Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2729744 C 2017/01/03

(11)(21) **2 729 744**

(12) BREVET CANADIEN / CANADIAN PATENT

(13) **C**

(86) **Date de dépôt PCT/PCT Filing Date:** 2009/06/30
(87) **Date publication PCT/PCT Publication Date:** 2010/01/07
(45) **Date de délivrance/Issue Date:** 2017/01/03
(85) **Entrée phase nationale/National Entry:** 2010/12/30
(86) **N° demande PCT/PCT Application No.:** US 2009/049243
(87) **N° publication PCT/PCT Publication No.:** 2010/002882
(30) **Priorités/Priorities:** 2008/06/30 (US61/076,859); 2009/05/07 (US61/176,426); 2009/06/10 (US61/185,837)

(51) **Cl.Int./Int.Cl.** ***G10K 11/18*** (2006.01), ***G10K 11/20*** (2006.01), ***G10K 11/28*** (2006.01), ***G10K 11/36*** (2006.01)

(72) **Inventeurs/Inventors:**
KNICKREHM, GLENN, US;
BASSUET, ALBAN, US;
ELLERINGTON, GEORGE, GB;
WOODGER, ANDREW NEILL, GB

(73) **Propriétaire/Owner:**
CONSTELLATION PRODUCTIONS, INC., US

(74) **Agent:** PIASETZKI NENNIGER KVAS LLP

(54) **Titre : PROCEDES ET SYSTEMES PERMETTANT D'AMELIORER LA CARACTERISATION D'ENVIRONNEMENTS ACOUSTIQUES**

(54) **Title: METHODS AND SYSTEMS FOR IMPROVED ACOUSTIC ENVIRONMENT CHARACTERIZATION**

(57) **Abrégé/Abstract:**
In embodiments of the present invention improved capabilities are described for determining a multi-dimensional sound signature for a location within a hypothetical space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the hypothetical space such that the similarity between the multi-dimensional sound signature for the location within the modified hypothetical space and the known multi-dimensional sound signature is increased.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 January 2010 (07.01.2010)

PCT

(10) International Publication Number
WO 2010/002882 A3

(51) International Patent Classification:
G10K 11/18 (2006.01) *G10K 11/28* (2006.01)
G10K 11/20 (2006.01) *G10K 11/36* (2006.01)

(21) International Application Number:
PCT/US2009/049243

(22) International Filing Date:
30 June 2009 (30.06.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

61/076,859	30 June 2008 (30.06.2008)	US
61/176,426	7 May 2009 (07.05.2009)	US
61/185,837	10 June 2009 (10.06.2009)	US

(71) Applicant *(for all designated States except US)*: **CONSTELLATION PRODUCTIONS, INC.** [US/US]; 161 First Street, Cambridge, MA 02142-1247 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **KNICKREHM, Glenn** [US/US]; Unit 712, 975 Memorial Drive, Cambridge, MA 02138 (US). **BASSUET, Alban** [FR/US]; 155 West 71st Street, Apt # 3 J, New York, NY 10023 (US). **ELLERINGTON, George** [GB/GB]; 33 Hocombe Wood Road, Chandlers Ford, Eastleigh, Hampshire SO53 5 PN (GB). **WOODGER, Andrew, Neill**; 15 Heber Road, London SE22 9 J2 (GB).

(74) Agent: **BALDAUF, Kent, E.**; The Webb Law Firm, 700 Koppers Building, 436 Seventh Avenue, Pittsburgh, PA 15219 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: METHODS AND SYSTEMS FOR IMPROVED ACOUSTIC ENVIRONMENT CHARACTERIZATION

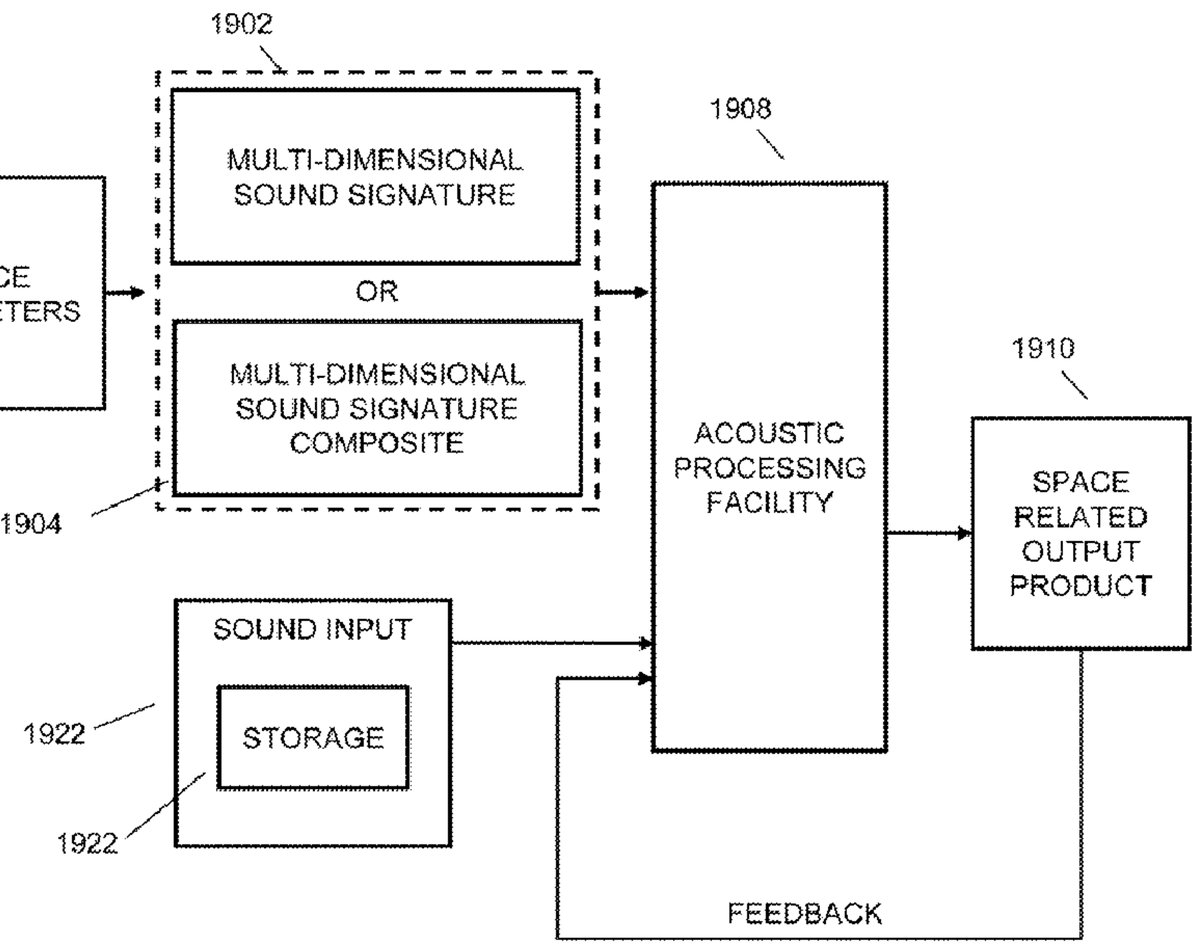


FIG. 19

(57) Abstract: In embodiments of the present invention improved capabilities are described for determining a multi-dimensional sound signature for a location within a hypothetical space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the hypothetical space such that the similarity between the multi-dimensional sound signature for the location within the modified hypothetical space and the known multi-dimensional sound signature is increased.

WO 2010/002882 A3

WO 2010/002882 A3

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:
8 April 2010

DEMANDES OU BREVETS VOLUMINEUX

LA PRÉSENTE PARTIE DE CETTE DEMANDE OU CE BREVETS COMPREND PLUS D'UN TOME.

CECI EST LE TOME __1___ DE __3 __

NOTE: Pour les tomes additionels, veillez contacter le Bureau Canadien des Brevets.

JUMBO APPLICATIONS / PATENTS

THIS SECTION OF THE APPLICATION / PATENT CONTAINS MORE THAN ONE VOLUME.

THIS IS VOLUME __1___ OF __3___

NOTE: For additional volumes please contact the Canadian Patent Office.

WO 2010/002882 PCT/US2009/049243

METHODS AND SYSTEMS FOR IMPROVED ACOUSTIC ENVIRONMENT CHARACTERIZATION

BACKGROUND

Field:

[0002] The invention described herein generally refers to acoustics, and more specifically to the production of improved acoustics in performance centers and electronically simulated performance experiences. Aspects of the invention also relate to stage machinery systems.

Description of the Related Art:

[0003] Designing performance centers and audio or audiovisual reproduction equipment is presently governed by the application of acoustic and physical measurements, parameters, and ratios. However, these methods have only been partially effective in creating a satisfactory subjective experience in many modern performance centers. This is because the parameters and measurements currently used do not distinguish certain significant features of a performance venue that contribute to effective performances and yield a satisfying audience experience. This has led to the creation of many modern concert halls that meet the accepted standards, but whose acoustics fail to produce highly satisfactory audience or performer experiences. Therefore there exists a need for improved methods used in the design, modification, and simulation of acoustic spaces.

[0004] Further, the design of performance centers also uses stage machinery, the complexity and expense of which has increased dramatically over time. Stage changes for live theatre often require substantial expensive equipment, as well as significant manpower, often requiring a team of people to engage in highly coordinated tasks, sometimes aided by machines, in order to effect a scene change. Such stage change systems are often beyond the reach of small theatres, both in cost and manpower. Even in larger, better financed performance venues, modern

techniques for providing scenery and scenery changes are often deployed in fly spaces above the stage, resulting in degraded acoustic characteristics. Therefore a need exists for improved methods for effecting rapid, complex scene changes, at lower cost and with less manpower. A need also exists to provide scenery and scenery changing methods that contribute to improved acoustics in performance centers.

SUMMARY

[0005] Methods and systems disclosed herein include improved methods and systems for design, modification, optimization, re-creation, simulation, and the like, of venues having highly desirable qualities for listeners, including concert halls and theatres, as well as smaller venues such as practice rooms.

[0006] Methods and systems disclosed herein include commercial applications including re-creation of acoustics environments in a rehearsal space, performance space, entertainment space, simulated space, hypothetical space, and the like; in a media content, during media use, and the like; in venue ticketing, venue sound sampling in venue ticketing, and the like; in software interfaces associated with the viewing, analyzing, modifying, modeled acoustic spaces; and the like.

[0007] Methods and systems disclosed herein include methods and systems for enabling rapid, automatic scene changes, optionally using electromechanical systems and optionally operating under computer control.

[0008] In embodiments, methods and systems for storing the multi-dimensional sound signature in accordance with an embodiment of the present invention may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within a space by measuring the multi-dimensional sound signature and storing the multi-dimensional sound signature using a storage medium. The measuring of the multi-dimensional sound signature may include initiating a sound at a first location in the space and measuring more than one dimension of the resulting sound at a second location in the space to form the multi-dimensional sound signature for such second location.

[0009] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of

multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0010] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0011] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like. In embodiments, the sound may be characterized by a single frequency.

[0012] In embodiments, the parameters of the initiated sound may be varied over time. In embodiments, the sound may be initiated using a speaker, a subwoofer, a speaker and a subwoofer, a tetrahedron speaker, a tetrahedron speaker and a subwoofer, a speaker system with at least as many sides as a tetrahedron, a speaker system with at least as many sides as a tetrahedron, as well as a subwoofer, a dodecahedral speaker, a dodecahedral speaker and a subwoofer, a microphone, a directional microphone, and the like.

[0013] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0014] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0015] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0016] In embodiments, methods and systems for storing the multi-dimensional sound signature in accordance with another embodiment of the present

invention may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within a space, and storing the multi-dimensional sound signature using a storage medium. The multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions, by measuring the multi-dimensional sound signature. The measuring of the multi-dimensional sound signature may include initiating a sound at a first location in the space and measuring more than one dimension of the resulting sound at a second location in the space to form the multi-dimensional sound signature for such second location.

[0017] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In

embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0018] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0019] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like. In embodiments, the sound may be characterized by a single frequency.

[0020] In embodiments, the parameters of the initiated sound may be varied over time. In embodiments, the sound may be initiated using a speaker, a subwoofer, a speaker and a subwoofer, a tetrahedron speaker, a tetrahedron speaker and a subwoofer, a speaker system with at least as many sides as a tetrahedron, a dodecahedral speaker, a dodecahedral speaker and a subwoofer, a microphone, a directional microphone, and the like.

[0021] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0022] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle

interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0023] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0024] In embodiments, methods and systems for storing the measurement to form a multi-dimensional sound signature may be provided. The methods and systems may include initiating a sound at a first location in a space, measuring more than one dimension of the resulting sound at a second location in the space, and storing the measurements in a storage medium to form a multi-dimensional sound signature for the second location in the space.

[0025] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference

between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0026] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0027] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like. In embodiments, the sound may be characterized by a single frequency.

[0028] In embodiments, the parameters of the initiated sound may be varied over time. In embodiments, the sound may be initiated using a speaker, a subwoofer, a speaker and a subwoofer, a tetrahedron speaker, a tetrahedron speaker and a subwoofer, a speaker system with at least as many sides as a tetrahedron, a speaker system with at least as many sides as a tetrahedron, as well as a subwoofer, a dodecahedral speaker, a dodecahedral speaker and a subwoofer, a microphone, a directional microphone, and the like.

[0029] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0030] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage.

A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0031] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0032] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature may be provided. The methods and systems may include initiating a sound at a first location in a space, measuring more than one dimension of the resulting sound at a second location in the space, and storing the measurements in a storage medium to form a multi-dimensional sound signature for the second location in the space. The multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0033] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound

vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0034] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0035] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like. In embodiments, the sound may be characterized by a single frequency.

[0036] In embodiments, the parameters of the initiated sound may be varied over time. In embodiments, the sound may be initiated using a speaker, a subwoofer, a speaker and a subwoofer, a tetrahedron speaker, a tetrahedron speaker

and a subwoofer, a speaker system with at least as many sides as a tetrahedron, a speaker system with at least as many sides as a tetrahedron, as well as a subwoofer, a dodecahedral speaker, a dodecahedral speaker and a subwoofer, a microphone, a directional microphone, and the like.

[0037] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0038] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0039] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0040] In embodiments, methods and systems for storing the multi-dimensional sound signatures for each of the plurality of locations in accordance with various embodiments of the present invention may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space by determining a multi-dimensional sound signature for each of a plurality of

locations in the space, and storing the multi-dimensional sound signatures for each of the plurality of locations using a storage medium to form the multi-dimensional sound signature composite for the space. Each multi-dimensional sound signature may be determined by initiating a sound at a constant location in the space and measuring more than one dimension of the resulting sound at each of the plurality of locations in the space.

[0041] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0042] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at

the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0043] In embodiments, the dimension may be a direction, intensity, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation; path length, amplitude, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0044] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[0045] In embodiments, the sound may be characterized by a single frequency.

[0046] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0047] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0048] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0049] In embodiments, methods and systems for storing the multi-dimensional sound signatures for each of the plurality of locations in accordance with various embodiments of the present invention may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space by determining a multi-dimensional sound signature for each of a plurality of locations in the space, and storing the multi-dimensional sound signatures for each of the plurality of locations using a storage medium to form the multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite

may define a preferential order for reception of sound from a plurality of incidence directions. Each multi-dimensional sound signature may be determined by initiating a sound at a constant location in the space and measuring more than one dimension of the resulting sound at each of the plurality of locations in the space.

[0050] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0051] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments,

more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0052] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0053] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[0054] In embodiments, the sound may be characterized by a single frequency.

[0055] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0056] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0057] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location. In embodiments, the space may be a great hall, a jewel box, and the like.

[0058] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a plurality of locations within the space in respect of sound initiated at a source location within the space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space.

[0059] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative

to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0060] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference

between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0061] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0062] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[0063] In embodiments, the sound may be characterized by a single frequency.

[0064] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0065] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ

church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0066] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0067] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a plurality of locations within the space in respect of sound initiated at a source location within the space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions.

[0068] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound

signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0069] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In

embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0070] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0071] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[0072] In embodiments, the sound may be characterized by a single frequency.

[0073] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[0074] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0075] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident

angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0076] In embodiments, methods and systems for storing the measurements for each other location to form a multi-dimensional sound signature composite for the space may be provided. The methods and systems may include initiating a sound at a first location in a space, measuring more than one dimension of the resulting sound at a plurality of other locations in the space, and storing the measurements for each other location in a storage medium to form a multi-dimensional sound signature composite for the space.

[0077] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence

directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0078] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0079] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound

pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0080] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[0081] In embodiments, the sound may be characterized by a single frequency.

[0082] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience. In embodiments, the space may be a great hall, a jewel box, and the like.

[0083] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0084] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0085] In embodiments, methods and systems for storing the measurements for each other location to form a multi-dimensional sound signature composite for the space may be provided. The methods and systems may include initiating a sound at a first location in a space, measuring more than one dimension of the resulting sound at a plurality of other locations in the space, and storing the measurements for each other location in a storage medium to form a multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the space may be a great hall, a jewel box, and the like.

[0086] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[0087] In embodiments, methods and systems for storing the multi-dimensional sound signatures in accordance with various embodiments of the present invention may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space by determining a plurality of multi-dimensional sound signatures for a location in the space, and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. Each multi-dimensional sound signature may be determined by initiating a sound at one of a plurality of other locations in the space and measuring more than one dimension of the resulting sound at the location in the space.

[0088] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a

preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0089] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for

each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[0090] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[0091] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[0092] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[0093] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience. In embodiments, the space may be a great hall, a jewel box, and the like.

[0094] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a

cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[0095] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[0096] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[0097] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space, and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions, by determining a plurality of multi-dimensional sound signatures for a location in the space. Each multi-dimensional sound signature may be determined by initiating a sound at one of a plurality of other locations in the space and measuring more than one dimension of the resulting sound at the location in the space.

[0098] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative

to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[0099] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference

between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00100] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00101] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00102] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00103] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience. In embodiments, the space may be a great hall, a jewel box, and the like.

[00104] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance

location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00105] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00106] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00107] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a location within the space in respect of sound initiated at a plurality of source locations within the space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space.

[00108] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite

may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00109] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound

signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00110] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00111] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00112] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00113] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience. In embodiments, the space may be a great hall, a jewel box, and the like.

[00114] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure

housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00115] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00116] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00117] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a location within the space in respect of sound initiated at a plurality of source locations within the space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space. The multi-dimensional sound signatures may define a preferential order for reception of sound from a plurality of incidence directions.

[00118] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative

to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00119] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following

reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00120] In embodiments, the dimension may be a direction, intensity, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00121] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00122] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00123] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience. In embodiments, the space may be a great hall, a jewel box, and the like.

[00124] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In

embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00125] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00126] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00127] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the space may be provided. The methods and systems may include measuring more than one dimension of the sound at a location in a space resulting from sound initiated at a plurality of other locations in the space, and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the space.

[00128] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional

sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00129] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In

embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00130] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00131] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00132] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00133] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience. In embodiments, the space may be a great hall, a jewel box, and the like.

[00134] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ

church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00135] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00136] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00137] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the space may be provided. The methods and systems may include measuring more than one dimension of the sound at a location in a space resulting from sound initiated at a plurality of other locations in the space and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions.

[00138] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite for a space may be created by determining a plurality of multi-dimensional sound signatures for a location in the space, and determining a multi-

dimensional sound signature for each of a plurality of locations in the space. Each multi-dimensional sound signature may be determined by initiating a sound at one of a plurality of other locations in the space and measuring more than one dimension of the resulting sound at the location in the space. Each multi-dimensional sound signature may be determined by initiating a sound at a constant location in the space and measuring more than one dimension of the resulting sound at each of the plurality of locations in the space.

[00139] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00140] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of

multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00141] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00142] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00143] In embodiments, the sound may be characterized by a single frequency.

[00144] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00145] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00146] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00147] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00148] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space and storing the

multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. The multi-dimensional sound signature composite may be created by determining a plurality of multi-dimensional sound signatures for a location in the space and determining a multi-dimensional sound signature for each of a plurality of locations in the space. Each multi-dimensional sound signature may be determined by initiating a sound at one of a plurality of other locations in the space and measuring more than one dimension of the resulting sound at the location in the space. Each multi-dimensional sound signature may be determined by initiating a sound at a constant location in the space and measuring more than one dimension of the resulting sound at each of the plurality of locations in the space.

[00149] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00150] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00151] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound

energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00152] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00153] In embodiments, the sound may be characterized by a single frequency.

[00154] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00155] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00156] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00157] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at

increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00158] In embodiments, methods and systems for storing multi-dimensional sound signatures for a location within the space in respect of sound initiated at a plurality of source locations within the space may be provided. The multi-dimensional sound signatures for the location may be stored in the multi-dimensional sound signature composite. In embodiments, methods and systems for storing multi-dimensional sound signatures for a plurality of locations within the space in respect of sound initiated at a source location within the space may be provided. The multi-dimensional sound signatures for the plurality of locations may be stored in the multi-dimensional sound signature composite.

[00159] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00160] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00161] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound

energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00162] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00163] In embodiments, the sound may be characterized by a single frequency.

[00164] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00165] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00166] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00167] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at

increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00168] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a location within the space in respect of sound initiated at a plurality of source locations within the space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, methods and system for storing the multi-dimensional sound signatures for a plurality of locations within the space in respect of sound initiated at a source location within the space may be provided.

[00169] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00170] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00171] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound

energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00172] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00173] In embodiments, the sound may be characterized by a single frequency.

[00174] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00175] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00176] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00177] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at

increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00178] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the space may be provided. The methods and systems may include measuring more than one dimension of the sound at a location in a space resulting from sound initiated at a plurality of other locations in the space, initiating a sound at a first location in a space and measuring more than one dimension of the resulting sound at a plurality of other locations in the space, and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the space.

[00179] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00180] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of

sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00181] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00182] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00183] In embodiments, the sound may be characterized by a single frequency.

[00184] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00185] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00186] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00187] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00188] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the space. The methods and systems may include measuring more than one dimension of the sound at a location in a space resulting from sound initiated at a plurality of other locations in the space, initiating a sound at a first location in a space and measuring more than one dimension of the resulting sound at a plurality of other locations in the space, and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions.

[00189] In embodiments, methods and systems for storing the multi-dimensional sound signature in accordance with various embodiments of the present invention may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within a hypothetical space by computing and storing the multi-dimensional sound signature in a storage medium. The computing of the multi-dimensional sound signature may include simulating the initiation of a sound at a first location in the space and measuring more than one dimension of the resulting sound at a second location in the hypothetical space. Such simulation may be performed using a computer processor.

[00190] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a

plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00191] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00192] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00193] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00194] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00195] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00196] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00197] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent

loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00198] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00199] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature may be provided. The methods and systems may include simulating the initiation of a sound at a first location in a hypothetical space, simulating the measurement of more than one dimension of the resulting sound at a second location in the hypothetical space, and storing the measurements in a storage medium to form a multi-dimensional sound signature for the second location in the hypothetical space. In embodiments, the simulation may be performed by a computer processor.

[00200] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a

plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00201] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00202] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00203] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00204] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00205] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00206] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00207] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent

loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00208] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00209] In embodiments, methods and systems for storing the multi-dimensional sound signatures for each of the plurality of locations to form the multi-dimensional sound signature composite may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a hypothetical space by determining a multi-dimensional sound signature for each of a plurality of locations in the hypothetical space and storing the multi-dimensional sound signatures for each of the plurality of locations using a storage medium to form the multi-dimensional sound signature composite for the hypothetical space. Each multi-dimensional sound signature may be determined by simulating the initiation of a sound at a constant location in the space and measuring more than one dimension of the resulting sound at each of the plurality of locations in the hypothetical space. Simulation may be performed using a computer processor.

[00210] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In

embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00211] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was

created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00212] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00213] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00214] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00215] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00216] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a

marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00217] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00218] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00219] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a plurality of locations within the space in respect of sound initiated at a source location within the space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a hypothetical space. The multi-dimensional sound signatures may be generated using a computer processor.

[00220] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In

embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00221] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In

embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00222] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00223] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00224] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00225] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00226] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00227] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00228] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00229] In embodiments, methods and systems for storing the measurements for each other location to form a multi-dimensional sound signature composite for the hypothetical space may be provided. The methods and systems may include simulating the initiation of a sound at a first location in a hypothetical space, simulating the measurement of more than one dimension of the resulting sound at a plurality of other locations in the hypothetical space, and storing the measurements for each other location in a storage medium to form a multi-dimensional sound signature composite for the hypothetical space. The simulation may be performed using a computer processor.

[00230] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound

signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00231] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a

preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00232] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00233] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00234] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00235] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00236] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a

marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00237] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00238] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00239] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the hypothetical space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a hypothetical space by determining a plurality of multi-dimensional sound signatures for a location in the hypothetical space and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the hypothetical space. Each multi-dimensional sound signature determined by simulating the initiation of a sound at one of a plurality of other locations in the hypothetical space and measuring of more than one dimension of the resulting sound at the location in the hypothetical space. The simulation may be performed using a computer processor.

[00240] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite

may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00241] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound

signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00242] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00243] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00244] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00245] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00246] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In

embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00247] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00248] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00249] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a location within the hypothetical space in respect of sound initiated at a plurality of source locations within the hypothetical space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a hypothetical space. The multi-dimensional sound signatures may be generated using a computer processor.

[00250] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional

sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00251] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In

embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00252] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00253] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00254] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00255] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00256] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, , a cathedral, an

amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00257] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00258] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00259] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the hypothetical space may be provided. The methods and systems may include measuring more than one dimension of the sound at a location in a hypothetical space resulting from sound initiated at a plurality of other locations in the hypothetical space and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the hypothetical space. The measurement and initiation may be simulated through the use of a computer processor.

[00260] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a

preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00261] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for

each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00262] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00263] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00264] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00265] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00266] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie

theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00267] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00268] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00269] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the space. The methods and systems may include creating a multi-dimensional sound signature composite for a hypothetical space and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. The creating a multi-dimensional sound signature composite may be created by determining a plurality of multi-dimensional sound signatures for a location in the hypothetical space and determining a multi-dimensional sound signature for each of a plurality of locations in the hypothetical space. Each multi-dimensional sound signature may be determined by initiating a sound at one of a plurality of other locations in the hypothetical space and measuring more than one dimension of the resulting sound at the location in the hypothetical space. Such measurement and initiation may be simulated through the use of a computer processor. Each multi-dimensional sound signature may be determined by initiating a sound at a constant location in the hypothetical space and measuring more than one dimension of the resulting sound at each of the plurality of locations in the hypothetical space. Such measurement and initiation may be simulated through the use of a computer processor.

[00270] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00271] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at

the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00272] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00273] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00274] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00275] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00276] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00277] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00278] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00279] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a location within the hypothetical space in respect of sound initiated at a plurality of source locations within the hypothetical space may be provided. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space. In embodiments, methods and systems for storing the multi-dimensional sound signatures for a plurality of locations

within the hypothetical space in respect of sound initiated at a source location within the hypothetical space may be provided.

[00280] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00281] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include

loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00282] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00283] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00284] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00285] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00286] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00287] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00288] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00289] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the hypothetical space may be provided. The methods and systems may include simulating the measurement of more than one dimension of the sound at a location in

a hypothetical space resulting from sound initiated at a plurality of other locations in the hypothetical space, simulating the initiation of a sound at a first location in a hypothetical space, simulating the measurement of more than one dimension of the resulting sound at a plurality of other locations in the hypothetical space, and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the hypothetical space. The stated simulation may be done using a computer processor.

[00290] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00291] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of

multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00292] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00293] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00294] In embodiments, the sound may be characterized by a single frequency. In embodiments, the sound may not be initiated but may be a sound

source inherent to the space. In embodiments, the sound may not be initiated but may be generated by at least one sound source inherent to the space. In embodiments, the sound may be initiated by at least one sound source inherent to the space.

[00295] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00296] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00297] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00298] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00299] In embodiments, methods and systems for storing the multi-dimensional sound signature in accordance with various embodiments of the present invention may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within a space by measuring the multi-dimensional sound signature and storing the multi-dimensional sound signature using a storage medium. The measurement of multi-dimensional sound signature and may include measuring more than one dimension of the sound at a location in the space resulting from the inherent ambient sound of the space to form for such location the multi-dimensional sound signature.

[00300] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00301] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions.

Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00302] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early decay time, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00303] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00304] In embodiments, the sound may be characterized by a single frequency.

[00305] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00306] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00307] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00308] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00309] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature for the location in the

space may be provided. The methods and systems may include preserving the inherent ambient sound of a space, measuring more than one dimension of the sound at a location in the space, and storing the measurements in a storage medium to form a multi-dimensional sound signature for the location in the space.

[00310] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00311] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments,

more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00312] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00313] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00314] In embodiments, the sound may be characterized by a single frequency.

[00315] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00316] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00317] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00318] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00319] In embodiments, methods and systems for storing the multi-dimensional sound signatures for each of the plurality of locations to form the multi-dimensional sound signature composite for the space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space by determining a multi-dimensional sound signature for each of a plurality of locations in the space and storing the multi-dimensional sound signatures for each of the plurality of locations using a storage medium to form the multi-dimensional sound

signature composite for the space. , Each multi-dimensional sound signature may be determined by measuring more than one dimension of the sound at each of the plurality of locations in the space resulting from the inherent ambient sound of the space.

[00320] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00321] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments,

more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00322] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00323] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00324] In embodiments, the sound may be characterized by a single frequency.

[00325] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00326] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00327] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00328] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00329] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a plurality of locations within the space in respect of the inherent ambient sound of the space may be provided. The methods and systems may include preserving the inherent ambient sound of a space, measuring more than one dimension of the resulting sound at a plurality of locations in the space, and storing the measurements for each location in a storage medium to form a multi-dimensional sound signature composite for the space.

[00330] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00331] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at

the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00332] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00333] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00334] In embodiments, the sound may be characterized by a single frequency.

[00335] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00336] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space

may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00337] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00338] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00339] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space by determining a plurality of multi-dimensional sound signatures for a location in the space and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. Each multi-dimensional sound signature may be determined measuring more than one dimension of the sound at the location in the space resulting from the inherent ambient sound of the space.

[00340] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional

sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00341] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling

directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00342] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00343] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00344] In embodiments, the sound may be characterized by a single frequency.

[00345] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00346] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure

housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00347] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00348] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00349] In embodiments, methods and systems for storing the multi-dimensional sound signatures for a location within the space in respect of the inherent ambient sound of the space. The multi-dimensional sound signatures may be stored in a multi-dimensional sound signature composite for a space.

[00350] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional

sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00351] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In

embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00352] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00353] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00354] In embodiments, the sound may be characterized by a single frequency.

[00355] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00356] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a

marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00357] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00358] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00359] In embodiments, methods and systems for storing the measurements to form a multi-dimensional sound signature composite for the space may be provided. The methods and systems may include measuring more than one dimension of the sound at a location in a space resulting from the inherent ambient sound of the space and storing the measurements in a storage medium to form a multi-dimensional sound signature composite for the space.

[00360] In embodiments, methods and systems for storing the multi-dimensional sound signatures to form the multi-dimensional sound signature composite for the space may be provided. The methods and systems may include creating a multi-dimensional sound signature composite for a space and storing the multi-dimensional sound signatures using a storage medium to form the multi-dimensional sound signature composite for the space. The multi-dimensional sound signature composite may be created by determining a plurality of multi-dimensional sound signatures for a location in the space and determining a multi-dimensional sound signature for each of a plurality of locations in the space. Each multi-dimensional sound signature may be determined by measuring more than one dimension of the sound at the location in the space resulting from the inherent ambient sound of the space. Each multi-dimensional sound signature may be determined by measuring more than one dimension of the sound at each of the

plurality of locations in the space resulting from the inherent ambient sound of the space.

[00361] In embodiments, the multi-dimensional sound signature composite may be a data record, a table, and the like. In embodiments, the multi-dimensional sound signature composite may be stored in a database. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define an amplitude range for each incidence direction. In embodiments, the multi-dimensional sound signatures in the multi-dimensional sound signature composite may define a preferential order for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from multiple incidence directions. In embodiments, the multi-dimensional sound signature composite may include information about the tonal distribution of sound reaching the multiple locations from a multiple incidence directions. The tonal distribution may include a high-frequency drop-off that may be greater than the masking effect of air.

[00362] In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness at a frequency from the direction. In embodiments, the multi-dimensional sound signature may consist of multiple sound vectors. Each sound vector may represent the incidence of sound at the second location from a direction defined by three spatial dimensions. Each sound vector may include the time lag and loudness from the direction. In embodiments, more than one dimension may include direction defined by three spatial dimensions, time lag and amplitude. In embodiments, more than one dimension may include

loudness amplitude and time-lag defined by three spatial dimensions. In embodiments, the dimension may be the difference in the timing of arrival of sound at the second location from different directions. In embodiments, the dimension may be the difference between the timing of arrival of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the dimension may be the difference in the amplitude of the sound arriving at the second location from different directions. In embodiments, the dimension may be the difference between the amplitude of reflected sound versus sound traveling directly from the first location to the second location. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to sound reaching each location without reflection. In embodiments, the multi-dimensional sound signature may associate a timing range for each incidence direction following reflection relative to a time in which the sound was created. In embodiments, the multi-dimensional sound signature may define a preferential timing for reception of sound from a plurality of incidence directions. In embodiments, the multi-dimensional sound signature may define a preferential order for reception of sound from a plurality of incidence directions.

[00363] In embodiments, the dimension may be a direction, intensity, amplitude, attenuation, frequency, frequency distribution, pitch, time, time lag, delay, loudness at a frequency, clarity, timbre, arrival time, azimuth, elevation, path length, reverberation time (RT), early decay time (EDT), early to late sound index, early lateral energy fraction (LF), total relative sound level (G), integrated energy, sound pressure, early to late arriving sound energy ratio, definition, early to total sound energy ratio, and the like. In embodiments, the dimension may be a direction defined by three spatial dimensions.

[00364] In embodiments, the sound may be audible, inaudible, a multi-frequency sound, and the like.

[00365] In embodiments, the sound may be characterized by a single frequency.

[00366] In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00367] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and

a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, an opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00368] In embodiments, the measured values may be represented by a vector diagram. The length of the vector in the vector diagram may represent loudness. The direction of the vector in the vector diagram may represent the incident angle of the incoming sound. The color of the vector in the vector diagram may represent time lag. In embodiments, the sound signature may be represented as time series of distinct sound waves representing initial arrival of reflected sound from different directions. In embodiments, a preferred multi-dimensional sound signature may be determined by defining acceptable timing and amplitude ranges for a series of sound waves arriving at a location.

[00369] In embodiments, the above stated methods may be repeated at 15 degree increments. In embodiments, the above stated methods may be repeated at increments of 15 degrees approximately. In embodiments, the angular separation granulation for vector representation may be 15 degrees.

[00370] In embodiments, methods and systems for combining multi-dimensional sound signature composites into a single multi-dimensional sound signature composite may be provided. The methods and systems may include creating a creating a multi-dimensional sound signature composite for a first space, creating a multi-dimensional sound signature composite for a second space, and combining multi-dimensional sound signature composites for a the first and second space into a single multi-dimensional sound signature composite. The range of values

for each dimension may include values of such dimensions derived from each of the first and second space.

[00371] In embodiments, the first space multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00372] In embodiments, the second space multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like. In embodiments, the first and second spaces may share similar acoustic properties and may be used for the performance of the same genre of music. In embodiments, the sounds initiated in the first and second spaces may be similar.

[00373] In embodiments, the range of values for each dimension may include the values for each of the first and second space. In embodiments, the acoustic properties represented by the single combined multi-dimensional sound signature composite may be superior to those of any of the individual spaces. In embodiments, for a given purpose, the acoustic properties represented by the single combined multi-dimensional sound signature composite may be superior to those of any of the individual spaces. In embodiments, the first and second spaces may share similar geometric properties.

[00374] In embodiments, methods and systems for combining multi-dimensional sound signature composites into a single multi-dimensional sound signature composite may be provided. The methods and systems may include creating multi-dimensional sound signature composites for a plurality of spaces and combining the multi-dimensional sound signature composites into a single multi-dimensional sound signature composite representing the range of values for each dimension included in the multi-dimensional sound signature composites for the plurality of spaces.

[00375] In embodiments, the first space multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00376] In embodiments, the second space multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like. In embodiments, the first and second spaces may share similar acoustic properties and may be used for the performance of the same genre of music. In embodiments, the sounds initiated in the first and second spaces may be similar.

[00377] In embodiments, the range of values for each dimension may include the values for each of the first and second space. In embodiments, the acoustic properties represented by the single combined multi-dimensional sound signature composite may be superior to those of any of the individual spaces. In embodiments, for a given purpose, the acoustic properties represented by the single combined multi-dimensional sound signature composite may be superior to those of any of the individual spaces. In embodiments, the first and second spaces may share similar geometric properties.

[00378] In embodiments, methods and systems for decomposing the multi-dimensional sound signature composites may be provided. The methods and systems may include creating a multi-dimensional sound signature composite containing multi-dimensional sound data corresponding to a plurality of locations and decomposing the multi-dimensional sound signature composite into two or more multi-dimensional sound signature sub-composites. Each sub-composite corresponding to at least one selected location in the plurality of locations.

[00379] In embodiments, the multi-dimensional sound signature composite may be a space; a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a

hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00380] In embodiments, each sub-composite may correspond to at least one selected location in the number of locations. In embodiments, the at least one selected location may correspond to a space, a physical space, a zone of a space, a region of a space, a range of seats in a space, a stage contained in a space, an auditorium contained in a space, and the like.

[00381] In embodiments, methods and systems for modifying the space may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within a space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the space such that the similarity between the multi-dimensional sound signature for the location within the modified space and the known multi-dimensional sound signature may be increased.

[00382] In embodiments, the similarity may be increased for one dimension of the multi-dimensional sound signature, at least one dimension of the multi-dimensional sound signature, and the like. In embodiments, the space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature. In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like.

[00383] In embodiments, the known multi-dimensional sound signature may be an actual multi-dimensional sound signature for a location in another space, an idealized multi-dimensional sound signature, and the like

[00384] In embodiments, the known multi-dimensional sound signature may result from manipulation of at least one other multi-dimensional sound signature. In embodiments, the known multi-dimensional sound signature may be for a location in a hypothetical space.

[00385] In embodiments, methods and systems for modifying the space may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the space such that the similarity between the multi-dimensional sound signature composite for the modified space and the known multi-dimensional sound signature may be increased.

[00386] In embodiments, the space may correspond to the Great Hall and the known multi-dimensional sound signature composite may correspond to the Great Hall multi-dimensional sound signature composite. In embodiments, the space may correspond to the Jewel Box and the known multi-dimensional sound signature composite may correspond to the Jewel Box multi-dimensional sound signature composite. In embodiments, the similarity may be increased for one dimension of the multi-dimensional sound signature composite. In embodiments, the similarity may be increased for one or more dimensions of the multi-dimensional sound signature composite. In embodiments, the similarity may be increased for one location in the space. In embodiments, the similarity may be increased for at least one location in the space. In embodiments, the space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature. In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a

stage, removing scenery located on a stage, moving scenery located on a stage, and the like.

[00387] In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00388] In embodiments, methods and systems for modifying the hypothetical space may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within a hypothetical space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the hypothetical space such that the similarity between the multi-dimensional sound signature for the location within the

modified hypothetical space and the known multi-dimensional sound signature is increased.

[00389] In embodiments, the similarity may be increased for one dimension of the multi-dimensional sound signature. In embodiments, the similarity may be increased for at least one dimension of the multi-dimensional sound signature. In embodiments, the modification may include altering the design of the hypothetical space. In embodiments, the hypothetical space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature. In embodiments, the hypothetical space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like.

[00390] In embodiments, the known multi-dimensional sound signature may be an actual multi-dimensional sound signature for a location in another space. In embodiments, the known multi-dimensional sound signature may result from manipulation of at least one other multi-dimensional sound signature. In embodiments, the known multi-dimensional sound signature may be an idealized multi-dimensional sound signature. In embodiments, the known multi-dimensional sound signature may be a multi-dimensional sound signature for a location in a hypothetical space.

[00391] In embodiments, methods and systems for modifying the hypothetical space may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a hypothetical space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the hypothetical space such that the similarity between the multi-dimensional sound signature composite for the

modified hypothetical space and the known multi-dimensional sound signature is increased.

[00392] In embodiments, the similarity may be increased for one dimension of the multi-dimensional sound signature composite. In embodiments, the similarity may be increased for at least one dimension of the multi-dimensional sound signature composite. In embodiments, the similarity may be increased for one location in the hypothetical space. In embodiments, the similarity may be increased for at least one location in the hypothetical space. In embodiments, the modification may include altering the design of the hypothetical space. In embodiments, the hypothetical space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature. In embodiments, the hypothetical space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like.

[00393] In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional

sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00394] In embodiments, methods and systems for modifying the space to increase the number of locations within the space may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the space to increase the number of locations within the space that fall within the known multi-dimensional sound signature composite.

[00395] In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for a dimension. In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for more than one dimension. In embodiments, the space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by moving fixtures designed to create reflections of sound within a defined

range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature.

[00396] In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like. In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00397] In embodiments, methods and systems for modifying the space to increase the number of locations within the space may be provided. The methods and

systems may include determining a multi-dimensional sound signature composite for a space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the space such that the number of locations within the space that fall within the known multi-dimensional sound signature composite may be maximized.

[00398] In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for a dimension. In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for more than one dimension. In embodiments, the space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature.

[00399] In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like. In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature

composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00400] In embodiments, methods and systems for modifying the space may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, computing the quotient of the number of locations within the space that fall within the known multi-dimensional sound signature composite divided by the number of locations common to both the space and the known multi-dimensional sound signature composite, and modifying the space such that the quotient may be increased.

[00401] In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for a dimension. In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for more than one dimension. In embodiments, the space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the space may be modified by moving fixtures designed to create reflections of sound within a defined

range of time, amplitude and direction. In embodiments, the range may be defined based on a preferred, multi-dimensional sound signature.

[00402] In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like. In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00403] In embodiments, methods and systems for modifying the hypothetical space may be provided. The methods and systems may include

determining a multi-dimensional sound signature composite for a hypothetical space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the hypothetical space to increase the number of locations within the hypothetical space that fall within the known multi-dimensional sound signature composite.

[00404] In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for a dimension. In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for more than one dimension. In embodiments, the modification may include altering the design of the hypothetical space. In embodiments, the hypothetical space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction.

[00405] In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like. In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite results from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature

composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00406] In embodiments, methods and systems for modifying the hypothetical space may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a hypothetical space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the hypothetical space such that the number of locations within the hypothetical space that fall within the known multi-dimensional sound signature composite may be maximized.

[00407] In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for a dimension. In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for more than one dimension. In embodiments, the modification may include altering the design of the hypothetical space. In embodiments, the hypothetical space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by

moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction.

[00408] In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like. In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite results from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00409] In embodiments, methods and systems for modifying the hypothetical space may be provided. The methods and space may include

determining a multi-dimensional sound signature composite for a hypothetical space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, computing the quotient of the number of locations within the hypothetical space that fall within the known multi-dimensional sound signature composite divided by the number of locations common to both the hypothetical space and the known multi-dimensional sound signature composite, and modifying the hypothetical space such that the quotient may be increased.

[00410] In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for a dimension. In embodiments, the number of locations falling within the known multi-dimensional sound signature may be increased for more than one dimension. In embodiments, the modification may include altering the design of the hypothetical space. In embodiments, the hypothetical space may be modified by the construction of fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by adding fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by removing fixtures designed to create reflections of sound within a defined range of time, amplitude and direction. In embodiments, the hypothetical space may be modified by moving fixtures designed to create reflections of sound within a defined range of time, amplitude and direction.

[00411] In embodiments, the space may be modified by adding fabric, removing fabric, moving fabric, adding concrete, removing concrete, moving concrete, adding wood, removing wood, moving wood, adding scenery located on a stage, removing scenery located on a stage, moving scenery located on a stage, and the like. In embodiments, the known multi-dimensional sound signature composite may be an actual multi-dimensional sound signature composite for another space. In embodiments, the known multi-dimensional sound signature composite results from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the determined multi-dimensional sound signature composite may be a single source multi-dimensional

sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the determined multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00412] In embodiments, methods and systems for re-creating a known acoustic environment in a rehearsal space may be provided. The methods and systems may include determining the acoustic characteristics of the known environment, storing a multi-dimensional sound signature, determining the acoustic environment of the rehearsal space, comparing the determined acoustic environment of the rehearsal space with the stored multi-dimensional sound signature of the known space, and modifying the sound characteristics of the rehearsal space such as to reduce the differences between the acoustic environment of the rehearsal space and the multi-dimensional sound signature of the known space when a sound may be produced in the rehearsal space. The multi-dimensional sound signature may include a combination of a plurality of different sound dimensions selected from the group consisting of timing, direction, amplitude and frequency of sound reflections of the known acoustic environment.

[00413] In embodiments, the determination of the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature. In embodiments, determining of the acoustic environment of the

rehearsal space may include the creation of a multi-dimensional sound signature for the rehearsal space. In embodiments, the above stated comparing may include the comparison of the multi-dimensional sound signature of the rehearsal space with the multi-dimensional sound signature of the known space.

[00414] In embodiments, modifying the sound characteristics may include modifying a reflective characteristic of the rehearsal space. In embodiments, modifying the sound characteristics may include modifying an absorption characteristic of the rehearsal space. In embodiments, modifying the sound characteristics may include adjusting a sound system of the rehearsal space.

[00415] In embodiments, adjusting a sound system may include adjusting at least one of timing, location, direction and volume of at least one speaker in the space. In embodiments, adjusting a sound system may include adjusting a parameter of a sound mixing system. In embodiments, the parameter may include adjusting at least one of the timing, frequency, and volume of sound that will be played by at least one speaker. In embodiments, modifying the sound characteristics may include modifying at least one reflection to mimic at least one of a secondary and a tertiary reflection in the space. In embodiments, the sound dimensions of the sound signature composite may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment. In embodiments, reflections may include primary and secondary reflections from similar directions. In embodiments, reflections may include primary, secondary and tertiary reflections from similar directions. In embodiments, the determination of the acoustic environment of the rehearsal space may include the creation of a multi-dimensional sound signature for the rehearsal space. In embodiments, the above stated comparing may include the comparison of the multi-dimensional sound signature of the rehearsal space with the multi-dimensional sound signature of the known space.

[00416] In embodiments, the plurality of locations may be a plurality of sound initiation locations, a plurality of sound measurement locations, and the like. In embodiments, the plurality of locations may be a plurality of sound initiation locations and a plurality of sound measurement locations.

[00417] In embodiments, the space may be a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a virtual reality environment, a simulation environment, a computer gaming environment, a sound recording studio, and the like. In embodiments, the sound recording studio may include a sound mixing

facility and a sound recording facility. In embodiments, the at least one speaker may be headphones, a surround sound system, a subwoofer, an array of speakers arranged to produce multi-dimensional sound in the space, a monitor, a monitor located on a stage.

[00418] In embodiments, the at least one microphone may include a direct input. In embodiments, the at least one microphone may include a direct input from a musical instrument. In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may be of live sound originating in the space. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated at the location. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00419] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor. In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility. In embodiments, the sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00420] In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the reproduction may create the effect at each

location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite and the listener may generate, at least in part, the sound contemporaneously originating in the space.

[00421] In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. The listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated in the space of the space of the known multi-dimensional sound signature composite.

[00422] In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature composite. The listener may generates, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00423] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor.

[00424] In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility, and the like. The sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00425] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, a location in the audience area of a space, a location in the stage area of a space, and the like.

[00426] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional

sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00427] In embodiments, methods and systems for handling sound in a space equipped with a microphone and at least one speaker adapted to play sound from the microphone may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within the space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the sound emitted by the speaker such that the similarity between the multi-dimensional sound signature for the location within the space and the known multi-dimensional sound signature may be increased.

[00428] In embodiments, the space may be a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a virtual reality environment, a simulation environment, a computer gaming environment, a sound recording studio, and the like. In embodiments, the sound recording studio may include a sound mixing facility and a sound recording facility. In embodiments, the at least one speaker may be headphones, a surround sound system, a subwoofer, an array of speakers arranged to produce multi-dimensional sound in the space, a monitor, a monitor located on a stage.

[00429] In embodiments, the at least one microphone may include a direct input. In embodiments, the at least one microphone may include a direct input from a musical instrument. In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may be of live sound originating in the space. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space. In embodiments, the reproduction may create the effect that

a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated at the location. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00430] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor. In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility. In embodiments, the sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00431] In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite and the listener may generate, at least in part, the sound contemporaneously originating in the space.

[00432] In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. The listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated in the space of the space of the known multi-dimensional sound signature composite.

[00433] In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature composite. The listener may generates, at least in part, the sound contemporaneously

originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00434] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor.

[00435] In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility, and the like. The sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00436] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, a location in the audience area of a space, a location in the stage area of a space, and the like.

[00437] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00438] In embodiments, methods and system for handling sound in a space equipped with a microphone and at least one speaker may be provided. The methods and systems may include reproducing sound contemporaneously originating in the space, using at least in part the microphone and the at least one speaker, in accordance with a known multi-sound signature for a location. Such reproduction may apply the

known multi-dimensional sound signature to the reproduced sound. In embodiments, applying the known multi-dimensional sound signature may include adjusting at least one of the timing and volume of sound emitted by a speaker at a specified location within the space. In embodiments, timing of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to timing of rear and side reflections specified in the multi-dimensional sound signature. In embodiments, the timing of sounds emitted from speakers placed at side locations may be adjusted to mimic primary and secondary side reflections specified in the multi-dimensional sound signature. In embodiments, the volume of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to amplitude of rear and side reflections specified in the multi-dimensional sound signature.

[00439] In embodiments, the space may be a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a virtual reality environment, a simulation environment, a computer gaming environment, a sound recording studio, and the like. In embodiments, the sound recording studio may include a sound mixing facility and a sound recording facility. In embodiments, the at least one speaker may be headphones, a surround sound system, a subwoofer, an array of speakers arranged to produce multi-dimensional sound in the space, a monitor, a monitor located on a stage.

[00440] In embodiments, the at least one microphone may include a direct input. In embodiments, the at least one microphone may include a direct input from a musical instrument. In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may be of live sound originating in the space. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated at the location. In

embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00441] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor. In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility. In embodiments, the sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00442] In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite and the listener may generate, at least in part, the sound contemporaneously originating in the space.

[00443] In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. The listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated in the space of the space of the known multi-dimensional sound signature composite.

[00444] In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature composite. The listener may generates, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00445] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor.

[00446] In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility, and the like. The sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00447] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, a location in the audience area of a space, a location in the stage area of a space, and the like.

[00448] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00449] In embodiments, methods and systems for re-creating a known acoustic environment in a rehearsal space may be provided. The methods and systems may include determining the acoustic characteristics of the known environment, storing a multi-dimensional sound signature composite, determining the acoustic environment of the rehearsal space, comparing the determined acoustic environment of the rehearsal space with the stored multi-dimensional sound signature composite of the known space and modifying the sound characteristics of the rehearsal space such as to reduce the differences between the acoustic environment of

the rehearsal space and the multi-dimensional sound signature composite of the known space when a sound may be produced in the rehearsal space.

[00450] In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature. In embodiments, determining may result in a multi-dimensional sound profile across a plurality of locations of the known acoustic environment. In embodiments, the multi-dimensional sound signature composite may include a combination of a plurality of different sound dimensions selected from the group consisting of timing, direction, amplitude and frequency of sound reflections of the known acoustic environment. In embodiments, the sound dimensions of the sound signature composite may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment. In embodiments, the reflections may include primary and secondary reflections from similar directions. In embodiments, the reflections may include primary, secondary and tertiary reflections from similar directions.

[00451] In embodiments, determining the acoustic environment of the rehearsal space may include the creation of a multi-dimensional sound signature for the rehearsal space. In embodiments, the stated comparing includes the comparison of the multi-dimensional sound signature of the rehearsal space with the multi-dimensional sound signature of the known space. In embodiments, the plurality of locations may be a plurality of sound initiation locations. In embodiments, the plurality of locations may be a plurality of sound measurement locations. In embodiments, the plurality of locations may be a plurality of sound initiation locations and a plurality of sound measurement locations.

[00452] In embodiments, the space may be a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a virtual reality environment, a simulation environment, a computer gaming environment, a sound recording studio, and the like. In embodiments, the sound recording studio may include a sound mixing facility and a sound recording facility. In embodiments, the at least one speaker may be headphones, a surround sound system, a subwoofer, an array of speakers arranged to produce multi-dimensional sound in the space, a monitor, a monitor located on a stage.

[00453] In embodiments, the at least one microphone may include a direct input. In embodiments, the at least one microphone may include a direct input from a musical instrument. In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may be of live sound originating in the space. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated at the location. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00454] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor. In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility. In embodiments, the sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00455] In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite and the listener may generate, at least in part, the sound contemporaneously originating in the space.

[00456] In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. The listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated in the space of the space of the known multi-dimensional sound signature composite.

[00457] In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature composite. The listener may generates, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00458] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor.

[00459] In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility, and the like. The sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00460] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, a location in the audience area of a space, a location in the stage area of a space, and the like.

[00461] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite

may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00462] In embodiments, methods and systems for handling sound in a space equipped with a microphone and at least one speaker adapted to play sound from the microphone may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for the space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the sound emitted by the speaker such that the similarity between the multi-dimensional sound signature composite for the space and the known multi-dimensional sound signature composite may be increased.

[00463] In embodiments, the space may be a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a virtual reality environment, a simulation environment, a computer gaming environment, a sound recording studio, and the like. In embodiments, the sound recording studio may include a sound mixing facility and a sound recording facility. In embodiments, the at least one speaker may be headphones, a surround sound system, a subwoofer, an array of speakers arranged to produce multi-dimensional sound in the space, a monitor, a monitor located on a stage.

[00464] In embodiments, the at least one microphone may include a direct input. In embodiments, the at least one microphone may include a direct input from a musical instrument. In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may be of live sound originating in the space. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may

be substantially as it would sound had the sound been generated at the location. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00465] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor. In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility. In embodiments, the sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00466] In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite and the listener may generate, at least in part, the sound contemporaneously originating in the space.

[00467] In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. The listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated in the space of the space of the known multi-dimensional sound signature composite.

[00468] In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature composite. The listener may generates, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00469] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor.

[00470] In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility, and the like. The sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00471] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, a location in the audience area of a space, a location in the stage area of a space, and the like.

[00472] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00473] In embodiments, methods and systems for handling sound in a space equipped with a microphone and at least one speaker may be provided. The methods and systems may include reproducing sound contemporaneously originating in the space using at least in part the microphone and the at least one speaker, in accordance with a known multi-dimensional sound signature composite. In embodiments, such reproduction may apply the known multi-dimensional sound signature composite to the reproduced sound. In embodiments, applying the known multi-dimensional sound signature may include adjusting at least one of the timing and volume of sound emitted by a speaker at a specified location within the space. In

embodiments, timing of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to timing of rear and side reflections specified in the multi-dimensional sound signature. In embodiments, timing of sounds emitted from speakers placed at side locations may be adjusted to mimic primary and secondary side reflections specified in the multi-dimensional sound signature. In embodiments, the volume of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to amplitude of rear and side reflections specified in the multi-dimensional sound signature.

[00474] In embodiments, the space may be a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a virtual reality environment, a simulation environment, a computer gaming environment, a sound recording studio, and the like. In embodiments, the sound recording studio may include a sound mixing facility and a sound recording facility. In embodiments, the at least one speaker may be headphones, a surround sound system, a subwoofer, an array of speakers arranged to produce multi-dimensional sound in the space, a monitor, a monitor located on a stage.

[00475] In embodiments, the at least one microphone may include a direct input. In embodiments, the at least one microphone may include a direct input from a musical instrument. In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may be of live sound originating in the space. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature. In embodiments, the reproduction may create the effect that a listener may be at a location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated at the location. In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature and the listener may generate, at least in part, the sound contemporaneously originating in the space, such

that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00476] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor. In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility. In embodiments, the sound processing facility may include a plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00477] In embodiments, the reproduction may be in real-time. In embodiments, the reproduction may be substantially in real-time. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite and the listener may generate, at least in part, the sound contemporaneously originating in the space.

[00478] In embodiments, the reproduction may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. The listener may generate, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be substantially as it would sound had the sound been generated in the space of the space of the known multi-dimensional sound signature composite.

[00479] In embodiments, the reproduction may create the effect that a listener may be at the location of the known multi-dimensional sound signature composite. The listener may generates, at least in part, the sound contemporaneously originating in the space, such that the reproduced version of the sound generated by the listener may be more similar to sound generated at the location.

[00480] In embodiments, the application of the known multi-dimensional sound signature may be performed with a computer processor.

[00481] In embodiments, the modification may be performed with a computer processor, a sound mixing facility, a sound recording and playback facility, a sound processing facility, and the like. The sound processing facility may include a

plurality of channels configured to adjust timing of sounds played from specified locations in the space.

[00482] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, a location in the audience area of a space, a location in the stage area of a space, and the like.

[00483] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00484] In embodiments, methods and systems for assisting a live performance in a performance space may be provided. The methods and systems may include determining a multi-dimensional sound signature for an audience location in the performance space, taking sound from the live performance, modifying the sound from the live performance to increase conformance to at least one dimension of the multi-dimensional sound signature determined at the audience location, and feeding the modified sound to at least one performer to facilitate adjustment of the live performance based on the sound experienced by an audience member.

[00485] In embodiments, methods and systems for re-creating a known acoustic environment in a performance space may be performed. The methods and systems may include determining the acoustic characteristics of the known environment, including determining a multi-dimensional sound profile, storing the

multiple dimensions of the multi-dimensional sound profile as a multi-dimensional sound signature, determining the acoustic environment of a performance space, comparing the acoustic environment of the performance space with the stored multi-dimensional sound signature of the known space, and modifying the sound characteristics of the performance space such as to reduce the differences as determined in the comparison between the acoustic environment of the performance space and the multi-dimensional sound signature of the known space when a sound may be produced through the sound system of the performance space. In embodiments, the multi-dimensional sound signature may include a combination of a plurality of different sound parameters associated with sound reflections of the known acoustic environment.

[00486] In embodiments, the multiple dimensions of the sound signature may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment. In embodiments, the reflections may include primary and secondary reflections from similar directions.

[00487] In embodiments, the reflections may include primary, secondary and tertiary reflections from similar directions. In embodiments, the determining of the acoustic environment of the performance space may include the creation of a multi-dimensional sound signature for the performance space. In embodiments, the stated comparing may include the comparison of the multi-dimensional sound signature of the rehearsal space with the multi-dimensional sound signature of the known space. In embodiments, modifying the sound characteristics may include modifying a reflective characteristic of the rehearsal space. In embodiments, modifying the sound characteristics may include modifying an absorption characteristic of the rehearsal space. In embodiments, modifying the sound characteristics may include adjusting a sound system of the rehearsal space. In embodiments, adjusting a sound system may include adjusting at least one of timing, location, direction and volume of at least one speaker in the space. In embodiments, adjusting a sound system may include adjusting a parameter of a sound mixing system. In embodiments, the parameter may include adjusting at least one of the timing, frequency, and volume of sound that will be played by at least one speaker. In embodiments, modifying the sound characteristics may include modifying at least one reflection to mimic at least one of a secondary and a tertiary reflection in the space.

In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00488] In embodiments, the first location may be that of a performer. In embodiments, the first location may be on a stage located in the space. In embodiments, the second location may be that of an audience member. In embodiments, the second location may be in an auditorium of the space. In embodiments, the modification may be performed with a computer processor.

[00489] In embodiments, the space may be a performance space. In embodiments, the space may include a stage, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00490] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, a opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00491] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage. In embodiments, at least one speaker may be a headphone speaker. In embodiments, the at least one speaker may be a part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer.

[00492] In embodiments, the at least one speaker may be part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00493] In embodiments, the at least one microphone may include a direct input such as for a musical instrument.

[00494] In embodiments, methods and system of handling sound in a space equipped with a microphone and at least one speaker adapted to play sound from the microphone may be provided. The methods and systems may include determining the multi-dimensional sound signature for the first location within the space, determining the multi-dimensional sound signature for a second location within the space, comparing the multi-dimensional sound signature for the first and second locations, and modifying the sound emitted by the speaker such that the multi-dimensional sound signature for the first location may be modified to increase its similarity with the multi-dimensional sound signature for the second location.

[00495] In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00496] In embodiments, the first location may be that of a performer. In embodiments, the first location may be on a stage located in the space. In embodiments, the second location may be that of an audience member. In embodiments, the second location may be in an auditorium of the space. In embodiments, the modification may be performed with a computer processor.

[00497] In embodiments, the space may be a performance space. In embodiments, the space may include a stage, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00498] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance

location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, a opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00499] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage. In embodiments, at least one speaker may be a headphone speaker. In embodiments, the at least one speaker may be a part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer.

[00500] In embodiments, the at least one speaker may be part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00501] In embodiments, the at least one microphone may include a direct input such as for a musical instrument.

[00502] In embodiments, methods and systems for re-creating a known acoustic environment in a performance space may be provided. The methods and systems may include determining the acoustic environment of the known space, storing the measurements as a multi-dimensional sound signature composite, measuring the acoustic environment of the performance space, comparing the measured acoustic environment of the performance space with the stored multi-dimensional sound signature composite of the known space, and modifying the sound characteristics of at least one sound system component of the performance space such as to minimize the differences as determined in the comparison between the acoustic environment of the performance space and the multi-dimensional sound signature composite of the known space when a sound may be produced through the sound system of the performance space. The multi-dimensional sound signature may include a combination of a plurality of different sound parameters associated with sound reflections of the known acoustic environment. The multi-dimensional sound signature composite may include a combination of a plurality of different measured sound dimensions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments,

determining the acoustic environment may include specifying a multi-dimensional sound signature. In embodiments, determining of the acoustic environment of the performance space may include the creation of a multi-dimensional sound signature for the performance space. In embodiments, the stated comparing may include the comparison of the multi-dimensional sound signature of the performance space with the multi-dimensional sound signature of the known space.

[00503] In embodiments, the plurality of locations may be a plurality of sound initiation locations, a plurality of sound measurement locations, and the like. In embodiments, the plurality of locations may be a plurality of sound initiation locations and a plurality of sound measurement locations.

[00504] In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00505] In embodiments, the first location may be that of a performer. In embodiments, the first location may be on a stage located in the space. In embodiments, the second location may be that of an audience member. In embodiments, the second location may be in an auditorium of the space. In embodiments, the modification may be performed with a computer processor.

[00506] In embodiments, the space may be a performance space. In embodiments, the space may include a stage, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00507] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In

embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, a opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00508] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, and the like. In embodiments, at least one speaker may be a headphone speaker. In embodiments, the at least one speaker may be a part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer.

[00509] In embodiments, the at least one speaker may be part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00510] In embodiments, the at least one microphone may include a direct input such as for a musical instrument.

[00511] In embodiments, methods and systems for handling sound in a space equipped with a microphone and at least one speaker adapted to play sound from the microphone may be provided. The methods and system may include determining a multi-dimensional sound signature composite for the space, selecting a second location in the space, and modifying the sound emitted by the speaker such that the sound heard at the first location may be changed to increase its similarity with the sound heard at the second location with the use of the multi-dimensional sound signature composite.

[00512] In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00513] In embodiments, the first location may be that of a performer. In embodiments, the first location may be on a stage located in the space. In embodiments, the second location may be that of an audience member. In embodiments, the second location may be in an auditorium of the space. In embodiments, the modification may be performed with a computer processor.

[00514] In embodiments, the space may be a performance space. In embodiments, the space may include a stage, a substantially anechoic room, an

anechoic room, a practice room, a rehearsal location, a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the space may be occupied or unoccupied. In embodiments, the space may be occupied by an audience. In embodiments, the space may be occupied by material approximating an audience.

[00515] In embodiments, the space may include both a stage and an auditorium. In embodiments, the space may include both a performance location and a performance observation location. In embodiments, the space may include a stage. A first and second location may be located on the stage. In embodiments, the space may include only a stage. In embodiments, the space may include only a performance location. In embodiments, the space may be less than all the volume of the structure housing the space. In embodiments, the space may be a subset of the structure housing the space. In embodiments, the space may be a Great Hall. In embodiments, the space may be an ante room, a choir box, a ball court, an organ church, a Bach organ church, a basilica, a baroque opera house, a opera house, a cathedral, an amphitheater, a conference room, an office, a gymnasium, a movie theater, a vehicle interior, an automobile interior, an aircraft interior, a train interior, a marine interior, a public space, an airport, a train station, a subway station, a hospital, and the like.

[00516] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage. In embodiments, at least one speaker may be a headphone speaker. In embodiments, the at least one speaker may be a part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer

[00517] In embodiments, the at least one speaker may be part of an array of speakers arranged to produce multi-dimensional sound in the space. In embodiments, the at least one microphone may include a direct input such as for a musical instrument.

[00518] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic environment of a first space, including obtaining a multi-dimensional sound profile, storing the multiple dimensions of the multi-dimensional sound profile as a multi-dimensional sound signature, determining the acoustic environment of a second space, comparing the determined acoustic environment of the second space

with the stored multi-dimensional sound signature of the first space, and modifying the sound characteristics of the second space such as to reduce the differences as determined in the comparison between the acoustic environment of the second space and the multi-dimensional sound signature of the first space. The multi-dimensional sound signature may include a combination of a plurality of different sound parameters. In embodiments, the multiple dimensions of the sound signature may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment. In embodiments, the reflections may include primary and secondary reflections from similar directions. In embodiments, the reflections may include primary, secondary and tertiary reflections from similar directions.

[00519] In embodiments, modifying the sound characteristics may include modifying a reflective characteristic of the rehearsal space. In embodiments, modifying the sound characteristics may include modifying an absorption characteristic of the rehearsal space. In embodiments, modifying the sound characteristics may include adjusting a sound system of the rehearsal space. In embodiments, adjusting a sound system may include adjusting at least one of timing, location, direction and volume of at least one speaker in the space. In embodiments, adjusting a sound system may include adjusting a parameter of a sound mixing system. In embodiments, the parameter may include adjusting at least one of the timing, frequency, and volume of sound that will be played by at least one speaker.

[00520] In embodiments, modifying the sound characteristics may include modifying at least one reflection to mimic at least one of a secondary and a tertiary reflection in the space. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature. In embodiments, measuring of the acoustic environment of the second space may include the creation of a multi-dimensional sound signature for the second space. In embodiments, the stated comparing may include the comparison of the multi-dimensional sound signature of the second space with the multi-dimensional sound signature of the first space. In embodiments, the first space may be a known space, a hypothetical space, and the like. In embodiments, the sound system component may include a speaker system, a headphone, and the like.

[00521] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like.

[00522] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, and the like. In embodiments, the at least one speaker may be part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00523] In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00524] In embodiments, the one or more speakers may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, the one or more speakers may include a subwoofer.

[00525] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature selected by the listener. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00526] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor. In

embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like.

[00527] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of one or more other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00528] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, audience area of a space, a location in the stage area of a space, and the like.

[00529] In embodiments, methods and systems for handling sound in a space equipped with at least one speaker may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within the space, comparing the multi-dimensional sound signature to a known multi-dimensional sound signature, and modifying the sound emitted by the speaker such that the similarity between the multi-dimensional sound signature for the location within the space and the known multi-dimensional sound signature may be increased.

[00530] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic environment of a first space, storing the multiple dimensions of the multi-dimensional sound measurement as a multi-dimensional sound signature composite, determining the acoustic environment of a second space, comparing the determined acoustic environment of the second space with the stored multi-dimensional sound signature composite of the first space, and modifying the sound characteristics of at least one sound system component of the second space such as to minimize the

differences as determined in the comparison between the acoustic environment of the second space and the multi-dimensional sound signature composite of the first space when a sound may be produced through the sound system component of the second space. The stated determining may result in a multi-dimensional sound profile across a plurality of locations of the known acoustic environment. The multi-dimensional sound signature composite may include a combination of a plurality of different measured sound dimensions.

[00531] In embodiments, measuring of the acoustic environment of the second space may include the creation of a multi-dimensional sound signature composite for the second space. In embodiments, the stated comparing may include the comparison of the multi-dimensional sound signature composite of the second space with the multi-dimensional sound signature composite of the first space. In embodiments, the first space may be a known space, a hypothetical space, and the like. In embodiments, the sound system component may include a speaker system. In embodiments, the sound system component may include a headphone. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00532] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like.

[00533] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, and the like. In embodiments, the at least one speaker may be part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00534] In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00535] In embodiments, the one or more speakers may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional

sound in the space, and the like. In embodiments, the one or more speakers may include a subwoofer.

[00536] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature selected by the listener. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00537] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor. In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like.

[00538] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of one or more other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00539] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, audience area of a space, a location in the stage area of a space, and the like.

[00540] In embodiments, methods and systems for handling sound in a space equipped with at least one speaker may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for the space, comparing the multi-dimensional sound signature composite to a known multi-dimensional sound signature composite, and modifying the sound emitted by the speaker such that the similarity between the multi-dimensional sound signature composite for the space and the known multi-dimensional sound signature composite may be increased.

[00541] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like.

[00542] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, and the like. In embodiments, the at least one speaker may be part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00543] In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00544] In embodiments, the one or more speakers may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, the one or more speakers may include a subwoofer.

[00545] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature selected by the listener. The

location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00546] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor. In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like.

[00547] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of one or more other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00548] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, audience area of a space, a location in the stage area of a space, and the like.

[00549] In embodiments, methods and systems of handling sound in a space equipped with at least one speaker may be provided. The methods and systems may include reproducing sound not contemporaneously originating in the space, in

accordance with a known multi-sound signature composite. In embodiments, such reproduction may apply the known multi-dimensional sound signature composite to the reproduced sound. In embodiments, applying the known multi-dimensional sound signature may include adjusting at least one of the timing and volume of sound emitted by a speaker at a specified location within the space.

[00550] In embodiments, timing of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to timing of rear and side reflections specified in the multi-dimensional sound signature. In embodiments, timing of sounds emitted from speakers placed at side locations may be adjusted to mimic primary and secondary side reflections specified in the multi-dimensional sound signature. In embodiments, volume of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to amplitude of rear and side reflections specified in the multi-dimensional sound signature.

[00551] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like.

[00552] In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, and the like. In embodiments, the at least one speaker may be part of a surround sound system. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00553] In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00554] In embodiments, the one or more speakers may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, the one or more speakers may include a subwoofer.

[00555] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In

embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature selected by the listener. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00556] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. The location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor. In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like.

[00557] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of one or more other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the known multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00558] In embodiments, the known multi-dimensional sound signature may be for a location in an actual space, a hypothetical space, audience area of a space, a location in the stage area of a space, and the like.

[00559] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic environment of a first space, including determining a multi-dimensional sound profile, storing the multiple dimensions of the multi-dimensional sound profile as a multi-dimensional sound signature, determining the sound characteristics of an item of media content, and configuring the media content to increase similarity to the multi-dimensional sound signature when the media is played in an anticipated acoustic environment. The multi-dimensional sound signature may include a combination of a plurality of different sound parameters. The multiple dimensions of the sound signature may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment.

[00560] In embodiments, the reflections may include primary and secondary reflections from similar directions. In embodiments, the reflections may include primary, secondary and tertiary reflections from similar directions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00561] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00562] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00563] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a

subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00564] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be

selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00565] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00566] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00567] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00568] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00569] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00570] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00571] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00572] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00573] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic environment of a first space, including determining a multi-dimensional sound profile, storing the multiple dimensions of the multi-dimensional sound profile as a multi-dimensional sound signature, determining the sound characteristics of an item of media content, and configuring a media playback system of a playback environment to increase similarity of the sounds in the playback environment to sounds occurring in the first space. The multi-dimensional sound signature may include a combination of a plurality of different sound parameters.

[00574] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and

the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00575] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00576] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00577] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-

dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00578] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00579] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In

embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00580] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00581] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00582] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00583] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00584] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00585] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound

signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00586] In embodiments, methods and system for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic environment of a first space, including determining a multi-dimensional sound profile, storing the multiple dimensions of the multi-dimensional sound profile as a multi-dimensional sound signature, determining the sound characteristics of an item of media content, and configuring the sound characteristics of the media content item and the media playback system of a playback environment to increase similarity of the sounds in the playback environment to sounds occurring in the first space. The multi-dimensional sound signature may include a combination of a plurality of different sound parameters.

[00587] In embodiments, determining the acoustic environment of the second space may include the creation of a multi-dimensional sound signature for the second space. In embodiments, the stated comparing may include the comparison of the multi-dimensional sound signature of the second space with the multi-dimensional sound signature of the first space. In embodiments, the first space may be a known space, a hypothetical space, and the like.

[00588] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00589] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00590] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional

sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00591] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video

information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00592] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00593] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00594] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00595] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00596] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00597] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00598] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00599] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00600] In embodiments, methods and systems for handling sound in a space equipped with at least one speaker may be provided. The methods and systems may include determining a multi-dimensional sound signature for a location within the space, selecting a known multi-dimensional sound signature, comparing the multi-dimensional sound signature to the known multi-dimensional sound signature, and modifying the sound emitted by the speaker such that the similarity between the multi-dimensional sound signature for the location within the space and the known multi-dimensional sound signature may be increased.

[00601] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor

located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00602] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00603] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00604] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the

content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00605] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00606] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00607] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00608] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00609] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00610] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00611] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00612] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In

embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00613] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic characteristics of a first space, storing a multi-dimensional sound signature composite, determining the sound characteristics of an item of media content, and configuring the media content to increase similarity to the multi-dimensional sound signature when the media may be played in an anticipated acoustic environment. In embodiments, the determining may results in a multi-dimensional sound profile across a plurality of locations of the known acoustic environment. The multi-dimensional sound signature composite may include a combination of a plurality of different sound dimensions selected from the group consisting of timing, direction, amplitude and frequency of sound reflections of the known acoustic environment.

[00614] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00615] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00616] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on

the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00617] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00618] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00619] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00620] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00621] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00622] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite.

In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00623] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00624] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00625] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00626] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic characteristics of a first space, storing a multi-dimensional sound signature composite, determining the sound characteristics of an item of media content, and configuring a media playback system of a playback environment to increase similarity of the sounds in the playback environment to sounds occurring in the first space. In embodiments, the stated determining may result in a multi-dimensional sound profile across a plurality of locations of the known acoustic environment. In embodiments, the multi-dimensional sound signature composite may include a combination of a plurality of different sound dimensions selected from the group consisting of timing, direction, amplitude and frequency of sound reflections of the known acoustic environment.

[00627] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor

located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00628] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00629] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00630] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the

content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00631] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00632] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00633] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00634] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00635] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00636] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00637] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00638] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In

embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00639] In embodiments, methods and systems for simulating an acoustic environment may be provided. The methods and systems may include determining the acoustic characteristics of a first space, storing a multi-dimensional sound signature composite, determining the sound characteristics of an item of media content, and configuring the sound characteristics of the media content item and the media playback system of a playback environment to increase similarity of the sounds in the playback environment to sounds occurring in the first space. The stated determining may result in a multi-dimensional sound profile across a plurality of locations of the known acoustic environment. The multi-dimensional sound signature composite may include a combination of a plurality of different sound dimensions selected from the group consisting of timing, direction, amplitude and frequency of sound reflections of the known acoustic environment.

[00640] In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature. In embodiments, determining of the acoustic environment of the second space may include the creation of a multi-dimensional sound signature composite for the second space. In embodiments, the stated comparing may include the comparison of the multi-dimensional sound signature composite of the second space with the multi-dimensional sound signature composite of the first space. In embodiments, the first space may be a known space, a hypothetical space, and the like.

[00641] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00642] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a

media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00643] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00644] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-

dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00645] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00646] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00647] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00648] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known

multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00649] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00650] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00651] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00652] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00653] In embodiments, methods and systems for handling sound in a space equipped with at least one speaker may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for the space, selecting a known multi-dimensional sound signature composite, comparing the multi-dimensional sound signature composite to the known multi-dimensional sound signature composite, and modifying the sound emitted by the speaker such that

the similarity between the multi-dimensional sound signature composite for the space and the known multi-dimensional sound signature composite may be increased.

