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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 May 2001 (31.05.2001)

PCT

(10) International Publication Number
WO 01/39158 A1

(51) International Patent Classification[7]: G09B 15/00, 15/02

(21) International Application Number: PCT/US00/32055

(22) International Filing Date:
22 November 2000 (22.11.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/447,916 23 November 1999 (23.11.1999) US

(71) Applicant and
(72) Inventor: CONNICK, Harry, Jr. [US/US]; Wilkins Management, 323 Broadway, Cambridge, MA 02139 (US).

(74) Agent: OSTROW, Seth, H.; Brown Raysman Millstein Felder & Steiner, LLP, 120 W. 45th Street, New York, NY 10036 (US).

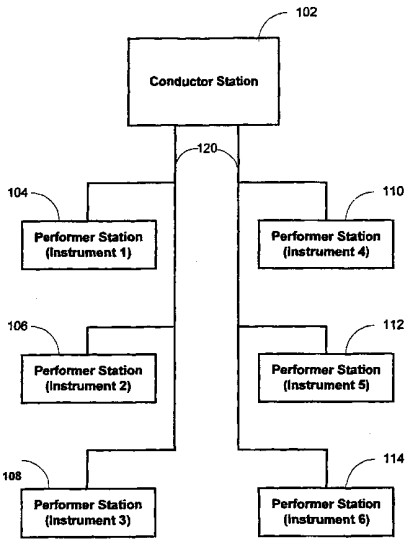
(81) Designated States *(national)*: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*
— *Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SYSTEM AND METHOD FOR COORDINATING MUSIC DISPLAY AMONG PLAYERS IN AN ORCHESTRA



(57) Abstract: A system and method for coordinated music composition and display among musicians is presented. The system and method enables a conductor, composer or band leader to interactively edit one or more score parts of a composition using a pen-based interface (310), mouse (308), alphanumeric keyboard (318), or a musical keyboard (322). Hand-written music editing, which is entered with the pen-based interface (310), may be flexibly converted to a digital music notation format. Connected to the composer station (102) are one or more musician stations (104, 106, 108, 110, 112, 114) that may be arranged as an orchestra. The musical score parts may be selectively transmitted to one or more musician stations by the composer. Thus, an operator of the conductor station (102) can flexibly write and edit music score parts and transmit the parts to musicians over the network. The system and method can also be used to conduct the orchestra in rehearsals or performances.

WO 01/39158 A1

SYSTEM AND METHOD FOR COORDINATING MUSIC DISPLAY AMONG PLAYERS IN AN ORCHESTRA

COPYRIGHT NOTICE

A portion of the disclosure of this patent document contains material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent document or the patent disclosure, as it appears in the Patent and Trademark Office patent files or records, but otherwise reserves all copyright rights whatsoever.

BACKGROUND OF THE INVENTION

The invention disclosed herein relates to computerized systems for composing and displaying musical scores. In particular, the present invention is an improved user interface and system that allows a conductor or composer to interactively modify a musical score and to transmit the modifications to individual musicians or selected groups of musicians in an orchestra.

Traditionally, printed paper copies of sheet music have been required for any orchestral or band musician to read in order to perform a musical score. The use of such printed sheet music has resulted in certain disadvantages, such as the need to turn pages, the risk of losing pages, and the time consuming task of making edits or changes to musical scores, which may involve reprinting the score. In addition, the use of printed sheet music limits the ability of the conductor of the orchestra to make changes during a rehearsal, concert or performance, and also unduly restricts the composition process.

Several systems have been developed for allowing the composition and notation of music on a computer. Examples of such systems include the FINALE music composition and notation software available from Coda Music Technology, Inc. of Minnesota, the MUSIC WRITE PLUS software from Voyetra Technologies Inc. of New York, the CUBASE VST system available from Steinberg North America of California, and the SIBELIUS music software available from Sibelius Software, Ltd. of the United Kingdom. These systems generally allow for the composition and editing of a musical score through a mouse or keyboard using a note palette or template, or through a MIDI compatible keyboard.

U.S. Patent No. 5,665,927, assigned to Casio Computer Co., Ltd., describes a hand-held device that uses a pen-based input device for music notation. A touch screen of the

device displays a musical staff and provides a method for the user to enter musical notations directly onto the displayed staff using the pen-based input device.

These software and systems provide some basic tools for the computerized composition and editing of music.

The Music Object Oriented Distributed System, or MOODS, is an integrated system of computer-based lecterns or stands which can be used for cooperatively editing and viewing musical scores. The MOODS system, which is described in a document retrievable on the Internet at <http://aguirre.dsi.unifi.it/~moods>, is designed for use by, among other things, orchestras during rehearsals and public performances.

The MOODS system is comprised of a set of lecterns for musicians for displaying musical scores; a lectern for conductors that is used to show, visualize or modify a score; a network for connecting these lecterns; and a database for storing and retrieving the musical scores. The musicians' lecterns are organized according to a hierarchy within the orchestra, with first level musicians being qualified to perform changes on a score while other musicians can be active or passive. This hierarchical organization allows a first instrument such as a first violinist, to directly transmit changes in the score to the other sub-lecterns.

Similarly, PCT application no. PCT/US98/08658, published November 12, 1998, describes a musical score display and editing system in which a band leader's device distributes display information to other devices. The leader may create modifications to a score using various music editing commands which are displayed on all devices displaying parts of the score to which they apply. The system also allows individual musicians to insert personal annotations into their own parts of the score, to be displayed on their own individual devices.

Despite this activity, to the inventor's knowledge there is no system which simplifies and facilitates the conductor's or composer's task of managing and coordinating score modification and dissemination. That is, none of these systems allow the conductor to work with a computerized device in the same fashion as if working with hard copy of sheet music and to fully control the extent to which others in an orchestra receive and view modifications to a score on an automatic, real-time basis. Furthermore, there is no fully integrated music display system that is self-contained, ergonomically designed, flexibly reconfigured, or easily transported. The present invention is directed to improvements that provide these advantages.

SUMMARY OF THE INVENTION

It is an object of the present invention to solve the problems described above associated with existing musical composition systems.

It is another object of the present invention to provide an intuitive user interface for a music editing system through which a conductor of an orchestra can change musical scores for all or some players in the orchestra.

It is another object of the present invention to integrate handwritten editing changes with a fully digital music composition and performance system.

It is another object of the present invention to provide an ergonomic and fully integrated system for multi-part musical composition and conducting.

The above and other objects are achieved by a method and system for facilitating multi-part score composition and conducting an orchestral performance, the method being implemented in a network of computerized devices each containing programming for displaying music on a display device, the computerized devices being used by each of a plurality of players in the orchestra under direction of the conductor. The method involves the step of registering an identity of an instrument in use by each player and the corresponding computerized device being used by the player. This allows the conductor to know which player and which instrument are using each device.

During a composition session or performance, the conductor enters at the conductor's computerized station one or more changes to a musical arrangement. These changes may be entered in a handwritten format, via an integrated piano keyboard, mouse, or keyboard. The conductor's computerized device contains a digitizer and touch screen for processing the input received from the conductor, and also contains means for converting the input changes from handwritten format to a digital music notation format. The means for handwriting conversion may be a music handwriting recognition program such as described above in relation to Pat. No. 5,665,927, which is hereby incorporated by reference into this application.

The conductor's station allows the conductor to select whether the input change is to be sent to all players in the orchestra or only to a selected group of one or more players who may be using an instrument impacted by the change. The conductor's station also allows the conductor to select whether the change should be converted to a digital music notation format before transmission to the players. If the conductor selects to send the change

only to the player or players using an instrument impacted by the change, the conductor's station determines which instrument or instruments are impacted by the change and identifies the corresponding computerized device or devices registered for that instrument. The change is then transmitted over the network to the players in accordance with the conductor's selections.

