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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
01 November 2018 (01.11.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/200446 A1

(51) International Patent Classification:
H01R 13/639 (2006.01) *H01R 13/434* (2006.01)

(21) International Application Number:
PCT/US2018/029035

(22) International Filing Date:
24 April 2018 (24.04.2018)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
15/499,463 27 April 2017 (27.04.2017) US

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(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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA,

(54) Title: ELECTRICAL CENTER MOUNTING-BRACKET

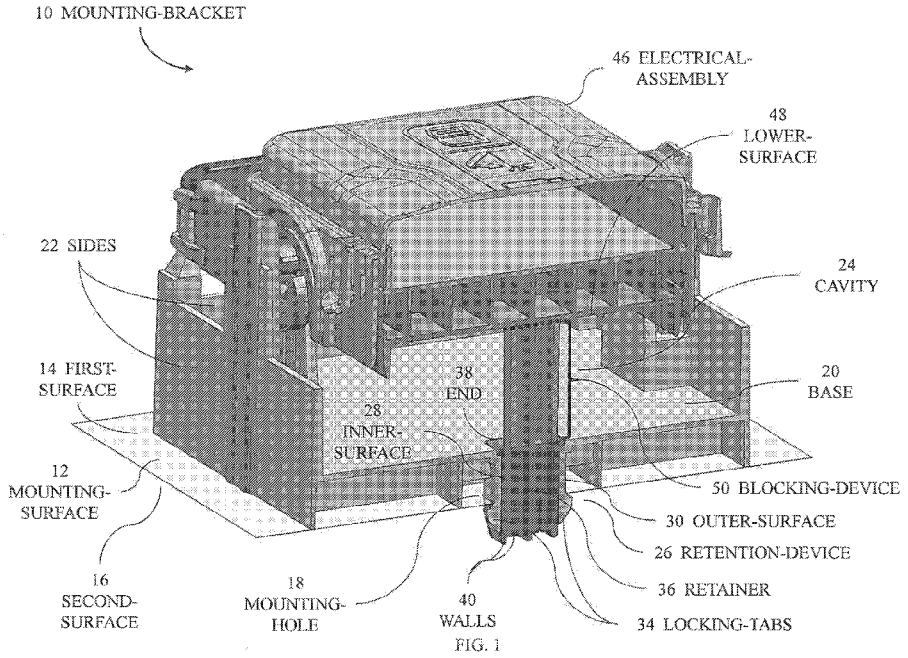


FIG. 1

(57) Abstract: A mounting -bracket (10) configured to attach to a mounting- surface (12) includes a base (20) and sides (22), a retainer (36), an electrical-assembly (46), and a blocking- device (50). The mounting-surface (12) defines a mounting-hole (18). The base (20) and sides (22) define a cavity (24). The base (20) includes a retention-device (26) that extends through the mounting-hole (18). The retention-device (26) has an inner-surface (28) and an outer-surface (30). The inner-surface (28) defines an aperture (32) and the outer-surface (30) includes locking-tabs (34). The retainer (36) is received within the aperture (32) of the retention-device (26). The retainer (36) has an end (38) and walls (40) generally perpendicular to the end (38). The walls (40) are in direct contact with the inner-surface (28) and prevent an inward-flexure (42) of the locking-tabs (34). The electrical-assembly (46) has a lower-surface (48) that is received within the cavity (24). The blocking-device (50) is in direct contact with the lower-surface (48) of the electrical-

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SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

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

assembly (46) and the end (38) of the retainer (36), thereby preventing a removal of the retainer (36) from the aperture (32) when the electrical-assembly (46) is received within the cavity (24).

ELECTRICAL CENTER MOUNTING-BRACKET

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit under Article 8 of the Patent Cooperation Treaty of U.S. Provisional Patent Application No. 15/499,463 filed on April 27, 2017, the entire disclosure of which is hereby incorporated by reference.

TECHNICAL FIELD OF INVENTION

[0002] This disclosure generally relates to a mounting-bracket, and more particularly relates to a mounting-bracket used to mount a bussed electrical center on a vehicle.

BACKGROUND OF INVENTION

[0003] It is known to mount bussed electrical centers to a vehicle mounting point for durability against shock and vibration. Typical mounting systems require a mounting-bracket to be fastened to the vehicle using metallic clips and/or nuts and bolts that add additional components, cost, and/or additional processes steps to the perform the mounting operation.

SUMMARY OF THE INVENTION

[0004] In accordance with one embodiment, a mounting-bracket configured to attach to a mounting-surface is provided. The mounting-surface has a first-surface and a second-surface opposite the first-surface. The mounting-surface defines a mounting-hole that connects the first-surface to the second-surface. The mounting-bracket includes a

base and sides, a retainer, an electrical-assembly, and a blocking-device. The base and sides define a cavity. The base includes a retention-device that extends through the mounting-hole beyond the second-surface. The retention-device has an inner-surface and an outer-surface. The inner-surface defines an aperture. The outer-surface includes locking-tabs that are in direct contact with the second-surface. The retainer is received within the aperture of the retention-device. The retainer has an end and walls generally perpendicular to the end. The walls are in direct contact with the inner-surface and prevent an inward-flexure of the locking-tabs. The electrical-assembly has a lower-surface that is received within the cavity. The blocking-device is in direct contact with the lower-surface of the electrical-assembly and the end of the retainer, thereby preventing a removal of the retainer from the aperture when the electrical-assembly is received within the cavity.

[0005] In another embodiment, a mounting-bracket configured to attach to a mounting-surface is provided. The mounting-surface has a first-surface and a second-surface opposite the first-surface. The mounting-surface defines a mounting-hole that connects the first-surface to the second-surface. The mounting-bracket includes a base and sides, a retainer, an electrical-assembly, and a blocking-device. The base and sides define a cavity. The sides include mounting-lugs. The base includes a retention-device that extends through the mounting-hole beyond the second-surface. The retention-device has an inner-surface and an outer-surface. The inner-surface defines an aperture. The outer-surface includes locking-tabs that are in direct contact with the second-surface. The retainer is received within the aperture of the retention-device. The retainer has an end and walls generally perpendicular to the end. When the retainer is in a seated-

position the walls are in direct contact with the inner-surface and prevent an inward-flexure of the locking-tabs. The electrical-assembly has a lower-surface that is received within the cavity. The electrical-assembly includes a mate-assist-device movable from an unmated-position to a mated-position. The mate-assist-device is configured to engage and rotate on the mounting-lugs. The lower-surface includes a blocking-device extending below the lower-surface. The retainer is moved to the seated-position by the blocking-device and the blocking-device is in direct contact with the end of the retainer when the mate-assist-device is moved from the unmated-position to the mated-position, thereby preventing a removal of the retainer from the aperture.

[0006] In yet another embodiment, a mounting-bracket configured to attach to a mounting-surface is provided. The mounting-surface has a first-surface and a second-surface opposite the first-surface. The mounting-surface defines a mounting-hole that connects the first-surface to the second-surface. The mounting-bracket includes a base and sides and an electrical-assembly. The base and sides define a cavity. The sides include mounting-lugs. The base includes a retention-device that extends through the mounting-hole beyond the second-surface. The retention-device has an inner-surface and an outer-surface. The inner-surface defines an aperture. The outer-surface includes locking-tabs that are in direct contact with the second-surface. The electrical-assembly has a lower-surface that is received within the cavity. The electrical-assembly includes a mate-assist-device movable from an unmated-position to a mated-position. The mate-assist-device is configured to engage and rotate on the mounting-lugs. The lower-surface includes a blocking-device having side-walls generally perpendicular to the lower-surface extending below the lower-surface. The blocking-device is received within the aperture

of the retention-device such that the side-walls are in direct contact with the inner-surface. The side-walls prevent an inward-flexure of the locking-tabs when the mate-assist-device is moved from the unmated-position to the mated-position, thereby preventing a removal of the mounting-bracket from the mounting-hole.

[0007] Further features and advantages will appear more clearly on a reading of the following detailed description of the preferred embodiment, which is given by way of non-limiting example only and with reference to the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0008] The present invention will now be described, by way of example with reference to the accompanying drawings, in which:

[0009] Fig. 1 is a cross-section view of a mounting-bracket in accordance with a first embodiment;

[0010] Fig. 2 is an end-view of a retention-device of the mounting-bracket of Fig. 1 in accordance with the first embodiment;

[0011] Fig. 3 is a cross-section view of a retainer in accordance with the first embodiment;

[0012] Fig. 4 is a cross-section view of the retainer of Fig. 3 in an unseated-position in accordance with the first embodiment;

[0013] Fig. 5 is a cross-section view of the retainer of Fig 3 with a locking-feature in accordance with the first embodiment;

[0014] Fig. 6 is a cross-section view of a mounting-bracket in accordance with a second embodiment;

[0015] Fig. 7 is a cross-section exploded view of the mounting-bracket of Fig. 6 in accordance with the second embodiment;

[0016] Fig. 8 is an end-view of a retention-device of the mounting-bracket of Fig. 7 in accordance with the second embodiment;

[0017] Fig. 9 is a cross-section view of the retainer of Fig. 6 in an unseated-position in accordance with the second embodiment;

[0018] Fig. 10 is a cross-section view of the retainer of Fig. 6 in a seated-position in accordance with the second embodiment;

[0019] Fig. 11 is a cross-section view of the retainer of Fig 6 with a locking-feature in accordance with one second embodiment;

[0020] Fig. 12 is a cross-section view of a mounting-bracket in accordance with a third embodiment; and

[0021] Fig. 13 is a base of a mounting-bracket in accordance with any of the embodiments.

[0022] The reference numbers of similar elements in the embodiments shown in the various figures share the last two digits.

DETAILED DESCRIPTION

[0023] Fig. 1 illustrates a non-limiting example of a mounting-bracket 10 for a bussed electrical center, configured to attach to a mounting-surface 12. The bussed electrical center may be used for automotive applications where environmental factors, such as vibration and temperature variations, require a robust connection to a vehicle. The mounting-surface 12 may be fabricated from a sheet-metal component that is affixed the

vehicle, or may be a part of a vehicle frame or body. The mounting-surface 12 has a first-surface 14 and a second-surface 16 opposite the first-surface 14. The mounting-surface 12 defines a mounting-hole 18 that connects the first-surface 14 to the second-surface 16.