[00654] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00655] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00656] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information

and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00657] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00658] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00659] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound

signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00660] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00661] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00662] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00663] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00664] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00665] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00666] In embodiments, methods and systems for handling sound in a space equipped with at least one speaker may be provided. The methods and systems may include selecting a known multi-dimensional sound signature composite and reproducing sound not contemporaneously originating in the space, in accordance with the known multi-sound signature composite. Such reproduction may apply the known multi-dimensional sound signature composite to the reproduced sound.

[00667] In embodiments, applying the known multi-dimensional sound signature may include adjusting at least one of the timing and volume of sound emitted by a speaker at a specified location within the space. In embodiments, the timing of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to timing of rear and side reflections specified in the multi-dimensional sound signature. In embodiments, timing of sounds emitted from speakers placed at side locations may be adjusted to mimic primary and secondary side reflections specified in the multi-dimensional sound signature. In embodiments, volume of sounds emitted from speakers placed at rear and side locations in the space may be adjusted to increase similarity to amplitude of rear and side reflections specified in the multi-dimensional sound signature.

[00668] In embodiments, the space may be a recording studio, a virtual reality environment, a simulation environment, a computer gaming environment, and the like. In embodiments, the at least one speaker may be a monitor, a monitor located on a stage, a headphone speaker, a surround sound system, and the like. In embodiments, the at least one speaker may include a subwoofer. In embodiments, the at least one speaker may be a part of an array of speakers arranged to produce multi-dimensional sound in the space.

[00669] In embodiments, the item of content may include sound, audio, audio and video, a movie, film, television, music, voice, a video game, and the like. In embodiments, the space may be a movie theater, an IMAX theater, a living room, a

media room, a home media room, a conference room, a museum, a gallery, an arena, a restaurant, a sports venue, a vehicle interior, a substantially anechoic room, an anechoic room, a practice room, a rehearsal location, and the like.

[00670] In embodiments, the at least one speaker may be headphones, a surround sound system, an array of speakers arranged to produce multi-dimensional sound in the space, and the like. In embodiments, at least one speaker may include a subwoofer. In embodiments, the known multi-dimensional sound signature may be selected based on the content. In embodiments, the known multi-dimensional sound signature may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature may be provided with the content, but the actual known multi-dimensional sound signature may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature may be selected by a processor based on a determination of the location shown in the video information.

[00671] In embodiments, the known multi-dimensional sound signature composite may be selected based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected automatically based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected by a processor based on the content. In embodiments, the known multi-dimensional sound signature composite may be selected based on location information provided with the content. In embodiments, the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-dimensional sound signature composite may be provided with the content. In embodiments, the identity of the known multi-

dimensional sound signature composite may be provided with the content, but the actual known multi-dimensional sound signature composite may not be provided with the content. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on the video information. In embodiments, the content may contain audio and video information and the known multi-dimensional sound signature composite may be selected by a processor based on a determination of the location shown in the video information.

[00672] In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature. In embodiments, the modification may create the effect that a listener may be at the location of the known multi-dimensional sound signature and that location may be selected by the listener. In embodiments, the location may be a seat in the space, a stage located in the space, and the like. In embodiments, the modification may be performed with a computer processor.

[00673] In embodiments, the modification may create the effect at each location in the space that a listener may be at a corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at the corresponding location of the space of the known multi-dimensional sound signature composite. In embodiments, the modification may create the effect at a location in the space that a listener may be at a location of the space of the known multi-dimensional sound signature composite that may be selected by the user. In embodiments, the location may be a seat in the space, a stage located in the space, and the like.

[00674] In embodiments, the known multi-dimensional sound signature is for a location in an actual space, a hypothetical space, an audience area of a space, a stage area of a space, and the like. In embodiments, the known multi-dimensional sound signature may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00675] In embodiments, the known multi-dimensional sound signature may be determined during the creation of the content. In embodiments, the known

multi-dimensional sound signature may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature may be similar to that of the space in which the content would typically be performed.

[00676] In embodiments, the known multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the known multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the known multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite.

[00677] In embodiments, the known multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space; a single source multi-dimensional sound signature composite; a multiple source multi-dimensional sound signature composite; a multiple source, multiple locations, multi-dimensional sound signature composite; a hypothetical multi-dimensional sound signature composite; an ambient multi-dimensional sound signature composite; and the like.

[00678] In embodiments, the known multi-dimensional sound signature composite may be for a battlefield, a church, a cave, a forest, an office, a house, a hospital, a train station, an airport, a park, an underwater space, and the like.

[00679] In embodiments, the known multi-dimensional sound signature composite may be determined during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be created during the creation of the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in the content. In embodiments, the known multi-dimensional sound signature composite may be similar to that of the space in which the content would typically be performed.

[00680] In embodiments, methods and systems for ticket seating selection may be provided. The methods and systems may include determining the acoustic environment of the space, storing the multiple dimensions of the multi-dimensional sound measurement as a multi-dimensional sound signature, and providing a ticket purchase selection option to the user that relates the location of a seat for selection to

a sound characteristic for the location of the seat as based upon the stored multi-dimensional sound signature. The measuring may be a multi-dimensional sound measurement, and the space may be associated with the ticket seating selection by a user. The multi-dimensional sound signature may include a combination of a plurality of different measured sound dimensions.

[00681] In embodiments, the multiple dimensions of the sound signature may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment. In embodiments, the reflections may include primary and secondary reflections from similar directions. In embodiments, the reflections may include primary, secondary and tertiary reflections from similar directions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00682] In embodiments, the ticket may be categorized as for a direct zone, a diamond zone, a middle zone, a deep envelopment zone, and the like. In embodiments, the ticket may be categorized as for a location with high-quality sound. In embodiments, the ticket may be categorized as for a location with medium-quality sound. In embodiments, the ticket may be categorized as for a location with low-quality sound. In embodiments, the ticket may be categorized as for a location with sound characterized by bass frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by mid-range frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by treble frequencies.

[00683] In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00684] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00685] In embodiments, methods and tickets for making a ticket available for a location may be provided. The methods and systems may include determining a multi-dimensional sound signature for a selected location in a space and making available a ticket for the location. Such ticket may be categorized based on the multi-dimensional sound signature.

[00686] In embodiments, methods and systems for making a ticket available for a location may be provided. The methods and systems may include determining a preferred multi-dimensional sound signature for an individual, determining a multi-dimensional sound signature for a selected location in a space, and making available a ticket for the location. The multi-dimensional sound signature for the location may correspond to the preferred multi-dimensional sound signature.

[00687] In embodiments, the ticket may be categorized as for a direct zone, a diamond zone, a middle zone, a deep envelopment zone, and the like. In embodiments, the ticket may be categorized as for a location with high-quality sound. In embodiments, the ticket may be categorized as for a location with medium-quality sound. In embodiments, the ticket may be categorized as for a location with low-quality sound. In embodiments, the ticket may be categorized as for a location with sound characterized by bass frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by mid-range frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by treble frequencies.

[00688] In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00689] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00690] In embodiments, methods and systems for ticket seating selection may be provided. The methods and system may include determining the acoustic environment of the space, storing the multiple dimensions of the multi-dimensional

sound measurement as a multi-dimensional sound signature composite, and providing a ticket purchase selection option to the user that may relate the location of a seat for selection to a sound characteristic for the location of the seat as based upon the stored multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may include a combination of a plurality of different measured sound dimensions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00691] In embodiments, the ticket may be categorized as for a direct zone, a diamond zone, a middle zone, a deep envelopment zone, and the like. In embodiments, the ticket may be categorized as for a location with high-quality sound. In embodiments, the ticket may be categorized as for a location with medium-quality sound. In embodiments, the ticket may be categorized as for a location with low-quality sound. In embodiments, the ticket may be categorized as for a location with sound characterized by bass frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by mid-range frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by treble frequencies.

[00692] In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00693] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00694] In embodiments, methods and systems for making a ticket available for a location may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a space, selecting a location in the space, and making available a ticket for the location. Such ticket may be categorized based on the multi-dimensional sound signature.

[00695] In embodiments, the ticket may be categorized as for a direct zone, a diamond zone, a middle zone, a deep envelopment zone, and the like. In embodiments, the ticket may be categorized as for a location with high-quality sound. In embodiments, the ticket may be categorized as for a location with medium-quality sound. In embodiments, the ticket may be categorized as for a location with low-quality sound. In embodiments, the ticket may be categorized as for a location with sound characterized by bass frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by mid-range frequencies. In embodiments, the ticket may be categorized as for a location with sound characterized by treble frequencies.

[00696] In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00697] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00698] In embodiments, methods and systems for providing a venue seating sound sample for ticket seating selection may be described. The methods and systems may include determining the acoustic environment of the space, storing the multiple dimensions of the multi-dimensional sound measurement as a multi-dimensional sound signature, and providing a sound sample associated with the ticket purchase selection by the user that relates the location of a seat for selection to a sound characteristic for the location of the seat as based upon the stored multi-dimensional sound signature.

[00699] In embodiments, the sound may be a sample of a performance of a type typically performed in the space. In embodiments, the sound was created by an artist who will be performing in the venue. In embodiments, the sound may be a sample of an upcoming performance to be held in the venue. In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an

entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00700] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00701] In embodiments, the location may be a seat, an area of seating, a zone of the space, and the like. In embodiments, the reproduced sound may be provided in connection with a representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an image of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive image of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space showing a stage in the performance space. In embodiments, the location may be selected using a graphical user interface that may be associated with the sound an interactive representation of the view from the location in the space. In embodiments, methods and systems may allow a listener to purchase tickets for the location.

[00702] In embodiments, measuring acoustic environment may be a multi-dimensional sound measurement. The space may be associated with the ticket seating selection by a user. The multi-dimensional sound signature may include a combination of a plurality of different measured sound dimensions. In embodiments, the multiple dimensions of the sound signature may be selected from the group consisting of timing, direction, amplitude and frequency of reflections of sound associated with the known acoustic environment. In embodiments, the reflections may include primary and secondary reflections from similar directions. In

embodiments, the reflections may include primary, secondary and tertiary reflections from similar directions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00703] In embodiments, methods and systems for reproducing sound may be provided. The methods and systems may include determining a multi-dimensional sound signature for a selected location in a space and reproducing sound in accordance with the multi-sound signature. Such reproduction may apply the multi-dimensional sound signature to the reproduced sound so that the sound may be heard as it would be heard at the location in the space.

[00704] In embodiments, the sound may be a sample of a performance of a type typically performed in the space. In embodiments, the sound was created by an artist who will be performing in the venue. In embodiments, the sound may be a sample of an upcoming performance to be held in the venue. In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00705] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00706] In embodiments, the location may be a seat, an area of seating, a zone of the space, and the like. In embodiments, the reproduced sound may be provided in connection with a representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an image of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive image of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may

be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space showing a stage in the performance space. In embodiments, the location may be selected using a graphical user interface that may be associated with the sound an interactive representation of the view from the location in the space. In embodiments, methods and systems may allow a listener to purchase tickets for the location.

[00707] In embodiments, methods and systems for providing a venue seating sound sample for ticket seating selection may be described. The methods and systems may include determining the acoustic environment of the space, storing the multiple dimensions of the multi-dimensional sound measurement as a multi-dimensional sound signature composite, and providing a sound sample associated with the ticket purchase selection by the user that relates the location of a seat for selection to a sound characteristic for the location of the seat as based upon the stored multi-dimensional sound signature composite.

[00708] In embodiments, the measurement of the acoustic environment may include multi-dimensional sound measurements across a plurality of locations. The space may be associated with the ticket seating selection by a user. In embodiments, the multi-dimensional sound signature composite may include a combination of a plurality of different measured sound dimensions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00709] In embodiments, the sound may be a sample of a performance of a type typically performed in the space. In embodiments, the sound was created by an artist who will be performing in the venue. In embodiments, the sound may be a sample of an upcoming performance to be held in the venue. In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00710] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be

implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00711] In embodiments, the location may be a seat, an area of seating, a zone of the space, and the like. In embodiments, the reproduced sound may be provided in connection with a representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an image of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive image of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space showing a stage in the performance space. In embodiments, the location may be selected using a graphical user interface that may be associated with the sound an interactive representation of the view from the location in the space. In embodiments, methods and systems may allow a listener to purchase tickets for the location.

[00712] In embodiments, methods and systems for reproducing sound may be provided. The methods and systems may include determining a multi-dimensional sound signature composite for a space, selecting a location in the space, and reproducing sound in accordance with the multi-sound signature composite. Such reproduction may apply the multi-dimensional sound signature composite to the reproduced sound so that the sound may be heard as it would be heard at the location in the space.

[00713] In embodiments, the sound may be a sample of a performance of a type typically performed in the space. In embodiments, the sound was created by an artist who will be performing in the venue. In embodiments, the sound may be a sample of an upcoming performance to be held in the venue. In embodiments, the space may be a performance hall, a concert hall, a sports venue, an arena, an

entertainment venue, a movie theater, an IMAX theater, a museum, a vehicle interior, and the like.

[00714] In embodiments, the methods may be implemented in a software application executed on a computer. In embodiments, the methods may be implemented using a graphical user interface. In embodiments, the methods may be implemented using a web interface, a processor, a computer, and the like. In embodiments, the methods may be implemented by providing a storage media containing a sound as it would be heard at multiple locations. In embodiments, the storage media may be a compact disc, a DVD, and the like.

[00715] In embodiments, the location may be a seat, an area of seating, a zone of the space, and the like. In embodiments, the reproduced sound may be provided in connection with a representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an image of the view from the location in the space. In embodiments, the reproduced sound may be provided in connection with an interactive image of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space. In embodiments, the space may be a performance space and the reproduced sound may be provided in connection with an interactive representation of the view from the location in the space showing a stage in the performance space. In embodiments, the location may be selected using a graphical user interface that may be associated with the sound an interactive representation of the view from the location in the space. In embodiments, methods and systems may allow a listener to purchase tickets for the location.

[00716] In embodiments, methods and systems for providing an acoustical environment graphical user interface may be described. The methods and systems may include determining an acoustic environment of a space, storing the multiple dimensions of the multi-dimensional sound measurement as a multi-dimensional sound signature, and enabling a visual representation of the stored multi-dimensional sound signature through the acoustical environment graphical user interface. In embodiments, the measurement of the acoustic environment may be a multi-

dimensional sound measurement. In embodiments, the multi-dimensional sound signature may include a combination of a plurality of different measured sound dimensions.

[00717] In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00718] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00719] In embodiments, methods and systems for providing an acoustical environment graphical user interface may be described. The methods and systems may include determining an acoustic environment of a space, storing the multiple dimensions of the multi-dimensional sound measurement as a multi-dimensional sound signature composite, and enabling a visual representation of the stored multi-dimensional sound signature composite through the acoustical environment graphical user interface.

[00720] In embodiments, the measuring of the acoustic environment may include multi-dimensional sound measurements across a plurality of locations. In

embodiments, the multi-dimensional sound signature composite may include a combination of a plurality of different measured sound dimensions. In embodiments, determining the acoustic environment may include making a multi-dimensional sound measurement. In embodiments, determining the acoustic environment may include specifying a multi-dimensional sound signature.

[00721] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00722] In embodiments, a graphical user interface may be provided. The graphical user interface may include at least one field for representation of at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite, and an input means for manipulating the at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite.

[00723] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional

sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00724] In embodiments, a software interface capable of visually representing at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite may be provided.

[00725] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00726] In embodiments, a graphical user interface may be provided. The graphical user interface may include at least one field for visually representation of at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite, and an input means for manipulating the at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite.

[00727] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00728] In embodiments, a software interface for manipulation of at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite may be provided.

[00729] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may

be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00730] In embodiments, a graphical user interface may be provided. The graphical user interface may include at least one field for manipulation of at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite, and an input means for manipulating the at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite.

[00731] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00732] In embodiments, a software interface for designing a space in consideration of at least one of a multi-dimensional sound signature and a multi-dimensional sound signature composite may be provided.

[00733] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00734] In embodiments, a computer-implemented program for designing a space may be provided. The computer-implemented program may include a design module capable of visually representing parameters of a planned space as specified by a user of the design module, a sound signature representation module capable of visually representing a multi-dimensional sound signature in the space, and an analytical acoustics module capable of determining the predicted impact of changes to parameters in the design module on a multi-dimensional sound signature in the planned space. In embodiments, a modified multi-dimensional sound signature may be presented to the user upon modification of parameters of the space in the design module.

[00735] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual

space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00736] In embodiments, a computer-implemented program for designing a space may be provided. The methods and systems may include a design module capable of visually representing parameters of a planned space as specified by a user of the design module, a sound signature representation module capable of visually representing a multi-dimensional sound signature composite in the space, and an analytical acoustics module capable of determining the predicted impact of changes to parameters in the design module on a multi-dimensional sound signature composite in the planned space. In embodiments, a modified multi-dimensional sound signature may be presented to the user upon modification of parameters of the space in the design module.

[00737] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In

embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00738] In embodiments, a software interface for designing a space including feedback based on comparison to preferred signatures may be provided.

[00739] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00740] In embodiments, a computer-implemented program for designing a space may be provided. The methods and systems may include a design module capable of visually representing parameters of a planned space as specified by a user of the design module, a sound signature representation module capable of visually representing a multi-dimensional sound signature in the space, and an analytical

acoustics module capable of determining the predicted impact of changes to parameters in the design module on a multi-dimensional sound signature in the planned space. The sound signature representation module may be capable of accessing a representation of at least one multi-dimensional sound signature from at least one preferred acoustical environment. In embodiments, a modified multi-dimensional sound signature may be presented to the user. In embodiments, a feedback module for facilitating comparison of the predicted multi-dimensional sound signature of the planned space to the multi-dimensional sound signature of a preferred acoustical environment may be presented upon modification of parameters of the space in the design module.

[00741] In embodiments, the space may be a hypothetical space. In embodiments, the manipulation may be combination, decomposition, and the like. In embodiments, the multi-dimensional sound signature composite may be for an actual space, a hypothetical space, and the like. In embodiments, the multi-dimensional sound signature composite may result from manipulation of at least one other multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an idealized multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multi-dimensional sound signature composite for a hypothetical space. In embodiments, the multi-dimensional sound signature composite may be a single source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a multiple source, multiple location, multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be a hypothetical multi-dimensional sound signature composite. In embodiments, the multi-dimensional sound signature composite may be an ambient multi-dimensional sound signature composite.

[00742] In embodiments, a computer-implemented program for designing a space may be provided. The methods and systems may include a design module capable of visually representing parameters of a planned space as specified by a user of the design module, a sound signature representation module capable of visually representing a multi-dimensional sound signature composite in the space, the sound signature representation module capable of accessing a representation of at least one

DEMANDES OU BREVETS VOLUMINEUX

LA PRÉSENTE PARTIE DE CETTE DEMANDE OU CE BREVETS COMPREND PLUS D'UN TOME.

CECI EST LE TOME __1___ DE __3___

NOTE: Pour les tomes additionels, veillez contacter le Bureau Canadien des Brevets.

JUMBO APPLICATIONS / PATENTS

THIS SECTION OF THE APPLICATION / PATENT CONTAINS MORE THAN ONE VOLUME.

THIS IS VOLUME __1___ OF __3___

NOTE: For additional volumes please contact the Canadian Patent Office.

Replacement page

PATENT

CLAIMS

What is claimed is:

1. A method comprising:

determining at least one reflection of sound from a sound initiation location at a location within a great hall, such that the at least one reflection is selected from the group of reflection angles consisting of: a floor reflection with a delay between 0.5 and 1.5, side left reflection with a delay between 5.0 and 30.7, side right reflection with a delay between 7.9 and 34.8, upper left reflection with a delay between 25.4 and 69.1, upper right reflection with a delay between 28.7 and 71.4, ceiling reflection with a delay between 39.4 and 83.9, ceiling corner left reflection with a delay between 43.0 and 92.5, ceiling corner right reflection with a delay between 45.3 and 92.8, rear wall reflection with a delay between 7.2 and 175.3, side-rear left reflection with a delay between 11.8 and179.8, side-rear right reflection with a delay between 14.6 and 179.5, upper corner rear left reflection with a delay between 31.1 and 192.0, upper corner rear right reflection with a delay between 34.3 and 191.5, ceiling-rear reflection with a delay between 44.6 and 198.3, wherein the delays are measured in milliseconds;

comparing the time delay for the at least one reflection with the time delay for the corresponding reflection angle selected from the group of reflection angles; and

modifying the design of the great hall to bring each reflection within the time delay range for the corresponding reflection angle selected from the group of reflection angles.

2. A method comprising:

determining at least one reflection of sound from a sound initiation location at a location within a great hall, such that the at least one reflection is selected from the group of reflection angles consisting of: a floor reflection with a delay between 0.5 and 1.5, side left reflection with a delay between 7.9 and 34.8, side right reflection with a delay between 5.0 and 30.7, upper left

AMENDED SHEET(ART. 34)

Replacement page

PATENT

reflection with a delay between 28.7 and 71.4, upper right reflection with a delay between 25.4 and 69.1, ceiling reflection with a delay between 39.4 and 83.9, ceiling corner left reflection with a delay between 45.3 and 92.8, ceiling corner right reflection with a delay between 43.0 and 92.5, rear wall reflection with a delay between 7.2 and 175.3, side-rear left reflection with a delay between 14.6 and179.5, side-rear right reflection with a delay between 11.8 and 179.8, upper corner rear left reflection with a delay between 34.3 and 191.5, upper corner rear right reflection with a delay between 31.1 and 192.0, ceiling-rear reflection with a delay between 44.6 and 198.3, wherein the delays are measured in milliseconds;

comparing the time delay for the at least one reflection with the time delay for the corresponding reflection angle selected from the group of reflection angles; and

modifying the design of the great hall to bring each reflection within the time delay range for the corresponding reflection angle selected from the group of reflection angles.

3. A method comprising:

determining at least one reflection of sound from a sound initiation location at a location within a great hall, such that the at least one reflection is selected from the group of reflection angles consisting of: a floor reflection with a delay between 0.8 and 1.9, front reflection with a delay between 7.0 and 8.9, side left reflection with a delay between 3.2 and 22.1, side right reflection with a delay between 10.6 and 28.0, rear reflection with a delay between 8.3 and 67.3, side-rear left reflection with a delay between 10.9 and 73.3, side-rear right reflection with a delay between 17.6 and 73.3, ceiling reflection with a delay between 19.3 and 35.0, ceiling corner left reflection with a delay between 21.5 and 44.6, ceiling corner right reflection with a delay between 27.4 and 46.8, ceiling-rear wall reflection with a delay between 25.2 and 79.1, side-side left reflection with a delay between 23.3 and 52.2, side-side right reflection with a delay between 33.8 and 58.5, front-side left reflection with a delay between 11.3 and 25.9, front-side right reflection with a delay between 17.9 and 31.0, ceiling-rear side left reflection with a delay between 27.3 and

AMENDED SHEET(ART. 34)

Replacement page

PATENT

84.3, ceiling-rear side right reflection with a delay between 32.8 and 84.3, wherein the delays are measured in milliseconds;
comparing the time delay for the at least one reflection with the time delay for the corresponding reflection angle selected from the group of reflection angles; and
modifying the design of the great hall to bring each reflection within the time delay range for the corresponding reflection angle selected from the group of reflection angles.

4. A method comprising:

determining at least one reflection of sound from a sound initiation location at a location within a great hall, such that the at least one reflection is selected from the group of reflection angles consisting of: a floor reflection with a delay between 0.8 and 1.9, front reflection with a delay between 7.0 and 8.9, side left reflection with a delay between 10.6 and 28.0, side right reflection with a delay between 3.2 and 22.1, rear reflection with a delay between 8.3 and 67.3, side-rear left reflection with a delay between 17.6 and 73.3, side-rear right reflection with a delay between 10.9 and 73.3, ceiling reflection with a delay between 19.3 and 35.0, ceiling corner left reflection with a delay between 27.4 and 46.8, ceiling corner right reflection with a delay between 21.5 and 44.6, ceiling-rear wall reflection with a delay between 25.2 and 79.1, side-side left reflection with a delay between 33.8 and 58.5, side-side right reflection with a delay between 23.3 and 52.2, front-side left reflection with a delay between 17.9 and 31.0, front-side right reflection with a delay between 11.3 and 25.9, ceiling-rear side left reflection with a delay between 32.8 and 84.3, ceiling-rear side right reflection with a delay between 27.3 and 84.3,wherein the delays are measured in milliseconds;
comparing the time delay for the at least one reflection with the time delay for the corresponding reflection angle selected from the group of reflection angles; and
modifying the design of the great hall to bring each reflection within the time delay range for the corresponding reflection angle selected from the group of reflection angles.

AMENDED SHEET(ART. 34)

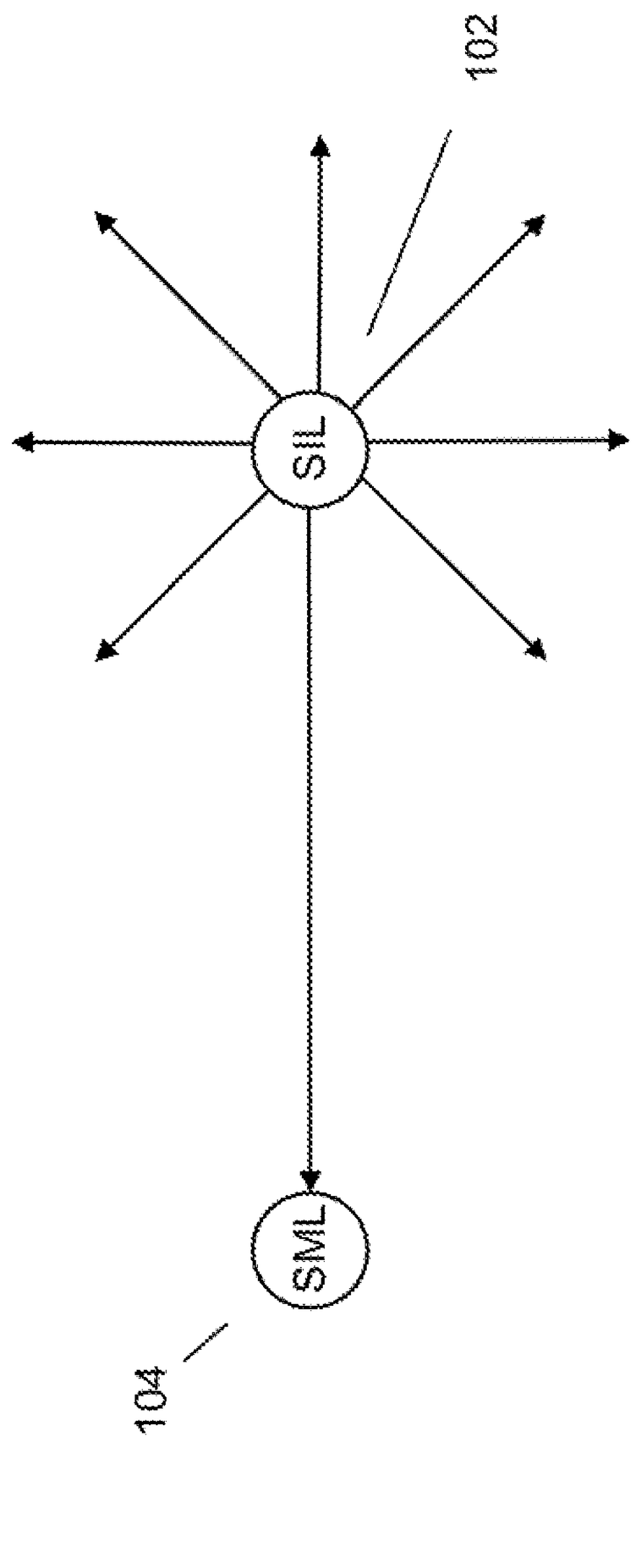


FIG 1

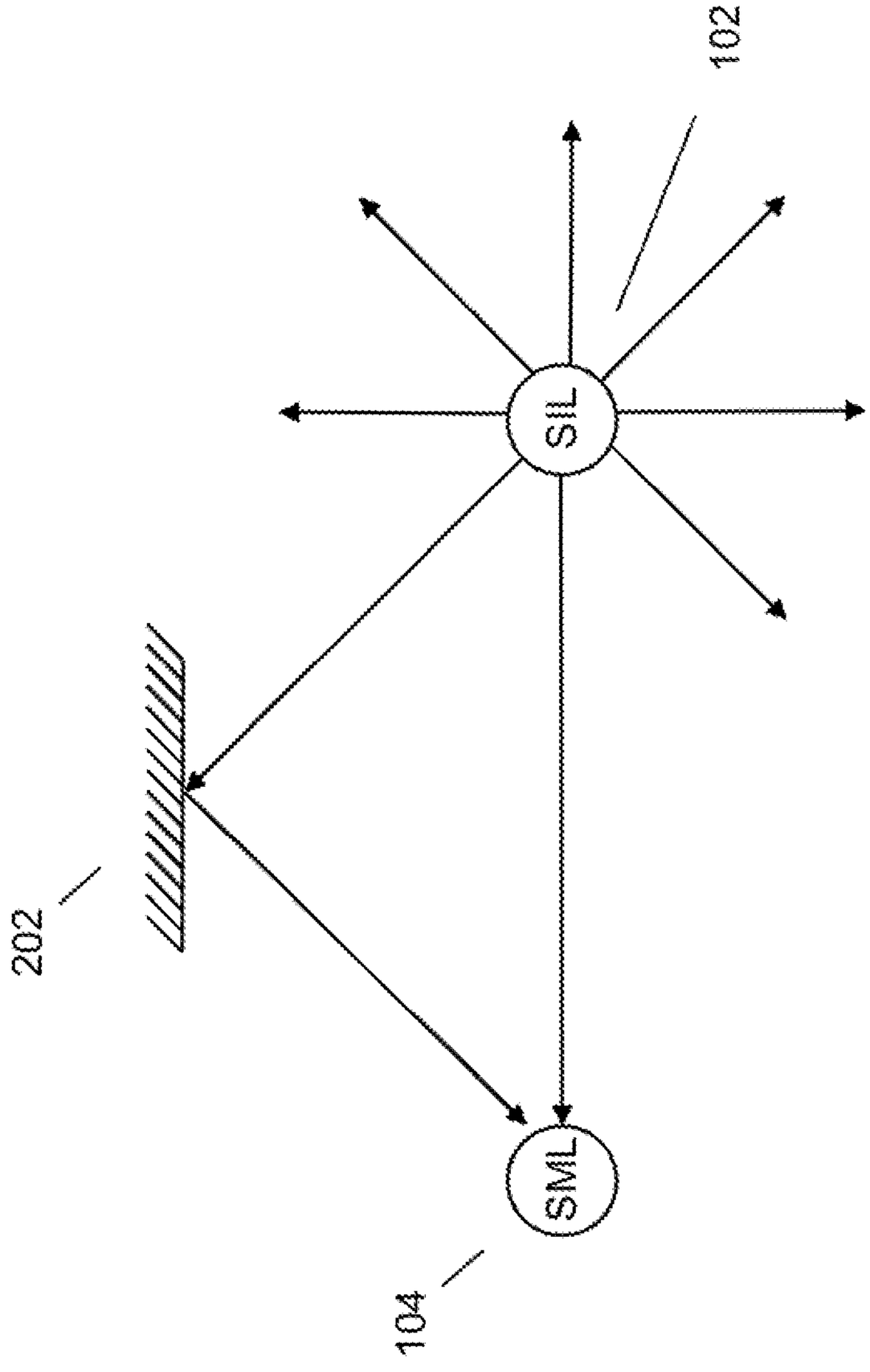


FIG 2

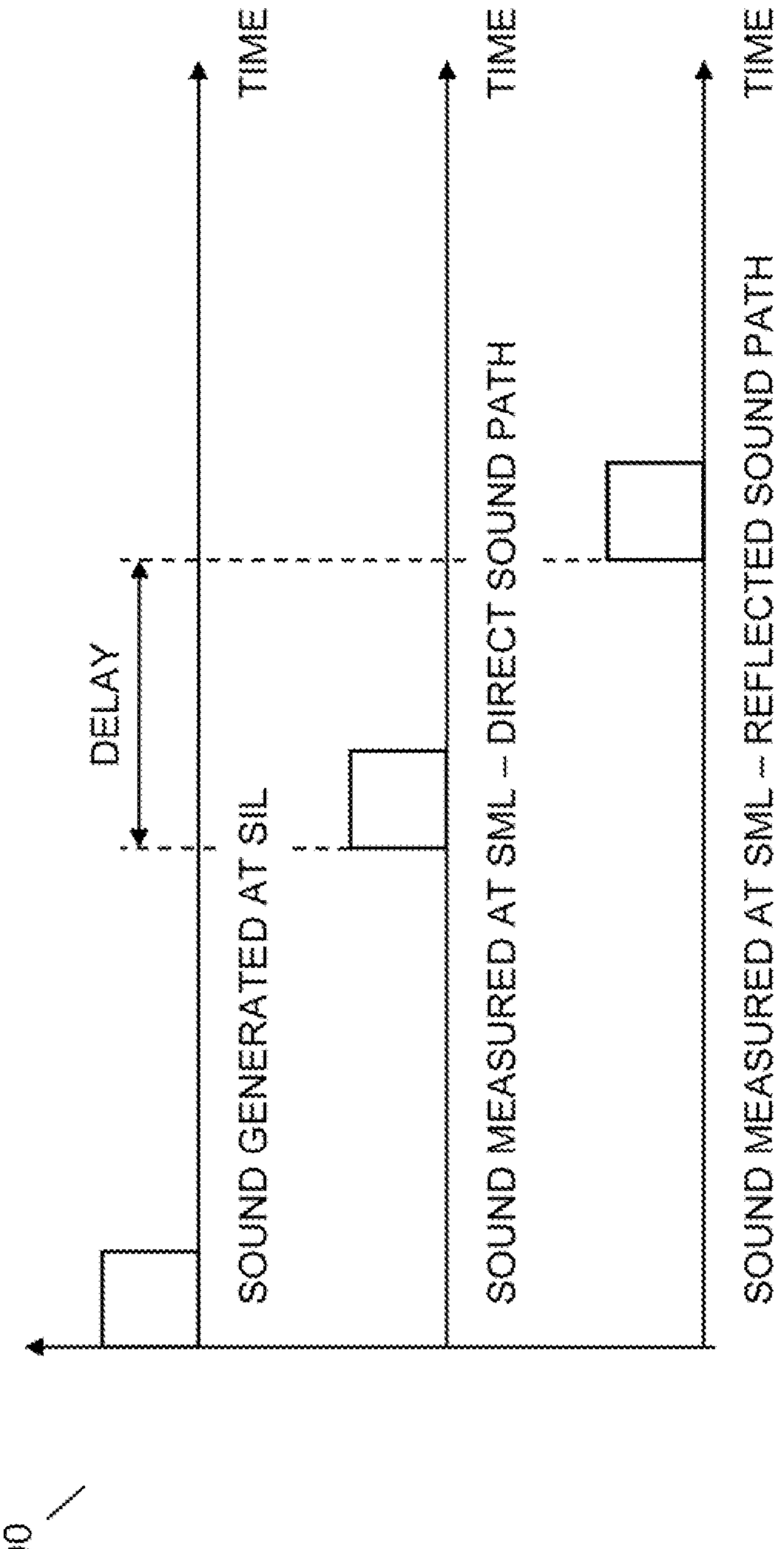

TIME
TIME
TIME
DELAY
SOUND GENERATED AT SIL
SOUND MEASURED AT SML – DIRECT SOUND PATH
SOUND MEASURED AT SML – REFLECTED SOUND PATH
300

FIG. 3

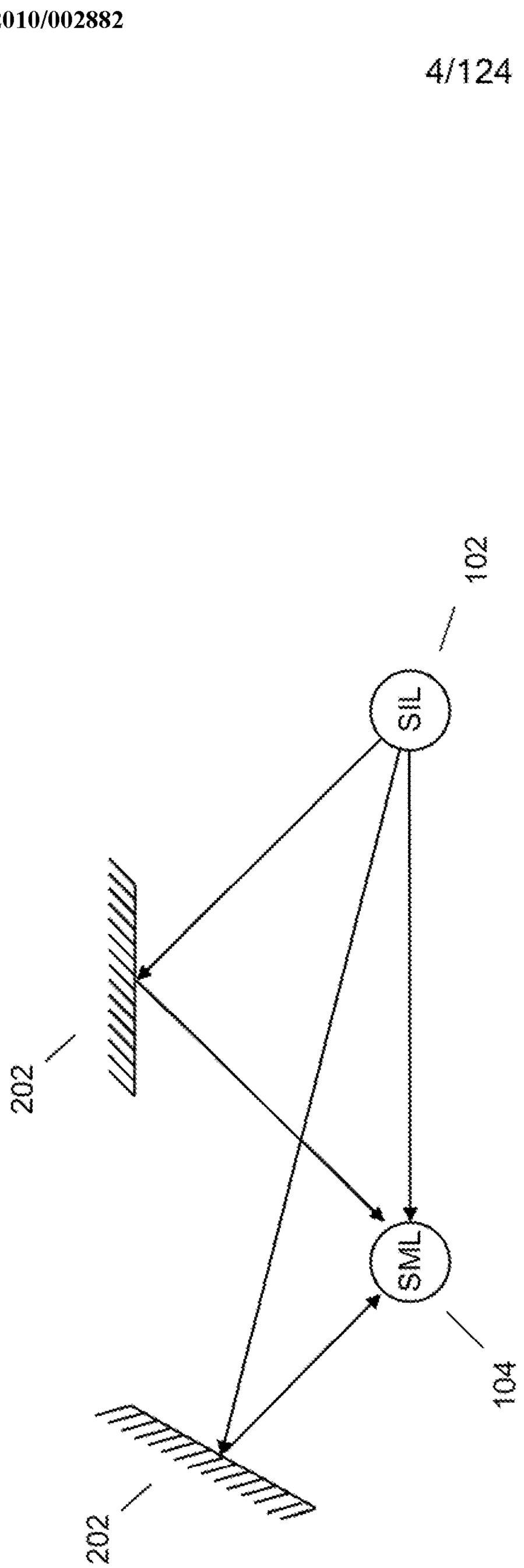


FIG. 4

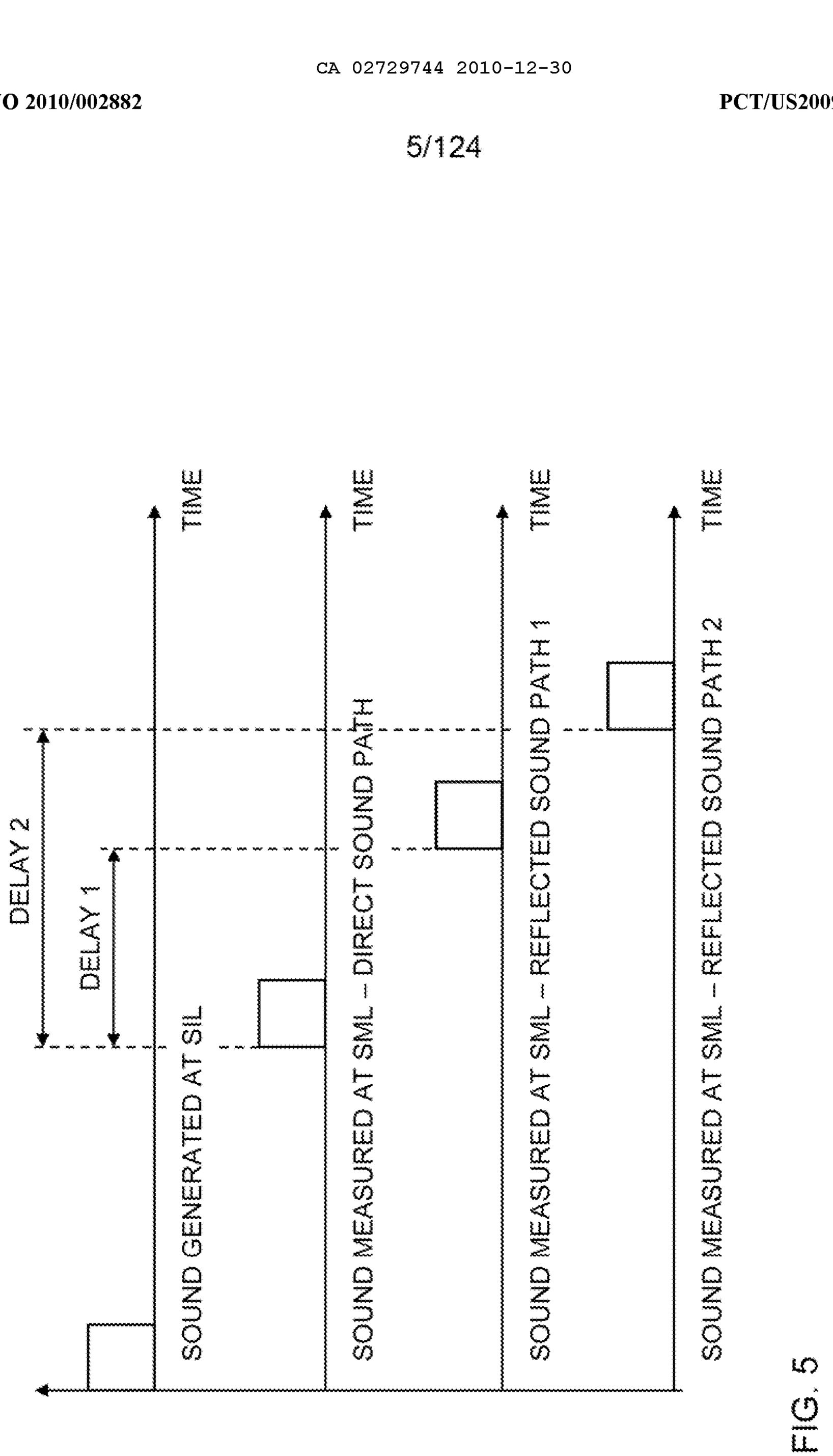

DELAY 2
DELAY 1
SOUND GENERATED AT SIL
TIME
SOUND MEASURED AT SML – DIRECT SOUND PATH
TIME
SOUND MEASURED AT SML – REFLECTED SOUND PATH 1
TIME
SOUND MEASURED AT SML – REFLECTED SOUND PATH 2
TIME
500

FIG. 5

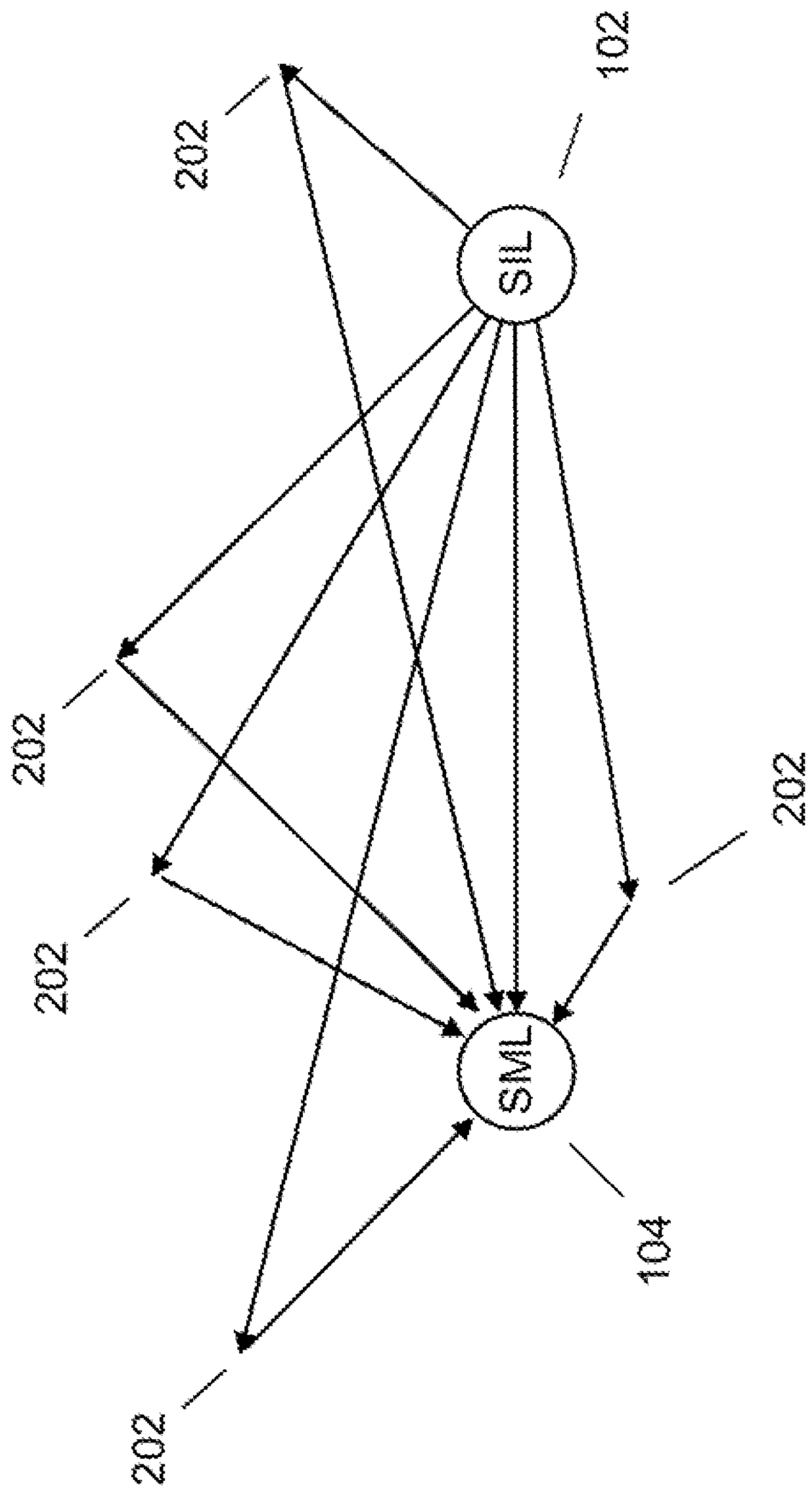


FIG. 6

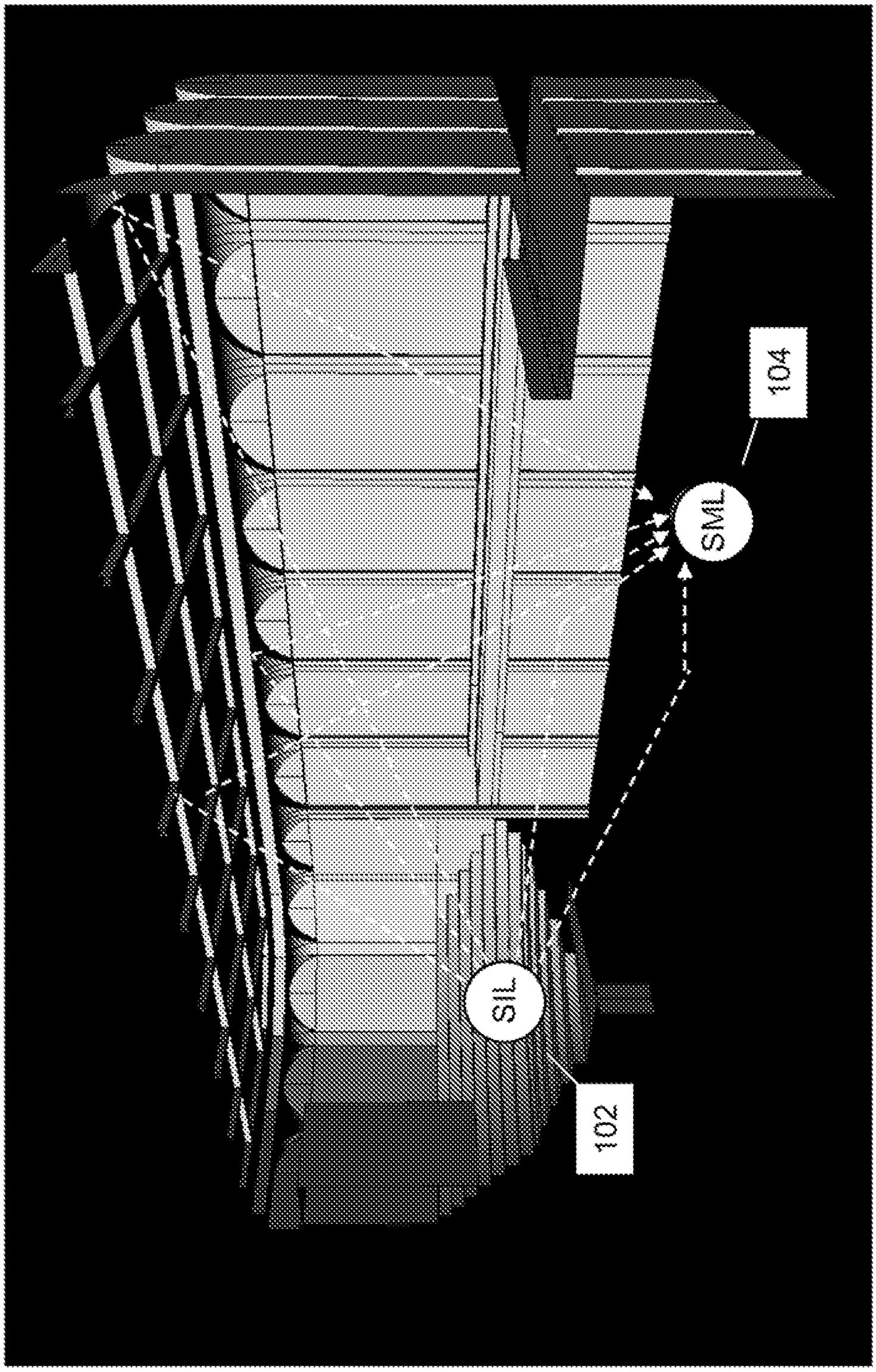


FIG. 7

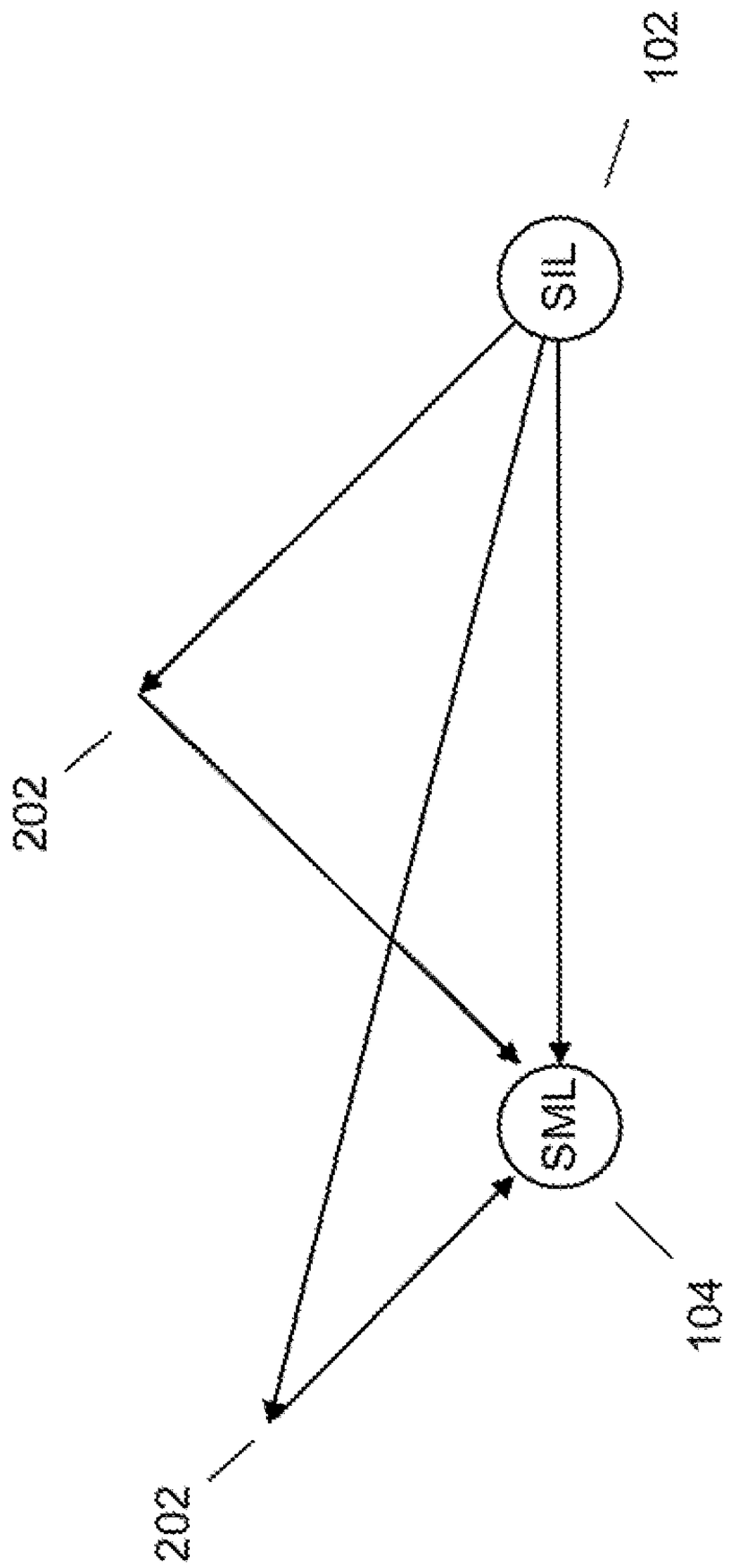


FIG. 8

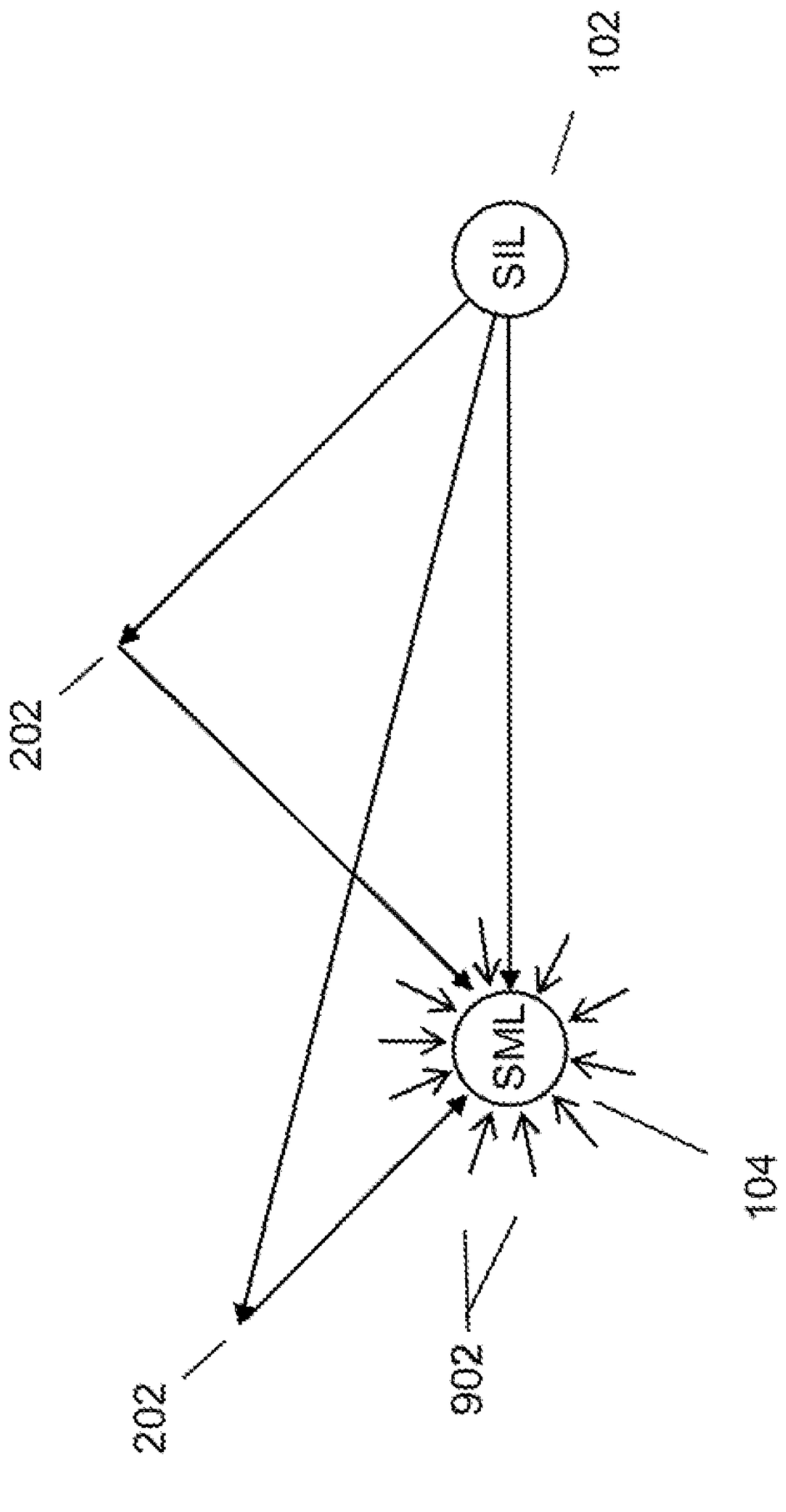


FIG. 9

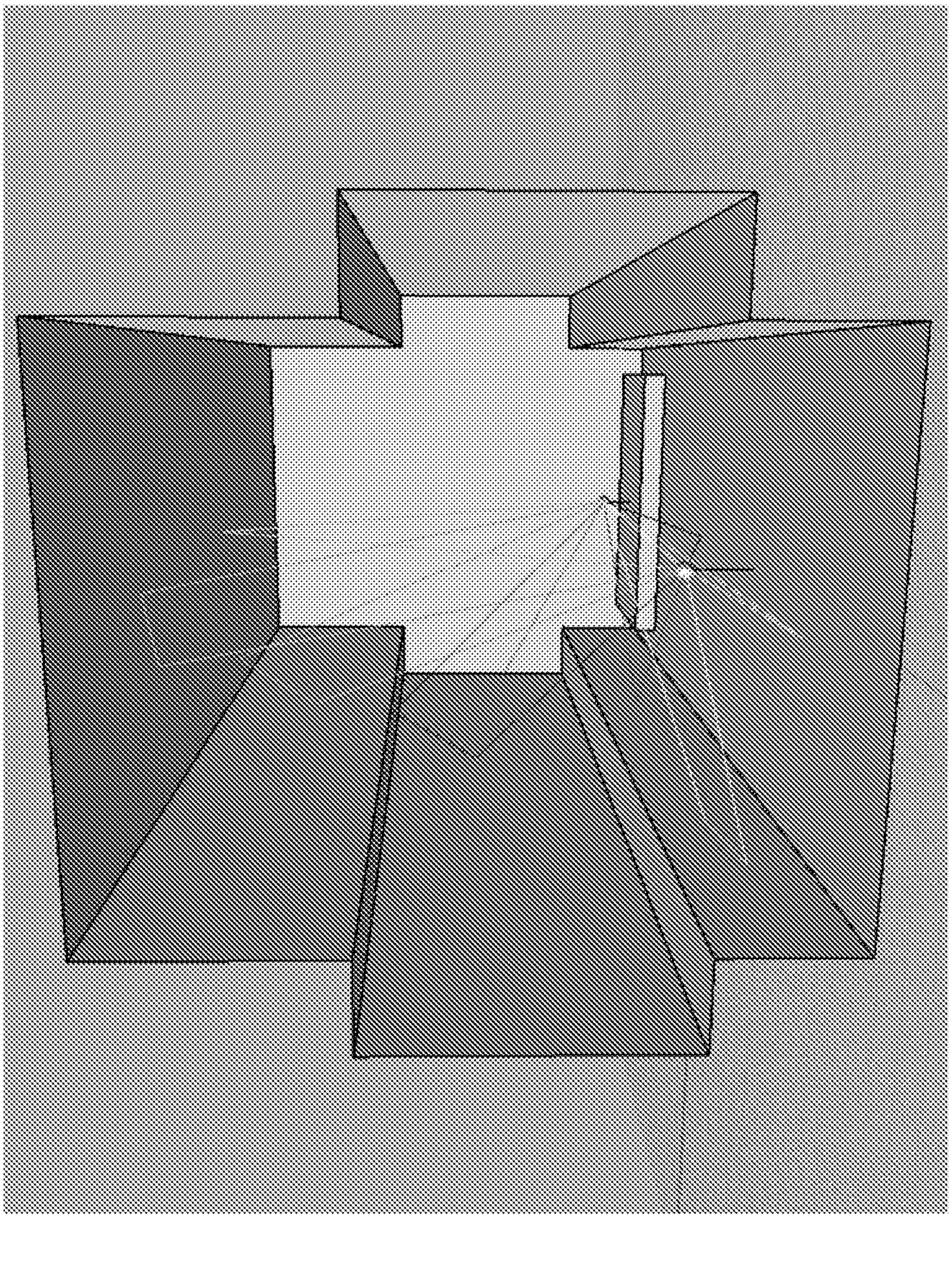


FIG. 10

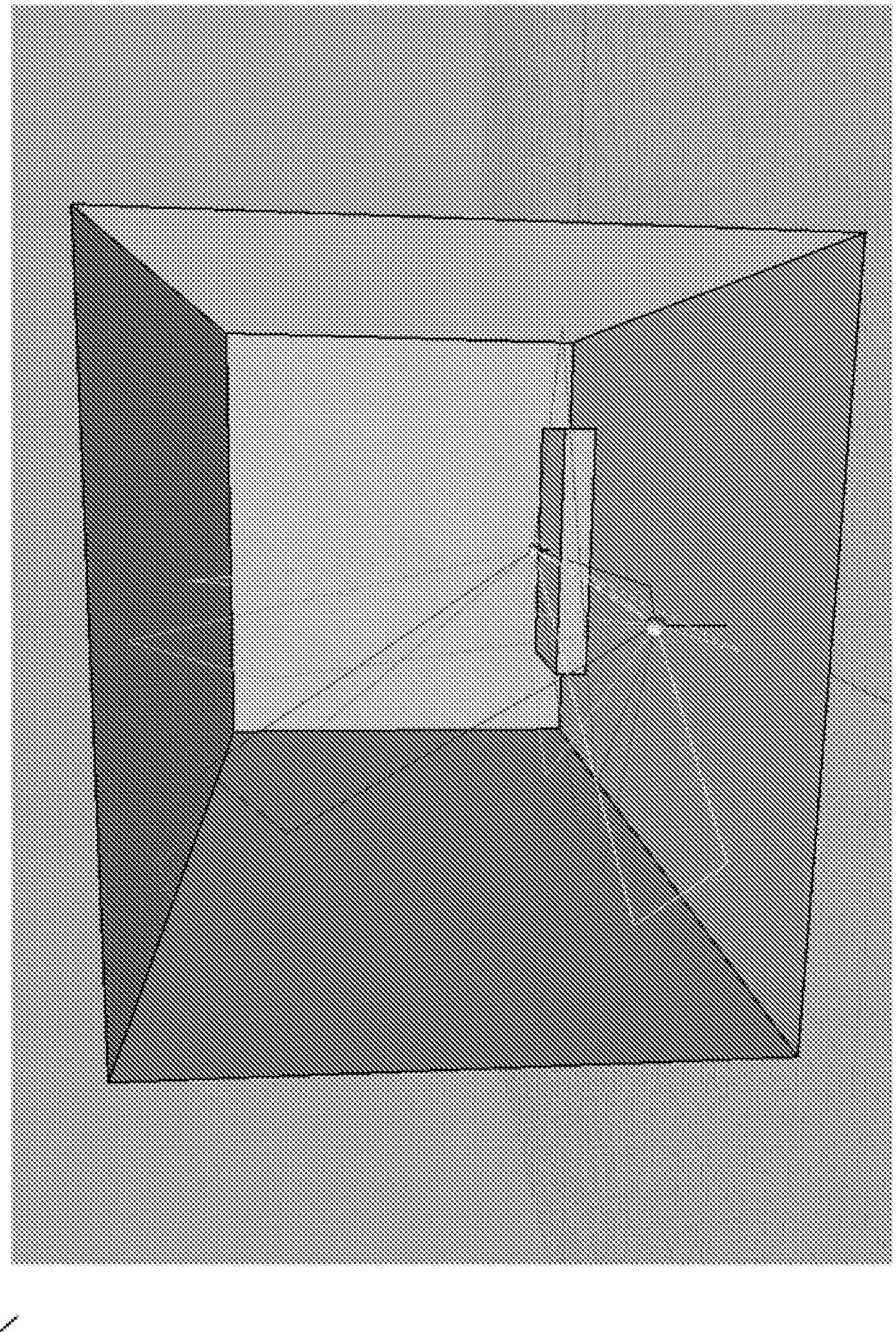


FIG. 11

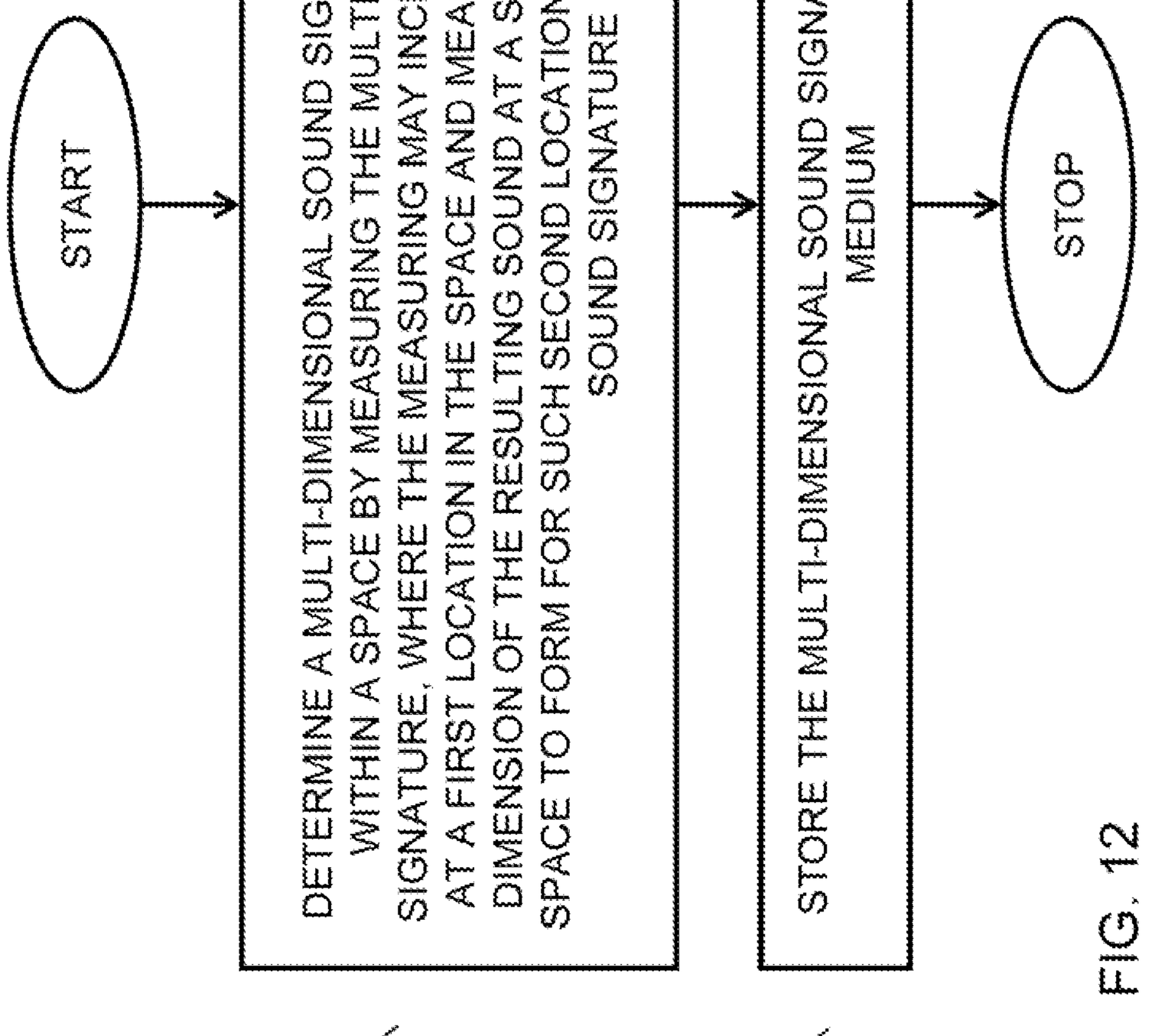

1200
START
1202
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN A SPACE BY MEASURING THE MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MEASURING MAY INCLUDE INITIATING A SOUND AT A FIRST LOCATION IN THE SPACE AND MEASURING MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT A SECOND LOCATION IN THE SPACE TO FORM FOR SUCH SECOND LOCATION THE MULTI-DIMENSIONAL SOUND SIGNATURE
1204
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURE USING A STORAGE MEDIUM
STOP

FIG. 12

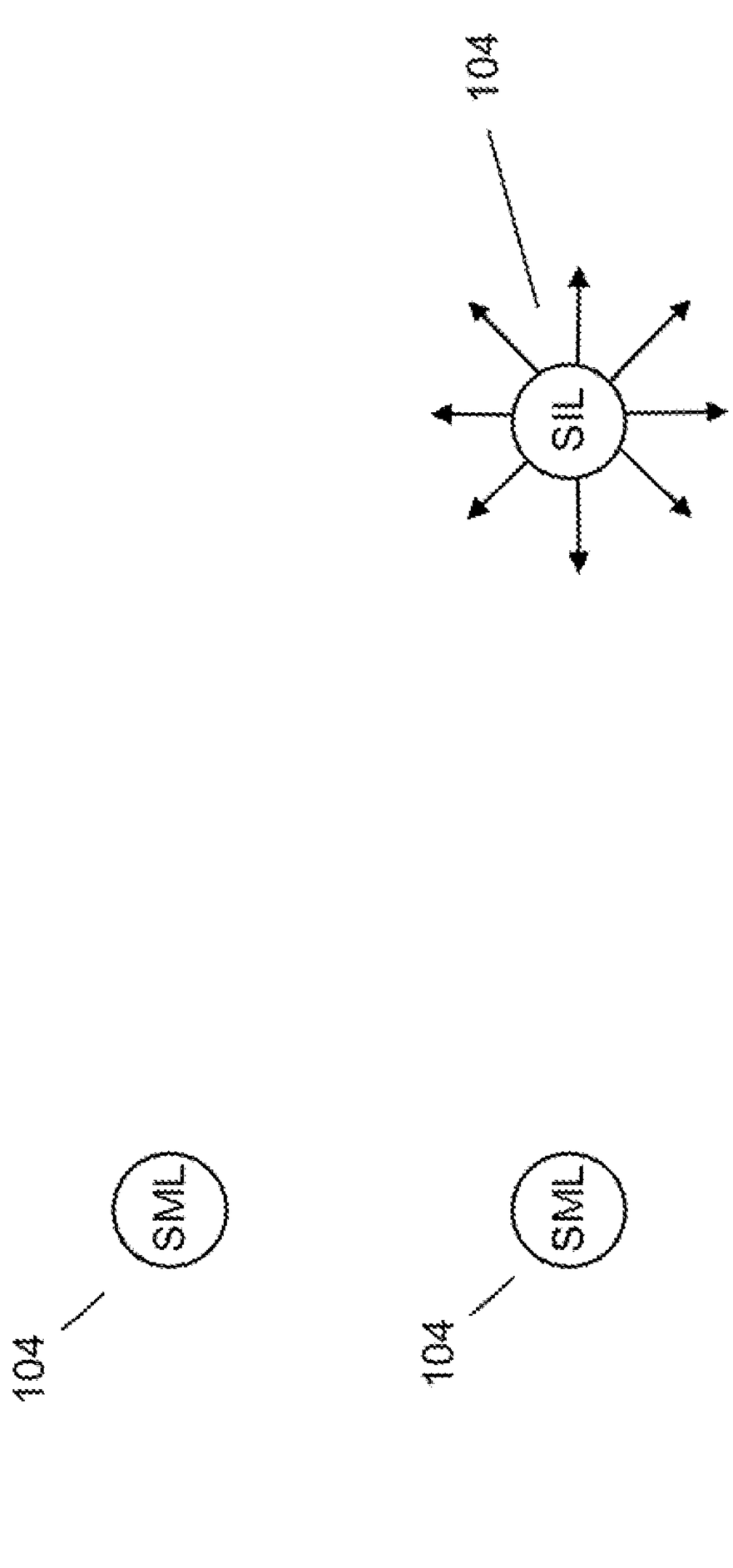


FIG 13

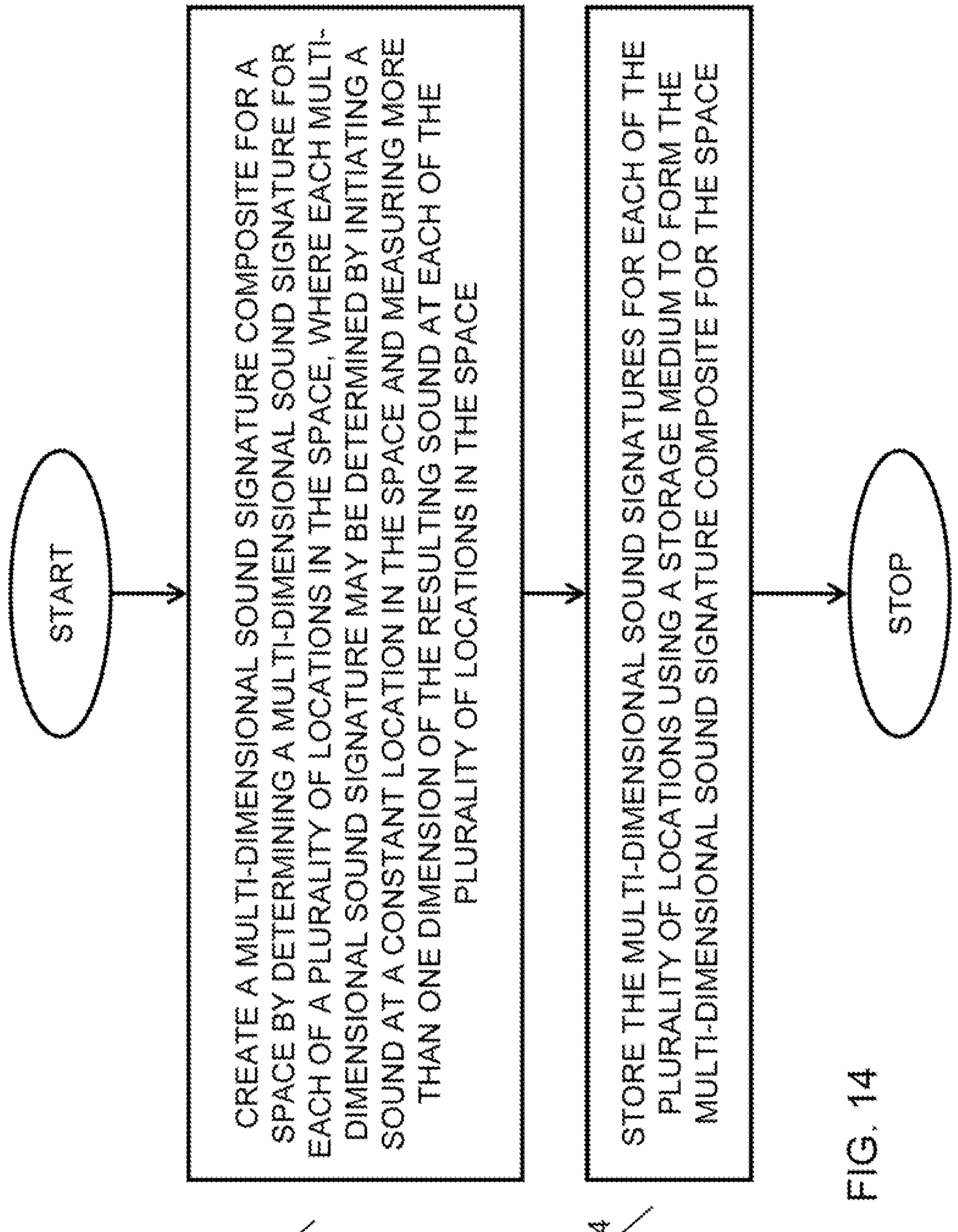

1400
START
1402
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE BY DETERMINING A MULTI-DIMENSIONAL SOUND SIGNATURE FOR EACH OF A PLURALITY OF LOCATIONS IN THE SPACE, WHERE EACH MULTI-DIMENSIONAL SOUND SIGNATURE MAY BE DETERMINED BY INITIATING A SOUND AT A CONSTANT LOCATION IN THE SPACE AND MEASURING MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT EACH OF THE PLURALITY OF LOCATIONS IN THE SPACE
1404
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES FOR EACH OF THE PLURALITY OF LOCATIONS USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
STOP