One of the features of the system of the present invention that sets it apart from other computer-based score editors and related applications is the user interface. The conductor and other musicians are able to write directly onto the display screen, just as with any palm computing device, allowing for immediate note changes, edits, and other musical explorations. Thus, the musician will not have to edit using dialog boxes or keyboard commands, and simply takes an electronic pen and writes the desired changes directly onto the screen. For example, to replace a quarter note with a half note, all the musician would have to do is draw a half note on the staff, just as though it were on paper. The half note remains in a handwritten format until the musician explicitly decides to convert the handwritten representation to a digital music notation using a handwriting recognition application.

Because all of the computers in the band or orchestra are networked, the band leader or conductor can make a universal edit for all musicians at a rehearsal or performance from a central station and transmit the edited score to all of the other musicians simultaneously. The conductor could also make changes on an individual part as well. For example, if the conductor wanted the trumpet section to repeat four bars, the players would have the option to make the required changes individually or simply accept the changes made by the conductor.

The computer, display screen, operating system, and application are integrated into a single self-contained unit. Because everything is in one unit, external wiring and other clutter are eliminated reducing setup time, effort and possible errors. The unit housing the computerized device is large enough and provides sufficient display resolution to represent standard pages of printed music, while remaining compact and light enough to be portable. This allows for the musicians to comfortably travel to and from rehearsals, recordings and performances with the device. New musical scores and parts are distributed by discs, or other digital storage methods, which can be used directly by the computerized device. This eliminates the need for extraneous paper parts or bulky folders full of sheet music.

Furthermore, any confusion about which is the most current or correct version of a musical score is eliminated. An entire music catalog can now be placed in a back pocket.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated in the figures of the accompanying drawings which are meant to be exemplary and not limiting, in which like references are intended to refer to like or corresponding parts, and in which:

Figure 1 shows an exemplary network of computerized musical composition devices in accordance with one embodiment of the present invention;

Figure 2 is a block diagram of an exemplary musical composition device in accordance with one embodiment of the present invention;

Figure 3a is a perspective view of an exemplary musical composition device of Figure 2;

Figure 3b is a side view of the keyboard assembly of a first embodiment of the present invention with the keyboard in a closed position;

Figure 3c is a side view of the keyboard assembly of a first embodiment of the present invention with the keyboard in an open position;

Figure 3d is a top view of the keyboard assembly of a first embodiment of the present invention with the keyboard in a closed position;

Figure 3e is a side view of the keyboard assembly of first embodiment of the present invention with the keyboard in an open position;

Figure 3f is a side view of the keyboard assembly of a second embodiment of the present invention with the keyboard in a closed position;

Figure 3g is a side view of the keyboard assembly of a second embodiment of the present invention with the keyboard in an open position;

Figure 3h is a top view of the keyboard assembly of a second embodiment of the present invention with the keyboard in a closed position;

Figure 3i is a top view of the keyboard assembly of a second embodiment of the present invention with the keyboard in a closed position;

Figure 3j is a side view of the keyboard assembly of a third embodiment of the keyboard of the present invention with the keyboard in a closed position;

Figure 3k is a side view of the keyboard assembly of the third embodiment of the keyboard of the present invention with the keyboard in an open position;

Figure 3l is a top view of the keyboard assembly of the third embodiment of the keyboard of the present invention with the keyboard in a closed position;

Figure 3m is a top view of the keyboard assembly of a third embodiment of the keyboard of the present invention with the keyboard in an open position;

Figure 3n is a perspective view of the musical composition device of Figure 3a mounted on a music stand;

Figure 4 is a flow chart showing an exemplary process of leading an orchestra using the system shown in Figure 1;

Figure 5 is an exemplary screen display for the device of Figures 2 and 3 showing an exemplary set of active control buttons; and

Figures 6a-6c and 7a-7b represent exemplary sequences of screen displays generated during operation of one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention are now described with reference to the drawings in the Figures.

Referring to Figure 1, a schematic diagram of an example orchestral configuration is presented with a single conductor station 102 and six musician stations, 104, 106, 108, 110, 112, and 114. The conductor station 102 is connected to the musician stations 104-114 by a computer network 120, which may be based on one of a number of networking technologies such as the Internet, a proprietary networking protocol such as the Token Ring system, or a wireless networking technology. These stations may be located in relatively close proximity or may be located at any distance from each other.

Referring to Figure 2, a block diagram of the conductor station is presented. The conductor station includes a general purpose central processing unit (CPU) 204 that is connected to a memory 202 and one or more input / output devices 206. The CPU 204 is also connected to an integrated keyboard and MIDI interface 208 that provides input from an integrated alphanumeric keyboard and musical keyboard, described hereinbelow, or other musical device interface. Also connected to the CPU 204 is a network interface 212 used to access the other musician stations 104-114 on the network 120, and enables the conductor to transmit and receive information from the other musician stations 104-114 using a communications interface 218. Connected to the CPU 204 is a handwriting recognition

system 210 that processes pen strokes to determine music edits, system commands, and other user input.

Executing on the CPU 204 are several software modules. The conducting module 216 provides program features for composing and conducting music and distributing the musical score to musicians on the network. Accessible to the conducting module is a general music score editing program 214 such as the FINALE system, described hereinabove. Underlying the system and connected to the conducting module and the music editor is a composition database 220 that may contain musical data such as musical compositions, scores, parts, and other information.

With reference to Figure. 3a, a generalized exemplary music composition device is shown. The machine includes a display screen 312, which is a touch screen capable of detecting handwritten input made by a stylus or digital pen 310. The stylus 310 may be connected to the system 102 by a connecting wire or via a wireless system such as an infrared communication system. The display screen 312 shows musical score pages 314 as well as command icons 316 that activate various system functions. These buttons are context sensitive in that they change when the system is performing different functions or operating in different modes. Integrated into the device is a carrying handle 30, a floppy diskette 304, a removable media storage device such as a ZIP drive 306 or other magnetic or optical storage device. A mouse 308 or other pointing device is also provided that may be used to operate the system.

The device also includes an integrated keyboard assembly that integrates an alphanumeric keyboard 318, such as typically used with a computer, with a musical keyboard 322. In one embodiment of the present inventions, the alphanumeric keyboard 318 and musical keyboard 322 may be connected by a sliding track 320 that allows the musical keyboard to slide into the alphanumeric keyboard. Additional embodiments of the keyboard assembly are described hereinbelow.

With reference to Figures 3b-3e, a first embodiment of a keyboard of the present invention is described. In Figure 3b the keyboard is shown in the closed position with the musical keyboard 322 slid under or into the alphanumeric keyboard 318 along a guide or track 320. Figure 3c shows the keyboard in the open position with the musical keyboard 322 extended along the track 320 of the alphanumeric keyboard 318, so that both keyboards are simultaneously accessible. Figure 3d shows a top view of the keyboard with the musical

keyboard 322 slid into the alphanumeric keyboard 318; and, Figure 3e shows the same top view with the musical keyboard 322 extended from the alphanumeric keyboard 318.