[0024] The mounting-bracket 10 includes a base 20 and sides 22 that are formed to define a cavity 24. The base 20 and sides 22 may be fabricated from any material suitable for use in automotive applications, and is preferably made from a non-electrically conductive polymeric material capable of being injection-molded, such as a polyamide (nylon) or a polypropylene material. The cavity 24 may hold electrical-components (not shown) that may include, but are not limited to, connectors, wires, printed-circuit-boards, etc., that may be connected to other electrical-systems (not shown) on the vehicle. The base 20 includes a retention-device 26 that extends through the mounting-hole 18 and beyond the second-surface 16 of the mounting-surface 12. The retention-device 26 has an inner-surface 28 and an outer-surface 30, where the inner-surface 28 defines an aperture 32 (see Fig. 2). The outer-surface 30 includes locking-tabs 34 that may be in direct contact with the second-surface 16 and act to securely hold the mounting-bracket 10 to the mounting-surface 12.

[0025] The mounting-bracket 10 also includes a retainer 36 (see Fig. 1) that is received within the aperture 32 of the retention-device 26. The retainer 36 is preferably made from a non-electrically conductive polymeric material capable of being injection-molded, such as a nylon or a polypropylene material. The retainer 36 has an end 38 and walls 40 generally perpendicular to the end 38, wherein the walls 40 are in direct contact with the inner-surface 28 and prevent an inward-flexure 42 (see Fig. 2) of the locking-tabs 34.

The retainer 36 as illustrated in Fig. 1 and Fig. 3 is shown in a seated-position 44 where the end 38 is flush with the base 20 of the mounting-bracket 10. The end 38 may form a T-shape that is perpendicular to the walls 40 and may rest on a shoulder (not specifically shown) that is recessed into the base 20. The recess may also include a chamfer (not shown) configured to receive a tool (e.g. a flat-blade screw driver) to assist in a removal of the retainer 36 for the purposes of disassembly or service operations. Other configurations are contemplated, but not shown, such as the end 38 resting directly on the base 20 in relief (i.e. not flush with the base 20).

[0026] The mounting-bracket 10 also includes an electrical-assembly 46, such as a bussed electrical center, (see Fig. 1) having a lower-surface 48 that is received within the cavity 24. The electrical-assembly 46 may hold electrical-components (not shown) that may include, but are not limited to, electrical-connectors, wires, printed-circuit-boards, etc., that may be connected to other electrical-systems on the vehicle. The electrical-connectors held in the electrical-assembly 46 may mate with the electrical-connectors held in the cavity 24 of the mounting-bracket 10, and may require a significant mating-force depending on the number and types of mating-connectors. The electrical-assembly 46 may also be removably locked to the sides 22 when received within the cavity 24.

[0027] The mounting-bracket 10 also includes a blocking-device 50 (see Fig. 1) in direct contact with the lower-surface 48 of the electrical-assembly 46 and the end 38 of the retainer 36, thereby preventing a removal of the retainer 36 from the aperture 32 when the electrical-assembly 46 is received within the cavity 24. The blocking-device 50 may be a separate component that is placed within the cavity 24 prior to the electrical-assembly 46 being received within the cavity 24. The blocking-device 50 is preferably

made from a non-electrically conductive polymeric material capable of being injection-molded, such as a nylon or a polypropylene material. The blocking-device 50 may be designed to have sufficient rigidity to assist in the seating of the retainer 36 without causing a deflection of the blocking-device 50.

[0028] The blocking-device 50 may also be integrated into the lower-surface 48 of the electrical-assembly 46 such that the blocking-device 50 extends below the lower-surface 48 and is in direct contact with the end 38 of the retainer 36, thereby preventing the removal of the retainer 36 from the aperture 32 when the electrical-assembly 46 is received within the cavity 24.

[0029] The retention-device 26 may include a ramp 52 (see Fig. 2) located on the inner-surface 28. The ramp 52 defines a rise 54 and a run 56, wherein the rise 54 is located opposite a tip 58 of the locking-tabs 34, and the run 56 extends along a portion of the inner-surface 28 opposite the locking-tabs 34 to a point above the first-surface 14 of the mounting-hole 18 (see Fig. 4). The ramp 52 prevents an insertion of the retainer 36 and maintains the retainer 36 in an unseated-position 60 until a force 62 (see Fig. 3) is applied to seat the retainer 36. It will be recognized by those skilled in the art that the retention-device 26 may be inserted in the mounting-hole 18 with minimal effort from an assembler while the retainer 36 is in the unseated-position 60. The force 62 required to seat the retainer 36 is preferably sufficiently large to prevent movement of the retention-device 26 within the mounting-hole 18 when subjected to a vibration-profile (not shown) representative of the vehicle application in the field. Those skilled in the art will recognize that the rise 54, a dimension of the mounting-hole 18, the material properties of the retention-device 26, and the mass of the mounting-bracket 10 will dictate the required

force 62 to prevent movement. The required force 62 may be determined using known engineering calculations.

[0030] The retainer 36 may also include a locking-feature 64 (see Fig. 5) that prevents the retainer 36 from being removed from the aperture 32 when the retainer 36 is in the unseated-position 60. The locking-feature 64 is beneficial during handling of the mounting-bracket 10, such as when being installed by the assembler and may prevent a loss of the retainer 36.

[0031] A non-limiting example of a second embodiment is illustrated in Fig. 6 in which a mounting-bracket 110 includes sides 122 that include mounting-lugs 166 (see Fig. 7) and an electrical-assembly 146 that includes a mate-assist-device 168 movable from an unmated-position 170 to a mated-position 172. The mate-assist-device 168 is configured to engage and rotate on the mounting-lugs 166. A lower-surface 148 of the electrical-assembly 146 includes a blocking-device 150 extending below the lower-surface 148, wherein a retainer 136 is moved to a seated-position 144 by the blocking-device 150 and the blocking-device 150 is in direct contact with an end 138 of the retainer 136 when the mate-assist-device 168 is moved from the unmated-position 170 to the mated-position 172, thereby preventing a removal of the retainer 136 from an aperture 132.

[0032] The mounting-bracket 110 may also include a retention-device 126 that may include a ramp 152 (see Fig. 8) located on an inner-surface 128. The ramp 152 defines a rise 154 and a run 156, wherein the rise 154 is located opposite a tip 158 of a locking-tab 134, and the run 156 extends along a portion of the inner-surface 128 opposite the locking-tabs 134 to a point above a first-surface 114 of a mounting-hole 118 (see Fig. 9).

The ramp 152 prevents an insertion of the retainer 136 and maintains the retainer 136 in an unseated-position 160 until a force 162 (see Fig. 10) is applied to seat the retainer 136. It will be recognized by those skilled in the art that the retention-device 126 may be inserted in the mounting-hole 118 with minimal effort from an assembler while the retainer 136 is in the unseated-position 160. The force 162 required to seat the retainer 136 is preferably sufficiently large to prevent movement of the retention-device 126 within the mounting-hole 118 when subjected to a vibration-profile (not shown) representative of the vehicle application in the field. Those skilled in the art will recognize that the rise 154, a dimension of the mounting-hole 118, the material properties of the retention-device 126, and the mass of the mounting-bracket 110 will dictate the required force 162 to prevent movement which may be determined using known engineering calculations.

[0033] The retainer 136 may also include a locking-feature 164 (see Fig. 11) that prevents the retainer 136 from being removed from the aperture 132 when the retainer 136 is in the unseated-position 160. The locking-feature 164 is beneficial during handling of the mounting-bracket 110, such as when being installed by the assembler and may prevent a loss of the retainer 136.

[0034] A non-limiting example of a third embodiment is illustrated in Fig. 12 in which a mounting-bracket 210 includes an electrical-assembly 246 including a mate-assist-device 268 movable from an unmated-position 270 to a mated-position 272. The mate-assist-device 268 is configured to engage and rotate on mounting-lugs 266. A lower-surface 248 of the electrical-assembly 246 includes a blocking-device 250 having side-walls 274 generally perpendicular to the lower-surface 248 extending below the lower-

surface 248, wherein the blocking-device 250 is received within an aperture 232 of a retention-device 226 such that the side-walls 274 are in direct contact with an inner-surface 228 and prevent an inward-flexure 242 of a locking-tab 234 when the mate-assist-device 268 is moved from the unmated-position 270 to the mated-position 272, thereby preventing a removal of the mounting-bracket 210 from a mounting-hole 18.

[0035] The retention-device 226 may also include a ramp 252 that is located on the inner-surface 228. The ramp 252 defines a rise 254 and a run 256, wherein the rise 254 is located opposite a tip 258 of the locking-tabs 234, and wherein the run 256 extends along a portion of the inner-surface 228 opposite the locking-tab 234 to a point above a first-surface 214 of the mounting-hole 218. The ramp 252 may prevent an insertion of the blocking-device 250 until the mate-assist-device 268 is moved from the unmated-position 270 to the mated-position 272.

[0036] The embodiments described herein are illustrated with a single retention-device 26 for illustration purposes only. Alternative embodiments may be envisioned in which multiple retention-devices 26 (see Fig. 13) are included in the mounting-bracket 10 to satisfy the application requirements.

[0037] Accordingly, a mounting-bracket 10 configured to attach to a mounting-surface 12 is provided. The mounting-bracket 10 solves the problem of added assembly tools, such as pneumatic screw drivers, or additional assembler installation procedures required at a lower cost than the prior art mounting brackets.

[0038] While this invention has been described in terms of the preferred embodiments thereof, it is not intended to be so limited, but rather only to the extent set forth in the claims that follow. Moreover, the use of the terms first, second, etc. does not denote any

order of importance, but rather the terms first, second, etc. are used to distinguish one element from another. Furthermore, the use of the terms a, an, etc. do not denote a limitation of quantity, but rather denote the presence of at least one of the referenced items. Additionally, directional terms such as upper, lower, etc. do not denote any particular orientation, but rather the terms upper, lower, etc. are used to distinguish one element from another and locational establish a relationship between the various elements.