FIG. 14

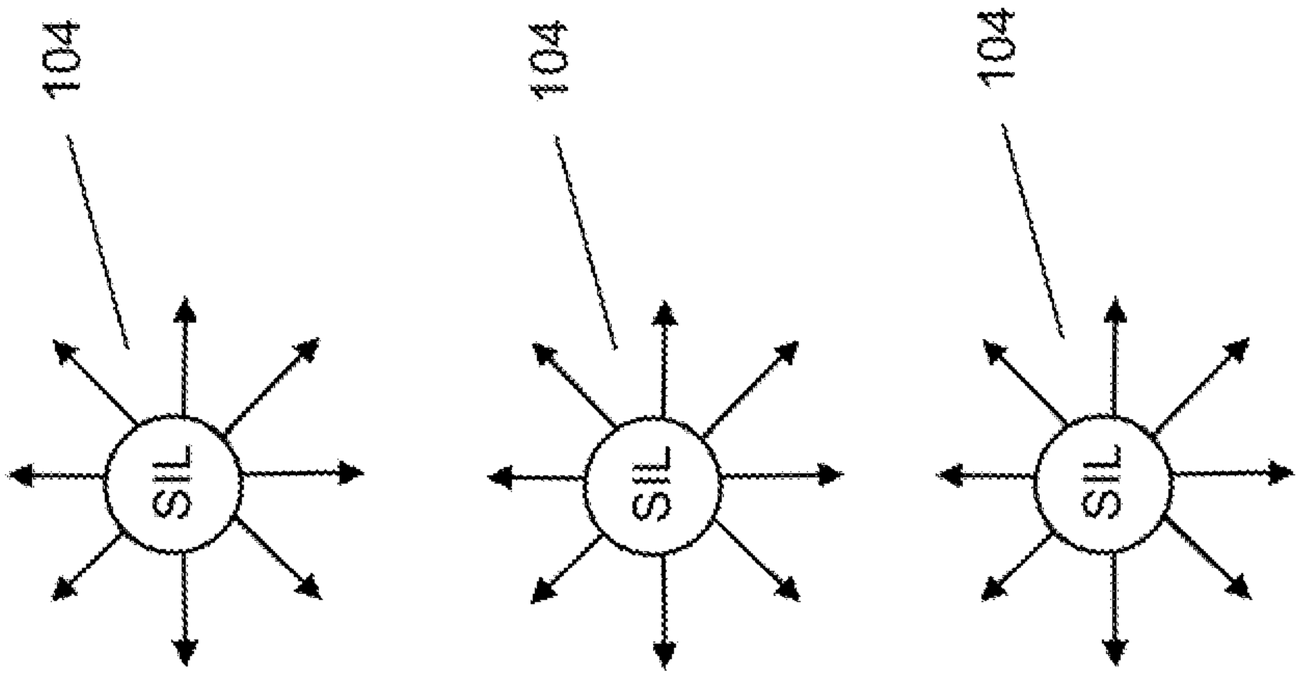


FIG 15

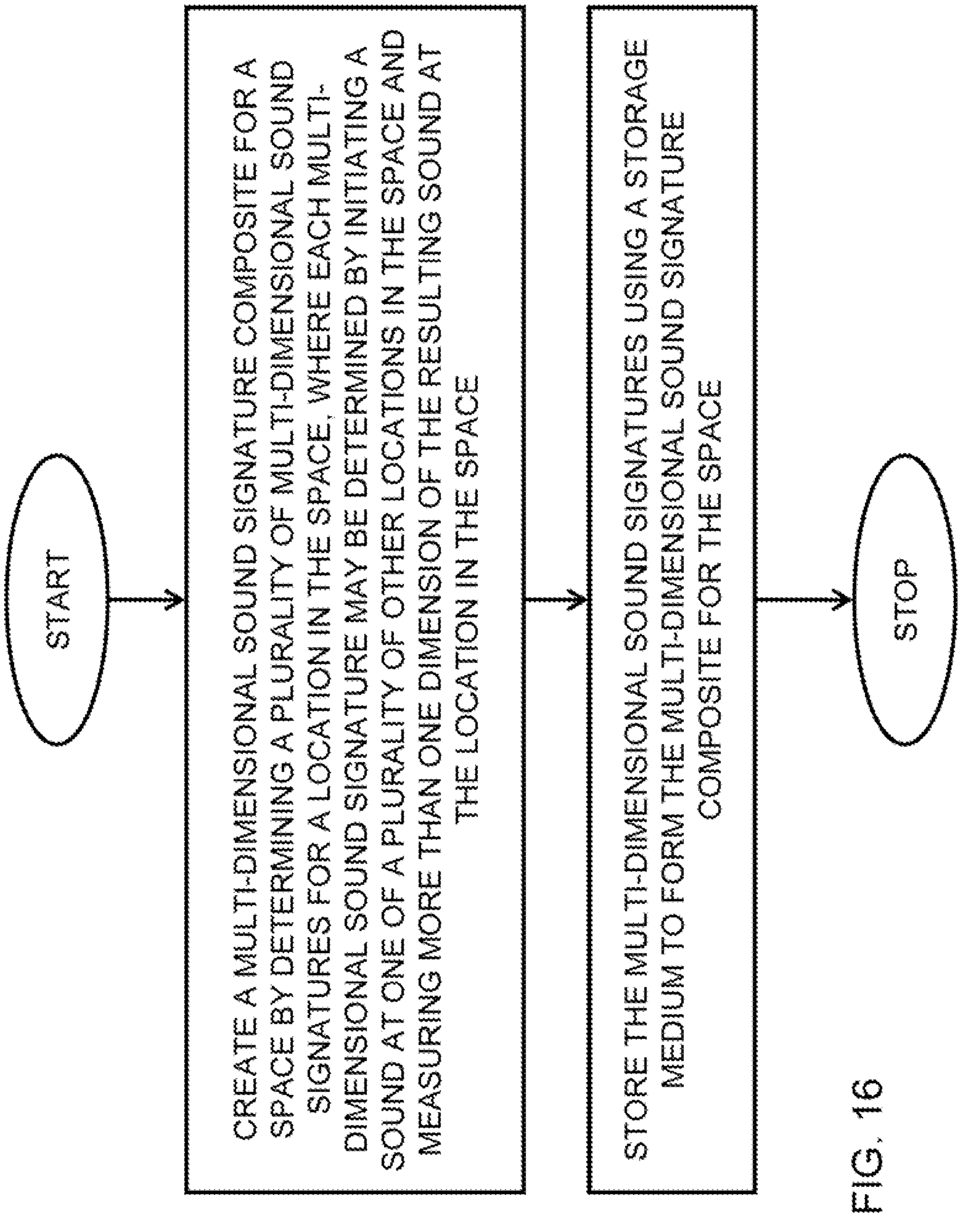

1600
START
1602
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE BY DETERMINING A PLURALITY OF MULTI-DIMENSIONAL SOUND SIGNATURES FOR A LOCATION IN THE SPACE, WHERE EACH MULTI-DIMENSIONAL SOUND SIGNATURE MAY BE DETERMINED BY INITIATING A SOUND AT ONE OF A PLURALITY OF OTHER LOCATIONS IN THE SPACE AND MEASURING MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT THE LOCATION IN THE SPACE
1604
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
STOP

FIG. 16

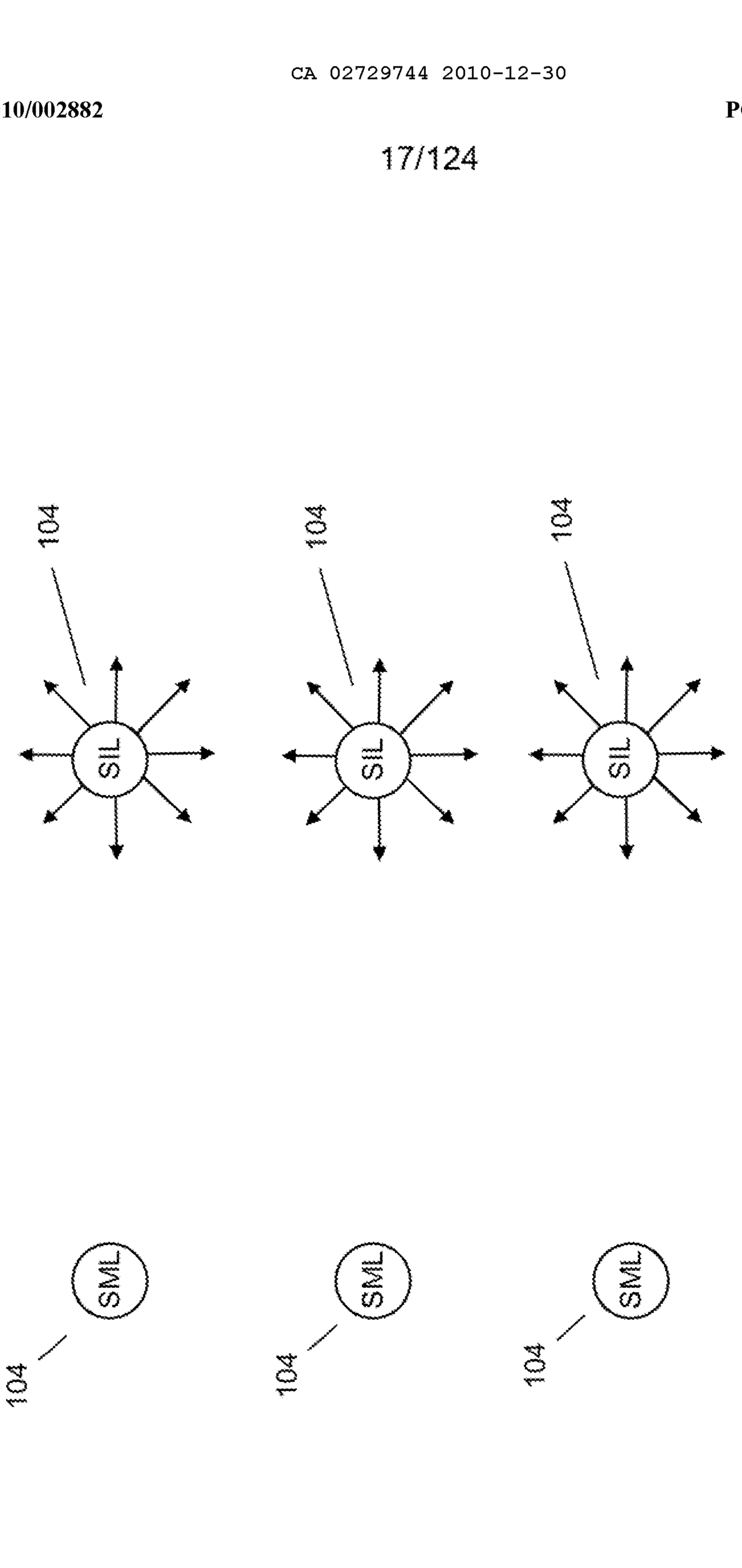


FIG 17

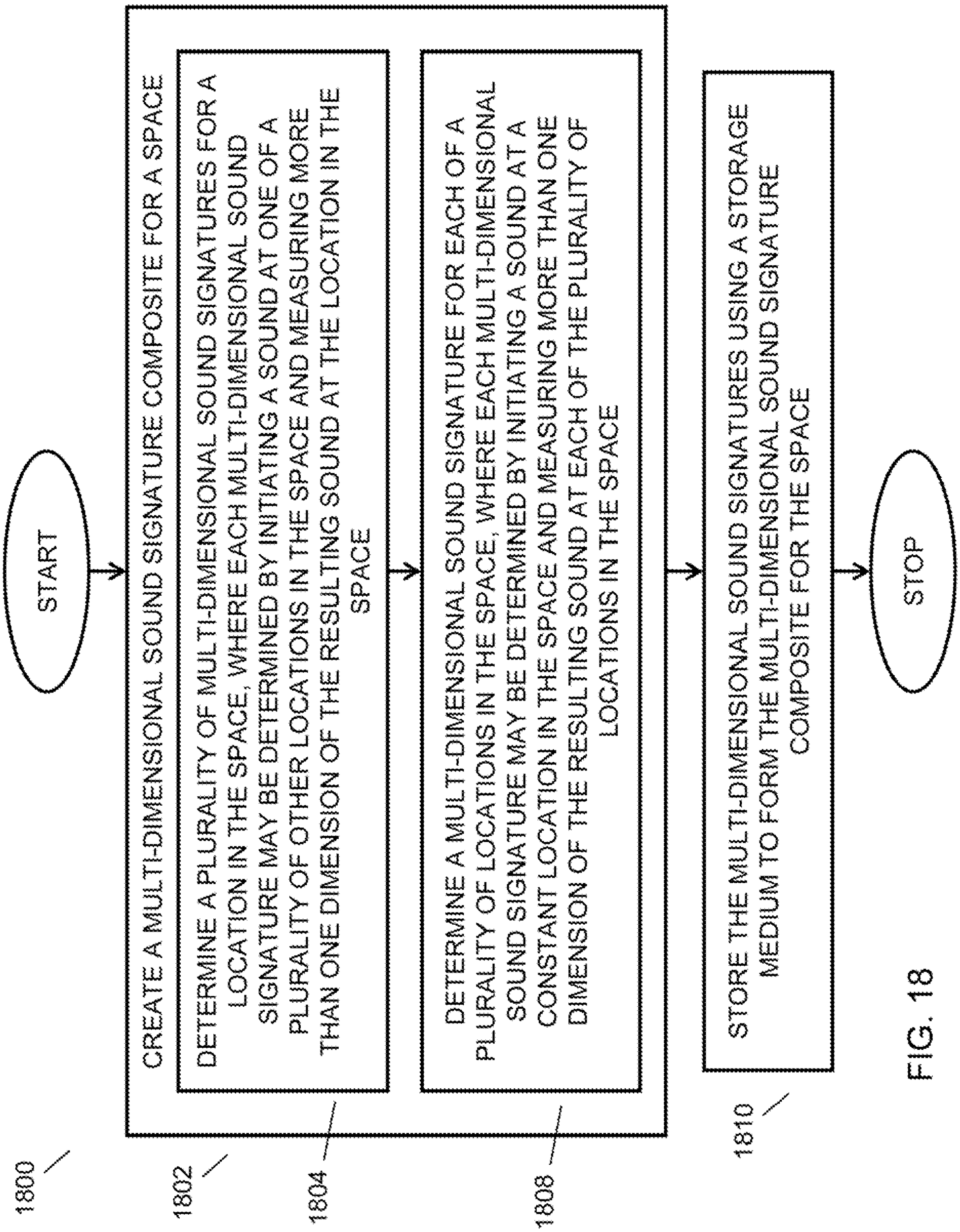

START
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
DETERMINE A PLURALITY OF MULTI-DIMENSIONAL SOUND SIGNATURES FOR A LOCATION IN THE SPACE, WHERE EACH MULTI-DIMENSIONAL SOUND SIGNATURE MAY BE DETERMINED BY INITIATING A SOUND AT ONE OF A PLURALITY OF OTHER LOCATIONS IN THE SPACE AND MEASURING MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT THE LOCATION IN THE SPACE
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR EACH OF A PLURALITY OF LOCATIONS IN THE SPACE, WHERE EACH MULTI-DIMENSIONAL SOUND SIGNATURE MAY BE DETERMINED BY INITIATING A SOUND AT A CONSTANT LOCATION IN THE SPACE AND MEASURING MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT EACH OF THE PLURALITY OF LOCATIONS IN THE SPACE
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
STOP
1800
1802
1804
1808
1810

FIG. 18

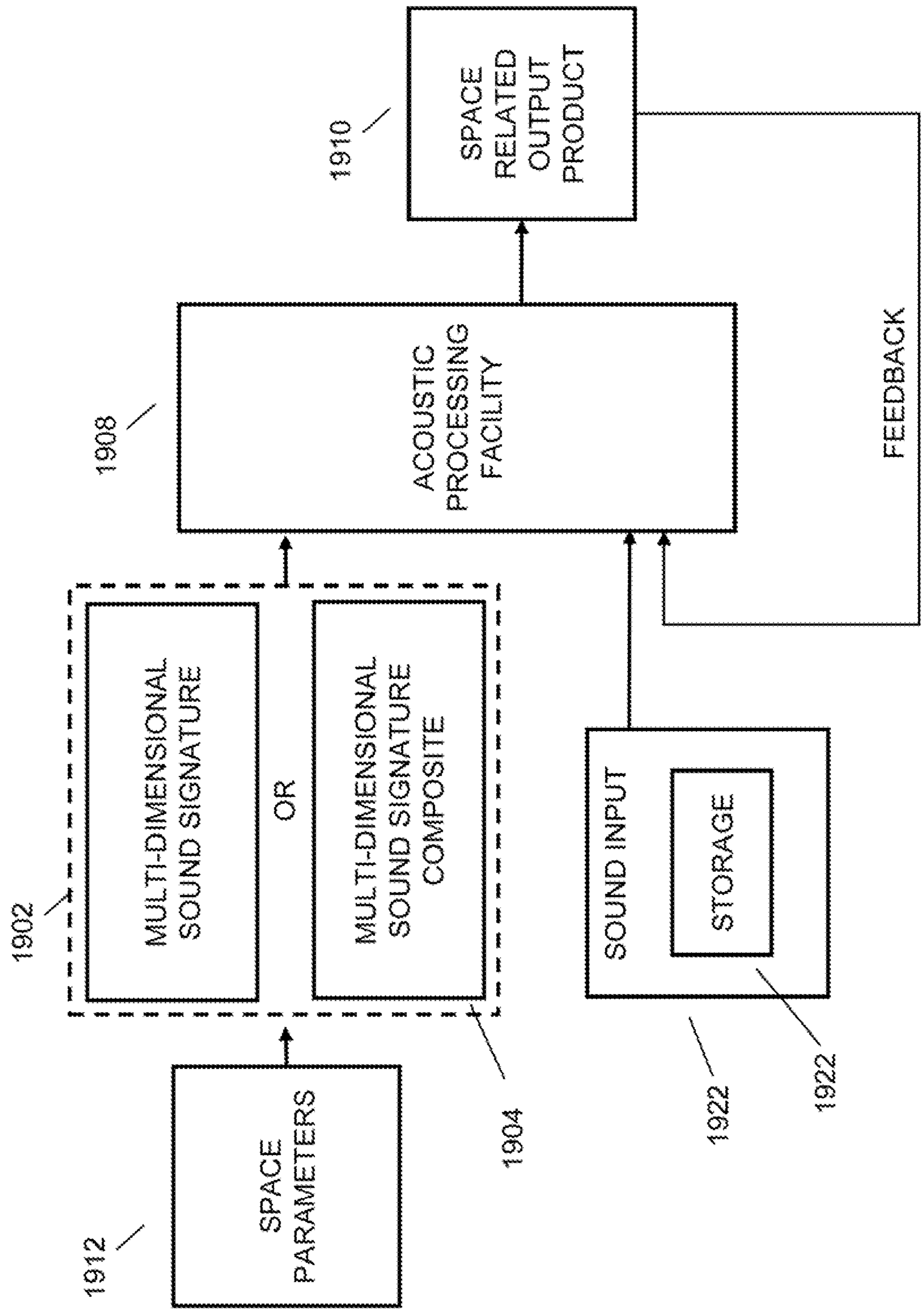
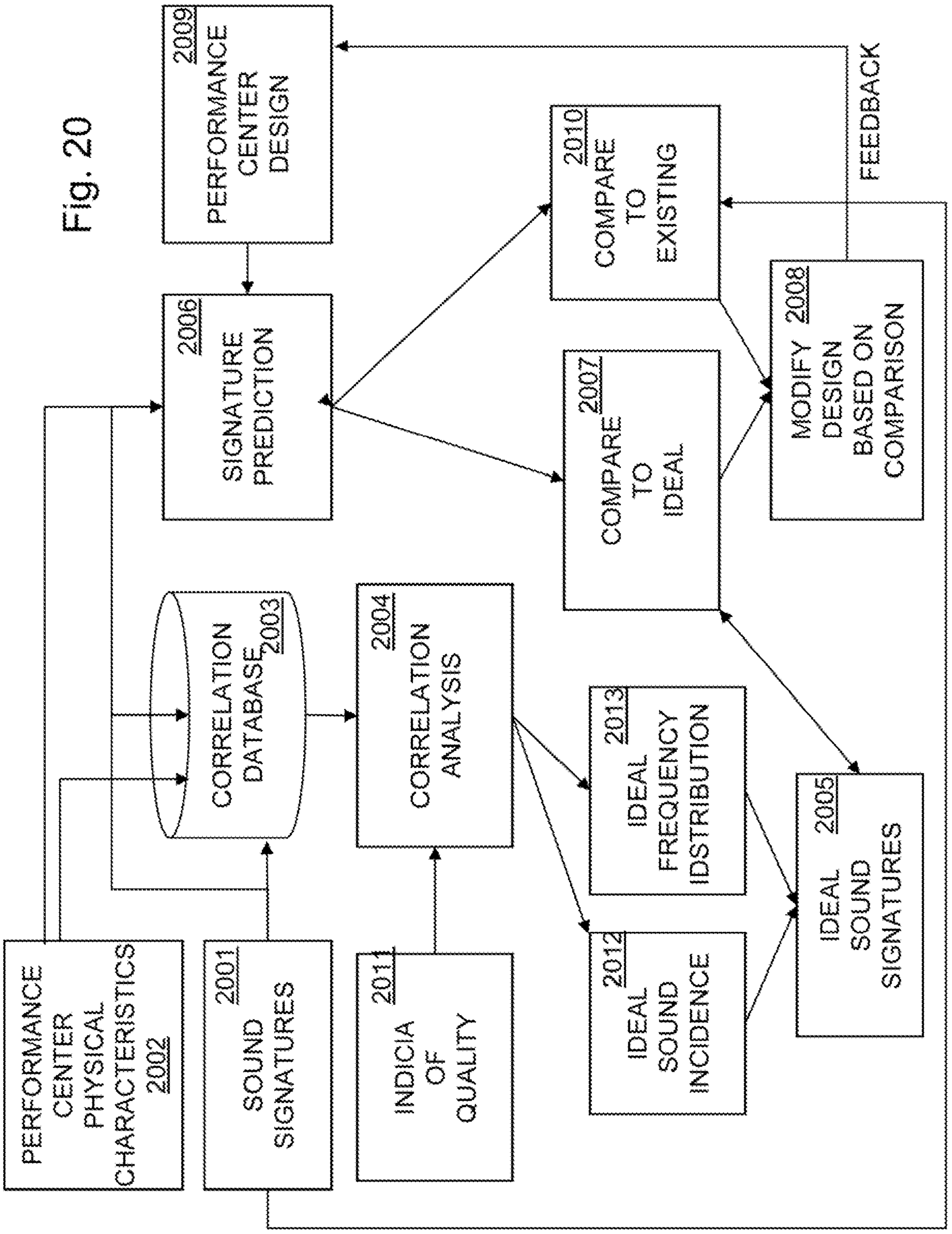

SPACE PARAMETERS
1912
SPACE RELATED OUTPUT PRODUCT
1910
ACOUSTIC PROCESSING FACILITY
1908
MULTI-DIMENSIONAL SOUND SIGNATURE
OR
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
1902
1904
FEEDBACK
SOUND INPUT
STORAGE
1922
1922

FIG. 19

Fig. 20


PERFORMANCE CENTER DESIGN 2009
SIGNATURE PREDICTION 2006
COMPARE TO EXISTING 2010
COMPARE TO IDEAL 2007
MODIFY DESIGN BASED ON COMPARISON 2008
FEEDBACK
PERFORMANCE CENTER PHYSICAL CHARACTERISTICS 2002
SOUND SIGNATURES 2001
INDICIA OF QUALITY 2011
CORRELATION DATABASE 2003
CORRELATION ANALYSIS 2004
IDEAL FREQUENCY IDSTRIBUTION 2013
IDEAL SOUND INCIDENCE 2012
IDEAL SOUND SIGNATURES 2005

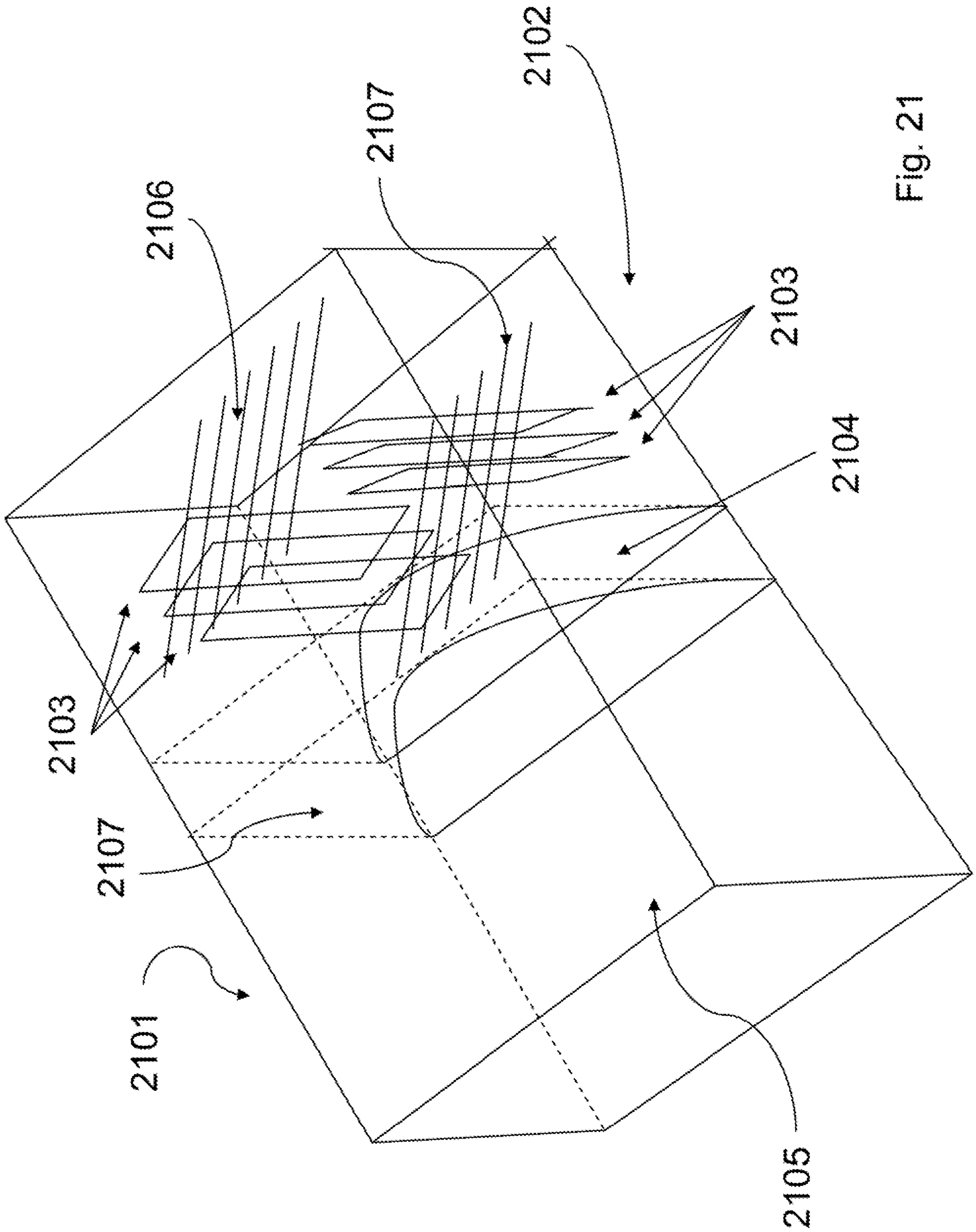


Fig. 21

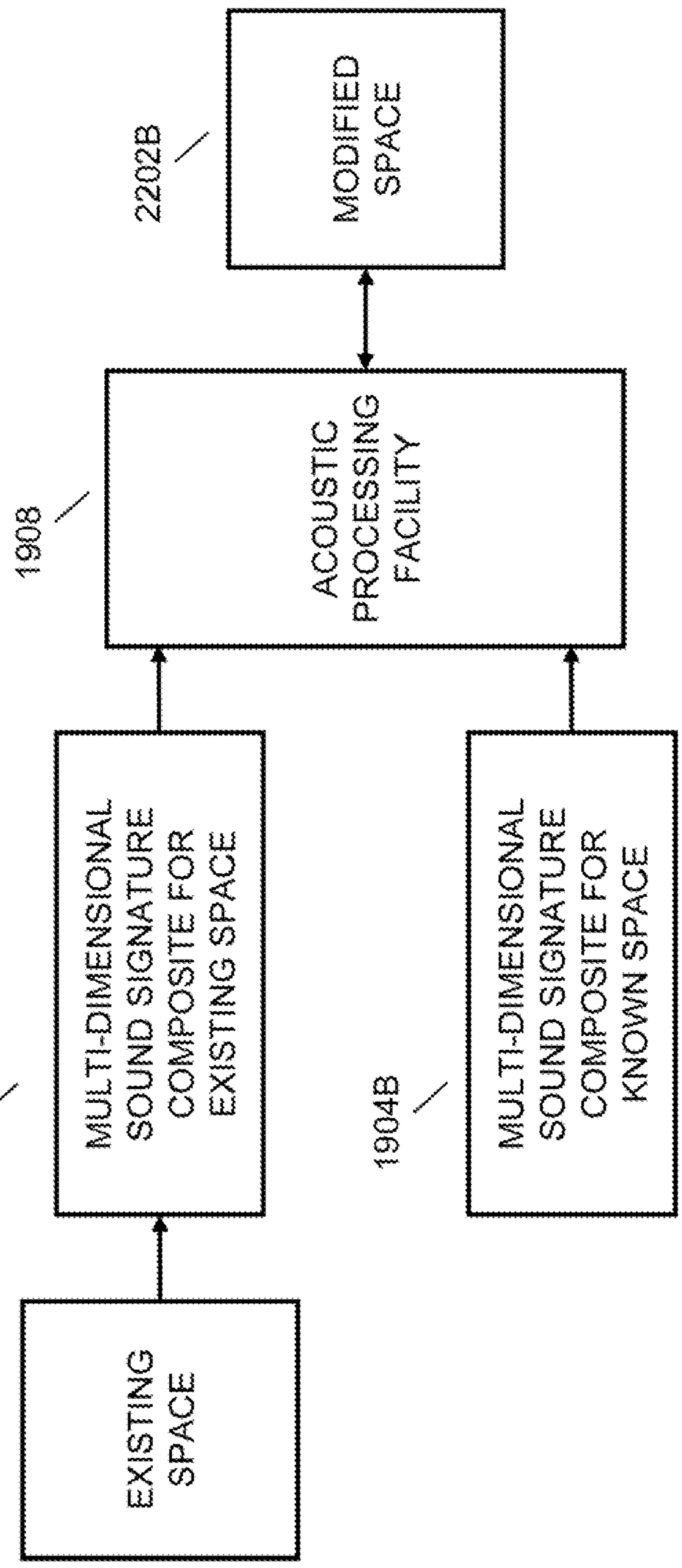

2202A
EXISTING SPACE
1904A
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR EXISTING SPACE
1908
ACOUSTIC PROCESSING FACILITY
1904B
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR KNOWN SPACE
2202B
MODIFIED SPACE

FIG. 22

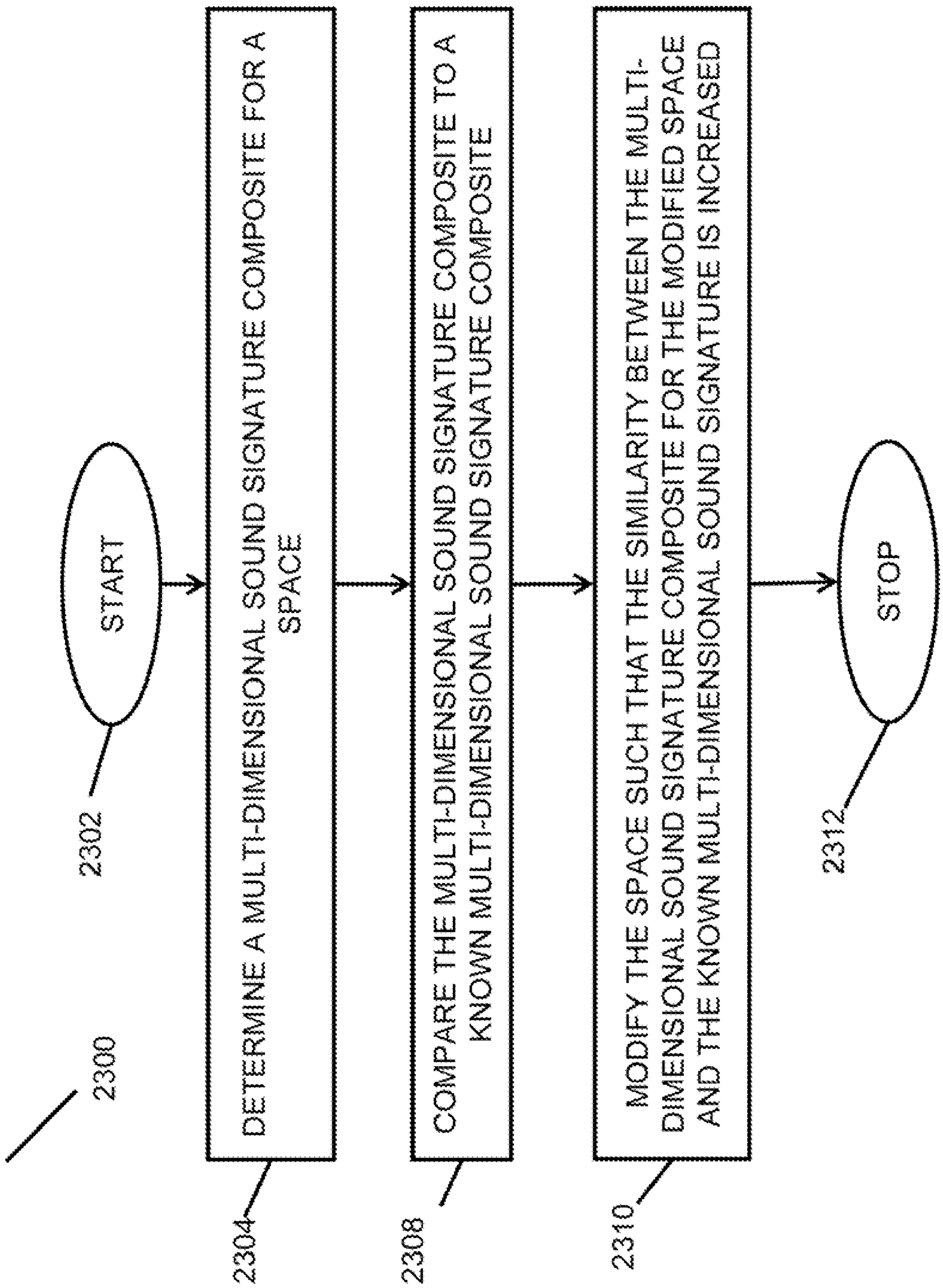

2300
START
2302
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
2304
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2308
MODIFY THE SPACE SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE MODIFIED SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE IS INCREASED
2310
STOP
2312

FIG. 23

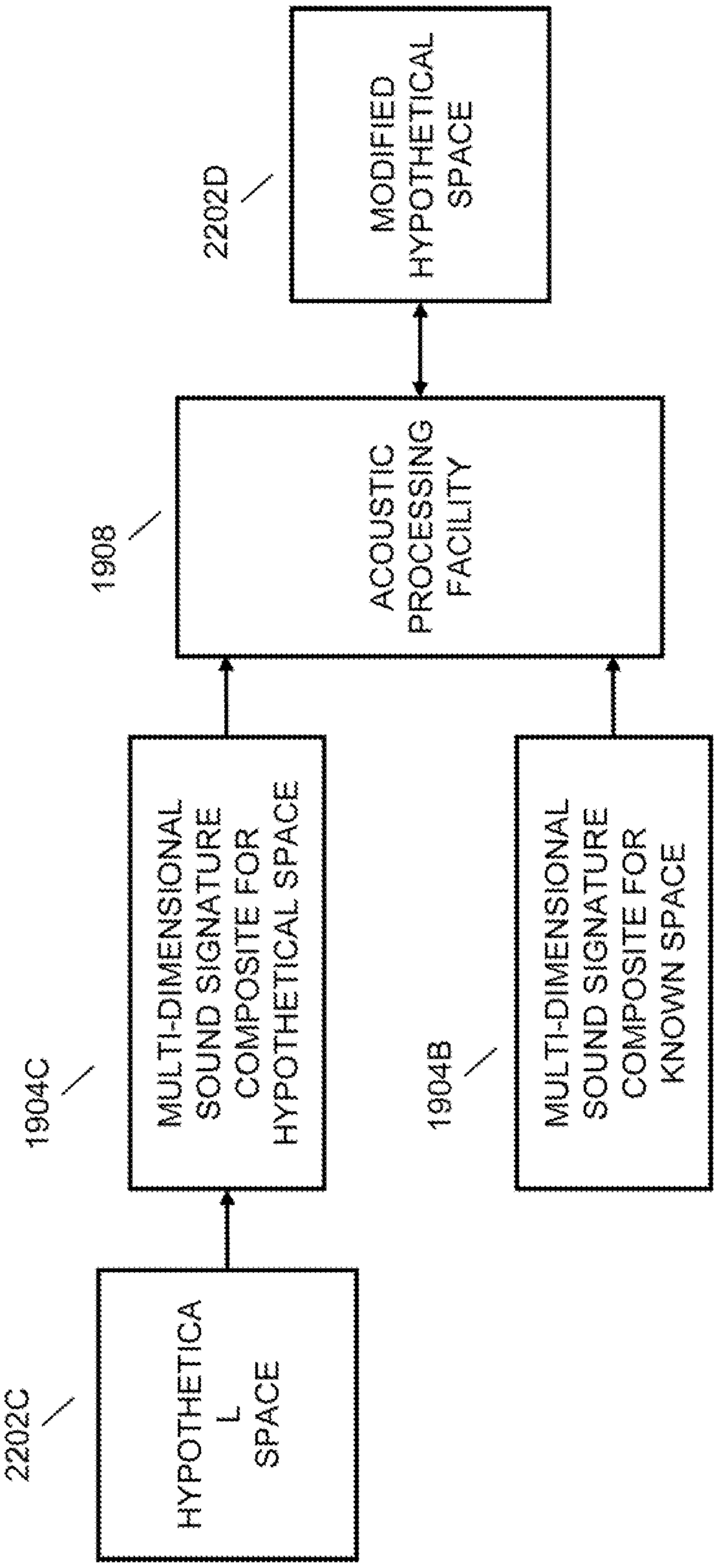

2202D
MODIFIED HYPOTHETICAL SPACE
1908
ACOUSTIC PROCESSING FACILITY
1904C
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR HYPOTHETICAL SPACE
1904B
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR KNOWN SPACE
2202C
HYPOTHETICAL SPACE

FIG. 24

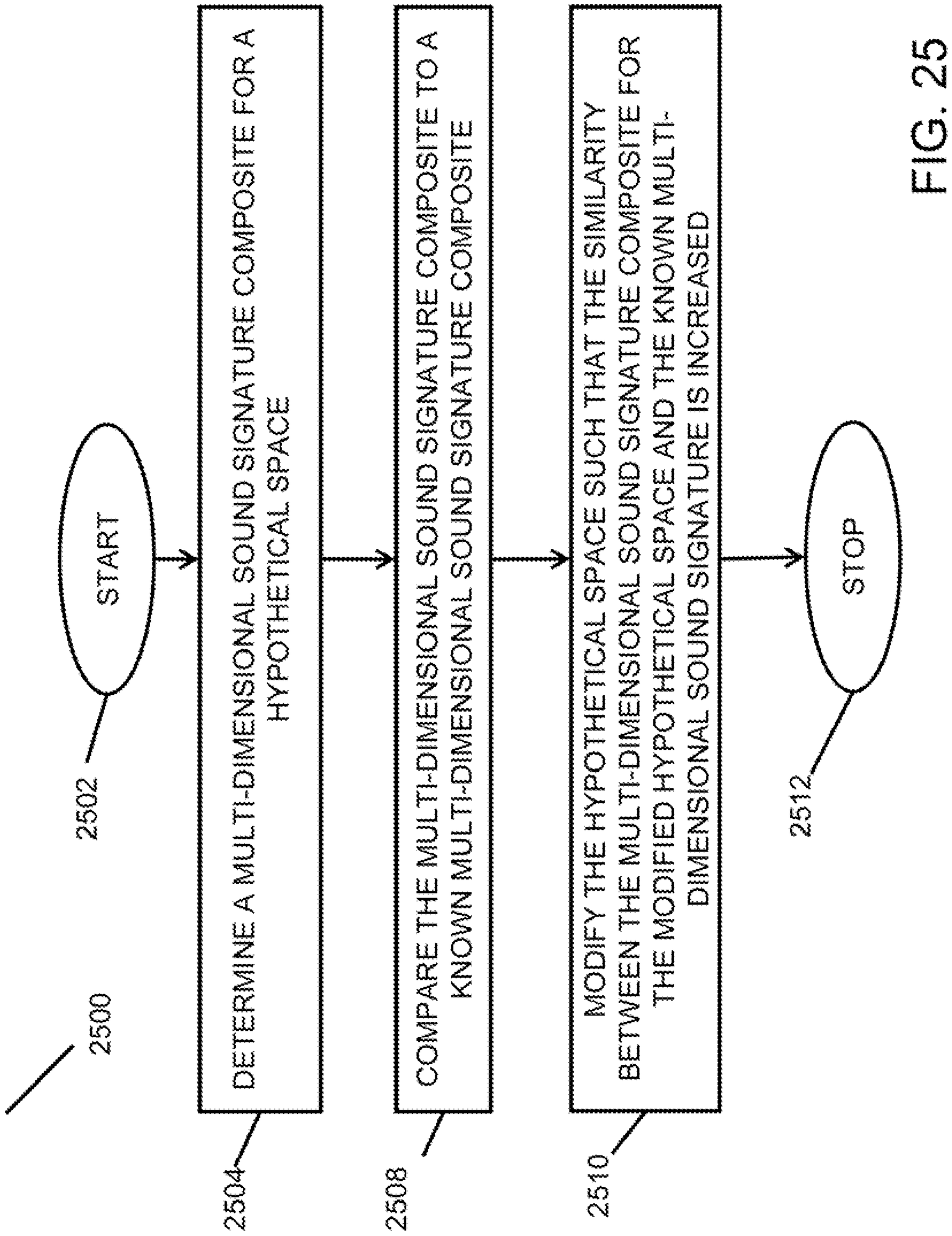

START
2500
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE
2502
2504
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2508
MODIFY THE HYPOTHETICAL SPACE SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE MODIFIED HYPOTHETICAL SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE IS INCREASED
2510
STOP
2512

FIG. 25

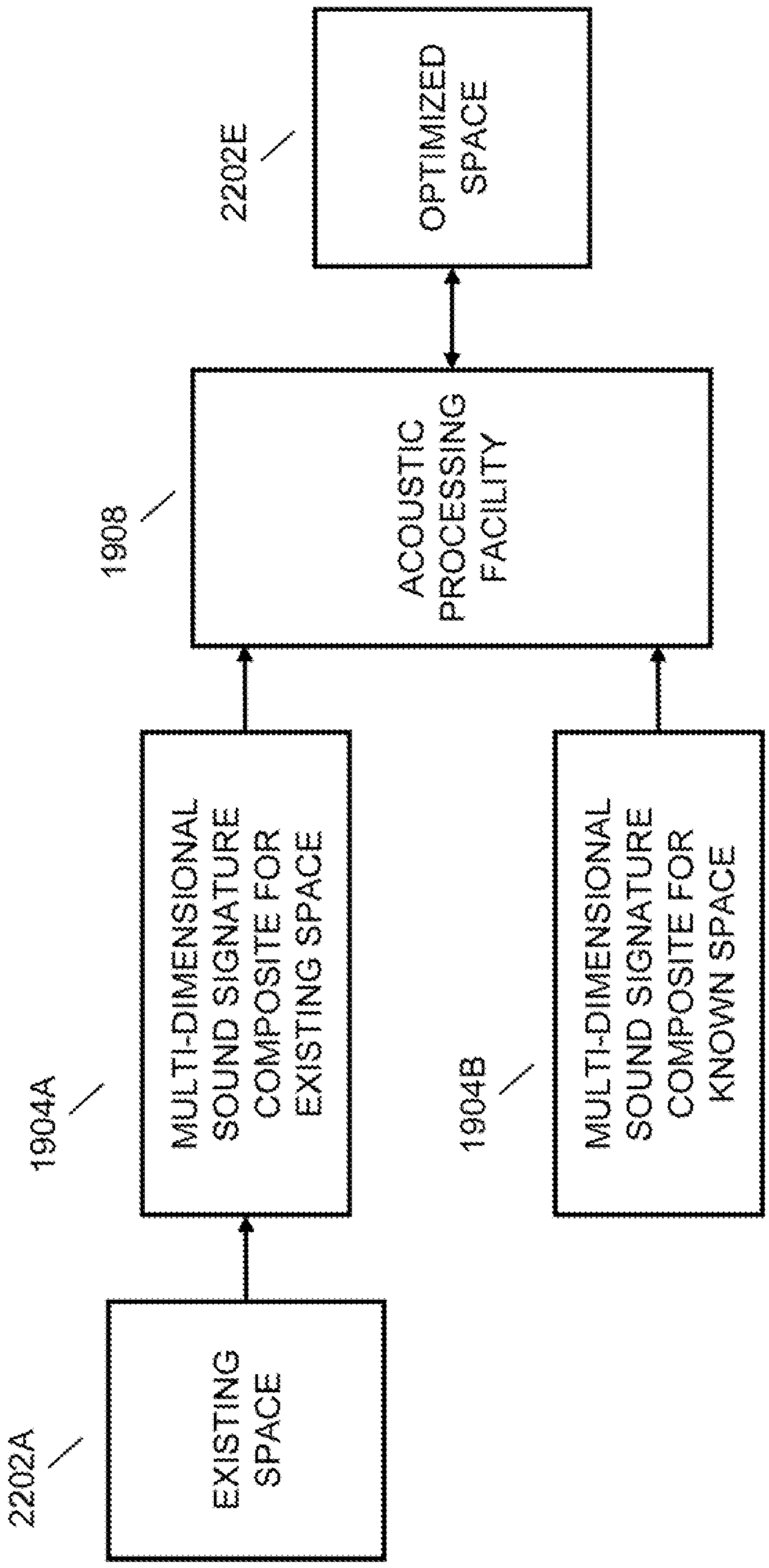

2202E
OPTIMIZED SPACE
1908
ACOUSTIC PROCESSING FACILITY
1904A
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR EXISTING SPACE
1904B
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR KNOWN SPACE
2202A
EXISTING SPACE

FIG. 26

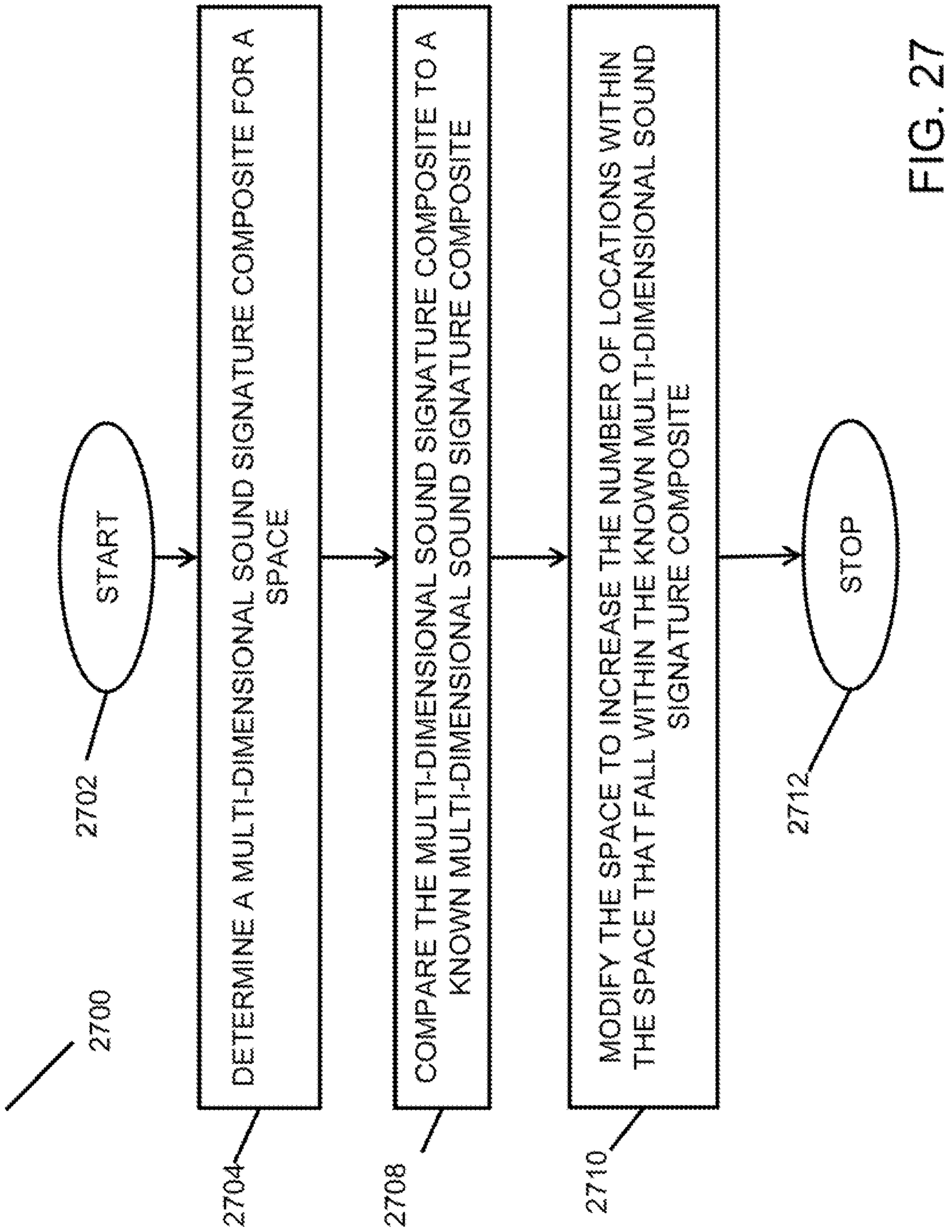

2700
START
2702
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
2704
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2708
MODIFY THE SPACE TO INCREASE THE NUMBER OF LOCATIONS WITHIN THE SPACE THAT FALL WITHIN THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2710
STOP
2712

FIG. 27

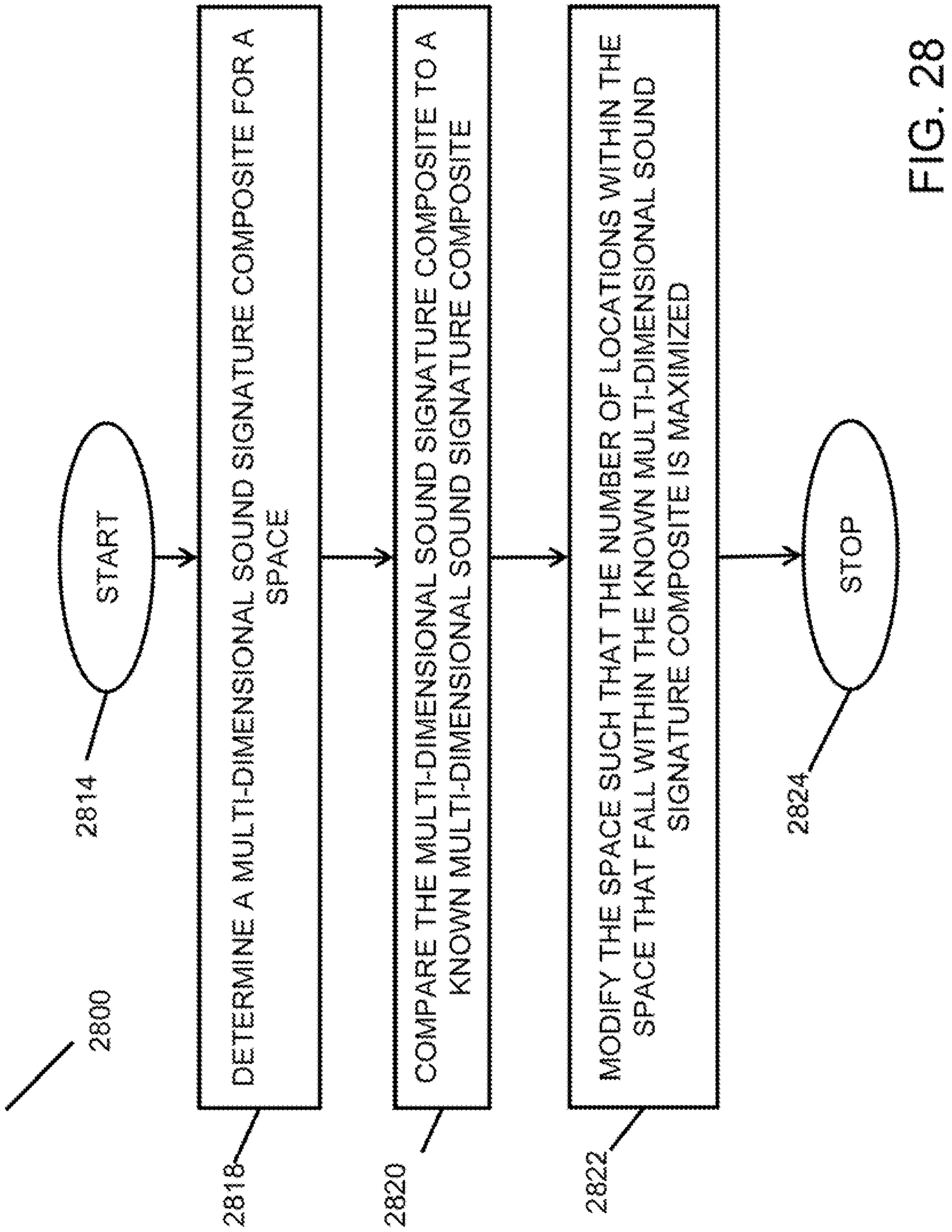

2800
START
2814
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
2818
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2820
MODIFY THE SPACE SUCH THAT THE NUMBER OF LOCATIONS WITHIN THE SPACE THAT FALL WITHIN THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IS MAXIMIZED
2822
STOP
2824

FIG. 28

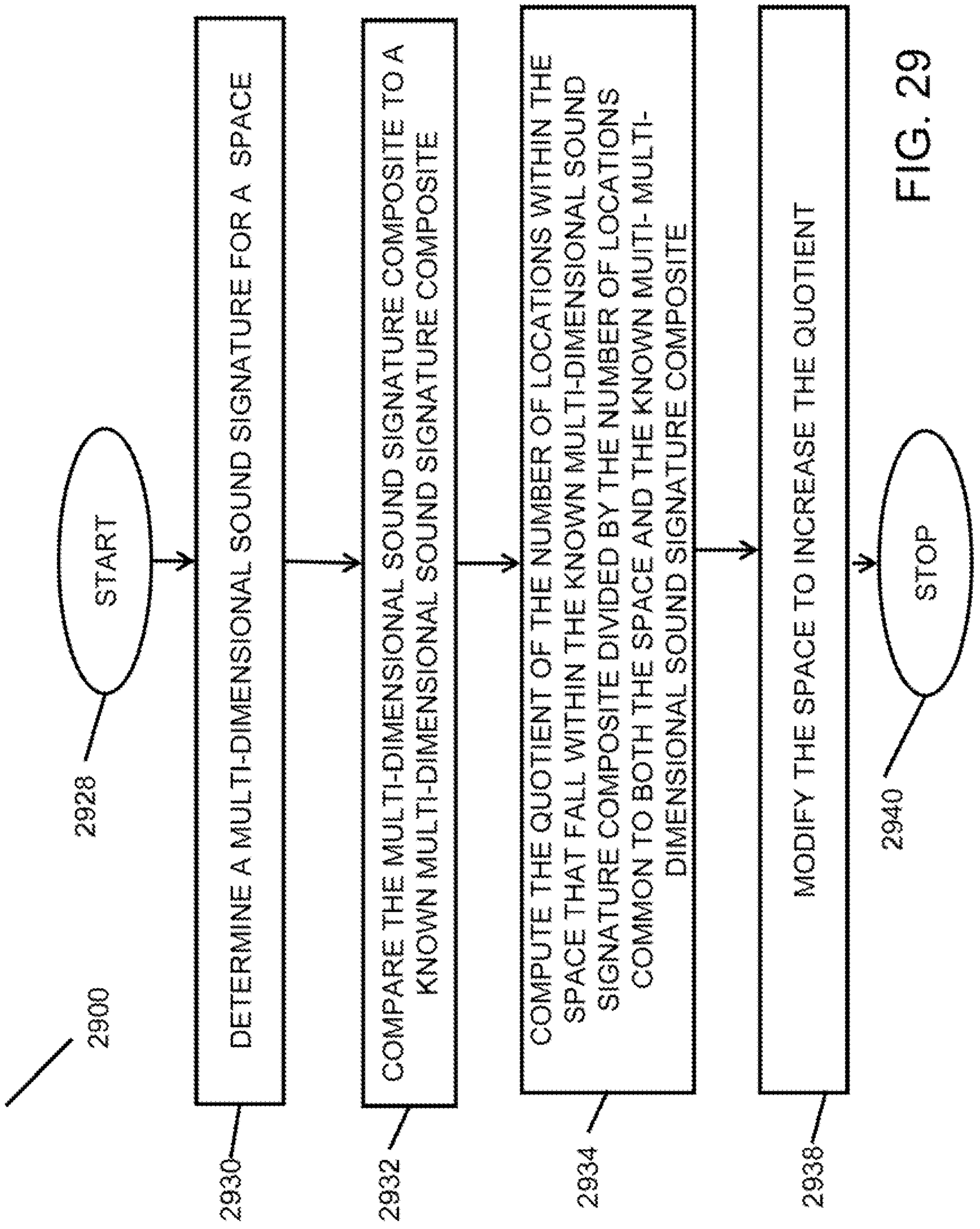

START
2928
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A SPACE
2930
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2932
COMPUTE THE QUOTIENT OF THE NUMBER OF LOCATIONS WITHIN THE SPACE THAT FALL WITHIN THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE DIVIDED BY THE NUMBER OF LOCATIONS COMMON TO BOTH THE SPACE AND THE KNOWN MUITI- MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
2934
2938
MODIFY THE SPACE TO INCREASE THE QUOTIENT
2940
STOP
2900

FIG. 29

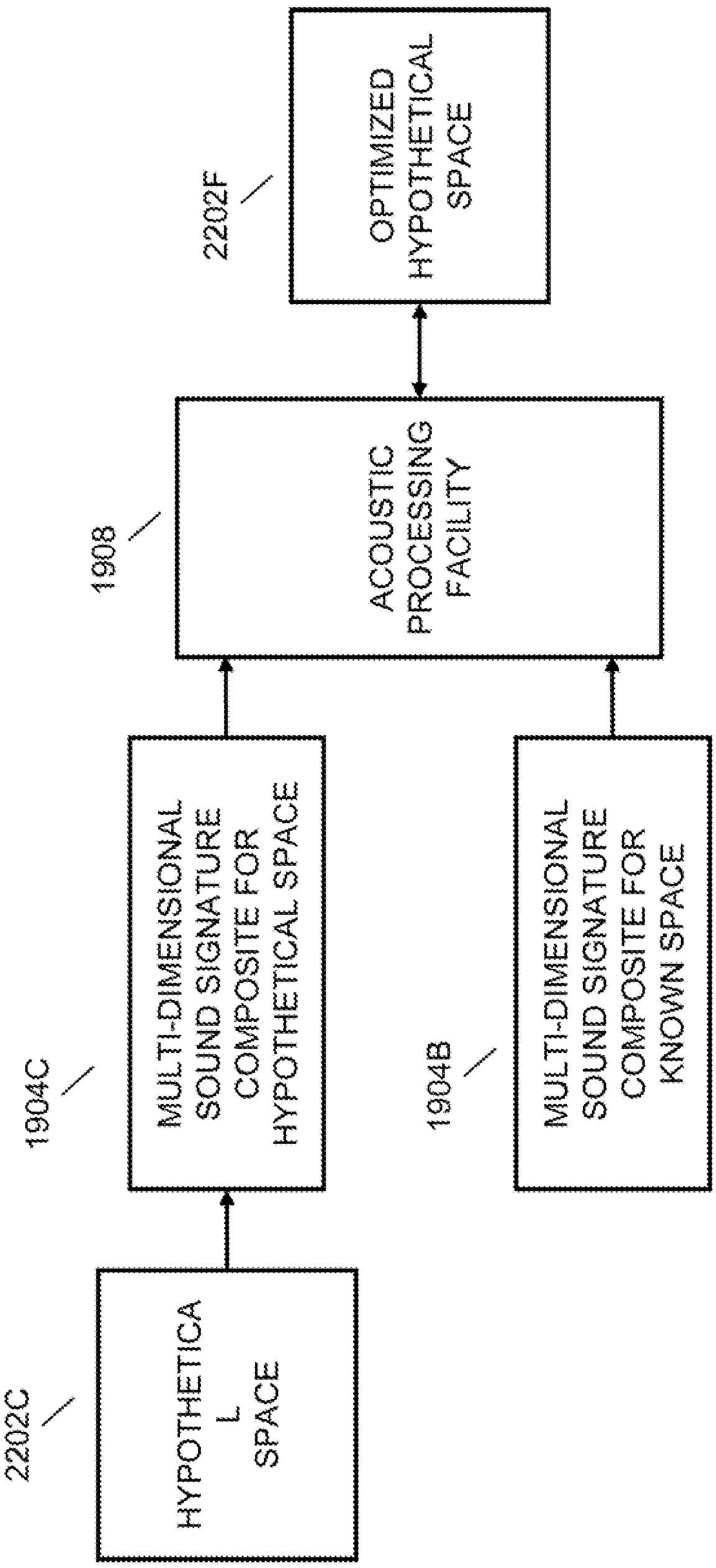

2202F
OPTIMIZED HYPOTHETICAL SPACE
1908
ACOUSTIC PROCESSING FACILITY
1904C
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR HYPOTHETICAL SPACE
1904B
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR KNOWN SPACE
2202C
HYPOTHETICAL SPACE

FIG. 30

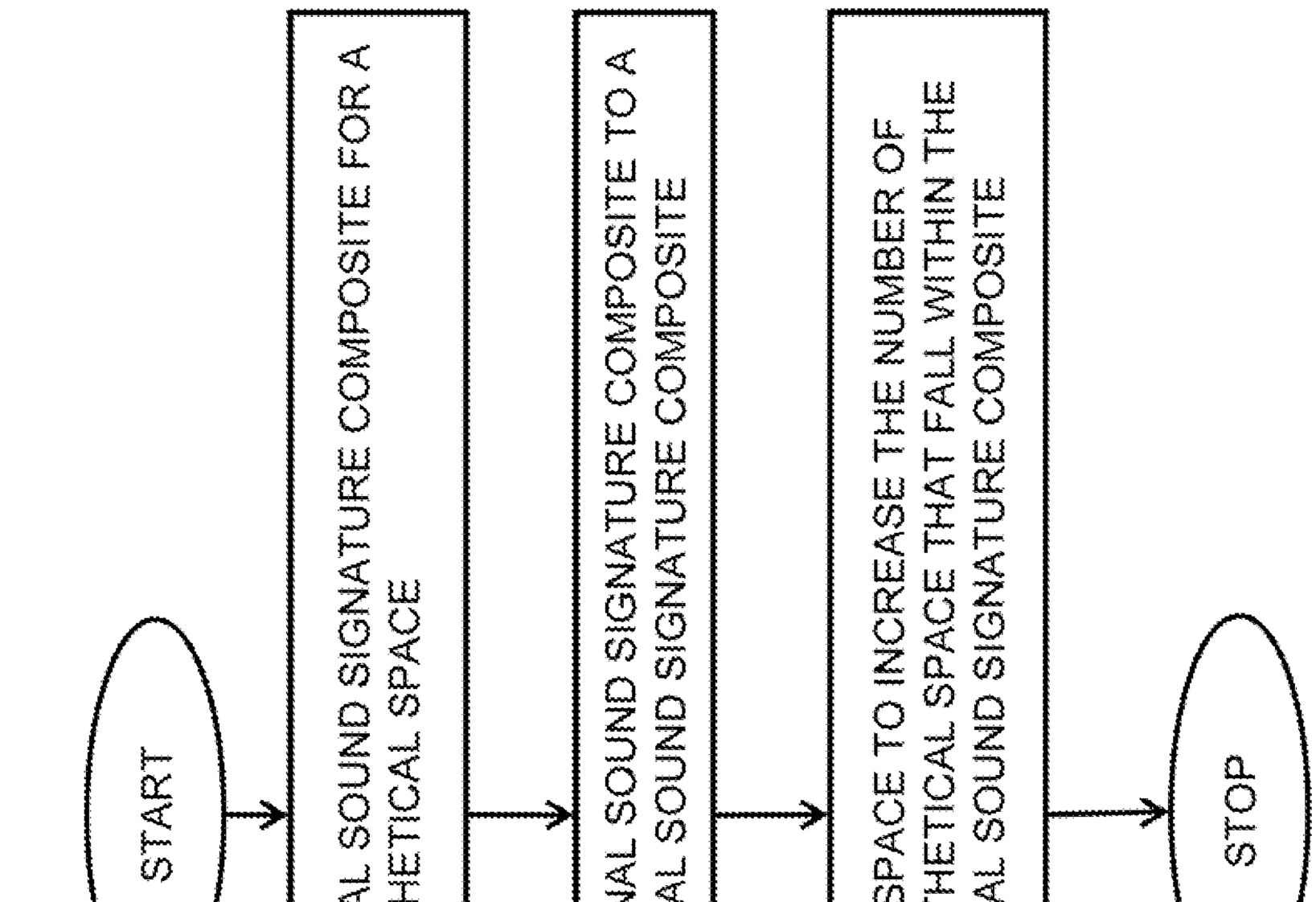

3100
START
3102
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE
3104
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
3108
MODIFY THE HYPOTHETICAL SPACE TO INCREASE THE NUMBER OF LOCATIONS WITHIN THE HYPOTHETICAL SPACE THAT FALL WITHIN THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
3110
STOP
3112

FIG. 31

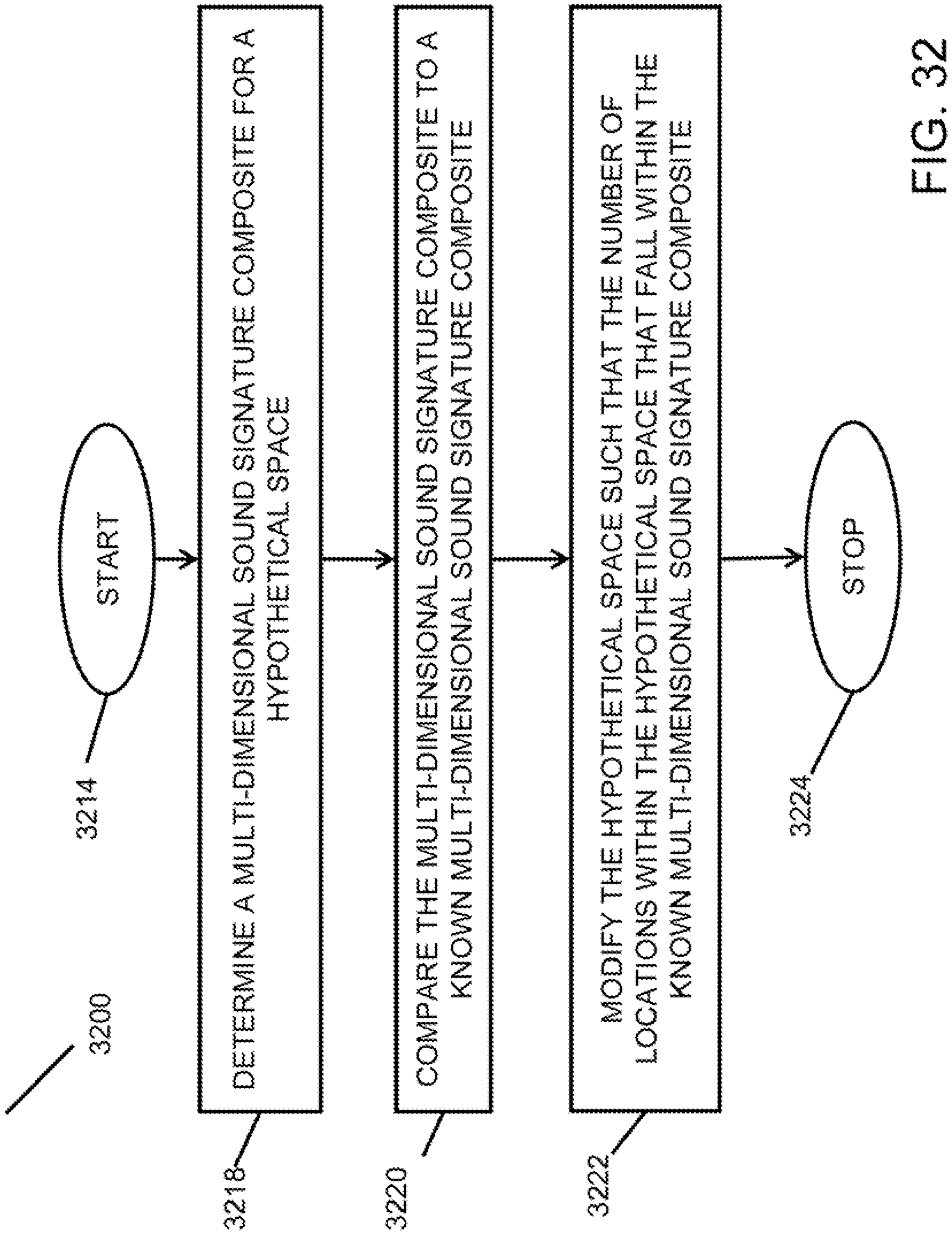

3200
START
3214
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE
3218
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
3220
MODIFY THE HYPOTHETICAL SPACE SUCH THAT THE NUMBER OF LOCATIONS WITHIN THE HYPOTHETICAL SPACE THAT FALL WITHIN THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
3222
STOP
3224

FIG. 32

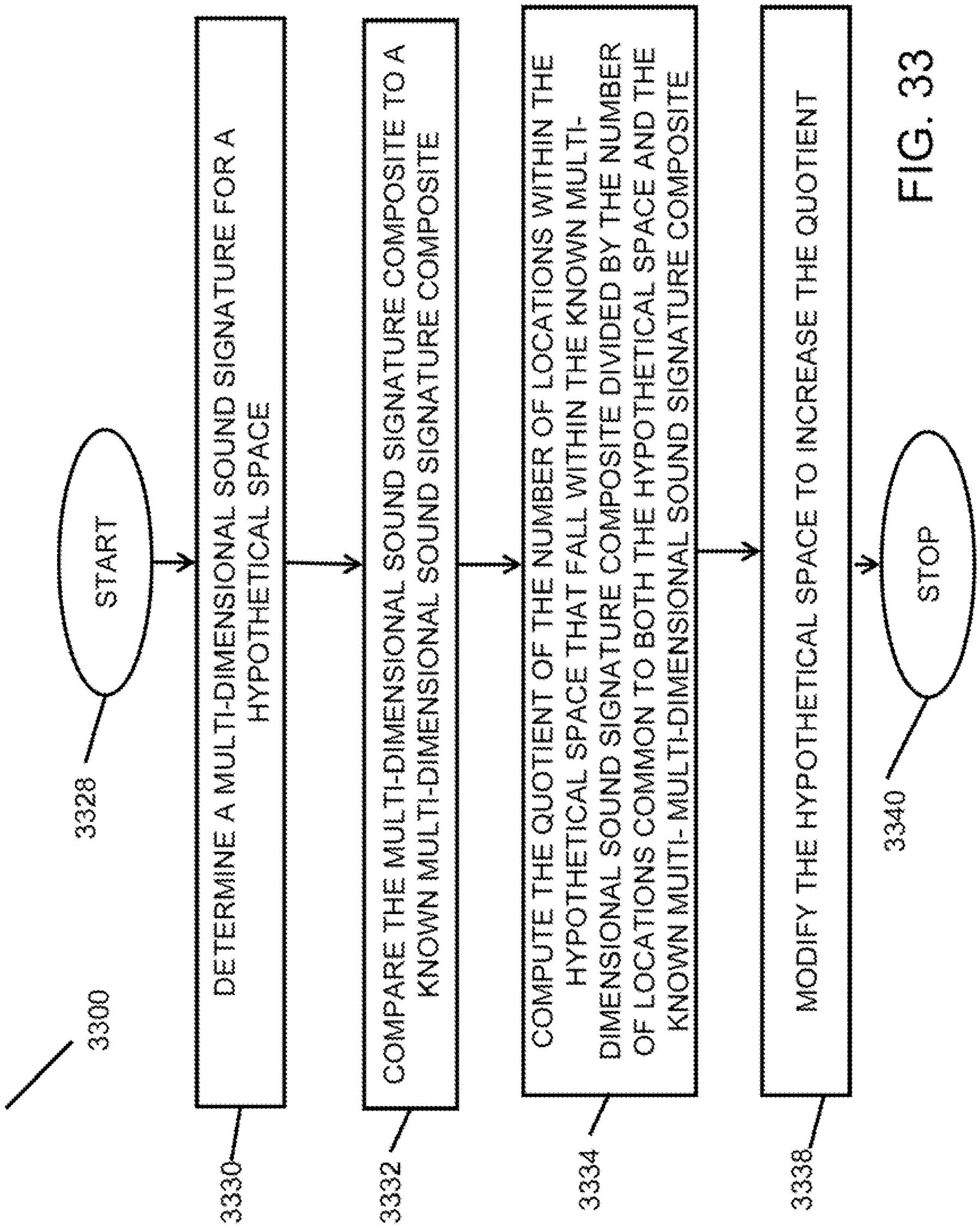

3300
START
3328
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A HYPOTHETICAL SPACE
3330
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
3332
COMPUTE THE QUOTIENT OF THE NUMBER OF LOCATIONS WITHIN THE HYPOTHETICAL SPACE THAT FALL WITHIN THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE DIVIDED BY THE NUMBER OF LOCATIONS COMMON TO BOTH THE HYPOTHETICAL SPACE AND THE KNOWN MUITI- MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
3334
MODIFY THE HYPOTHETICAL SPACE TO INCREASE THE QUOTIENT
3338
STOP
3340