With reference to Figures 3f-3g, a second embodiment of a keyboard of the present invention is described. In Figure 3f the keyboard is shown in the closed position with the musical keyboard 322 folded over the alphanumeric keyboard 318 by a hinge or other attachment 324. Figure 3g shows the keyboard in the open position with the musical keyboard 322 attached to alphanumeric keyboard 318 by the hinge in the open position 320, so that, once again, both keyboards are simultaneously accessible. Figure 3d shows a top view of the keyboard with the musical keyboard 322 folded onto the alphanumeric keyboard 318; and, Figure 3e shows the same top view with the musical keyboard 322 folded open from the alphanumeric keyboard 318.

It is hereby noted that in the above descriptions, in which the musical keyboard 318 is the movable component, the order of coupling of the musical keyboard 318 and the alphanumeric keyboard 322 may be switched such that the alphanumeric keyboard 322 is the movable component. For example, with respect to Figures 3b-3e the alphanumeric keyboard 322 may slide into the musical keyboard 318, and with respect to Figures 3f-3i the alphanumeric keyboard 322 may fold onto the musical keyboard 318.

With reference to Figures 3j-3m, a third embodiment of the musical portion of the keyboard assembly of the present invention is described. This configuration, called a 'butterfly', permits a musical keyboard 322 that is wider than the alphanumeric keyboard 318. With reference to Figure 3j the butterfly keyboard is shown in the closed position where the keyboard 322 is segmented into a center portion 328 and two side portions 330, also called wings, that are joined by two hinges 326. Figure 3k shows the butterfly keyboard in the open position with the two wings 330 opened to be level with the center portion 328 to form a single wide keyboard 322. Figure 3l shows a top view of the butterfly keyboard 322 with hinges 326 in the closed position and the wings 330 folded onto the alphanumeric keyboard 318; and, Figure 3e shows the same top view with the butterfly keyboard 322 folded open from the center portion of the keyboard 318.

With reference to Figure 3n, the music display system 102 is described mounted by a joint, adapter, or threaded screw 334 on top of a music stand or lectern 332. In one embodiment of the present invention the joint 334 enables the music display system 102 to tilt and swivel so that a comfortable viewing angle may be produced.

With reference to Figure 4, a flow diagram describing the general operation of the system is presented. In step 402 the conductor selects a composition, or alternately creates a new composition. The composition will include one or more score parts, each score part corresponding to a musician and associated musician station in the orchestra. The conductor associates or registers the part with the corresponding musician or musician station in step 404. Alternatively, the musicians preregister their identity and/or instrument and station ID, which data is sent to and stored in the conductor's station for use and access by the conductor in selecting musicians stations to receive changes, e.g., by selecting an option to send changes only to those instruments affected by the changes. The system then can store the association so that the conductor is not required to reenter the association information. The conductor then selects a part, step 406, that corresponds to an individual musician or a group of musicians, in order to view, modify or transmit that score part. Once the score part is selected, the conductor can process the part using editing marks that are recognized by the handwriting system, step 408. The conductor then chooses whether to convert the handwritten changes to digital music format, step 410. If the conductor decides to finalize the handwritten edit changes, the system recognizes and converts the handwritten edit markings into digital music notation in step 412. The conductor then chooses which musician stations will receive the changes, e.g., all stations or just stations associated with affected instruments, step 414. The changes are then transmitted to the one or more selected musician stations on the network at step 416. The resulting changes to the musical score can also be saved in step 416.

With reference to Figure 5, a detail view of the editing screen of the conductor system is shown. This screen display shows two pages of a musical score 314, drawn schematically. Below the musical score display 314 are a set of icons or buttons 316 that provide system functionality. In the example, screen six buttons 336-346 are active, although a greater or smaller number may be present and the location of the buttons 316 may vary. The text or symbols on the buttons 316 change when the system is executing different processes or modules. The six buttons in the present view, described from left to right are: a button that transmits the score to all musicians 336; a button that sends the score to a selected group of musicians 338, a button that sends the score to an individual musician 340. The next button 342, when selected, converts handwritten score changes into a digital music notation

format. The next button 344 displays the previous score page, and the last button 346 displays the next score page.

With respect to Figs. 6a-6c, an example of a simple music edit is described. Figure 6a shows the abstracted score 314 on the display 312 of the present invention with a music note 350 displayed. In Figure 6b, a handwritten music annotation 352, in this case an annotation to delete note 350 of the score 314 on the display 312, is shown. In Figure 6c, the handwritten annotation 352 has been converted to digital music notation and note 350 is deleted from the score 314 on the display 312.

With respect to Figs 7a-7b, an example of adding a musical note is shown. In Figure 7a, a hand drawn whole note 360 is drawn by the conductor on the score 314 on the display 312. In Figure 7b, the whole note 350 is shown on the score 314 of the display 312 after it has been converted into a digital musical notation format.

While the invention has been described and illustrated in connection with preferred embodiments, many variations and modifications as will be evident to those skilled in this art may be made without departing from the spirit and scope of the invention, and the invention is thus not to be limited to the precise details of methodology or construction set forth above as such variations and modification are intended to be included within the scope of the invention.

WHAT IS CLAIMED IS:

1. In a network of computerized devices each containing programming for displaying music on a display device, the computerized devices being used by each of a plurality of players in an orchestra under direction of a conductor, a method for facilitating leading of the orchestra, the method comprising:

registering an identity of an instrument in use by each player and the corresponding computerized device being used by the player;

receiving at a computerized device in use by the conductor a change to a musical arrangement represented in a handwritten format, the conductor's computerized device comprising means for converting changes from handwritten format to electronic music type format;

allowing the conductor to select whether the change is to be sent to all players in the orchestra or only to one or more players using an instrument impacted by the change;

if the conductor selects to send the change only to the player or players using an instrument impacted by the change, determining which instrument or instruments are impacted by the change and identifying the corresponding computerized device or devices registered for that instrument;

allowing the conductor to select whether the change should be converted to electronic music type format before transmission to the one or more players; and

transmitting the change to one or more players in accordance with the conductor's selections.

2. The method of claim 1, wherein the step of receiving the conductor's change comprises receiving the change through a touch screen display device.

3. The method of claim 1, wherein the step of receiving the conductor's changes comprises receiving the changes through a digitizer and electronic stylus.

4. The method of claim 1, comprising displaying the changes in the received handwritten format on the conductor's computerized device.

5. The method of claim 4, comprising displaying the changes in the received handwritten format on the player's computerized devices to which the changes are transmitted.

6. The method of claim 5, comprising converting the changes from the received handwritten format to an electronic format for display on each player's computerized devices.

7. A graphical user interface system for a musical composition and orchestration system, the method comprising:

means for allowing a conductor to electronically input a change to a musical score displayed on a display device in a handwritten format;

means for allowing the conductor to select whether an input change is to be transmitted to all of a plurality of players in an orchestra or only to those one or more players playing an instrument affected by the change;

means for determining which one or more players are affected by the input change;

means for allowing the conductor to select whether to convert the handwritten change to a music type format prior to transmission of the change to the player or players; and

means for transmitting the change to the player or players in accordance with the conductor's selections.

8. The system of claim 7, comprising a musical keyboard operatively coupled to a computer keyboard.

9. An apparatus comprising:

a computer input keyboard;

a musical keyboard movably coupled to the computer input keyboard; and

means for connecting the computer input keyboard and musical keyboard to a computerized device.

10. The apparatus of claim 9, wherein the computer input keyboard comprises two parallel tracks each extending along one side of the input keyboard and wherein the parallel tracks comprises means for sliding within the tracks between a first, fully extended position exposing the musical keyboard and a second, retracted position within the computer input keyboard.

11. The apparatus of claim 9, wherein the computer input keyboard comprises one or more hinges attached to the keyboard wherein the hinges comprise means for folding

the musical keyboard and the computer keyboard between a first, folded open position for the musical keyboard and a second, position folded on top of the computer input keyboard.

