

TITLE

FRAME AND TRIM RINGS FOR UNDERBED HITCH MOUNTING SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from U.S. Provisional Patent Application No. 62/174,388, entitled, "FRAME AND TRIM RINGS FOR UNDERBED HITCH MOUNTING ASSEMBLY," filed June 11, 2015 which is incorporated by reference herein.

FIELD OF INVENTION

[0002] The present invention is generally related to a towing apparatus and, more particularly, to an underbed hitch mounting system. More particularly, this disclosure is directed to an improved structural frame system and trim rings for an underbed hitch mounting system

BACKGROUND

[0003] Many vehicles are designed to transport freight, goods, merchandise, personal property, and other such cargo. Often, a hitch assembly is utilized to connect a towed vehicle or trailer to a towing vehicle, such as a truck for example, to increase the capacity to transport goods. Many types of coupling devices have been developed for providing this connection between a towing vehicle and a towed vehicle.

[0004] It is well known to utilize a trailer hitch to connect a trailer to a towing vehicle. There are many different types of trailer hitches that may be attached to the towing vehicle in a variety of ways, depending on the type of hitch to be used. Some of the most common types of hitches include gooseneck, fifth wheel, front mount, and the like. Often, the type of hitch used to connect

a trailer and a vehicle is determined by the size, shape and other features of the trailer. For example, large trailers such as semi trailers and campers often require a fifth wheel hitch, whereas, small and midsized trailers, such as boat trailers, are better suited for gooseneck trailer hitches. Typically, trailers are connected to a towing vehicle by way of a ball hitch secured to the vehicle and a ball socket coupling mechanism on the trailer that mounts over the ball and thereby allows for the trailer to pivot behind the towing vehicle.

[0005] Due to the size and weight of many trailers, towing a trailer may cause unsafe conditions for the towing vehicle, such as fishtailing or other unsafe effects. To avoid these unwanted effects, it is preferable to evenly balance and distribute the weight of the trailer over the wheels of the towing vehicle. This is best accomplished by connecting the hitch to the frame or base of the towing vehicle, near the vehicle's center of gravity. Accordingly, fifth wheel and gooseneck hitches mounted to pickup trucks are often connected to the truck frame underneath the bed of the truck.

[0006] Traditional fifth wheel hitches include a head assembly for receiving a king pin on a trailer, a base having a plurality of legs, and one or more mounting rails. The mounting rails may be permanently fixed to the frame of a vehicle, such as a pickup truck. For example, the mounting rails may be connected between two portions of a pickup truck frame underneath the truck bed. The mounting rails may include a plurality of holes for receiving the legs of the fifth wheel hitch.

[0007] Corresponding openings may be cut in the truck bed and aligned with the holes in the mounting rails. The legs of the fifth wheel hitch may be connected to holes in the mounting rails through the openings in the truck bed, thereby securing the fifth wheel hitch to the frame of the truck. When the fifth wheel hitch is not in use, the legs may be disconnected from the holes in the rails and the hitch may be removed from the bed of the truck. Caps may be placed over the holes to allow the truck bed to be used for other purposes.

[0008] Traditional gooseneck hitches also mount to a pickup truck frame, beneath the bed of a truck. A gooseneck hitch is designed for use in a pickup truck similar to a fifth wheel. The difference is that the gooseneck uses a ball and coupler verses a kingpin and pin receiver. Gooseneck hitches include a mounting plate configured to connect to the frame of a truck, a receptacle in the mounting plate configured to receive a ball hitch, and a hitch ball removably connected to the receptacle and configured to engage a coupling member of the trailer. An opening in the bed of the truck is aligned with the receptacle in the mounting plate, allowing the hitch ball to connect to the receptacle through the opening in the truck bed. The hitch balls themselves are typically removable or retractable so that when the hitch is not in use, the hitch ball may be removed or retracted when not in use, so as not to obstruct the bed of the pick-up truck in any significant manner.