WE CLAIM:

1. A mounting-bracket (10) configured to attach to a mounting-surface (12), said mounting-surface (12) having a first-surface (14) and a second-surface (16) opposite the first-surface (14), said mounting-surface (12) defining a mounting-hole (18) that connects the first-surface (14) to the second-surface (16), comprising:

a base (20) and sides (22) defining a cavity (24), said base (20) including a retention-device (26) that extends through the mounting-hole (18) beyond the second-surface (16), said retention-device (26) having an inner-surface (28) and an outer-surface (30), said inner-surface (28) defining an aperture (32), said outer-surface (30) including locking-tabs (34) that are in direct contact with the second-surface (16);

a retainer (36) received within the aperture (32) of the retention-device (26), said retainer (36) having an end (38) and walls (40) generally perpendicular to the end (38), wherein the walls (40) are in direct contact with the inner-surface (28) and prevent an inward-flexure (42) of the locking-tabs (34);

an electrical-assembly (46) having a lower-surface (48) that is received within the cavity (24); and

a blocking-device (50) in direct contact with the lower-surface (48) of the electrical-assembly (46) and the end (38) of the retainer (36), thereby preventing a removal of the retainer (36) from the aperture (32) when the electrical-assembly (46) is received within the cavity (24).

2. The mounting-bracket (10) in accordance with claim 1, wherein the lower-surface (48) of the electrical-assembly (46) includes the blocking-device (50) extending below the lower-surface (48), wherein the blocking-device (50) is in direct contact with the end (38) of the retainer (36), thereby preventing the removal of the retainer (36) from the aperture (32) when the electrical-assembly (46) is received within the cavity (24).

3. The mounting-bracket (10) in accordance with claim 1 or 2, wherein the electrical-assembly (46) is removably locked to the sides (22) when received within the cavity (24).

4. The mounting-bracket (10) in accordance with any one of the preceding claims, wherein the retention-device (26) includes a ramp (52) located on the inner-surface (28), said ramp (52) defining a rise (54) and a run (56), wherein the rise (54) is located opposite a tip (58) of the locking-tabs (34), and wherein the run (56) extends along a portion of the inner-surface (28) opposite the locking-tabs (34) to a point above the first-surface (14) of the mounting-hole (18), said ramp (52) preventing an insertion of the retainer (36) until a force (62) is applied to seat the retainer (36).

5. The mounting-bracket (10) in accordance with claim 4, wherein the retainer (36) includes a locking-feature (64) that prevents the retainer (36) from being removed from the aperture (32) when the retainer (36) is in an unseated-position (60).

6. A mounting-bracket (110) configured to attach to a mounting-surface (112), said mounting-surface (112) having a first-surface (114) and a second-surface (116) opposite the first-surface (114), said mounting-surface (112) defining a mounting-hole (118) that connects the first-surface (114) to the second-surface (116), comprising:

a base (120) and sides (122) defining a cavity (124), said sides (122) including mounting-lugs (166), said base (120) including a retention-device (126) that extends through the mounting-hole (118) beyond the second-surface (116), said retention-device (126) having an inner-surface (128) and an outer-surface (130), said inner-surface (128) defining an aperture (132), said outer-surface (130) including locking-tabs (134) that are in direct contact with the second-surface (116);

a retainer (136) received within the aperture (132) of the retention-device (126), said retainer (136) having an end (138) and walls (140) generally perpendicular to the end (138), wherein when the retainer (136) is in a seated-position (144) the walls (140) are in direct contact with the inner-surface (128) and prevent an inward-flexure (142) of the locking-tabs (134); and

an electrical-assembly (146) having a lower-surface (148) that is received within the cavity (124), said electrical-assembly (146) including a mate-assist-device (168) movable from an unmated-position (170) to a mated-position (172), said mate-

assist-device (168) configured to engage and rotate on the mounting-lugs (166), said the lower-surface (148) including a blocking-device (150) extending below the lower-surface (148), wherein the retainer (136) is moved to the seated-position (144) by the blocking-device (150) and the blocking-device (150) is in direct contact with the end (138) of the retainer (136) when the mate-assist-device (168) is moved from the unmated-position (170) to the mated-position (172), thereby preventing a removal of the retainer (136) from the aperture (132).

7. The mounting-bracket (110) in accordance with claim 6, wherein the retention-device (126) includes a ramp (152) located on the inner-surface (128), said ramp (152) defining a rise (154) and a run (156), wherein the rise (154) is located opposite a tip (158) of the locking-tabs (134), and wherein the run (156) extends along a portion of the inner-surface (128) opposite the locking-tabs (134) to a point above the first-surface (114) of the mounting-hole (118), said ramp (152) preventing an insertion of the retainer (136) until the mate-assist-device (168) is moved from the unmated-position (170) to the mated-position (172).

8. The mounting-bracket (110) in accordance with claim 7, wherein the retainer (136) includes a locking-feature (164) that prevents the retainer (136) from being removed from the aperture (132) when the retainer (136) is in an unseated-position (160).

9. A mounting-bracket (210) configured to attach to a mounting-surface (212), said mounting-surface (212) having a first-surface (214) and a second-surface (216) opposite the first-surface (214), said mounting-surface (212) defining a mounting-hole (218) that connects the first-surface (214) to the second-surface (216), comprising:

a base (220) and sides (222) defining a cavity (224), said sides (222) including mounting-lugs (266), said base (220) including a retention-device (226) that extends through the mounting-hole (218) beyond the second-surface (216), said retention-device (226) having an inner-surface (228) and an outer-surface (230), said inner-surface (228) defining an aperture (232), said outer-surface (230) including locking-tabs (234) that are in direct contact with the second-surface (216); and

an electrical-assembly (246) having a lower-surface (248) that is received within the cavity (224), said electrical-assembly (246) including a mate-assist-device (268) movable from an unmated-position (270) to a mated-position (272), said mate-assist-device (268) configured to engage and rotate on the mounting-lugs (266), said lower-surface (248) including a blocking-device (250) having side-walls (274) generally perpendicular to the lower-surface (248) extending below the lower-surface (248), wherein the blocking-device (250) is received within the aperture (232) of the retention-device (226) such that the side-walls (274) are in direct contact with the inner-surface (228) and prevent an inward-flexure (242) of the locking-tabs (234) when the mate-assist-device (268) is moved from the unmated-position (270) to the mated-position (272), thereby preventing a removal of the mounting-bracket (210) from the mounting-hole (218).

10. The mounting-bracket (210) in accordance with claim 9, wherein the retention-device (226) includes a ramp (252) located on the inner-surface (228), said ramp (252) defining a rise (254) and a run (256), wherein the rise (254) is located opposite a tip (258) of the locking-tabs (234), and wherein the run (256) extends along a portion of the inner-surface (228) opposite the locking-tabs (234) to a point above the first-surface (214) of the mounting-hole (218), said ramp (252) preventing an insertion of the blocking-device (250) until the mate-assist-device (268) is moved from the unmated-position (270) to the mated-position (272).

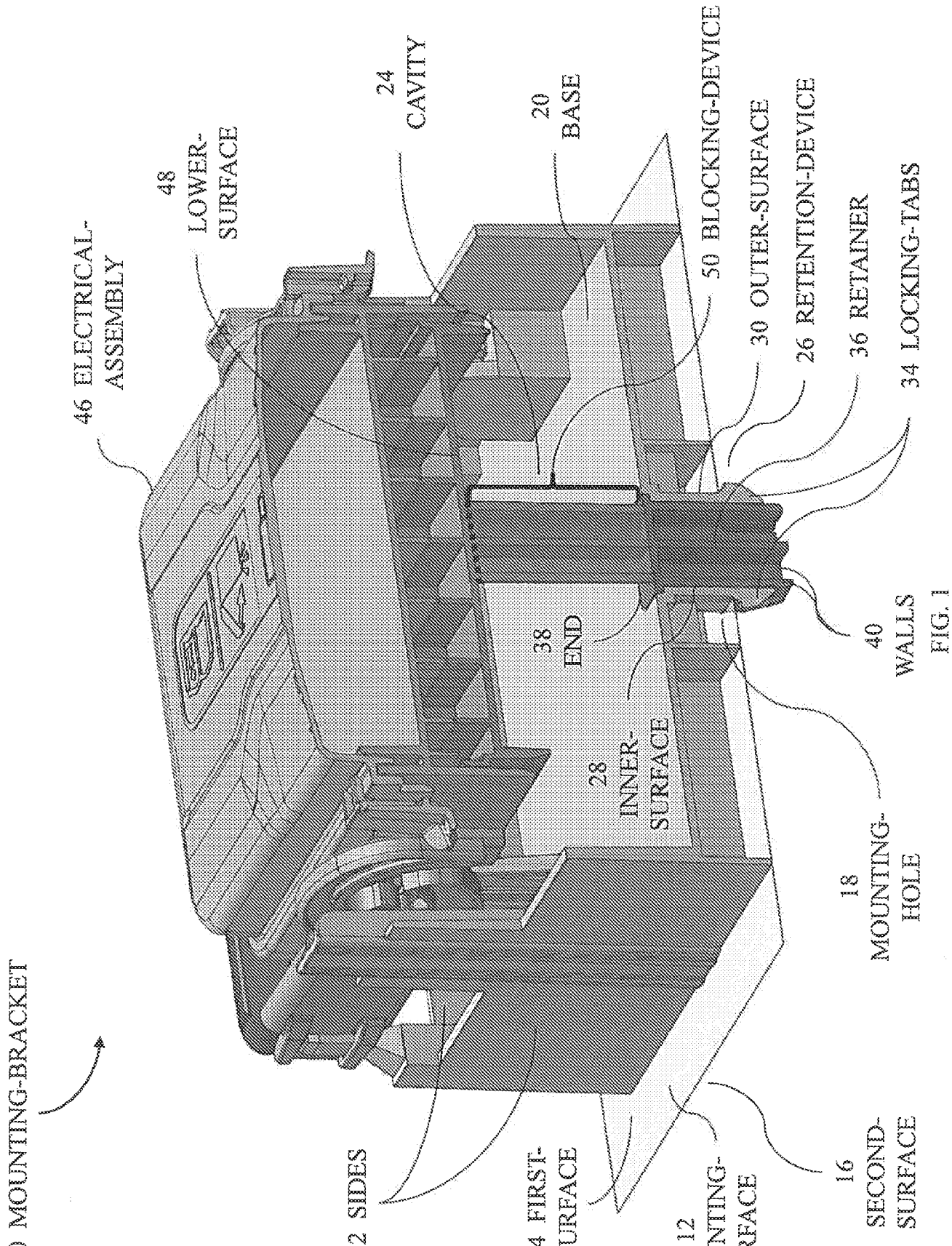

10 MOUNTING-BRACKET
46 ELECTRICAL-ASSEMBLY
48 LOWER-SURFACE
24 CAVITY
20 BASE
50 BLOCKING-DEVICE
30 OUTER-SURFACE
26 RETENTION-DEVICE
36 RETAINER
34 LOCKING-TABS
38 END
28 INNER-SURFACE
40 WALLS
18 MOUNTING-HOLE
22 SIDES
14 FIRST-SURFACE
12 MOUNTING-SURFACE
16 SECOND-SURFACE