FIG. 33

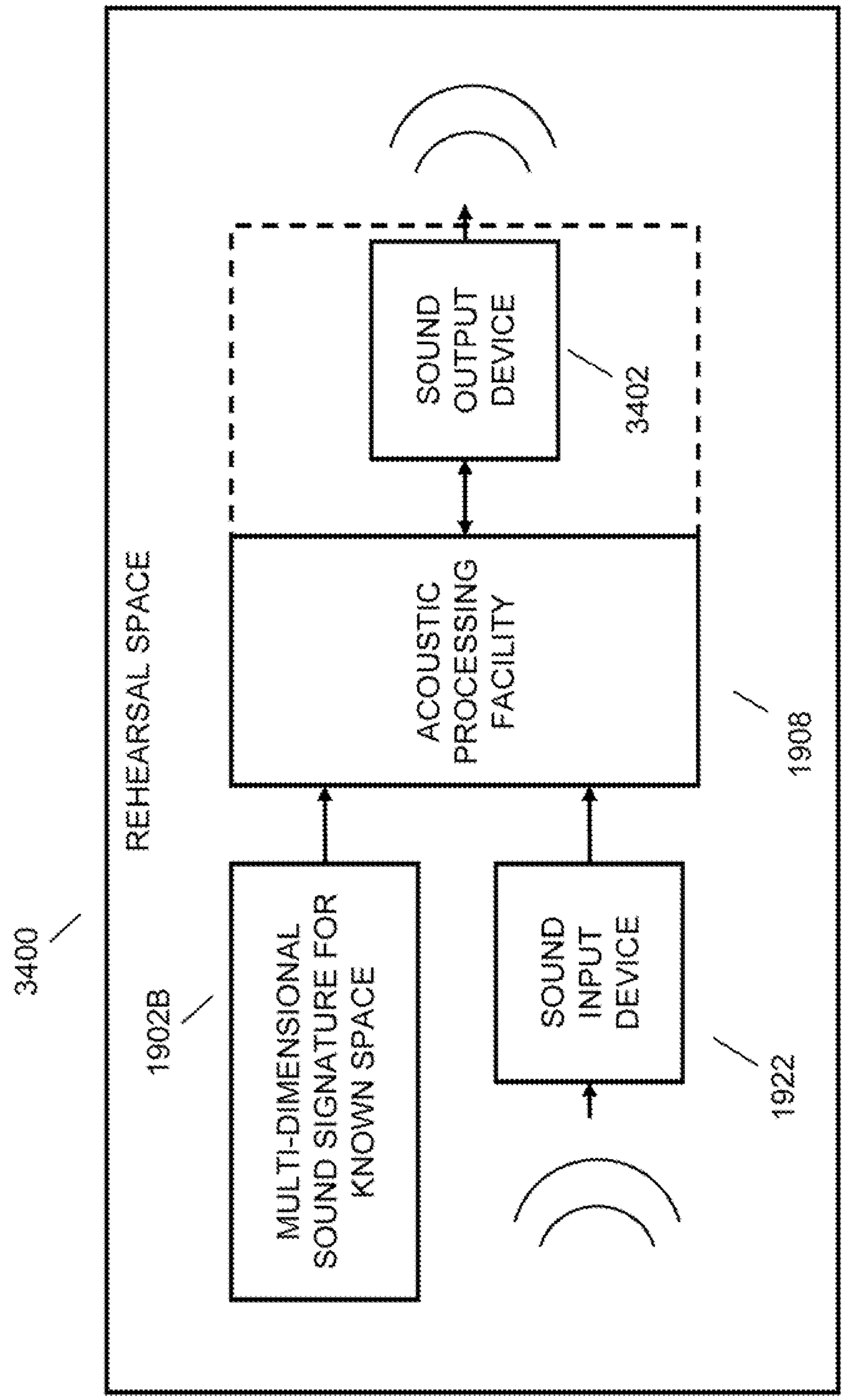

3400
REHEARSAL SPACE
1902B
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE
SOUND INPUT DEVICE
1922
ACOUSTIC PROCESSING FACILITY
1908
SOUND OUTPUT DEVICE
3402

FIG. 34

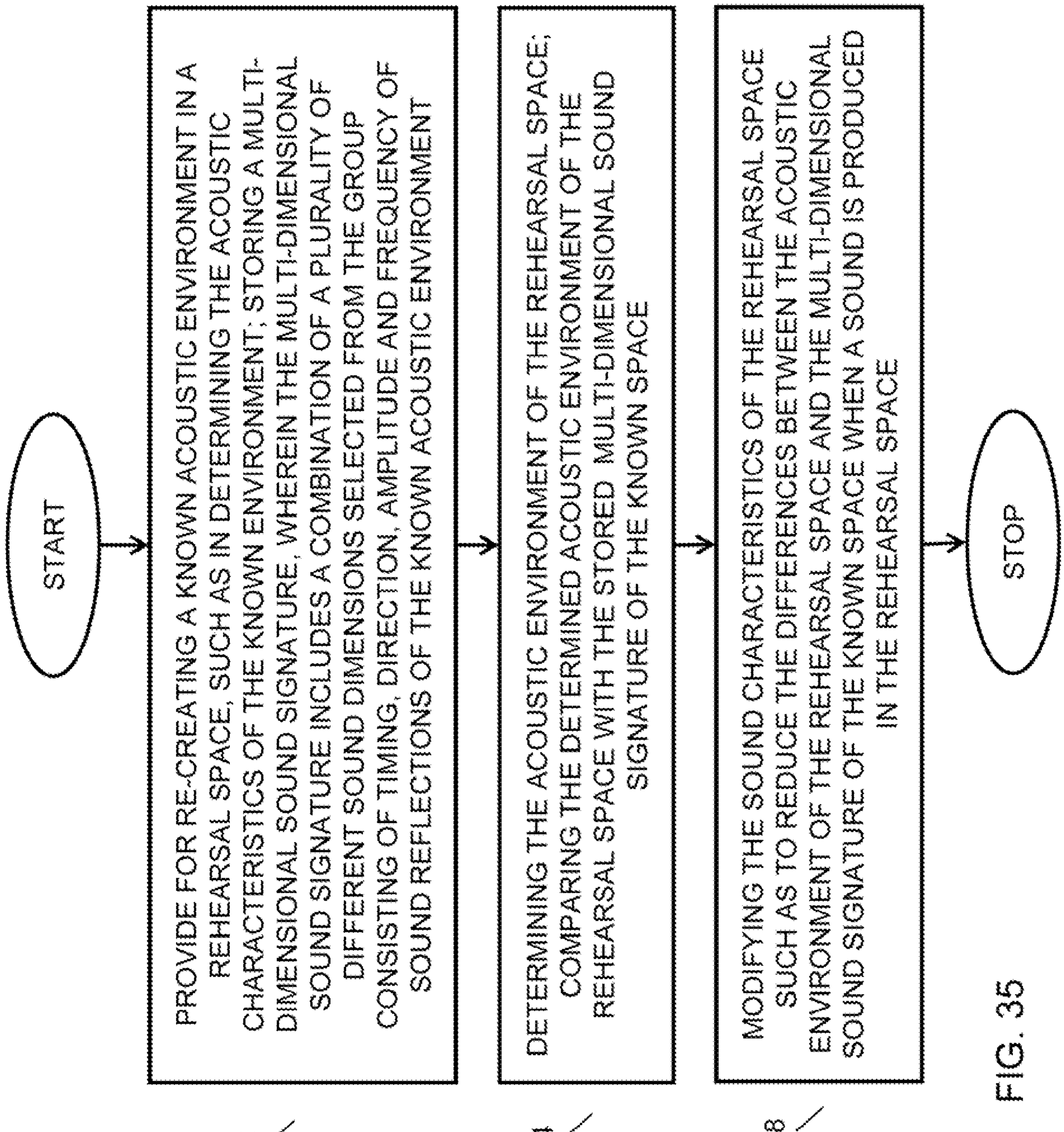

START
PROVIDE FOR RE-CREATING A KNOWN ACOUSTIC ENVIRONMENT IN A REHEARSAL SPACE, SUCH AS IN DETERMINING THE ACOUSTIC CHARACTERISTICS OF THE KNOWN ENVIRONMENT; STORING A MULTI-DIMENSIONAL SOUND SIGNATURE, WHEREIN THE MULTI-DIMENSIONAL SOUND SIGNATURE INCLUDES A COMBINATION OF A PLURALITY OF DIFFERENT SOUND DIMENSIONS SELECTED FROM THE GROUP CONSISTING OF TIMING, DIRECTION, AMPLITUDE AND FREQUENCY OF SOUND REFLECTIONS OF THE KNOWN ACOUSTIC ENVIRONMENT
DETERMINING THE ACOUSTIC ENVIRONMENT OF THE REHEARSAL SPACE; COMPARING THE DETERMINED ACOUSTIC ENVIRONMENT OF THE REHEARSAL SPACE WITH THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE OF THE KNOWN SPACE
MODIFYING THE SOUND CHARACTERISTICS OF THE REHEARSAL SPACE SUCH AS TO REDUCE THE DIFFERENCES BETWEEN THE ACOUSTIC ENVIRONMENT OF THE REHEARSAL SPACE AND THE MULTI-DIMENSIONAL SOUND SIGNATURE OF THE KNOWN SPACE WHEN A SOUND IS PRODUCED IN THE REHEARSAL SPACE
STOP
3500
3502
3504
3508

FIG. 35

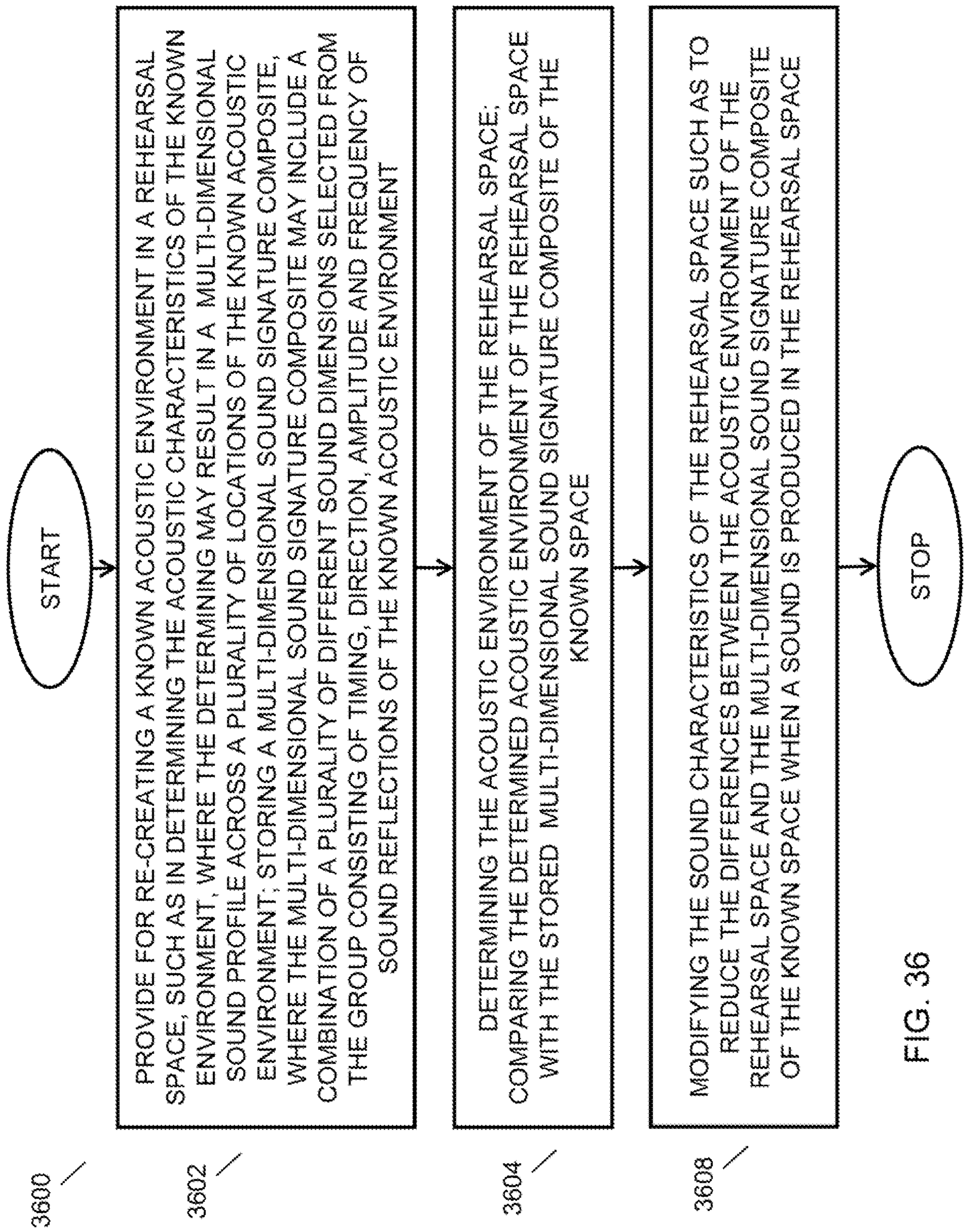

START
PROVIDE FOR RE-CREATING A KNOWN ACOUSTIC ENVIRONMENT IN A REHEARSAL SPACE, SUCH AS IN DETERMINING THE ACOUSTIC CHARACTERISTICS OF THE KNOWN ENVIRONMENT, WHERE THE DETERMINING MAY RESULT IN A MULTI-DIMENSIONAL SOUND PROFILE ACROSS A PLURALITY OF LOCATIONS OF THE KNOWN ACOUSTIC ENVIRONMENT; STORING A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND DIMENSIONS SELECTED FROM THE GROUP CONSISTING OF TIMING, DIRECTION, AMPLITUDE AND FREQUENCY OF SOUND REFLECTIONS OF THE KNOWN ACOUSTIC ENVIRONMENT
3600
3602
DETERMINING THE ACOUSTIC ENVIRONMENT OF THE REHEARSAL SPACE; COMPARING THE DETERMINED ACOUSTIC ENVIRONMENT OF THE REHEARSAL SPACE WITH THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE KNOWN SPACE
3604
MODIFYING THE SOUND CHARACTERISTICS OF THE REHEARSAL SPACE SUCH AS TO REDUCE THE DIFFERENCES BETWEEN THE ACOUSTIC ENVIRONMENT OF THE REHEARSAL SPACE AND THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE KNOWN SPACE WHEN A SOUND IS PRODUCED IN THE REHEARSAL SPACE
3608
STOP

FIG. 36

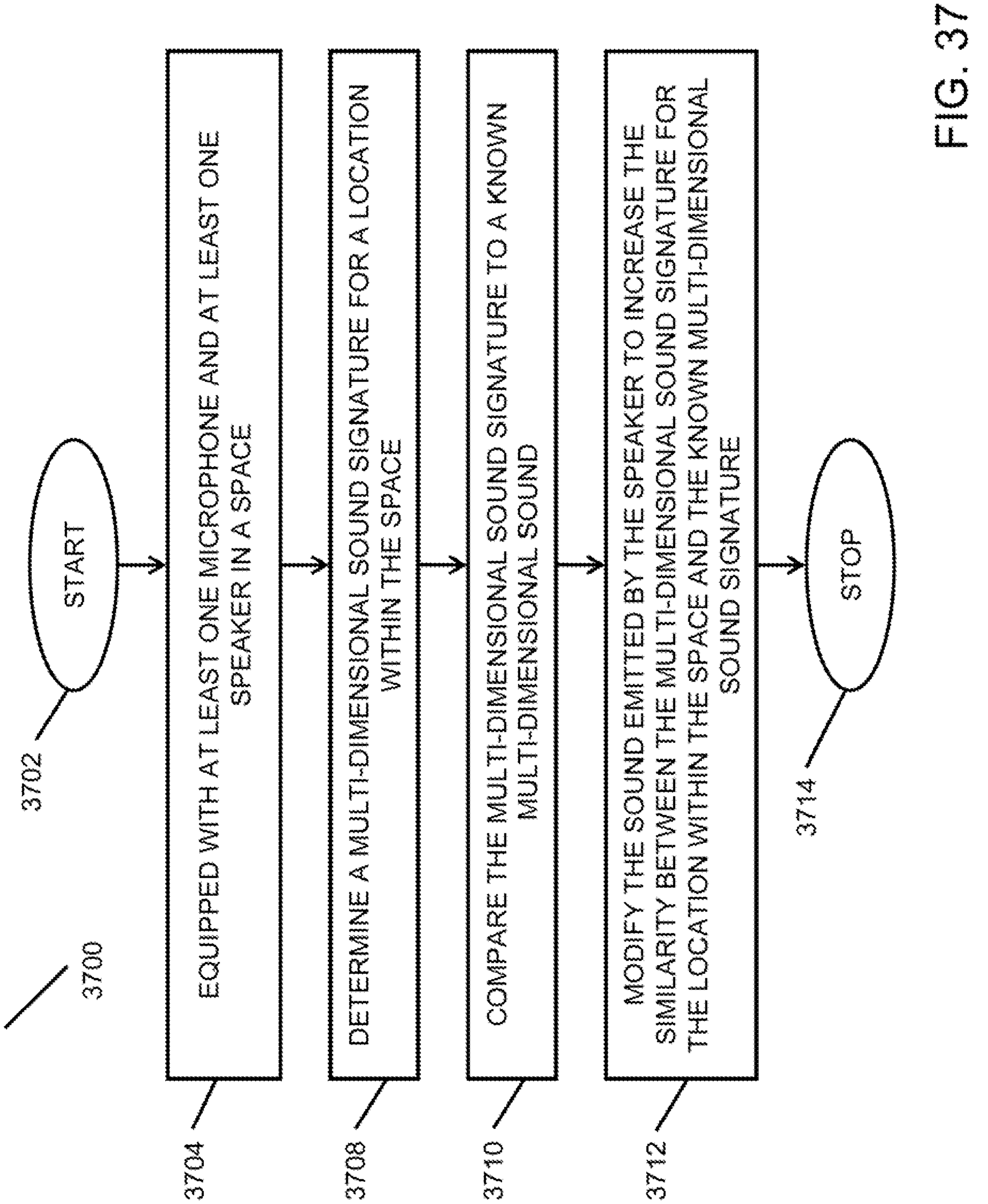

START
3700
3702
EQUIPPED WITH AT LEAST ONE MICROPHONE AND AT LEAST ONE SPEAKER IN A SPACE
3704
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN THE SPACE
3708
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE TO A KNOWN MULTI-DIMENSIONAL SOUND
3710
MODIFY THE SOUND EMITTED BY THE SPEAKER TO INCREASE THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION WITHIN THE SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE
3712
STOP
3714

FIG. 37

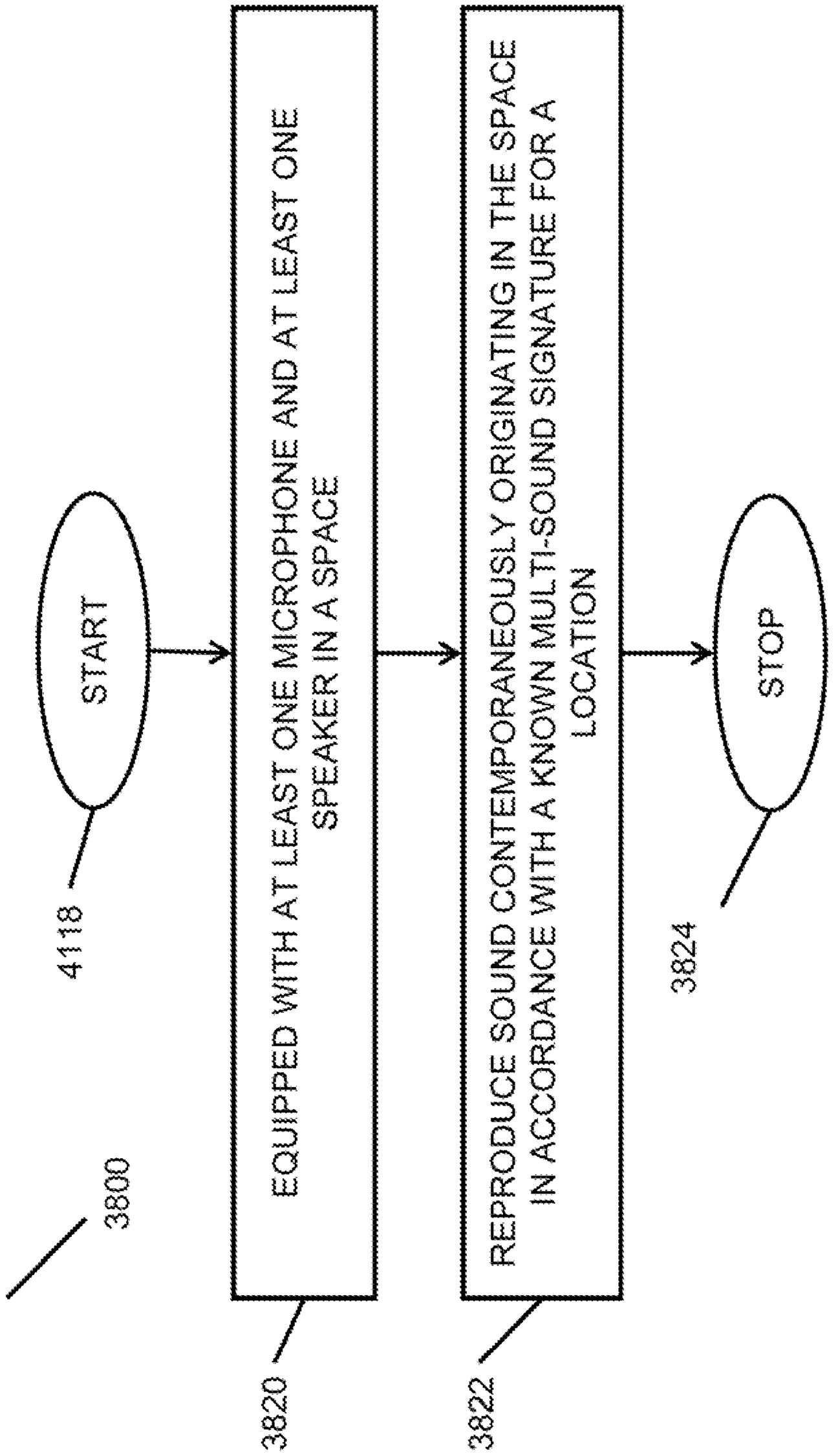

3800
START
4118
EQUIPPED WITH AT LEAST ONE MICROPHONE AND AT LEAST ONE SPEAKER IN A SPACE
3820
REPRODUCE SOUND CONTEMPORANEOUSLY ORIGINATING IN THE SPACE IN ACCORDANCE WITH A KNOWN MULTI-SOUND SIGNATURE FOR A LOCATION ON
3822
STOP
3824

FIG. 38

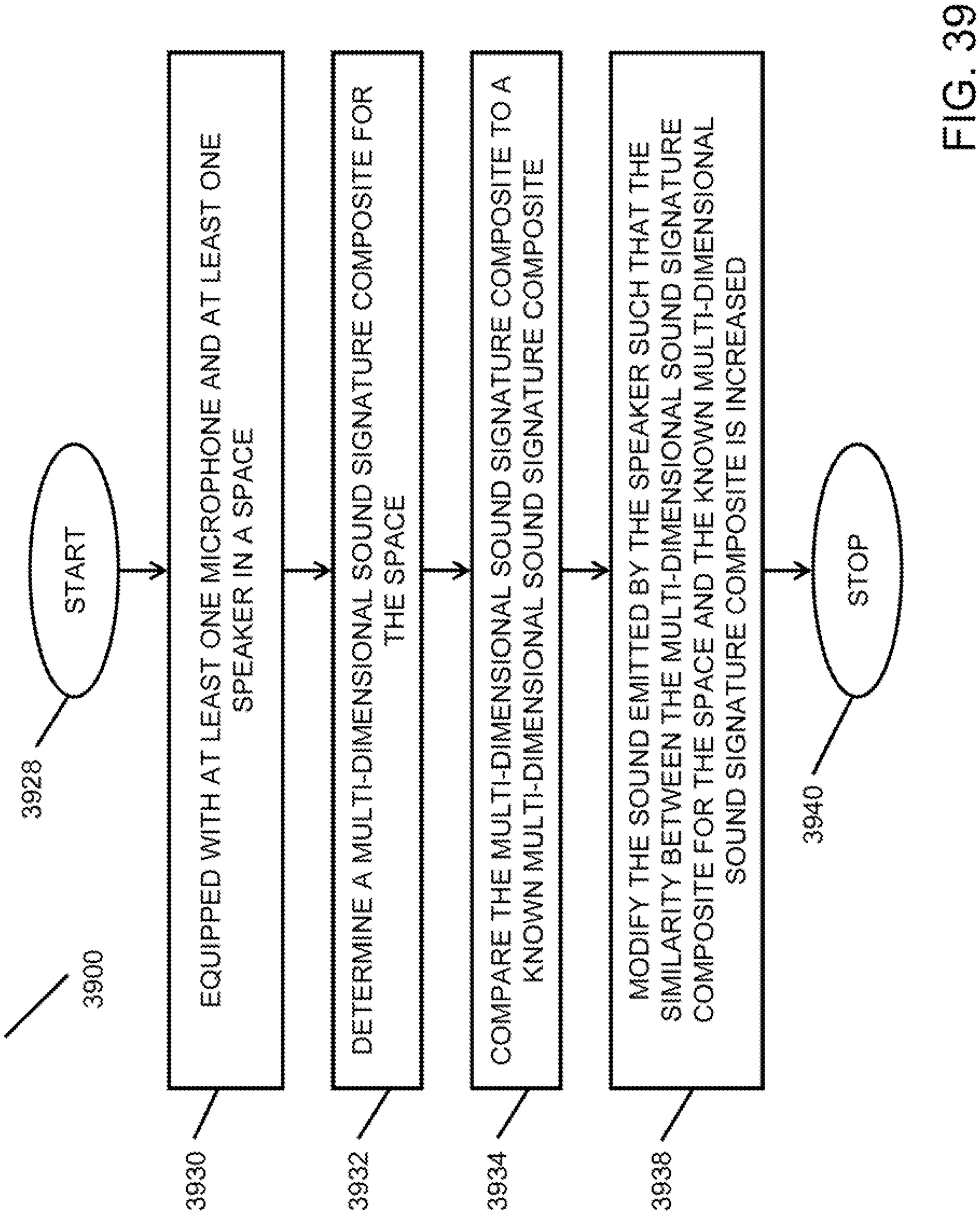

START
3928
3900
EQUIPPED WITH AT LEAST ONE MICROPHONE AND AT LEAST ONE SPEAKER IN A SPACE
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
MODIFY THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IS INCREASED
STOP
3940
3930
3932
3934
3938

FIG. 3

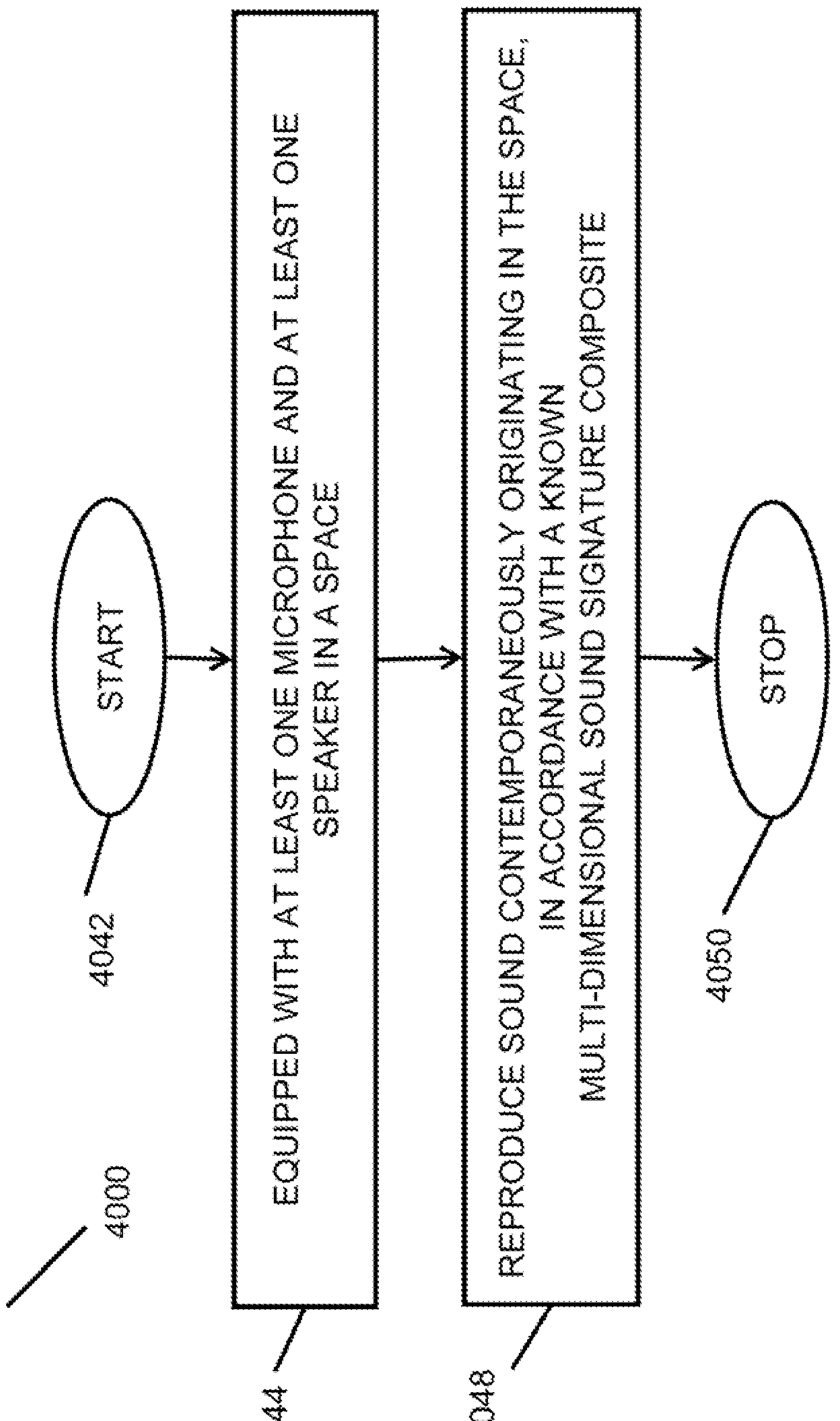

4000
START
4042
EQUIPPED WITH AT LEAST ONE MICROPHONE AND AT LEAST ONE SPEAKER IN A SPACE
4044
REPRODUCE SOUND CONTEMPORANEOUSLY ORIGINATING IN THE SPACE, IN ACCORDANCE WITH A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
4048
STOP
4050

FIG. 40

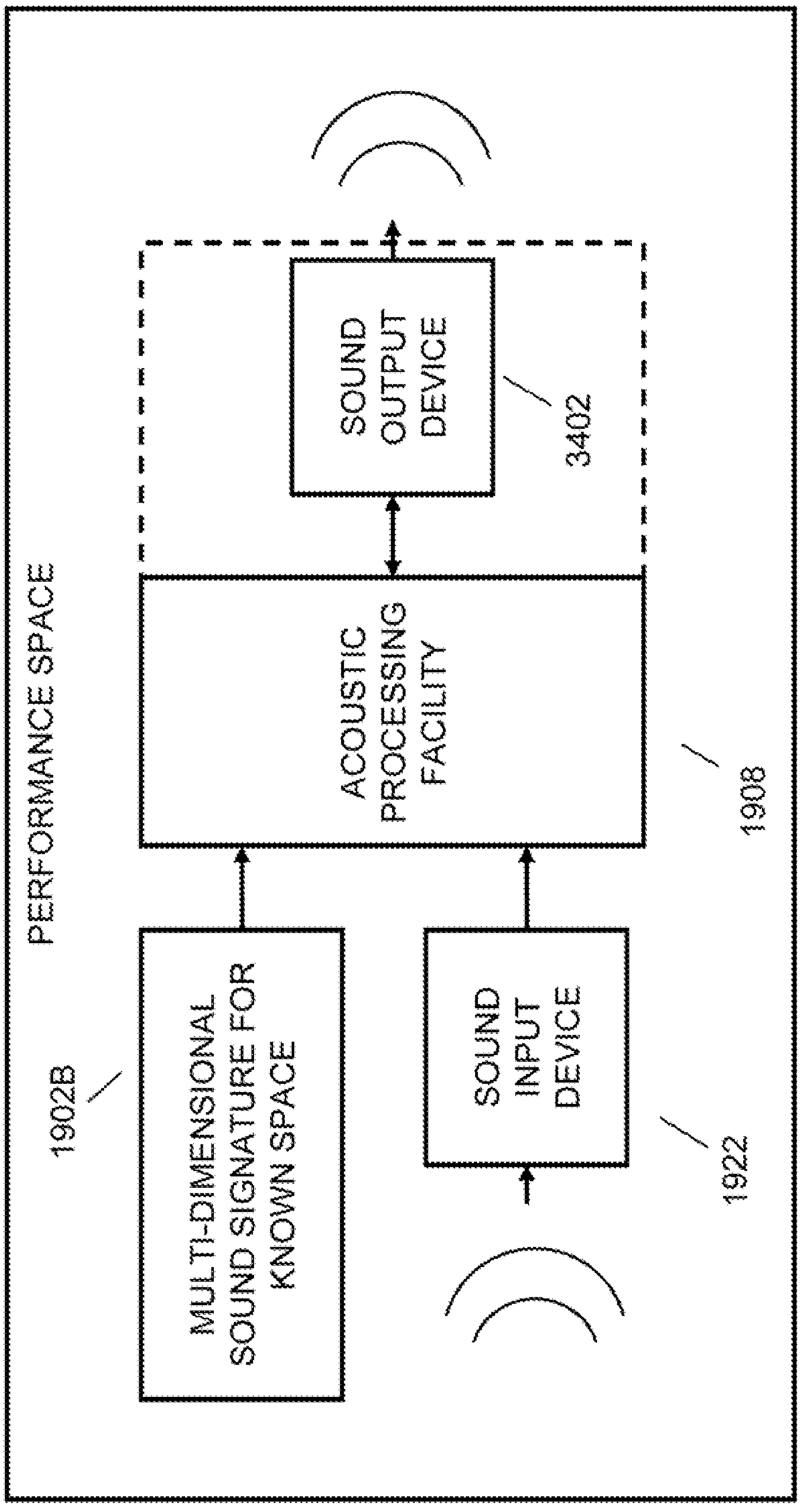

4100
PERFORMANCE SPACE
1902B
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE
SOUND INPUT DEVICE
1922
ACOUSTIC PROCESSING FACILITY
1908
SOUND OUTPUT DEVICE
3402

FIG. 41

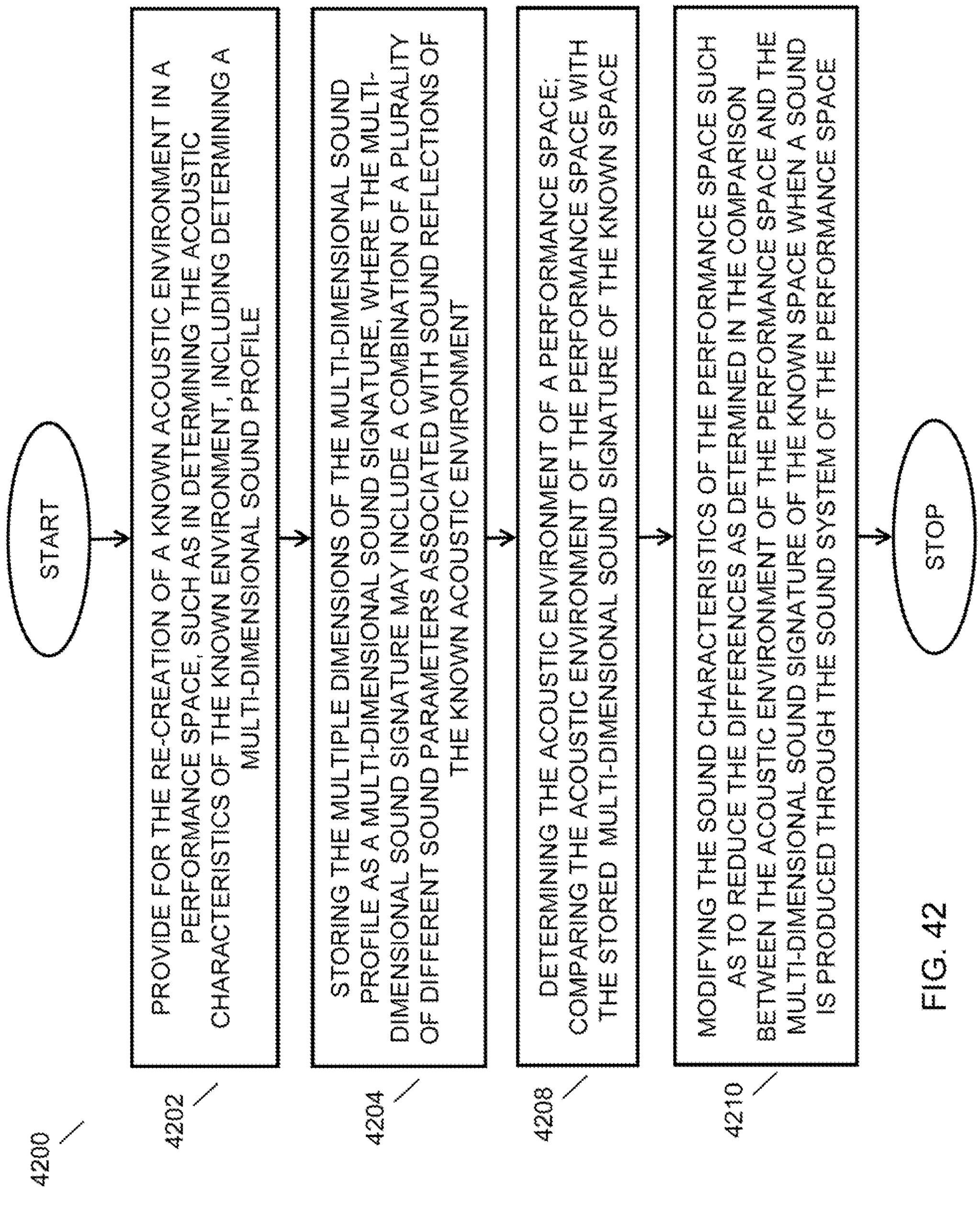

4200
START
4202
PROVIDE FOR THE RE-CREATION OF A KNOWN ACOUSTIC ENVIRONMENT IN A PERFORMANCE SPACE, SUCH AS IN DETERMINING THE ACOUSTIC CHARACTERISTICS OF THE KNOWN ENVIRONMENT, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
4204
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS ASSOCIATED WITH SOUND REFLECTIONS OF THE KNOWN ACOUSTIC ENVIRONMENT
4208
DETERMINING THE ACOUSTIC ENVIRONMENT OF A PERFORMANCE SPACE; COMPARING THE ACOUSTIC ENVIRONMENT OF THE PERFORMANCE SPACE WITH THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE OF THE KNOWN SPACE
4210
MODIFYING THE SOUND CHARACTERISTICS OF THE PERFORMANCE SPACE SUCH AS TO REDUCE THE DIFFERENCES AS DETERMINED IN THE COMPARISON BETWEEN THE ACOUSTIC ENVIRONMENT OF THE PERFORMANCE SPACE AND THE MULTI-DIMENSIONAL SOUND SIGNATURE OF THE KNOWN SPACE WHEN A SOUND IS PRODUCED THROUGH THE SOUND SYSTEM OF THE PERFORMANCE SPACE
STOP

FIG. 42

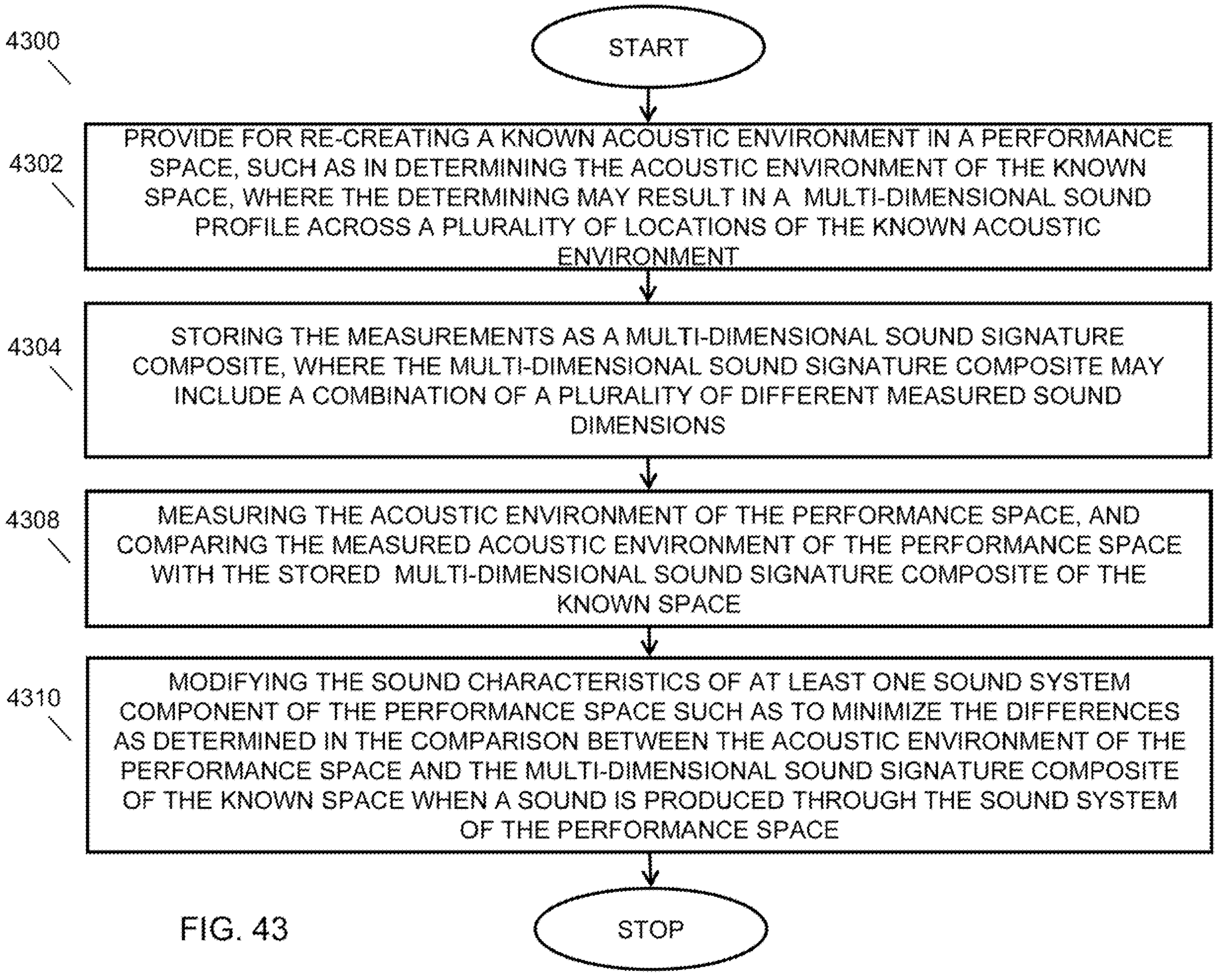

4300
START
4302
PROVIDE FOR RE-CREATING A KNOWN ACOUSTIC ENVIRONMENT IN A PERFORMANCE SPACE, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF THE KNOWN SPACE, WHERE THE DETERMINING MAY RESULT IN A MULTI-DIMENSIONAL SOUND PROFILE ACROSS A PLURALITY OF LOCATIONS OF THE KNOWN ACOUSTIC ENVIRONMENT
4304
STORING THE MEASUREMENTS AS A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS
4308
MEASURING THE ACOUSTIC ENVIRONMENT OF THE PERFORMANCE SPACE, AND COMPARING THE MEASURED ACOUSTIC ENVIRONMENT OF THE PERFORMANCE SPACE WITH THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE KNOWN SPACE
4310
MODIFYING THE SOUND CHARACTERISTICS OF AT LEAST ONE SOUND SYSTEM COMPONENT OF THE PERFORMANCE SPACE SUCH AS TO MINIMIZE THE DIFFERENCES AS DETERMINED IN THE COMPARISON BETWEEN THE ACOUSTIC ENVIRONMENT OF THE PERFORMANCE SPACE AND THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE KNOWN SPACE WHEN A SOUND IS PRODUCED THROUGH THE SOUND SYSTEM OF THE PERFORMANCE SPACE
STOP

FIG. 43

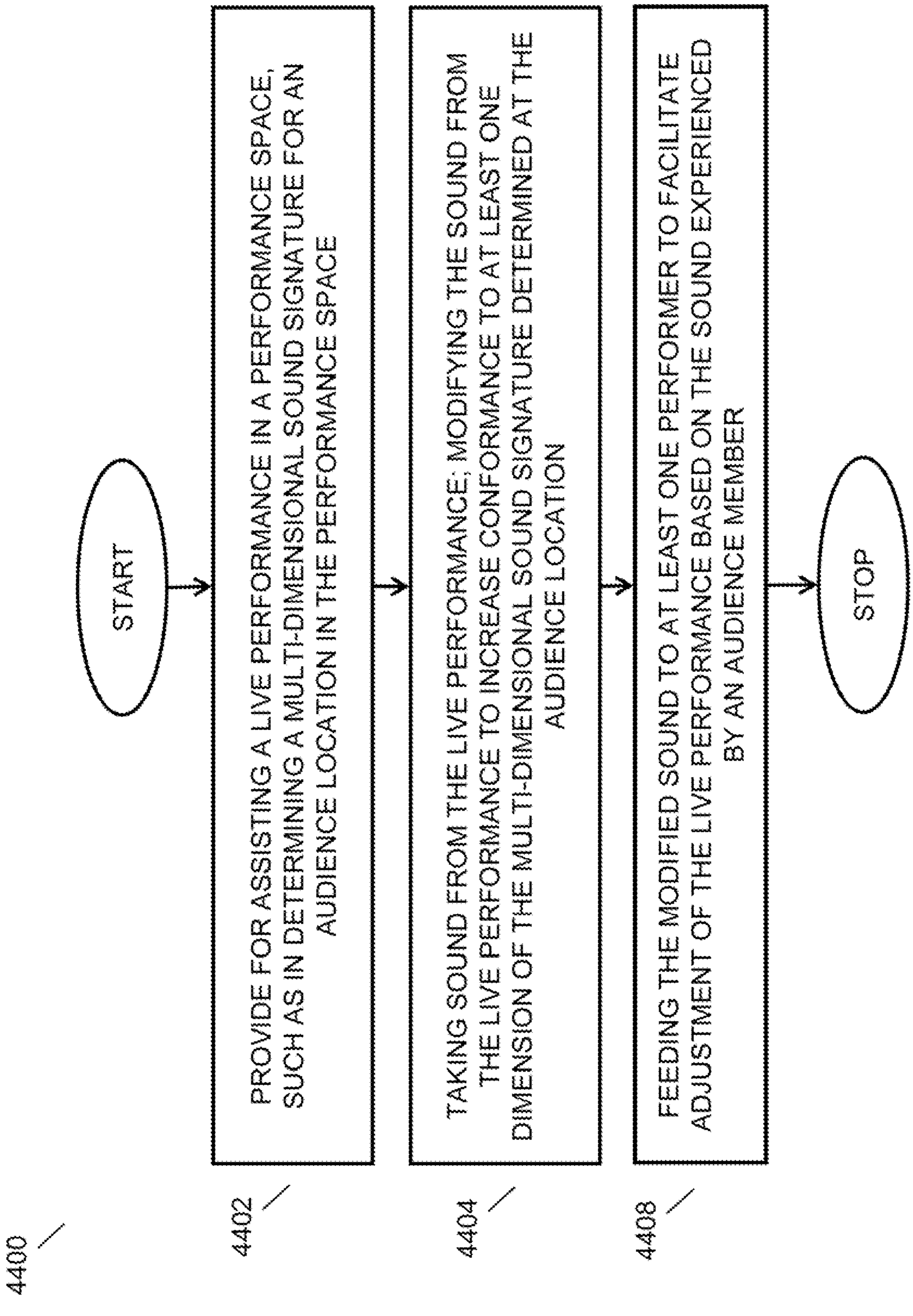

4400
4402
PROVIDE FOR ASSISTING A LIVE PERFORMANCE IN A PERFORMANCE SPACE, SUCH AS IN DETERMINING A MULTI-DIMENSIONAL SOUND SIGNATURE FOR AN AUDIENCE LOCATION IN THE PERFORMANCE SPACE
4404
TAKING SOUND FROM THE LIVE PERFORMANCE; MODIFYING THE SOUND FROM THE LIVE PERFORMANCE TO INCREASE CONFORMANCE TO AT LEAST ONE DIMENSION OF THE MULTI-DIMENSIONAL SOUND SIGNATURE DETERMINED AT THE AUDIENCE LOCATION
4408
FEEDING THE MODIFIED SOUND TO AT LEAST ONE PERFORMER TO FACILITATE ADJUSTMENT OF THE LIVE PERFORMANCE BASED ON THE SOUND EXPERIENCED BY AN AUDIENCE MEMBER
START
STOP

FIG. 44

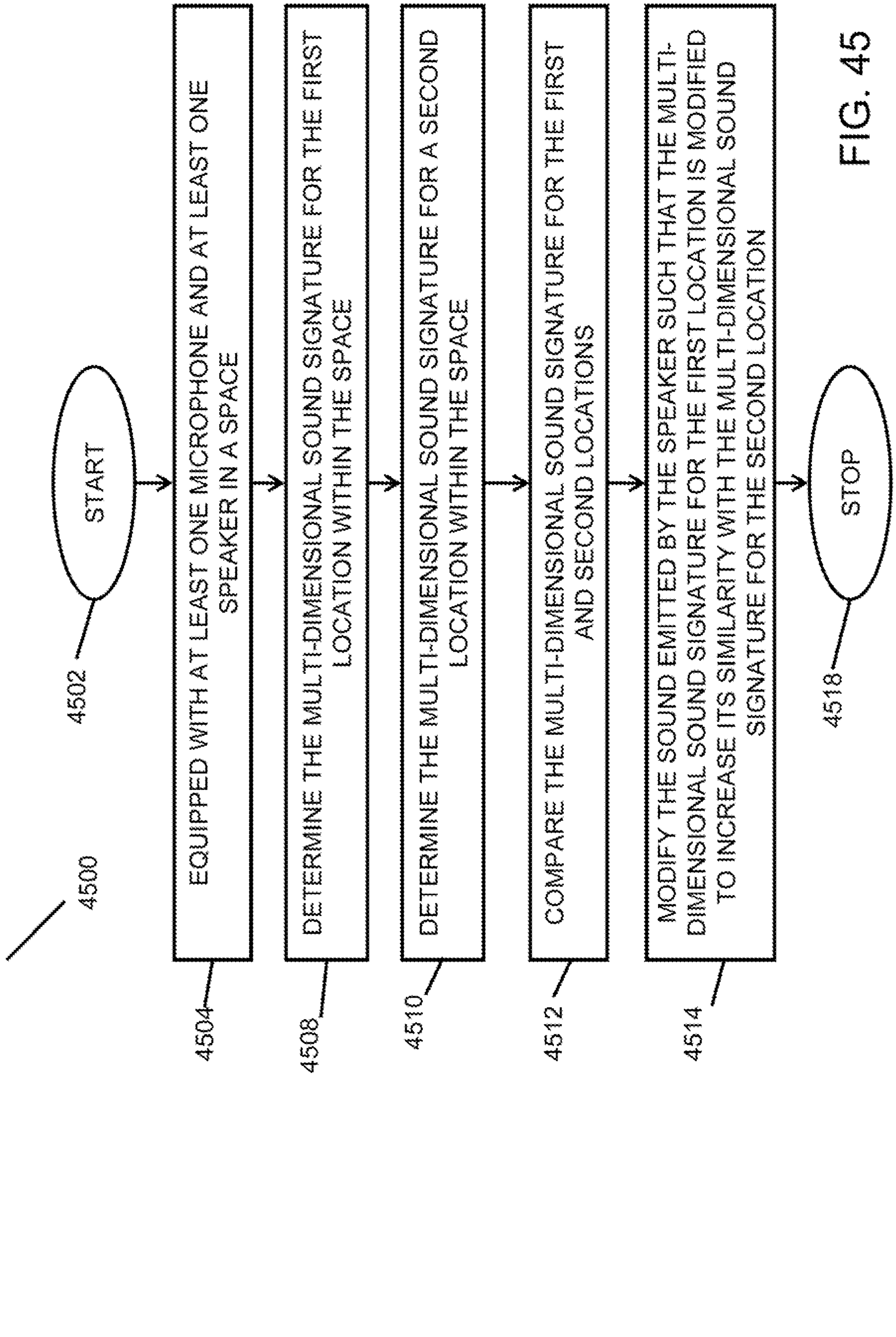

4500
START
4502
EQUIPPED WITH AT LEAST ONE MICROPHONE AND AT LEAST ONE SPEAKER IN A SPACE
4504
DETERMINE THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE FIRST LOCATION WITHIN THE SPACE
4508
DETERMINE THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR A SECOND LOCATION WITHIN THE SPACE
4510
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE FIRST AND SECOND LOCATIONS
4512
MODIFY THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE FIRST LOCATION IS MODIFIED TO INCREASE ITS SIMILARITY WITH THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE SECOND LOCATION
4514
STOP
4518

FIG. 45

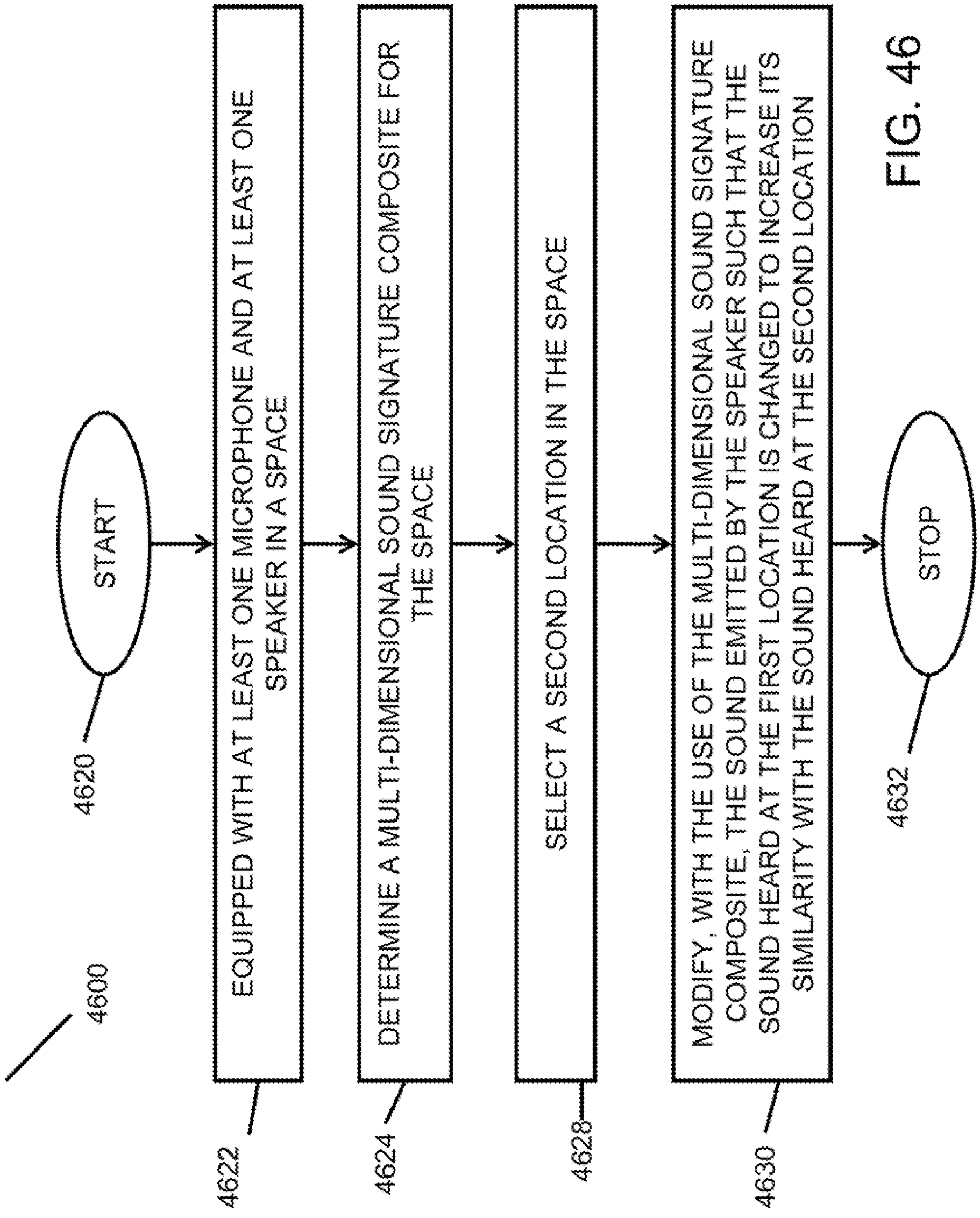

4600
START
4620
EQUIPPED WITH AT LEAST ONE MICROPHONE AND AT LEAST ONE SPEAKER IN A SPACE
4622
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
4624
SELECT A SECOND LOCATION IN THE SPACE
4628
MODIFY, WITH THE USE OF THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE SOUND HEARD AT THE FIRST LOCATION IS CHANGED TO INCREASE ITS SIMILARITY WITH THE SOUND HEARD AT THE SECOND LOCATION
4630
STOP
4632

FIG. 46

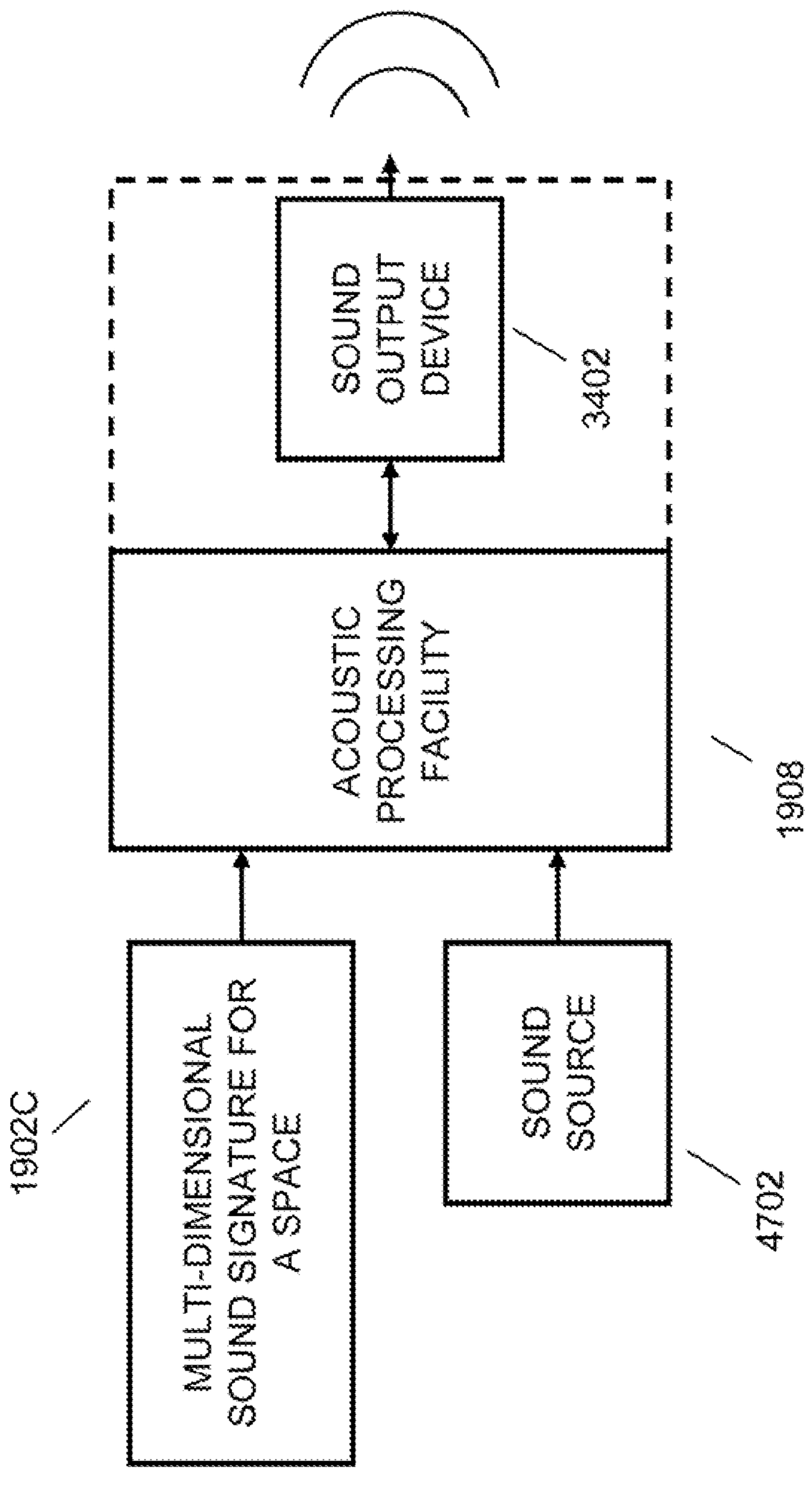

SOUND OUTPUT DEVICE
3402
ACOUSTIC PROCESSING FACILITY
1908
MULTI-DIMENSIONAL SOUND SIGNATURE FOR A SPACE
1902C
SOUND SOURCE
4702

FIG. 47

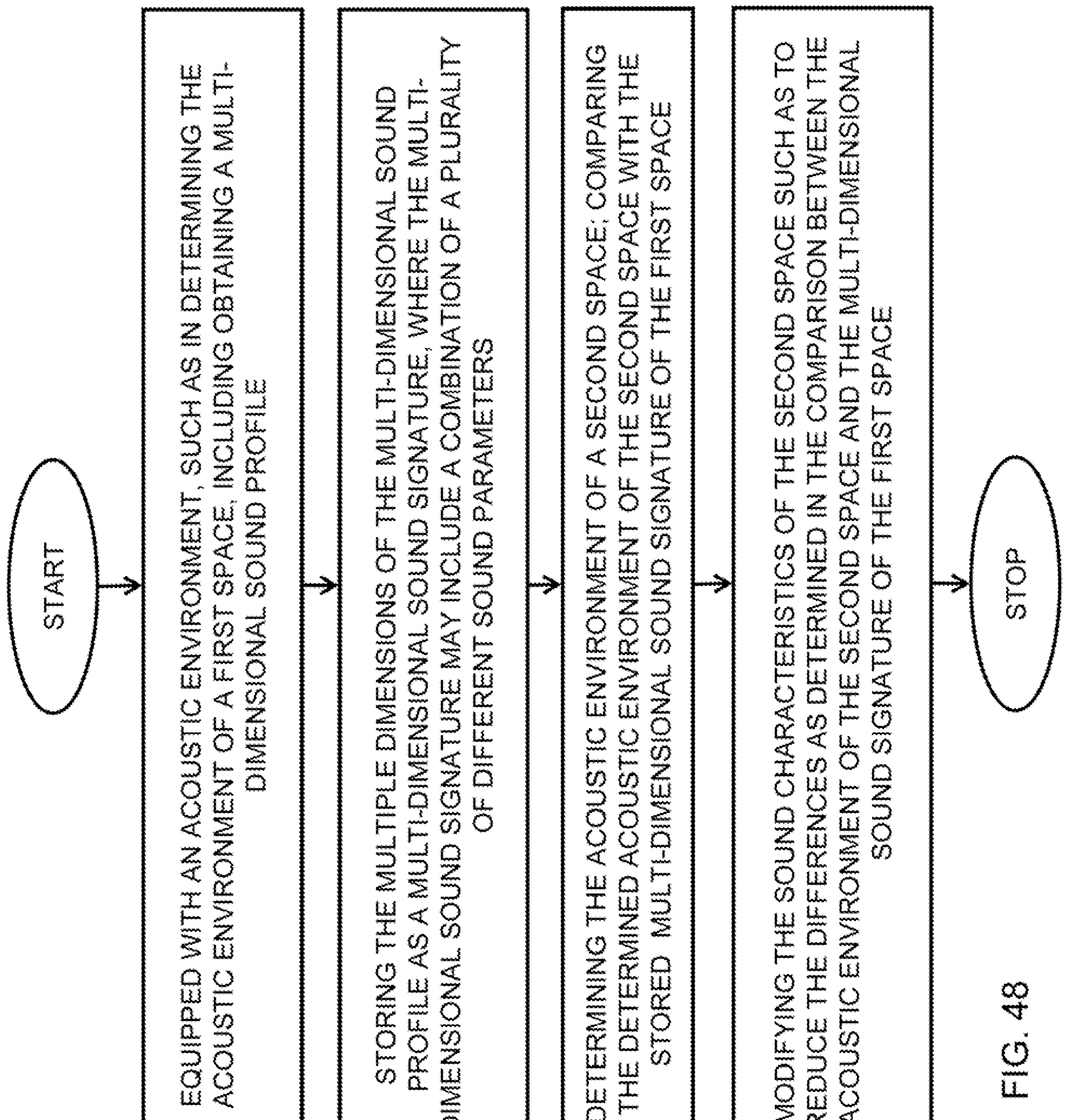

START
EQUIPPED WITH AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING OBTAINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE ACOUSTIC ENVIRONMENT OF A SECOND SPACE; COMPARING THE DETERMINED ACOUSTIC ENVIRONMENT OF THE SECOND SPACE WITH THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE OF THE FIRST SPACE
MODIFYING THE SOUND CHARACTERISTICS OF THE SECOND SPACE SUCH AS TO REDUCE THE DIFFERENCES AS DETERMINED IN THE COMPARISON BETWEEN THE ACOUSTIC ENVIRONMENT OF THE SECOND SPACE AND THE MULTI-DIMENSIONAL SOUND SIGNATURE OF THE FIRST SPACE
STOP
4800
4802
4804
4808
4810

FIG. 48

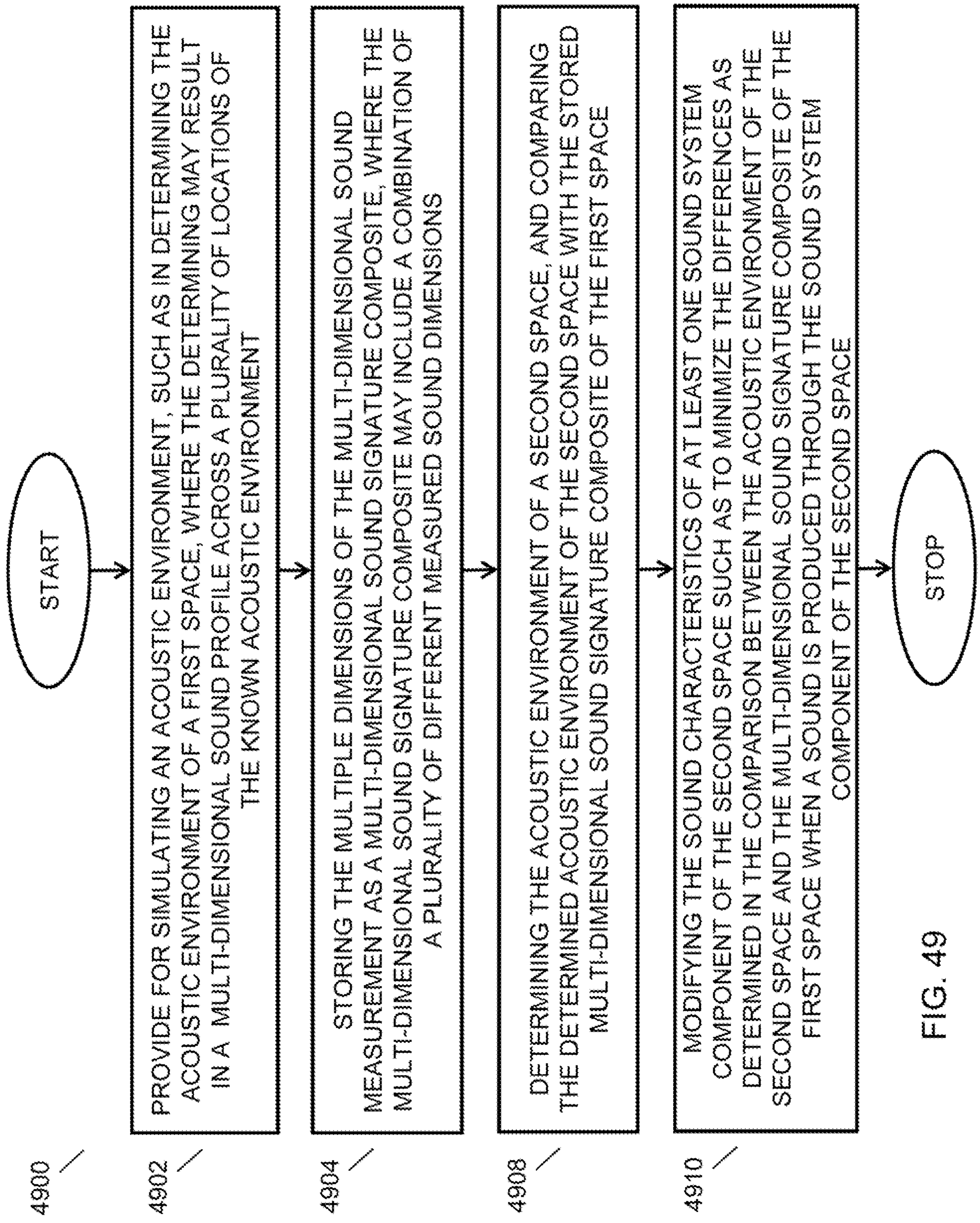

START
4900
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, WHERE THE DETERMINING MAY RESULT IN A MULTI-DIMENSIONAL SOUND PROFILE ACROSS A PLURALITY OF LOCATIONS OF THE KNOWN ACOUSTIC ENVIRONMENT
4902
MEASUREMENT AS A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS
4904
DETERMINING THE ACOUSTIC ENVIRONMENT OF A SECOND SPACE, AND COMPARING THE DETERMINED ACOUSTIC ENVIRONMENT OF THE SECOND SPACE WITH THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE FIRST SPACE
4908
MODIFYING THE SOUND CHARACTERISTICS OF AT LEAST ONE SOUND SYSTEM COMPONENT OF THE SECOND SPACE SUCH AS TO MINIMIZE THE DIFFERENCES AS DETERMINED IN THE COMPARISON BETWEEN THE ACOUSTIC ENVIRONMENT OF THE SECOND SPACE AND THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE FIRST SPACE WHEN A SOUND IS PRODUCED THROUGH THE SOUND SYSTEM COMPONENT OF THE SECOND SPACE
4910
STOP

FIG. 49

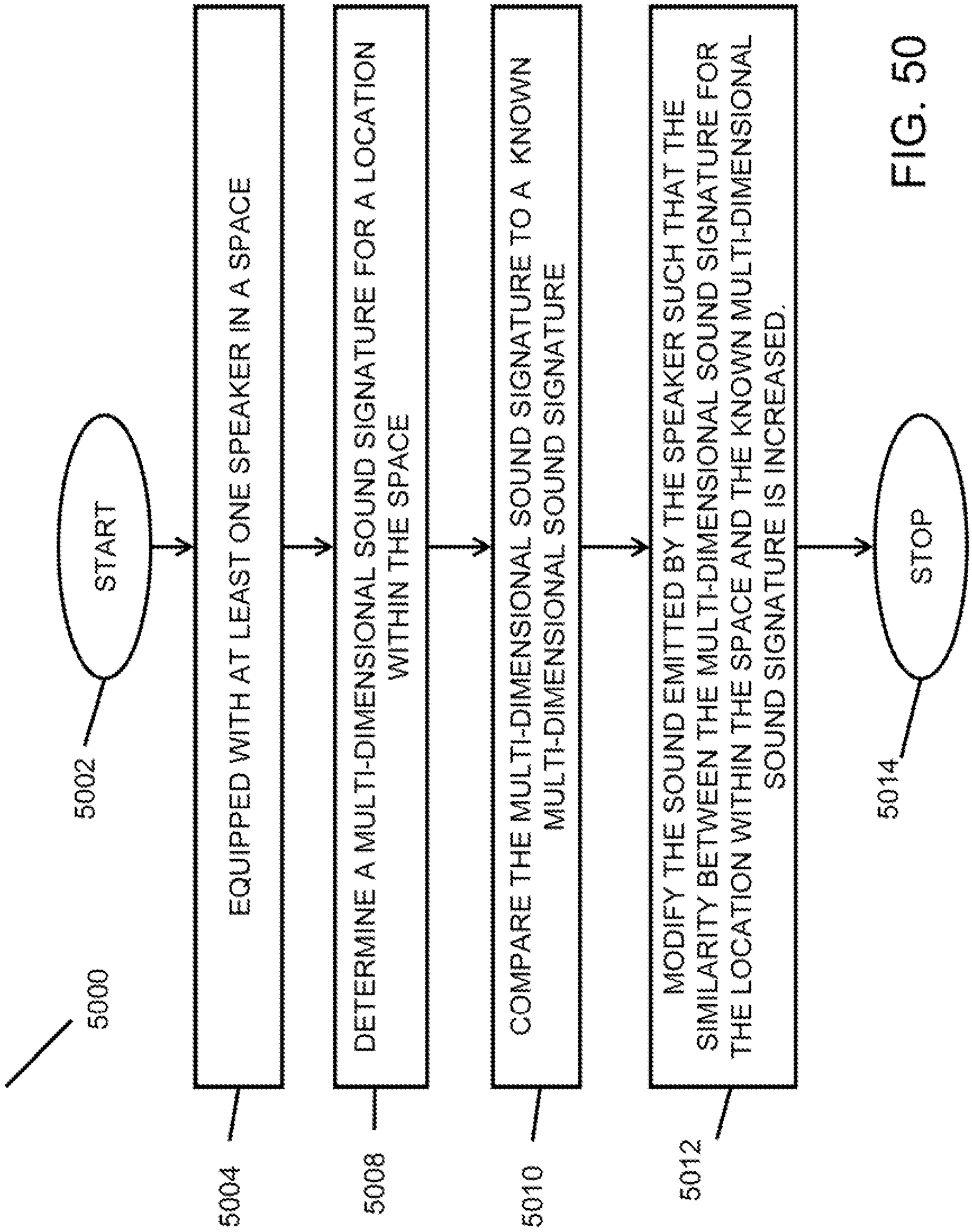

5000
START
5002
EQUIPPED WITH AT LEAST ONE SPEAKER IN A SPACE
5004
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN THE SPACE
5008
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE
5010
MODIFY THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION WITHIN THE SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE IS INCREASED.
5012
STOP
5014

FIG. 50

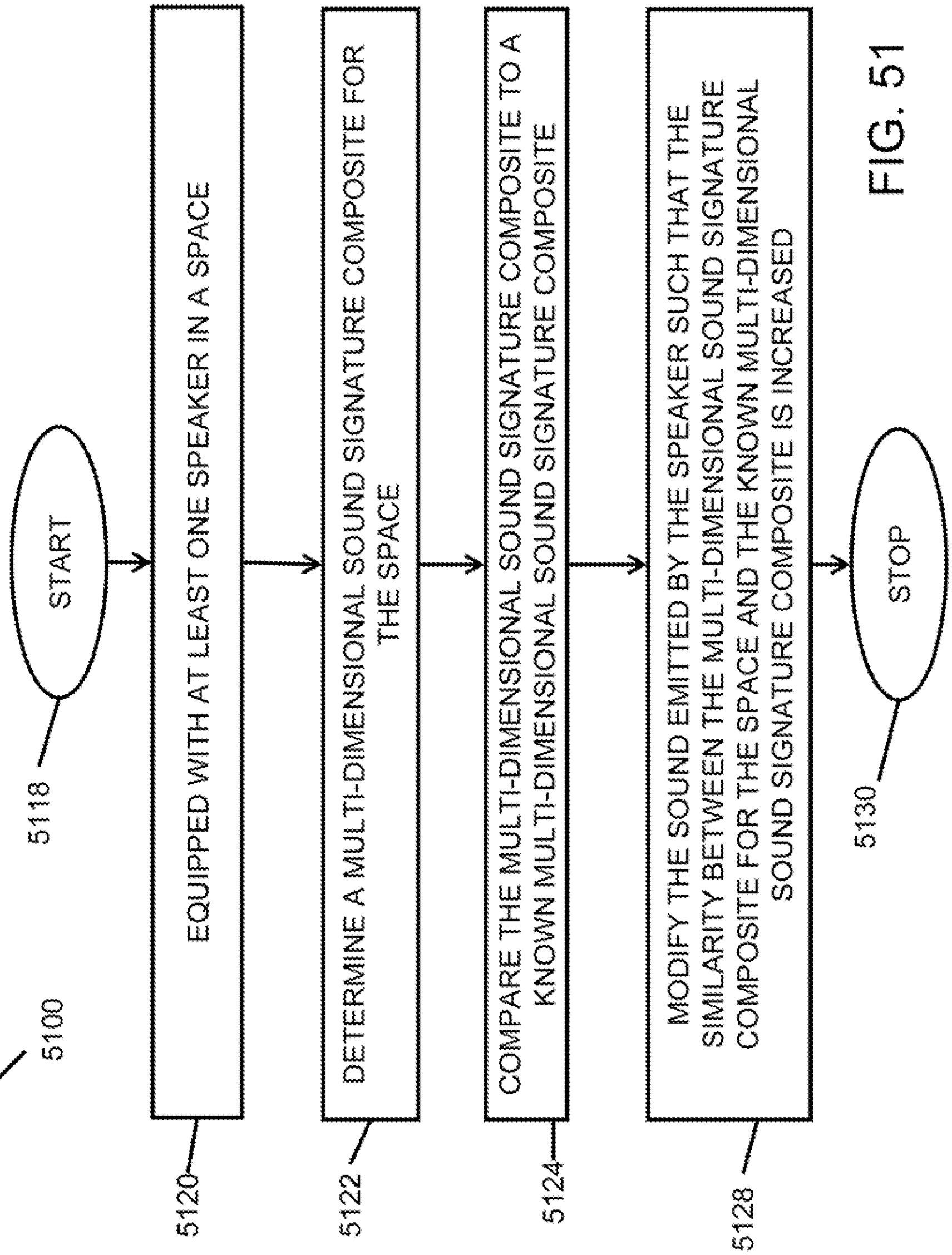

START
5100
EQUIPPED WITH AT LEAST ONE SPEAKER IN A SPACE
5118
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
5120
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
5122
MODIFY THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IS INCREASED
5124
STOP
5128
5130