[0009] Towing vehicles are generally arranged to accommodate either a fifth wheel hitch or a gooseneck hitch, but not both. To convert a towing vehicle from accommodating a fifth wheel hitch to a gooseneck hitch or vice versa is time and labor intensive and inefficient. Furthermore, both fifth wheel hitches and gooseneck hitches are preferably mounted to the vehicle frame near the vehicle's center of gravity. However, since fifth wheel hitches and gooseneck hitches use different mounting configurations, traditionally only one hitch can occupy this location.

[0010] Some underbed structural bodies are made by components that increase time to market and have higher tooling costs. Additionally, some vehicles, such as light duty trucks that may not be equipped with a frame configured for a 5th wheel hitch or gooseneck attachment may not be easily configured to receive support frame components as the layout of the available vehicle structure may not allow for particular strength of configured components. Known designs are described by U.S. Patents 7,793,968 and 7,828,317. Further, examples of these designs may be found in commonly owned patents including U.S. Patent Application Serial No. 14/739,076, entitled, "UNDERBED HITCH MOUNTING SYSTEM," filed June 15, 2015 which is a continuation of U.S. Patent Application Serial No. 13/790,134, entitled "UNDERBED HITCH

MOUNTING SYSTEM,” filed March 8, 2013, now U.S. Patent No. 9,067,468 which is a continuation of U.S. Patent Application Serial No. 12/609,062, entitled “UNDERBED HITCH MOUNTING SYSTEM,” filed October 30, 2009, now U.S. Patent No. 8,414,009 which claims benefit from U.S. Provisional Patent Application No. 61/197,732, entitled “UNDERBED HITCH MOUNTING SYSTEM,” filed on October 30, 2008, which are all hereby incorporated in their entirety by reference.

[0011] These patents describe “H” frame structures with integrated castings and safety chain/5th wheel pucks. The casting designs are either with an integrated safety chain/5th wheel mounting system or are separate from the castings along with the use of square or rectangular shaped tube mill standard tubing to connect the center gooseneck with the four safety chain mounts. These castings are usually expensive and have a long lead time for tooling.

[0012] Therefore, there is a need in the art for an improved apparatus for towing vehicles that allow for selectively accommodating either a fifth wheel hitch or a gooseneck hitch that reduces cost and time for manufacturing.

[0013] Further, underbed structural frames may be exposed to the bed portion of a vehicle. The configuration of the bed liner or contours of the vehicle bed may hamper bed usage by damaging cargo.

[0014] Therefore, the disclosed embodiments may solve the problems of the prior art and includes an assembly that may selectively cover exposed portions of the underbed structural frames.

SUMMARY

[0015] An underbed hitch mounting system capable of being connected to a vehicle frame is described. The mounting system may be utilized for towing vehicles wherein the mounting system may selectively accommodate either a fifth wheel hitch or a gooseneck hitch. The mounting system may be an apparatus for attaching either a fifth wheel trailer hitch or a gooseneck trailer hitch to a bed of a vehicle.

[0016] The underbed hitch mounting system comprises a structural frame member operably connectable to a frame of a vehicle under a load bed of the vehicle. The structural frame member includes a first rail and a second rail mount. Each rail mount having a pair of rail members extending therefrom and inserted into the first and second rail mounts. A mid rail connected to the first and second rail mounts. A socket positioned on each of the rail members, each socket engageable with a receiving member. A hitch ball socket positioned on the mid rail, the hitch ball socket engageable with a hitch. The rail members may be made from at least one of bar stock, welded tubing and sheet metal. The rail mounts may have a generally rectangular cross section and the mid rail may have a generally C-shaped cross section that extends between the rail mounts. The mid rail and first and second rail mounts are monolithically formed. A base plate may extend under the mid rail and may extend along at least a portion of the first and second rail mounts. The first and second rail mounts may be generally C-shaped frame members and the base plate may be a generally C-shaped frame member that extends under the mid rail and under and within the first and second rail mounts. The mid rail and first and second rail mounts may include a top portion that is generally monolithically formed and a bottom portion that is generally monolithically formed wherein the top portion is formed separate from the bottom portion and then attached to the bottom portion. The top and bottom portions may be made of folded sheet metal and may include a base plate that extends under and within the mid rail and under a portion of the first and second rail mounts.