FIG. 1

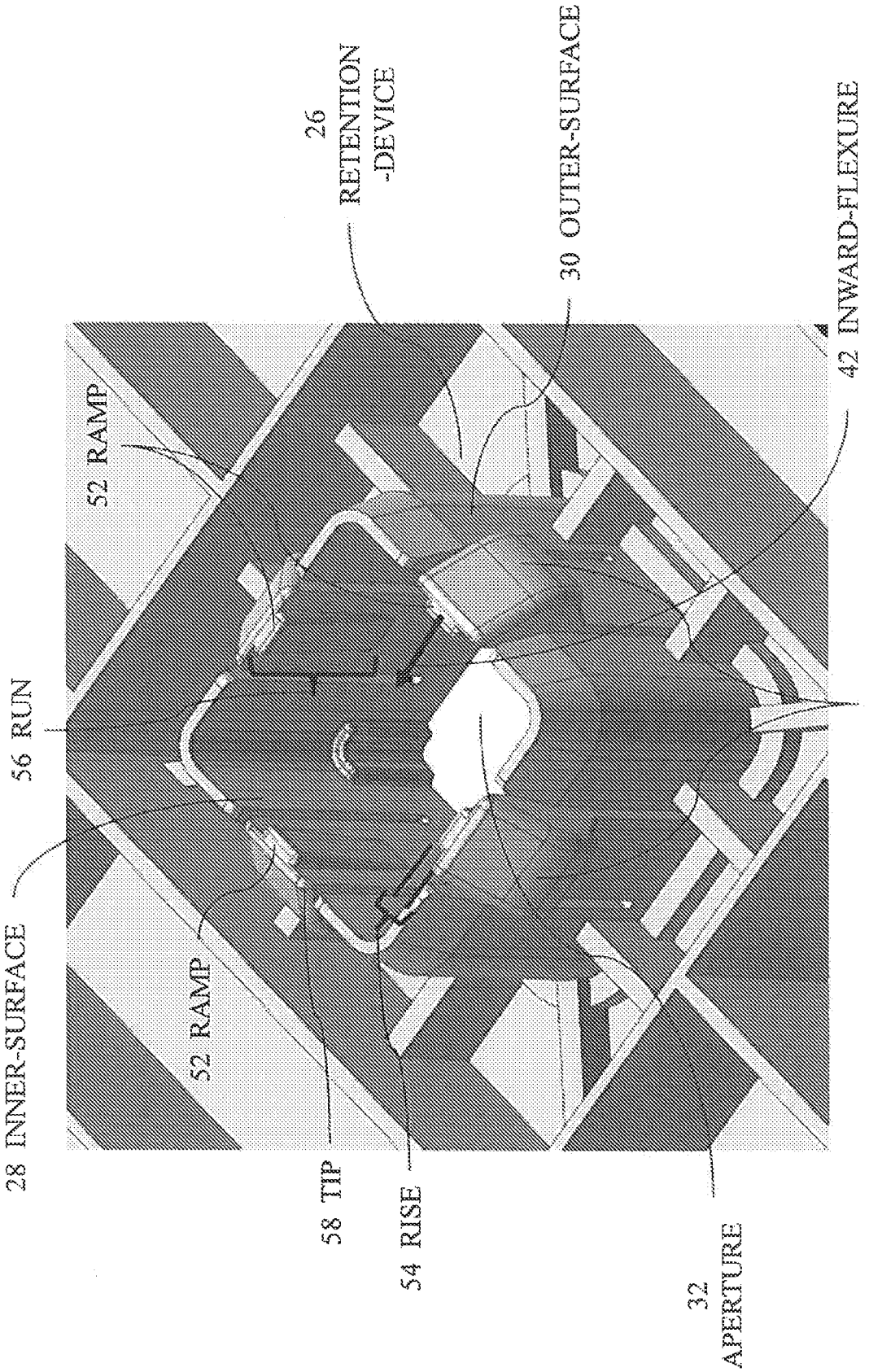

26 RETENTION -DEVICE
30 OUTER-SURFACE
42 INWARD-FLEXURE
52 RAMP
56 RUN
28 INNER-SURFACE
52 RAMP
34 LOCKING-TABS
58 TIP
54 RISE
32 APERTURE

