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MOUNT IN A LUMINAIRE

(57) Abstract: Present embodiments provide a light fixture having rotatable light modules and an extendable hinged mounting as-
sembly. The light modules are electrically coupled to the light fixture via a cord and a grommet/bracket feature which provides strain
relief and a waterproof barrier. The extendable hinged mounting assembly allows the light fixture to be mounted onto a ceiling or
other structure while providing a mounted position and an install position.



SYSTEMS, METHODS, AND DEVICES FOR PROVIDING ROTATABLE LIGHT MODULES AND HINGED MOUNT IN A LUMINAIRE

RELATED APPLICATION

[0001] The present application claims priority to U.S. Provisional Patent Application No. 61/644,226 titled “Systems, Methods, and Devices for Providing Rotatable Light Modules in a Luminaire”, filed May 8, 2012; and U.S. Provisional Patent Application No. 61/677,777 titled “Snap and Lock Hinge Mount”, filed July 31, 2012. The entire contents of each of the foregoing applications are hereby incorporated herein by reference.

TECHNICAL FIELD

[0002] Embodiments of the present disclosure relate generally to lighting solutions, and more particularly to systems, methods, and devices for providing light fixtures that incorporate rotatable light modules and a hinged mounting solution for quick installation.

BACKGROUND

[0003] Previous designs of light fixtures that incorporate rotatable LED-based light modules often include wiring layouts that are internal to the light fixture housing. This often limits the range of movement of the light modules and wiring integrity of the light fixture. For example, an operator changing the angle of the light modules may have to be extra careful when handling the light fixture so as not to accidentally pull or otherwise disrupt the wiring between the light modules and the other electronic components of the light fixture. Furthermore, such light fixtures are often mounted on a ceiling or other mounting structure, through which the light fixture is also electrically wired. During installation or maintenance, the light fixture may need to be removed from the ceiling in order to access the wires or other installation interface on the back side of the light fixture. In such cases, the operator may need to support the light fixture while performing the operation, making the process more challenging and error prone. Thus,

what is needed is a light fixture that allows for wiring the rotatable modules in such a way as to allow for rotation of the module while reducing the size or necessary layout of a fixture housing yet maintain wiring integrity and electrical reliability for the rotatable module. Additionally, the light fixture should provide a mounting means that allows for easy accessibility of the light fixture.

SUMMARY

[0004] An example embodiment of the present disclosure includes a light fixture. The light fixture includes a central housing containing one or more electrical components, a central grommet, wherein the central grommet traverses a central opening in the central housing, providing a path for a central cord to enter the central housing through the grommet, wherein the central grommet forms a water tight seal between the central cord and the central housing, and wherein the central cord is electrically coupled to the one or more electrical components. The light fixture further includes at least one rotatable light module coupled to the central housing, the at least one rotatable light module comprising a heat sink on a heat sink side of the at least one rotatable light model, and at least one peripheral cord coupled to the at least one rotatable light module at a first end of the at least one peripheral cord and traversing at least one respective peripheral opening in the central housing, wherein the at least one peripheral cord is electrically coupled to the one or more electrical components and the rotatable light module.

[0005] Another example embodiment of the present disclosure includes a mounting assembly. The mounting assembly includes a top plate having a first mating mechanism, a support hanger having a first end and a second end, the first end rotatively coupled to the top plate. The mounting assembly also includes a bottom plate comprising a second mating mechanism corresponding to the first mating mechanism, wherein the second end of the support hanger is rotatively coupled to the bottom plate. The mounting assembly is foldable into a folded position and extendable into an extended position. In

the folded position, the bottom plate, the support hanger, and the top plate are substantially parallel, and wherein the bottom plate is coupled to the top plate via the first and second mating mechanisms, the bottom plate being a first distance from the top plate. In the extended position, the first mating mechanism is decoupled from the second mating mechanism, the bottom plate being a second distance from the top plate, the second distance being greater than the first distance, and wherein the bottom plate is supported by the top plate via the support hanger.

[0006] Another example embodiment of the present disclosure includes a fixture mounting assembly. The fixture mounting assembly includes a top plate having a first mating mechanism, a support hanger having a first end and a second end, the first end moveably coupled to the top plate, and a fixture housing comprising a second mating mechanism on a top surface of the fixture housing corresponding to the first mating mechanism, wherein the second end of the support hanger is coupled to the fixture housing. The mounting assembly is foldable into a folded position and extendable into an extended position. In the folded position, the fixture housing is coupled to the top plate via the first and second mating mechanisms, the fixture housing being a first distance from the top plate. In the extended position, the first mating mechanism is decoupled from the second mating mechanism, the fixture housing being a second distance from the top plate, the second distance being greater than the first distance, and wherein the fixture housing is supported by the top plate via the support hanger.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The foregoing and other features and aspects of the disclosure are best understood with reference to the following description of certain example embodiments, when read in conjunction with the accompanying drawings, wherein:

[0008] FIG. 1A is a light fixture having rotatable light modules and a hinged mount in accordance with an example embodiment of the disclosure;

[0009] FIG. 1B is an exploded view of the light fixture of FIG. 1A in accordance with an example embodiment of the disclosure;

[0010] FIG. 2 shows a top view of a light module connection assembly in accordance with an example embodiment of the disclosure;

[0011] FIG. 3 is an exploded view of a bracket assembly used in a light module connection assembly in accordance with an example embodiment of the disclosure;

[0012] FIG. 4 is a cross-sectional view of a light module connection assembly in accordance with an example embodiment of the disclosure;

[0013] FIG. 5 shows a side view of a light module connection assembly in accordance with an example embodiment of the disclosure;

[0014] FIG. 6 is a perspective view of a light fixture and snap and lock hinge mount in an install position according to an example embodiment;

[0015] FIG. 7 is a perspective view of a light fixture and snap and lock hinge mount in a mounted position according to an example embodiment;

[0016] FIG. 8 is a side view of a light fixture and snap and lock hinge mount in an install position according to an example embodiment;

[0017] FIG. 9 is a side view of a snap foot and support wire hook of a snap and lock hinge mount according to an example embodiment;

[0018] FIG. 10 is another side view of a light fixture and snap and lock hinge mount in an install position according to an example embodiment;

[0019] FIG. 11 is another side view of a light fixture and snap and lock hinge mount in a mounted position according to an example embodiment;

[0020] FIG. 12 is a perspective view of a top cover of a light fixture for assembly with a snap and lock hinge mount according to an example embodiment;

[0021] FIG. 13 is a view of a snap and lock hinge mount in an install position according to an example embodiment;

[0022] FIG. 14 is a view of a snap and lock hinge mount in a seated position before snapping and locking the mount according to an example embodiment;

[0023] FIG. 15 is another view of a snap and lock hinge mount in a seated position before snapping and locking the mount, according to an example embodiment;

[0024] FIG. 16 is a view of a snap and lock hinge mount in a seated position after snapping the mount, according to an example embodiment;

[0025] FIG. 17 is a cutaway side view of a wire support hanger and wire hook of a snap and lock hinge mount before snapping the mount into a seated position, according to an example embodiment;

[0026] FIG. 18 is a cutaway side view of a wire support hanger wire and wire hook of a snap and lock hinge mount after snapping the mount into a seated position, according to an example embodiment;

[0027] FIG. 19 is a perspective side view of a snap and lock hinge mount before locking the mount, according to an example embodiment;

[0028] FIG. 20 is a bottom view of a lock arm of a lock hinge mount after locking the mount with the lock arm, according to an example embodiment; and

[0029] FIG. 21 is a bottom view of a lock arm of a lock hinge mount before locking the mount with the lock arm, according to an example embodiment.

BRIEF DESCRIPTION OF EXAMPLE EMBODIMENTS

[0030] Embodiments of the disclosure are directed to the construction and assembly of a light fixture with rotatable light modules and hinged mounting assembly. Example embodiments of the disclosure include flexible cords accessible on the outside of the light fixture housing to act as a strain relief to prevent internal wiring damage due to pulling of the flexible cord. The systems and methods described herein may provide several advantages including providing a strain relief to prevent the flexible cord from being pulled out of the light module (such as an LED-based light module) during transport, installation, or in the event the fixture was disturbed or vandalized. The embodiments of the disclosure described herein include other benefits such as providing a water tight flexible cord and grommet assembly to prevent water from entering the light module between the flexible cord and an overmolded grommet. Another benefit of certain embodiments of the disclosure is that when the light module is rotated, the integrity of the flexible cord entry into the back of the light module (or the heat sink of

the light module) remains uncompromised. Embodiments described herein also include a snap and lock hinge mount for securing the light fixture to a ceiling or wall while allowing for easy access and installation.

[0031] Example embodiments of the disclosure now will be described more fully hereinafter with reference to the accompanying drawings, in which example embodiments of the disclosure are shown. This disclosure may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the disclosure to those skilled in the art. Like numbers refer to like, but not necessarily the same or identical, elements throughout.

[0032] FIG. 1A is a light fixture 100 having rotatable light modules 105 and a snap and lock hinge mount 115 in accordance with an example embodiment of the disclosure. As shown in FIG. 1A, the light fixture 100 includes a central housing 110. The central housing 110 may house internal components of the light fixture, such as a driver module, backup battery, sensor(s), controller(s), wiring splices or junctions, etc. The main power line wiring 160 enters the central housing 110 in the middle of a top surface 111 of the central housing 110. As shown in FIG. 1A, the top surface 111 of the central housing 110 has a mounting assembly 115 attached. In the example embodiment shown in FIG. 1A, a grommet 125 and a cord 130 are located in the middle of each side 112 of an upper portion 165 of the central housing 110. The grommet 125 and cord 130 shield electrical conductors (e.g. wire, etc.) being routed from the central housing 110 to the light modules 105. In other embodiments of the disclosure, the grommet 125 and cord 130 may be located elsewhere along the exterior of the central housing 110 (i.e. other than the middle of each side of the central housing). Each cord 130 attaches to the light module 105, which in the embodiment shown in FIG. 1A, occurs in the middle of the light module 105 and is supported by a bracket assembly 120 and another grommet (not shown). In other embodiments of the disclosure, the cord 130 may be connected to the light module 105 elsewhere along the heat sink 135 or other surface of the light

module 105 (i.e. other than the middle of the back of the heat sink 135 of the light module 105).

[0033] The light fixture 100 further includes one or more thin corner sections 105 extending from corners of the central housing 110. The light modules 105 are disposed between the thin corner sections 155 at the sides 112 of the light fixture. In certain example embodiments, and as illustrated in Figure 1A, the light module 105 is attached to the thin corner sections 145 at one or more ends. The thin corner sections 145 include a slot 150 which defines a range of rotation for the light module 105. A pin (or screw or similar protrusion) 155 engages the slot 150 and the light module 105 to provide rotation for the light module 105 and hold (or lock) the light module 105 in place at a particular angle to direct light from the module 105 in a particular direction or configuration. The light module 105 includes a heat sink 135 and an LED board 140 (or substrate) thermally coupled to the heat sink 135.

[0034] FIG. 1B is an exploded view of the light fixture of FIG. 1A in accordance with an example embodiment of the disclosure. As shown in FIG. 1B, the central housing 110 is made up of a top portion 165 and a bottom portion 170. The housing 110 encloses/houses one or more internal components 175 such as a driver, backup battery, etc. FIG. 1B also shows the mounting assembly 115 for suspending the fixture from a ceiling. FIG. 1B also provides a better view of the corner section 145 of the housing 110 and how the light module 105 connects to the housing 110 while allowing the module 105 to rotate. In the embodiment shown in FIG. 1B, the top and bottom portions 165, 170 along with the corner sections 145 of the light fixture 100 are made from a deep drawn process using cold rolled steel. Such material allows for an overall lower assembly and manufacturing cost, while maintaining considerable strength as compared to traditional materials used for light fixture housings (e.g. aluminum, die casting, etc.).