[0017] In one embodiment, provided is a trim and cover assembly to used with the underbed hitch mounting system. The trim and cover assembly comprises a trim member and a cover member that is selectively attached to the trim member. The trim and cover member may be installed along the load bed of a vehicle to cover at least one of the socket and hitch ball socket of the underbed hitch mounting system.

[0018] In another embodiment, provided is a trim and cover assembly to be installed along a bed of a vehicle comprises a trim member and a cover member that is selectively attached to the trim

member. The trim member may be attached to a corrugated portion of the bed of the vehicle. The trim may include a trim profile and the cover member may include a cover profile wherein the trim profile and the cover profile are complimentary to a corrugated profile of the bed of the vehicle. The trim member include an upper flange, wherein a portion of the upper flange may be positioned along a top surface of the bed and a lower flange wherein a portion of the lower flange may be positioned along a bottom surface of the bed. The flange may include a space between the upper flange and the lower flange. The trim member may include a recessed wall having a first height along a first portion of the perimeter and a second height along a second portion of the perimeter such that the second height is greater than the first height. Further, space between the upper flange and the lower flange may be positioned along the recessed wall along the portion with the second height. The trim member may include a recessed wall having a first height along a first portion of the perimeter and a second height along a second portion of the perimeter such that the second height is greater than the first height. The trim member may be snap fit within an opening in the bed of the vehicle. The cover may be snap fit to the trim member. The trim member may include an aperture to receive at least one of the socket and hitch socket. A center portion of the trim member may be raised to follow the contours of the bed. The trim member and cover may include generally symmetrical profiles. The trim member may include a flap portion that extends between a plurality of raised portions of the bed of the vehicle.

[0019] In one embodiment, provided is an underbed hitch mounting system that comprises a structural frame member operably connectable to a frame of a vehicle under a load bed of the vehicle. The structural frame member comprises a first rail mount and a second rail mount. A first rail member and a second rail member may extend from and be inserted into the first rail mount. A mid rail may be connected to the first and second rail mounts. A socket may be positioned on each of the first and second rail members, each socket engageable with a receiving member. A hitch ball socket may be positioned on the mid rail, the hitch ball socket engageable

with a hitch wherein the first and second rail members may be made from at least one of bar stock and sheet metal.

DESCRIPTION OF THE DRAWINGS

[0020] Objects and advantages together with the operation of the invention may be better understood by reference to the following detailed description taken in connection with the following illustrations, wherein:

[0021] Figure 1A illustrates a top perspective view of a structural frame of an underbed hitch mounting system in a embodiment of the invention;

[0022] Figure 1B illustrates a bottom perspective view of the structural frame of the underbed hitch mounting system of Figure 1A;

[0023] Figure 1C illustrates a cross sectional view of the structural frame of the underbed hitch mounting system of Figure 1A;

[0024] Figure 2A illustrates a top perspective view of a structural frame of an underbed hitch mounting system in a embodiment of the invention;

[0025] Figure 2B illustrates a bottom perspective view of the structural frame of the underbed hitch mounting system of Figure 2A;

[0026] Figure 2C illustrates a cross sectional view of the structural frame of the underbed hitch mounting system of Figure 2A;

[0027] Figure 3A illustrates a top perspective view of a structural frame of an underbed hitch mounting system in a embodiment of the invention;

[0028] Figure 3B illustrates a bottom perspective view of the structural frame of the underbed hitch mounting system of Figure 3A;

[0029] Figure 3C illustrates a cross sectional view of the structural frame of the underbed hitch mounting system of Figure 3A;

[0030] Figure 4A illustrates a side view of an embodiment of the structural frame of the underbed hitch mounting system of the present invention;

[0031] Figure 4B illustrates a perspective view of an embodiment of a frame mount bracket of the structural frame of the underbed hitch mounting system;

[0032] Figures 5A, 5B, 5C, 5D, 5E, 5F, 5G, and 5H illustrate various schematic side views of alternate embodiments of the structural frame of the underbed hitch mounting system of the present invention;

[0033] Figure 6 illustrates a perspective view of embodiments of an underbed hitch mounting system mounted to a frame of a vehicle;

[0034] Figure 7 illustrates a perspective view of embodiments of the underbed hitch mounting system of the present invention;