FIG. 51

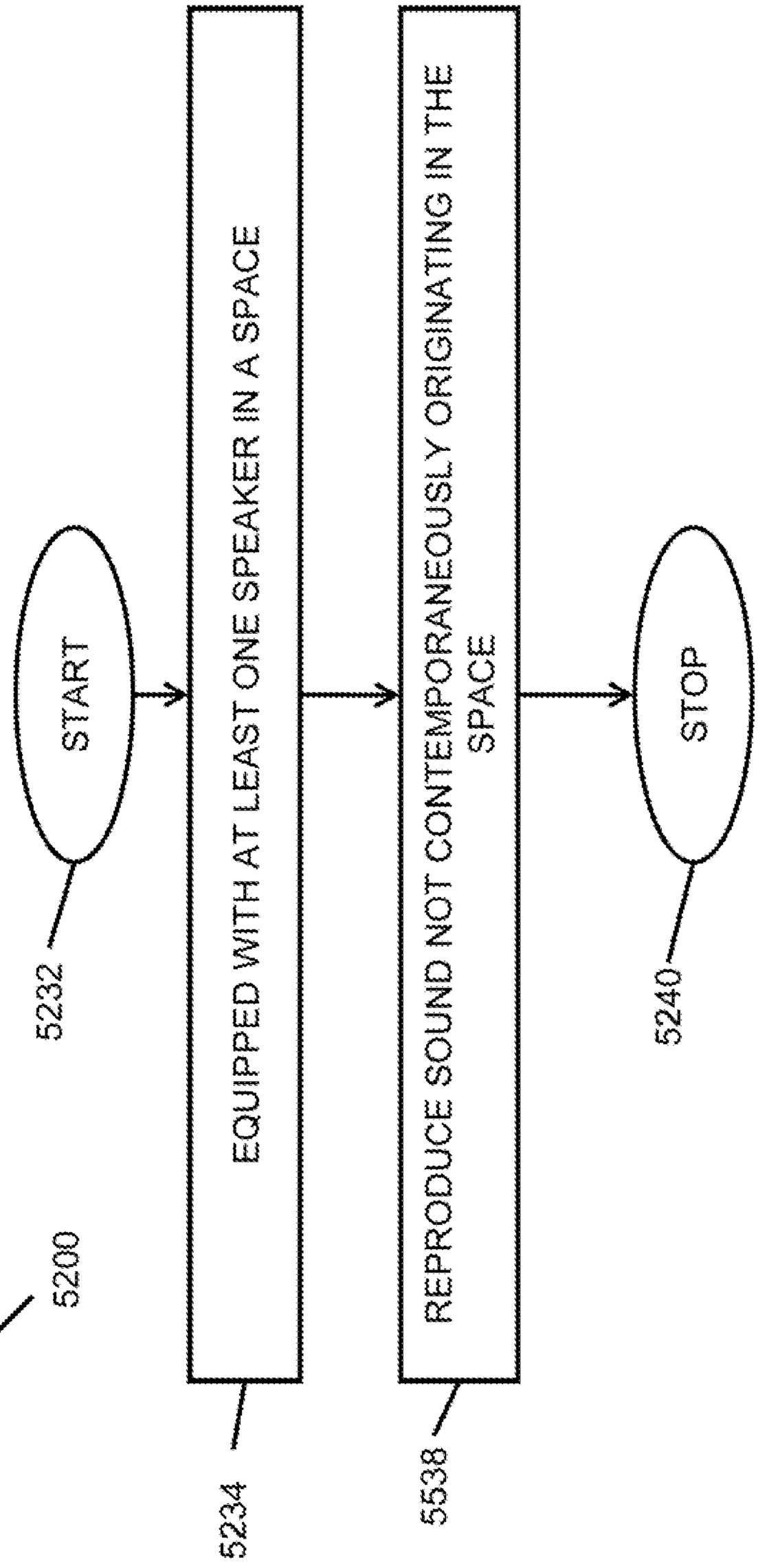

START
5232
EQUIPPED WITH AT LEAST ONE SPEAKER IN A SPACE
5234
REPRODUCE SOUND NOT CONTEMPORANEOUSLY ORIGINATING IN THE SPACE
5538
STOP
5240
5200

FIG. 52

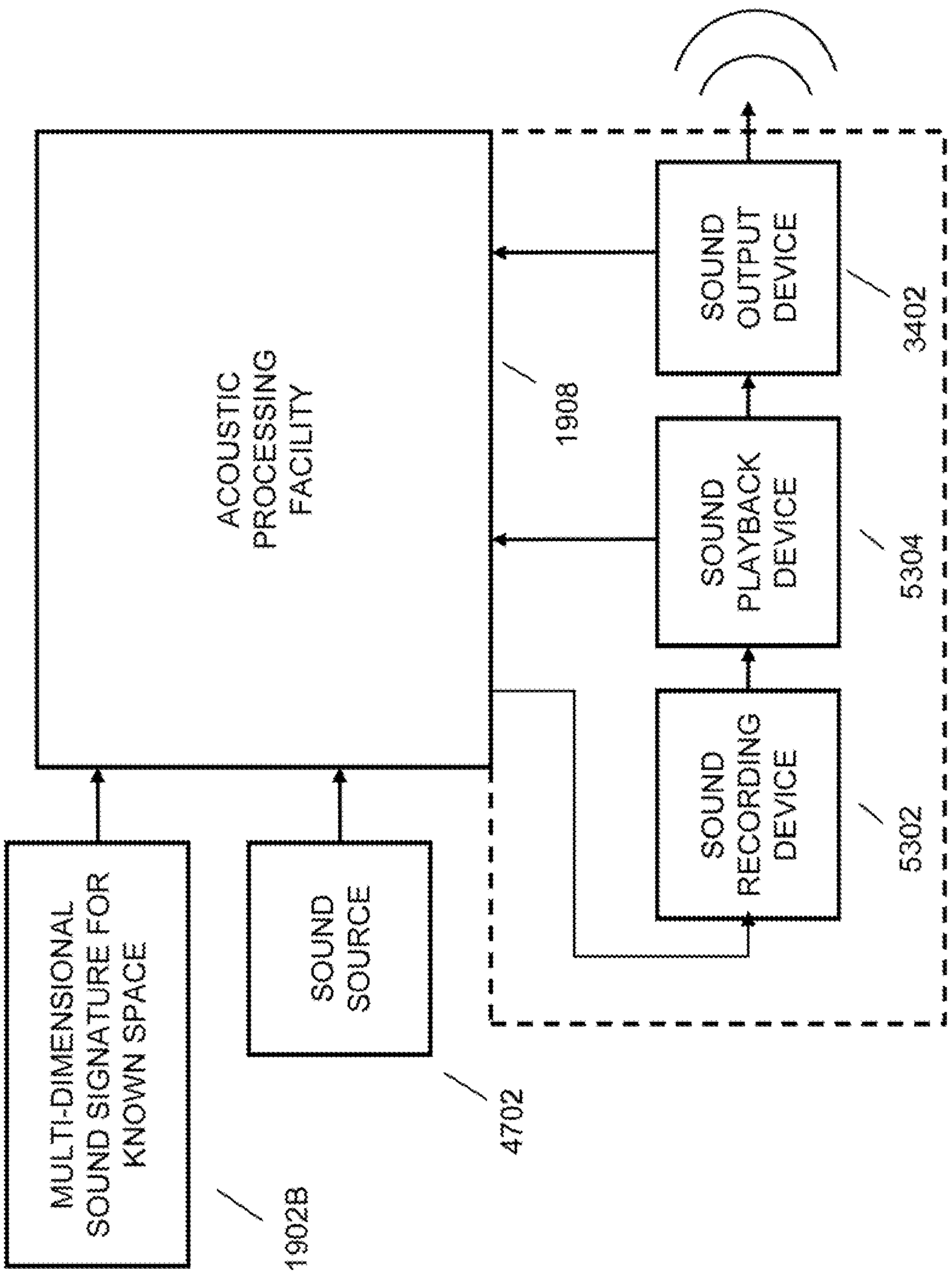

ACOUSTIC PROCESSING FACILITY
1908
SOUND OUTPUT DEVICE
3402
SOUND PLAYBACK DEVICE
5304
SOUND RECORDING DEVICE
5302
SOUND SOURCE
4702
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE
1902B

FIG. 53

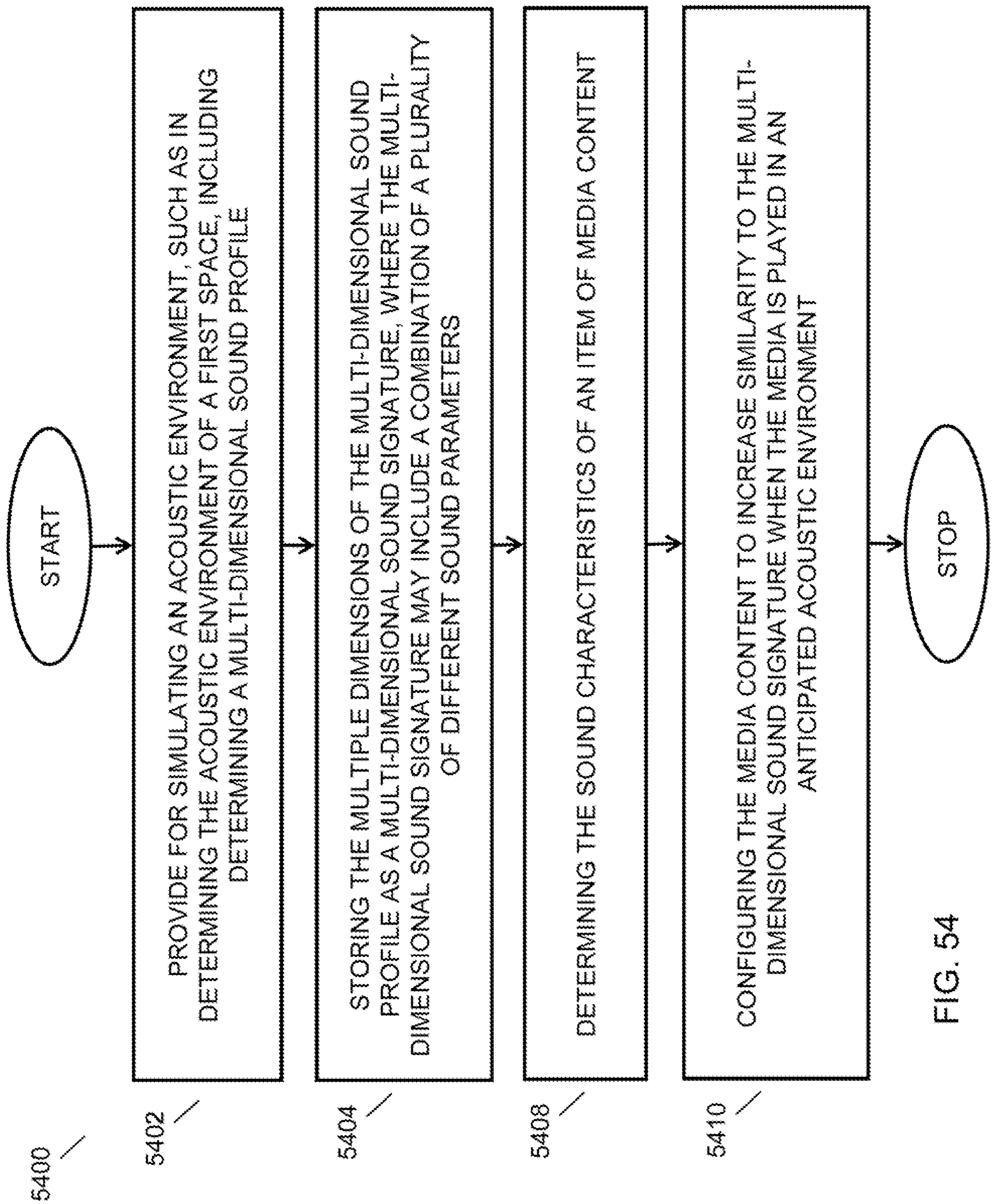

START
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE SOUND CHARACTERISTICS OF AN ITEM OF MEDIA CONTENT
CONFIGURING THE MEDIA CONTENT TO INCREASE SIMILARITY TO THE MULTI-DIMENSIONAL SOUND SIGNATURE WHEN THE MEDIA IS PLAYED IN AN ANTICIPATED ACOUSTIC ENVIRONMENT
STOP
5400
5402
5404
5408
5410

FIG. 54

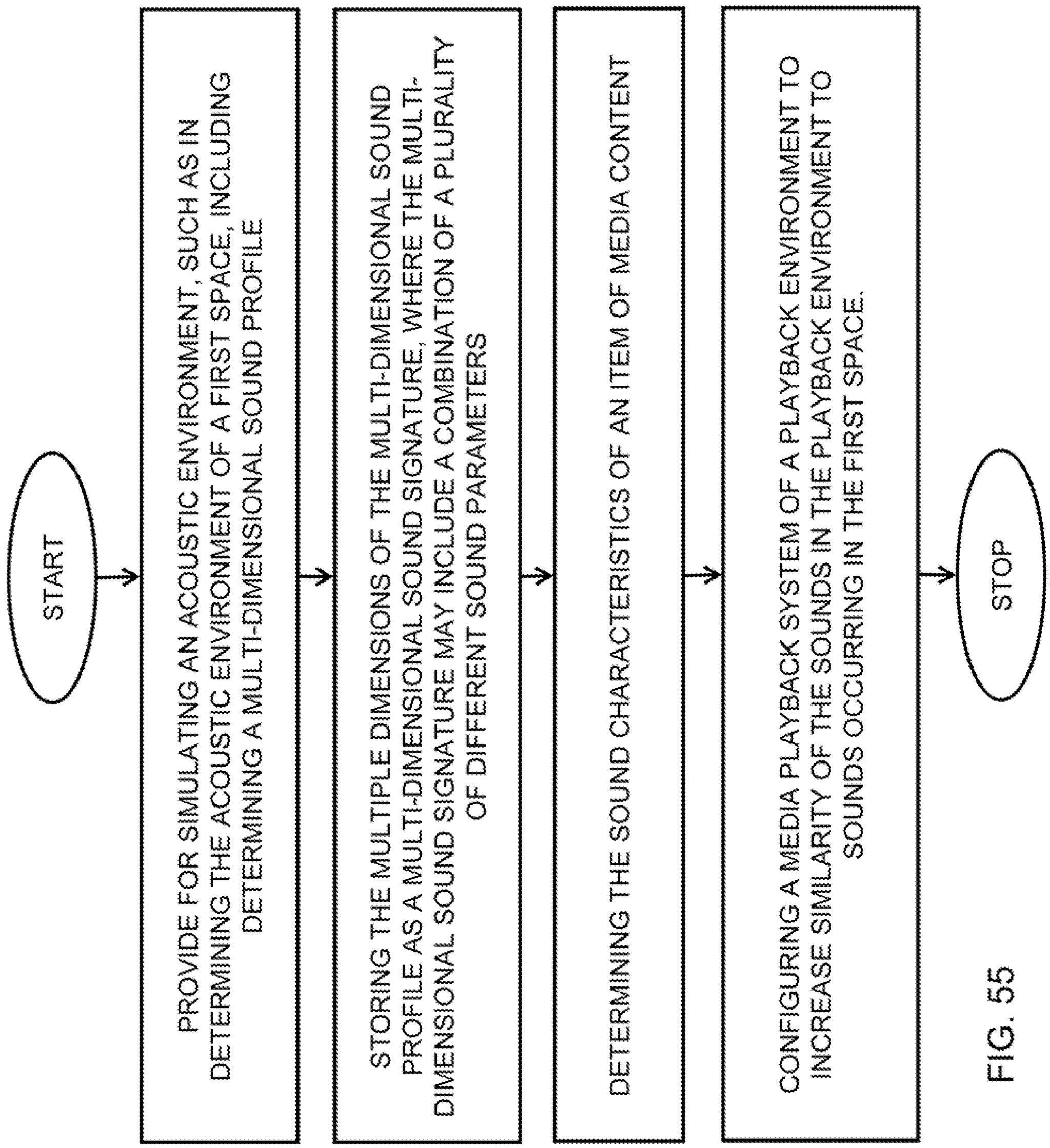

START
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE SOUND CHARACTERISTICS OF AN ITEM OF MEDIA CONTENT
CONFIGURING A MEDIA PLAYBACK SYSTEM OF A PLAYBACK ENVIRONMENT TO INCREASE SIMILARITY OF THE SOUNDS IN THE PLAYBACK ENVIRONMENT TO SOUNDS OCCURRING IN THE FIRST SPACE.
STOP
5500
5502
5504
5508
5510

FIG. 55

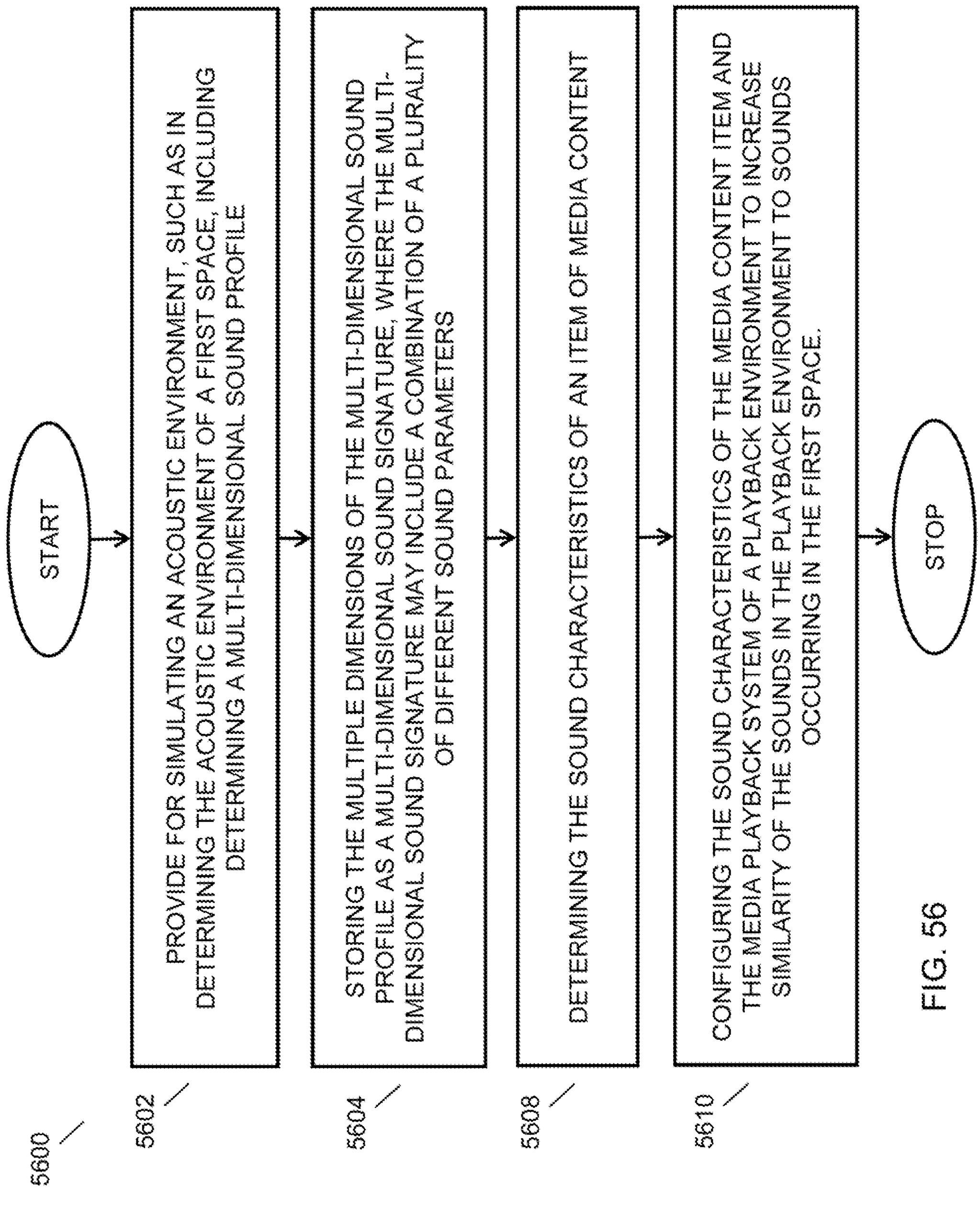

START
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE SOUND CHARACTERISTICS OF AN ITEM OF MEDIA CONTENT
CONFIGURING THE SOUND CHARACTERISTICS OF THE MEDIA CONTENT ITEM AND THE MEDIA PLAYBACK SYSTEM OF A PLAYBACK ENVIRONMENT TO INCREASE SIMILARITY OF THE SOUNDS IN THE PLAYBACK ENVIRONMENT TO SOUNDS OCCURRING IN THE FIRST SPACE.
STOP
5600
5602
5604
5608
5610

FIG. 56

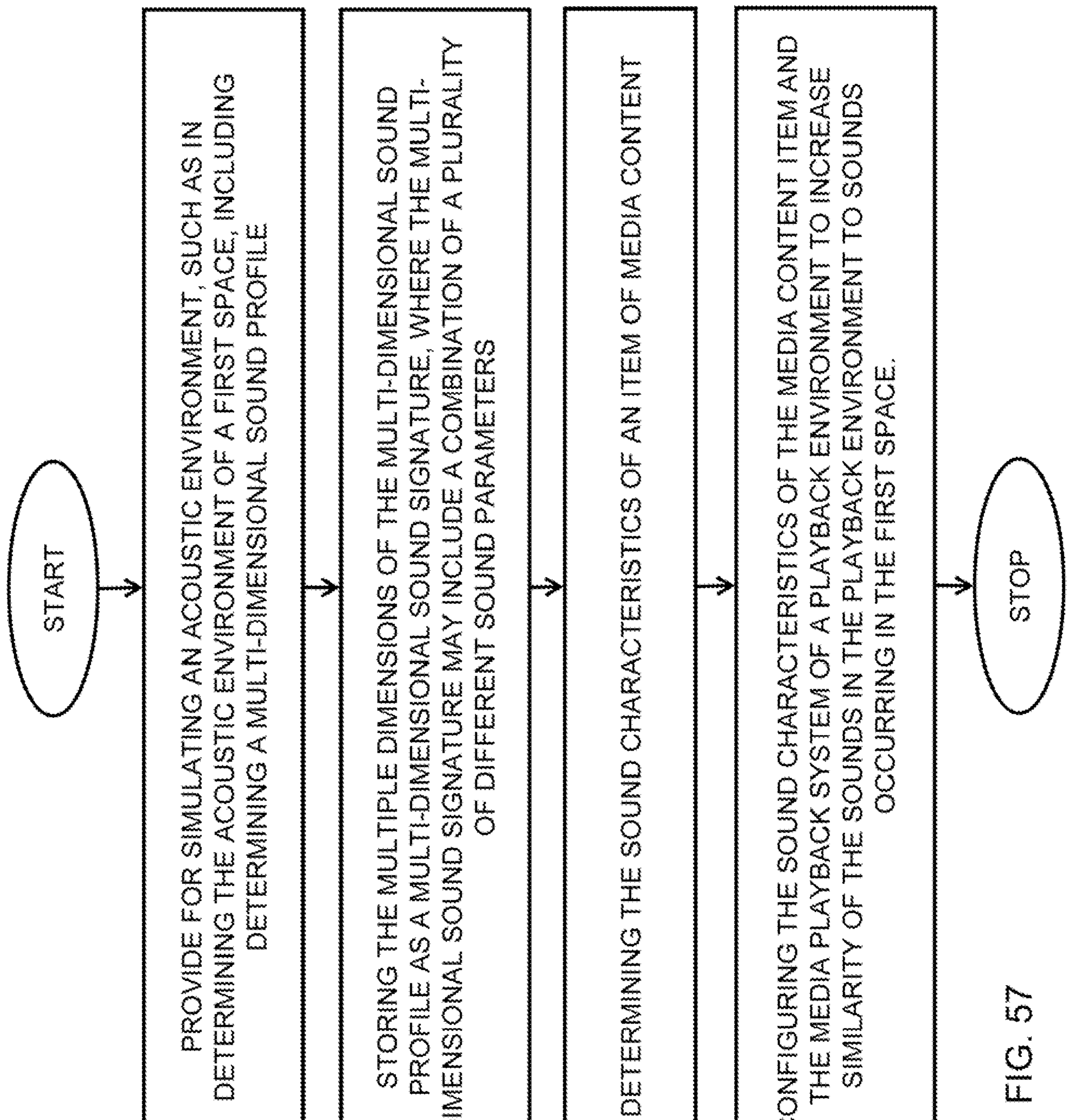

START
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE SOUND CHARACTERISTICS OF AN ITEM OF MEDIA CONTENT
CONFIGURING THE SOUND CHARACTERISTICS OF THE MEDIA CONTENT ITEM AND THE MEDIA PLAYBACK SYSTEM OF A PLAYBACK ENVIRONMENT TO INCREASE SIMILARITY OF THE SOUNDS IN THE PLAYBACK ENVIRONMENT TO SOUNDS OCCURRING IN THE FIRST SPACE.
STOP
5700
5702
5704
5708
5710

FIG. 57

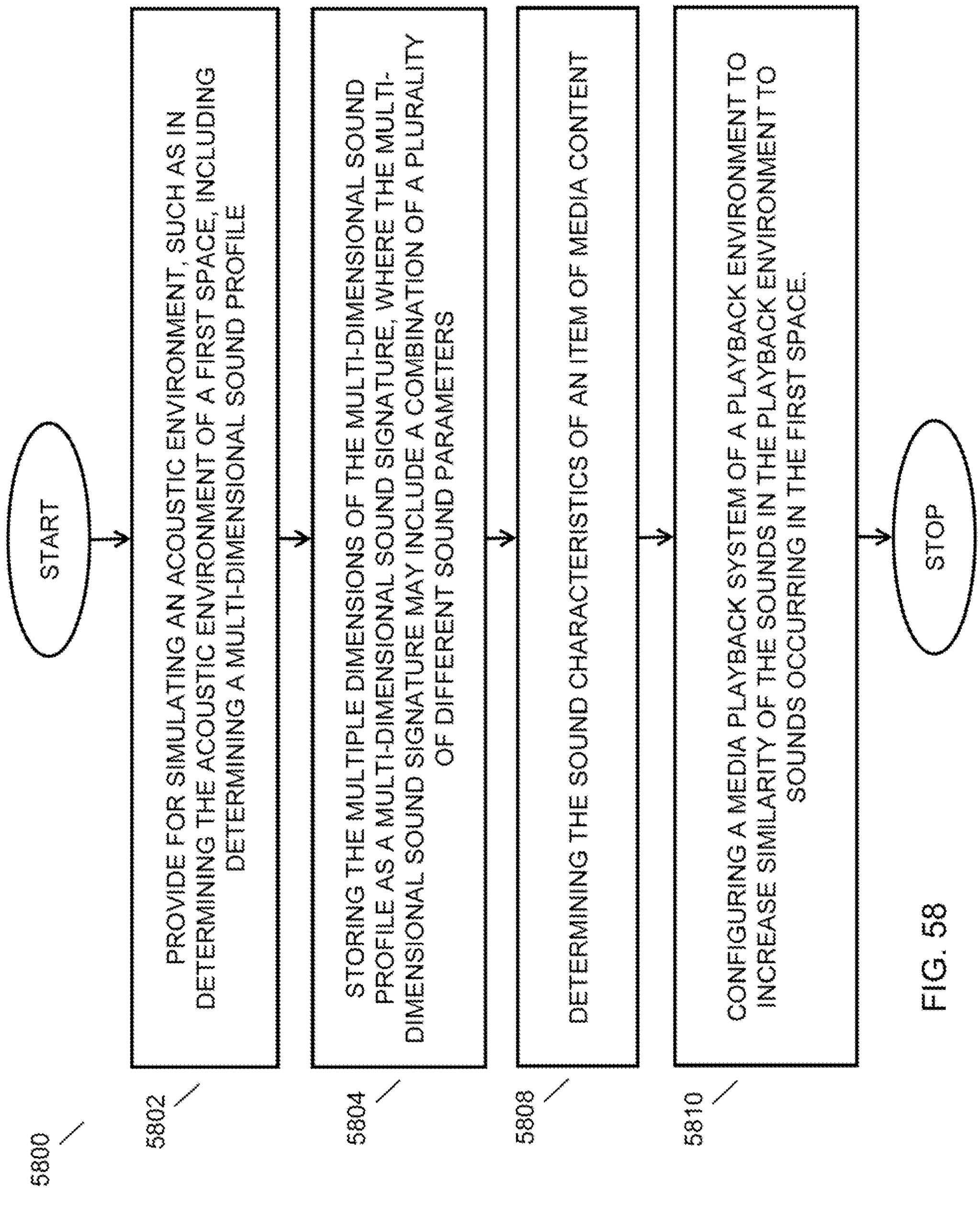

START
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE SOUND CHARACTERISTICS OF AN ITEM OF MEDIA CONTENT
CONFIGURING A MEDIA PLAYBACK SYSTEM OF A PLAYBACK ENVIRONMENT TO INCREASE SIMILARITY OF THE SOUNDS IN THE PLAYBACK ENVIRONMENT TO SOUNDS OCCURRING IN THE FIRST SPACE.
STOP
5800
5802
5804
5808
5810

FIG. 58

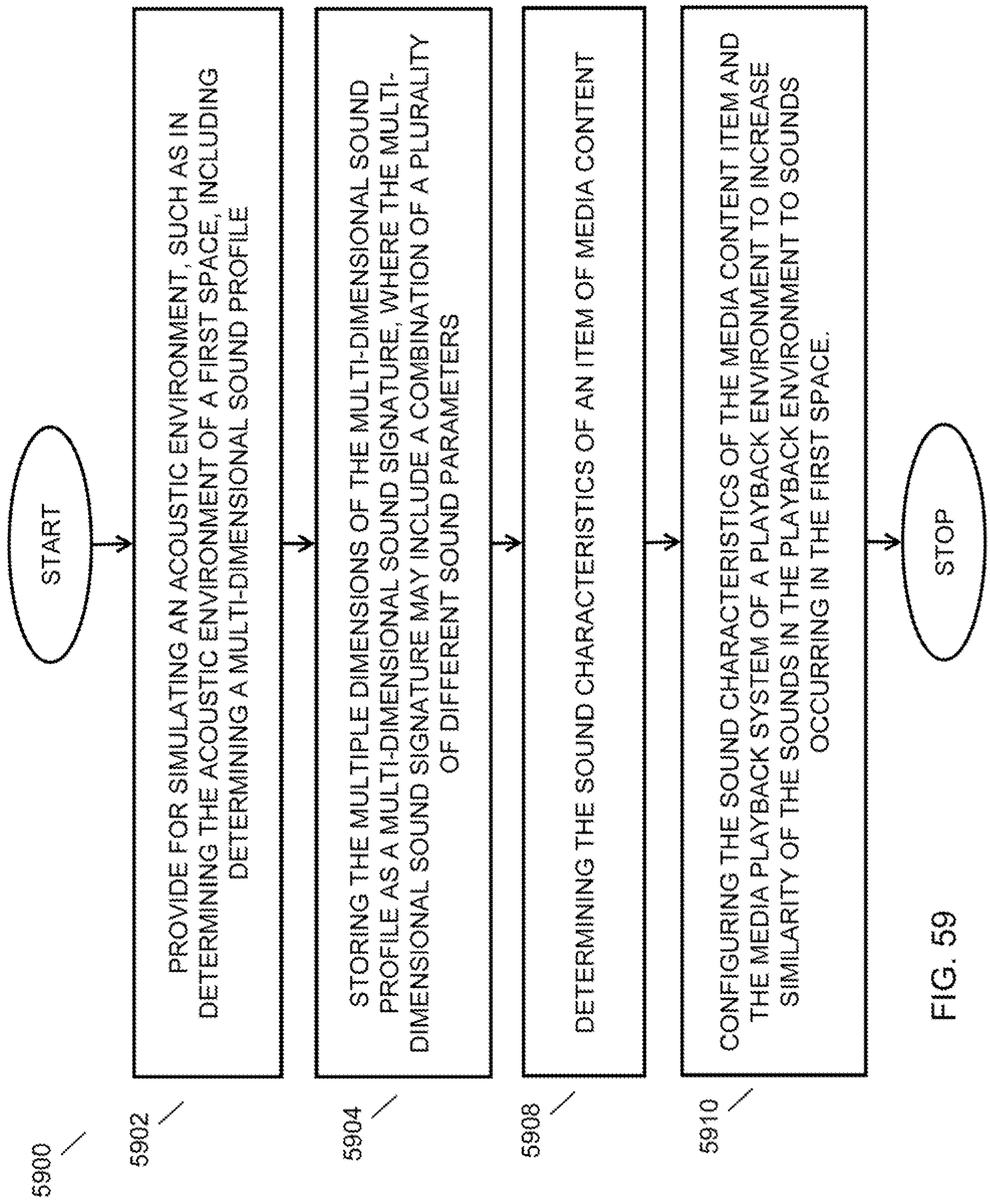

START
PROVIDE FOR SIMULATING AN ACOUSTIC ENVIRONMENT, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF A FIRST SPACE, INCLUDING DETERMINING A MULTI-DIMENSIONAL SOUND PROFILE
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND PROFILE AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT SOUND PARAMETERS
DETERMINING THE SOUND CHARACTERISTICS OF AN ITEM OF MEDIA CONTENT
CONFIGURING THE SOUND CHARACTERISTICS OF THE MEDIA CONTENT ITEM AND THE MEDIA PLAYBACK SYSTEM OF A PLAYBACK ENVIRONMENT TO INCREASE SIMILARITY OF THE SOUNDS IN THE PLAYBACK ENVIRONMENT TO SOUNDS OCCURRING IN THE FIRST SPACE.
STOP
5900
5902
5904
5908
5910

FIG. 59

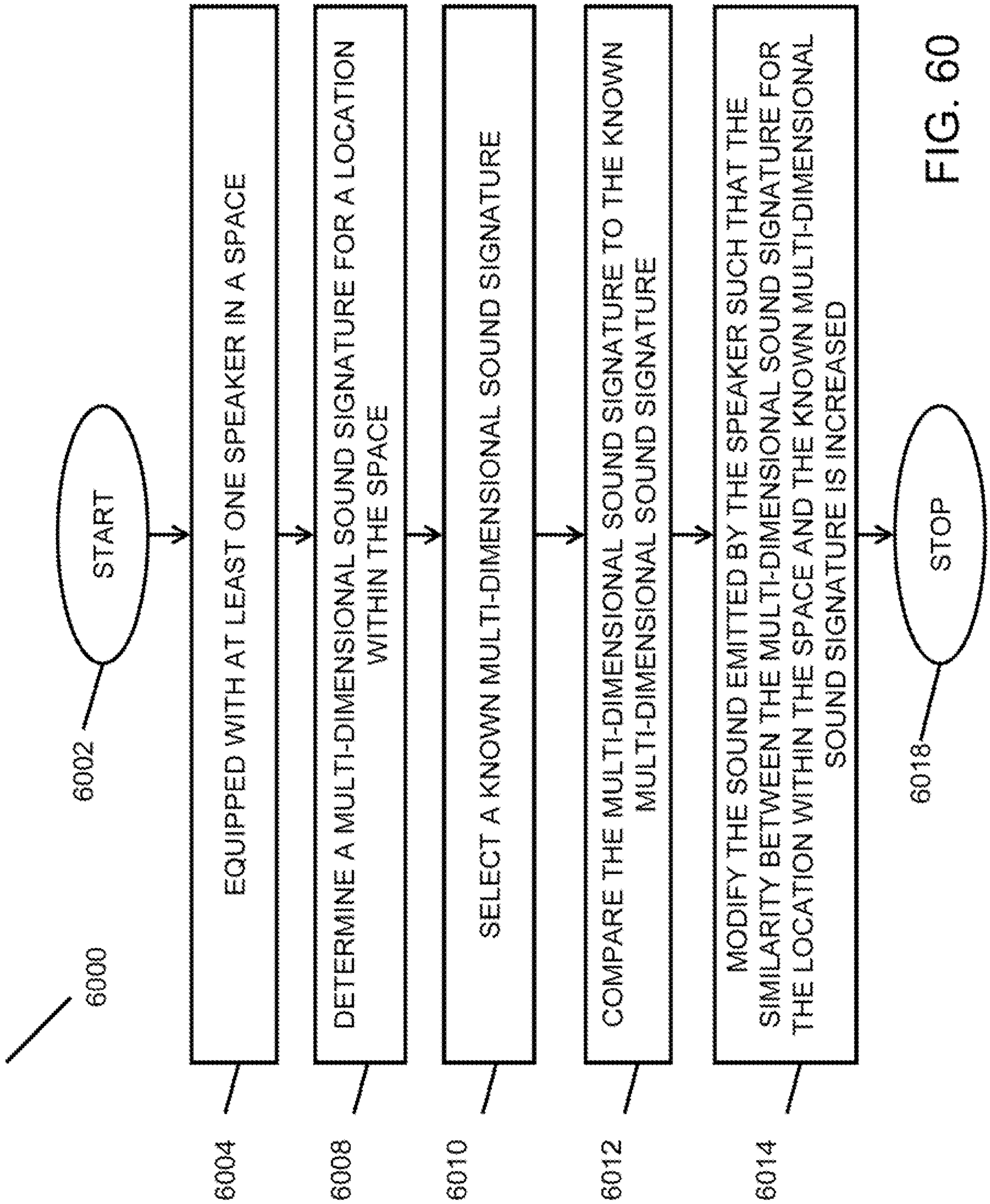

6000
START
6002
EQUIPPED WITH AT LEAST ONE SPEAKER IN A SPACE
6004
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN THE SPACE
6008
SELECT A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE
6010
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE TO THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE
6012
MODIFY THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION WITHIN THE SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE IS INCREASED
6014
STOP
6018

FIG. 60

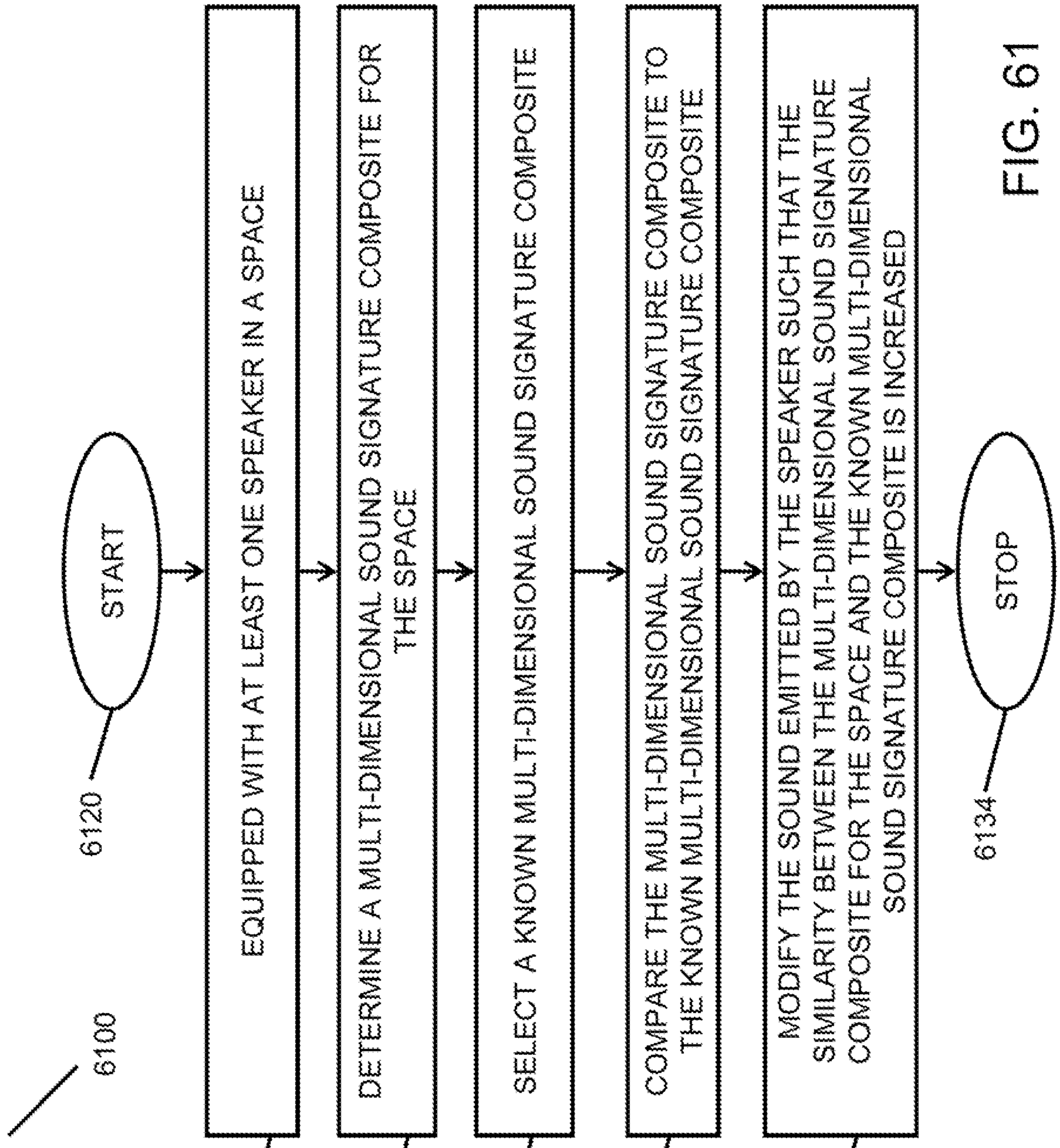

START
6100
6120
EQUIPPED WITH AT LEAST ONE SPEAKER IN A SPACE
6122
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
6124
SELECT A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
6128
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE TO THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
6130
MODIFY THE SOUND EMITTED BY THE SPEAKER SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IS INCREASED
6132
STOP
6134

FIG. 61

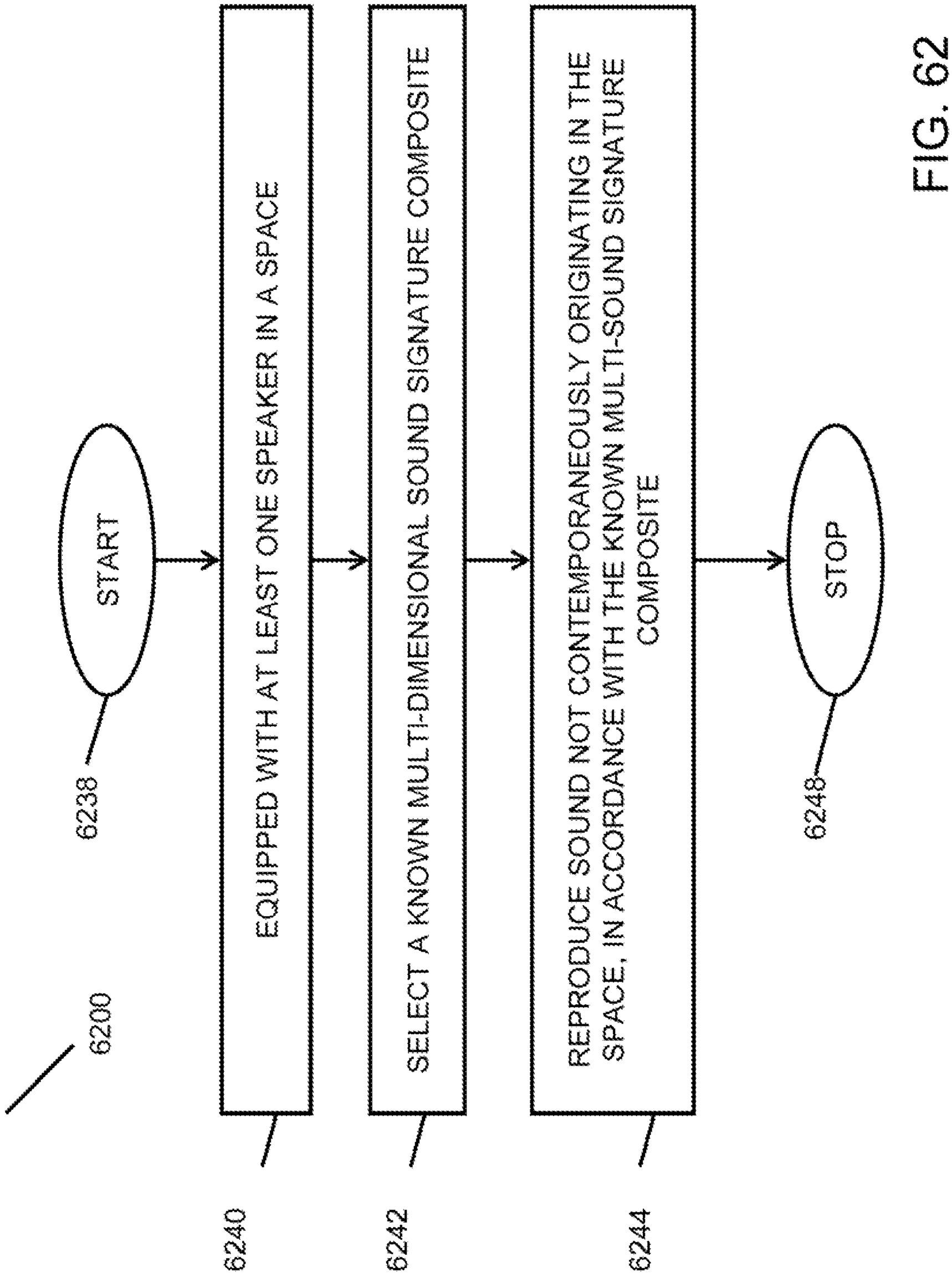

START
6200
EQUIPPED WITH AT LEAST ONE SPEAKER IN A SPACE
6238
SELECT A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
6240
REPRODUCE SOUND NOT CONTEMPORANEOUSLY ORIGINATING IN THE SPACE, IN ACCORDANCE WITH THE KNOWN MULTI-SOUND SIGNATURE COMPOSITE
6242
STOP
6244
6248

FIG. 62

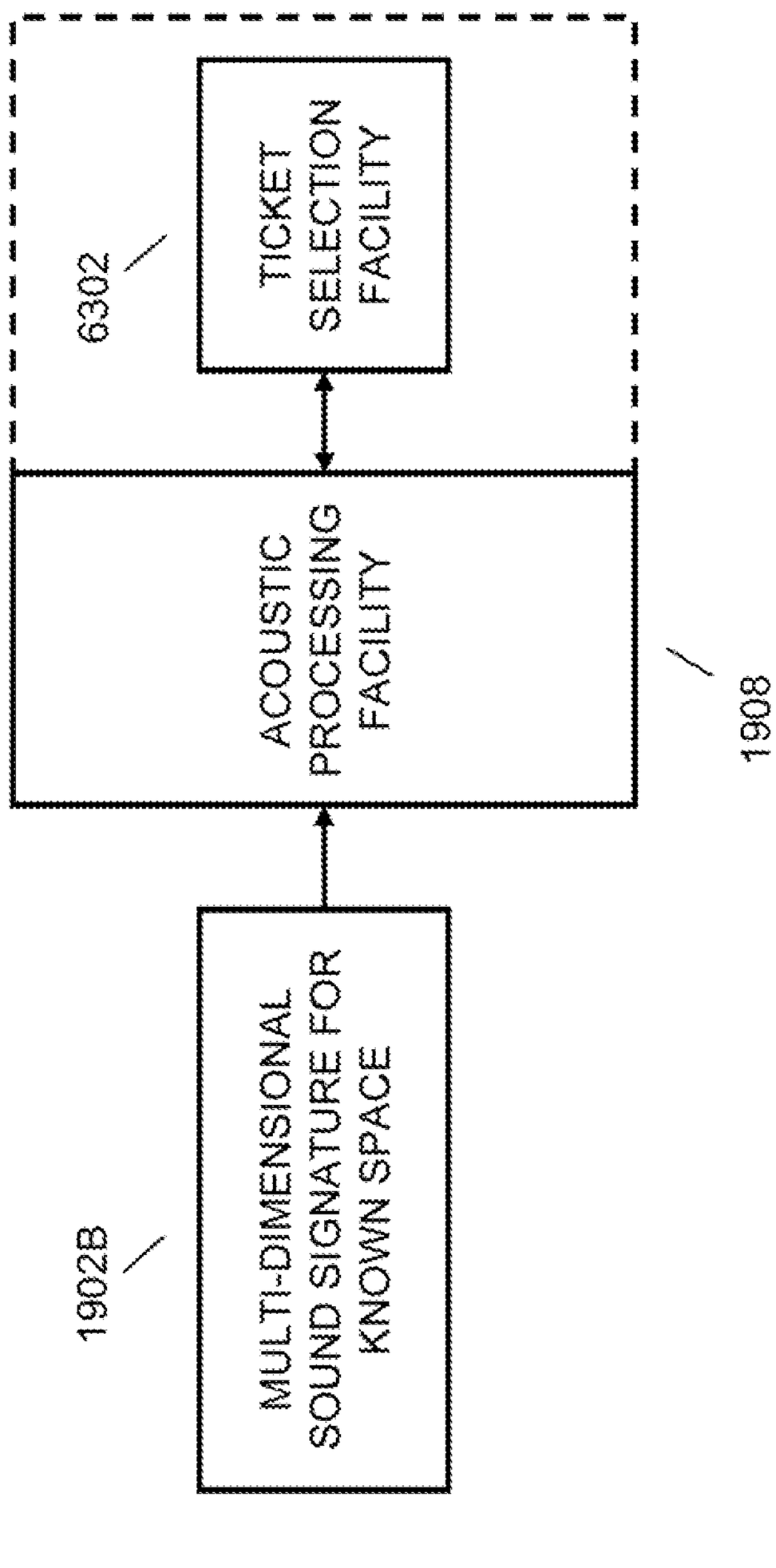

6302
TICKET SELECTION FACILITY
ACOUSTIC PROCESSING FACILITY
1908
1902B
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE

FIG. 63

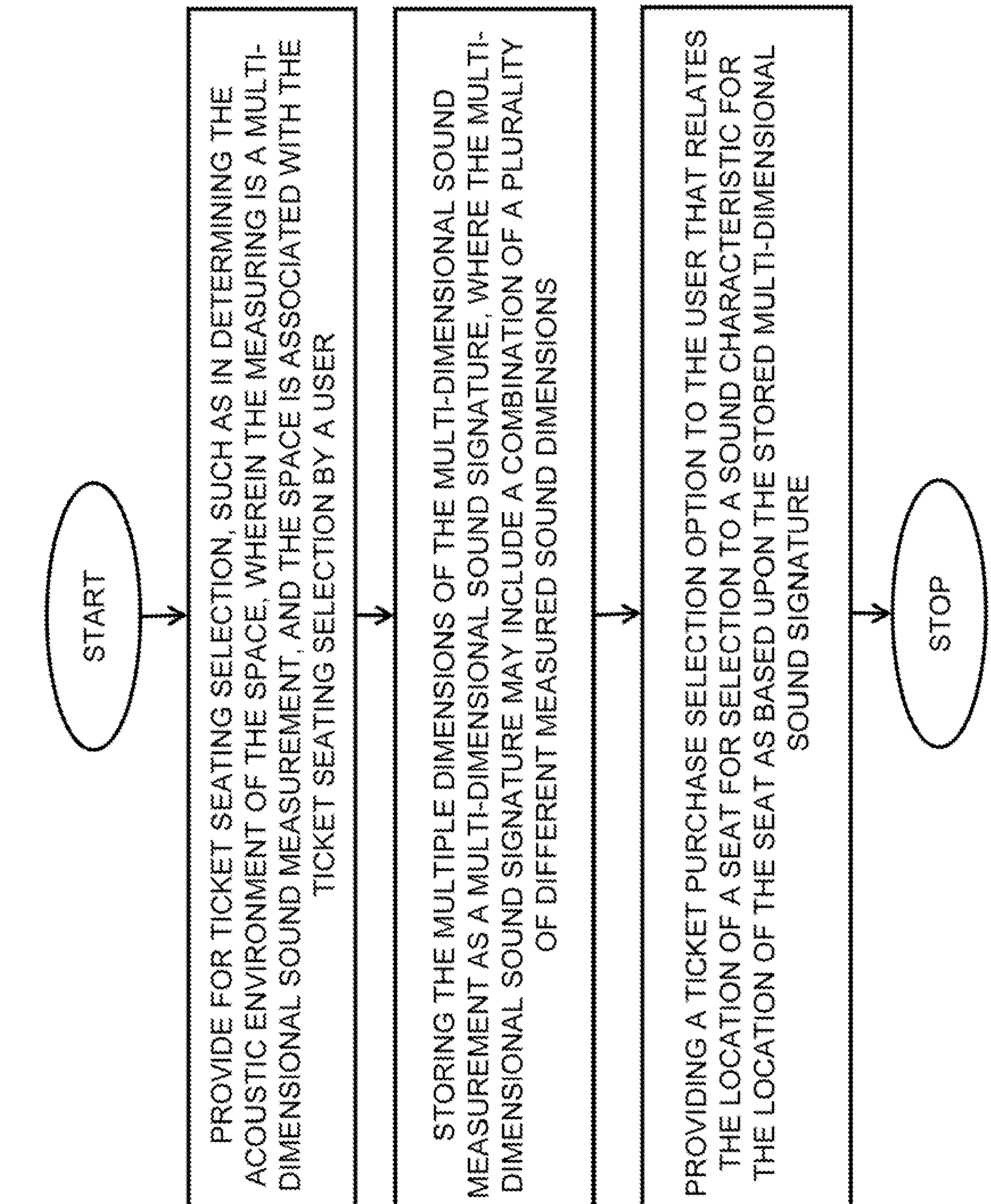

6400
START
6402
PROVIDE FOR TICKET SEATING SELECTION, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF THE SPACE, WHEREIN THE MEASURING IS A MULTI-DIMENSIONAL SOUND MEASUREMENT, AND THE SPACE IS ASSOCIATED WITH THE TICKET SEATING SELECTION BY A USER
6404
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND MEASUREMENT AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS
6408
PROVIDING A TICKET PURCHASE SELECTION OPTION TO THE USER THAT RELATES THE LOCATION OF A SEAT FOR SELECTION TO A SOUND CHARACTERISTIC FOR THE LOCATION OF THE SEAT AS BASED UPON THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE
STOP

FIG. 64

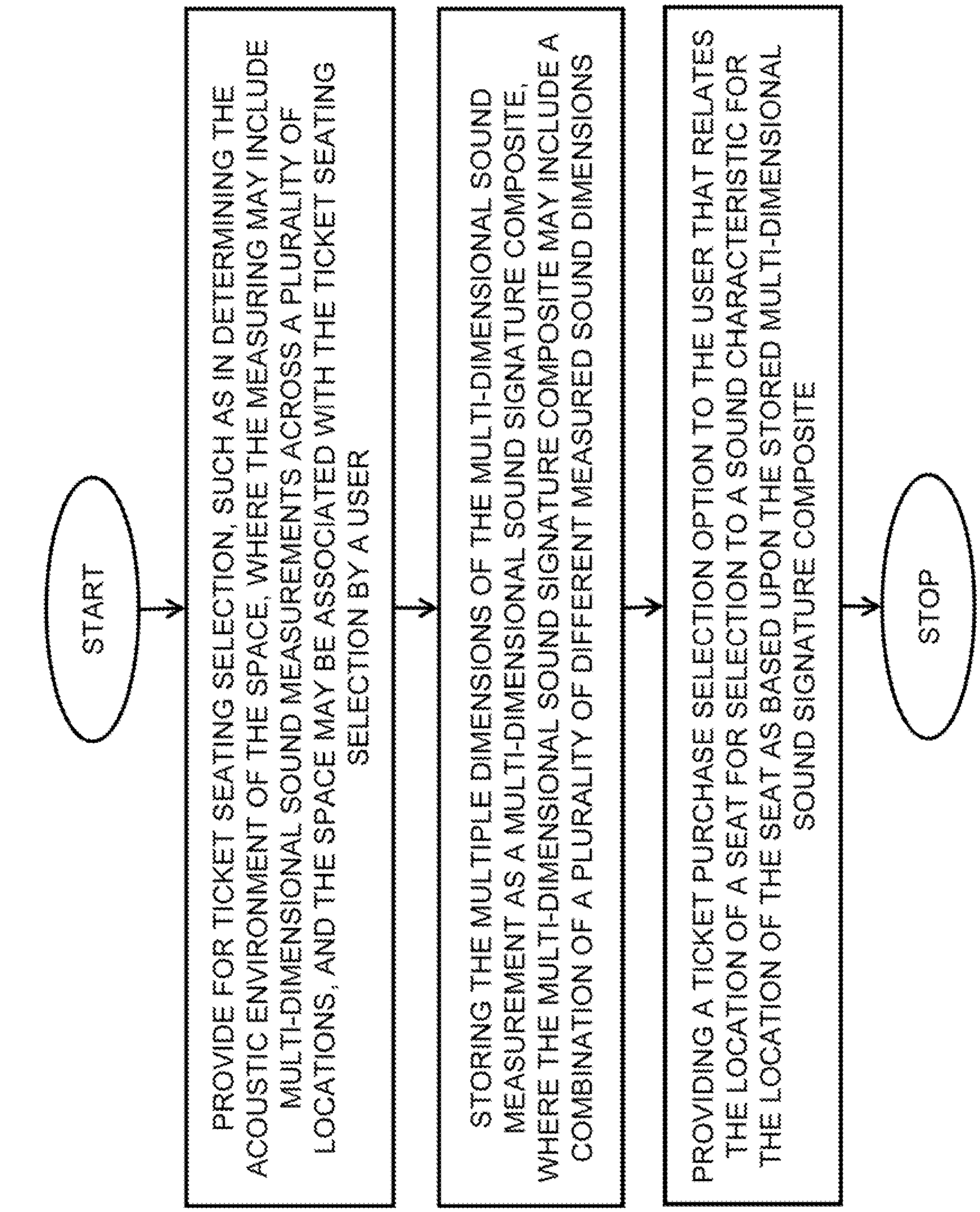

6500
START
6502
PROVIDE FOR TICKET SEATING SELECTION, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF THE SPACE, WHERE THE MEASURING MAY INCLUDE MULTI-DIMENSIONAL SOUND MEASUREMENTS ACROSS A PLURALITY OF LOCATIONS, AND THE SPACE MAY BE ASSOCIATED WITH THE TICKET SEATING SELECTION BY A USER
6504
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND MEASUREMENT AS A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS
6508
PROVIDING A TICKET PURCHASE SELECTION OPTION TO THE USER THAT RELATES THE LOCATION OF A SEAT FOR SELECTION TO A SOUND CHARACTERISTIC FOR THE LOCATION OF THE SEAT AS BASED UPON THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
STOP

FIG. 65

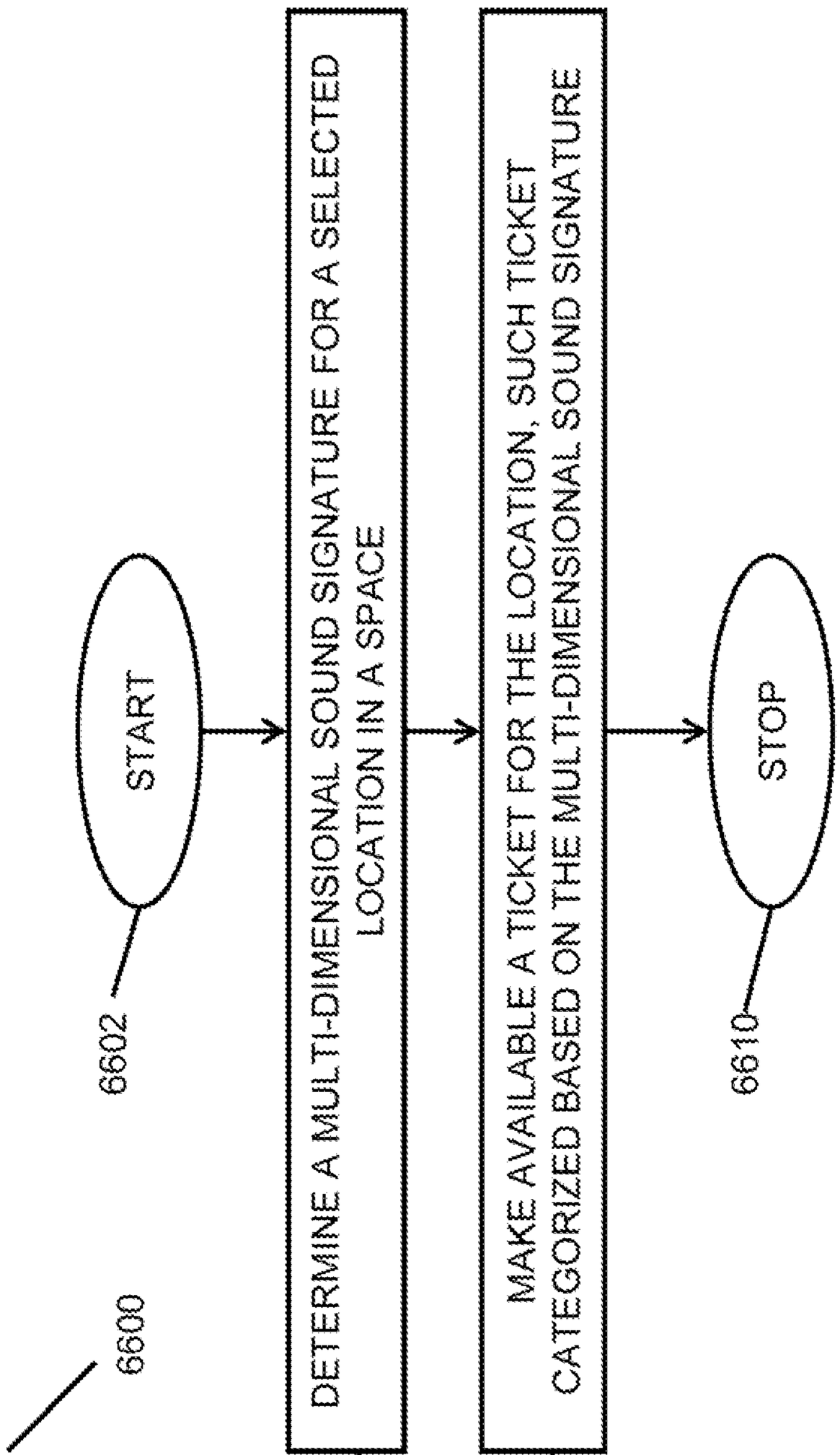

6600
START
6602
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A SELECTED LOCATION IN A SPACE
6604
MAKE AVAILABLE A TICKET FOR THE LOCATION, SUCH TICKET CATEGORIZED BASED ON THE MULTI-DIMENSIONAL SOUND SIGNATURE
6608
STOP
6610

FIG. 66

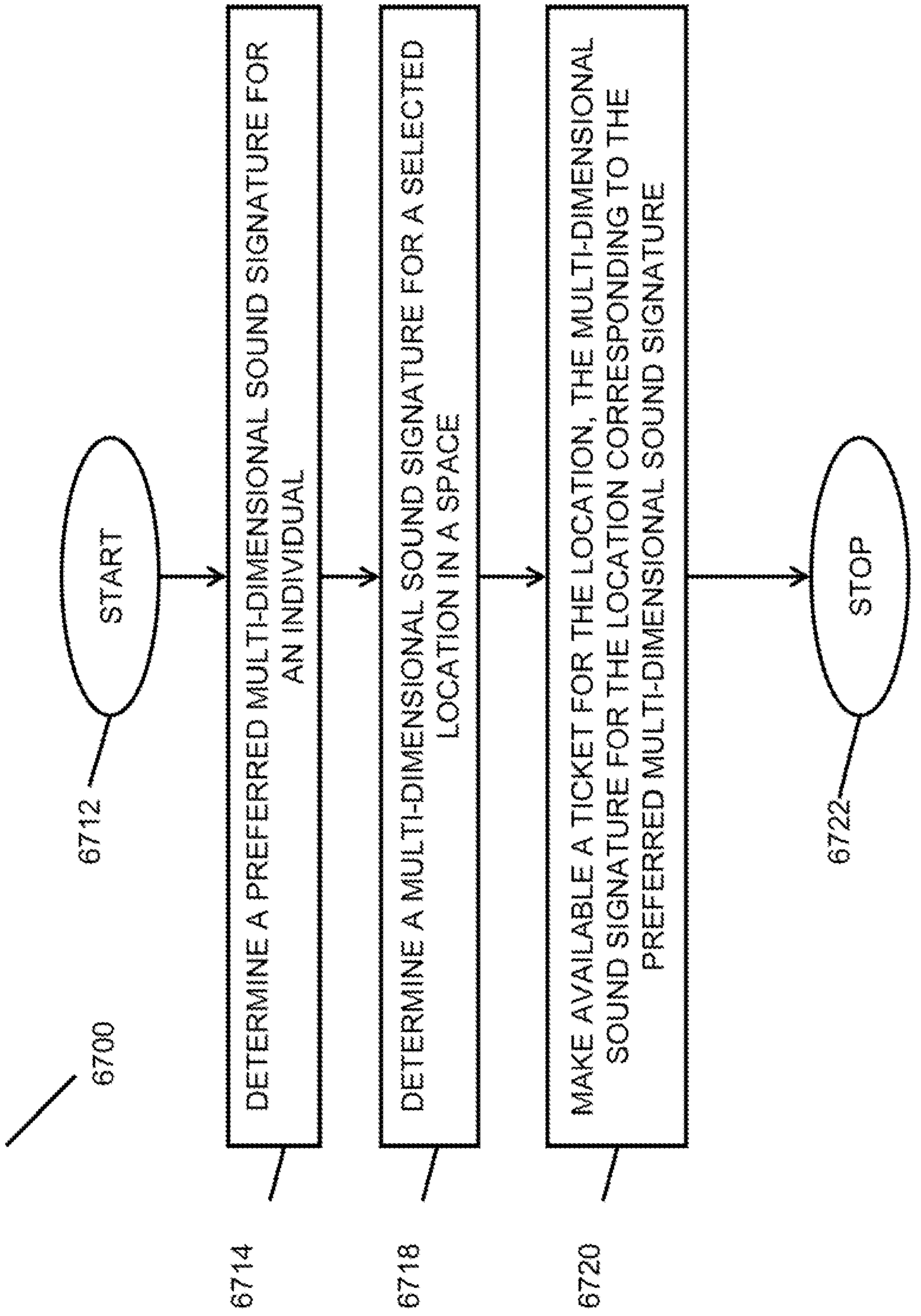

6700
START
6712
DETERMINE A PREFERRED MULTI-DIMENSIONAL SOUND SIGNATURE FOR AN INDIVIDUAL
6714
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A SELECTED LOCATION IN A SPACE
6718
MAKE AVAILABLE A TICKET FOR THE LOCATION, THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION CORRESPONDING TO THE PREFERRED MULTI-DIMENSIONAL SOUND SIGNATURE
6720
STOP
6722

FIG. 67

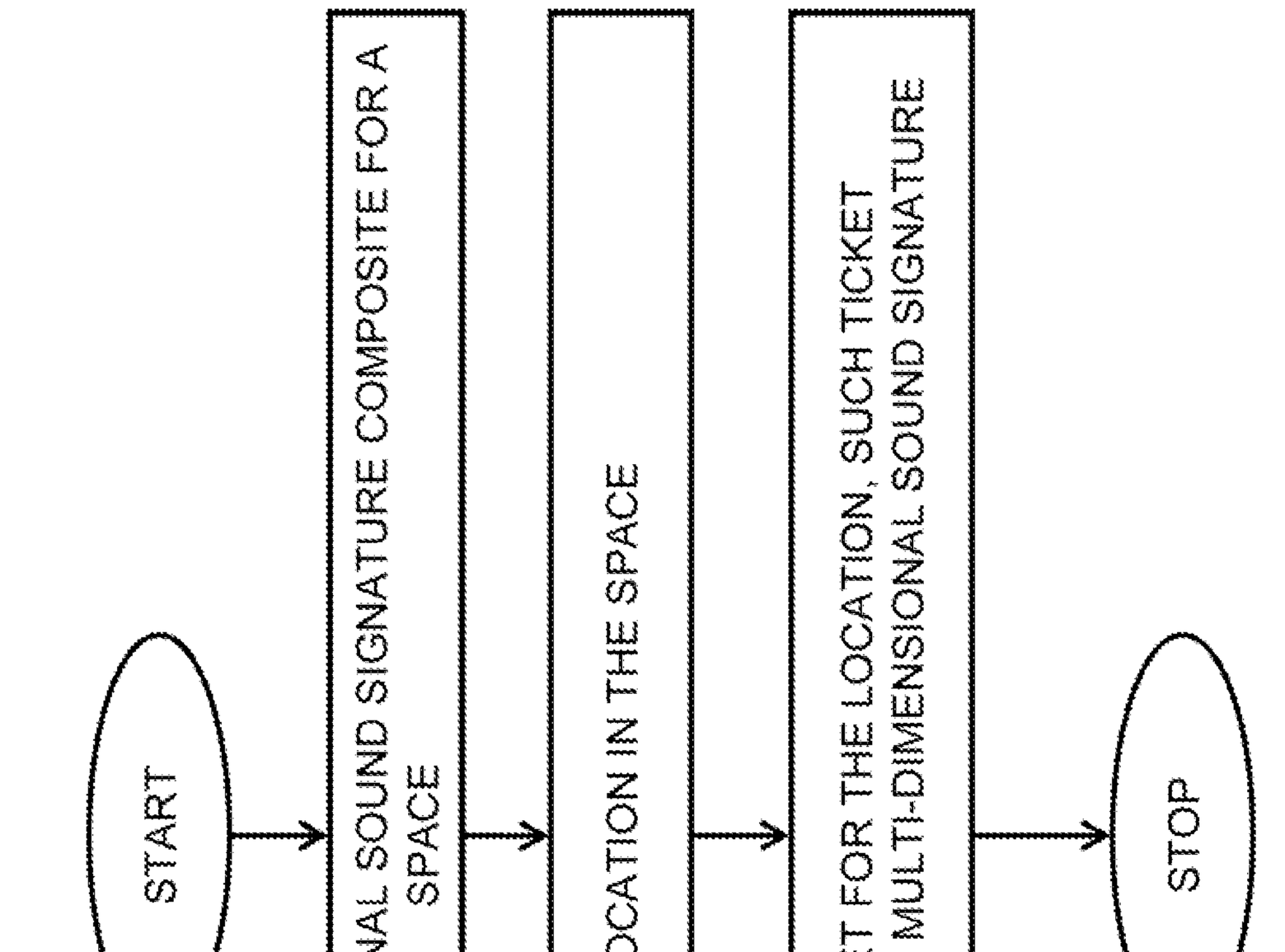

6800
START
6824
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
6828
SELECT A LOCATION IN THE SPACE
6830
MAKE AVAILABLE A TICKET FOR THE LOCATION, SUCH TICKET CATEGORIZED BASED ON THE MULTI-DIMENSIONAL SOUND SIGNATURE
6832
STOP
6834

FIG. 68

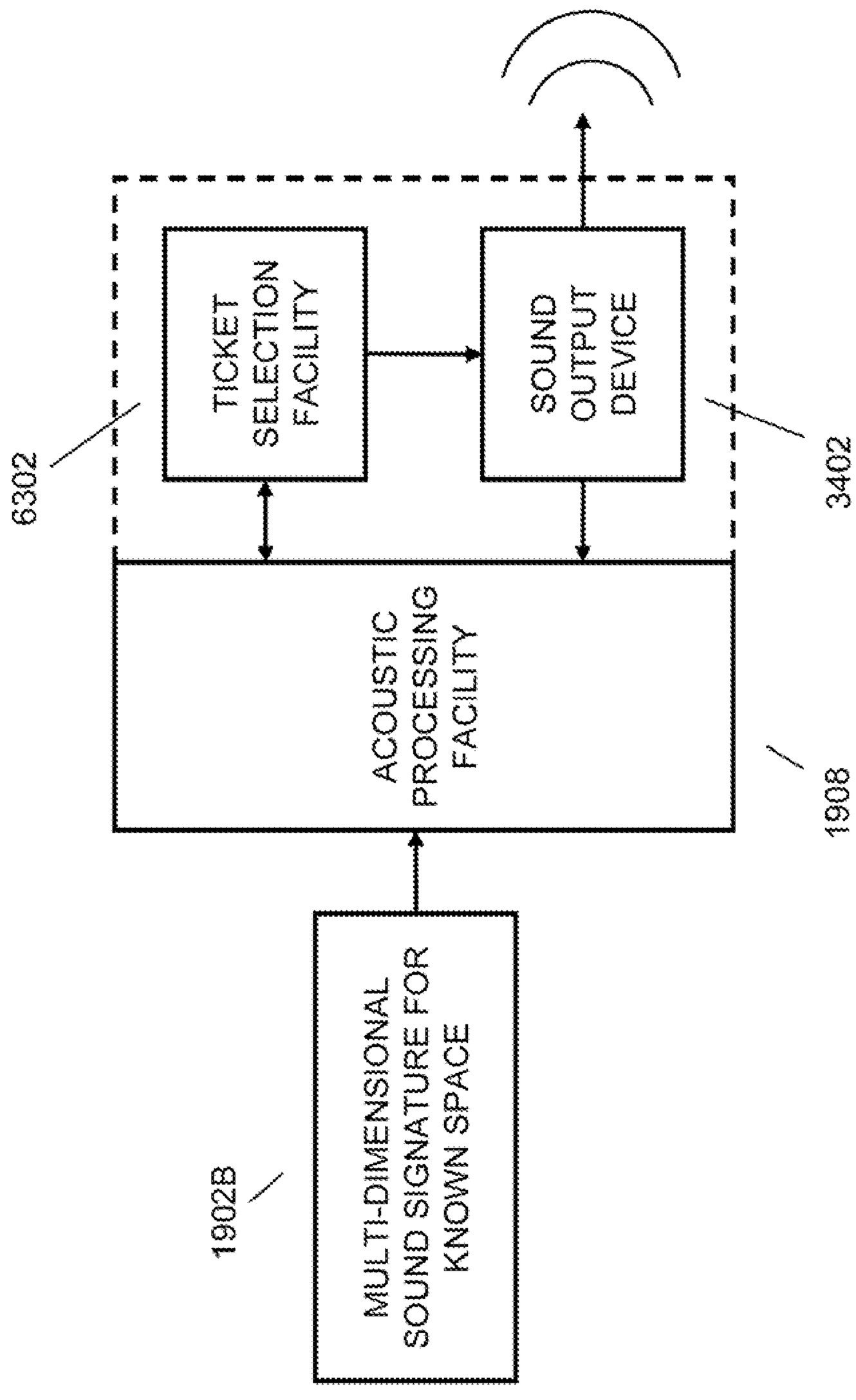

TICKET SELECTION FACILITY
SOUND OUTPUT DEVICE
6302
3402
ACOUSTIC PROCESSING FACILITY
1908
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE
1902B