[0035] FIG. 2 shows a top view of a light module connection assembly 200 in accordance with an example embodiment of the disclosure. As shown in FIG. 2, the light module connection assembly 200 includes a grommet 205 covering an opening from the central housing 110 of the light fixture 100 which allows a cord 210 to pass through and

connect to the back of the light module 105 for routing wiring to the LEDs on the LED board/substrate 215 of the light module 105 in such a way that the wiring is protected from water and prevents water from entering the fixture housing 110. The heat sink 225 located on the back of the light module 105 is shaped to accept the cord 210 as well as a bracket assembly 220 surrounding the cord 210. In the embodiment shown in FIG. 2, the bracket assembly 220 provides strain relief for the cord 210 when the cord is handled, pulled, or twisted. Further, the bracket assembly 220 protects the flexible cord 210 entry into the heat sink 225 while helping to prevent water entry into the light module 105. In an alternative embodiment of the disclosure, a grommet may be used on the light module 105 in place of (or in addition to) the bracket assembly 220 to provide similar protection and functionality (e.g. strain relief, etc.) as the bracket assembly 220. In certain example embodiments, the lighting module 105 includes light sources other than LEDs.

[0036] FIG. 3 is an exploded view of a bracket assembly 300 used in a light module connection assembly 200, in accordance with an example embodiment of the disclosure. As shown in FIG. 3, the bracket assembly 300 is made up of a first bracket 305 and second bracket 310, each of which has a C-shaped surface profile on one side, such that when the first bracket 305 and second bracket 310 are engaged with one or more fasteners 315 (e.g., a screw, pin, rivet, or other protrusion that may or may not be able to be tightened) the bracket assembly 300 compresses a grommet 320 around the flexible cord 325, making the connection where the flexible cord 325 attaches to the light module water tight. As shown in FIG. 3, an overmold grommet 320 covers the flexible cord 325 attaching to the light module 105.

[0037] FIG. 4 is a cross-sectional view 400 of a light module connection assembly 200 in accordance with an example embodiment of the disclosure. As shown in Figure 4, the cord 130 is held in place with respect to the light module 105 via the light module connection assembly 200. FIG. 5 shows a side view of a light module connection assembly 500 in accordance with an example embodiment of the disclosure. As shown in FIG. 5, the brackets 505 are shaped such that they engage with a corresponding feature 510 of the heat sink 515. In the example embodiment shown in FIG. 5, the brackets 505

have one or more slots 520 that accept a protrusion 510 that is integrated with the heat sink 515 to allow for better protection and support for the cord connection to the light module 105, particularly during rotation of the light module 105 and/or handling of the cord 130. In an alternative embodiment of the disclosure, the configuration between the brackets 505 and the heat sink feature 510 may be different (e.g., the heat sink 515 may contain a slot and the brackets 505 include corresponding protrusions, the brackets 505 and heat sink 515 may be sized for a snap fit relation, etc). Also shown in FIG. 5, is a recess 525 in the brackets surrounding the grommet 530 covering the cord 130 and light module connection, which provides clearance for the end of the grommet 530 while allowing the C-shaped surface of the brackets 515 to tightly surround the grommet 530 and/or cord 130.

[0038] FIG. 6 is a perspective view of the light fixture 100 and snap and lock hinge mount 115 according to an example embodiment. The snap and lock hinge mount 115 includes a top plate 1102, a wire support hanger 1104, and a bottom plate 1106. The bottom plate 1106, in the embodiment illustrated in FIG. 6, is mounted to the light fixture housing 110. In various embodiments, the bottom plate 1106 may be mounted to the light fixture housing 110 using rivets, screws, plastic fasteners, adhesive, or any other suitable attachment means.

[0039] In certain exemplary embodiments, the snap and lock hinge mount 115 is movable between an install position and a mounted position. In the “install” position, the top plate 1102 may be mounted to an electrical wiring box or enclosure, for example, while the bottom plate 1106 (and the fixture housing 110) is supported in a hanging position by the wire support hanger 104 a distance apart from the top plate 1102. In this position, an electrician is able to make electrical wiring connections to connect power to the light fixture 100 without completely removing the light fixture 100. After the light fixture 100 is electrically coupled to power, the snap and lock hinge mount 115 may be moved and locked into a “mounted” position.

[0040] As illustrated in FIG. 6, the top plate 1102 includes a first snap foot 1112A and a second snap foot 1112B proximate to one side of the top plate 1102. The top plate

1102 also includes a first snap foot 112A and a second snap foot 1112B proximate to the other side of the top plate 1102. In certain embodiments, lock arms 1108A and 1108B are mounted to the top plate 1102 at a pivot point, as described in further detail below. It is noted that the number and position of the snap feet 1112 and the lock arms 1108 may vary among embodiments. In other words, the embodiment of the snap and lock hinge mount 115 illustrated in FIG. 6 is an example only.

[0041] FIG. 7 is a perspective view of the light fixture 100 and the snap and lock hinge mount 115 in a mounted position. In FIG. 7, the top plate 1102 and the bottom plate 1106 have been brought together into contact or near-contact. Here, the lock arms 1108A and 1108B may be rotated into a locked position over the screws 1152A and 1152B. The lock arms 1108A and 1108B may be pivoted at pivot points 1155A and 1155B, respectively. In certain embodiments, the pivot points 1155A and 1155B may secure the lock arms 1108A and 1108B, respectively, by rivets or other suitable fastening means.

[0042] FIG. 8 is a side view of the light fixture 100 and the snap and lock hinge mount 115 in an install position. In FIG. 8, a support wire hook 1120 of the top plate 1102 is illustrated. The wire support hanger 1104 is hung on the support wire hook 1120. The wire support hanger 1104 is also mounted adjacent to or against the bottom plate 1106, creating a pivot for the support wire support hanger 1104 to swing. When the wire support hanger 1104 is hung on the support wire hook 1120, the bottom plate 1106 hangs from the top plate 1102.

[0043] FIG. 9 is a side view of the snap foot 1112B and the support wire hook 1120 of the snap and lock hinge mount 115. As illustrated in FIG. 9, the support wire hook 1120 includes two support wire hooks, 1120A and 1120B. Further, the snap foot 1112D proximate to the other side of the top plate 1102 is illustrated in FIG. 9. In certain example embodiments, the snap feet 112 are replaced or supplemented by other coupling mechanisms such as, but not limited to, clips, hooks, latches, etc.

[0044] FIG. 10 is another side view of the light fixture 100 and snap and lock hinge mount 115 in the install position. It is noted that, in the install position, the bottom

plate 1106 and the light fixture 100, hanging via the wire support hanger 1104 from the support wire hooks 1120A and 1120B, may be swung (i.e., moved) within a certain range of motion to permit access for electrical wiring connections to the light fixture 100.

[0045] FIG. 11 is another side view of the light fixture 100 and snap and lock hinge mount 115 in the mount position. In the mount position illustrated in FIG. 11, the top plate 1102 and bottom plate 1106 are brought together into contact or near-contact. Further, the lock arms 1108A and 1108B have been rotated into position over the screws 1152A and 1152B, respectively. Once the screws 1152A and 1152B have been tightened, the lock arms 1108A and 1108B are unable to pivot and are locked into position. Thus, the snap and lock hinge mount 115 is fixed in the mounted position.

[0046] FIG. 12 is a perspective view of a top cover 165 of the light fixture housing 110. As illustrated in FIG. 12, several embossed recesses are formed into the top cover 165. According to certain embodiments, before the bottom plate 1106 is mounted to the light fixture housing 110, the wire support hanger 1104 may be placed into a first embossed recess 1140. Ends of the wire support hanger 1104 are placed into end channels 1148A and 1148B. After placing the wire support hanger 1104 into the first embossed recess 1140, the bottom plate 1106 may be mounted to the top cover 165 of the light fixture housing 110, securing the wire support hanger 1104 between the top cover 165 and the bottom plate 1106. The embossed recesses 1144 and 1146 are recessed deeper than the embossed recess 1140, and permit spacing for the snap feet 1112, as described in further detail below. A further embossed recess 1142 is recessed deeper than the embossed recess 1140, and permits spacing for the wire support hooks 1120 when the snap and lock hinge mount 115 is in the mounted position.

[0047] FIG. 13 is a view of the snap and lock hinge mount 115 in an install position. As the top plate 1102 and bottom plate 1106 are brought together into contact or near-contact, the first snap foot 1112A is positioned to pass through the through-hole 1135A. Similarly, other snap feet (e.g., 1112B, 1112D, etc.) of the top plate 1102 are positioned to pass through corresponding through-holes in the bottom plate 1106. In FIG. 13, a depression 1113A of the first snap foot 1112A is illustrated. The depression

1113A is snapped into place when the snap and lock hinge mount 115 is moved into the mounted position as described below with reference to FIGS. 14-16.

[0048] FIG. 14 is a view of the snap and lock hinge mount 115 before snapping the mount in a mounted position. In FIG. 14, before snapping the snap and lock hinge mount 115 into the mounted (and locked) position, the top plate 1102 and bottom plate 1106 are brought together into contact or near-contact. The first snap foot 1112A passes through the through-hole 1135A and falls into the embossed recess 1144. In FIG. 14, the first foot rest 1150A of the bottom plate 1106 is illustrated. From the position illustrated in FIG. 14, the top plate 1102 is slid in the direction “A”, and the first snap foot 1112A can be slid so that the depression 1113A is seated over the first foot rest 1150A.

[0049] FIG. 15 is another view of the snap and lock hinge mount 115 before snapping the mount in the mounted position. In FIG. 15, before snapping the snap and lock hinge mount 115 into the mounted (and/or locked) position, the top plate 1102 and bottom plate 1106 are brought together into contact or near-contact. The first snap foot 1112A passes through the through-hole 1135A and falls into the embossed recess 1144, and the second snap foot 1112B passes through the through-hole 1135B and falls into the embossed recess 1144. In FIG. 15, the first foot rest 1150A and the second foot rest 1150B of the bottom plate 1106 is illustrated. From the position illustrated in FIG. 15, the top plate 1102 can be slid in the direction “A”, and the first snap foot 1112A and the second snap foot 1112B are slid so that the depressions 1113A and 1113B are seated over the first and second foot rests 1150A and 1150B, respectively.

[0050] FIG. 16 is a view of the snap and lock hinge mount 115 in a mounted position after snapping the mount in the seated position. As illustrated in FIG. 16, the top plate 1102 has been slid in the direction “A”, and the first snap foot 1112A and the second snap foot 1112B are slid such that the depressions 1113A and 1113B are seated over the first and second foot rests 1150A and 1150B, respectively. It is noted that, in the embodiments described herein, the snap and lock hinge mount 115 includes a through-hole 1135 and foot rest 1150 for each snap foot 1112 of the top plate 1102. It is further noted that, as the first snap foot 1112A and the second snap foot 1112B are slid in the

direction “A”, the ends of the feet 1112A and 1112B make noticeable contact with the foot rests 1150A and 1150B and offer a certain amount of resistance. As the feet 1112A and 1112B are further slid in the direction “A” such that the depressions 1113A and 1113B are seated over the first and second foot rests 1150A and 1150B, respectively, the snap and lock hinge mount 115 “snaps” into the mounted position. In example embodiments, the “snap” may be detected in an audible and/or tactile sense.

[0051] FIG. 17 is a cutaway side view of the wire support hanger 1104 and the wire hook 1120 of the snap and lock hinge mount 115, before snapping the mount 115 into the mounted position. From the position illustrated in FIG. 17, the top plate 1102 can be slid in the direction “A”, and the wire support hanger 1104 slides along the wire hook 1120 from the position illustrated in FIG. 17 to the position illustrated in FIG. 18.

[0052] FIG. 18 is a cutaway side view of the wire support hanger 1104 and the wire hook 1120 of the snap and lock hinge mount 115, after snapping the mount 115 into the mounted position. As illustrated in FIG. 18, the top plate 1102 has been slid in the direction “A”, and the wire support hanger 1104 has moved along the wire hook 1120 from the position illustrated in FIG. 17 to the position illustrated in FIG. 18.

[0053] FIG. 19 is a perspective side view of the snap and lock hinge mount 115 according to an example embodiment of the disclosure, before locking the mount 115. In FIG. 19, the top plate 1102 and the bottom plate 1106 are illustrated before being brought into near-contact, and the lock arms 1108A and 1108B are rotated outward so as not to touch the screws 1152A and 1152B. After the top plate 1102 and the bottom plate 1106 are brought into contact or near-contact and the top plate 1102 is slid into the seated position, as described above, the lock arms 1108A and 1108B may be pivoted at pivot points 1155A and 1155B, respectively. The lock arms 1108A and 1108B include eyelets 1109A and 1109B, respectively. After the top plate 1102 and the bottom plate 1106 are slid into the seated position, the lock arms 1108A and 1108B may be rotated at pivot points 1155A and 1155B over the screws 1152A and 1152B, respectively, and secured into a locked position by tightening the screws 1152A and 1152B. The screws 1152A

and 1152B, in various embodiments, may be secured with a washer or other means to prevent the screws 1152A and 1152B from being removed from the mount 115.