12. The apparatus of claim 9, wherein the musical keyboard comprises

a central keyboard segment;

two side keyboard segments;

the two side keyboard segments attached to the central keyboard segment with two hinges, which run parallel with the keys of the musical keyboards, and which comprise means for folding the keyboard two side segments on top of the central keyboard segment;

whereby the keyboard in the folded position is more narrow than when open.

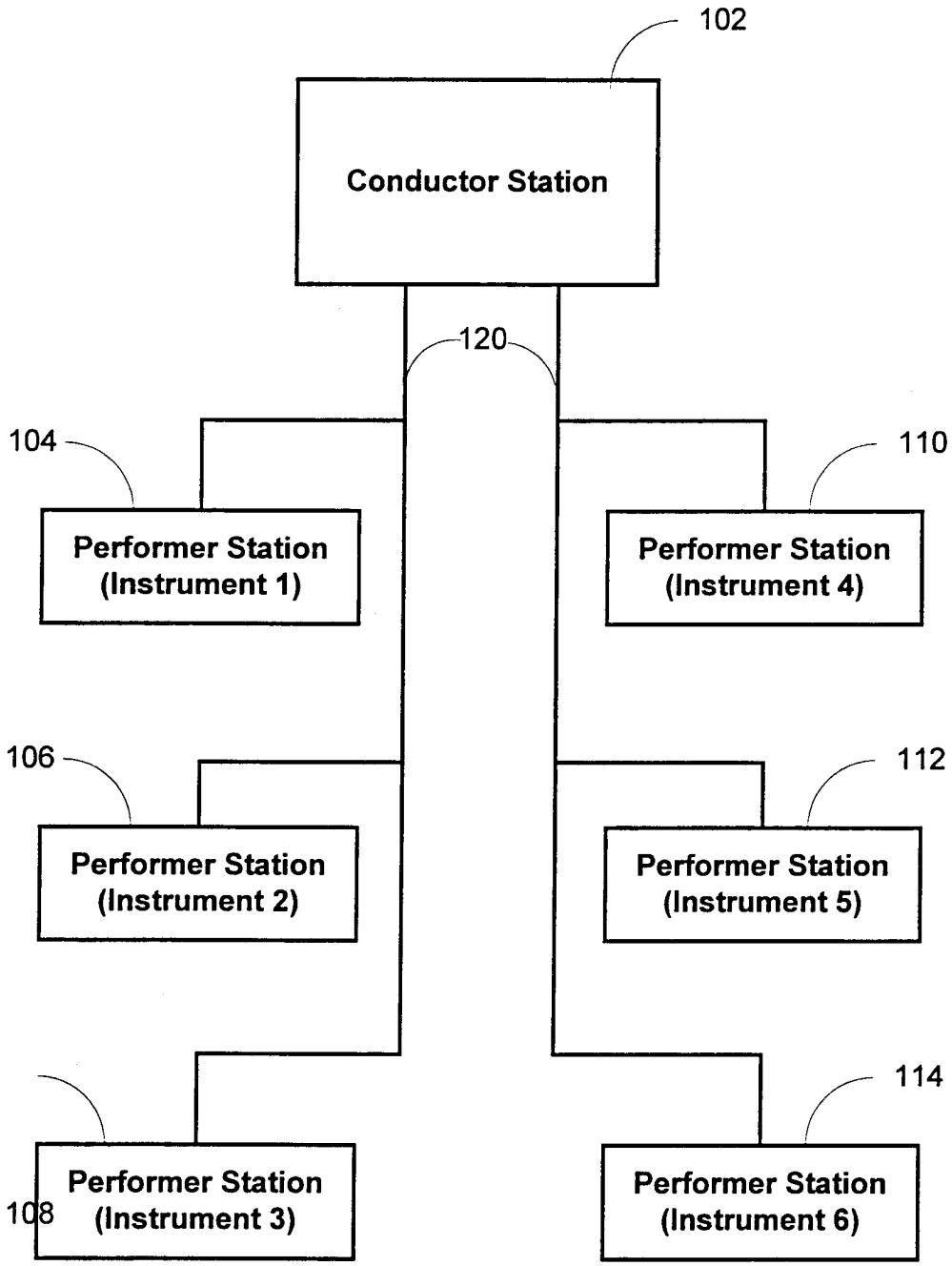

102
Conductor Station
120
104
Performer Station (Instrument 1)
110
Performer Station (Instrument 4)
106
Performer Station (Instrument 2)
112
Performer Station (Instrument 5)
108
Performer Station (Instrument 3)
114
Performer Station (Instrument 6)

Fig. 1

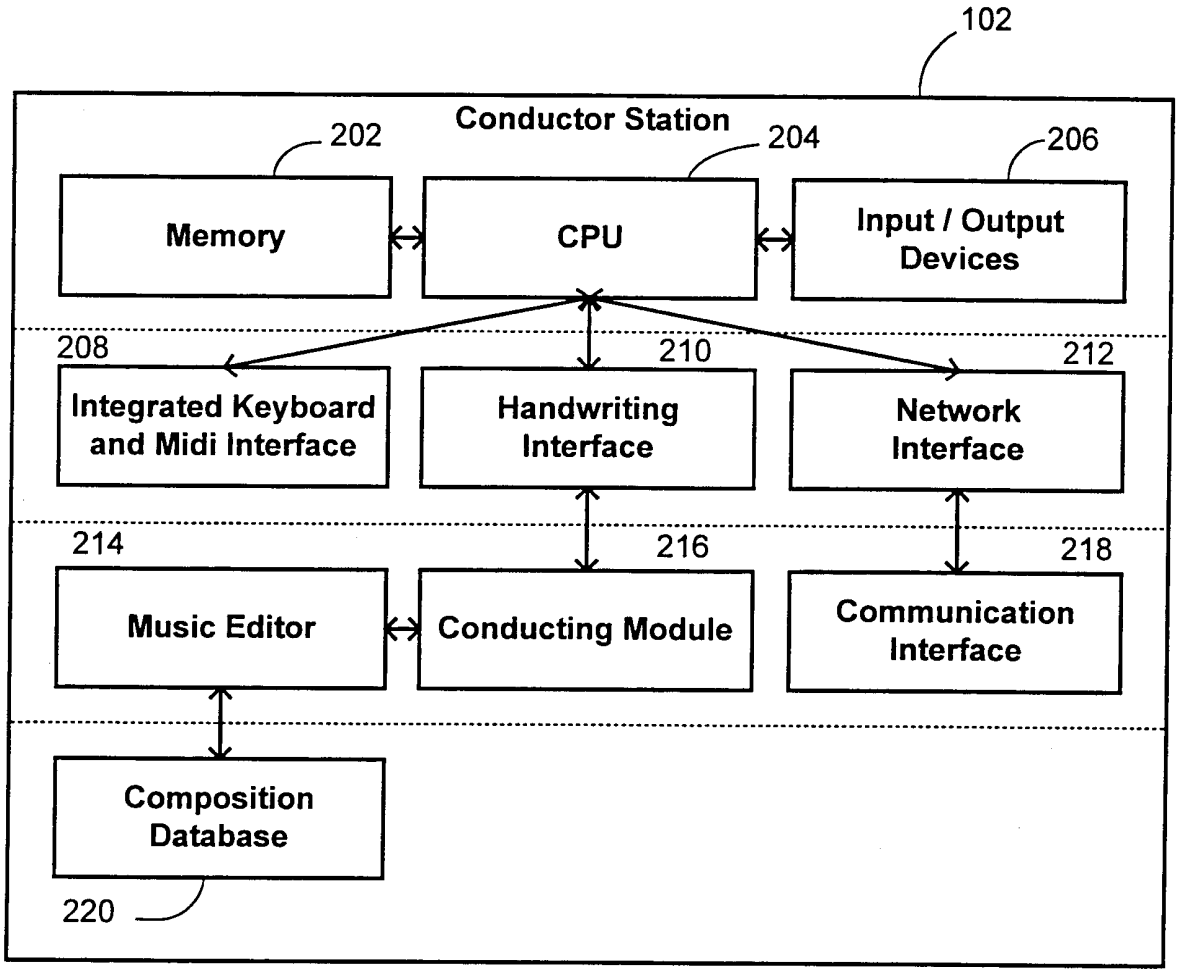

102
Conductor Station
202
204
206
Memory
CPU
Input / Output Devices
208
210
212
Integrated Keyboard and Midi Interface
Handwriting Interface
Network Interface
214
216
218
Music Editor
Conducting Module
Communication Interface
Composition Database
220