FIG. 69

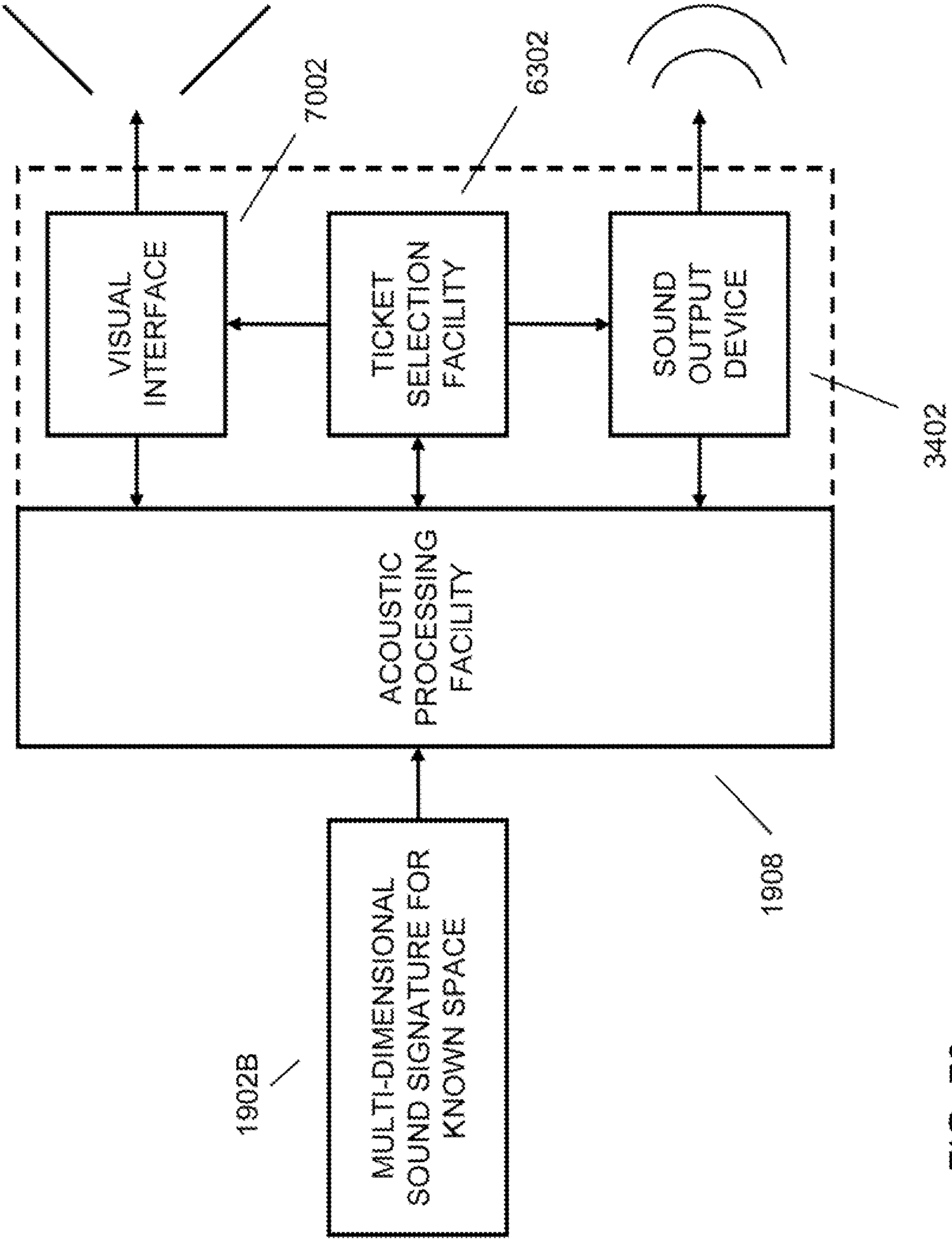

7002
6302
VISUAL INTERFACE
TICKET SELECTION FACILITY
SOUND OUTPUT DEVICE
3402
ACOUSTIC PROCESSING FACILITY
1908
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE
1902B

FIG. 70

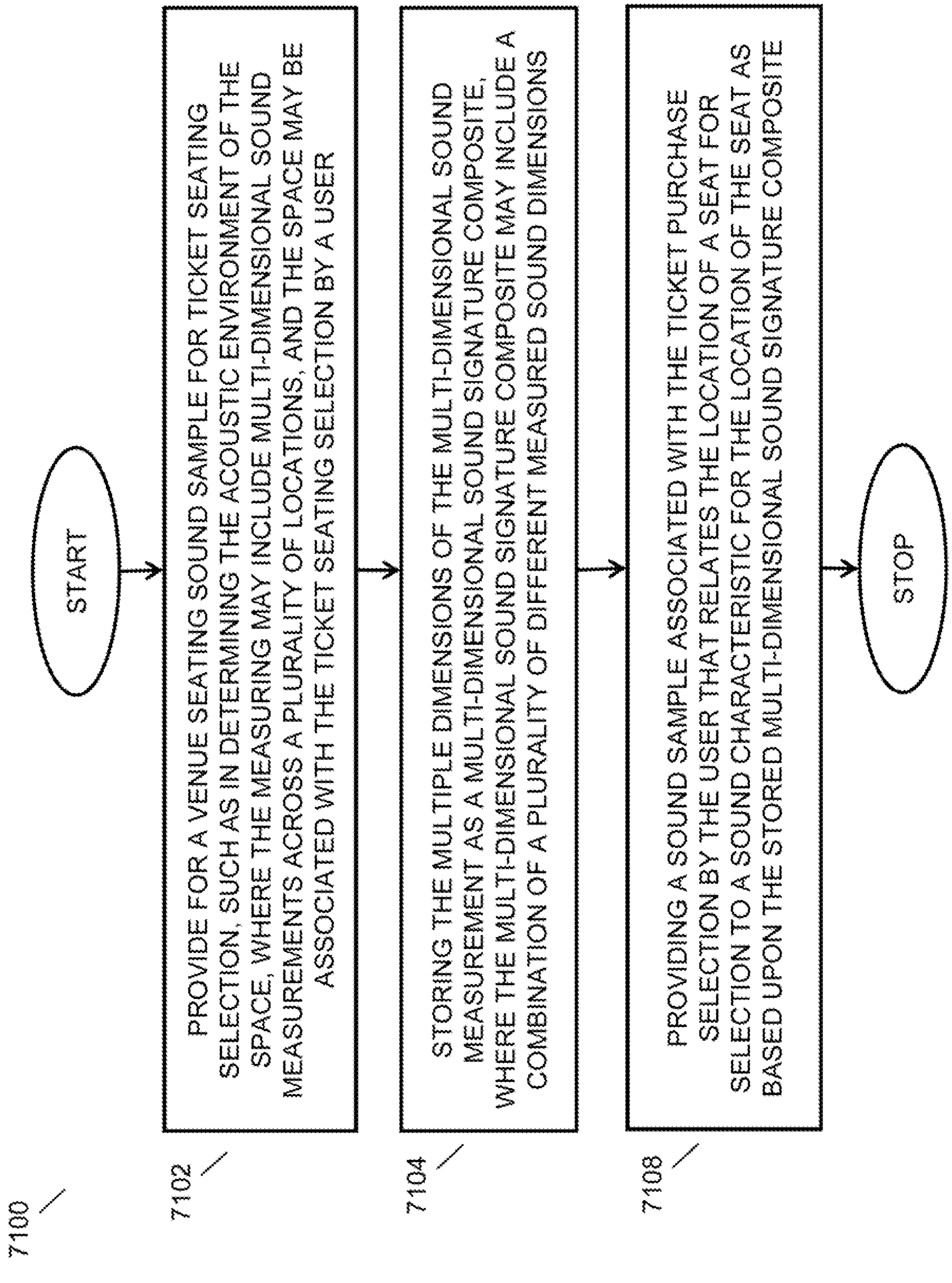

7100
7102
PROVIDE FOR A VENUE SEATING SOUND SAMPLE FOR TICKET SEATING SELECTION, SUCH AS IN DETERMINING THE ACOUSTIC ENVIRONMENT OF THE SPACE, WHERE THE MEASURING MAY INCLUDE MULTI-DIMENSIONAL SOUND MEASUREMENTS ACROSS A PLURALITY OF LOCATIONS, AND THE SPACE MAY BE ASSOCIATED WITH THE TICKET SEATING SELECTION BY A USER
7104
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND MEASUREMENT AS A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS
7108
PROVIDING A SOUND SAMPLE ASSOCIATED WITH THE TICKET PURCHASE SELECTION BY THE USER THAT RELATES THE LOCATION OF A SEAT FOR SELECTION TO A SOUND CHARACTERISTIC FOR THE LOCATION OF THE SEAT AS BASED UPON THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
START
STOP

FIG. 71

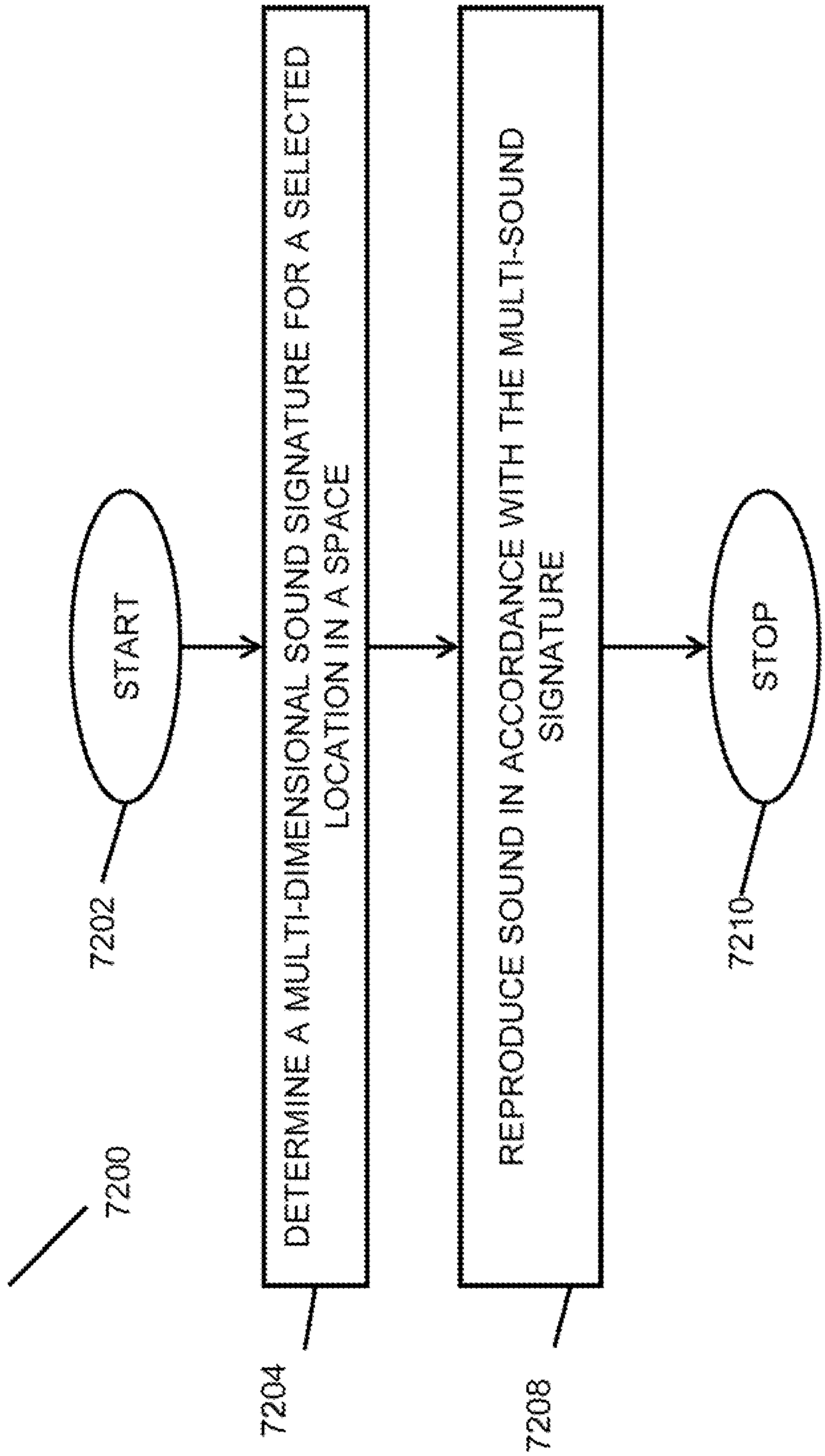

7200
START
7202
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A SELECTED LOCATION IN A SPACE
7204
REPRODUCE SOUND IN ACCORDANCE WITH THE MULTI-SOUND SIGNATURE
7208
STOP
7210

FIG. 72

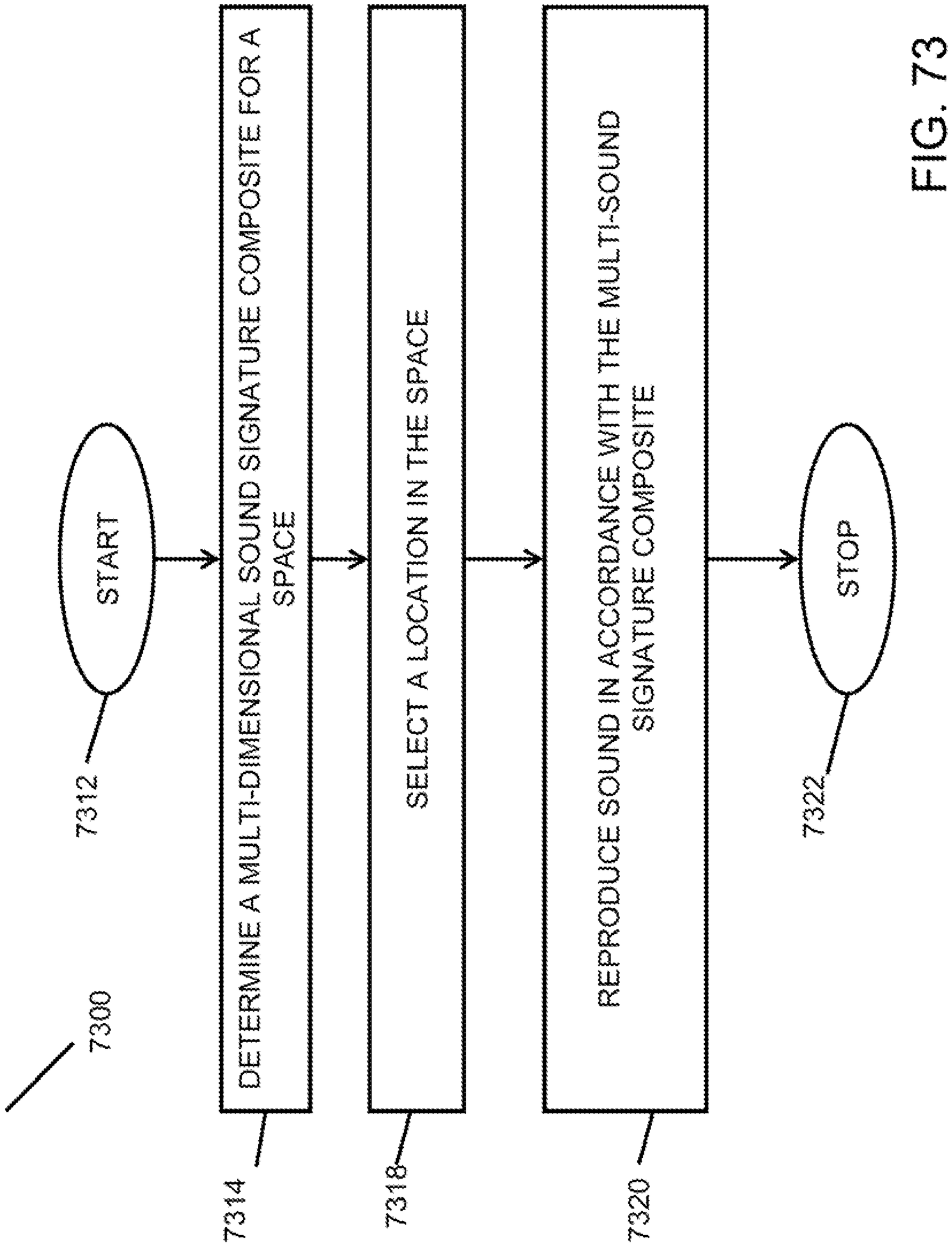

START
7312
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
7314
SELECT A LOCATION IN THE SPACE
7318
REPRODUCE SOUND IN ACCORDANCE WITH THE MULTI-SOUND SIGNATURE COMPOSITE
7320
STOP
7322
7300

FIG. 73

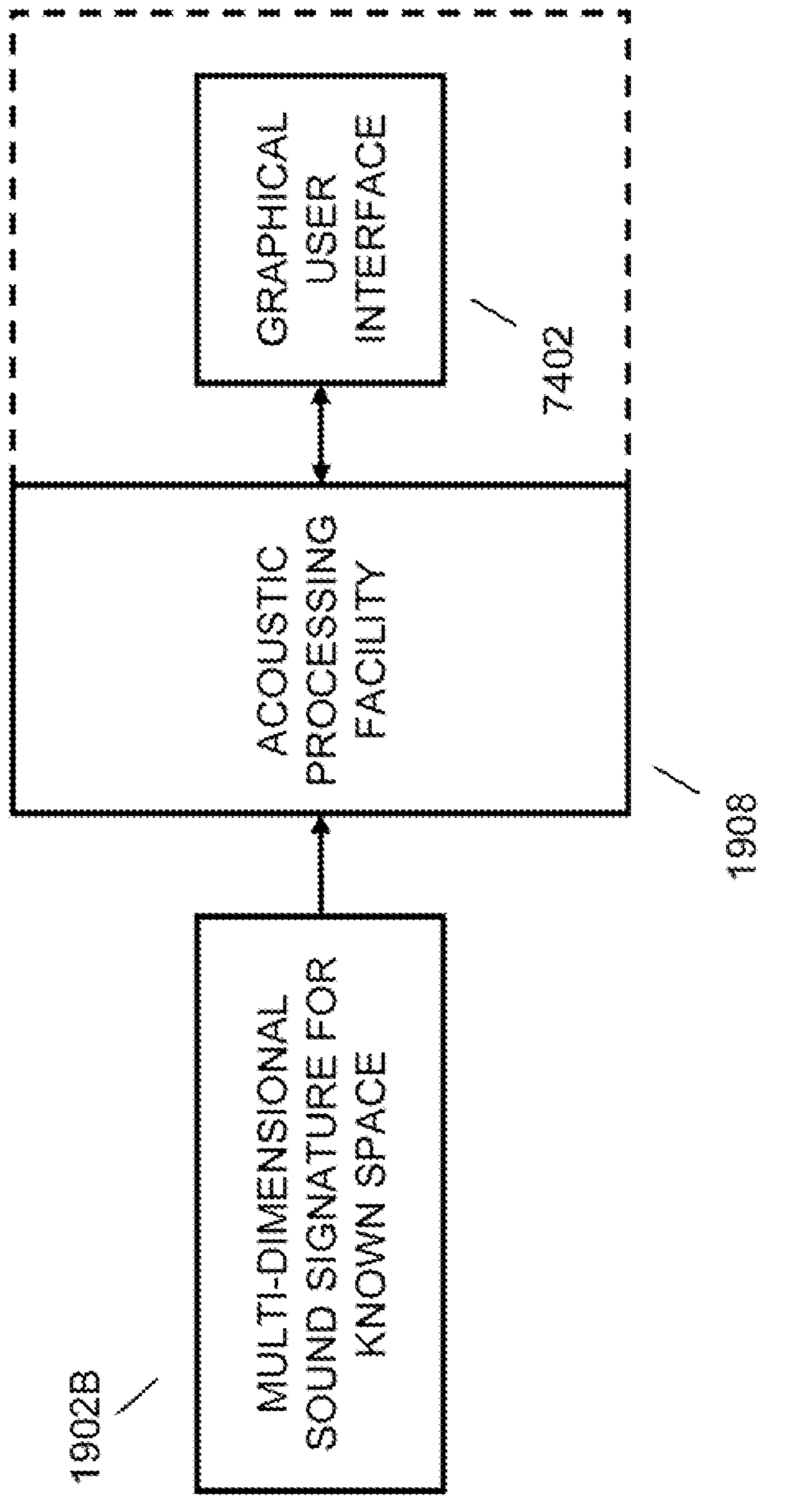

GRAPHICAL USER INTERFACE
7402
ACOUSTIC PROCESSING FACILITY
1908
MULTI-DIMENSIONAL SOUND SIGNATURE FOR KNOWN SPACE
1902B

FIG. 74

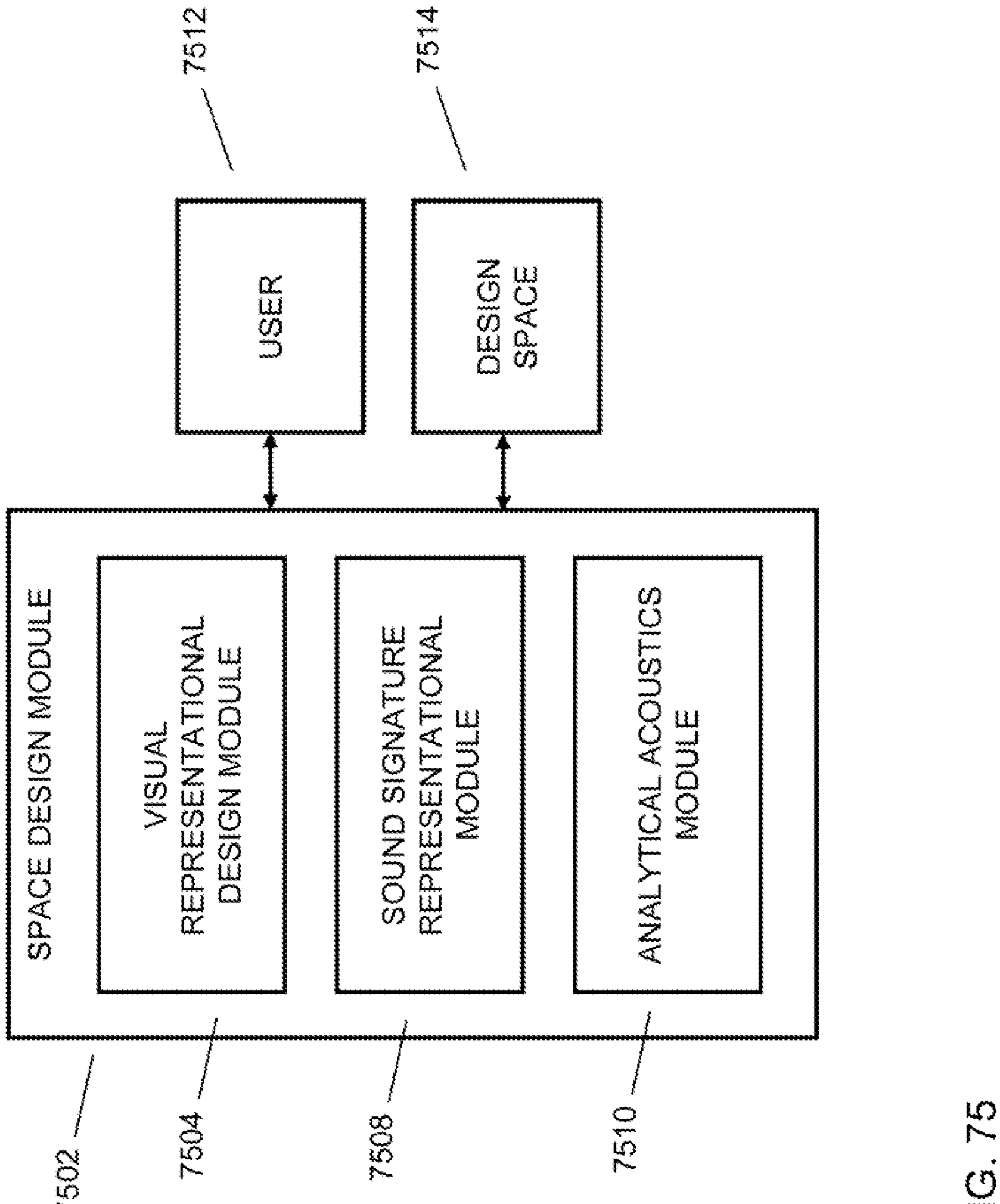

7512
7514
USER
DESIGN SPACE
SPACE DESIGN MODULE
VISUAL REPRESENTATIONAL DESIGN MODULE
SOUND SIGNATURE REPRESENTATIONAL MODULE
ANALYTICAL ACOUSTICS MODULE
7502
7504
7508
7510

FIG. 75

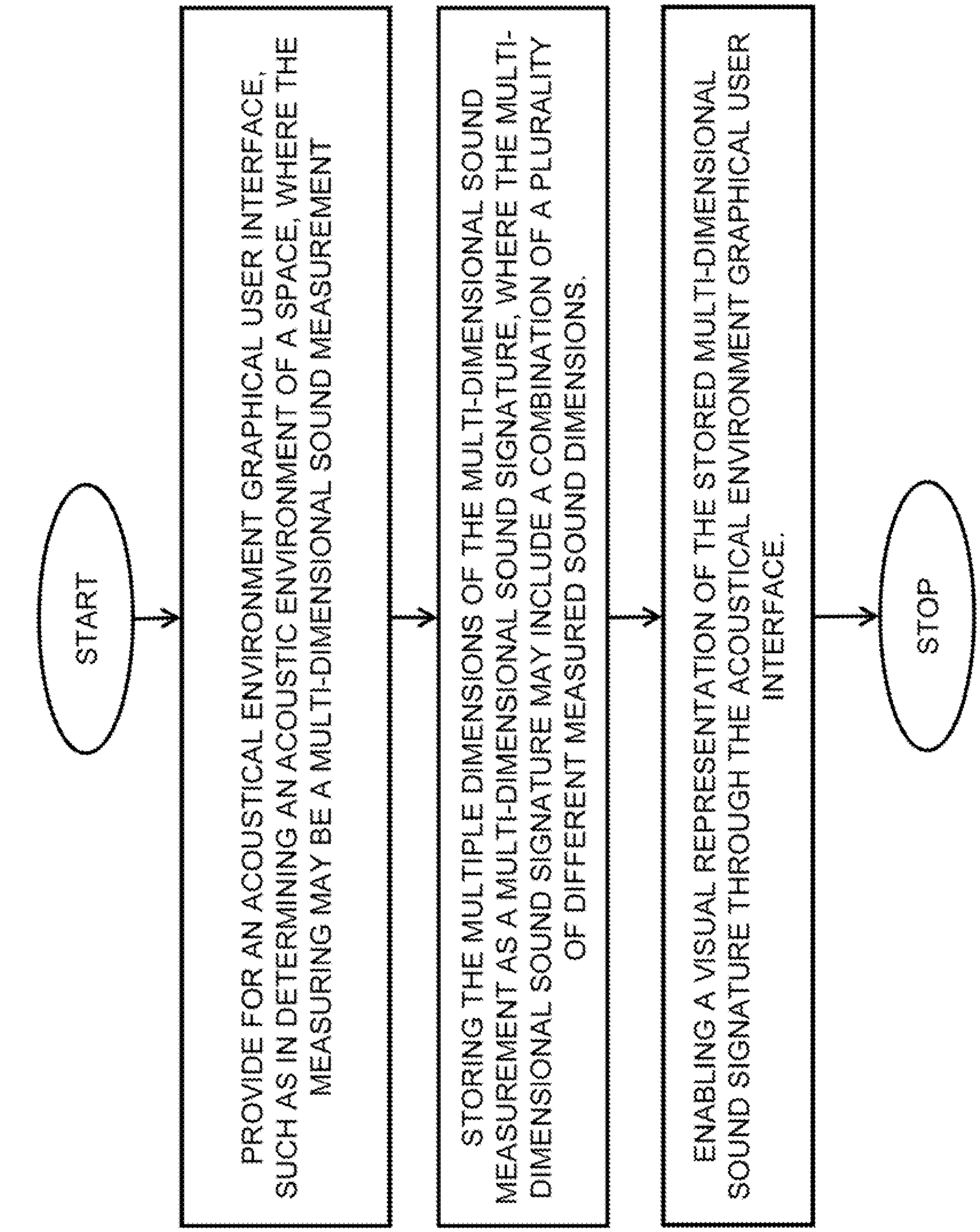

7600
START
7602
PROVIDE FOR AN ACOUSTICAL ENVIRONMENT GRAPHICAL USER INTERFACE, SUCH AS IN DETERMINING AN ACOUSTIC ENVIRONMENT OF A SPACE, WHERE THE MEASURING MAY BE A MULTI-DIMENSIONAL SOUND MEASUREMENT
7604
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND MEASUREMENT AS A MULTI-DIMENSIONAL SOUND SIGNATURE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS.
7608
ENABLING A VISUAL REPRESENTATION OF THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE THROUGH THE ACOUSTICAL ENVIRONMENT GRAPHICAL USER INTERFACE.
STOP

FIG. 76

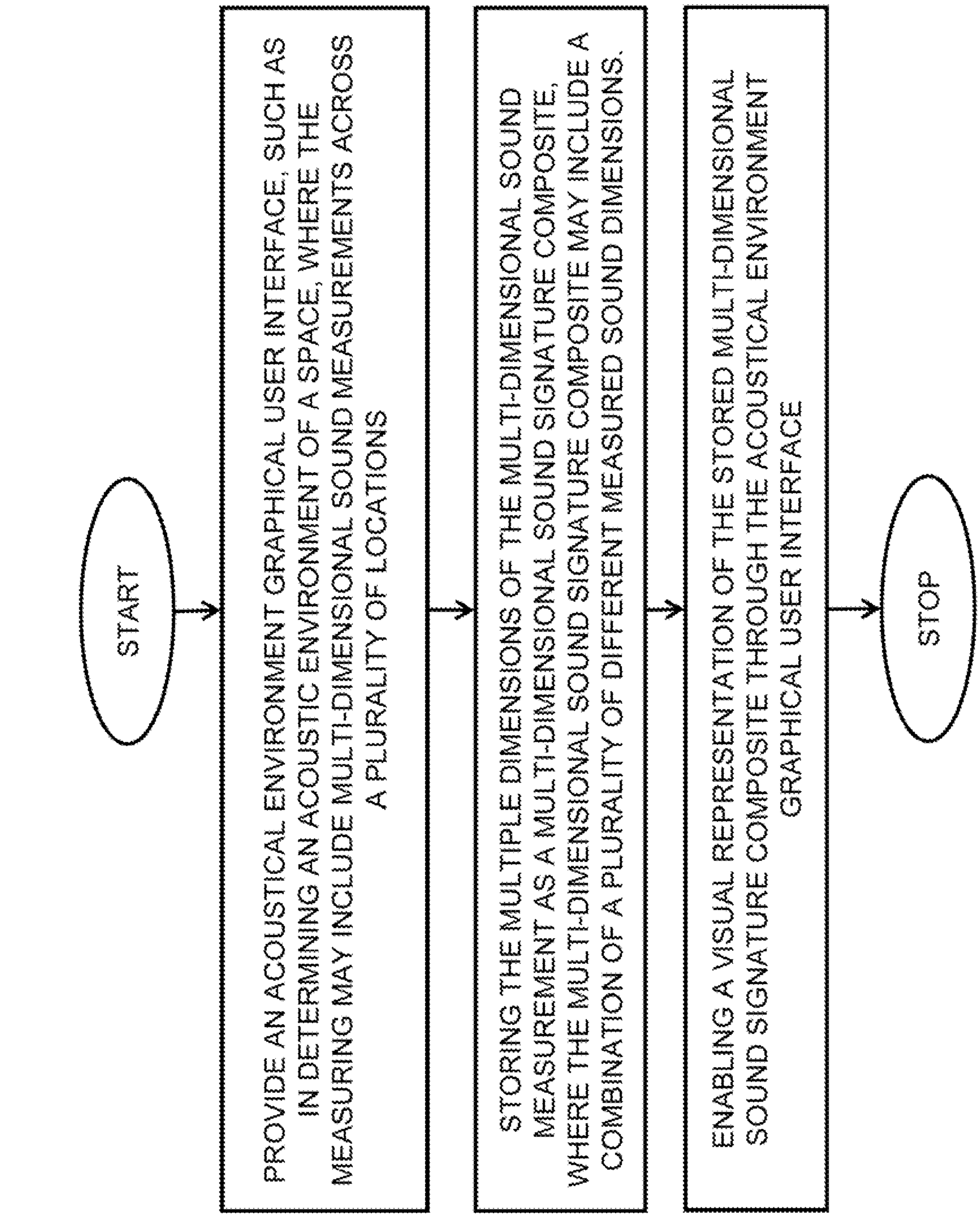

7700
7702
PROVIDE AN ACOUSTICAL ENVIRONMENT GRAPHICAL USER INTERFACE, SUCH AS IN DETERMINING AN ACOUSTIC ENVIRONMENT OF A SPACE, WHERE THE MEASURING MAY INCLUDE MULTI-DIMENSIONAL SOUND MEASUREMENTS ACROSS A PLURALITY OF LOCATIONS
7704
STORING THE MULTIPLE DIMENSIONS OF THE MULTI-DIMENSIONAL SOUND MEASUREMENT AS A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE, WHERE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY INCLUDE A COMBINATION OF A PLURALITY OF DIFFERENT MEASURED SOUND DIMENSIONS.
7708
ENABLING A VISUAL REPRESENTATION OF THE STORED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE THROUGH THE ACOUSTICAL ENVIRONMENT GRAPHICAL USER INTERFACE
START
STOP

FIG. 77

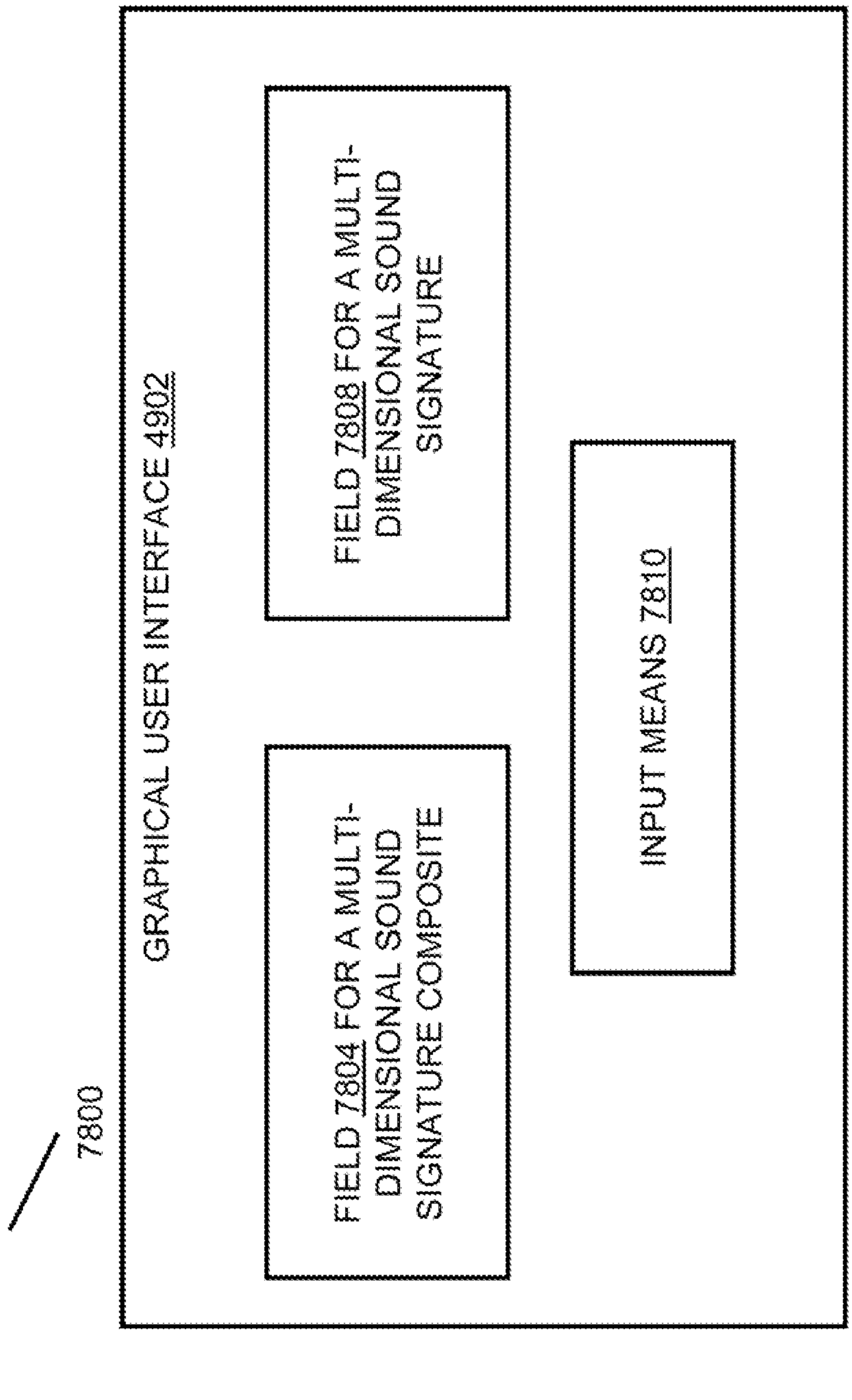

7800
GRAPHICAL USER INTERFACE 4902
FIELD 7804 FOR A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
FIELD 7808 FOR A MULTI-DIMENSIONAL SOUND SIGNATURE
INPUT MEANS 7810

FIG. 78

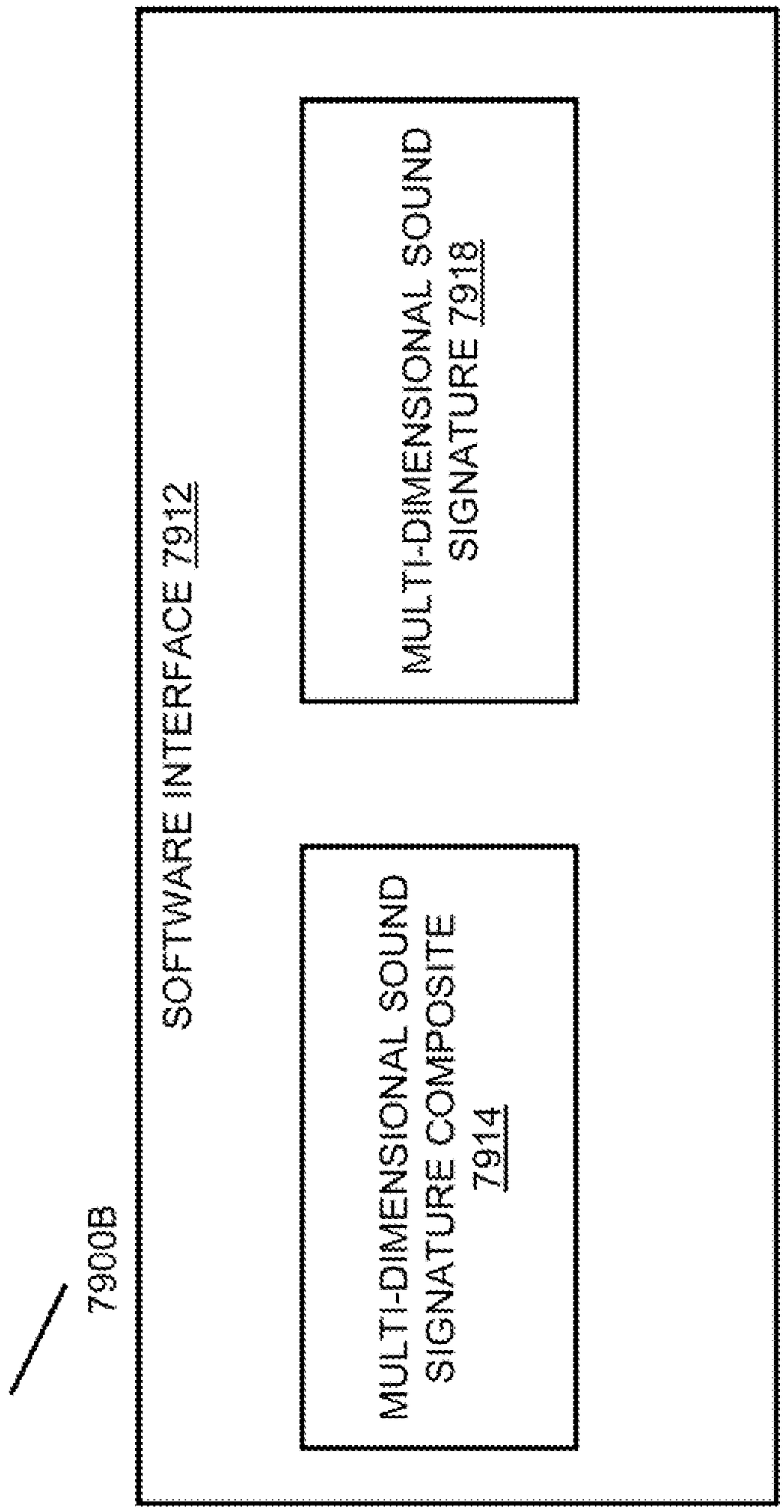

7900B
SOFTWARE INTERFACE 7912
MULTI-DIMENSIONAL SOUND SIGNATURE 7918
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE 7914

FIG. 79

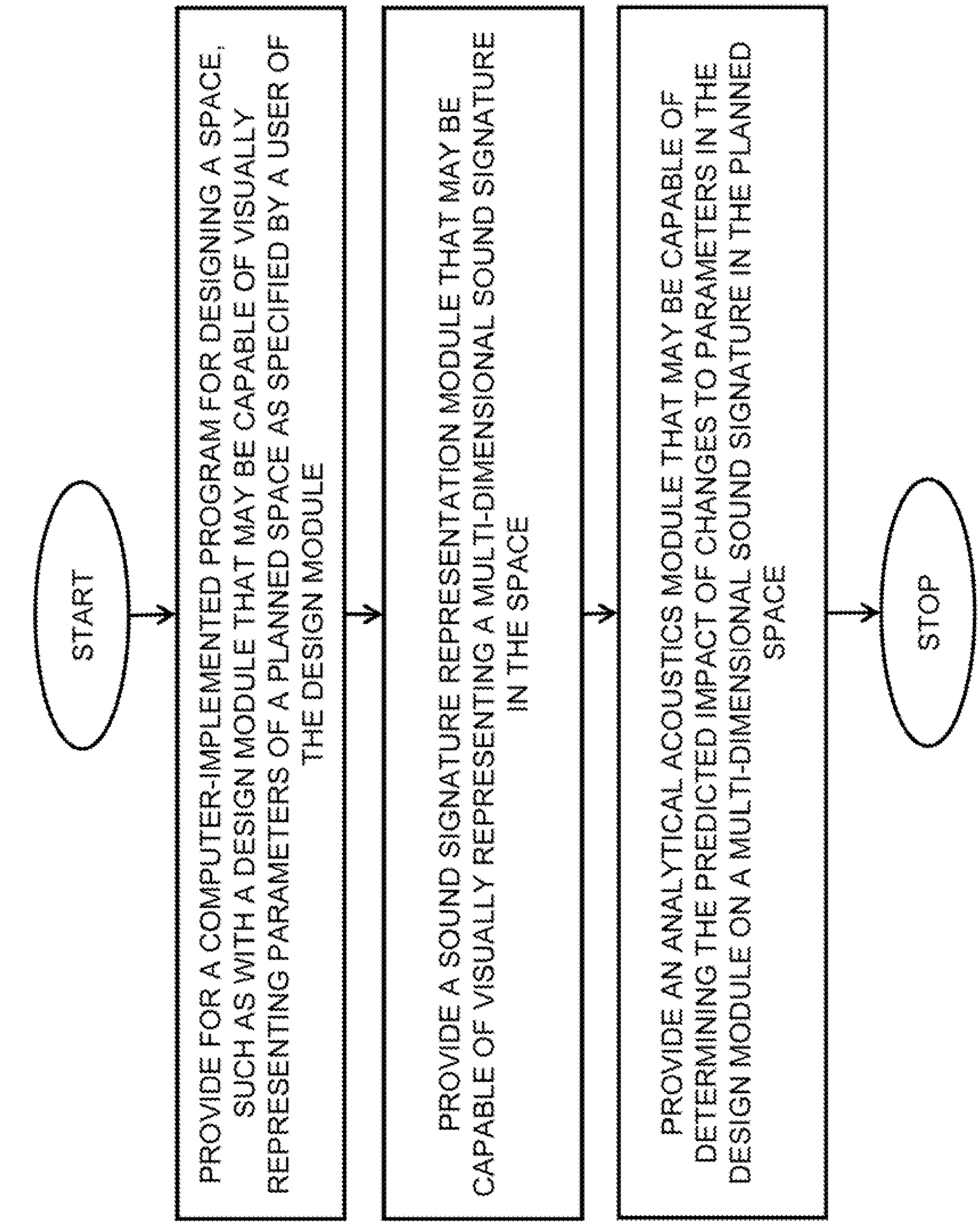

8000
8002
PROVIDE FOR A COMPUTER-IMPLEMENTED PROGRAM FOR DESIGNING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8004
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE SPACE
8008
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE PLANNED SPACE
START
STOP

FIG. 80

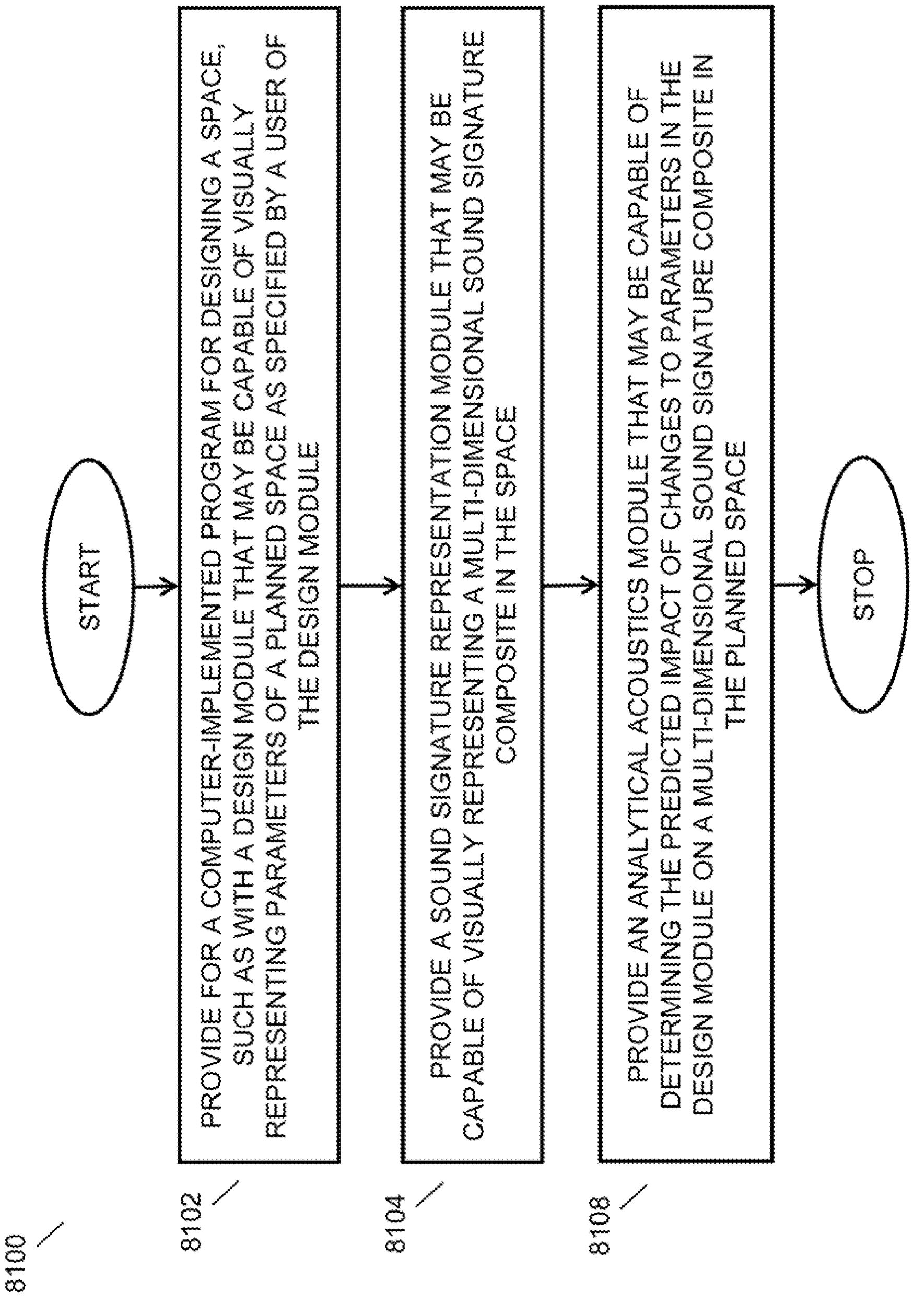

8100
START
8102
PROVIDE FOR A COMPUTER-IMPLEMENTED PROGRAM FOR DESIGNING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8104
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IN THE SPACE
8108
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IN THE PLANNED SPACE
STOP

FIG. 81

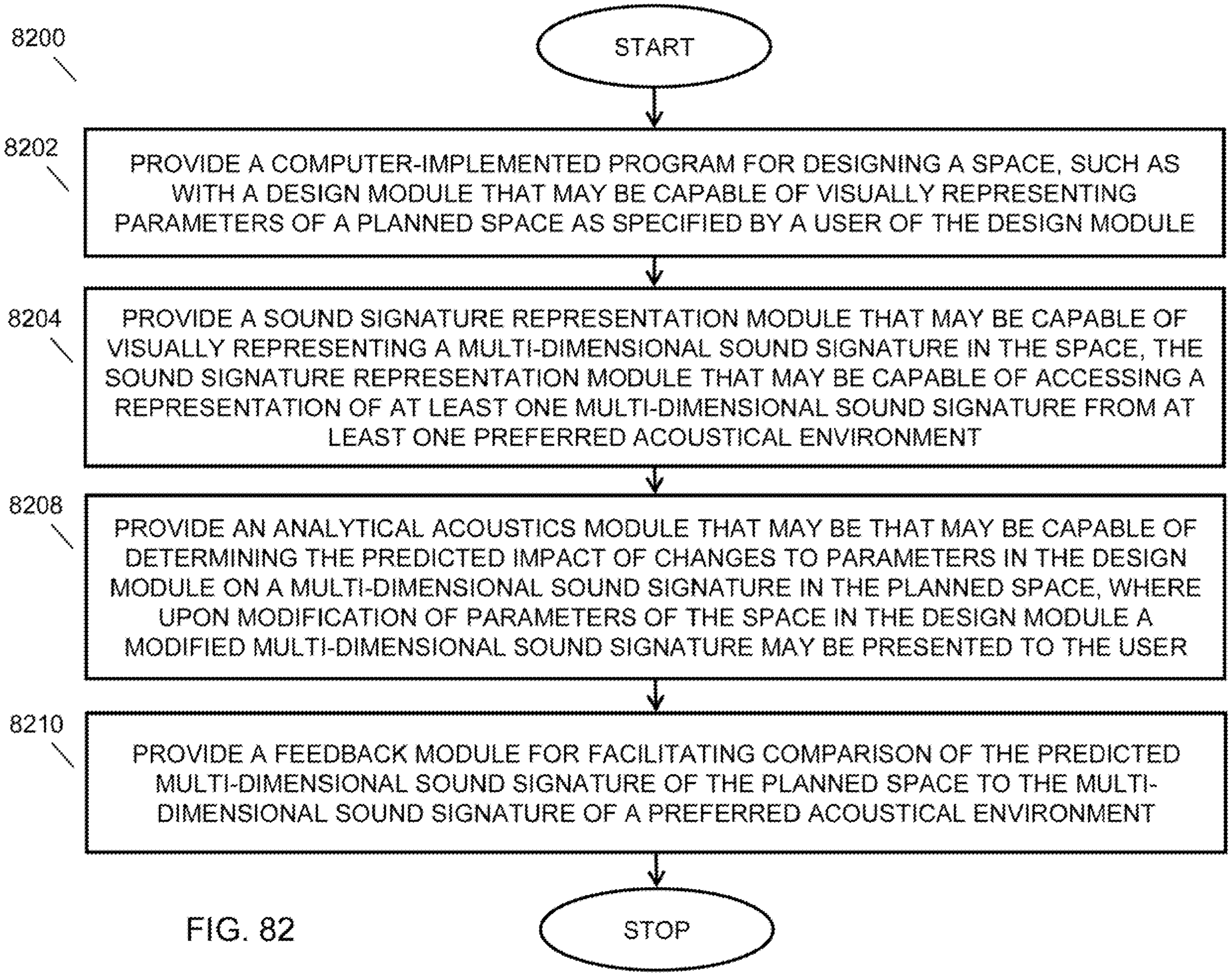

8200
START
8202
PROVIDE A COMPUTER-IMPLEMENTED PROGRAM FOR DESIGNING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8204
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE SPACE, THE SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF ACCESSING A REPRESENTATION OF AT LEAST ONE MULTI-DIMENSIONAL SOUND SIGNATURE FROM AT LEAST ONE PREFERRED ACOUSTICAL ENVIRONMENT
8208
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE PLANNED SPACE, WHERE UPON MODIFICATION OF PARAMETERS OF THE SPACE IN THE DESIGN MODULE A MODIFIED MULTI-DIMENSIONAL SOUND SIGNATURE MAY BE PRESENTED TO THE USER
8210
PROVIDE A FEEDBACK MODULE FOR FACILITATING COMPARISON OF THE PREDICTED MULTI-DIMENSIONAL SOUND SIGNATURE OF THE PLANNED SPACE TO THE MULTI-DIMENSIONAL SOUND SIGNATURE OF A PREFERRED ACOUSTICAL ENVIRONMENT
STOP

FIG. 82

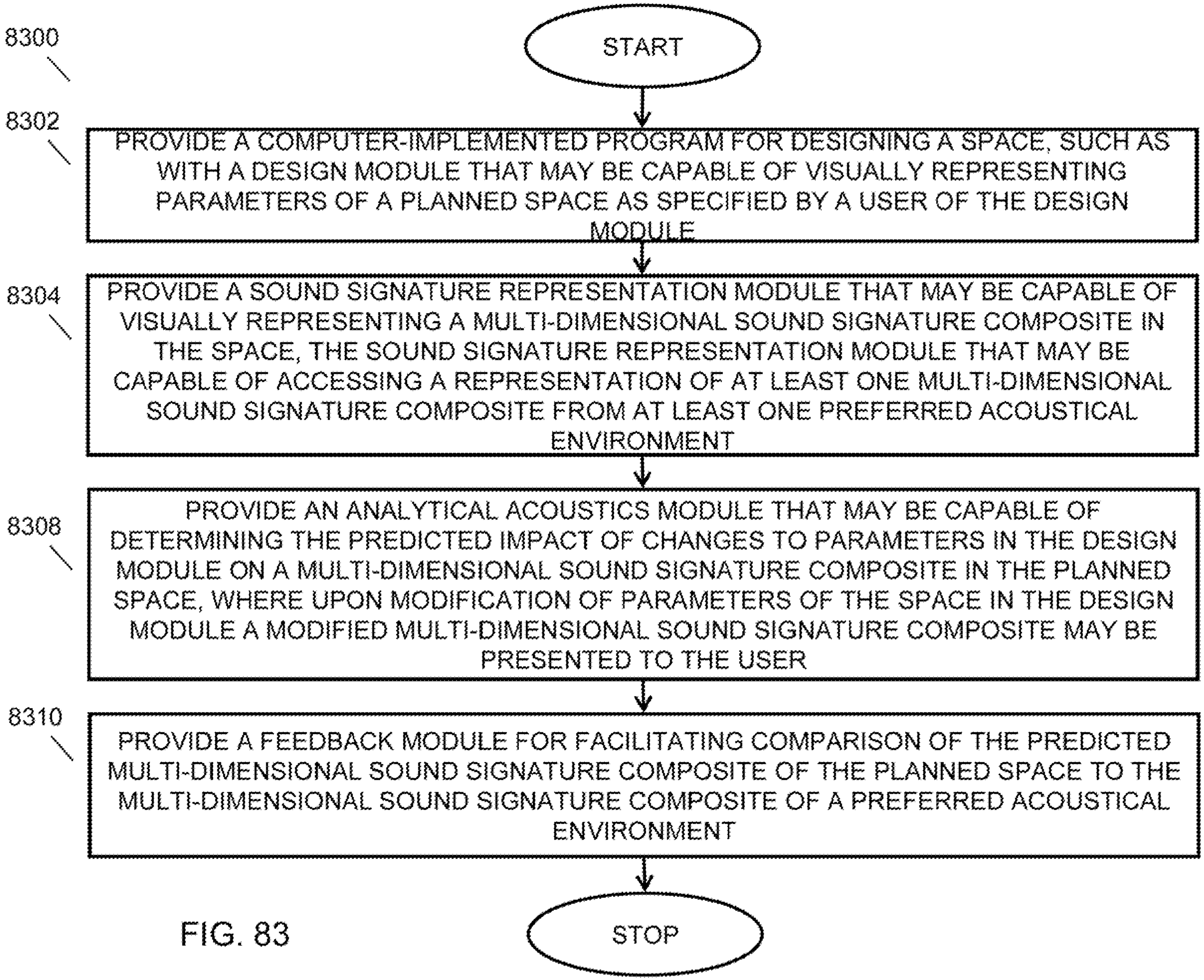


FIG. 83

CA 02729744 2010-12-30

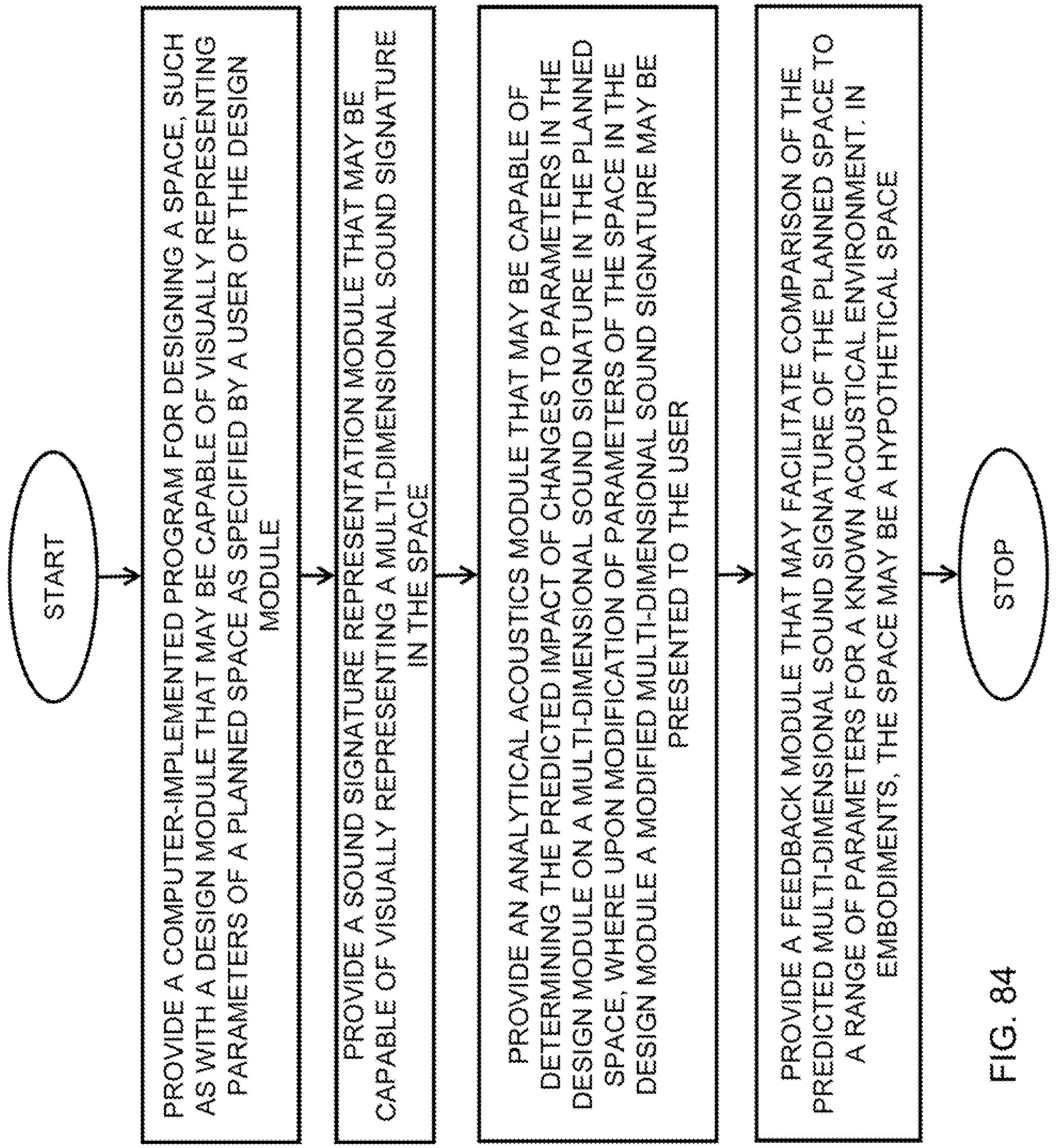

8400
START
8402
PROVIDE A COMPUTER-IMPLEMENTED PROGRAM FOR DESIGNING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8404
CA
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE SPACE
8408
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE PLANNED SPACE, WHERE UPON MODIFICATION OF PARAMETERS OF THE SPACE IN THE DESIGN MODULE A MODIFIED MULTI-DIMENSIONAL SOUND SIGNATURE MAY BE PRESENTED TO THE USER
8410
PROVIDE A FEEDBACK MODULE THAT MAY FACILITATE COMPARISON OF THE PREDICTED MULTI-DIMENSIONAL SOUND SIGNATURE OF THE PLANNED SPACE TO A RANGE OF PARAMETERS FOR A KNOWN ACOUSTICAL ENVIRONMENT. IN EMBODIMENTS, THE SPACE MAY BE A HYPOTHETICAL SPACE
STOP

FIG. 84

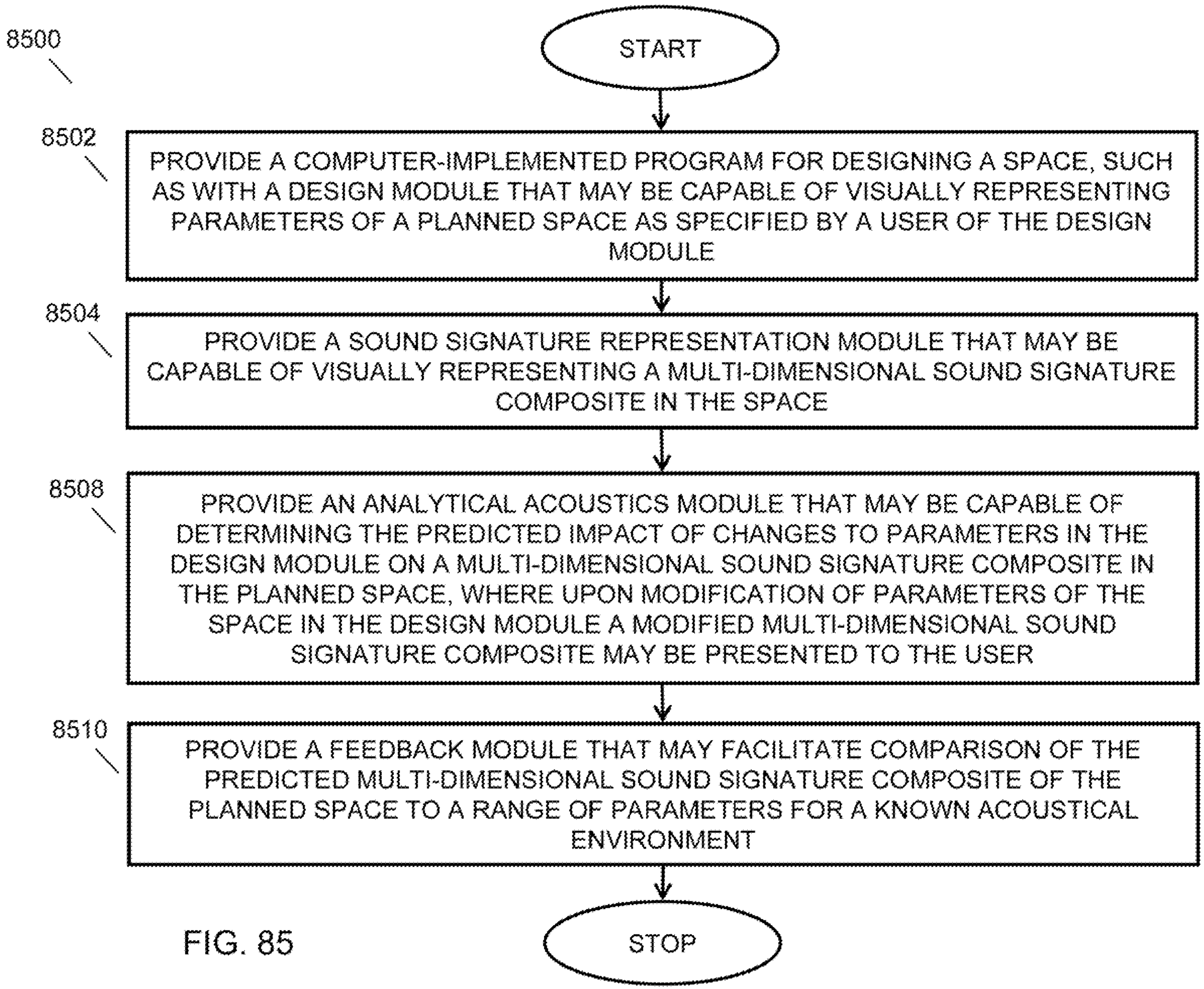

8500
START
8502
PROVIDE A COMPUTER-IMPLEMENTED PROGRAM FOR DESIGNING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8504
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IN THE SPACE
8508
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IN THE PLANNED SPACE, WHERE UPON MODIFICATION OF PARAMETERS OF THE SPACE IN THE DESIGN MODULE A MODIFIED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE MAY BE PRESENTED TO THE USER
8510
PROVIDE A FEEDBACK MODULE THAT MAY FACILITATE COMPARISON OF THE PREDICTED MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE OF THE PLANNED SPACE TO A RANGE OF PARAMETERS FOR A KNOWN ACOUSTICAL ENVIRONMENT
STOP

FIG. 85

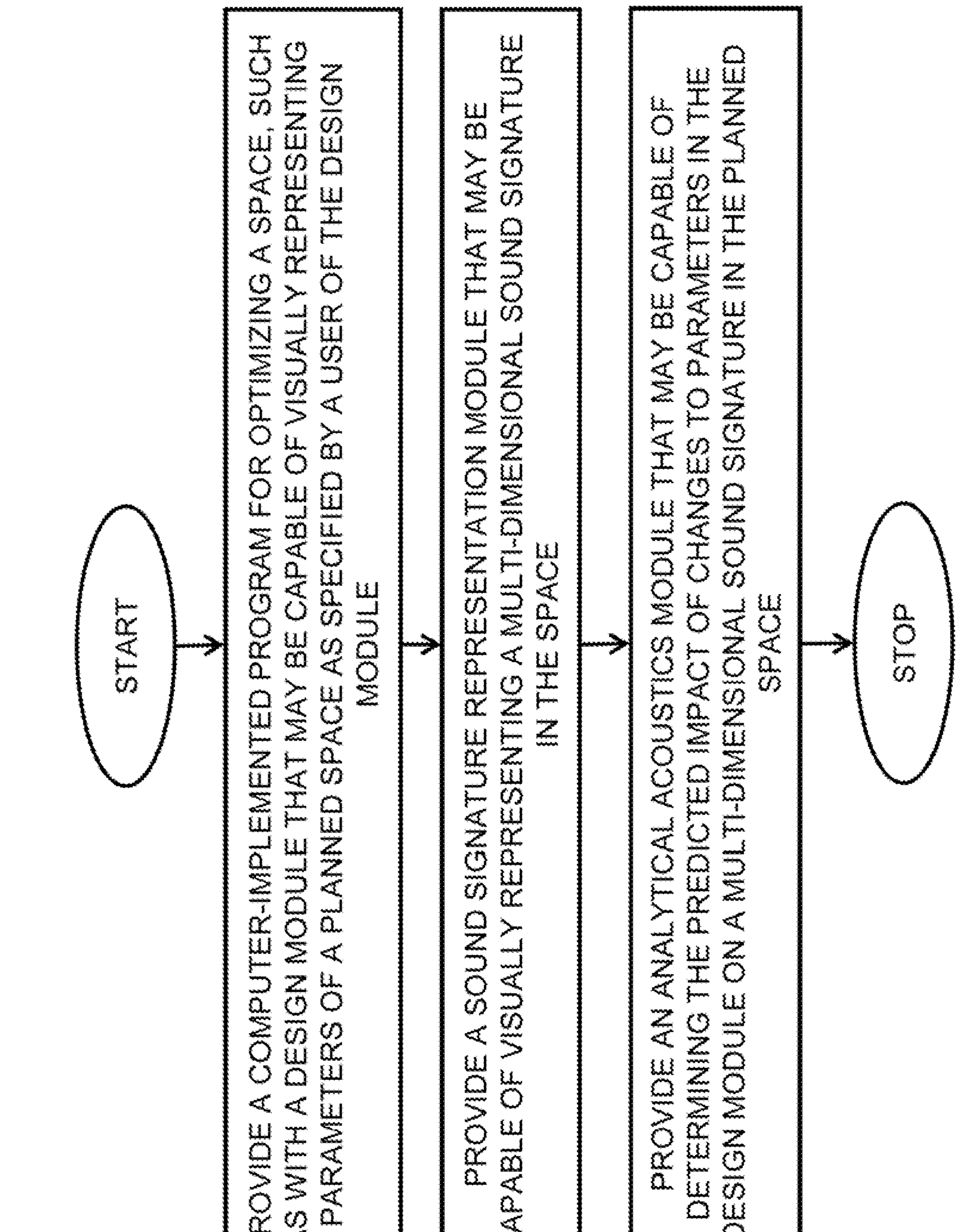

8600
8602
PROVIDE A COMPUTER-IMPLEMENTED PROGRAM FOR OPTIMIZING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8604
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE SPACE
8608
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE IN THE PLANNED SPACE
START
STOP

FIG. 86

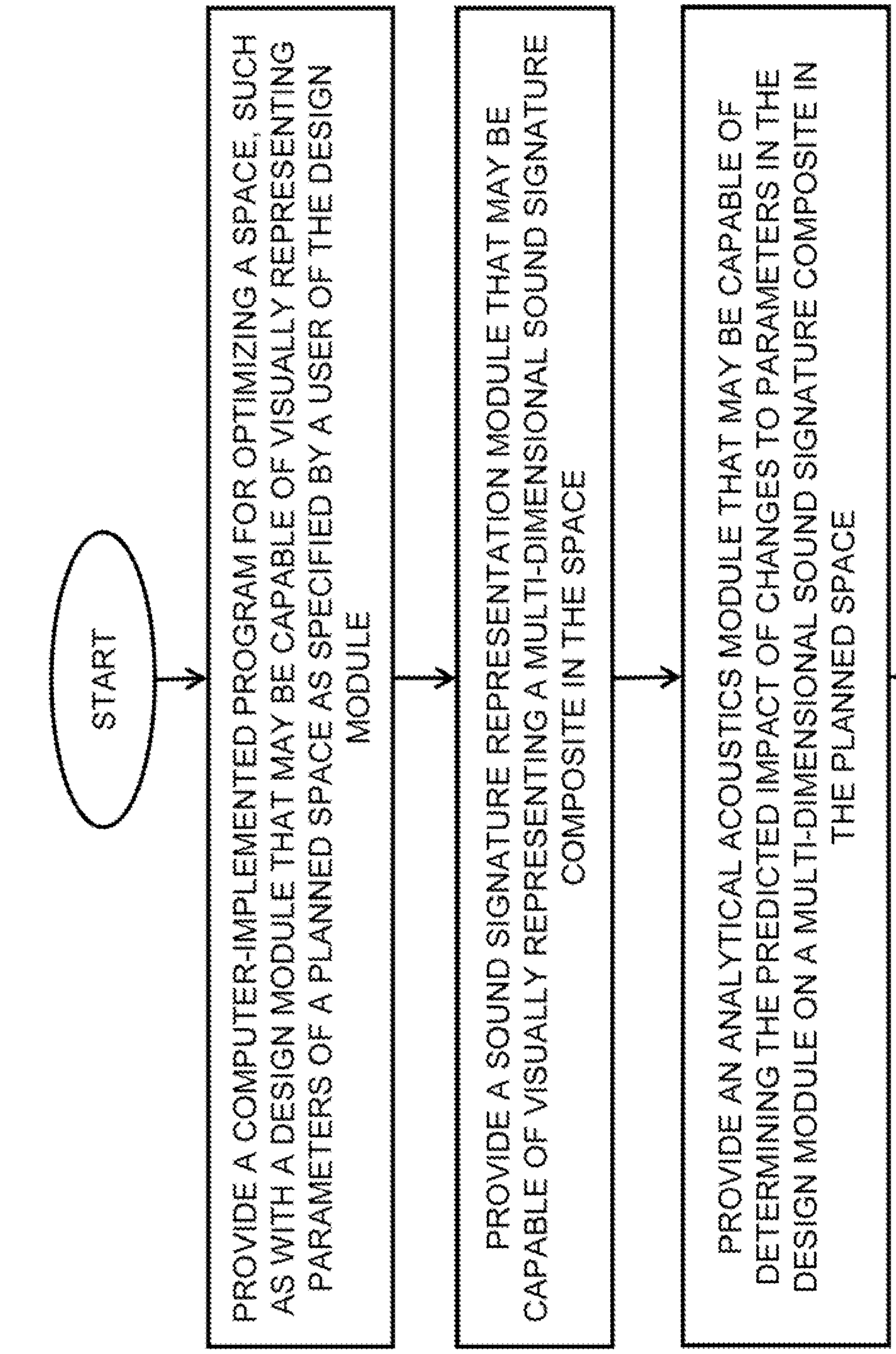

8700
8702
PROVIDE A COMPUTER-IMPLEMENTED PROGRAM FOR OPTIMIZING A SPACE, SUCH AS WITH A DESIGN MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING PARAMETERS OF A PLANNED SPACE AS SPECIFIED BY A USER OF THE DESIGN MODULE
8704
PROVIDE A SOUND SIGNATURE REPRESENTATION MODULE THAT MAY BE CAPABLE OF VISUALLY REPRESENTING A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IN THE SPACE
8708
PROVIDE AN ANALYTICAL ACOUSTICS MODULE THAT MAY BE CAPABLE OF DETERMINING THE PREDICTED IMPACT OF CHANGES TO PARAMETERS IN THE DESIGN MODULE ON A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE IN THE PLANNED SPACE
START
STOP