[0054] FIG. 20 is a bottom view of the lock arm 1108A after locking the snap and lock hinge mount 115. In FIG. 20, the lock arm stop 1164 is illustrated. The lock arm stop 1164, in the position illustrated in FIG. 20, prevents the lock arm 1108A from moving further in the direction “B”, based on contact between the edge 1160 and the stop 1164. It is noted that the position of the lock arm 1108A illustrated in FIG. 20 corresponds to the position of the lock arm 1108A illustrated in FIG. 11, for example.

[0055] FIG. 21 is a bottom view of the lock arm 1108A before locking the snap and lock hinge mount 115. In the position illustrated in FIG. 21, the lock arm stop 1164, prevents the lock arm 1108A from moving further in the direction “C”, based on contact between the edge 1162 and the stop 1164. It is noted that the position of the lock arm 1108A illustrated in FIG. 21 corresponds to the position of the lock arm 1108A illustrated in FIG. 19, for example.

[0056] In certain example embodiments, the bottom plate 1106 of the snap and lock hinge mount 115 is one and the same as the top surface 111 of the central housing 110.

[0057] Although each example embodiment has been described in detail, it is to be construed that any features and modifications that are applicable to one embodiment are also applicable to the other embodiments. Furthermore, although the disclosure has been described with reference to specific embodiments, these descriptions are not meant to be construed in a limiting sense. Various modifications of the disclosed embodiments, as well as alternative embodiments of the disclosure will become apparent to persons of ordinary skill in the art upon reference to the description of the example embodiments. It should be appreciated by those of ordinary skill in the art that the conception and the specific embodiments disclosed may be readily utilized as a basis for modifying or designing other structures or methods for carrying out the same purposes of the disclosure. It should also be realized by those of ordinary skill in the art that such equivalent constructions do not depart from the spirit and scope of the disclosure as set

forth in the appended claims. It is therefore, contemplated that the claims will cover any such modifications or embodiments that fall within the scope of the disclosure.

CLAIMS

What is claimed is:

1. A light fixture comprising:
 - a central housing containing one or more electrical components;
 - a central grommet, wherein the central grommet traverses a central opening in the central housing, providing a path for a central cord to enter the central housing through the grommet, wherein the central grommet forms a water tight seal between the central cord and the central housing, and wherein the central cord is electrically coupled to the one or more electrical components;
 - at least one rotatable light module coupled to the central housing, the at least one rotatable light module comprising a heat sink on a heat sink side of the at least one rotatable light model, and
 - at least one peripheral cord coupled to the at least one rotatable light module at a first end of the at least one peripheral cord and traversing at least one respective peripheral opening in the central housing, wherein the at least one peripheral cord is electrically coupled to the one or more electrical components and the rotatable light module.
2. The light fixture of Claim 1, further comprising:
 - at least one peripheral grommet traversing the at least one respective peripheral opening, wherein the at least one peripheral grommet surrounds a portion of the at least one peripheral cord and forms a water tight seal between the portion of the at least one peripheral cord and the central housing.
3. The light fixture of Claim 1, further comprising:
 - at least one bracket assembly disposed at the junction of the at least one peripheral cord and the at least one rotatable light module, wherein the bracket assembly is coupled to the rotatable light module and surrounds a portion of the at least one peripheral cord,

holding the portion of the at least one peripheral cord stationary with respect to the at least one light rotatable light module.

4. The light fixture of Claim 3, wherein the bracket assembly includes a first bracket and a second bracket connected to each other with at least one fastener such that at least a portion of a surface of both the first bracket and second bracket surrounds the cord.

5. The light fixture of Claim 3, wherein the bracket assembly is stationarily coupled to the heat sink via a mating feature.

6. The light fixture of Claim 5, wherein the bracket assembly includes at least one slot that engages with at least one protrusion of the heat sink.

7. The light fixture of Claim 1, wherein the central housing comprises two or more corner sections disposed at respective corners of the central housing, wherein the at least one rotatable lighting module is disposed near at least one edge of the central housing between two of the two or more corner sections, wherein the at least one rotatable lighting module is rotatively coupled to the two corner sections.

8. The light fixture of Claim 7, wherein the two or more corner sections each comprise a locking mechanism, the locking mechanism configured to lock the at least one rotatable lighting module in a plurality of positions.

9. The light fixture of Claim 1, further comprising:

a mounting mechanism coupled to the central housing at a first portion and configured to couple to a support structure at a second portion, wherein the first portion and the second portion are coupled by a movable middle portion, wherein the light fixture is movable between a hanging position and a mounted position via the mounting mechanism.

10. The light fixture of Claim 1, wherein the central housing is made of a deep drawn process using cold rolled steel.

11. A mounting assembly, comprising:
 - a top plate comprising a first mating mechanism;
 - a support hanger comprising a first end and a second end, the first end rotatively coupled to the top plate; and
 - a bottom plate comprising a second mating mechanism corresponding to the first mating mechanism, wherein the second end of the support hanger is rotatively coupled to the bottom plate,
 - wherein the mounting assembly is foldable into a folded position and extendable into an extended position,
 - wherein in the folded position, the bottom plate, the support hanger, and the top plate are substantially parallel, and wherein the bottom plate is coupled to the top plate via the first and second mating mechanisms, the bottom plate being a first distance from the top plate; and
 - wherein in the extended position, the first mating mechanism is decoupled from the second mating mechanism, the bottom plate being a second distance from the top plate, the second distance being greater than the first distance, and wherein the bottom plate is supported by the top plate via the support hanger.
12. The mounting assembly of Claim 11, wherein the first mating mechanism comprises a hook, and the second mating mechanism comprises a hook receptacle.
13. The mounting assembly of Claim 12, wherein the hook slides into the hook receptacle to hold the mounting assembly in the folded position.
14. The mounting assembly of Claim 11, wherein the bottom plate is configured to be coupled to a lighting fixture, wherein the top plate is configured to support the lighting fixture via the support hanger and the bottom plate when the mounting assembly is in the extended position.

15. The mounting assembly of Claim 14, wherein the top plate is configured to support the lighting fixture via the bottom plate and the first and second mating mechanism when the mounting assembly is in the folded position.
16. The mounting assembly of Claim 15, wherein top plate comprises a first coupling mechanism and the light fixture comprises a second coupling mechanism corresponding to the first coupling mechanism, the first coupling mechanism being coupled to the second coupling mechanism when the mounting assembly is in the mounted position.

17. A fixture mounting assembly, comprising:
a top plate comprising a first mating mechanism;
a support hanger comprising a first end and a second end, the first end moveably coupled to the top plate; and
a fixture housing comprising a second mating mechanism on a top surface of the fixture housing corresponding to the first mating mechanism, wherein the second end of the support hanger is coupled to the fixture housing;
wherein the mounting assembly is foldable into a folded position and extendable into an extended position,
wherein in the folded position, the fixture housing is coupled to the top plate via the first and second mating mechanisms, the fixture housing being a first distance from the top plate; and
wherein in the extended position, the first mating mechanism is decoupled from the second mating mechanism, the fixture housing being a second distance from the top plate, the second distance being greater than the first distance, and wherein the fixture housing is supported by the top plate via the support hanger.
18. The fixture mounting assembly of Claim 17, wherein the fixture housing comprises a light fixture housing.
19. The fixture mounting assembly of Claim 18, wherein the first mating mechanism comprises a hook, and the second mating mechanism comprises a hook receptacle, wherein the hook slides into the hook receptacle to hold the fixture mounting assembly in the folded position, and wherein the top plate supports the fixture housing via at least the first and second mating mechanism.
20. The fixture mounting assembly of Claim 17, wherein the top plate comprises a third mating mechanism and the fixture housing comprises a fourth mating mechanism on a side surface of the fixture housing, corresponding to the third mating mechanism, the

third mating mechanism being coupled to the fourth mating mechanism when the fixture mounting assembly is in the mounted position.

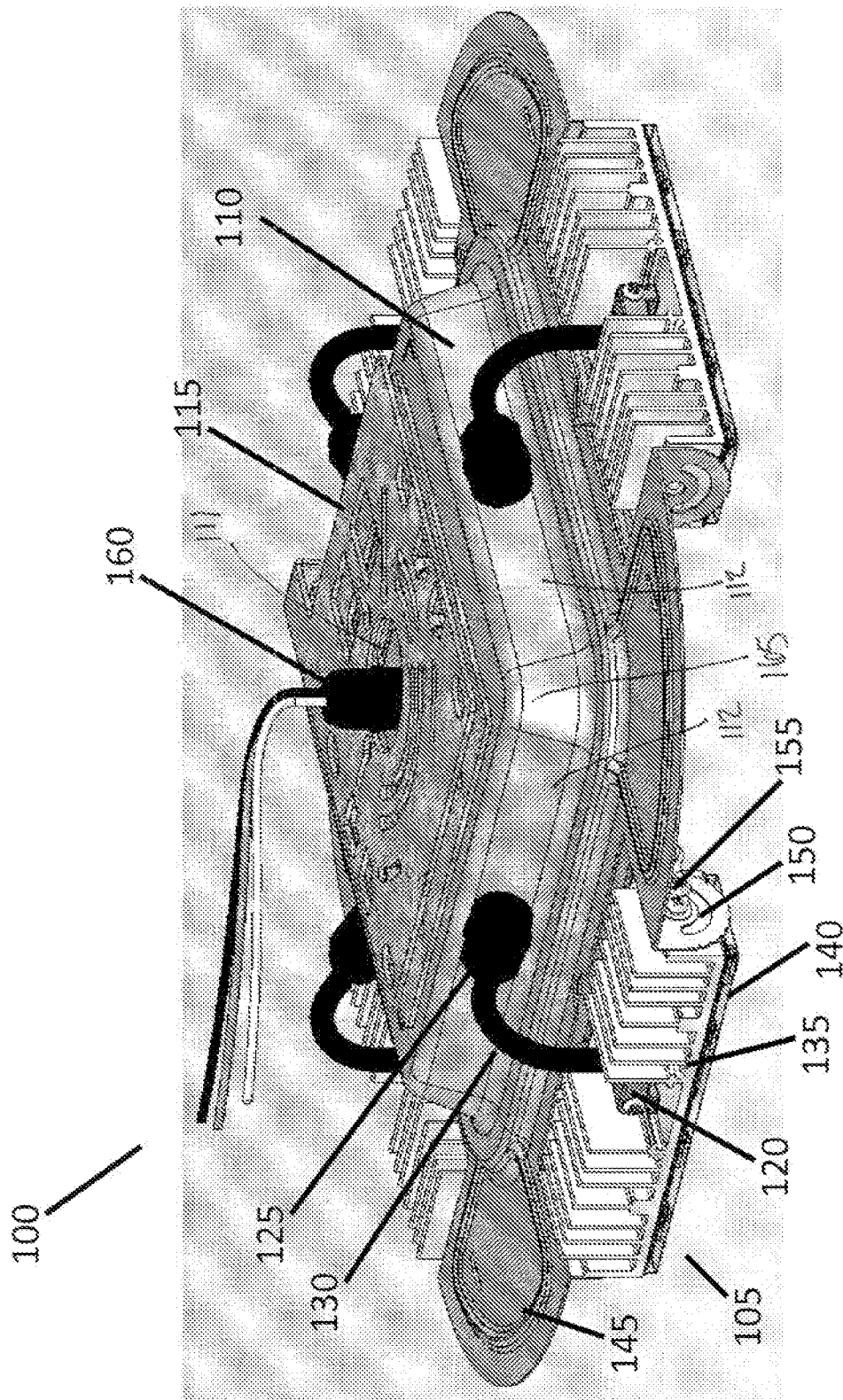
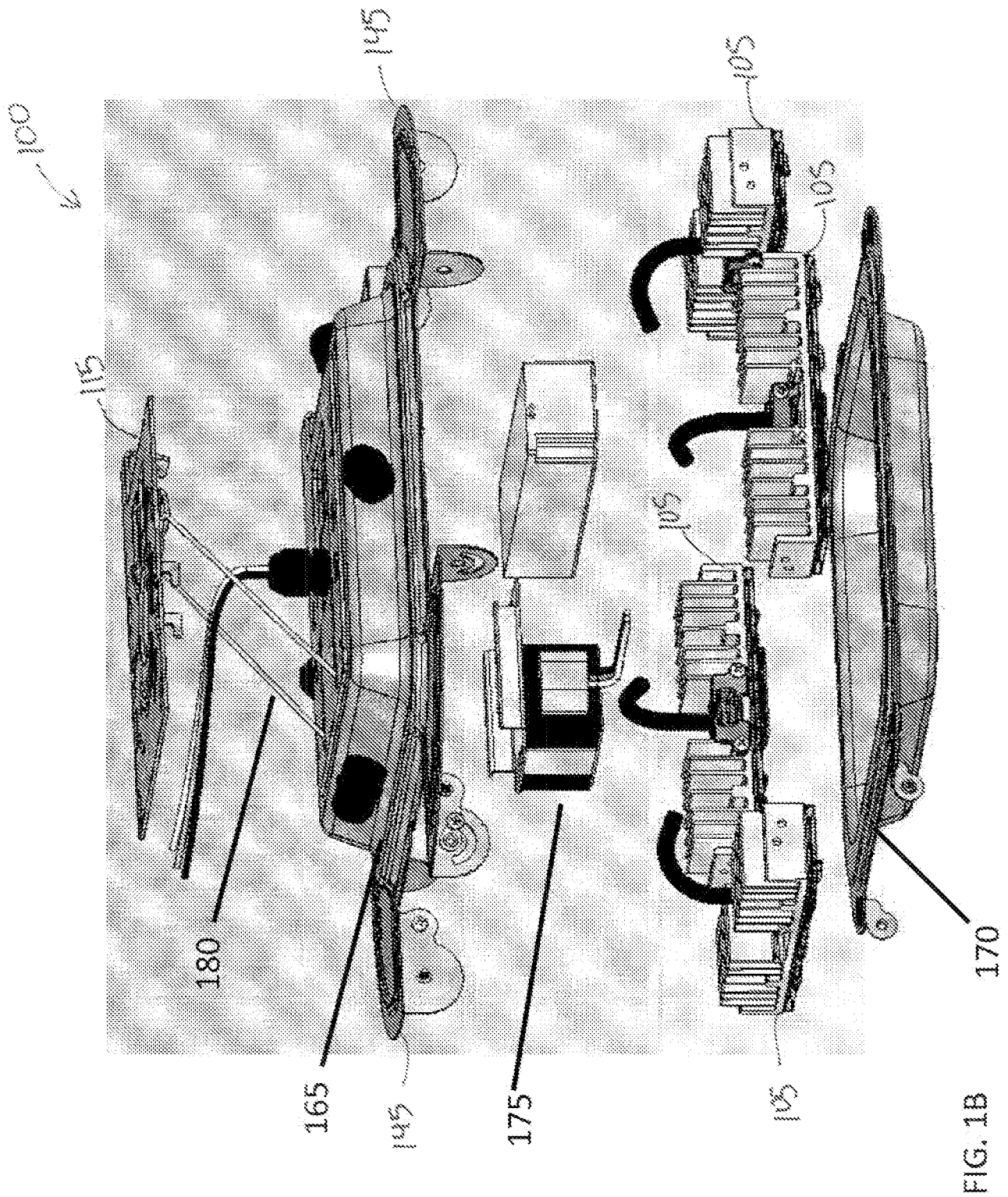