Fig. 2

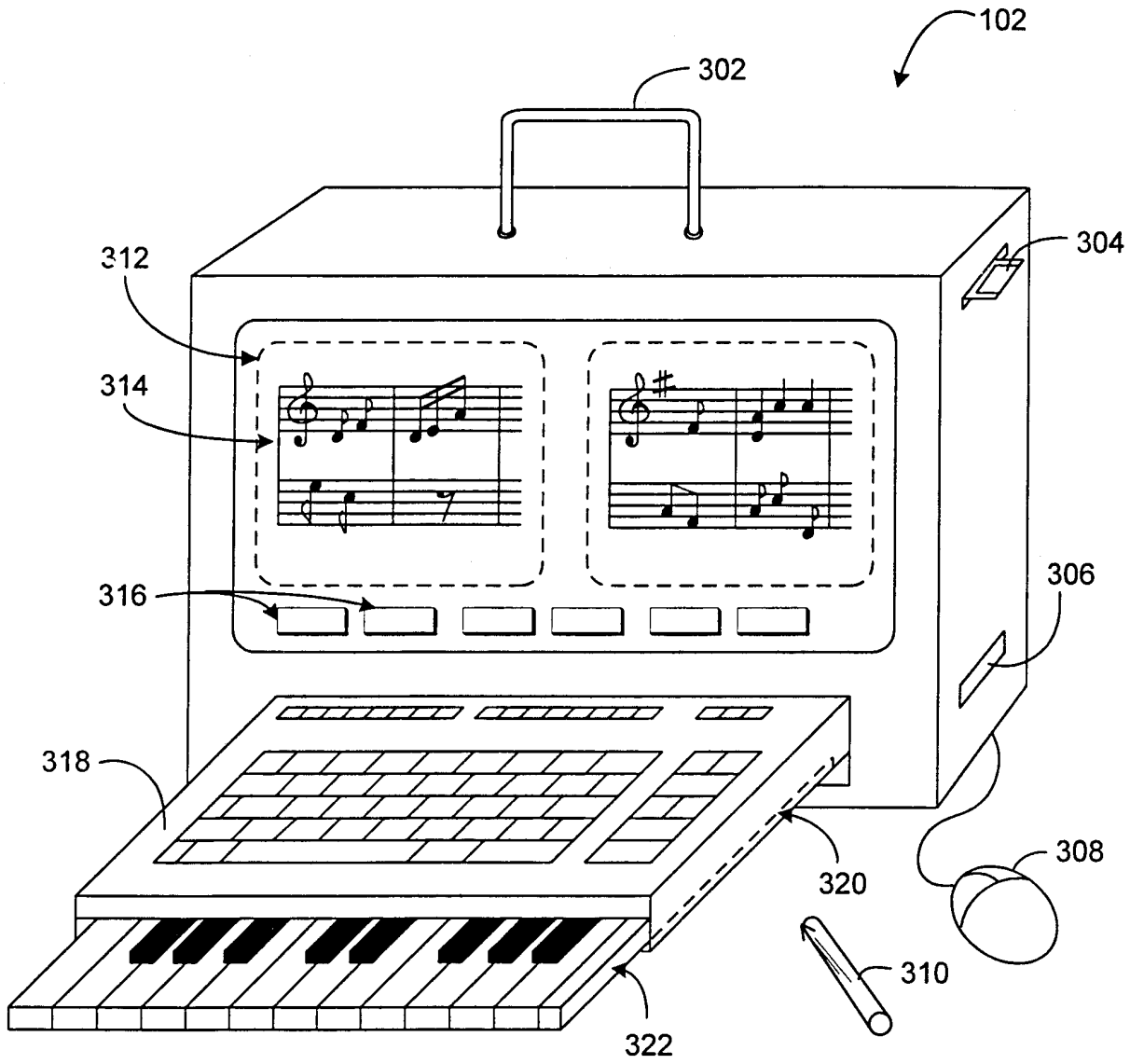


Fig. 3a

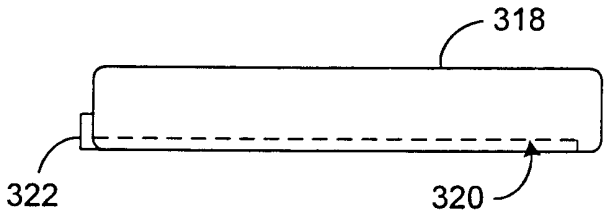


Fig. 3b

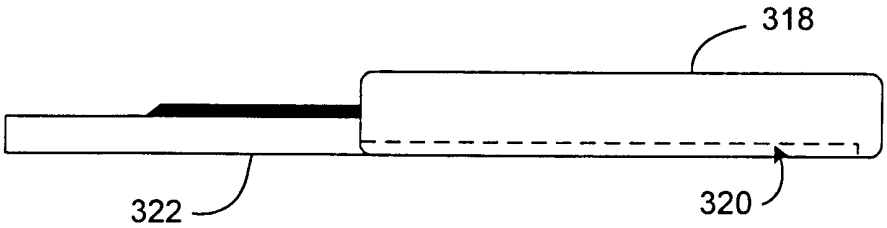


Fig. 3c

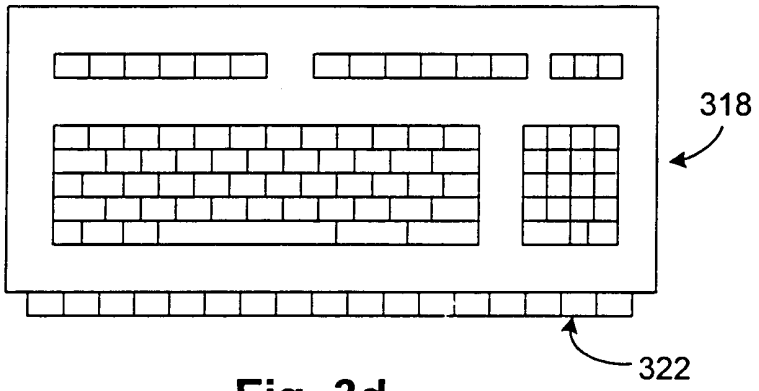


Fig. 3d

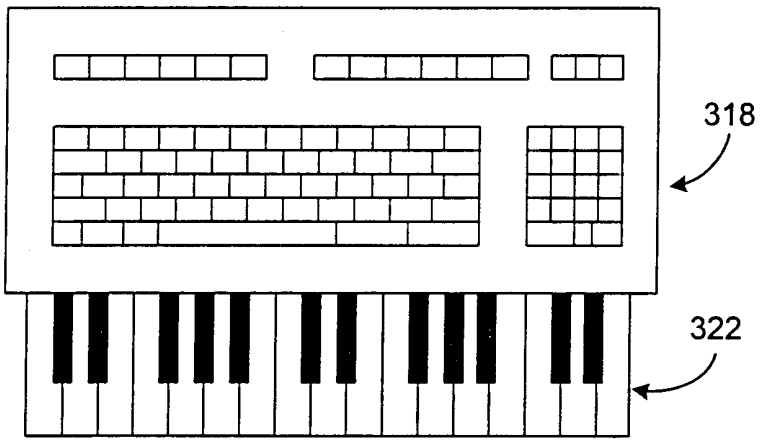


Fig. 3e

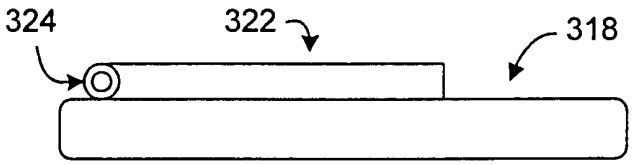


Fig. 3f

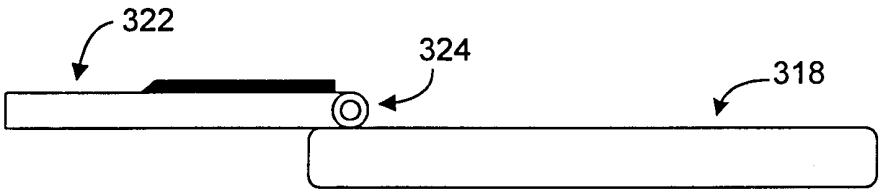


Fig. 3g

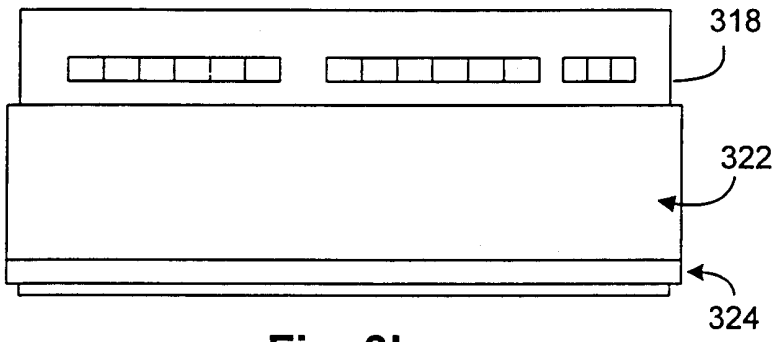