[0035] Figure 8A illustrates a side cross sectional view of an embodiment of the structural frame of the underbed hitch mounting system of the present invention;

[0036] Figure 8B illustrates a side cross sectional view of a portion of Figure 8A;

[0037] Figure 9 illustrates a perspective view of the structural frame of the underbed hitch mounting system attached to the underside of a vehicle bed;

[0038] Figure 10 illustrates a perspective view of embodiments of a trim member and a cover for the underbed hitch mounting system of the present invention;

[0039] Figure 11 illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0040] Figure 12A illustrates a cross sectional view of an embodiment of the trim ring for the underbed hitch mounting system of the present invention;

[0041] Figure 12B illustrates a perspective view of an embodiment of the trim ring for the underbed hitch mounting system of the present invention;

[0042] Figure 12C illustrates a perspective view of an embodiment of the trim ring for the underbed hitch mounting system of the present invention;

[0043] Figure 13 illustrates a perspective view of embodiments of the trim member and cover for the underbed hitch mounting system of the present invention;

[0044] Figure 14 illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0045] Figure 15A illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0046] Figure 15B illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0047] Figure 16A illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0048] Figure 16B illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0049] Figure 17A illustrates a cross sectional view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0050] Figure 17B illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0051] Figure 18A illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0052] Figure 18B illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0053] Figure 19A illustrates a cross sectional view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0054] Figure 19B illustrates a cross sectional view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0055] Figure 20A illustrates a bottom perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0056] Figure 20B illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0057] Figure 20C illustrates a perspective view of embodiments of the trim member for the underbed hitch mounting system of the present invention;

[0058] Figure 21 illustrates a perspective view of trim members for the underbed hitch mounting system of the present invention; and

[0059] Figure 22 illustrates a perspective view of trim members for the underbed hitch mounting system of the present invention.

DETAILED DESCRIPTION

[0060] Reference will now be made in detail to embodiments of the present teachings, examples of which are illustrated in the accompanying drawings. It is to be understood that other embodiments may be utilized and structural and functional changes may be made without departing from the respective scope of the present teachings. Moreover, features of the various embodiments may be combined, switched, or altered without departing from the scope of the present teachings, e.g., features of each embodiment disclosed herein may be combined, switched, or replaced with features of the other embodiments disclosed herein. As such, the following description is presented by way of illustration only and should not limit in any way the various alternatives and modifications that may be made to the illustrated embodiments and still be within the spirit and scope of the present teachings.

[0061] As used herein, the words “example” and “exemplary” mean an instance, or illustration. The words “example” or “exemplary” do not indicate a key or preferred aspect or embodiment. The word “or” is intended to be inclusive rather an exclusive, unless context suggests otherwise. As an example, the phrase “A employs B or C,” includes any inclusive permutation (e.g., A employs B; A employs C; or A employs both B and C). As another matter, the articles “a” and “an” are generally intended to mean “one or more” unless context suggest otherwise.

[0062] Figures 1A, 1B, 1C, 2A, 2B, 2C, 3A, 3B, and 3C illustrate embodiments for a structural frame member 20 for an underbed hitch mounting system 10. The underbed hitch mounting system 10 may be used with towing vehicles that allow for selectively accommodating either a

fifth wheel hitch or a gooseneck hitch. Trailer hitches, such as a gooseneck or fifth wheel hitches may be mounted to a truck bed. These types of hitches are often mounted beneath the truck bed (see Figure 9) in conjunction with the truck's own frame rails (See Figure 6), such as with cross members or rails, for example.

[0063] The underbed hitch mounting system 10 may include at least one rail mount or cross member 30 and at least one mid rail or adapter plate 40. For example, the mounting system 10 may include two rail mounts 30 and one mid rail or adapter plate 40. The rails 20 may be configured to support a gooseneck hitch or a fifth wheel hitch (not shown). Typical fifth wheel hitches may include a plurality of legs to connect the hitch to a vehicle. While the underbed hitch mounting system 10 may be shown and described as having two rail mounts 30 and one mid rail or adapter plate 40, it is to be understood that there may be any appropriate number of rails or adapter plates and it should not be limited to that shown and described herein.