FIG. 1A



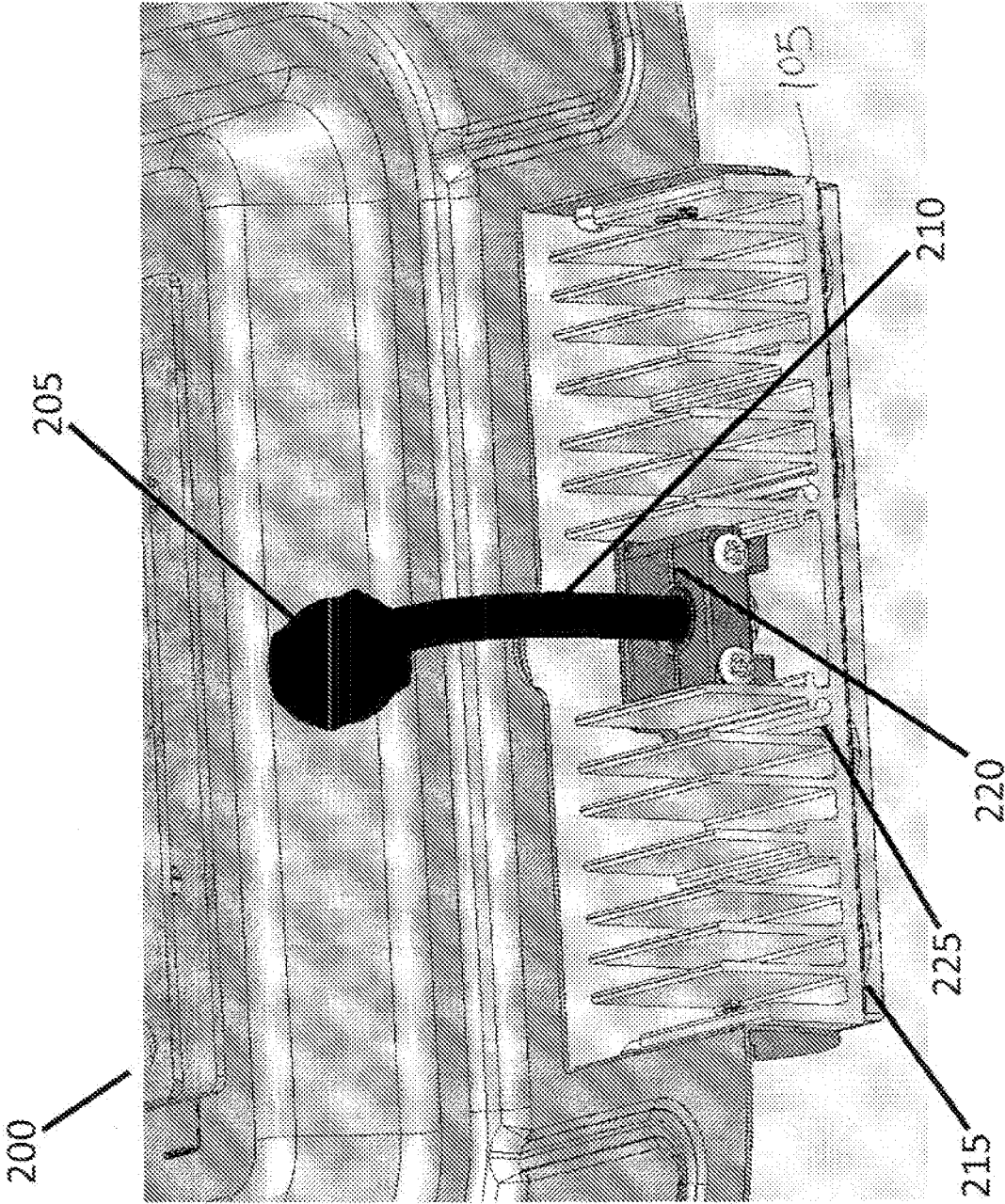


FIG. 2

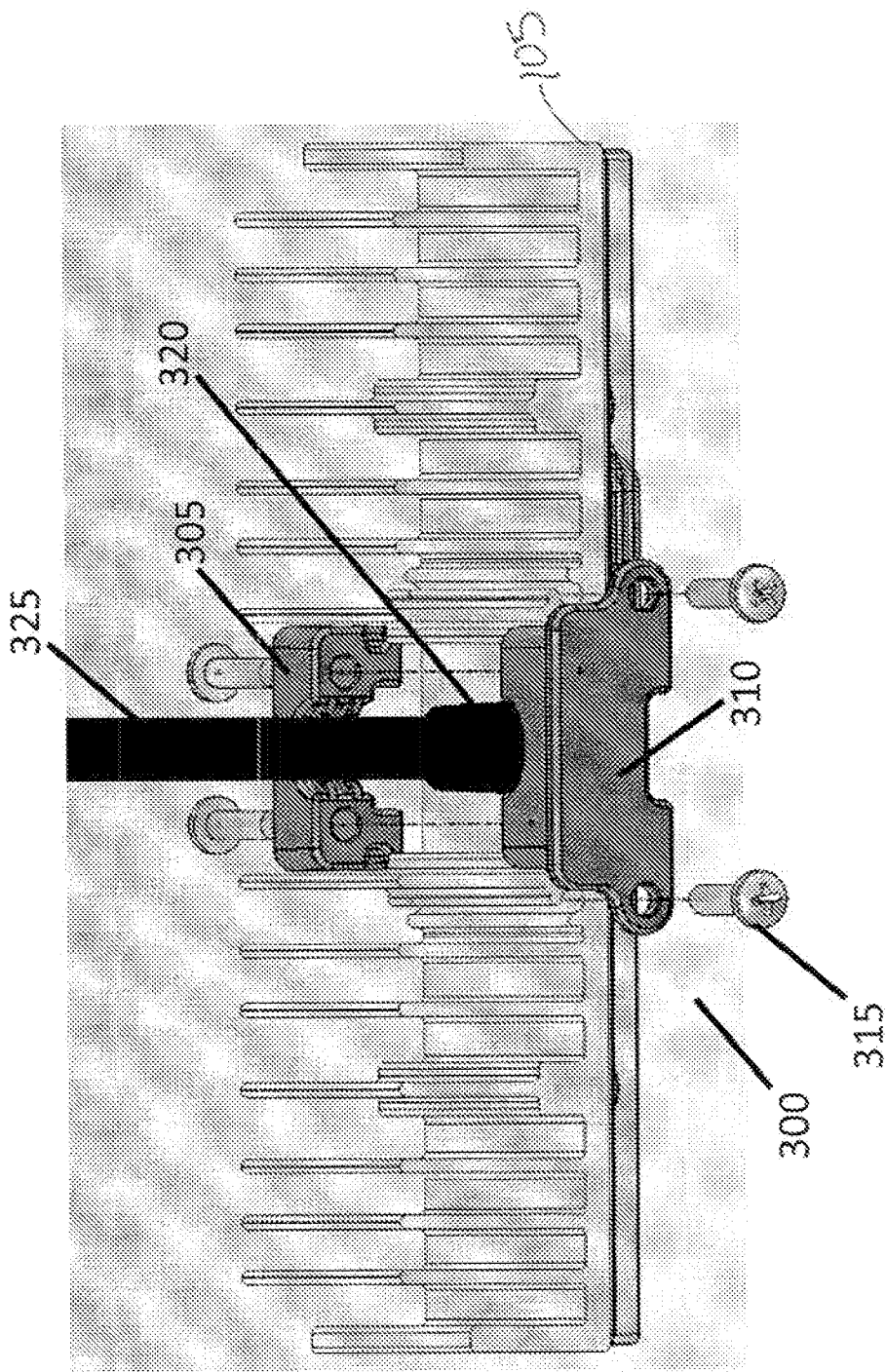


FIG. 3

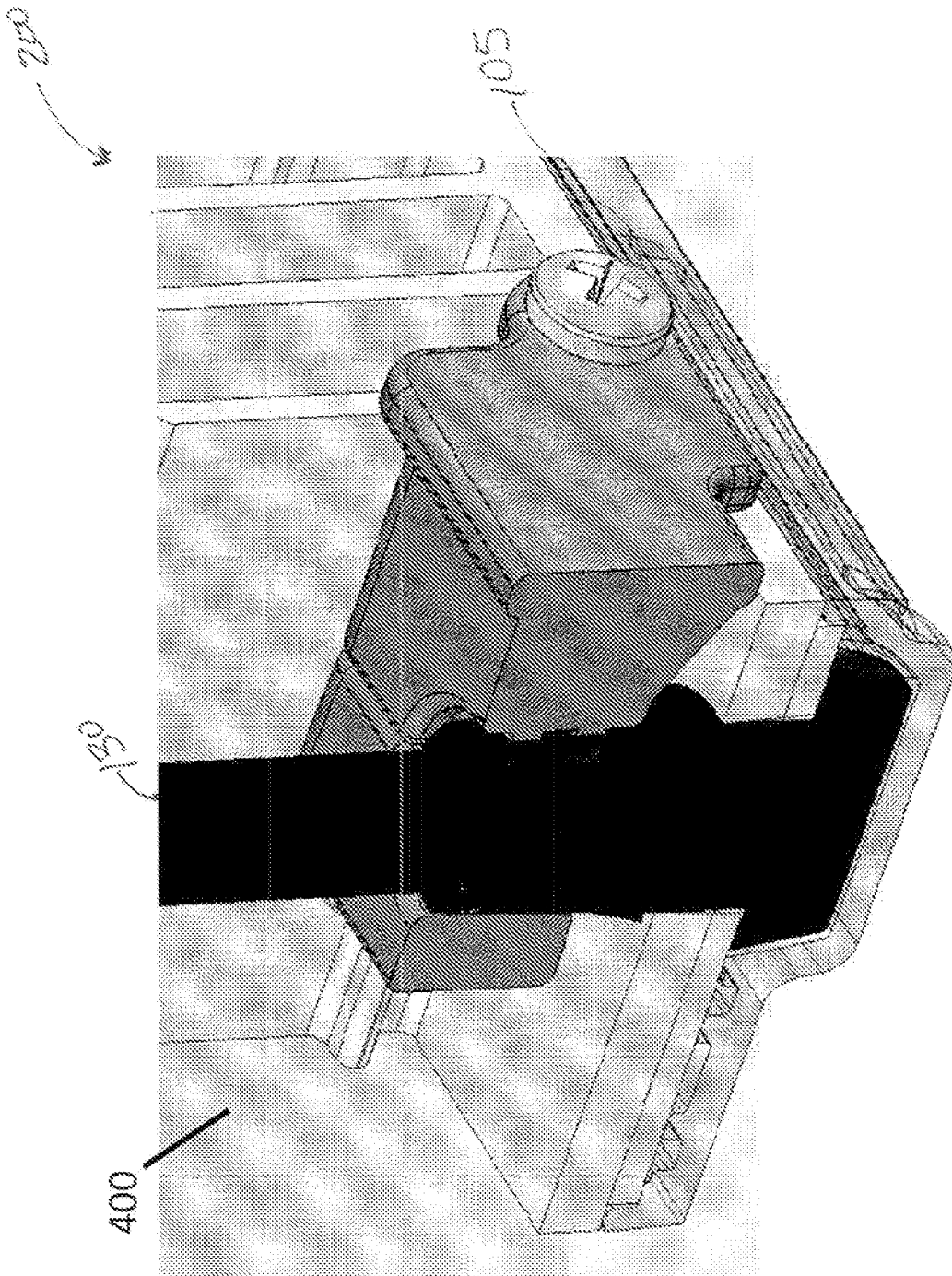
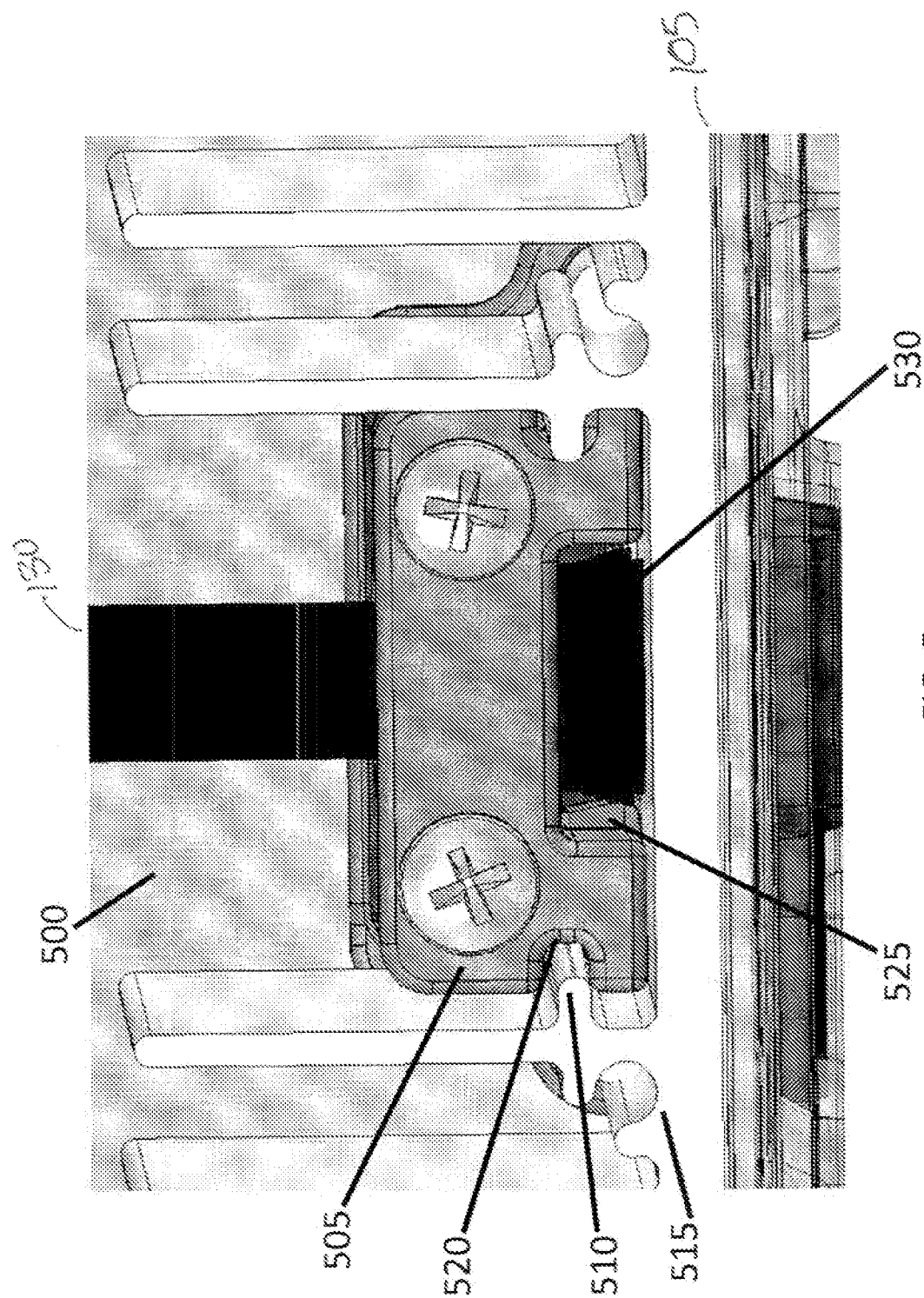