Fig. 3h

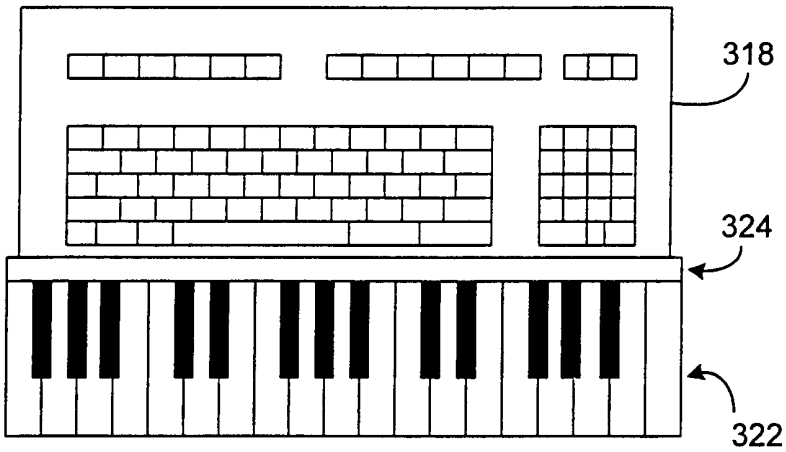


Fig. 3i

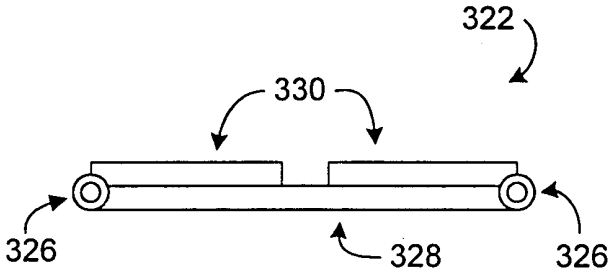


Fig. 3j

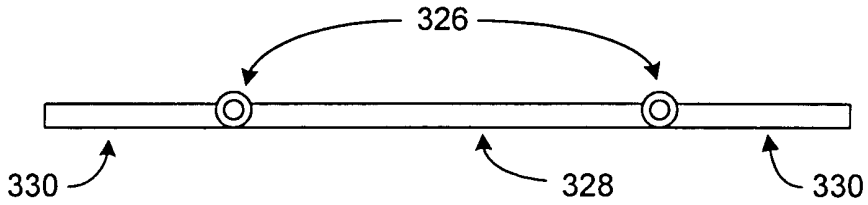


Fig. 3k

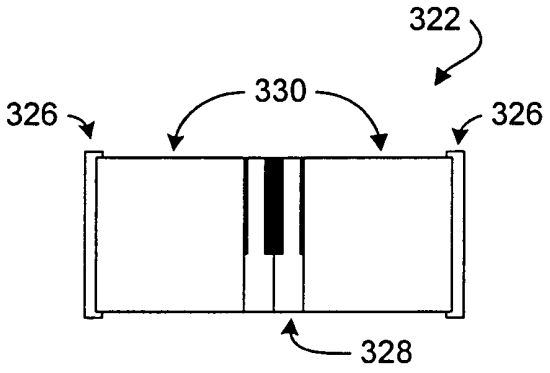


Fig. 3l

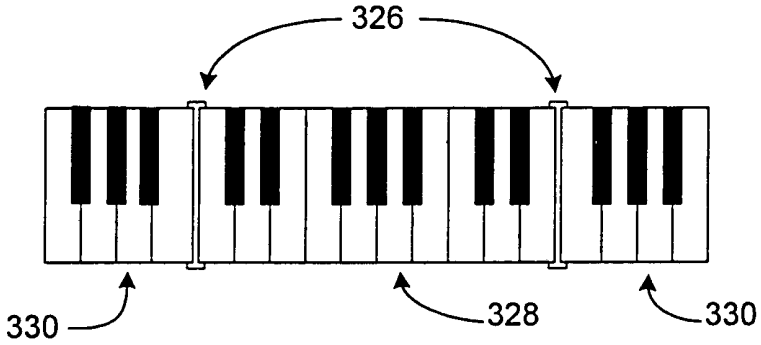


Fig. 3m

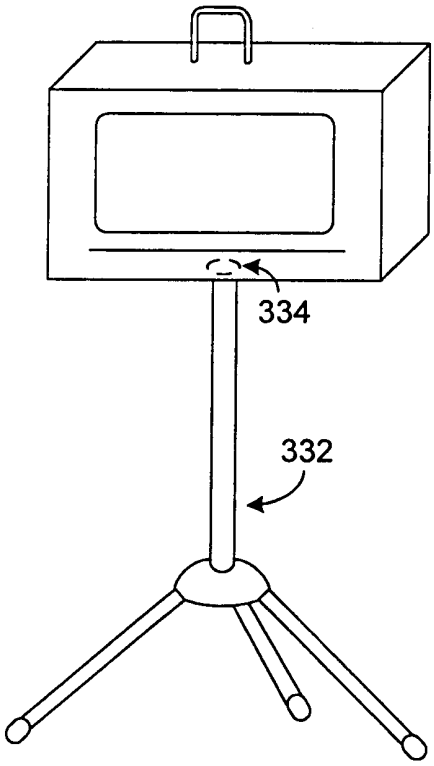


Fig. 3n

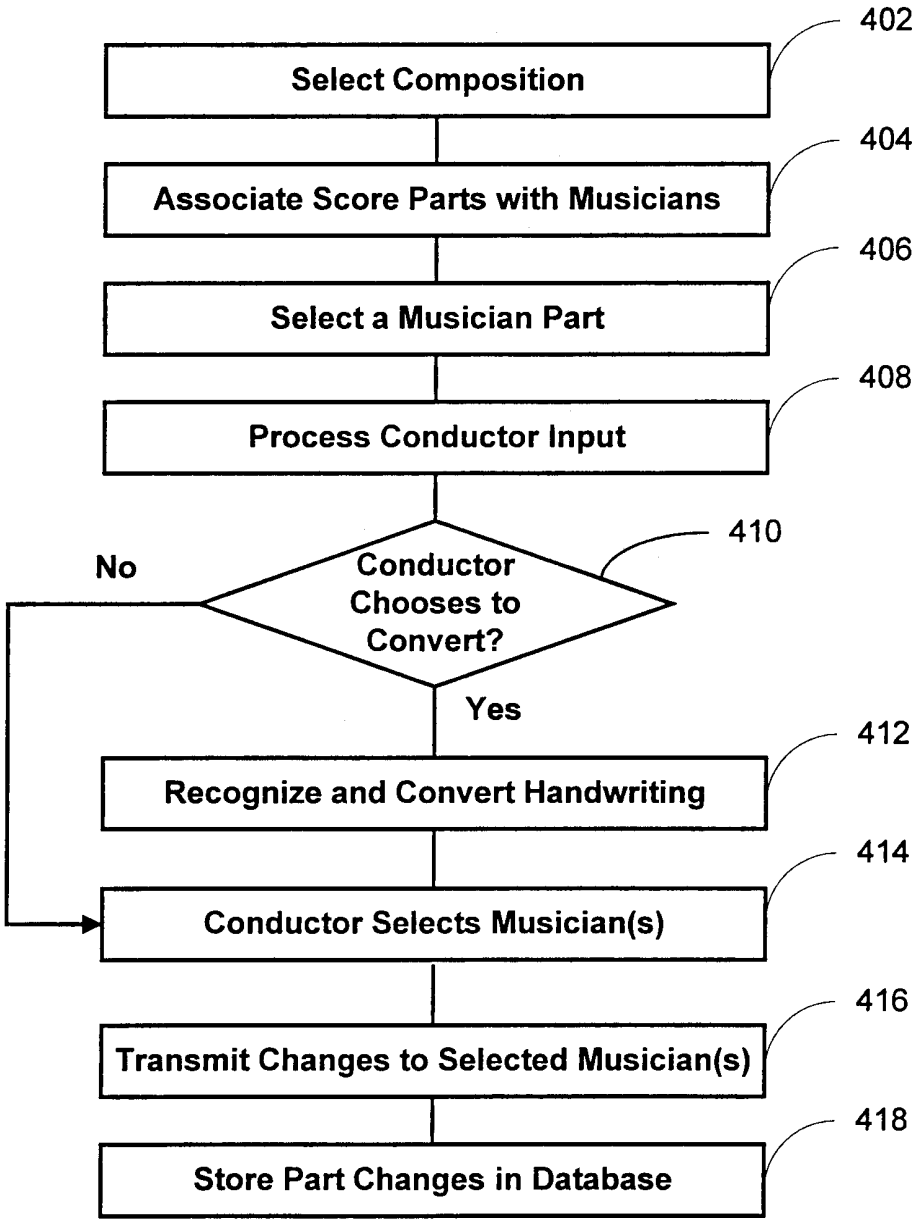

402
Select Composition
404
Associate Score Parts with Musicians