FIG. 2

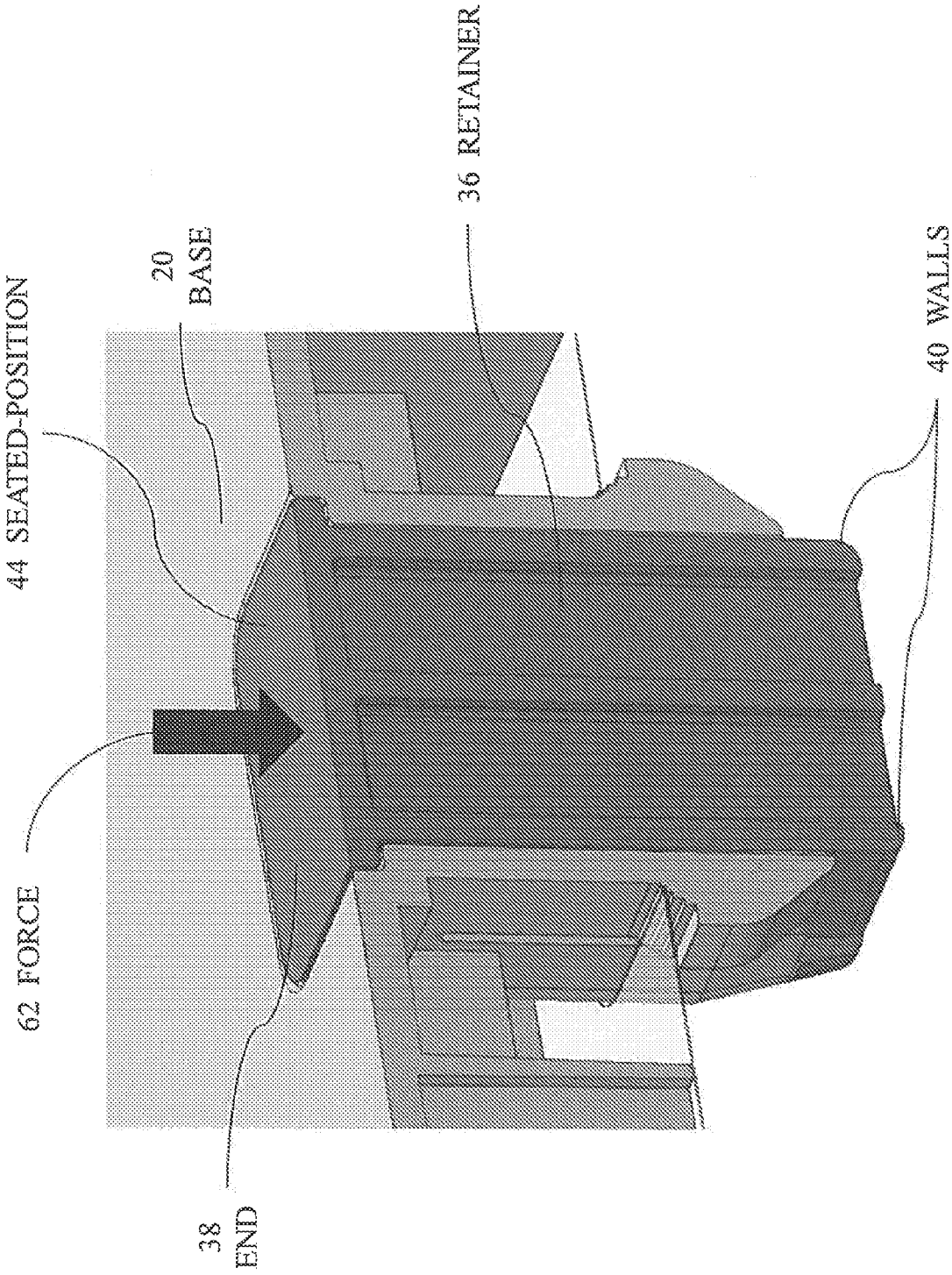

44 SEATED-POSITION
62 FORCE
38 END
20 BASE
36 RETAINER
40 WALLS

FIG. 3

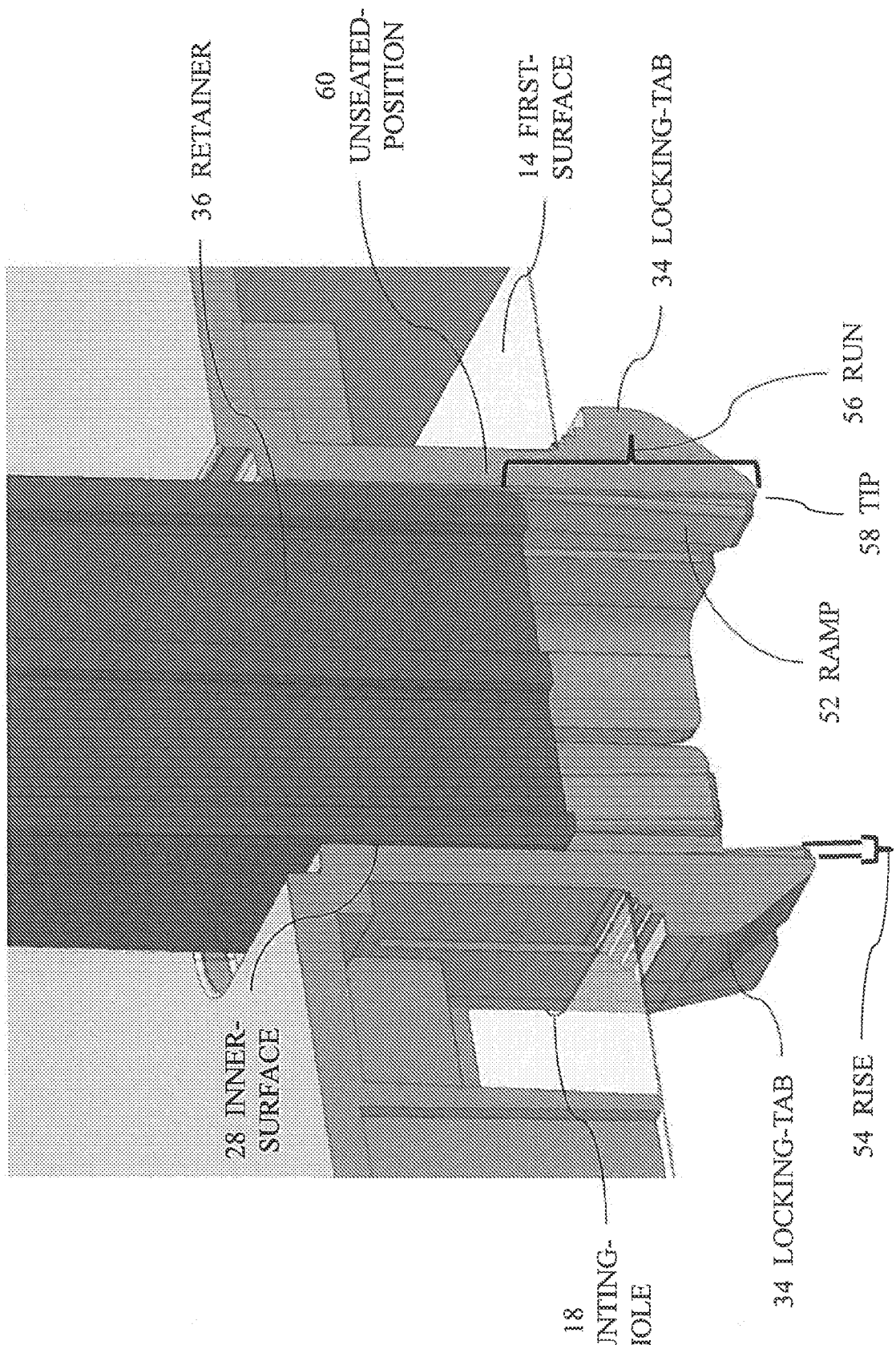

36 RETAINER
60 UNSEATED-POSITION
14 FIRST-SURFACE
34 LOCKING-TAB
56 RUN
58 TIP
52 RAMP
28 INNER-SURFACE
18 MOUNTING-HOLE
34 LOCKING-TAB
54 RISE

FIG. 4

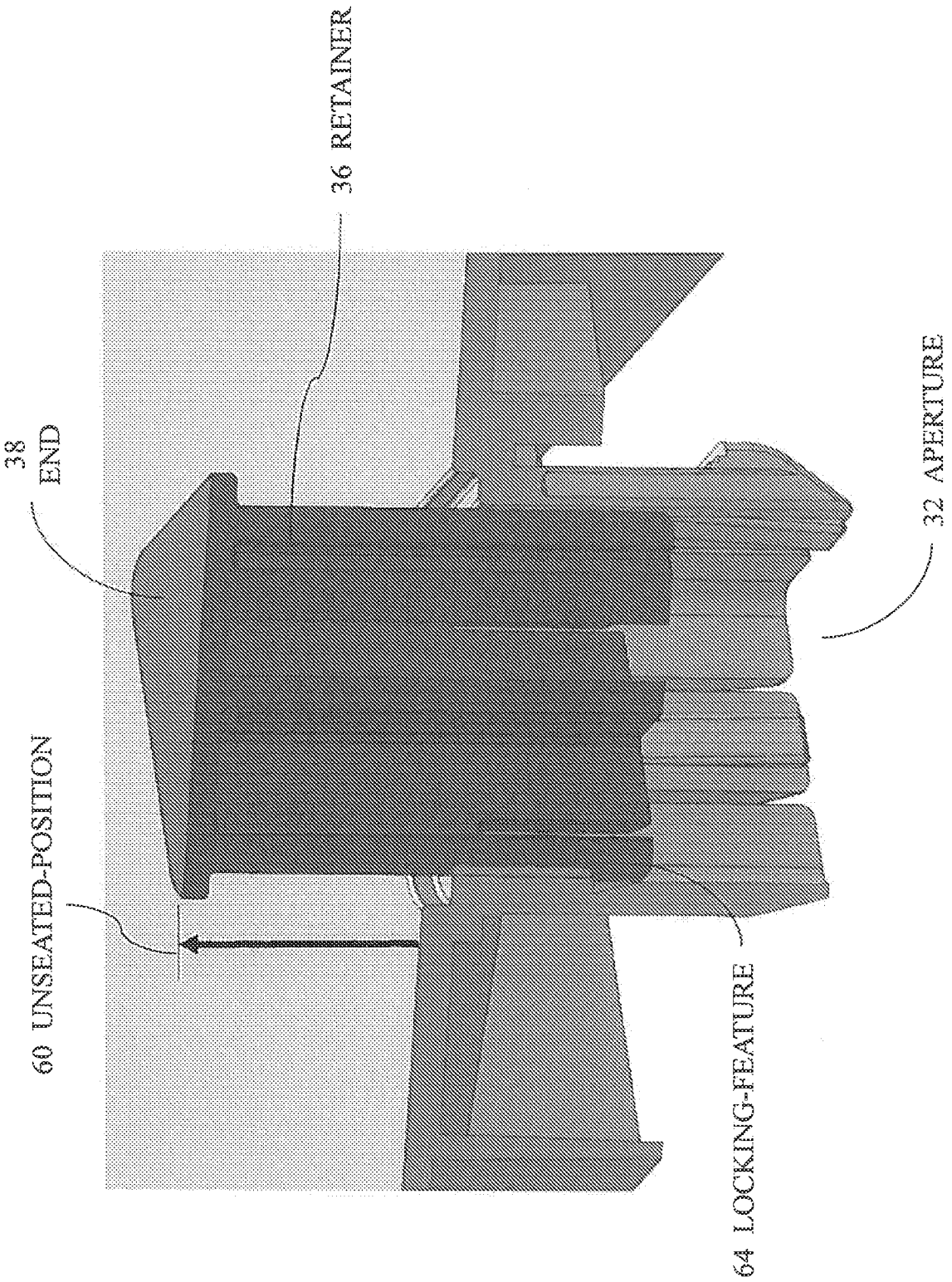

36 RETAINER
38
END
60 UNSEATED-POSITION
32 APERTURE
64 LOCKING-FEATURE

FIG. 5

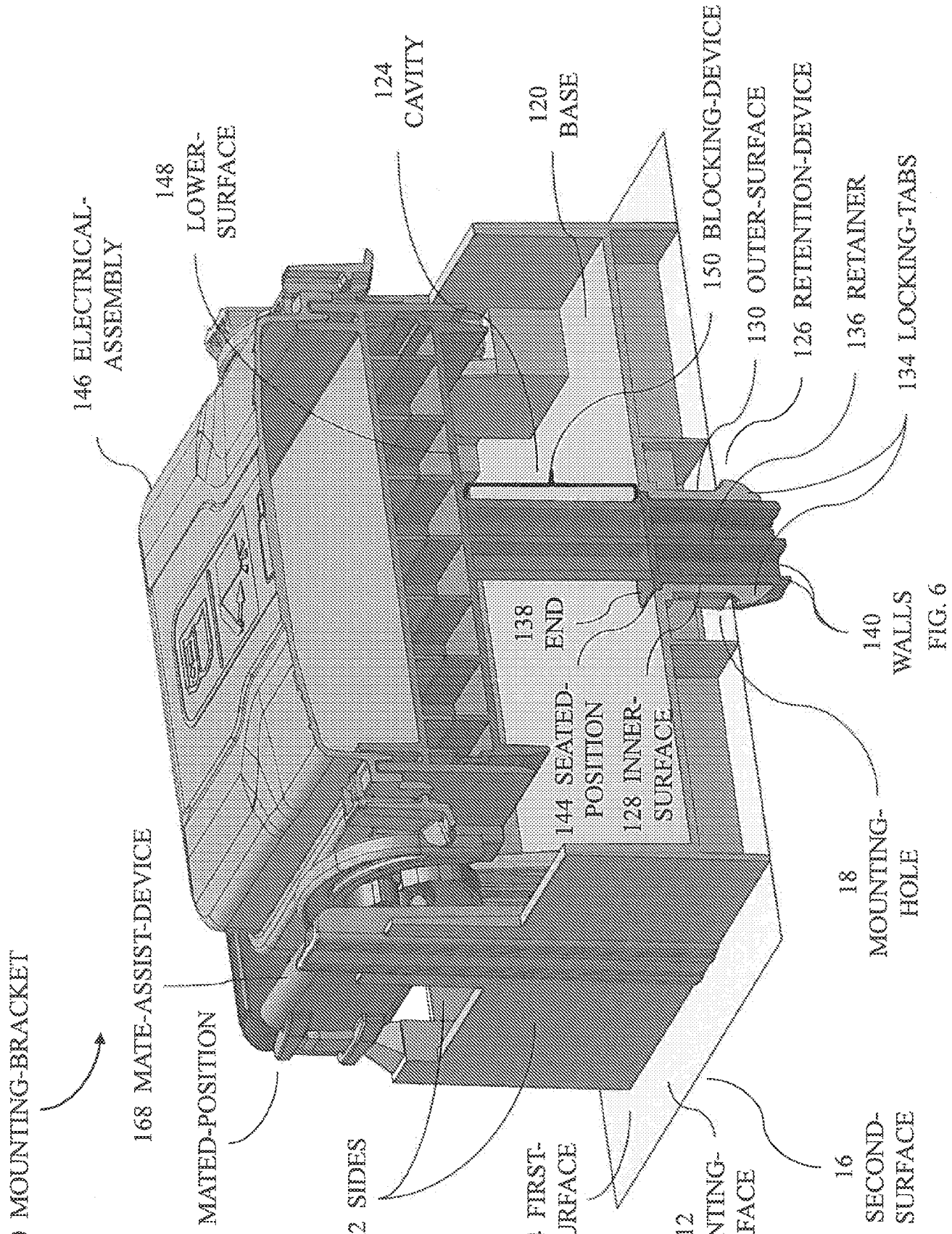

110 MOUNTING-BRACKET
168 MATE-ASSIST-DEVICE
172 MATED-POSITION
122 SIDES
14 FIRST-SURFACE
12 MOUNTING-SURFACE
16 SECOND-SURFACE
18 MOUNTING-HOLE
140 WALLS
138 END
144 SEATED-POSITION
128 INNER-SURFACE
134 LOCKING-TABS
136 RETAINER
126 RETENTION-DEVICE
130 OUTER-SURFACE
150 BLOCKING-DEVICE
120 BASE
124 CAVITY
148 LOWER-SURFACE
146 ELECTRICAL-ASSEMBLY