FIG. 87

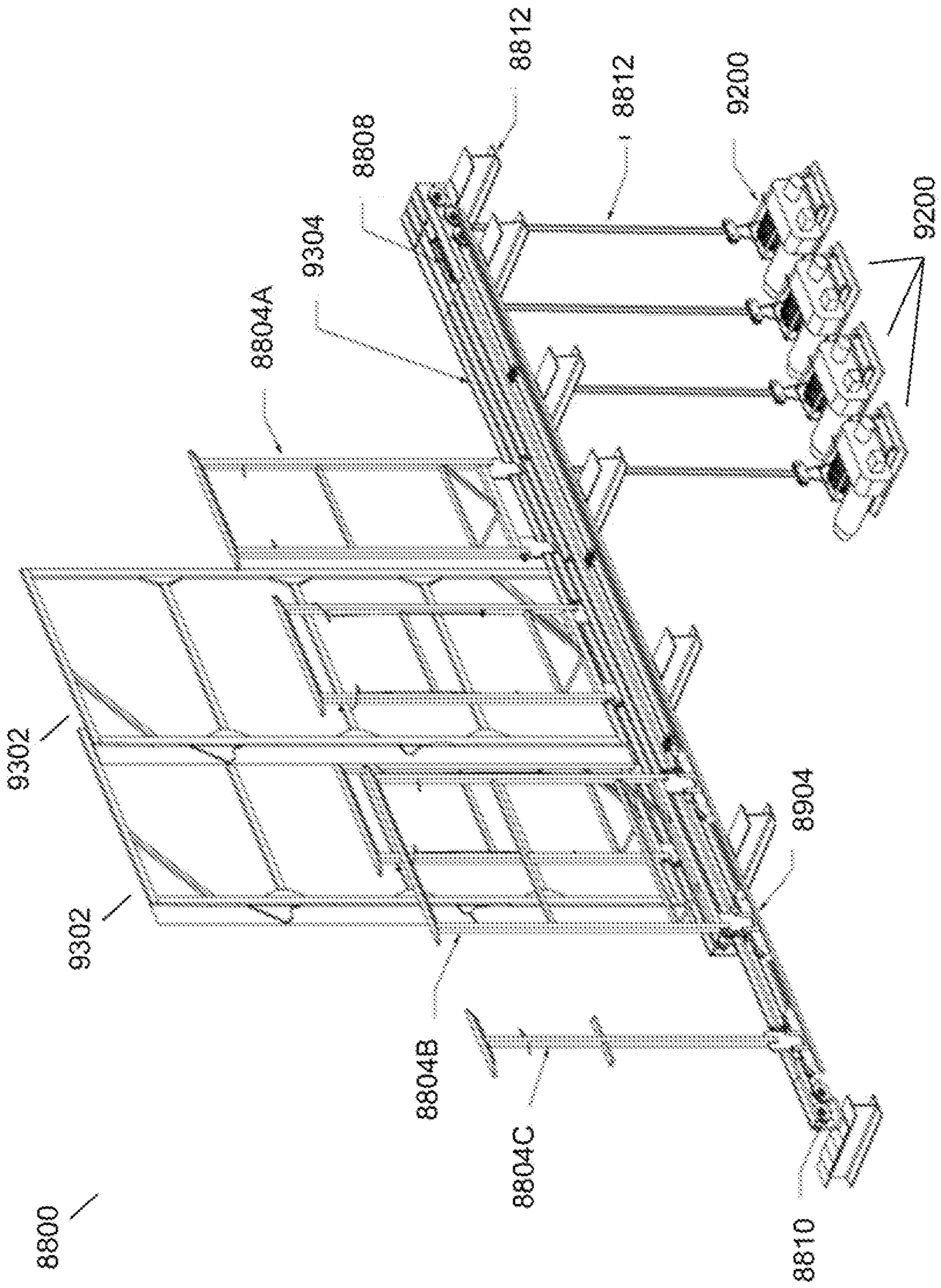

8812
8808
9304
8804A
9302
9302
8804B
8804C
8800
8812
9200
8904
8810

Fig. 88

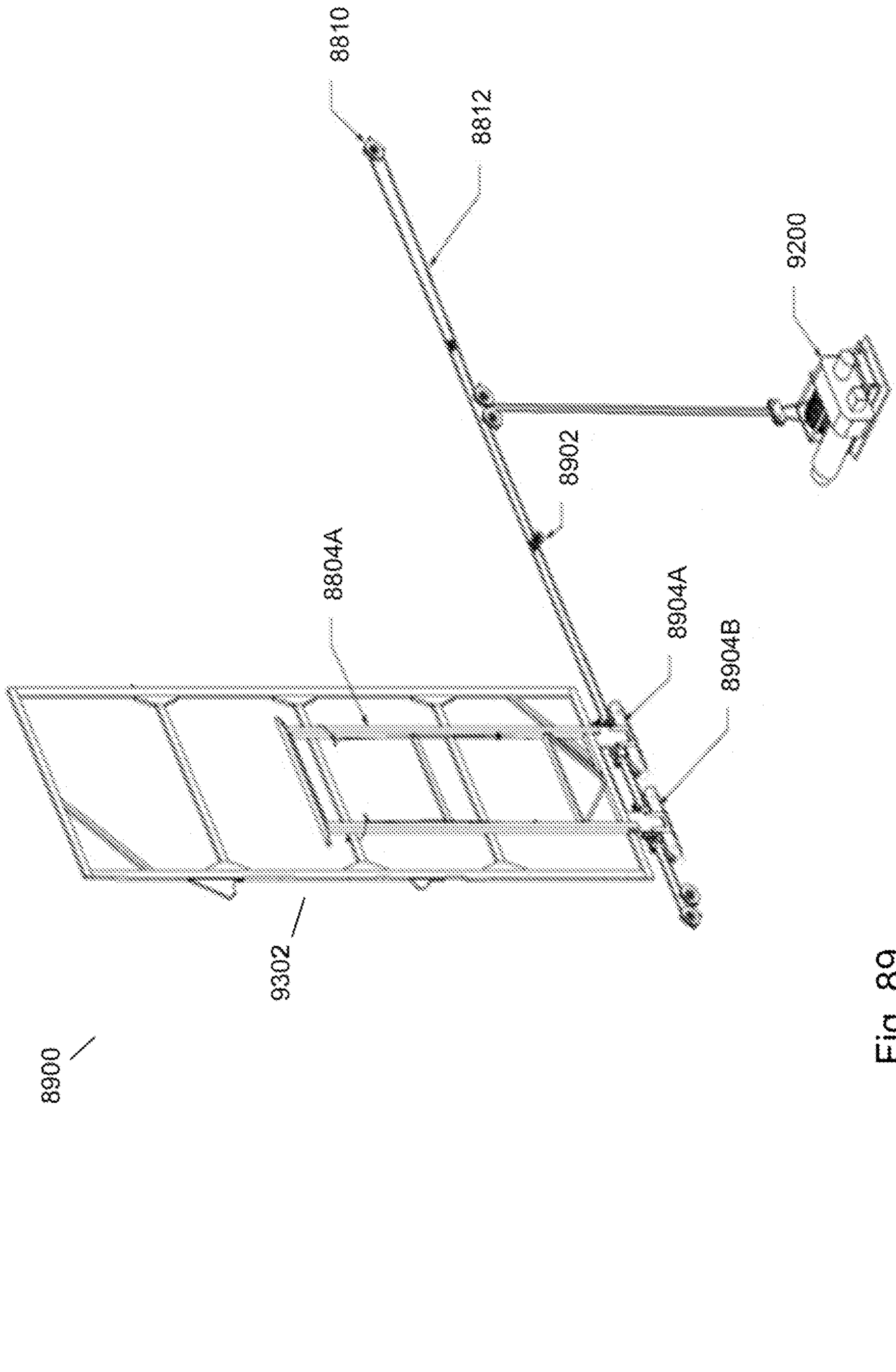


Fig. 89

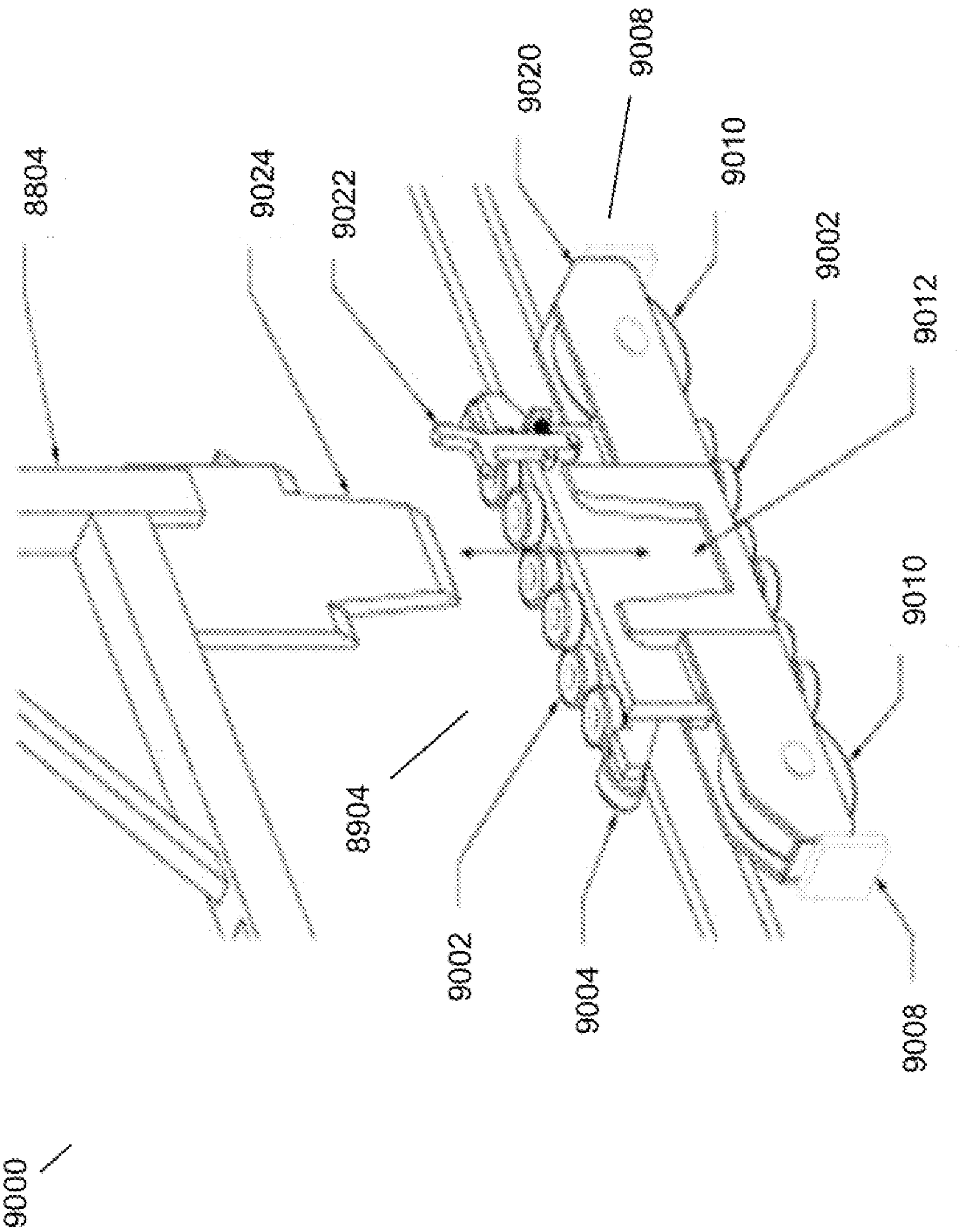

8804
9024
9022
9020
9008
9010
9002
9012
8904
9002
9004
9010
9008
9000

Fig. 90

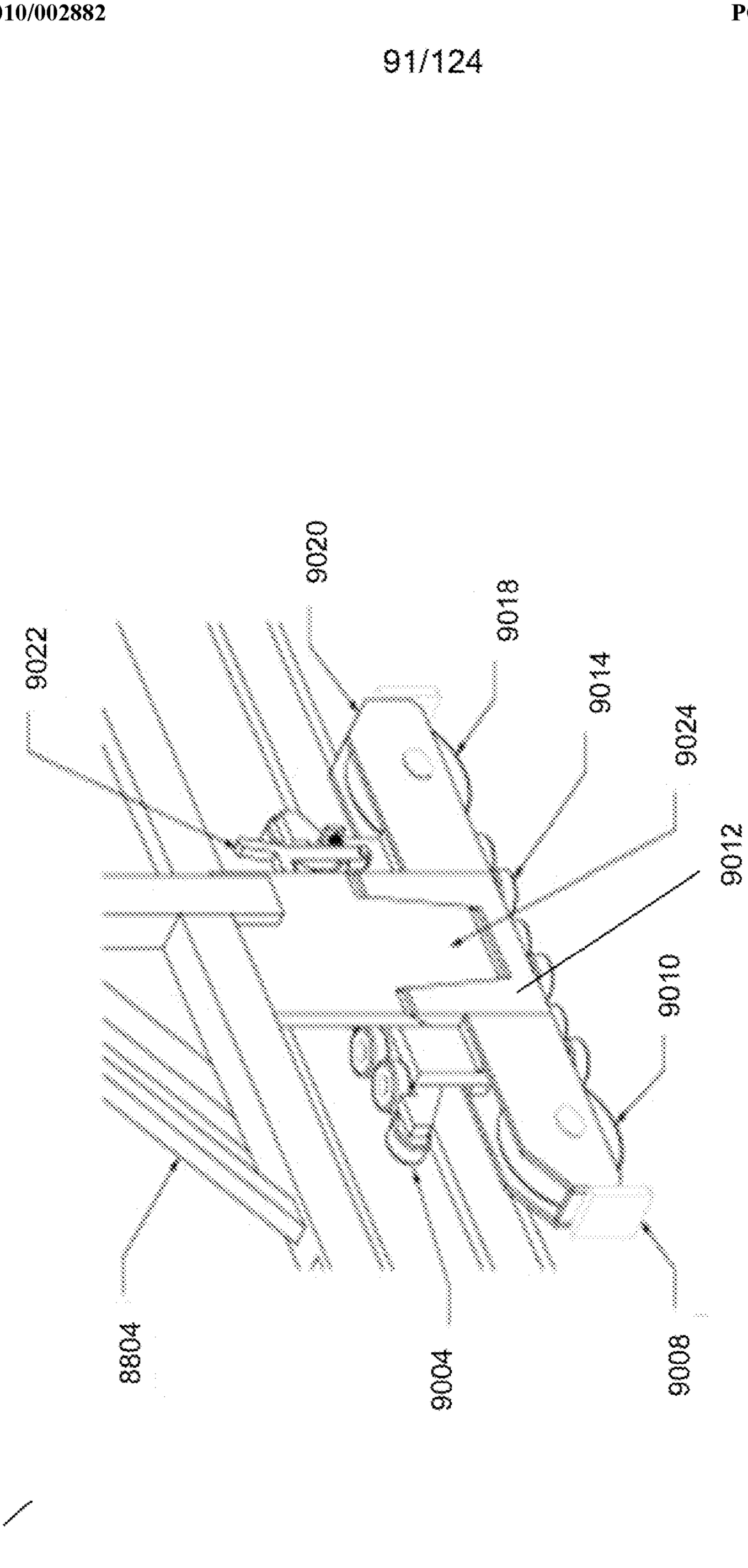


Fig. 91

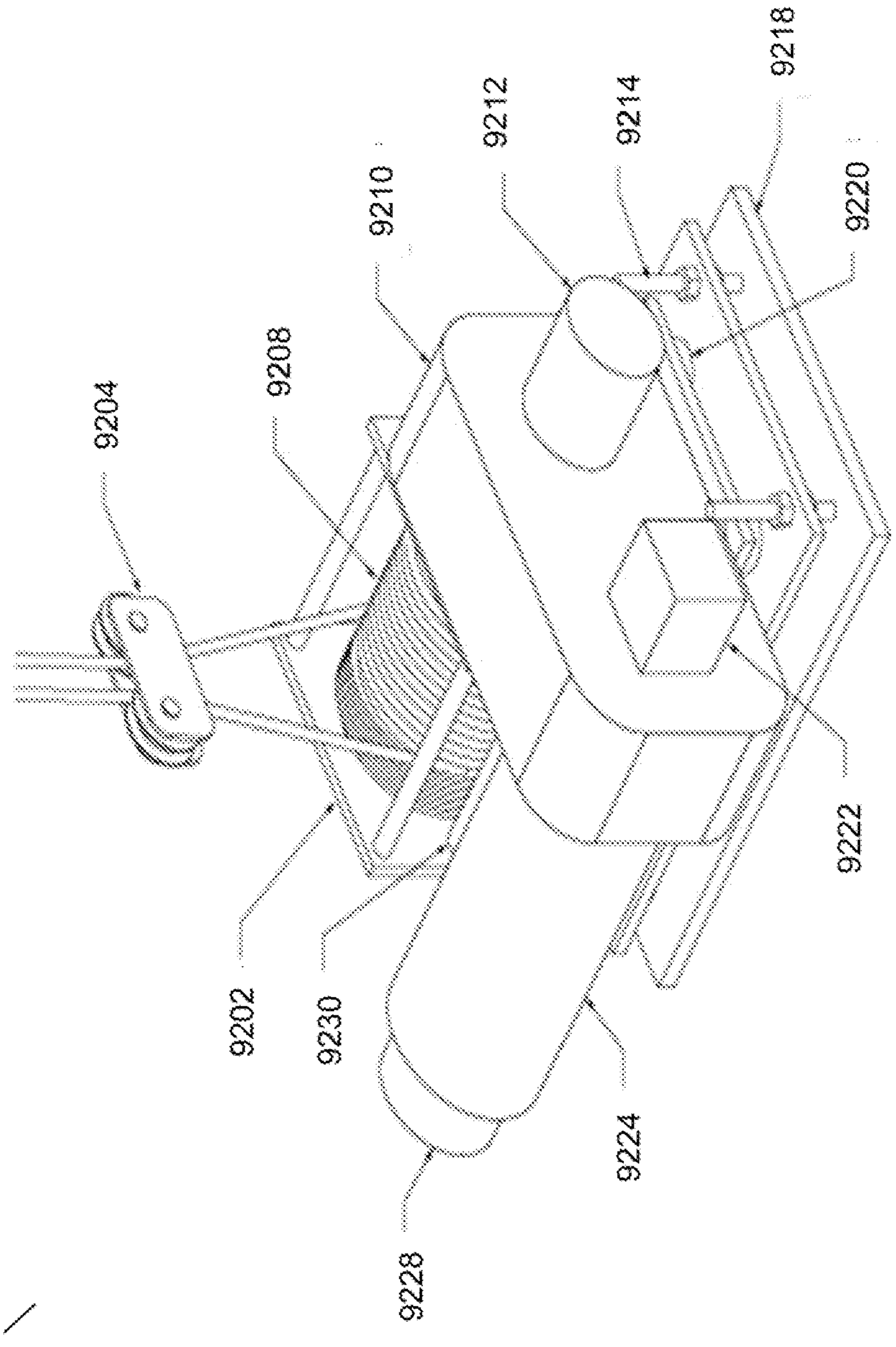

9200
9202
9204
9208
9210
9212
9214
9218
9220
9222
9224
9228
9230

Fig. 92

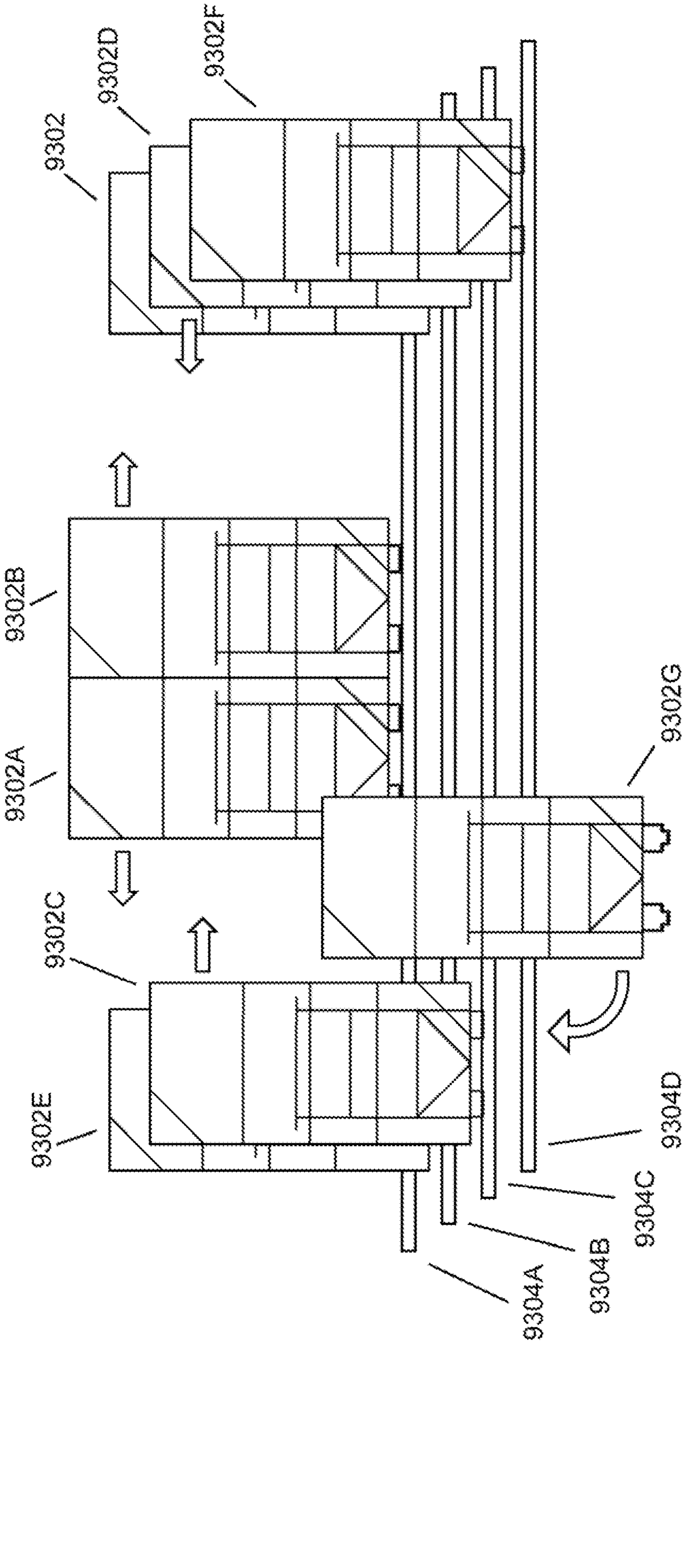

9302
9302D
9302F
9302B
9302A
9302C
9302E
9302G
9304A
9304B
9304C
9304D

Fig. 93

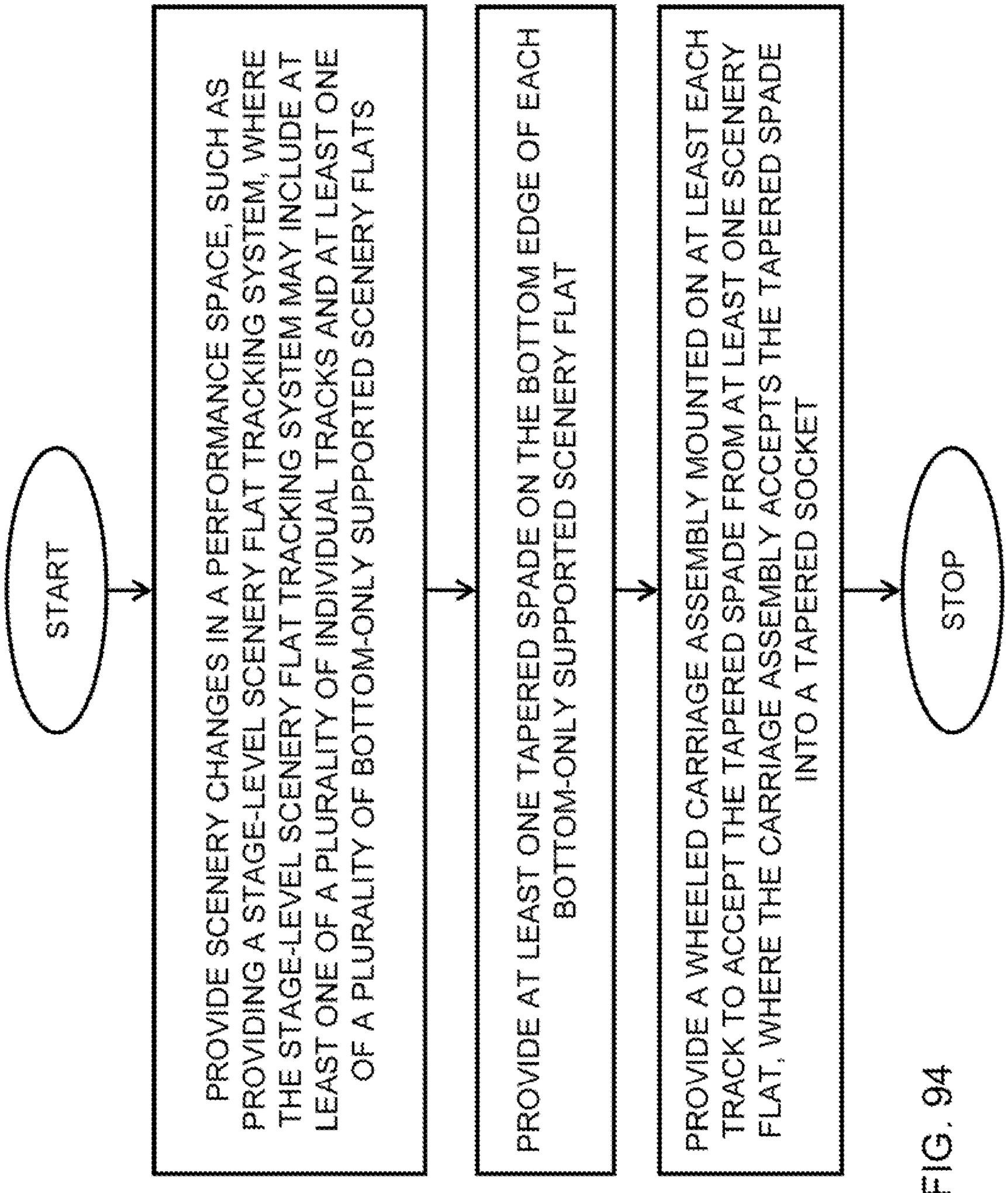

START
PROVIDE SCENERY CHANGES IN A PERFORMANCE SPACE, SUCH AS PROVIDING A STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM, WHERE THE STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM MAY INCLUDE AT LEAST ONE OF A PLURALITY OF INDIVIDUAL TRACKS AND AT LEAST ONE OF A PLURALITY OF BOTTOM-ONLY SUPPORTED SCENERY FLATS
PROVIDE AT LEAST ONE TAPERED SPADE ON THE BOTTOM EDGE OF EACH BOTTOM-ONLY SUPPORTED SCENERY FLAT
PROVIDE A WHEELED CARRIAGE ASSEMBLY MOUNTED ON AT LEAST EACH TRACK TO ACCEPT THE TAPERED SPADE FROM AT LEAST ONE SCENERY FLAT, WHERE THE CARRIAGE ASSEMBLY ACCEPTS THE TAPERED SPADE INTO A TAPERED SOCKET
STOP
9400
9402
9404
9408

FIG. 94

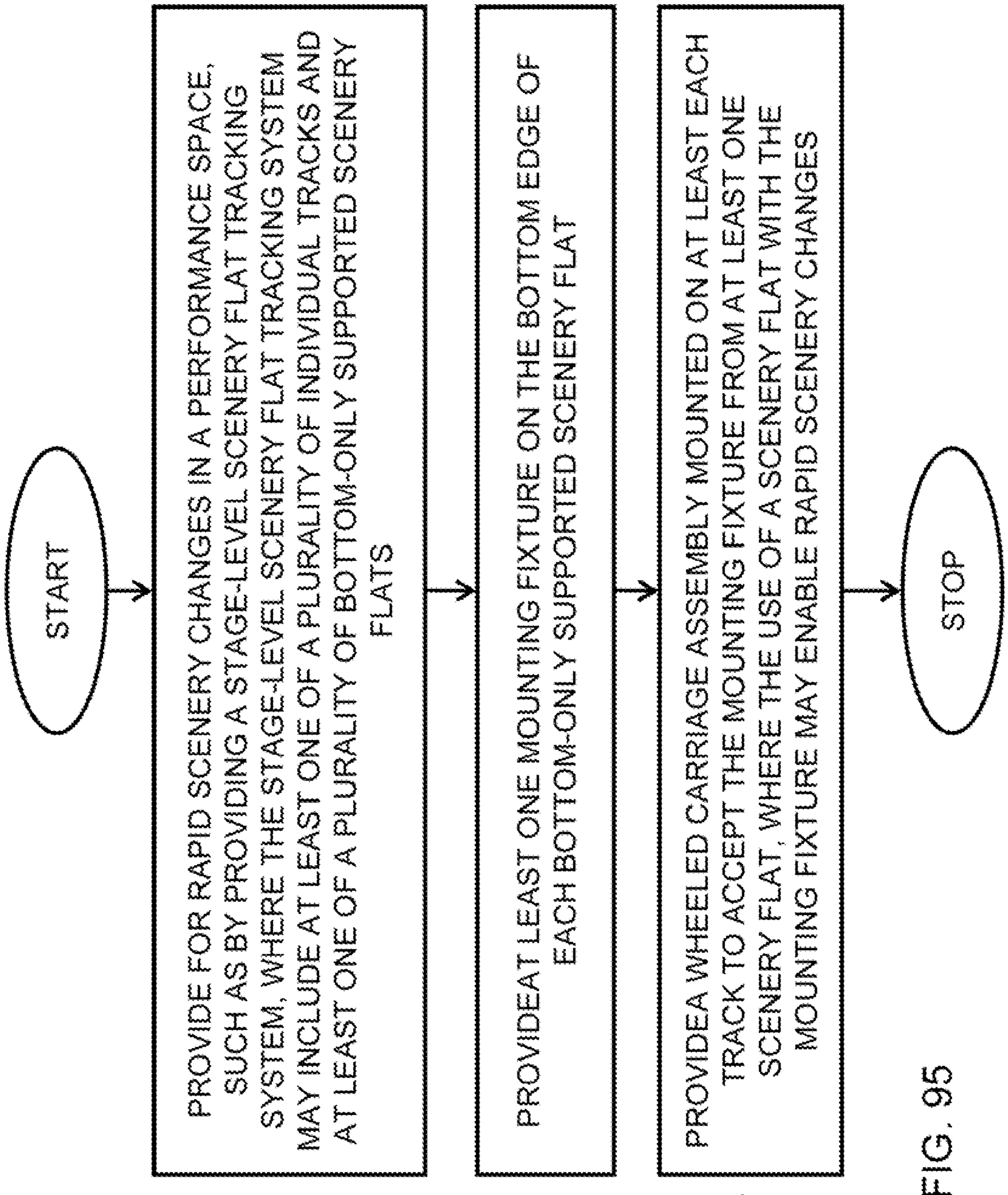

9500
START
PROVIDE FOR RAPID SCENERY CHANGES IN A PERFORMANCE SPACE, SUCH AS BY PROVIDING A STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM, WHERE THE STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM MAY INCLUDE AT LEAST ONE OF A PLURALITY OF INDIVIDUAL TRACKS AND AT LEAST ONE OF A PLURALITY OF BOTTOM-ONLY SUPPORTED SCENERY FLATS
9502
PROVIDEAT LEAST ONE MOUNTING FIXTURE ON THE BOTTOM EDGE OF EACH BOTTOM-ONLY SUPPORTED SCENERY FLAT
9504
PROVIDEA WHEELED CARRIAGE ASSEMBLY MOUNTED ON AT LEAST EACH TRACK TO ACCEPT THE MOUNTING FIXTURE FROM AT LEAST ONE SCENERY FLAT, WHERE THE USE OF A SCENERY FLAT WITH THE MOUNTING FIXTURE MAY ENABLE RAPID SCENERY CHANGES
9508
STOP

FIG. 95

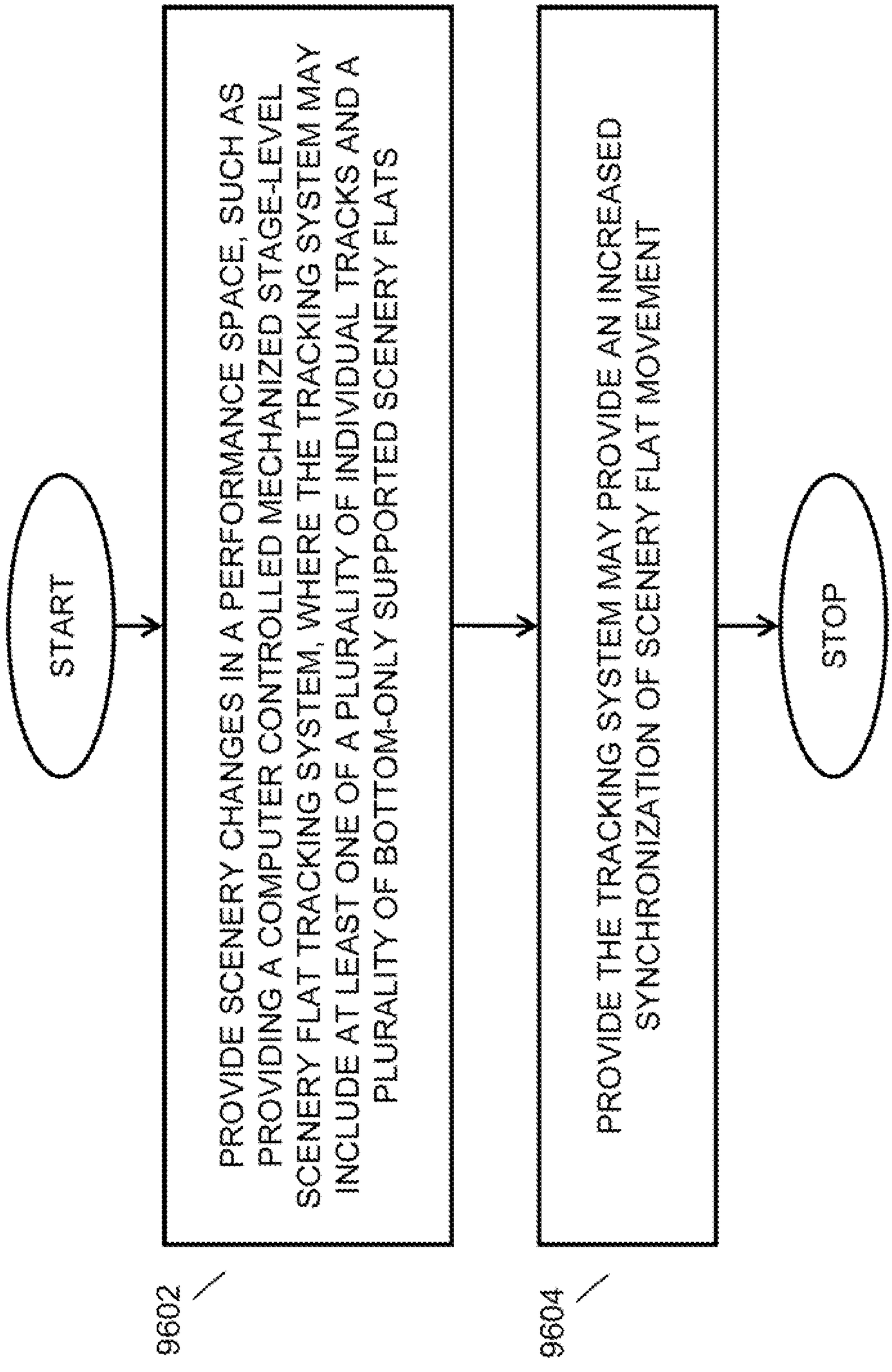

9600
START
9602
PROVIDE SCENERY CHANGES IN A PERFORMANCE SPACE, SUCH AS PROVIDING A COMPUTER CONTROLLED MECHANIZED STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM, WHERE THE TRACKING SYSTEM MAY INCLUDE AT LEAST ONE OF A PLURALITY OF INDIVIDUAL TRACKS AND A PLURALITY OF BOTTOM-ONLY SUPPORTED SCENERY FLATS
9604
PROVIDE THE TRACKING SYSTEM MAY PROVIDE AN INCREASED SYNCHRONIZATION OF SCENERY FLAT MOVEMENT
STOP

FIG. 96

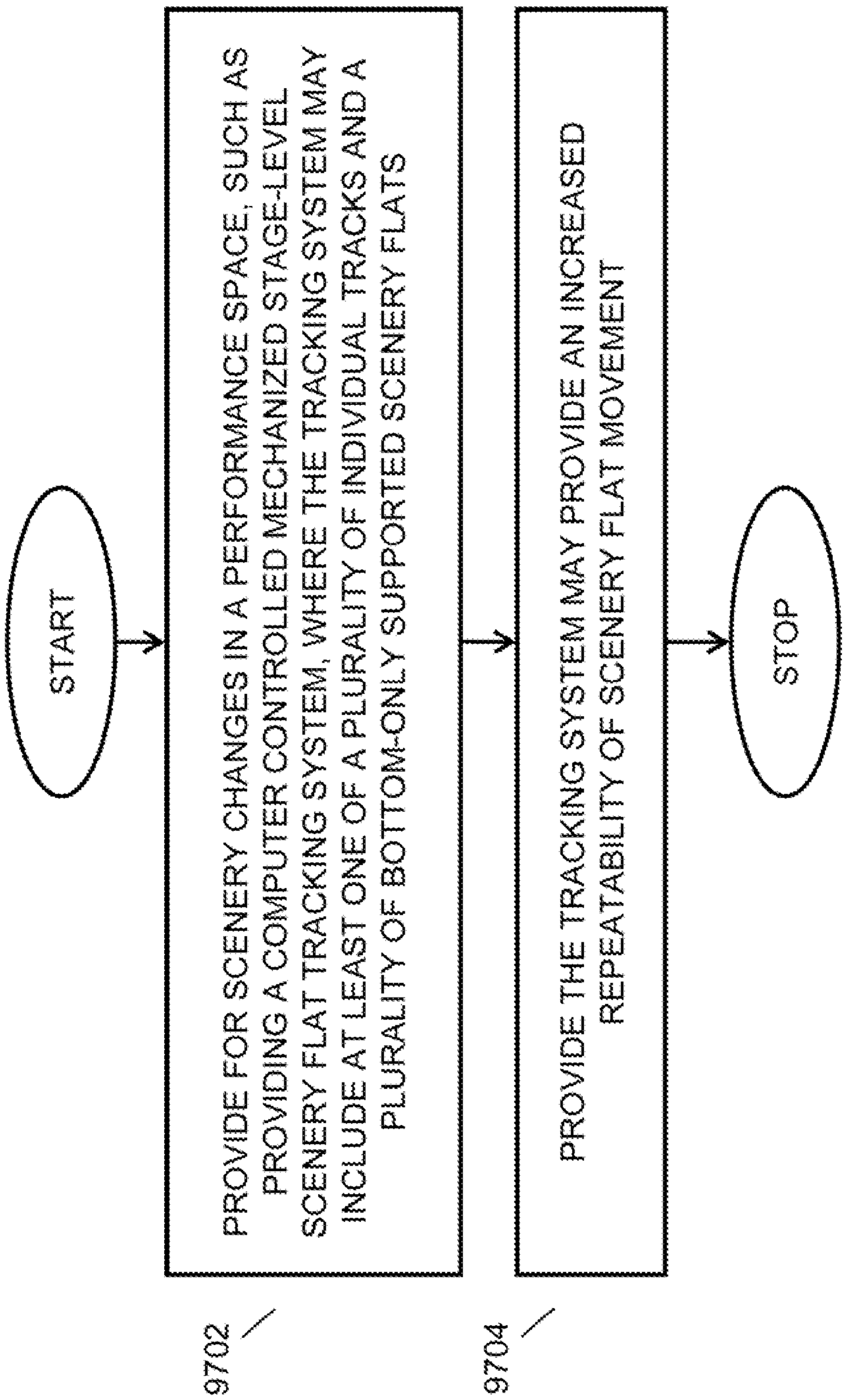

START
PROVIDE FOR SCENERY CHANGES IN A PERFORMANCE SPACE, SUCH AS PROVIDING A COMPUTER CONTROLLED MECHANIZED STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM, WHERE THE TRACKING SYSTEM MAY INCLUDE AT LEAST ONE OF A PLURALITY OF INDIVIDUAL TRACKS AND A PLURALITY OF BOTTOM-ONLY SUPPORTED SCENERY FLATS
PROVIDE THE TRACKING SYSTEM MAY PROVIDE AN INCREASED REPEATABILITY OF SCENERY FLAT MOVEMENT
STOP
9700
9702
9704

FIG. 97

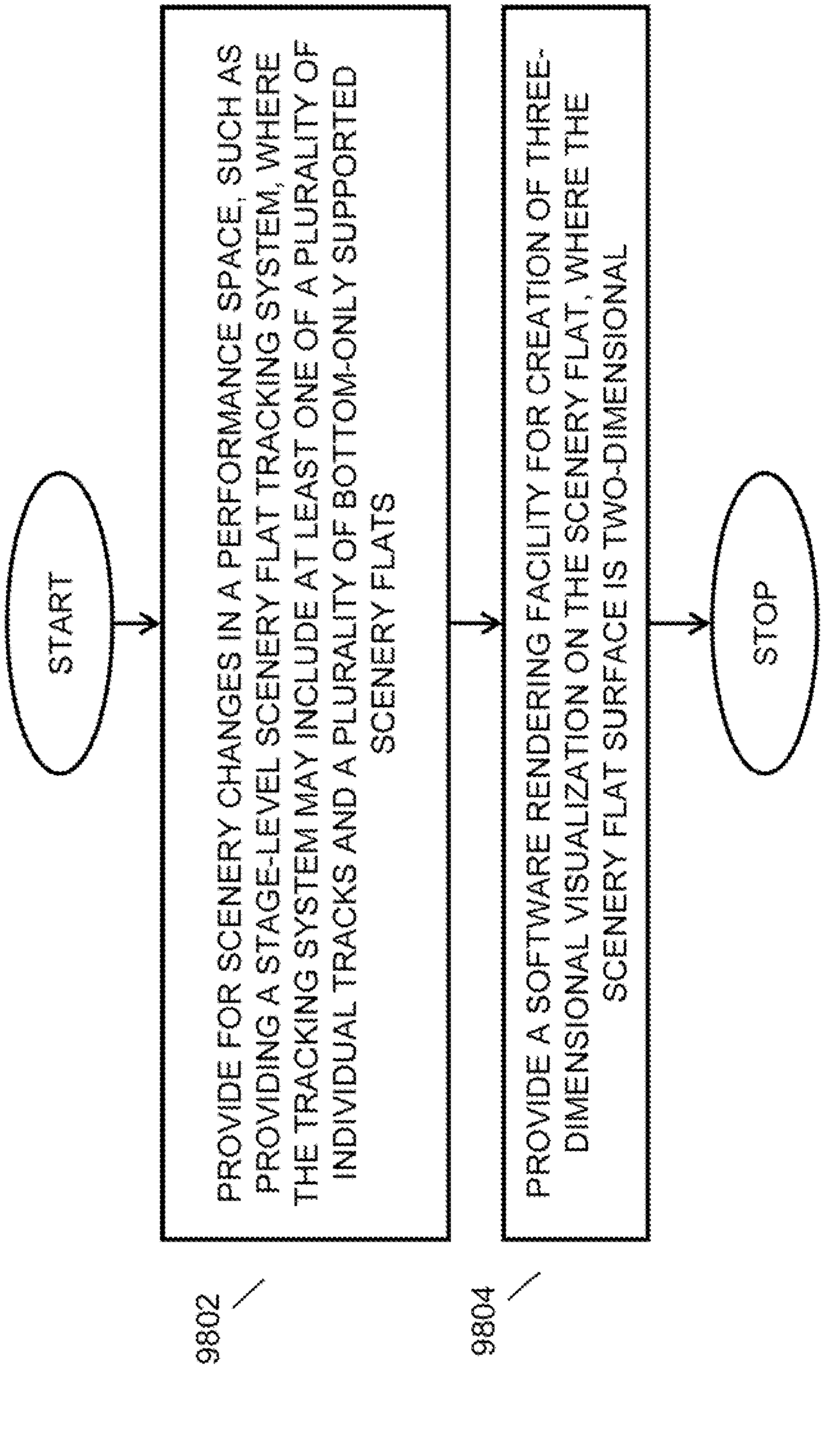

START
PROVIDE FOR SCENERY CHANGES IN A PERFORMANCE SPACE, SUCH AS PROVIDING A STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM, WHERE THE TRACKING SYSTEM MAY INCLUDE AT LEAST ONE OF A PLURALITY OF INDIVIDUAL TRACKS AND A PLURALITY OF BOTTOM-ONLY SUPPORTED SCENERY FLATS
PROVIDE A SOFTWARE RENDERING FACILITY FOR CREATION OF THREE-DIMENSIONAL VISUALIZATION ON THE SCENERY FLAT, WHERE THE SCENERY FLAT SURFACE IS TWO-DIMENSIONAL
STOP
9800
9802
9804

FIG. 98

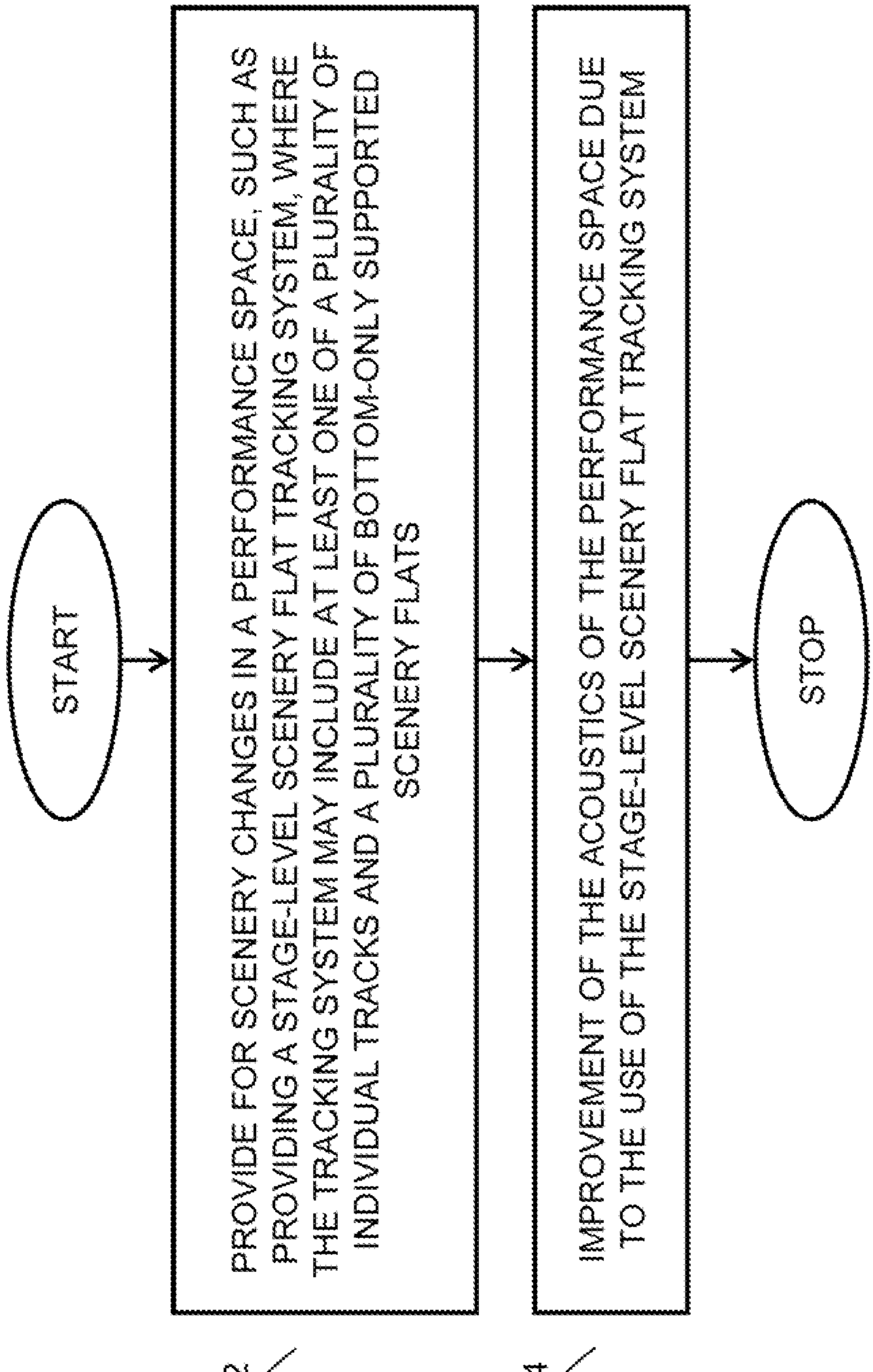

START
PROVIDE FOR SCENERY CHANGES IN A PERFORMANCE SPACE, SUCH AS PROVIDING A STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM, WHERE THE TRACKING SYSTEM MAY INCLUDE AT LEAST ONE OF A PLURALITY OF INDIVIDUAL TRACKS AND A PLURALITY OF BOTTOM-ONLY SUPPORTED SCENERY FLATS
IMPROVEMENT OF THE ACOUSTICS OF THE PERFORMANCE SPACE DUE TO THE USE OF THE STAGE-LEVEL SCENERY FLAT TRACKING SYSTEM
STOP
9900
9902
9904

FIG. 99

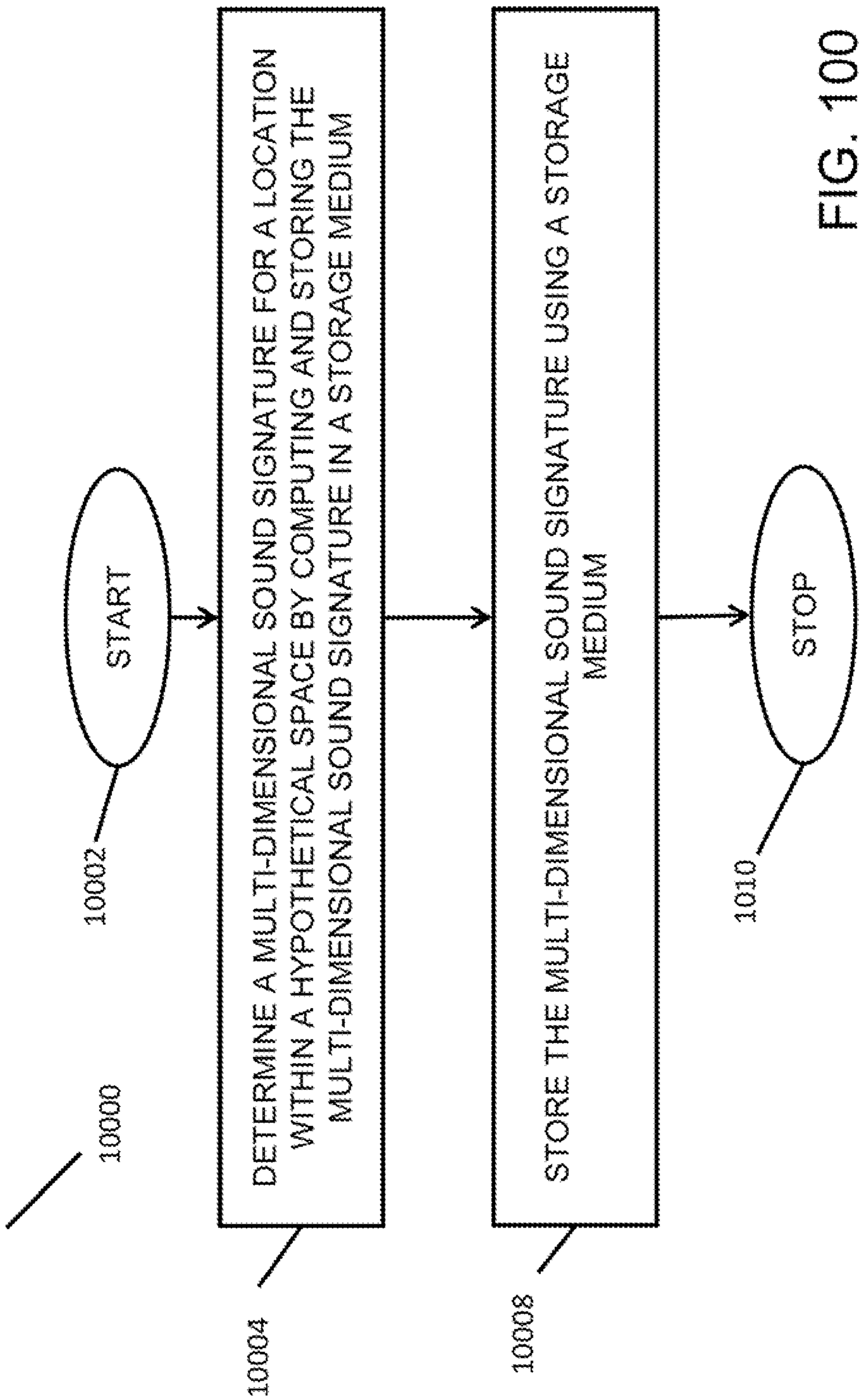

10000
START
10002
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN A HYPOTHETICAL SPACE BY COMPUTING AND STORING THE MULTI-DIMENSIONAL SOUND SIGNATURE IN A STORAGE MEDIUM
10004
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURE USING A STORAGE MEDIUM
10008
STOP
1010

FIG. 100

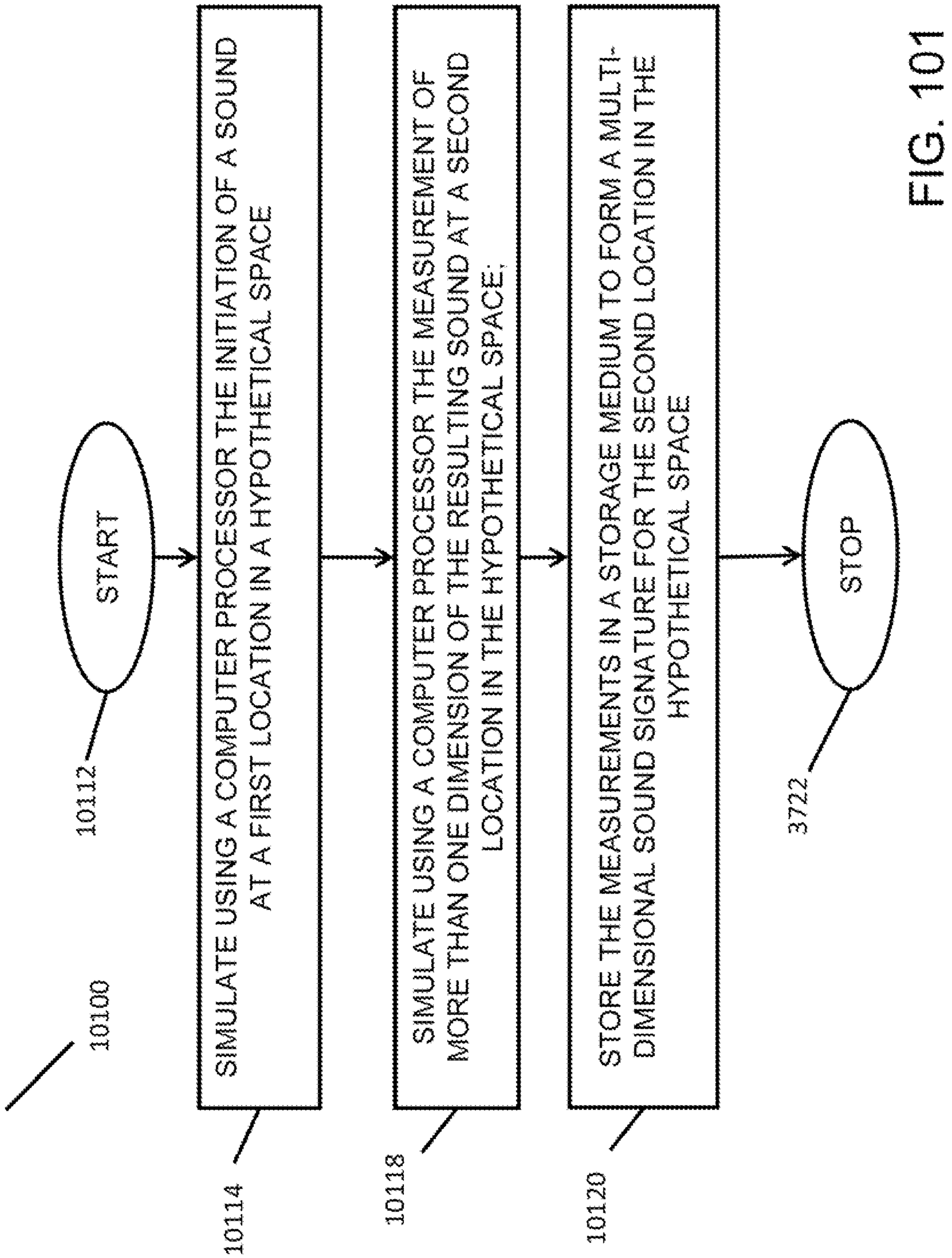

START
10112
SIMULATE USING A COMPUTER PROCESSOR THE INITIATION OF A SOUND AT A FIRST LOCATION IN A HYPOTHETICAL SPACE
10114
SIMULATE USING A COMPUTER PROCESSOR THE MEASUREMENT OF MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT A SECOND LOCATION IN THE HYPOTHETICAL SPACE;
10118
STORE THE MEASUREMENTS IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE SECOND LOCATION IN THE HYPOTHETICAL SPACE
10120
STOP
3722
10100

FIG. 101

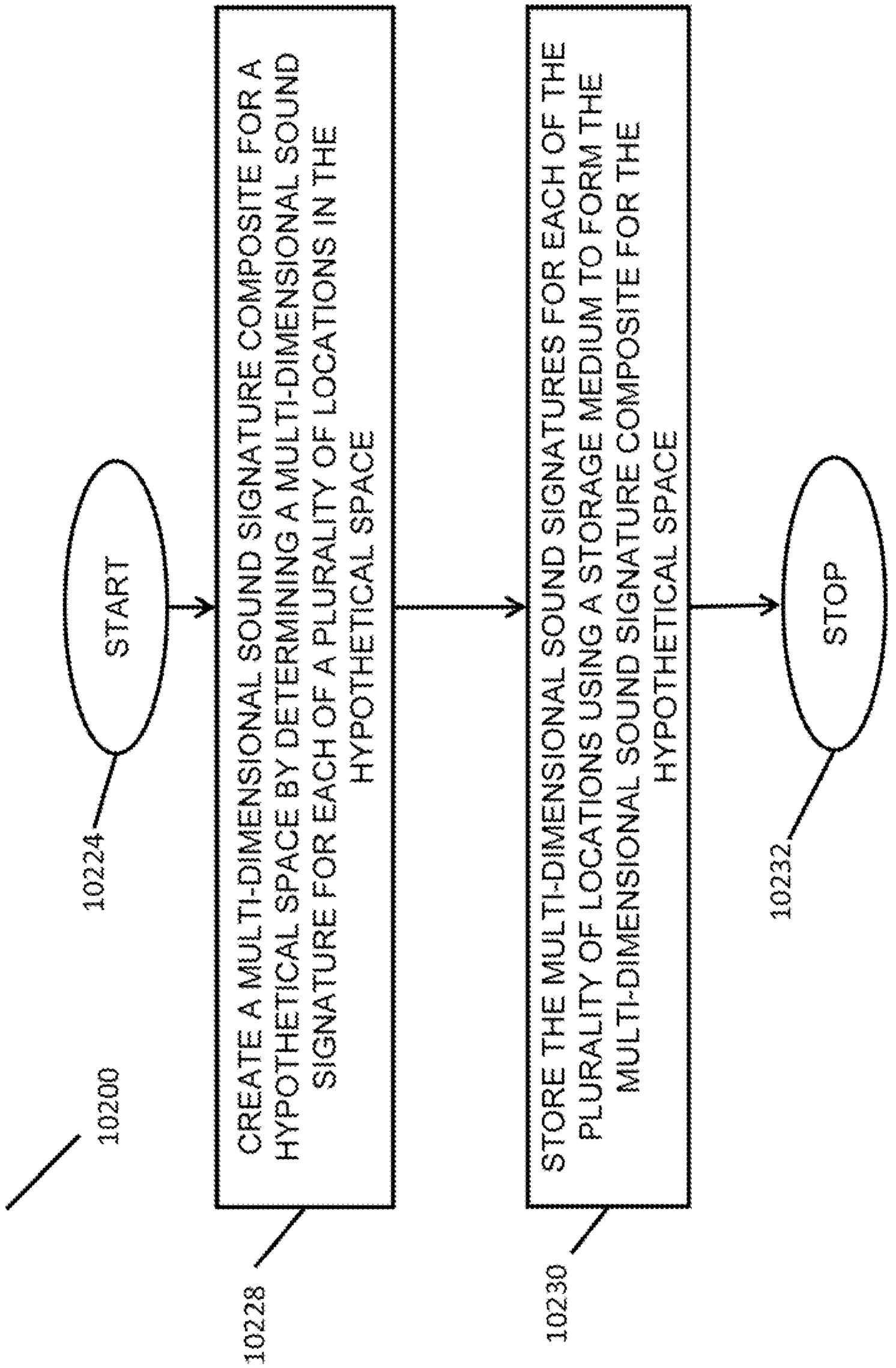

10200
START
10224
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE BY DETERMINING A MULTI-DIMENSIONAL SOUND SIGNATURE FOR EACH OF A PLURALITY OF LOCATIONS IN THE HYPOTHETICAL SPACE
10228
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES FOR EACH OF THE PLURALITY OF LOCATIONS USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE HYPOTHETICAL SPACE
10230
STOP
10232

FIG. 102

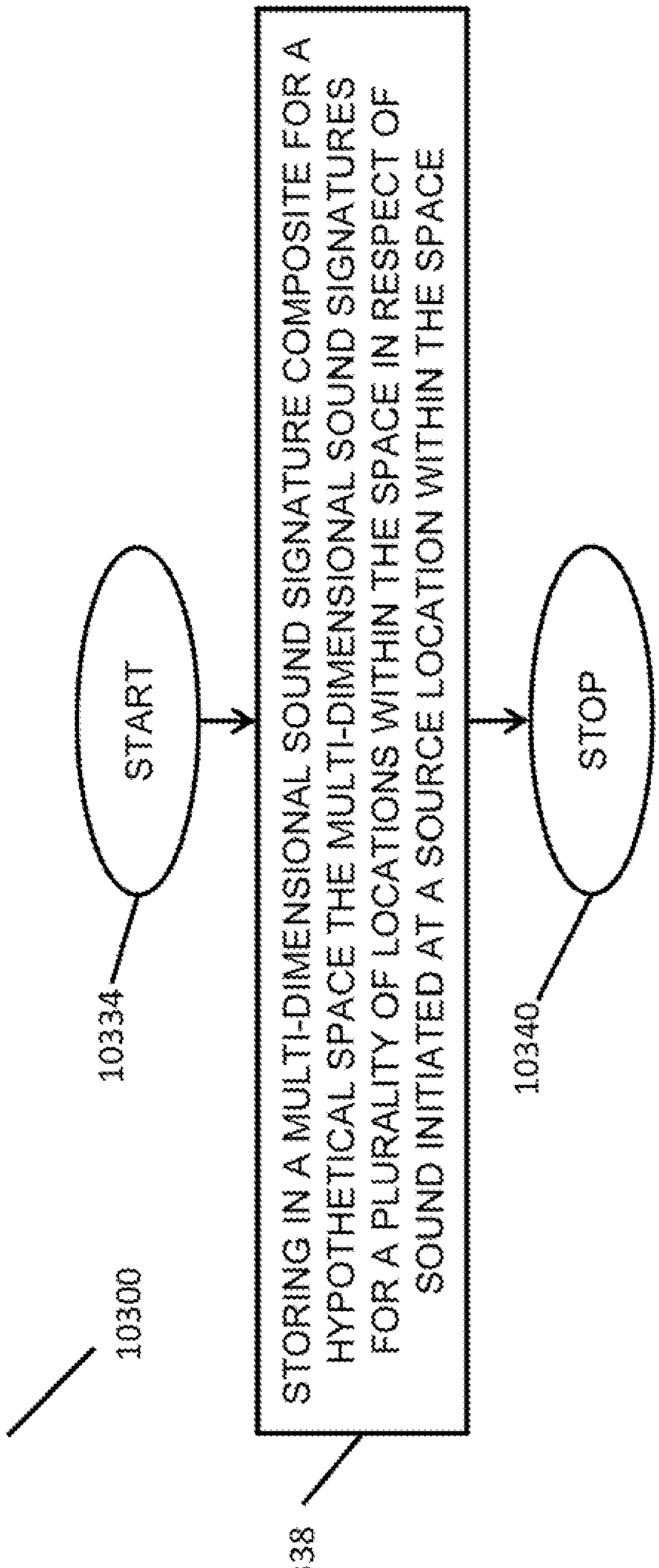

10300
START
10334
STORING IN A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE THE MULTI-DIMENSIONAL SOUND SIGNATURES FOR A PLURALITY OF LOCATIONS WITHIN THE SPACE IN RESPECT OF SOUND INITIATED AT A SOURCE LOCATION WITHIN THE SPACE
10338
STOP
10340

FIG. 103

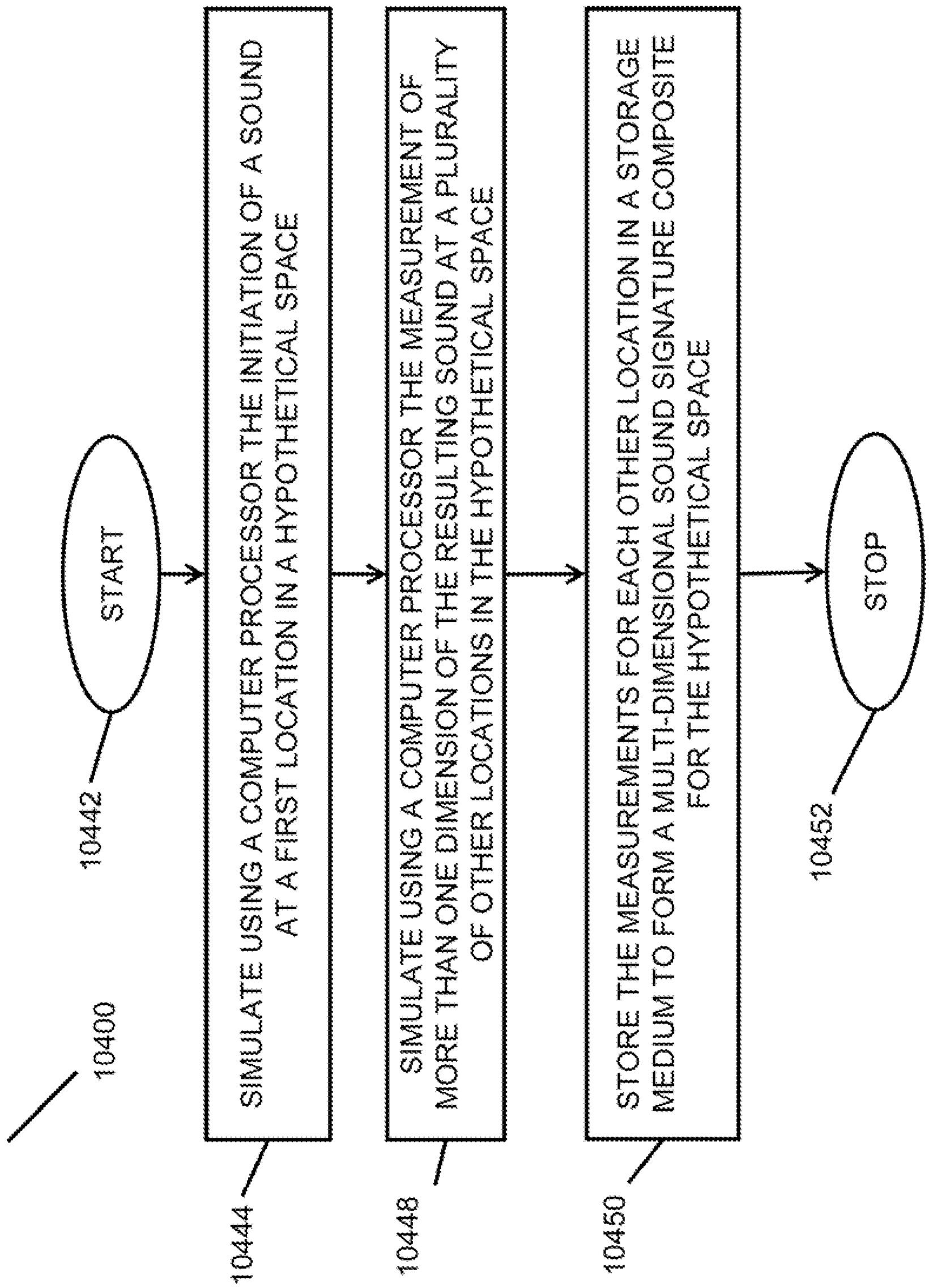

10400
START
10442
SIMULATE USING A COMPUTER PROCESSOR THE INITIATION OF A SOUND AT A FIRST LOCATION IN A HYPOTHETICAL SPACE
10444
SIMULATE USING A COMPUTER PROCESSOR THE MEASUREMENT OF MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT A PLURALITY OF OTHER LOCATIONS IN THE HYPOTHETICAL SPACE
10448
STORE THE MEASUREMENTS FOR EACH OTHER LOCATION IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE HYPOTHETICAL SPACE
10450
STOP
10452

FIG. 104

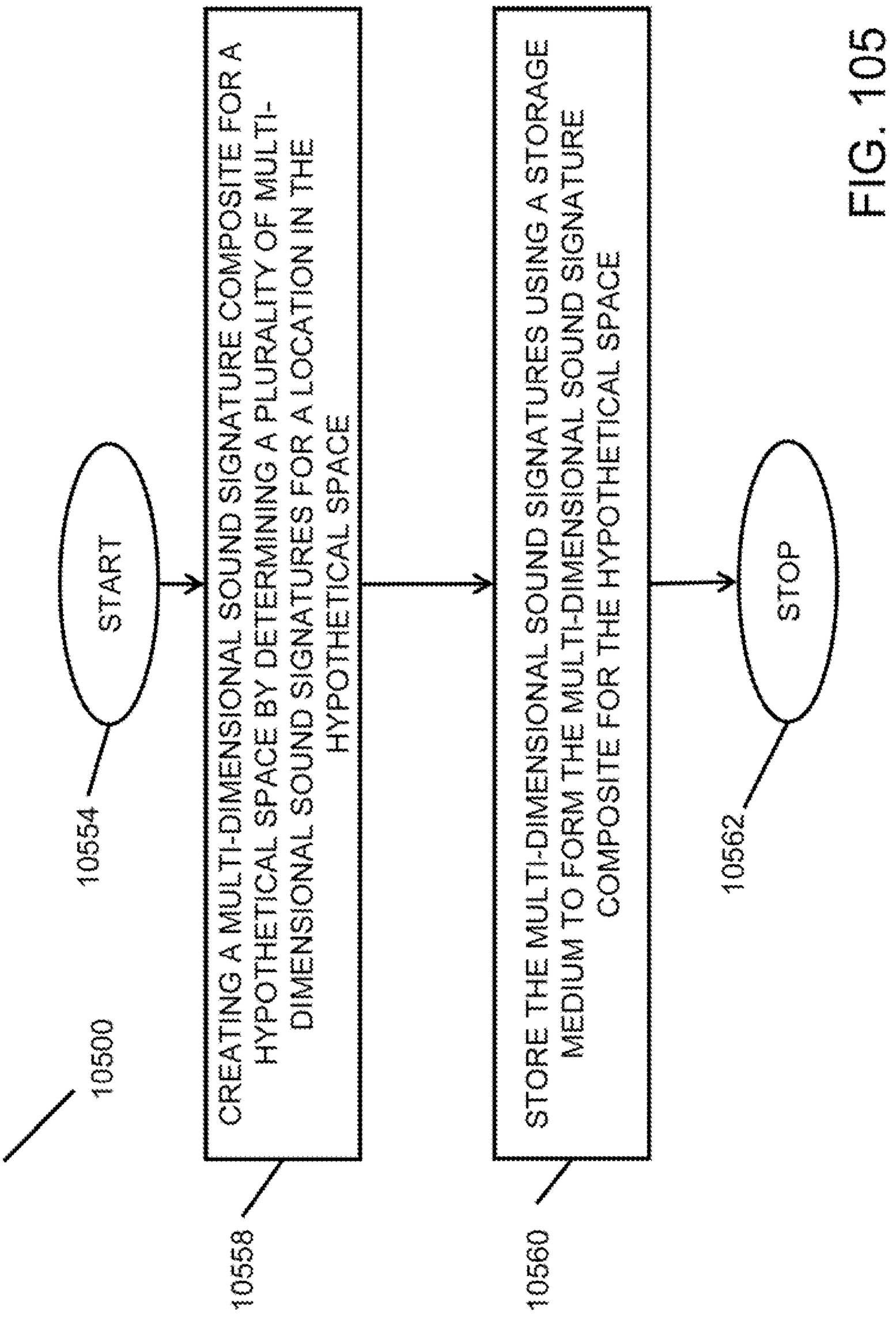

START
10554
CREATING A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE BY DETERMINING A PLURALITY OF MULTI-DIMENSIONAL SOUND SIGNATURES FOR A LOCATION IN THE HYPOTHETICAL SPACE
10558
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE HYPOTHETICAL SPACE
10560
STOP
10562
10500

FIG. 105

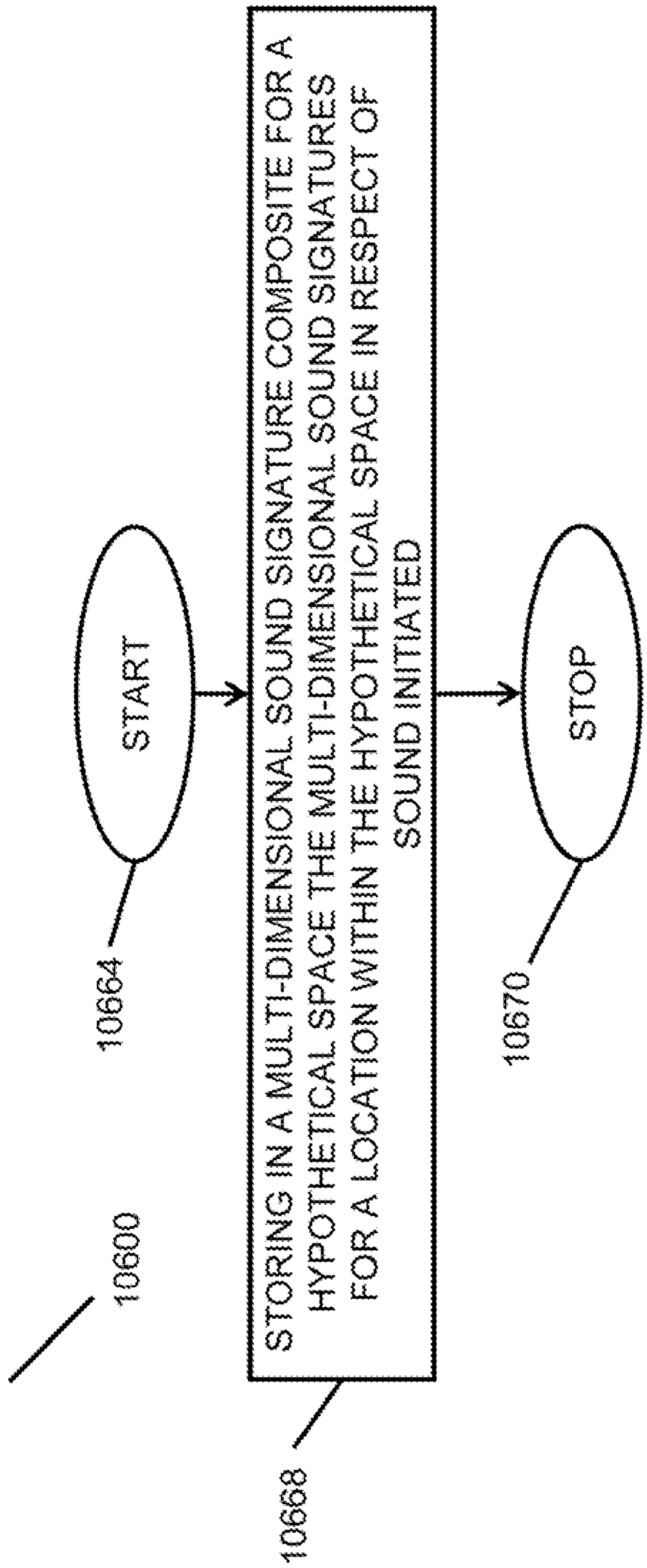

10600
START
10664
STORING IN A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE THE MULTI-DIMENSIONAL SOUND SIGNATURES FOR A LOCATION WITHIN THE HYPOTHETICAL SPACE IN RESPECT OF SOUND INITIATED
10668
STOP
10670