406
Select a Musician Part
408
Process Conductor Input
410
Conductor Chooses to Convert?
No
Yes
412
Recognize and Convert Handwriting
414
Conductor Selects Musician(s)
416
Transmit Changes to Selected Musician(s)
418
Store Part Changes in Database

Fig. 4

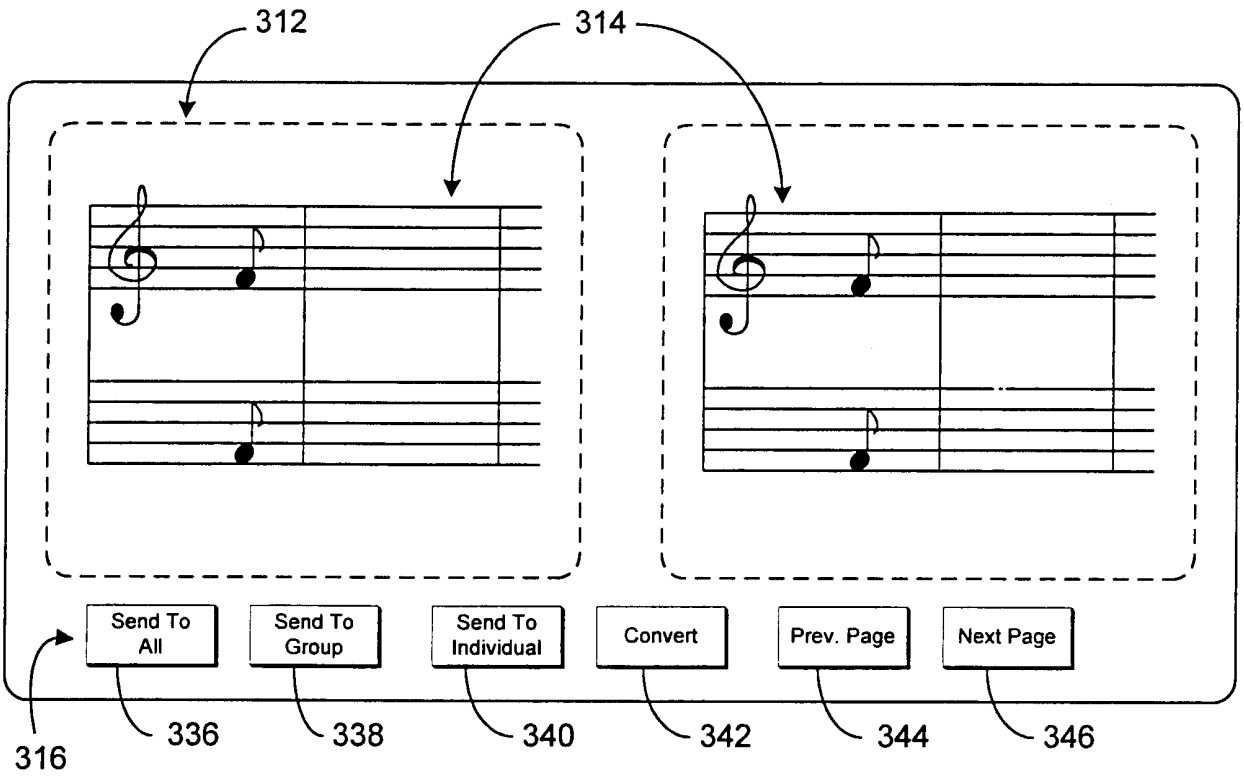

312
314
Send To All
Send To Group
Send To Individual
Convert
Prev. Page
Next Page
316
336
338
340
342
344
346