FIG. 6

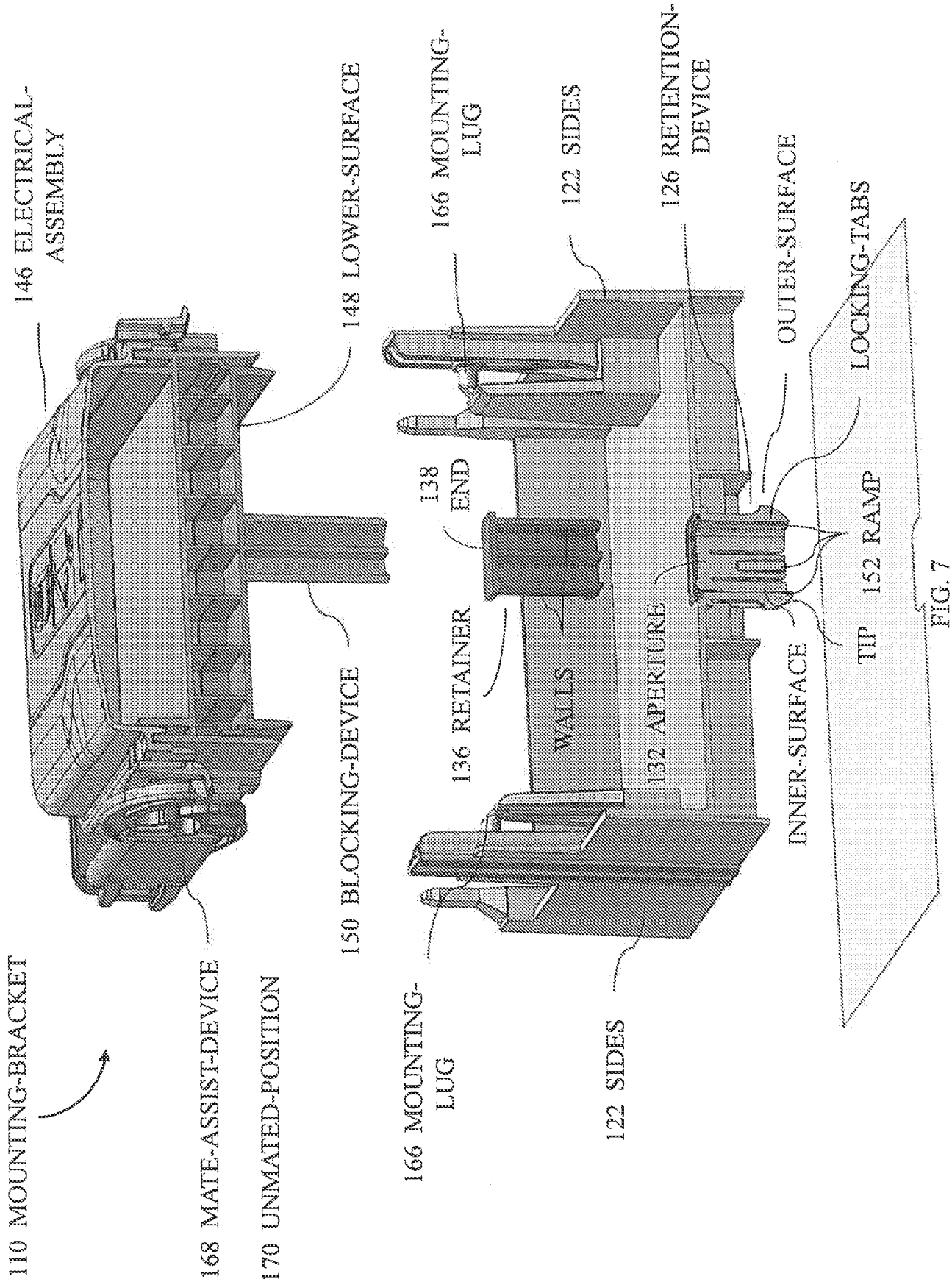

110 MOUNTING-BRACKET
168 MATE-ASSIST-DEVICE
170 UNMATED-POSITION
150 BLOCKING-DEVICE
148 LOWER-SURFACE
146 ELECTRICAL-ASSEMBLY
166 MOUNTING-LUG
122 SIDES
126 RETENTION-DEVICE
OUTER-SURFACE
LOCKING-TABS
TIP
152 RAMP
INNER-SURFACE
138 END
136 RETAINER
WALLS
132 APERTURE
122 SIDES
166 MOUNTING-LUG

FIG. 7

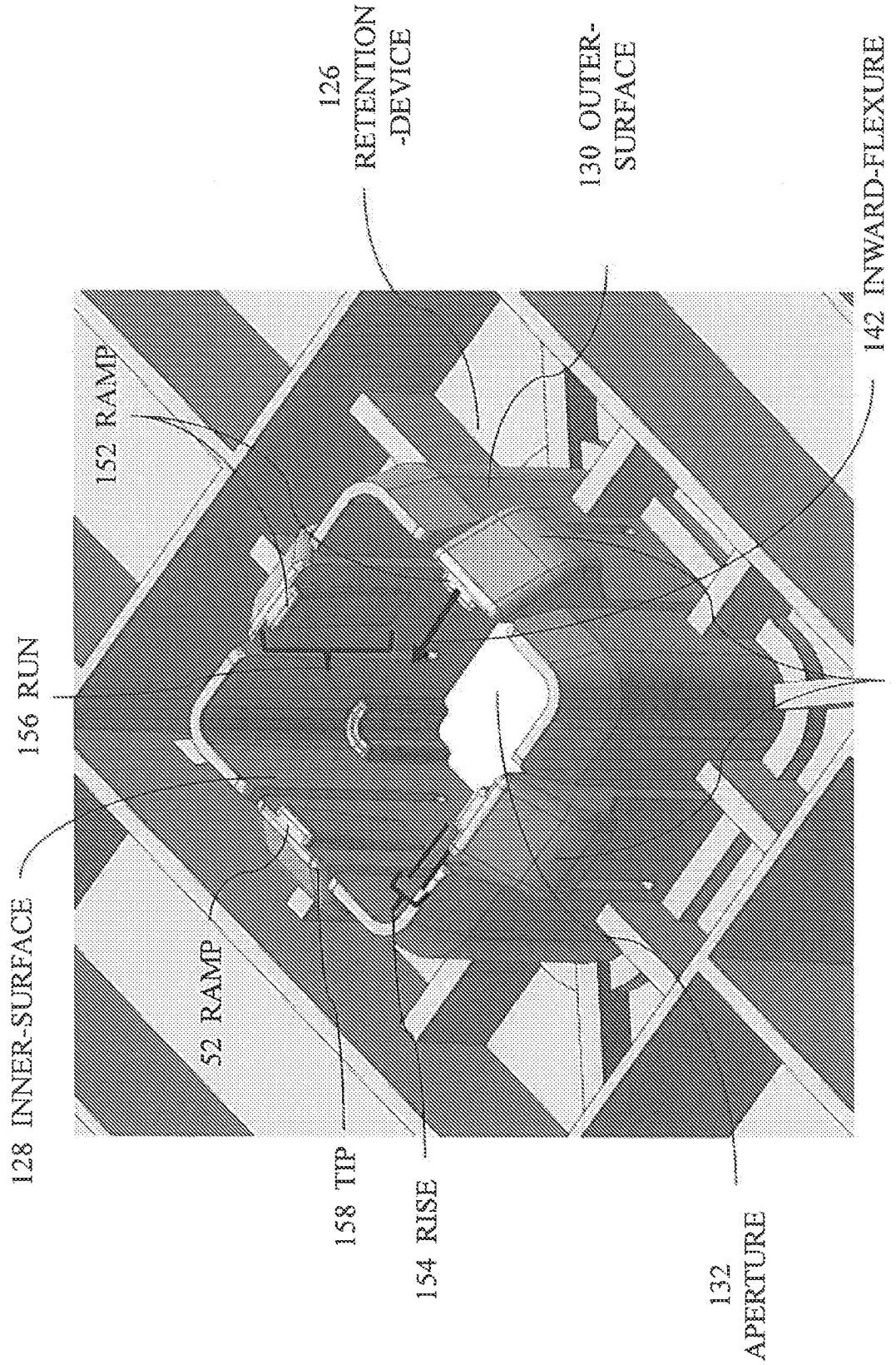

126 RETENTION -DEVICE
130 OUTER-SURFACE
142 INWARD-FLEXURE
152 RAMP
156 RUN
128 INNER-SURFACE
52 RAMP
158 TIP
154 RISE
132 APERTURE
134 LOCKING-TABS