FIG. 4



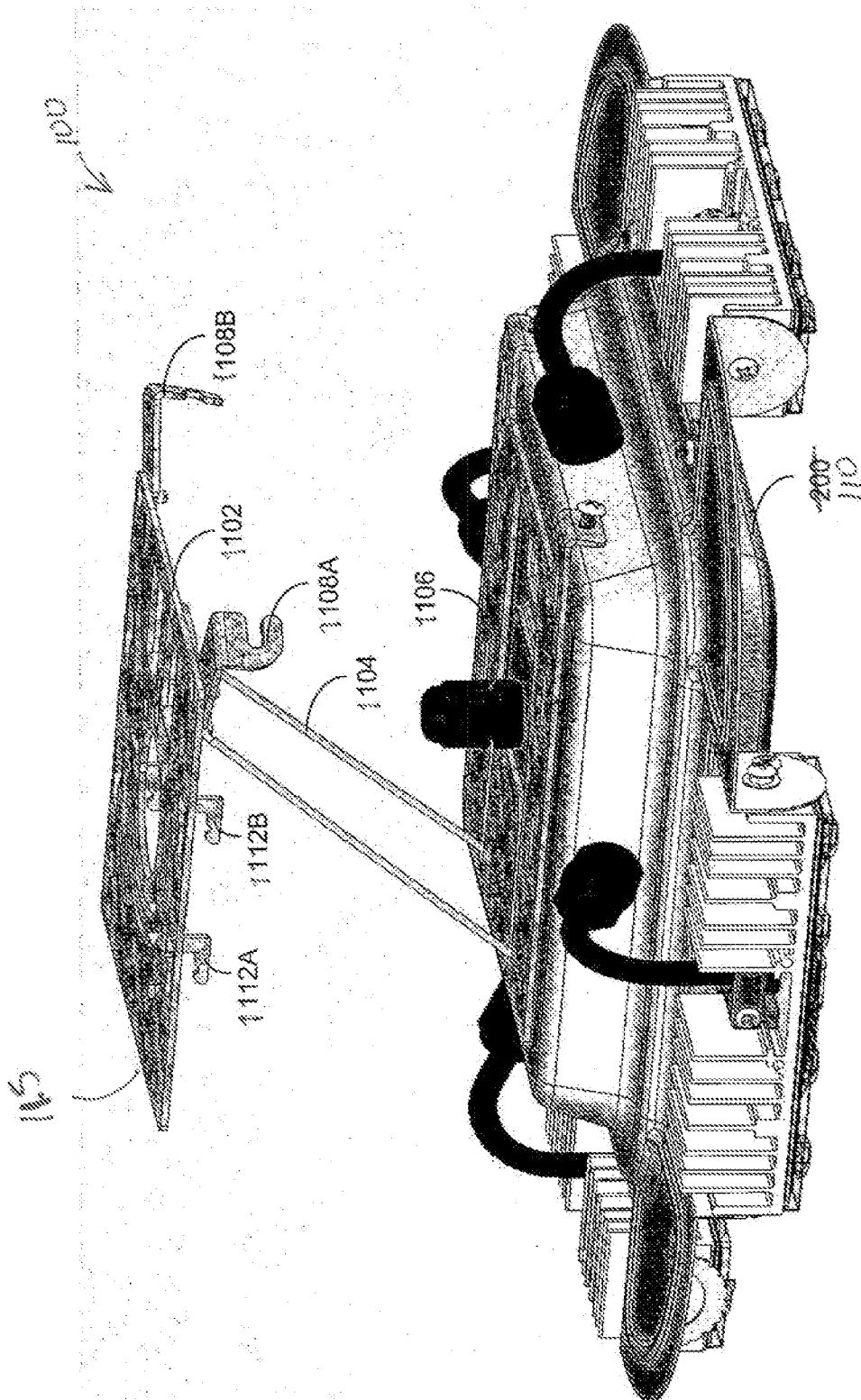


FIG. 6

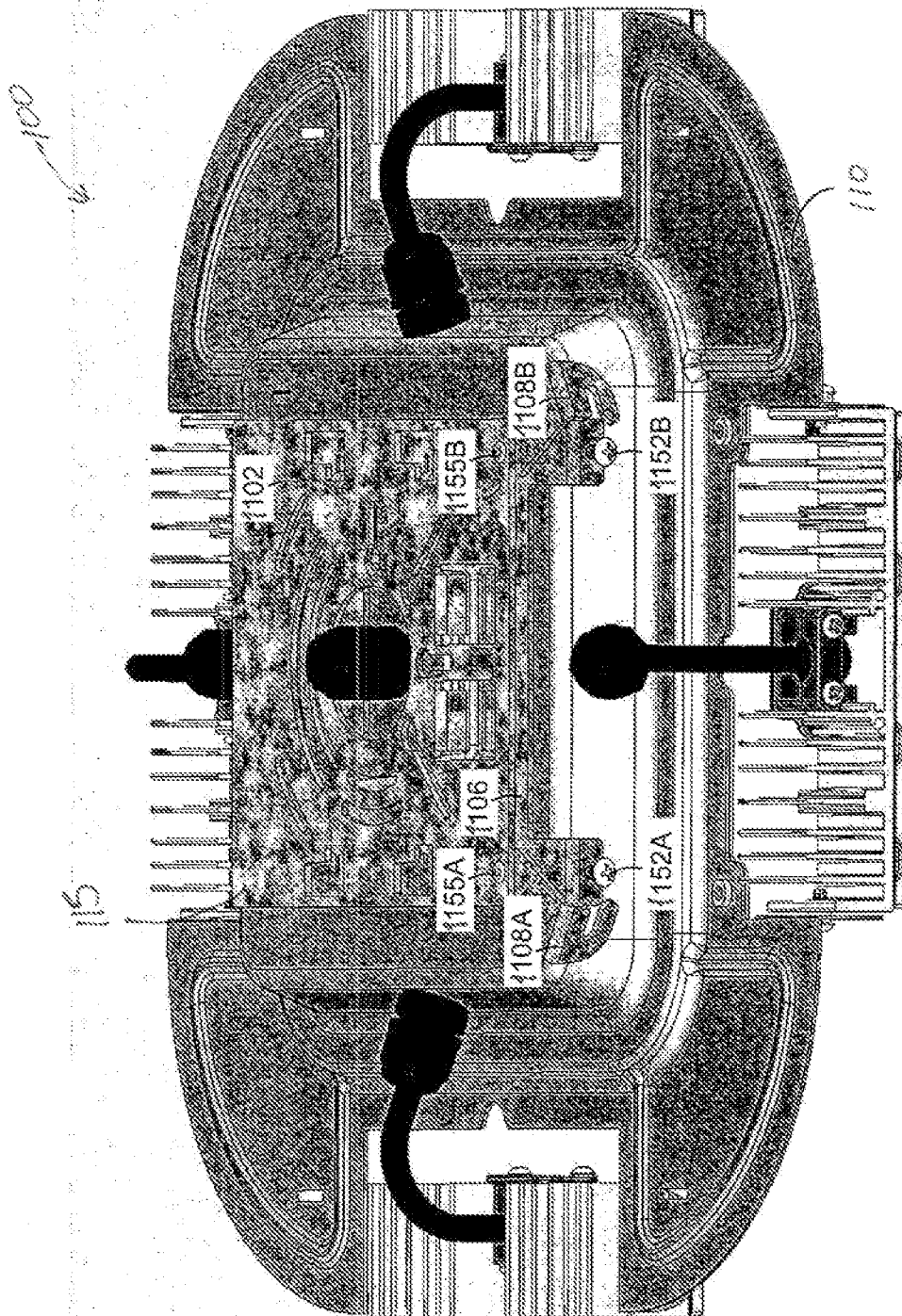


FIG. 7

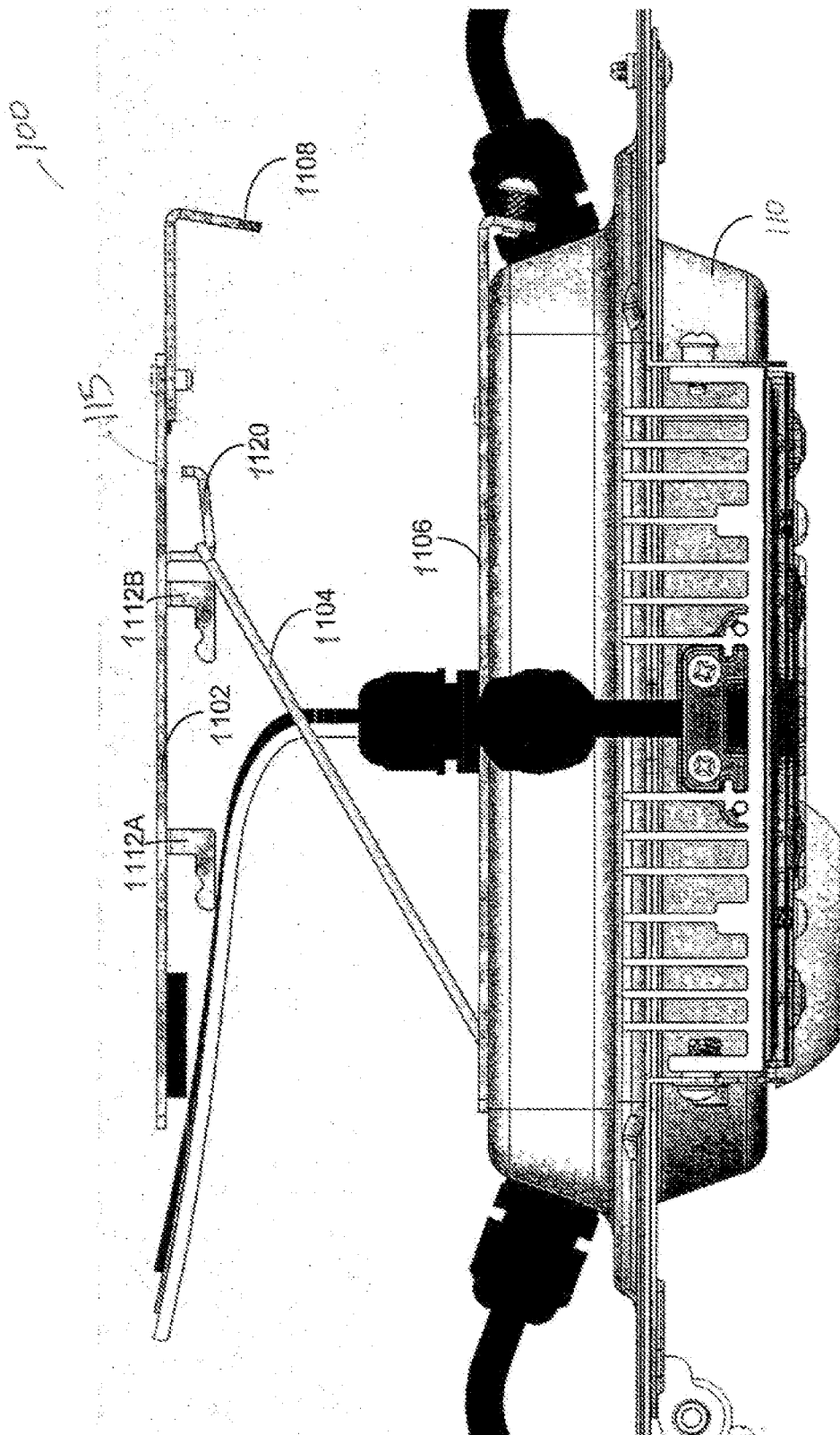