FIG. 106

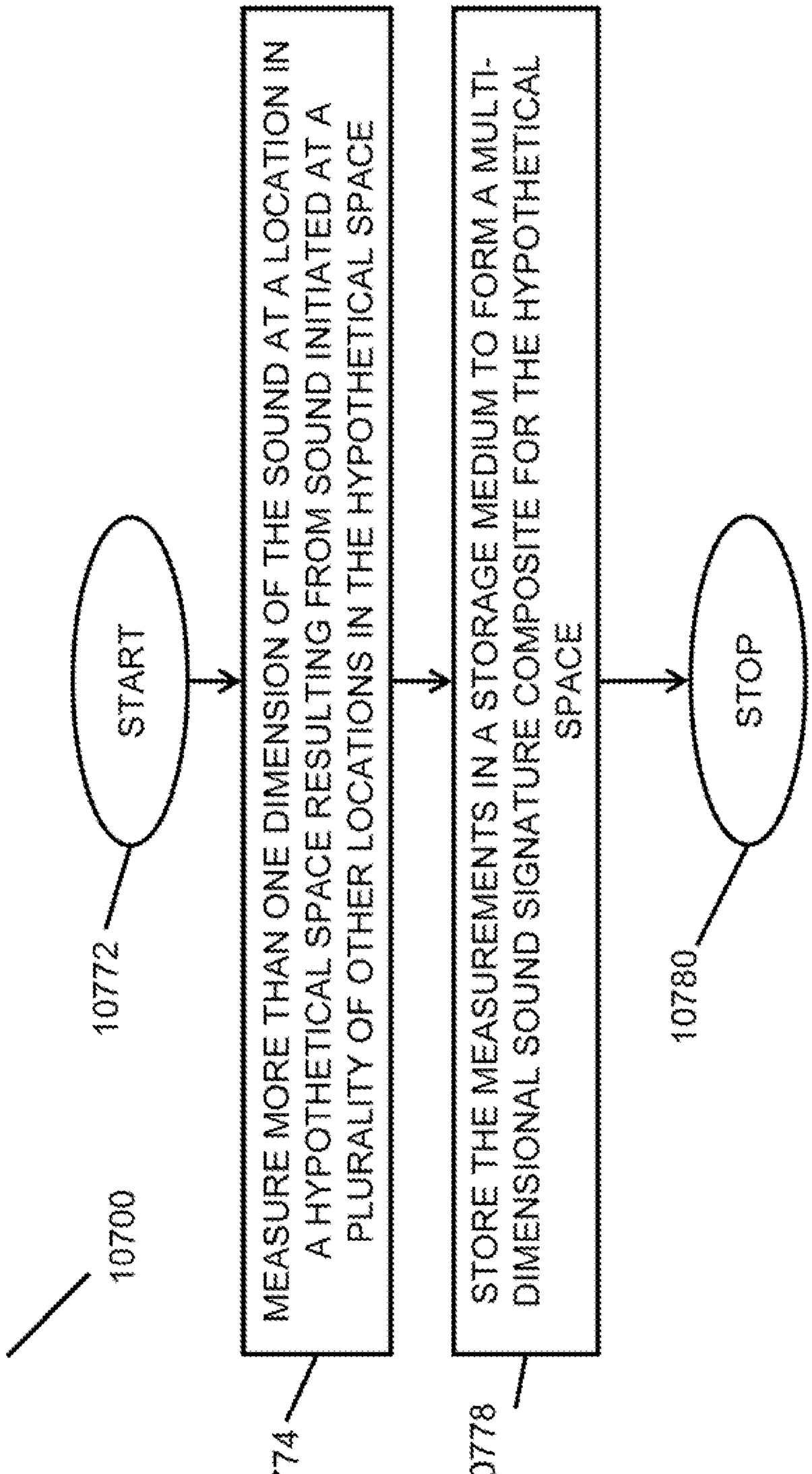

10700
START
10772
MEASURE MORE THAN ONE DIMENSION OF THE SOUND AT A LOCATION IN A HYPOTHETICAL SPACE RESULTING FROM SOUND INITIATED AT A PLURALITY OF OTHER LOCATIONS IN THE HYPOTHETICAL SPACE
10774
STORE THE MEASUREMENTS IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE HYPOTHETICAL SPACE
10778
STOP
10780

FIG. 107

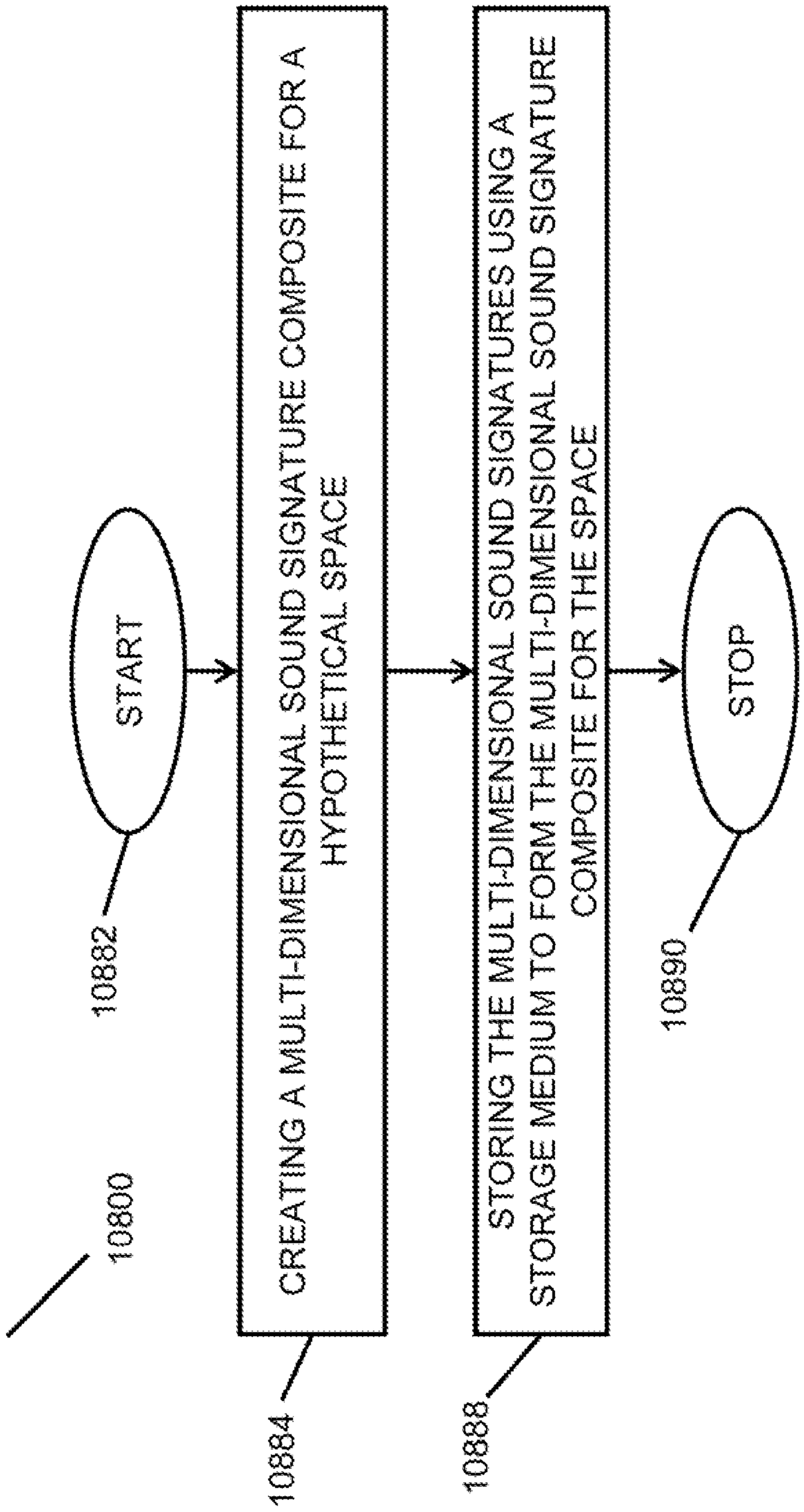

START
10882
CREATING A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A HYPOTHETICAL SPACE
10884
STORING THE MULTI-DIMENSIONAL SOUND SIGNATURES USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
10888
STOP
10890
10800

FIG. 108

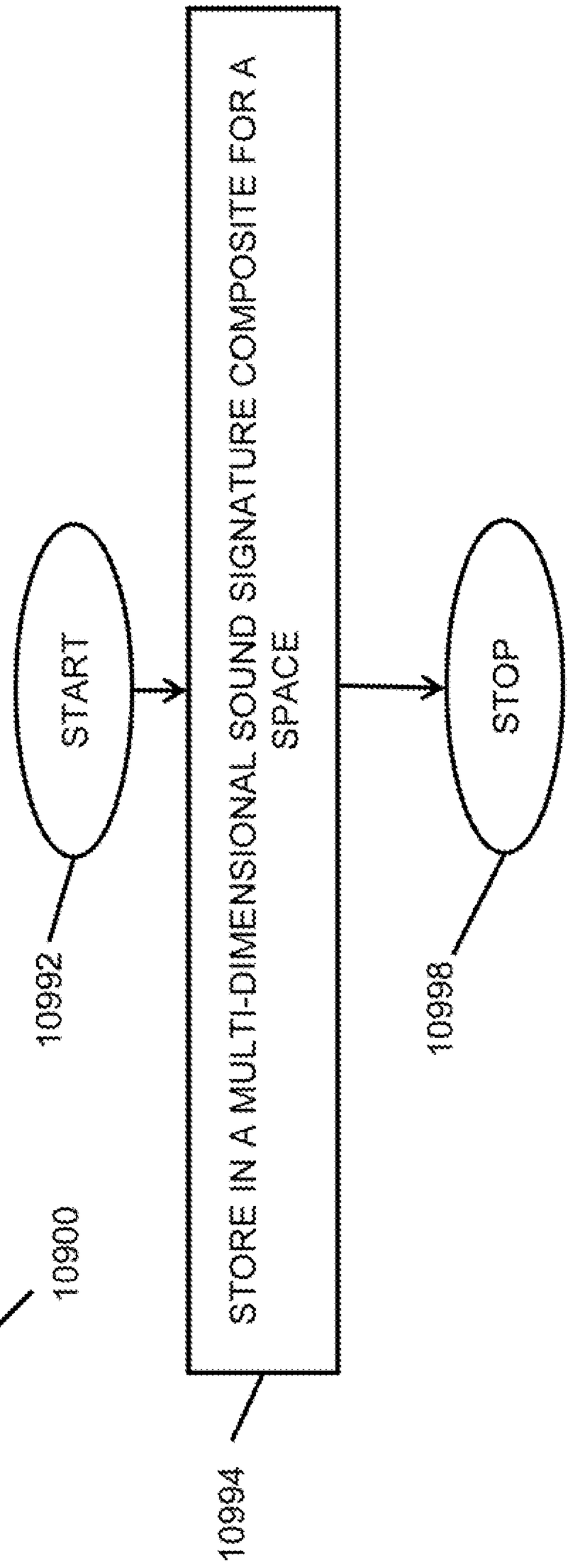

START
10992
STORE IN A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
10994
STOP
10998
10900

FIG. 109

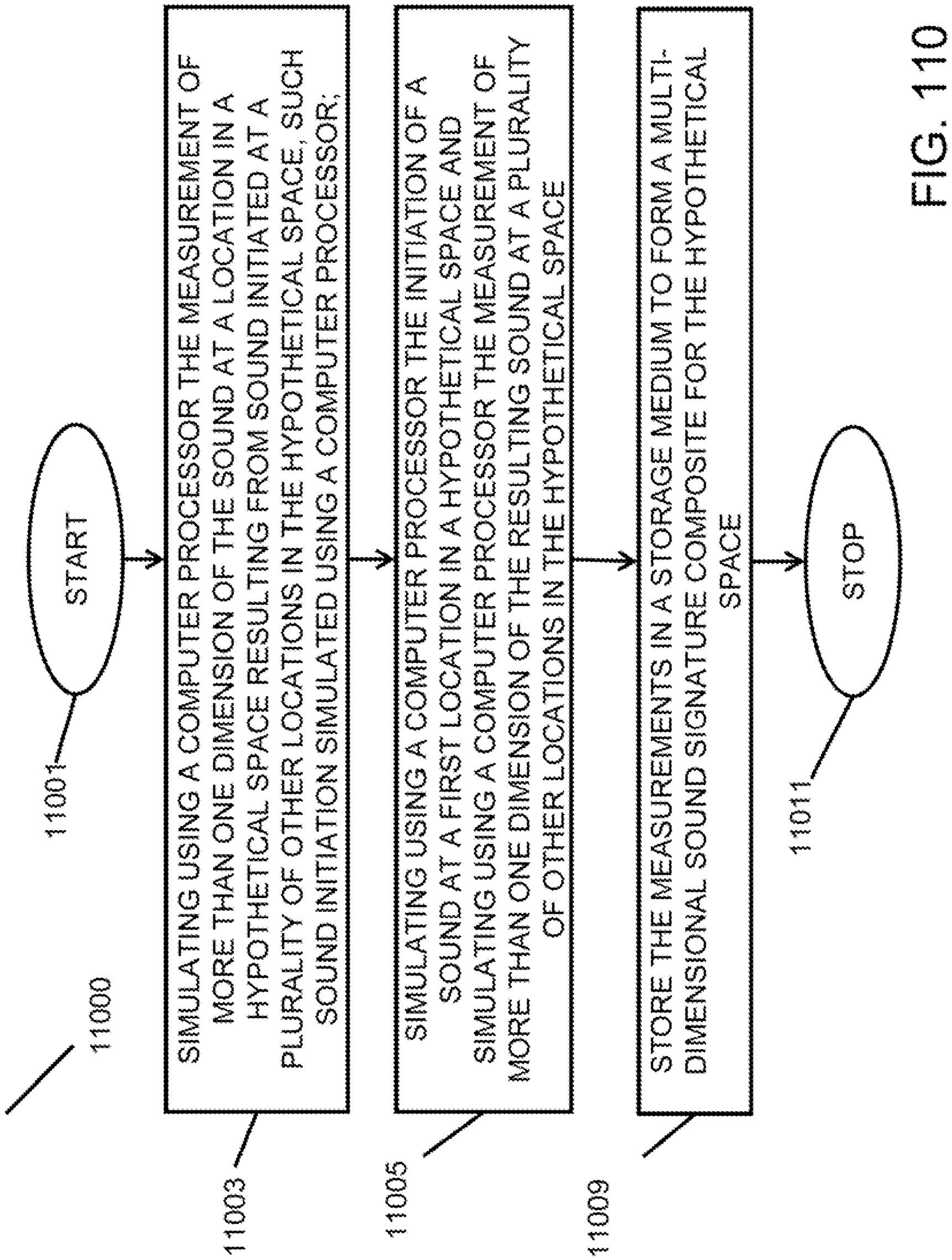

START
11001
SIMULATING USING A COMPUTER PROCESSOR THE MEASUREMENT OF MORE THAN ONE DIMENSION OF THE SOUND AT A LOCATION IN A HYPOTHETICAL SPACE RESULTING FROM SOUND INITIATED AT A PLURALITY OF OTHER LOCATIONS IN THE HYPOTHETICAL SPACE, SUCH SOUND INITIATION SIMULATED USING A COMPUTER PROCESSOR;
11003
SIMULATING USING A COMPUTER PROCESSOR THE INITIATION OF A SOUND AT A FIRST LOCATION IN A HYPOTHETICAL SPACE AND SIMULATING USING A COMPUTER PROCESSOR THE MEASUREMENT OF MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT A PLURALITY OF OTHER LOCATIONS IN THE HYPOTHETICAL SPACE
11005
STORE THE MEASUREMENTS IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE HYPOTHETICAL SPACE
11009
STOP
11011
11000

FIG. 110

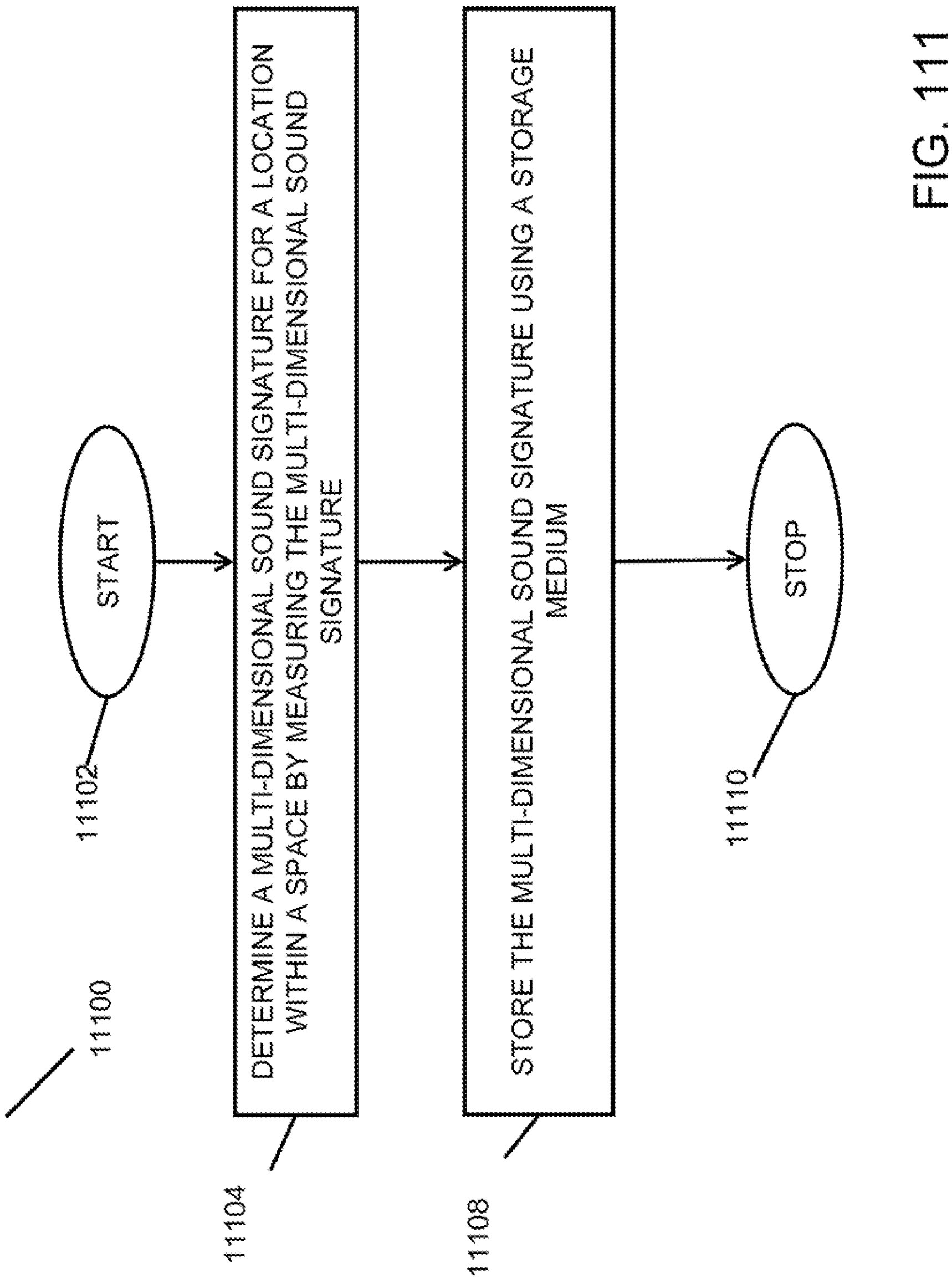

START
11102
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN A SPACE BY MEASURING THE MULTI-DIMENSIONAL SOUND SIGNATURE
11104
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURE USING A STORAGE MEDIUM
11108
STOP
11110
11100

FIG. 111

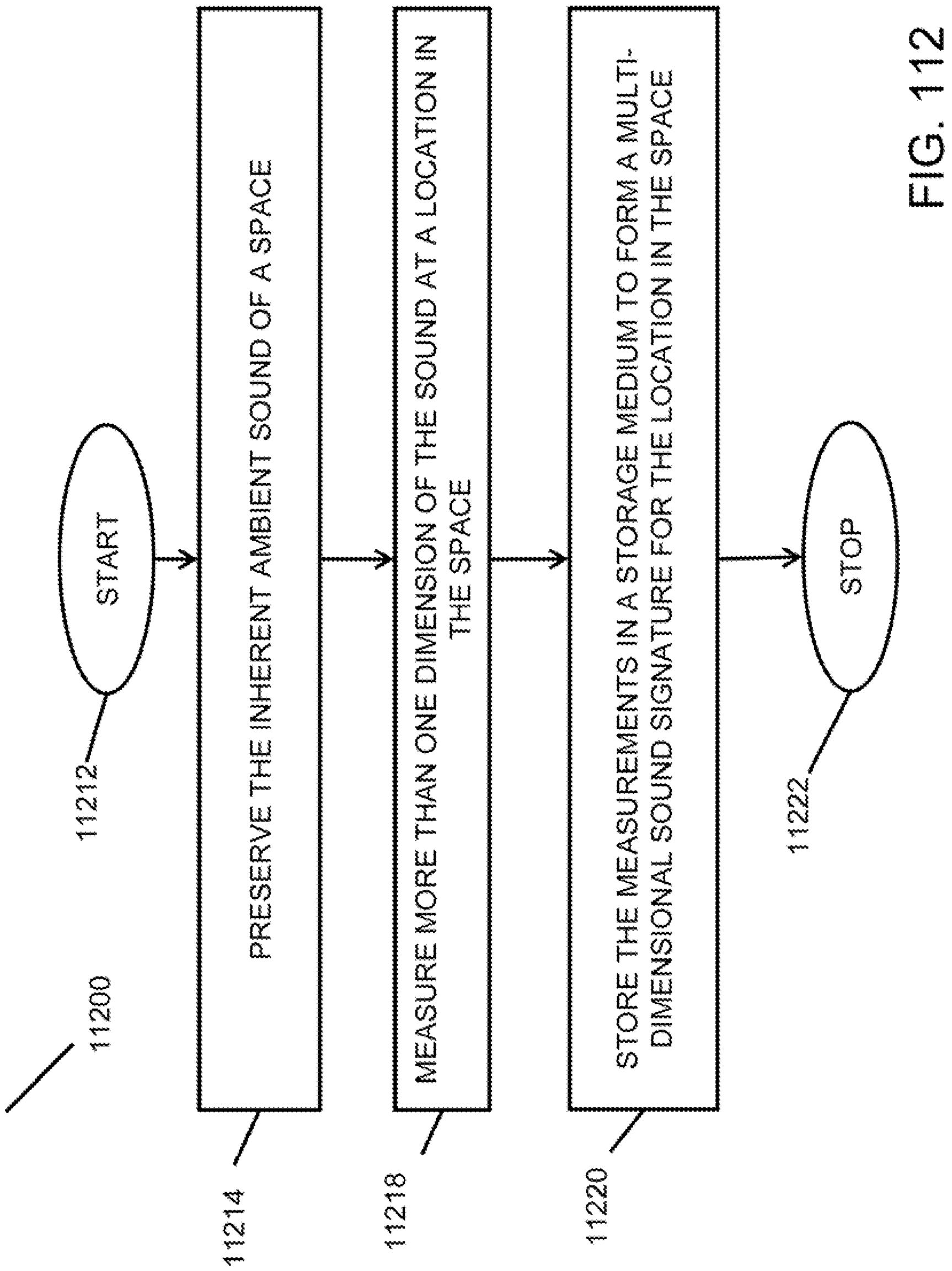

START
11212
PRESERVE THE INHERENT AMBIENT SOUND OF A SPACE
11214
MEASURE MORE THAN ONE DIMENSION OF THE SOUND AT A LOCATION IN THE SPACE
11218
STORE THE MEASUREMENTS IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION IN THE SPACE
11220
STOP
11222
11200

FIG. 112

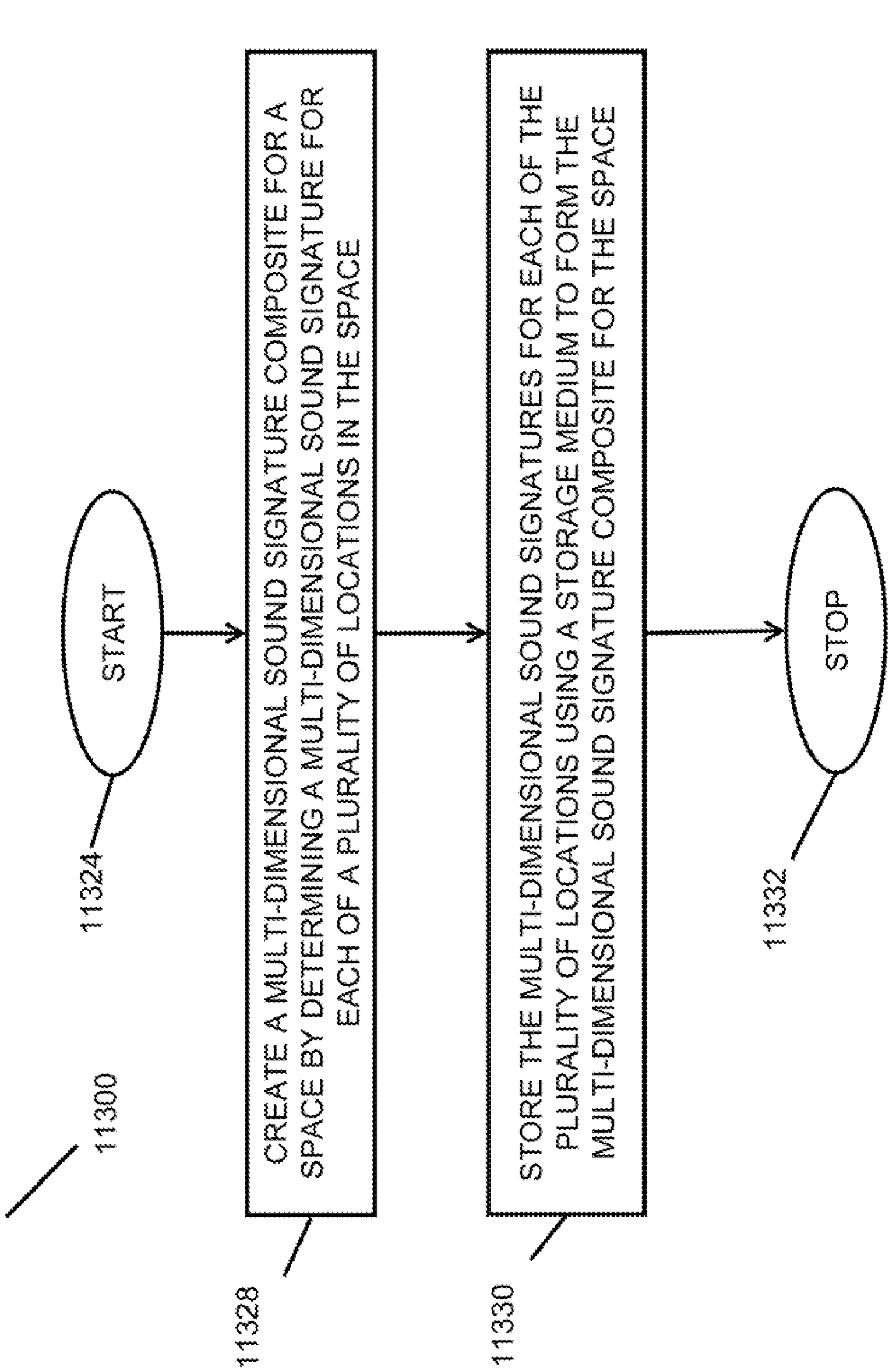

11300
START
11324
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE BY DETERMINING A MULTI-DIMENSIONAL SOUND SIGNATURE FOR EACH OF A PLURALITY OF LOCATIONS IN THE SPACE
11328
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES FOR EACH OF THE PLURALITY OF LOCATIONS USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
11330
STOP
11332

FIG. 113

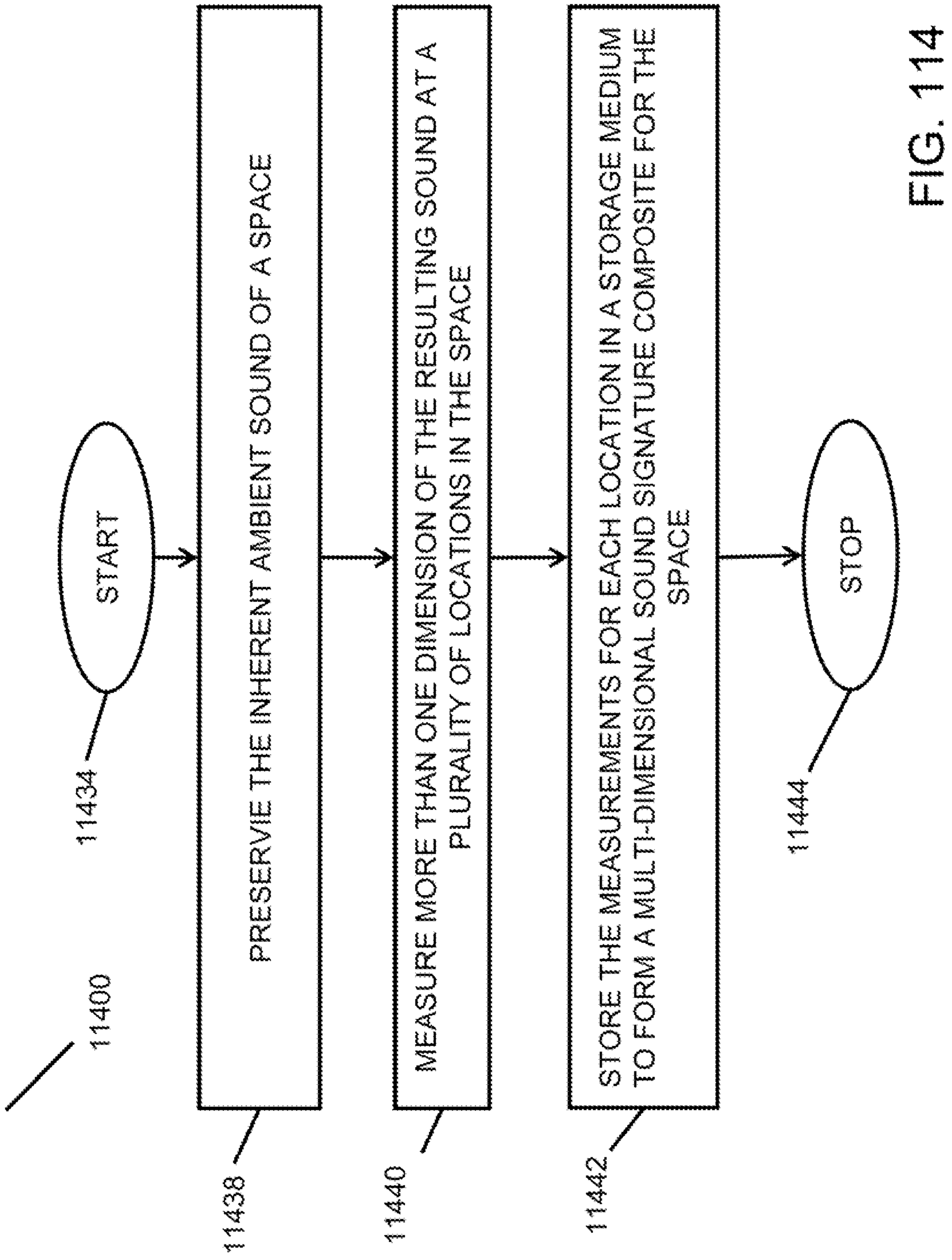

11400
START
11434
PRESERVIE THE INHERENT AMBIENT SOUND OF A SPACE
11438
MEASURE MORE THAN ONE DIMENSION OF THE RESULTING SOUND AT A PLURALITY OF LOCATIONS IN THE SPACE
11440
STORE THE MEASUREMENTS FOR EACH LOCATION IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
11442
STOP
11444

FIG. 114

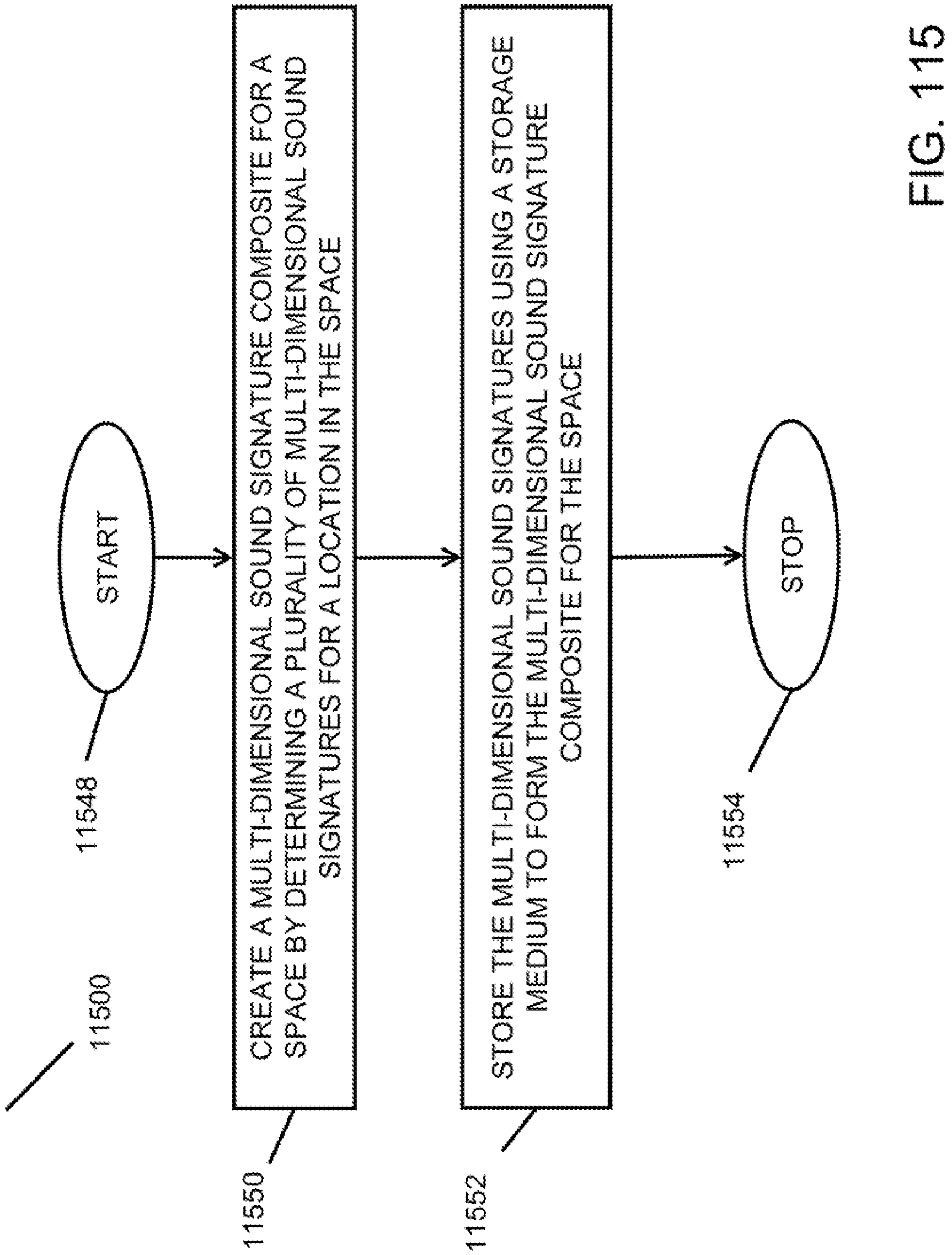

START
11548
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE BY DETERMINING A PLURALITY OF MULTI-DIMENSIONAL SOUND SIGNATURES FOR A LOCATION IN THE SPACE
11550
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
11552
STOP
11554
11500

FIG. 115

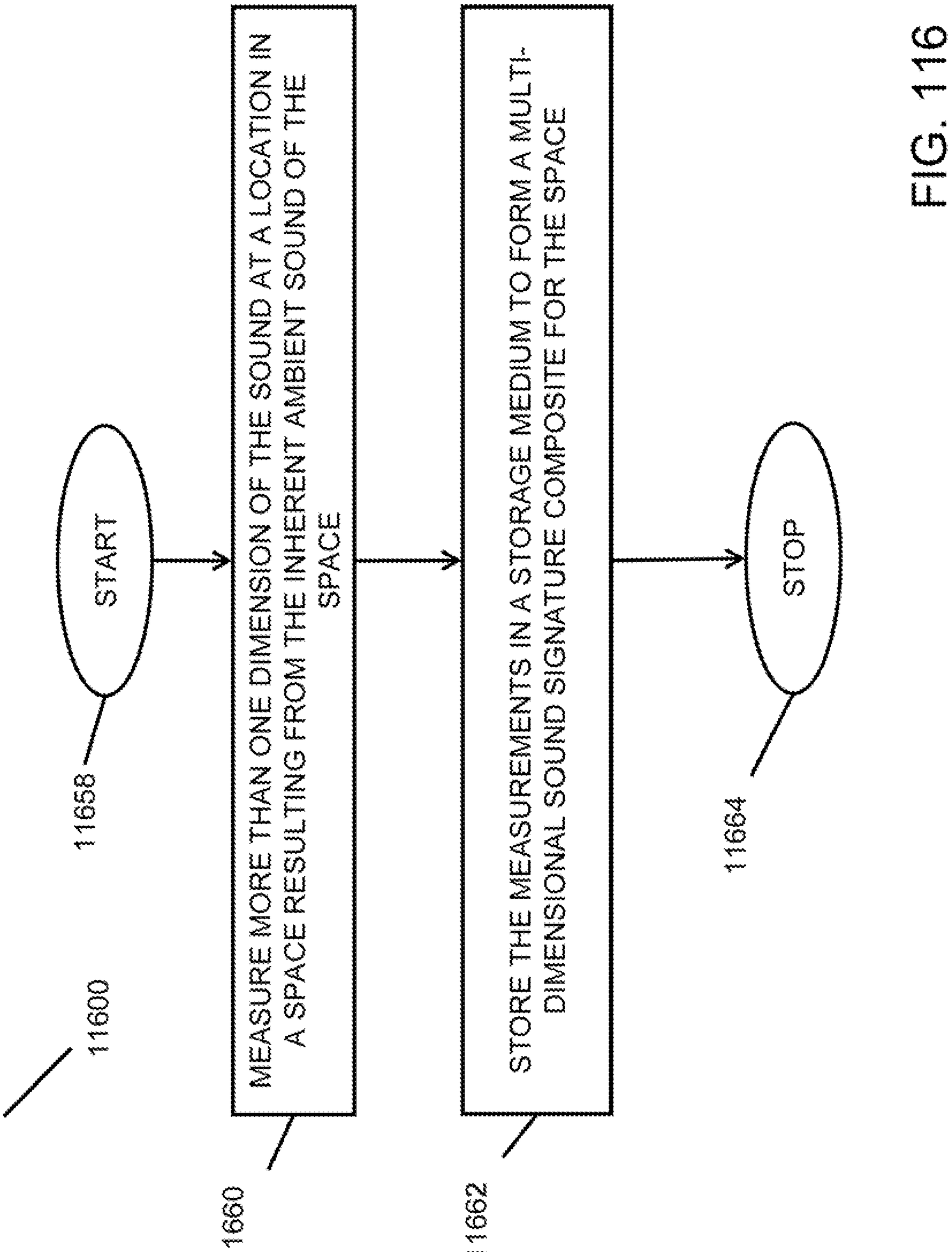

START
11658
MEASURE MORE THAN ONE DIMENSION OF THE SOUND AT A LOCATION IN A SPACE RESULTING FROM THE INHERENT AMBIENT SOUND OF THE SPACE
11600
STORE THE MEASUREMENTS IN A STORAGE MEDIUM TO FORM A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
11660
11662
STOP
11664

FIG. 116

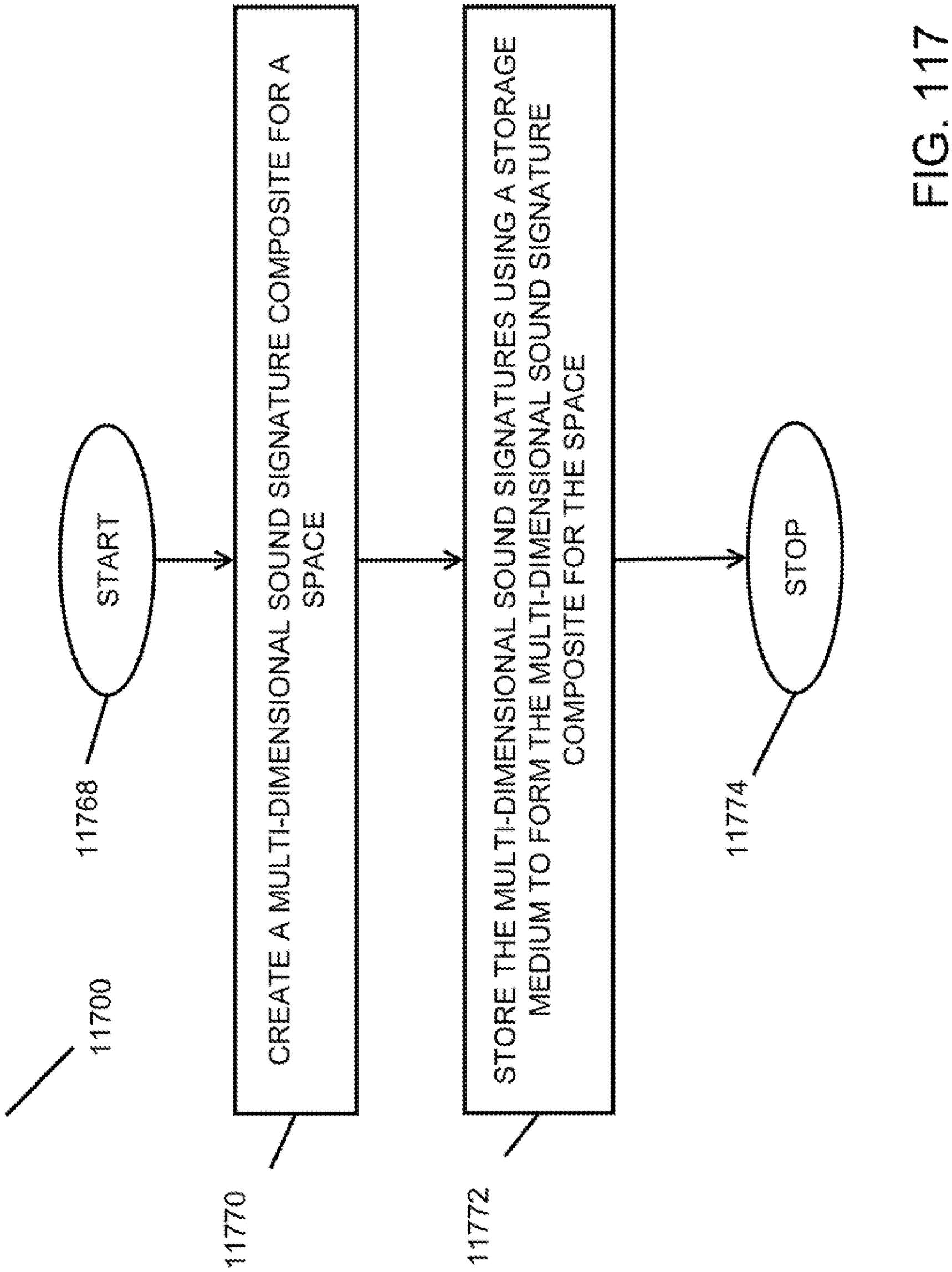

START
11768
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SPACE
11770
STORE THE MULTI-DIMENSIONAL SOUND SIGNATURES USING A STORAGE MEDIUM TO FORM THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR THE SPACE
11772
STOP
11774
11700

FIG. 117

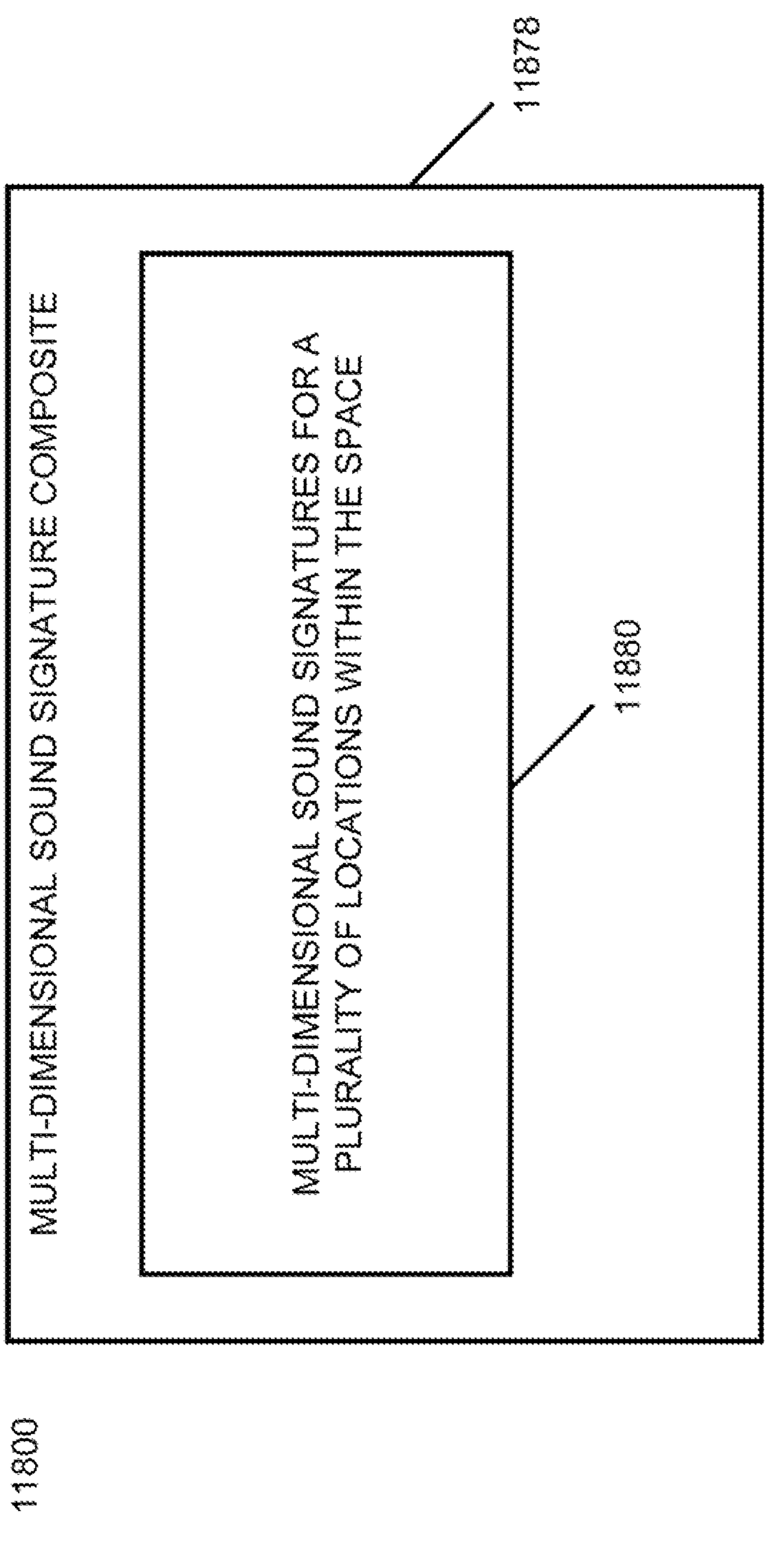

11800
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
MULTI-DIMENSIONAL SOUND SIGNATURES FOR A PLURALITY OF LOCATIONS WITHIN THE SPACE
11880
11878

FIG. 118

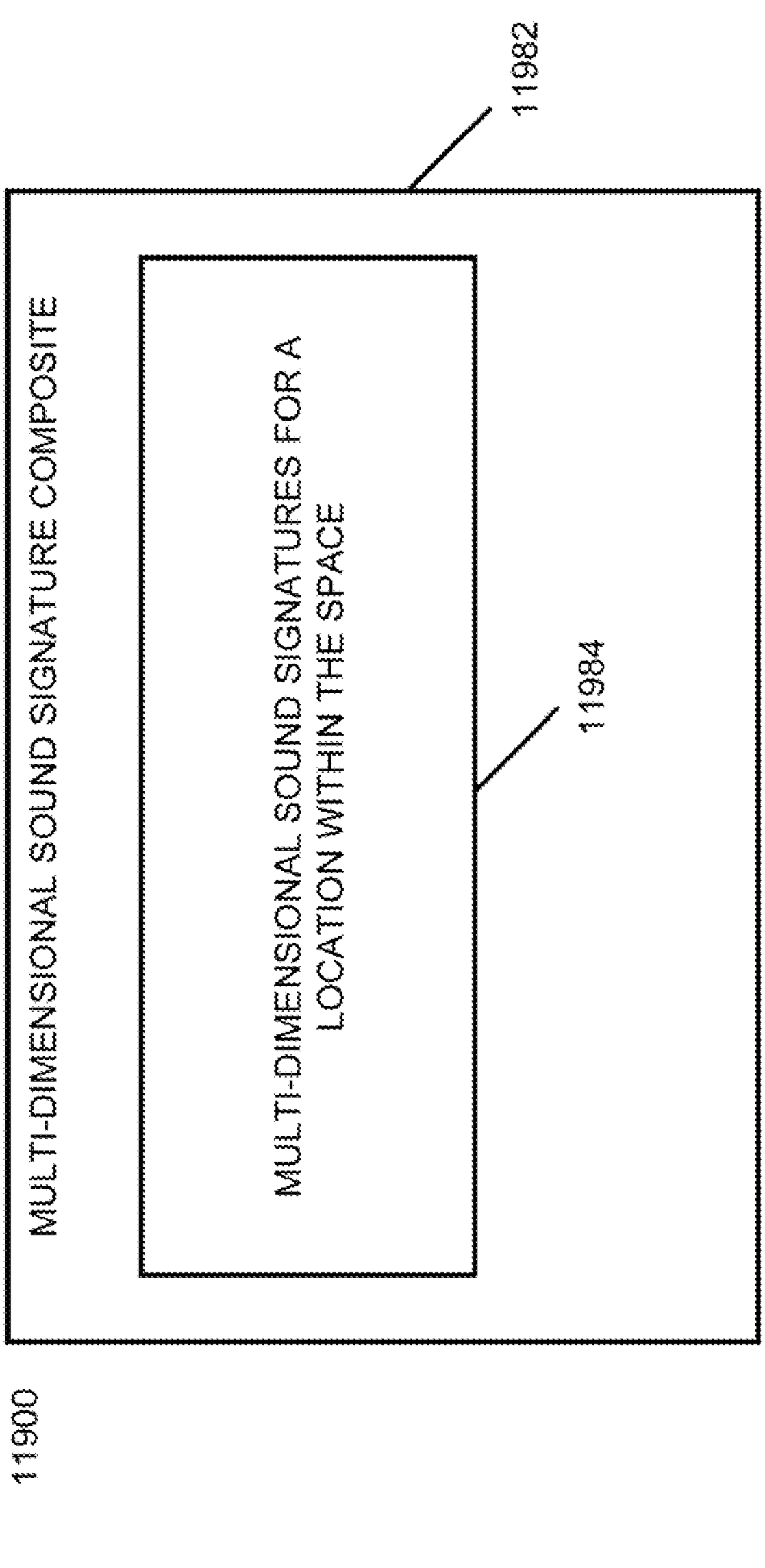

11982
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
MULTI-DIMENSIONAL SOUND SIGNATURES FOR A LOCATION WITHIN THE SPACE
11984
11900

FIG. 119

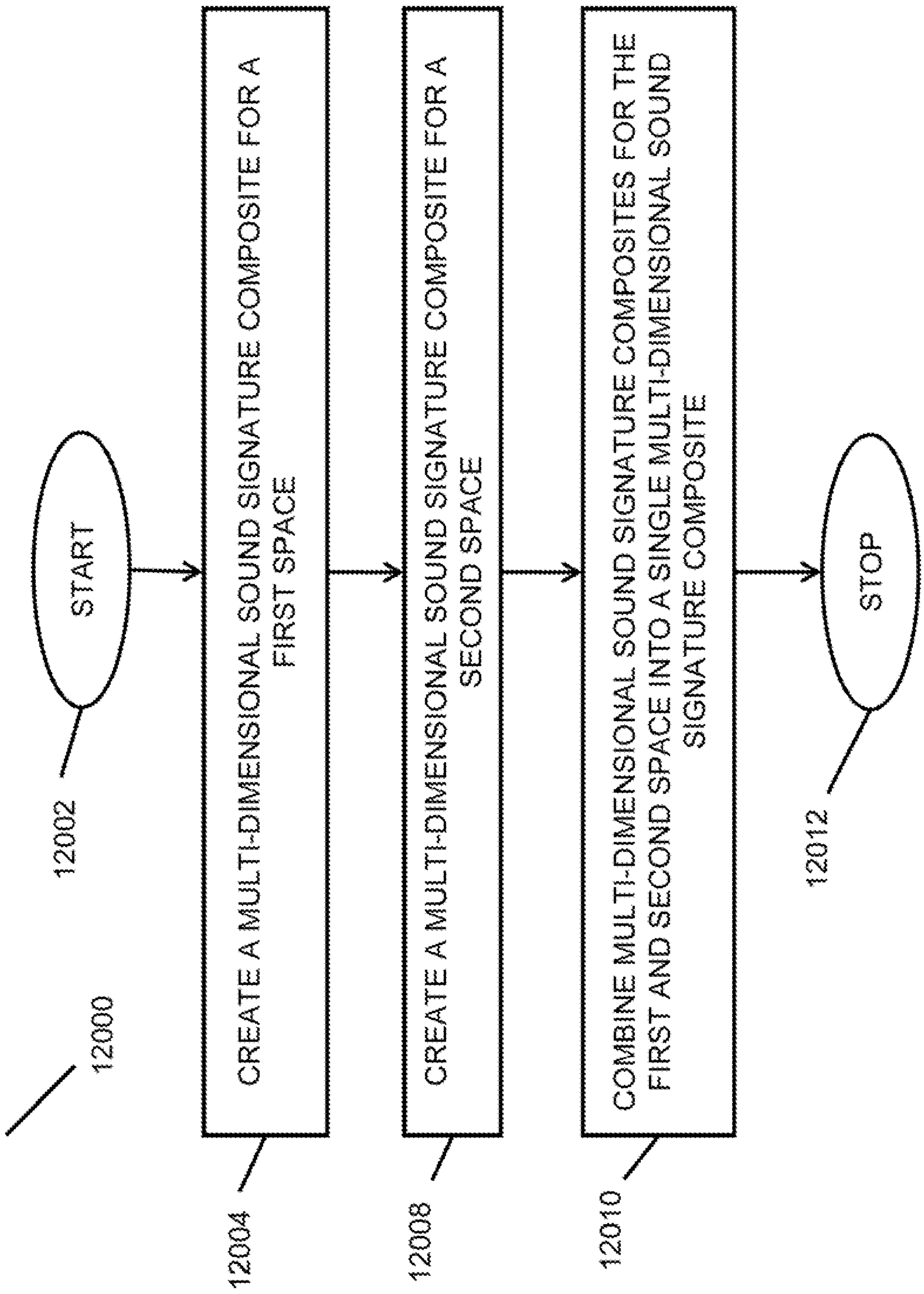

12000
START
12002
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A FIRST SPACE
12004
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE FOR A SECOND SPACE
12008
COMBINE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITES FOR THE FIRST AND SECOND SPACE INTO A SINGLE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
12010
STOP
12012

FIG. 120

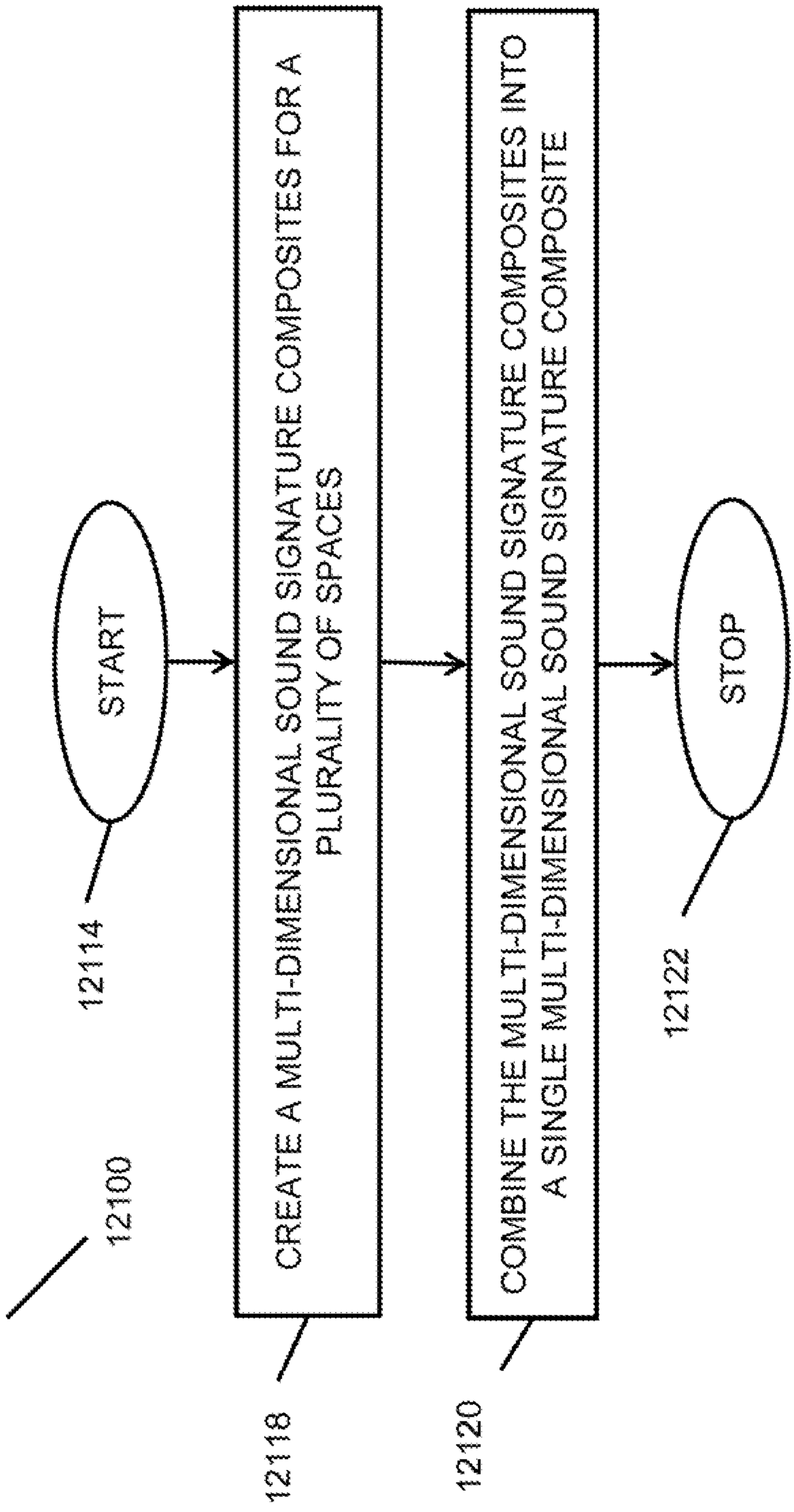

START
12114
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITES FOR A PLURALITY OF SPACES
12118
COMBINE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITES INTO A SINGLE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
12120
STOP
12122
12100

FIG. 121

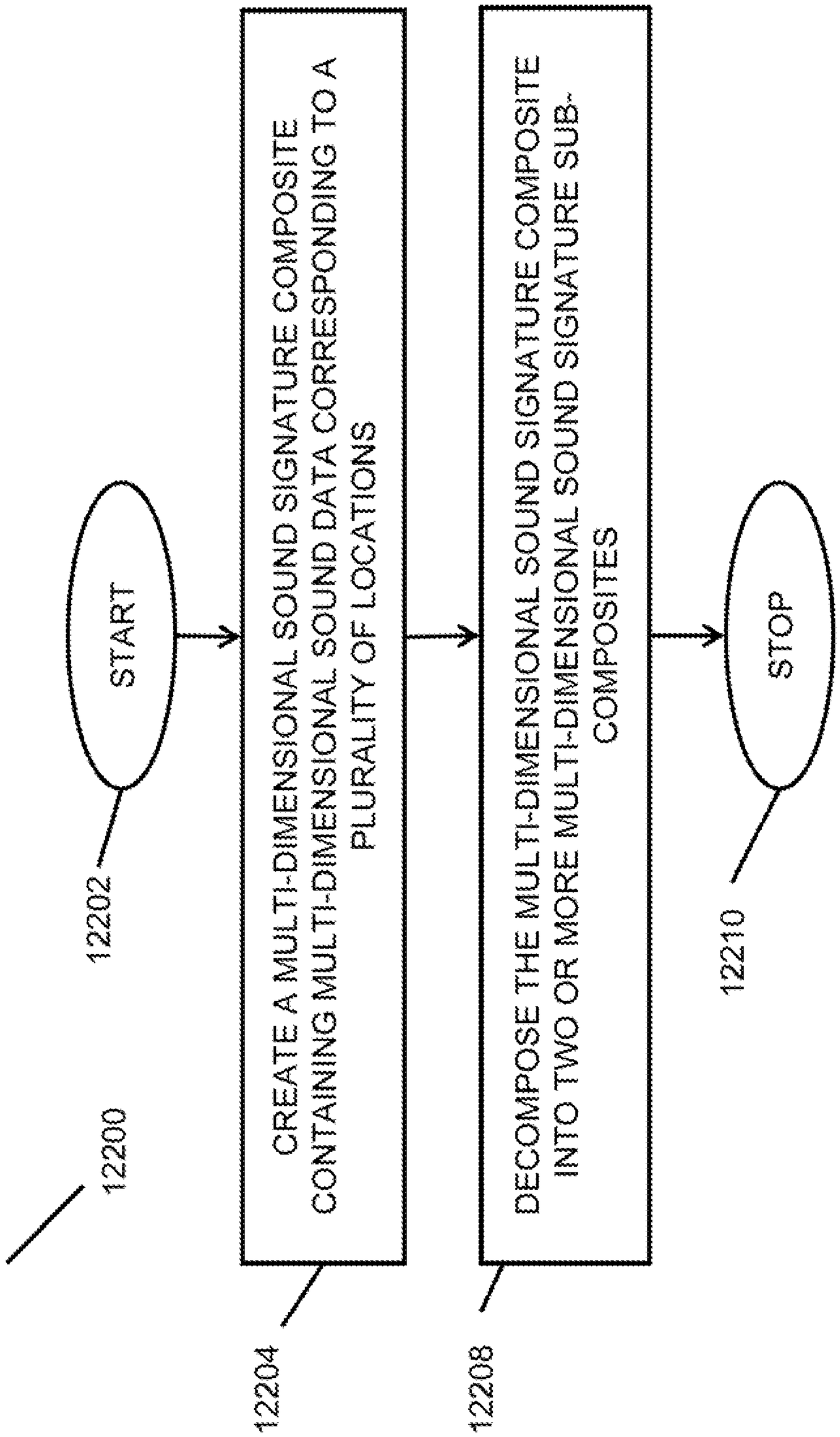

12200
START
12202
CREATE A MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE CONTAINING MULTI-DIMENSIONAL SOUND DATA CORRESPONDING TO A PLURALITY OF LOCATIONS
12204
DECOMPOSE THE MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE INTO TWO OR MORE MULTI-DIMENSIONAL SOUND SIGNATURE SUB-COMPOSITES
12208
STOP
12210

FIG. 122

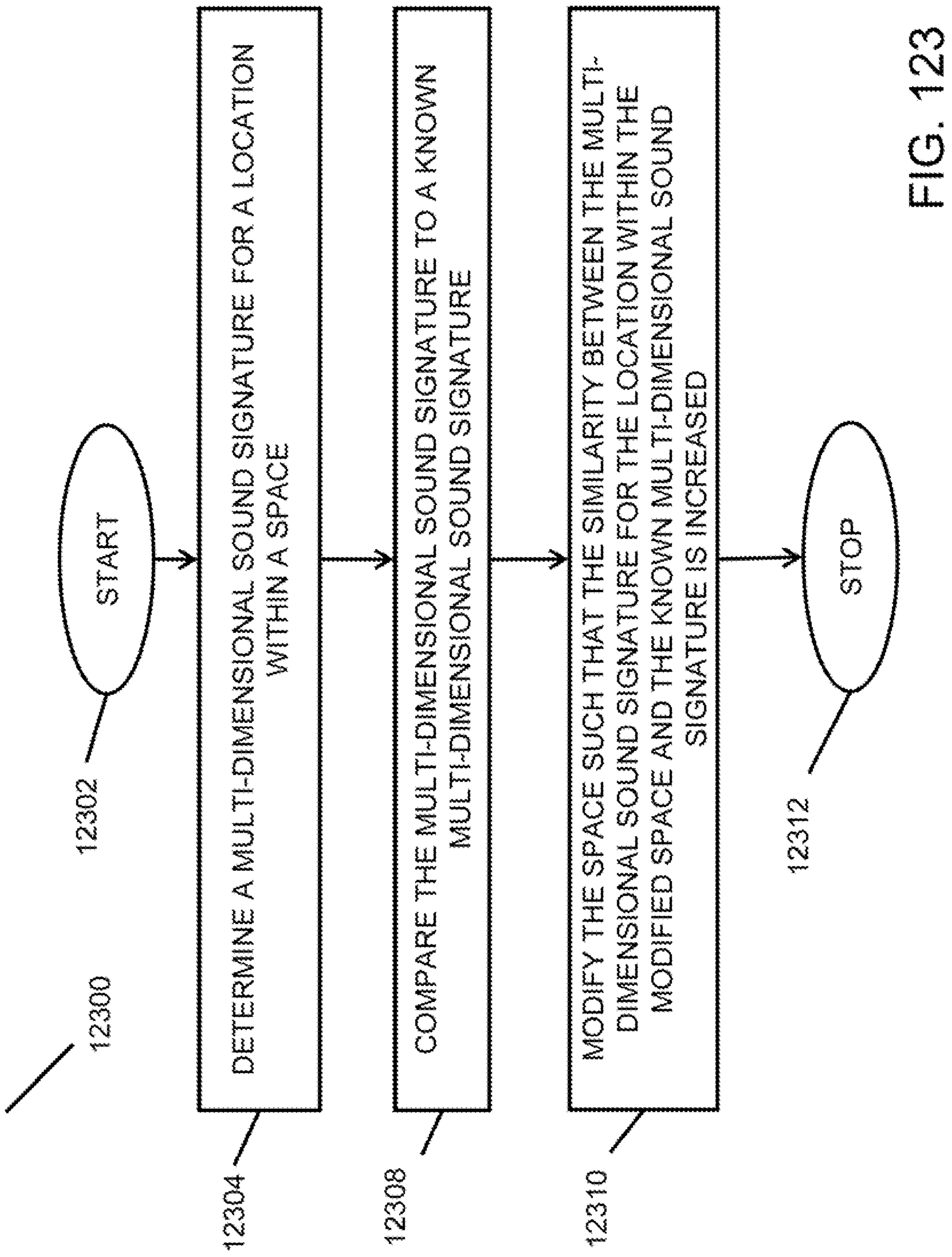

12300
START
12302
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN A SPACE
12304
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE
12308
MODIFY THE SPACE SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION WITHIN THE MODIFIED SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE IS INCREASED
12310
STOP
12312

FIG. 123

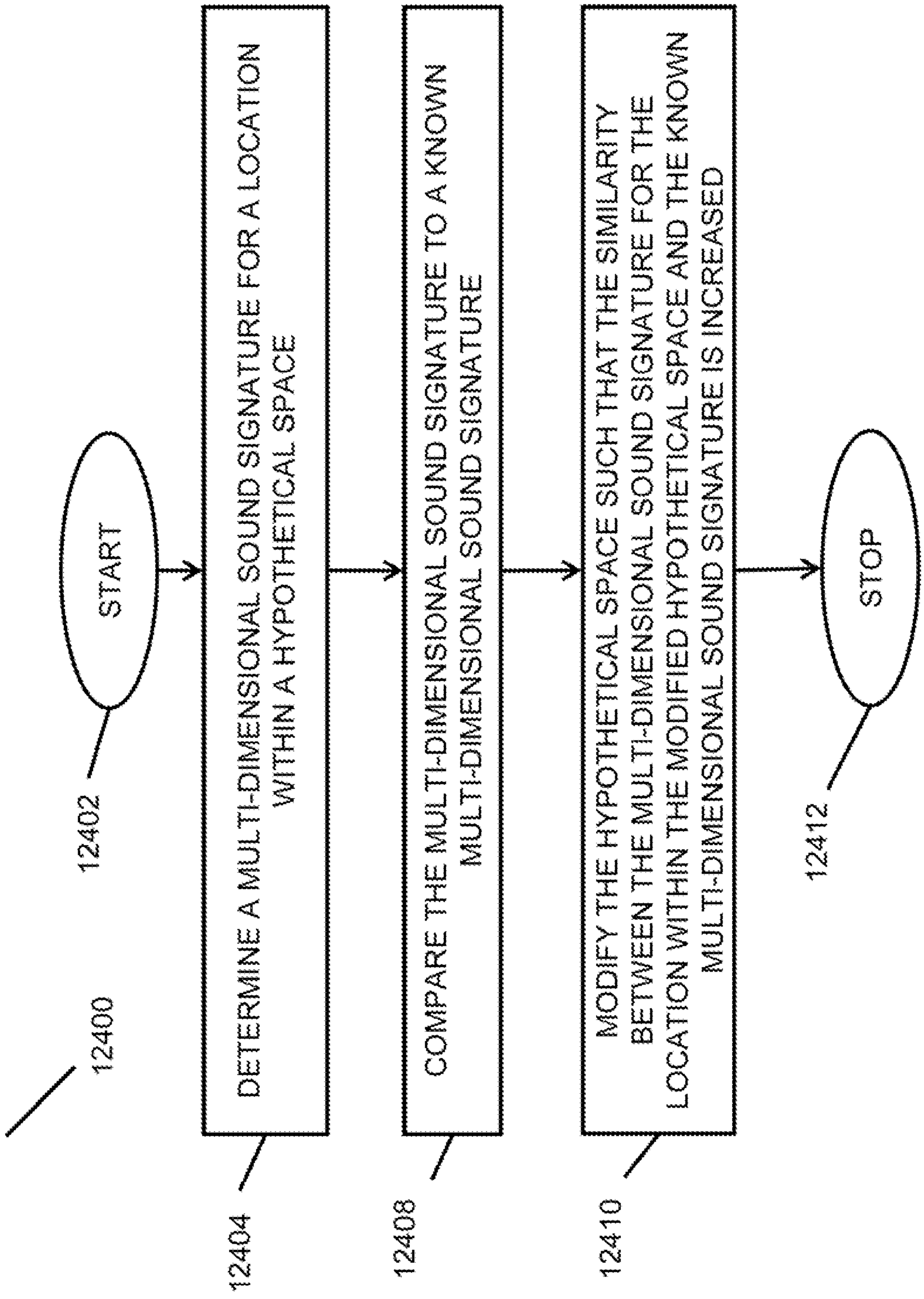
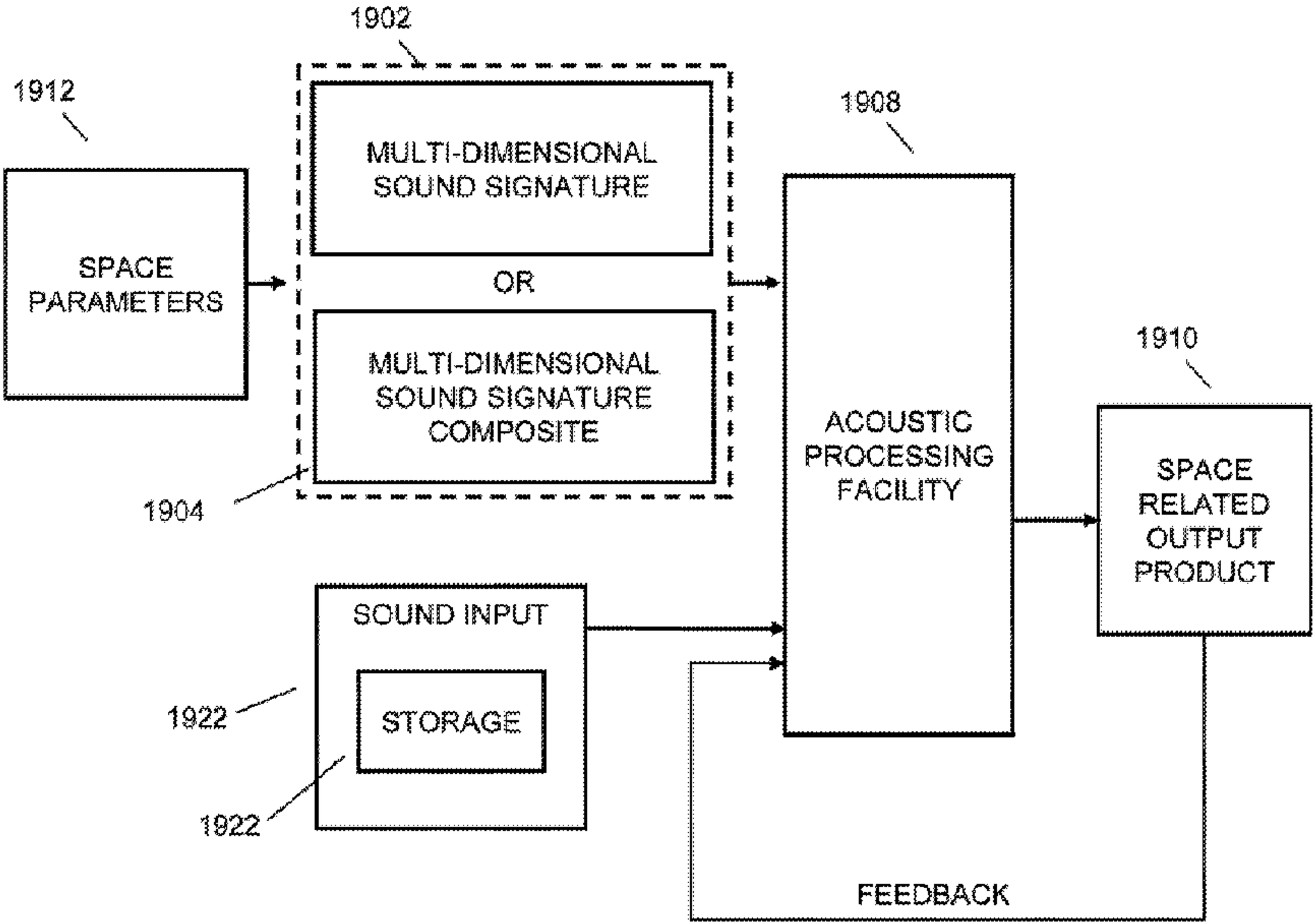

12400
START
12402
DETERMINE A MULTI-DIMENSIONAL SOUND SIGNATURE FOR A LOCATION WITHIN A HYPOTHETICAL SPACE
12404
COMPARE THE MULTI-DIMENSIONAL SOUND SIGNATURE TO A KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE
12408
MODIFY THE HYPOTHETICAL SPACE SUCH THAT THE SIMILARITY BETWEEN THE MULTI-DIMENSIONAL SOUND SIGNATURE FOR THE LOCATION WITHIN THE MODIFIED HYPOTHETICAL SPACE AND THE KNOWN MULTI-DIMENSIONAL SOUND SIGNATURE IS INCREASED
12410
STOP
12412

FIG. 124


1902
1912
1908
MULTI-DIMENSIONAL SOUND SIGNATURE
SPACE PARAMETERS
OR
MULTI-DIMENSIONAL SOUND SIGNATURE COMPOSITE
1910
ACOUSTIC PROCESSING FACILITY
SPACE RELATED OUTPUT PRODUCT
1904
SOUND INPUT
STORAGE
1922
1922
FEEDBACK