Fig. 5

Fig. 6a

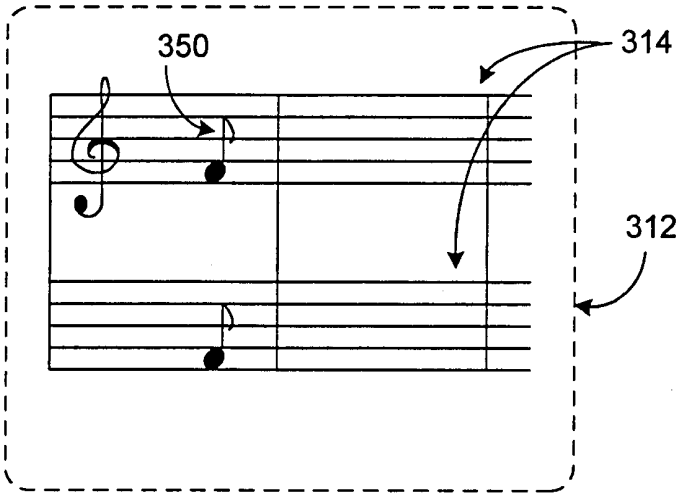


Fig. 6b

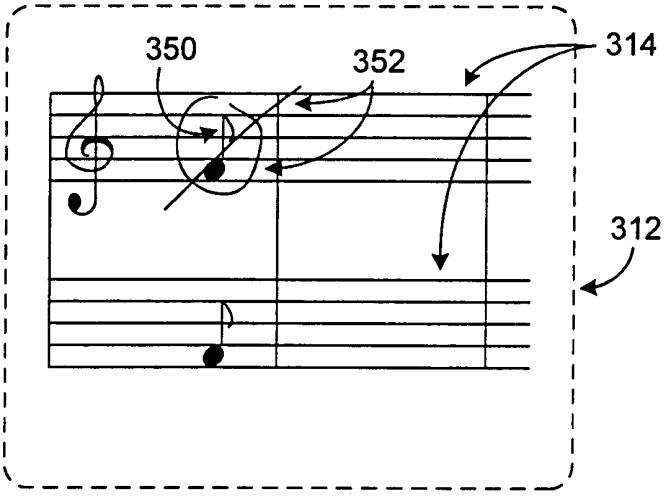


Fig. 6c

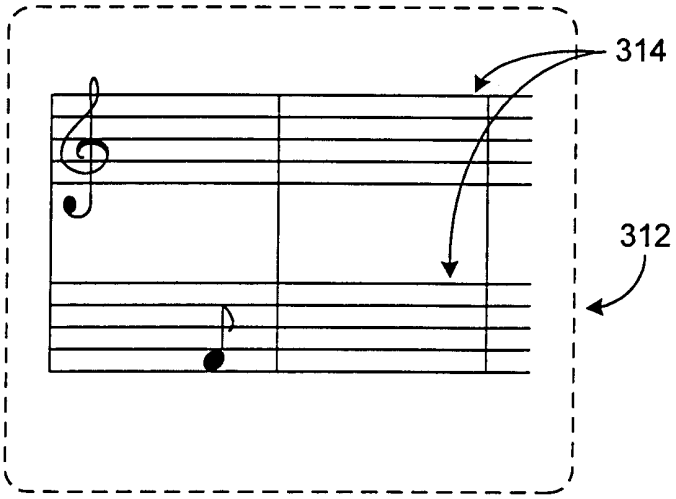


Fig. 7a

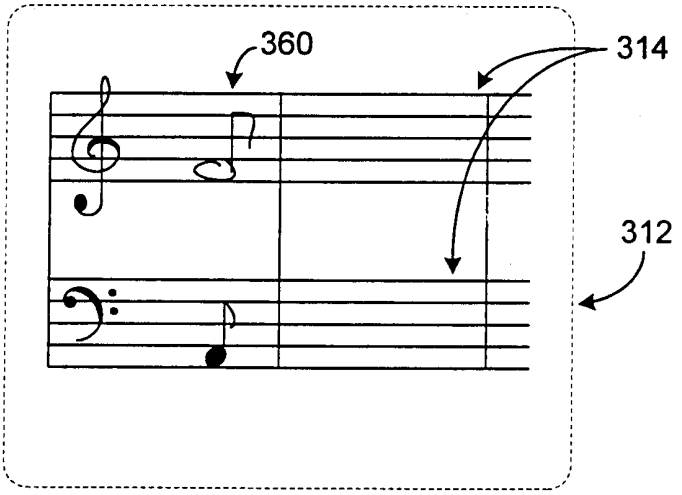
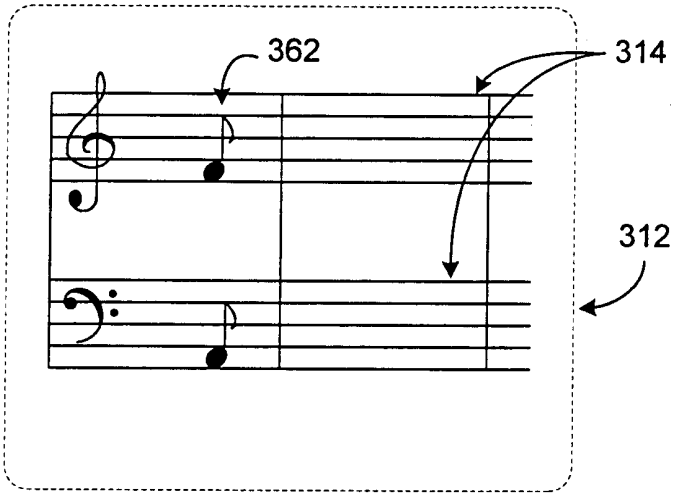


Fig. 7b



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/32055

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G09B 15/00, 15/02
US CL :84/477R, 483.1, 483.2, 600, 609, 610
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 84/477R, 478, 483.1, 483.2, 600-602, 609-610, 615, 634, 645, 649-650, 653, 666

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

USPTO APS EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,728,960 A (SITRICK) 17 March 1998 (17.03.1998), col. 5, lines 15-37; col. 6, lines 42-47; col. 11, lines 19-42; and col. 13, lines 14-28.	1-8
Y	US 5,665,927 A (TAKI et al) 09 September 1997 (09.09.1997), fig. 2, 6A-6C.	1-8
Y	US 5,146,833 A (LUI) 15 September 1992 (15.09.1992), fig. 3.	1-8
X	US 5,507,215 A (LIN) 16 April 1996 (16.04.1996), figs. 1, 2, 5, 7.	9
---		---
Y		10-12
Y	US 4,635,519 A (SAKURAI) 13 January 1987 (13.01.1987), figs. 1 and 10.	10, 12

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 07 MARCH 2001	Date of mailing of the international search report APR 05 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer MARLON FLETCHER Telephone No. (703) 308-0848

Form PCT/ISA/210 (second sheet) (July 1998)★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/32055

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,463,925 A (GALOCY) 07 November 1995 (07.11.1995), figs. 1-6.	10-12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/32055

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/32055

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING
This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claims 1-8, drawn to a network of display devices.
Group II, claims 9-12, drawn to an input apparatus for keyboards.

The inventions listed as Groups I and II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I relates to a single invention directed to controlling and viewing musical compositions amongst plural display devices. Group II is separate and distinct from Group I, wherein Group II is drawn to a device for connecting a musical keyboard and a computer keyboard.