FIG. 8

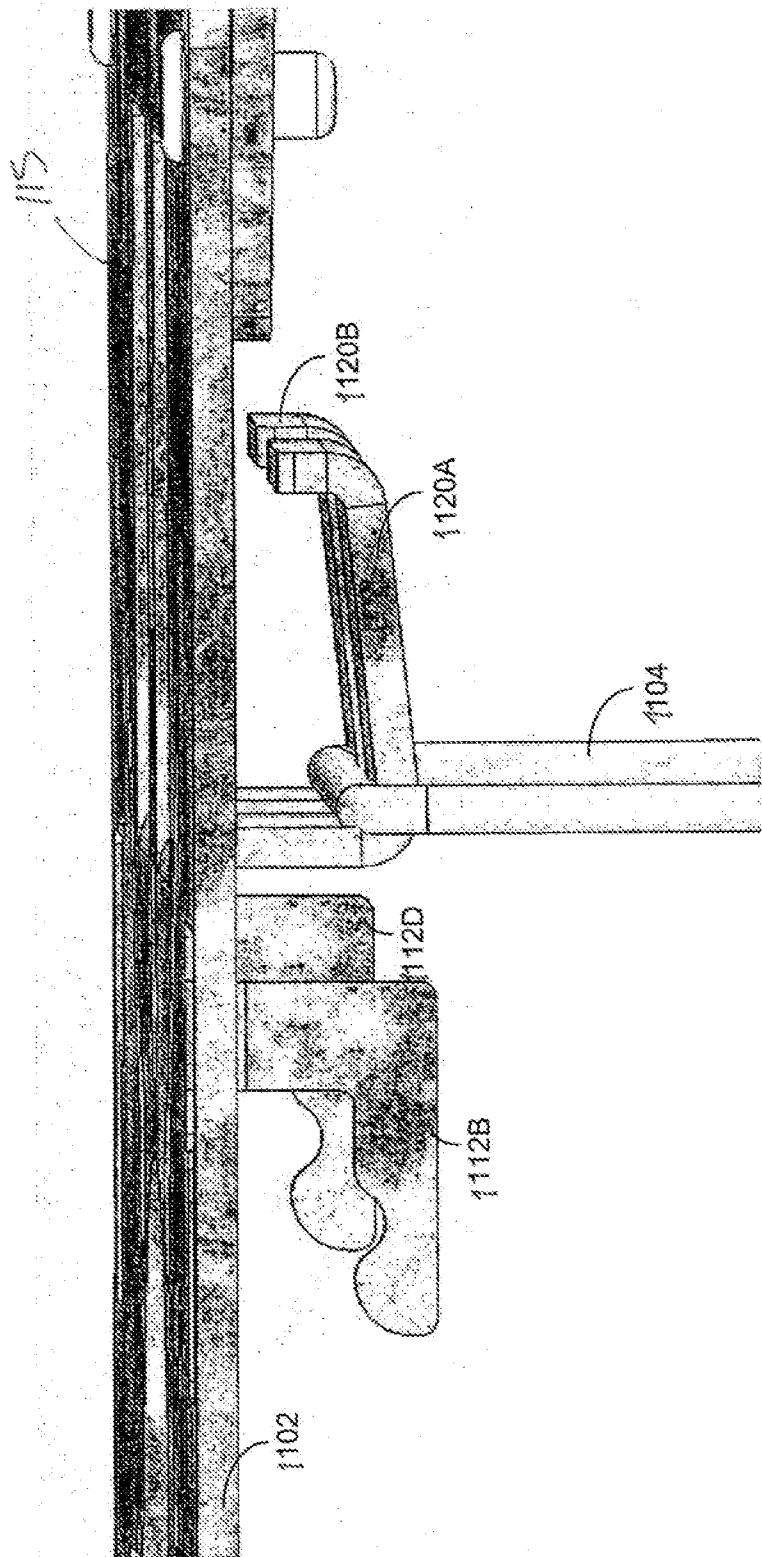
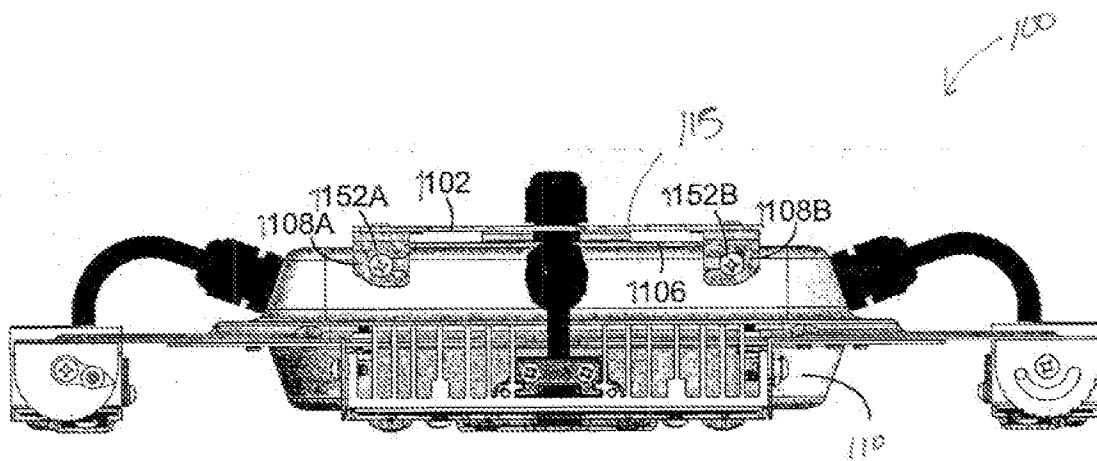
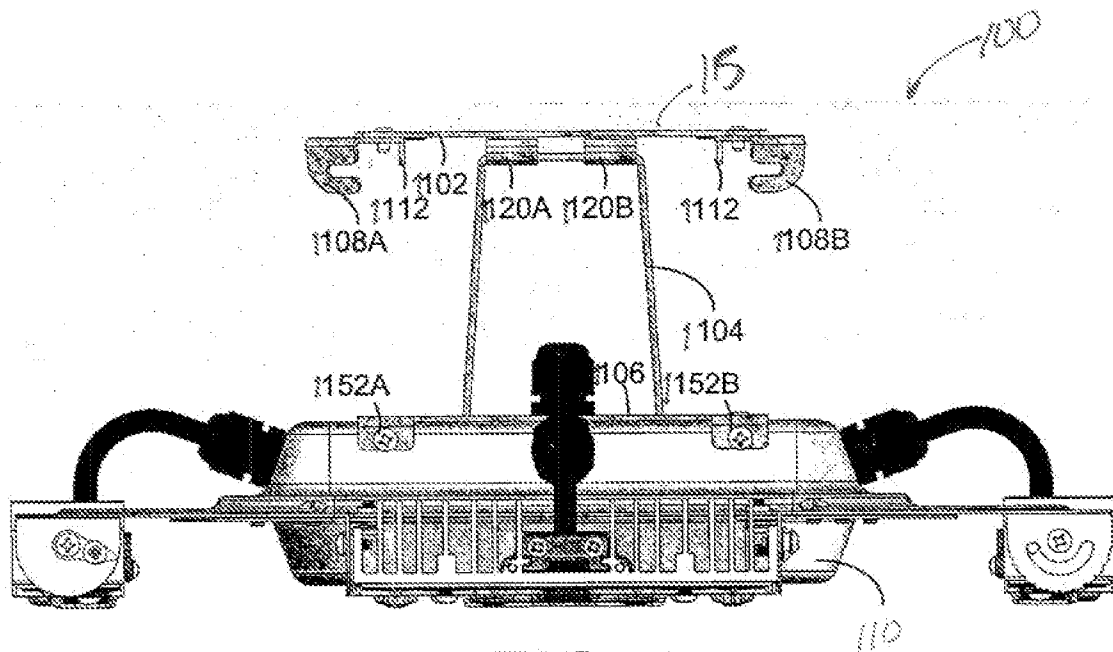