FIG. 8

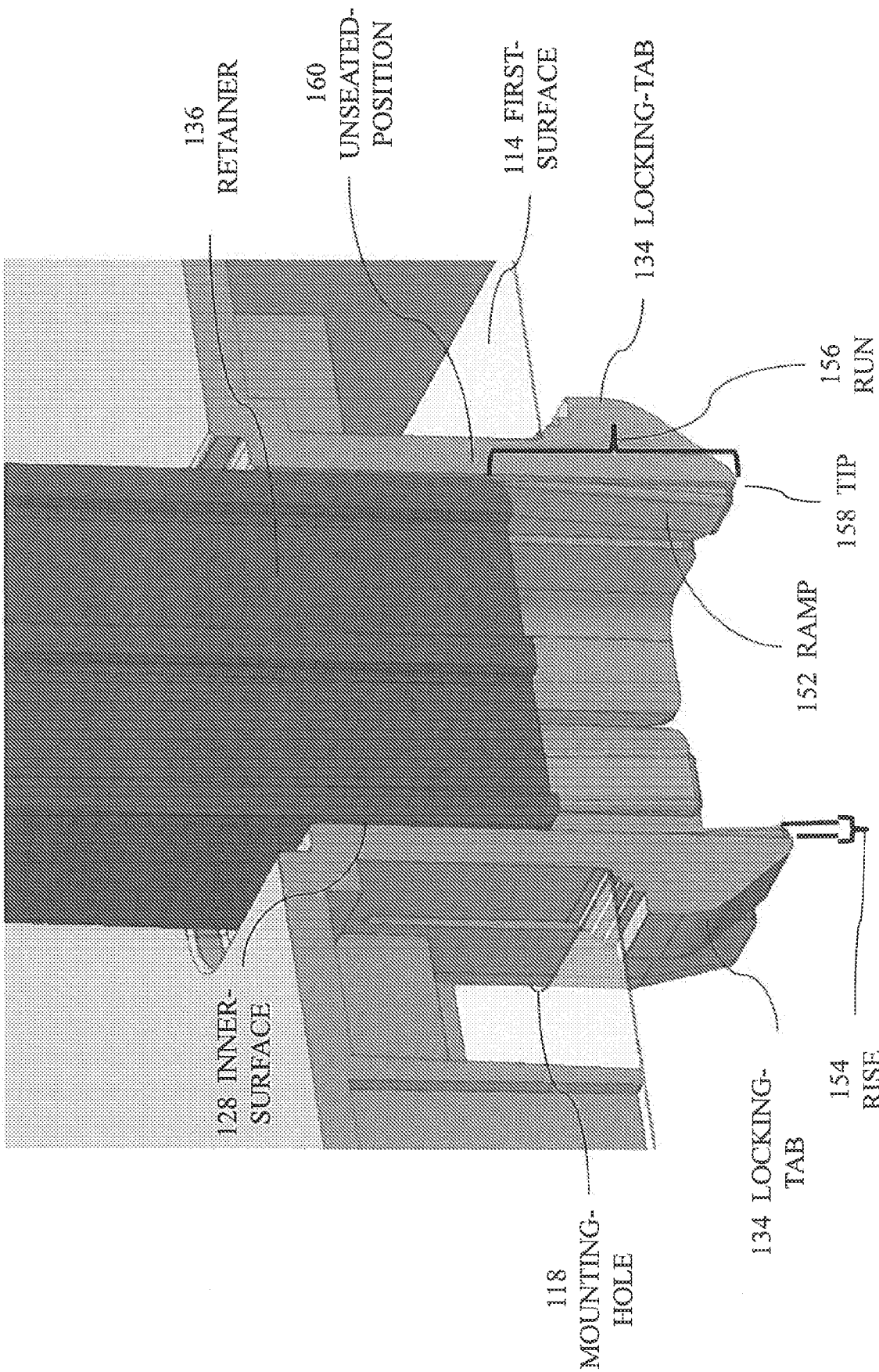

136 RETAINER
160 UNSEATED-POSITION
114 FIRST-SURFACE
134 LOCKING-TAB
156 RUN
158 TIP
152 RAMP
128 INNER-SURFACE
118 MOUNTING-HOLE
134 LOCKING-TAB
154 RISE