FIG. 9



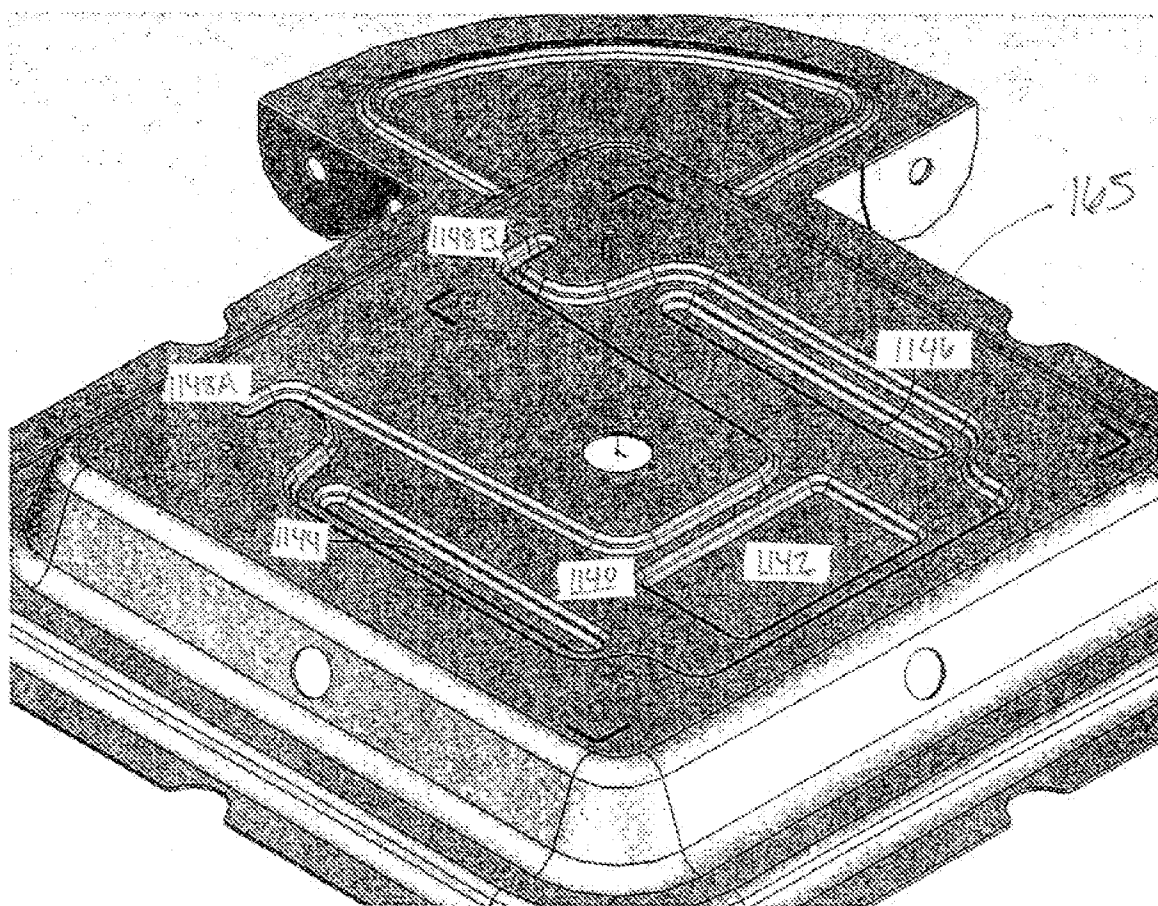


FIG 12

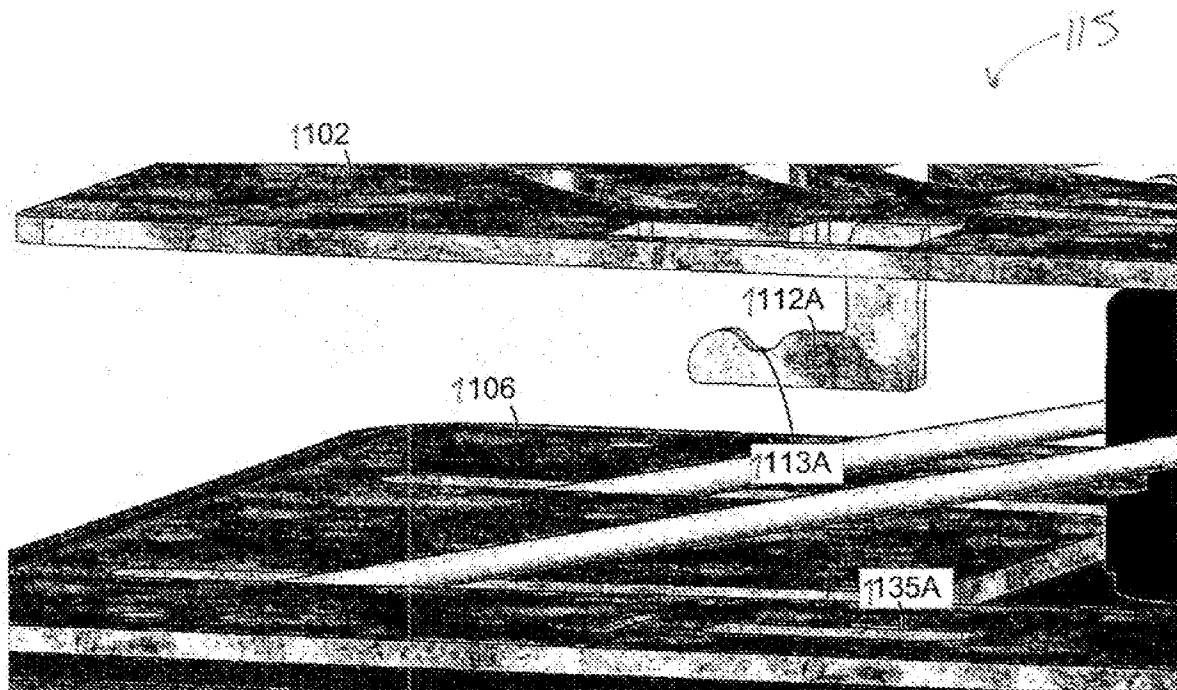


FIG. 13

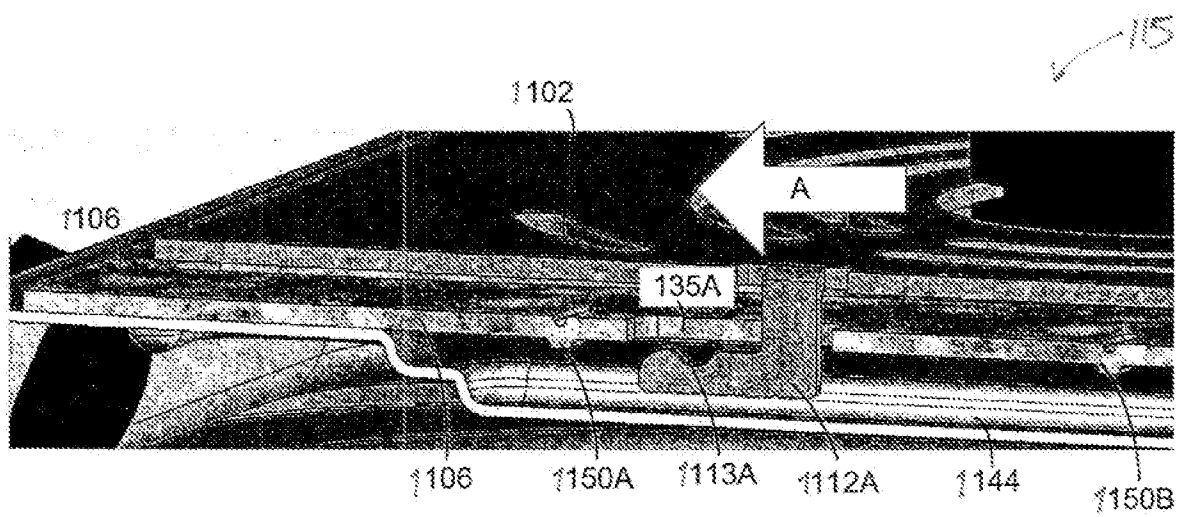


FIG. 14

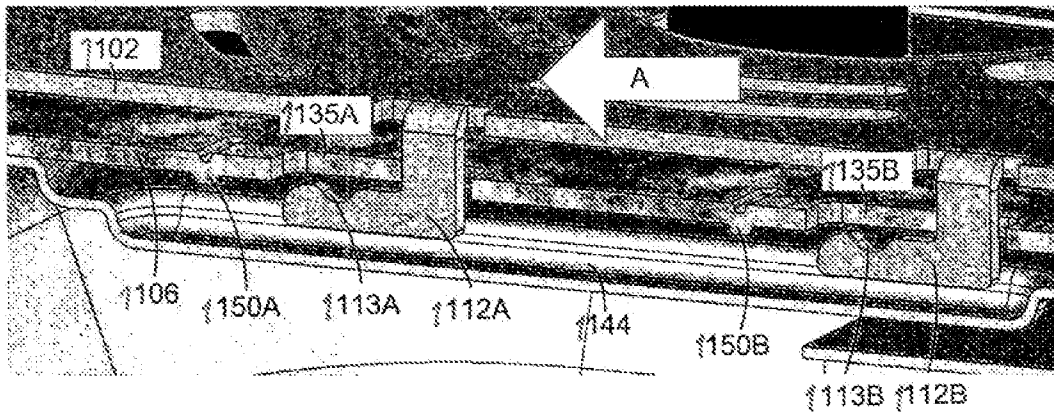


FIG. 15

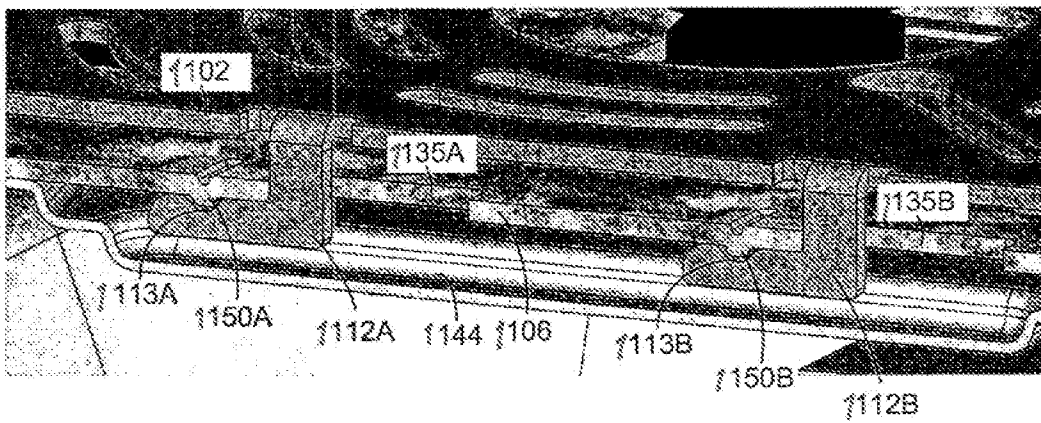


FIG. 16

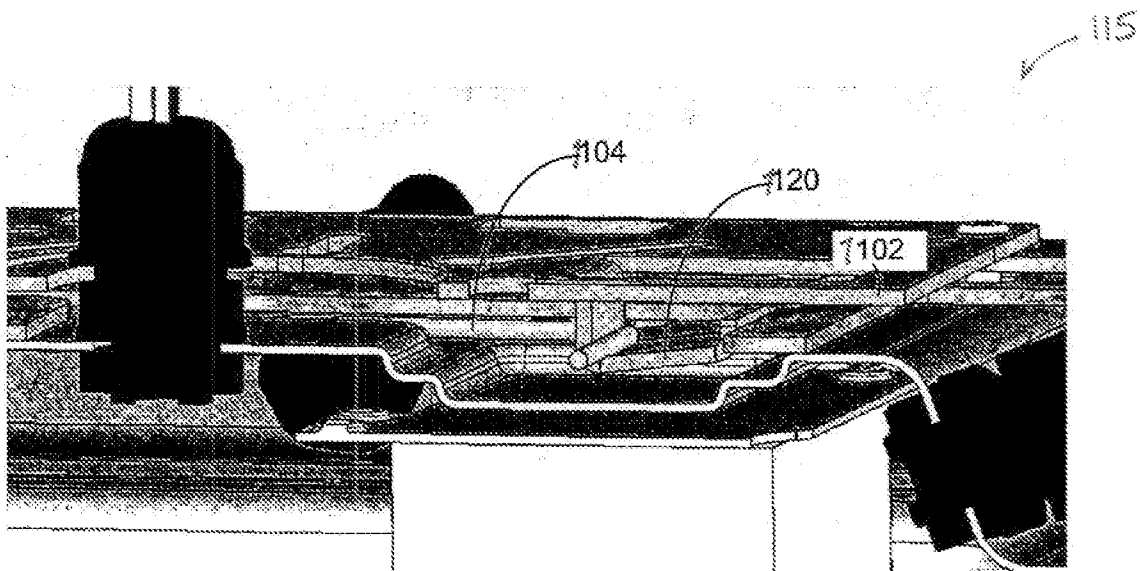


FIG. 17

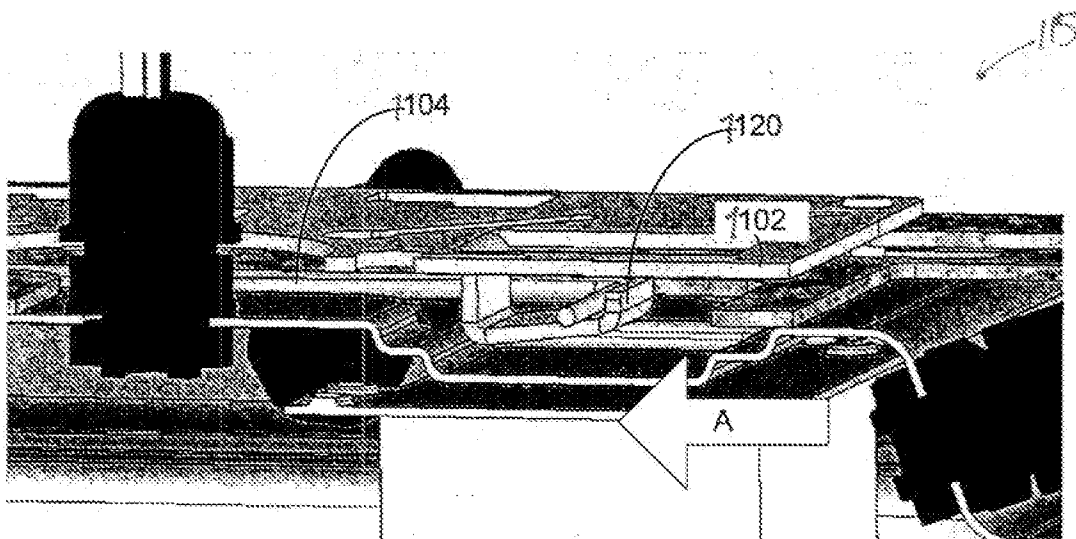


FIG. 18

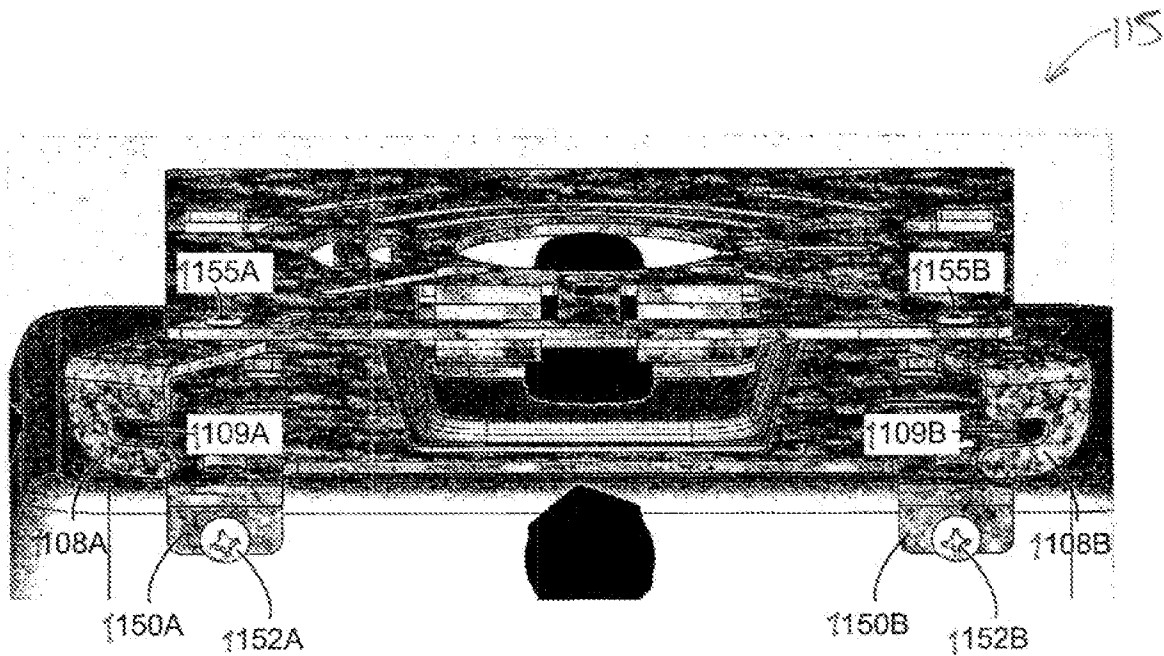


FIG. 19

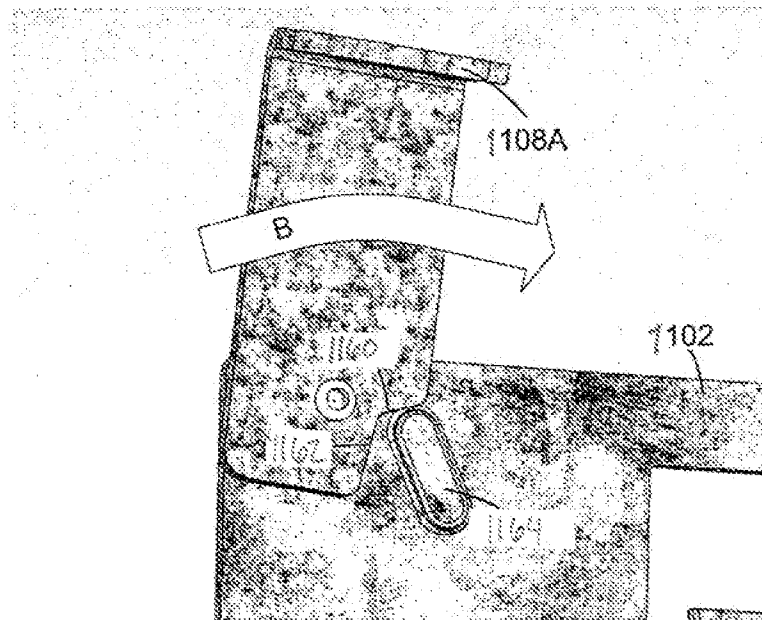


FIG. 20

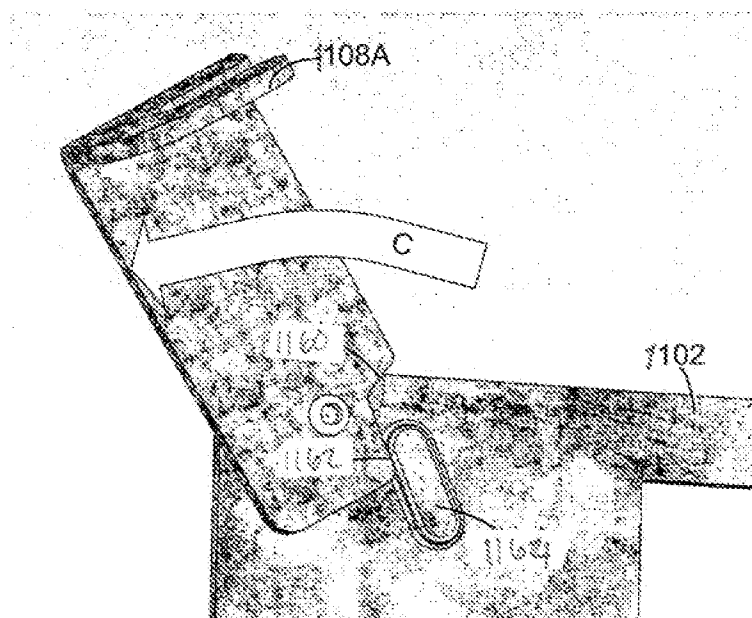


FIG. 21

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2013/031738

A. CLASSIFICATION OF SUBJECT MATTER		<i>F21V 21/14 (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)			
F21S 4/00, 9/02, F21V 21/14, 29/00			
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched			
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)			
PatSearch (RUPTO internal), Esp@cenet, PAJ, USPTO			
C. DOCUMENTS CONSIDERED TO BE RELEVANT			
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	
A	US 2008/0068839 A1 (TIR TECHNOLOGY LP) 20.03.2008	1-20	
A	US 2010/0157570 A1 (FU ZHUN PRECISION INDUSTRY (SHEN ZHEN) CO., LTD. et al.) 24.06.2010	1-20	
A	US 8070347 B1 (GEMMY INDUSTRIES CORPORATION) 06.12.2011	1-20	
A	US 6945671 B1 (TONI F. SWARENS) 20.09.2005	1-20	
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.			
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "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) "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	
27 June 2013 (27.06.2013)		04 July 2013 (04.07.2013)	
Name and mailing address of the ISA/ FIPS Russia, 123995, Moscow, G-59, GSP-5, Berezhkovskaya nab., 30-1		Authorized officer	
Facsimile No. +7 (499) 243-33-37		E. Rodionova	
		Telephone No. 8(499)240-25-91	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 2013/031738

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

There are claimed two groups of inventions which are not connected by a single inventive concept.

Group 1 – Claim 1. The special technical features are a grommet and a peripheral cord.

Group 2 – Claims 11 and 17. The special technical features are a top plate, a support hanger, mating mechanisms and a mounting assembly. Therefore, there is no common special technical feature between the groups of inventions which would define the contribution of respective inventions into the state of the art.

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 additional fees, this Authority did not invite payment of additional fees.
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 and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.