FIG. 9

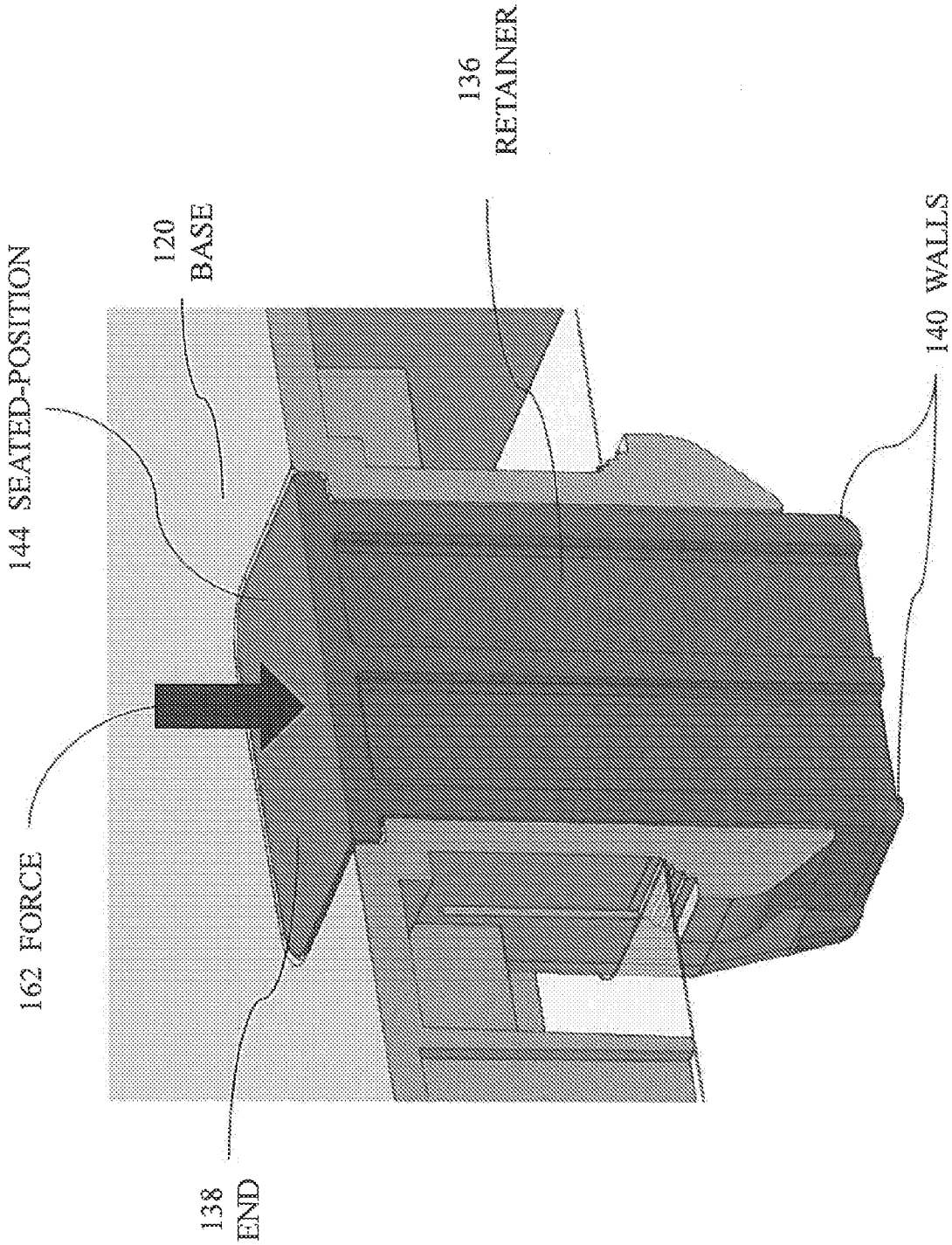

136 RETAINER
120 BASE
144 SEATED-POSITION
140 WALLS
162 FORCE
138 END

FIG. 10

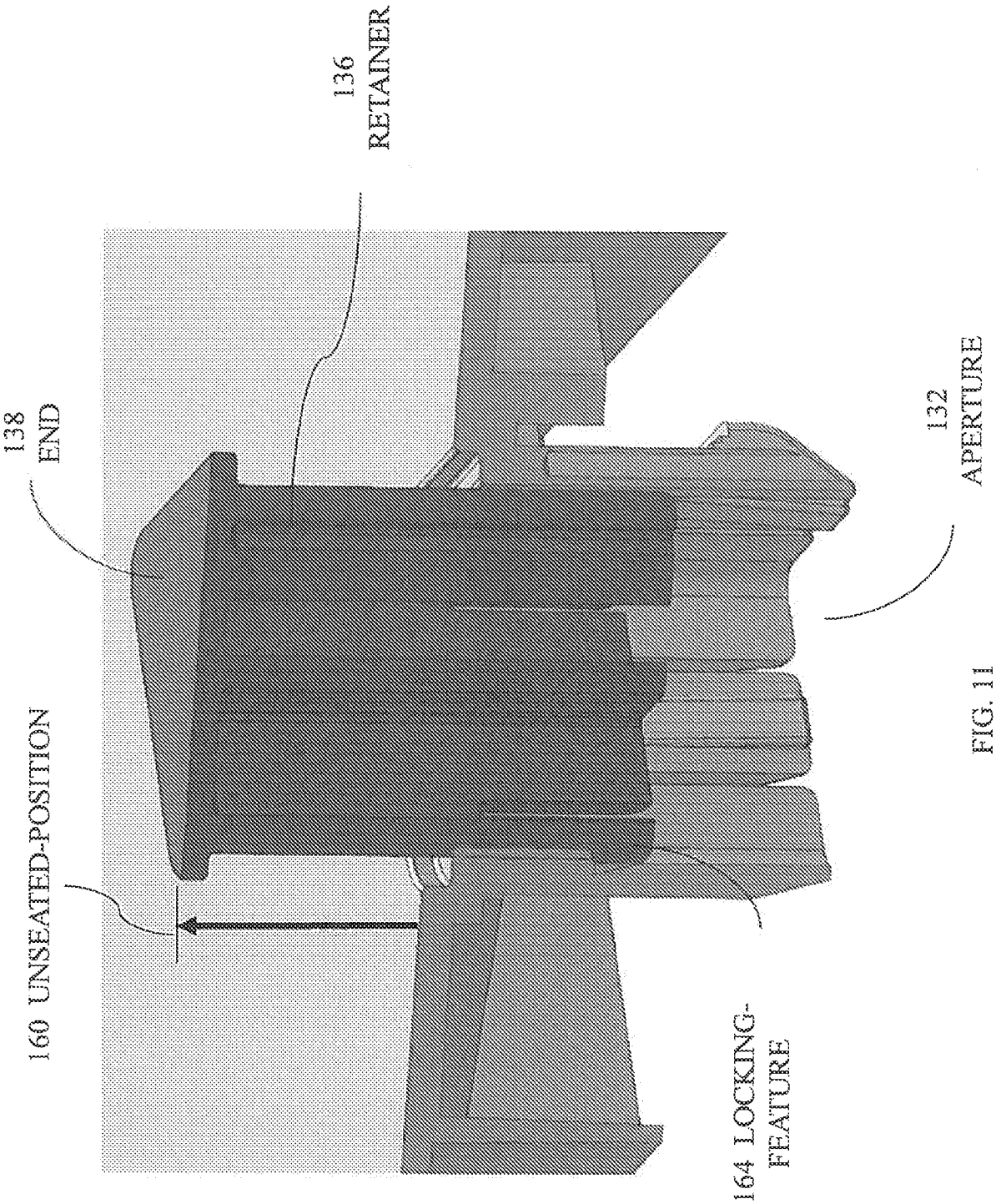

136
RETAINER
138
END
132
APERTURE
160 UNSEATED-POSITION
164 LOCKING-
FEATURE

FIG. 11

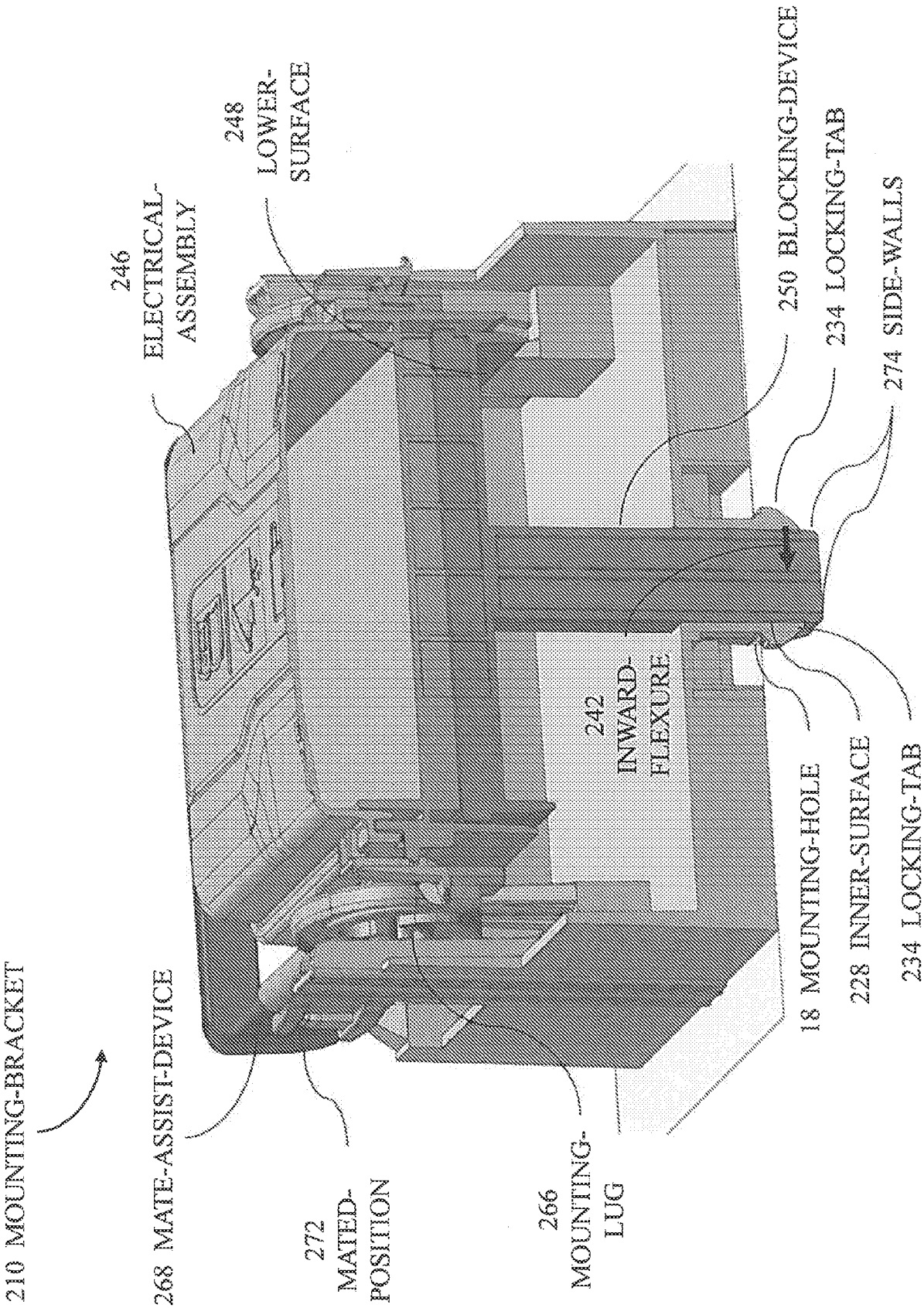

210 MOUNTING-BRACKET
268 MATE-ASSIST-DEVICE
272 MATED-POSITION
266 MOUNTING-LUG
242 INWARD-FLEXURE
18 MOUNTING-HOLE
228 INNER-SURFACE
234 LOCKING-TAB
274 SIDE-WALLS
234 LOCKING-TAB
250 BLOCKING-DEVICE
246 ELECTRICAL-ASSEMBLY
248 LOWER-SURFACE

FIG. 12

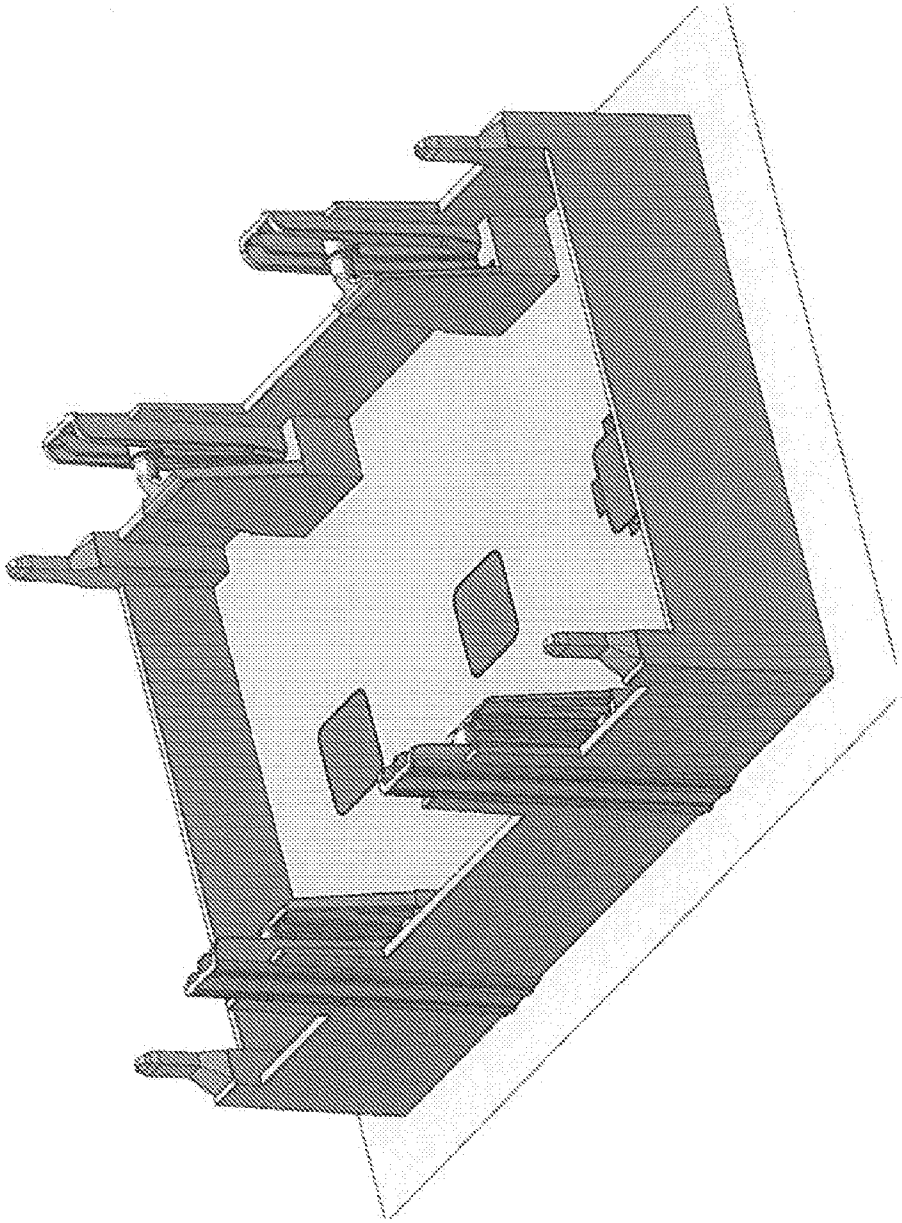


FIG. 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2018/029035

A. CLASSIFICATION OF SUBJECT MATTER

H01R 13/639(2006.01)i, H01R 13/434(2006.01)i

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)
H01R 13/639; H01R 13/46; H01R 13/73; H01R 13/627; H01R 4/30; B60J 3/02; H01R 13/434

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: mounting bracket, retention device, locking tab, retainer, electrical assembly, blocking device

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5775944 A (WILLIAM GEORGE FLASK et al.) 07 July 1998 See column 2, line 40 - column 3, line 65 and figures 1-2.	1-10
A	JP 2013-159211 A (YAZAKI CORP.) 19 August 2013 See paragraphs [0022]-[0045] and figures 1-2, 6-9.	1-10
A	US 2009-0197463 A1 (MARKUS CHRISTOPH et al.) 06 August 2009 See paragraphs [0032]-[0053] and figures 1A-5.	1-10
A	US 2004-0005806 A1 (ALFRED ANNECKE) 08 January 2004 See paragraphs [0041]-[0052] and figures 1-6.	1-10
A	JP 2001-291537 A (YAZAKI CORP.) 19 October 2001 See paragraphs [0016]-[0038] and figures 1-11.	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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"E" earlier application or patent but published on or after the international filing date
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"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
"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
"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 August 2018 (09.08.2018)	**09 August 2018 (09.08.2018)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2018/029035

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