[0064] The rail mounts 30 may be of any appropriate shape or size, such as a generally tubular, square or rectangular shape. Each rail mount 30 may be attached to a rail member 32 which may include one or more sockets 34 (See Figure 7). The sockets 34 may be of any appropriate shape or size, such as a generally ovular, circular or rectangular shape. The sockets 34 may be configured to receive and support the legs of a fifth wheel hitch. The legs may be secured to the rails 32 through the sockets 34 by any appropriate means, such as by fasteners, being welded, or the like.

[0065] The rails 32 may include connecting holes or mounting apertures 36 (Figures 7). The mounting apertures 36 may be of any appropriate shape or size, such as a generally circular, ovular or rectangular shape. There may be any number of appropriate mounting apertures 36 and should not be limited to that shown and described herein.

[0066] The mounting apertures 36 may be utilized for connecting another member to the rails 32, such as the frame mount brackets 50 (see Figures 7, 8A and 8B). The mounting apertures 36 may also be used to connect the rails 32 of the hitch mounting system 10 to the underbed of the

towing vehicle frame. For example, the rails 32 may be connected to the towing vehicle frame, such as underneath the truck bed (Figure 7).

[0067] The rails 32 may include one or more frame mount brackets 50 (Figures 4, 5, 6, and 7). The frame mount brackets 50 may be utilized for connecting the rails 32 to the frame 52. The rails 32 may be connected to the frame mount brackets 50 by any appropriate means, such as with fasteners, welding or the like. The frame mount brackets 50 may be of any appropriate shape or size, such as a general L-shape, rectangular plate or the like. The frame mount brackets 50 may be sized and shaped to engage a vehicle frame.

[0068] Typical vehicle frames 52 may include two parallel steel members (Figure 6). An end of the structural frame member 20 may connect to a first member of the frame 52 and an opposite end of the structural frame member 20 may connect to a second member of the vehicle frame 52. The rail mounts 30 and rails 32 may extend between the frame mount brackets 50. The rail mounts 30 and rails 32 may be of a length sufficient to span the distance between the frame mount brackets 50 when those brackets engage the vehicle framework 52. The frame mount brackets 50 may form a generally L-shaped bracket to engage the frame 52. The frame mount brackets 50 may be attached to the frame 52 by any appropriate means, such as with fasteners, welding or the like.

[0069] The mid rail or adapter plate 40 may be of any appropriate shape or size, such as a generally rectangular or tubular shape that may span the length between the rail mounts 30 (Figures 1A-C4). The mid rail or adapter plate 40 may be configured to connect to the rail mounts 30. The mid rail or adapter plate 40 may be attached to the rails by any appropriate means, such as with fasteners, welding or the like. Additionally, the adapter plate 40 may be a generally continuous and uniform monolithic construction with the rail mounts 30.

[0070] The adapter plate 40 may be of a one piece construction or may include several sections that may be secured together by welding, fasteners or the like. When the mid rail 40 is connected

to the rail mounts 30, the rail mounts 30 may be approximately flush with and parallel to one another.

[0071] The mid rail 40 may also include a base member 46. The base member 46 may be of any appropriate shape or size, such as a generally square, rectangular or tubular shape. The base member 46 may be a plate and may be attached to the bottom of the mid rail 40. The base member 46 may be attached to the mid rail 40 by any appropriate means, such as by welding, fasteners or the like. The base member 46 may also be secured to the rail mounts 30, such as on the underside of the rail mounts 30 (Figure 1B). In one embodiment, the base member 46 may have a continuous H type shape having portions that extend along the bottom of the rail mounts 30 and a portion that extends along the bottom of the mid rail 40. The base member 46 may have a shape that extends passed the edges of the bottom of the mid rail 40 as illustrated by Figure 1B.

[0072] The mid rail 40 may include a receiver 42 that may be configured to receive a hitch ball. For example, the receiver may be a hitch ball socket that may be configured to receive the hitch ball. The hitch ball socket 42 may be of any appropriate shape or size, such as a generally cylindrical shape. The hitch ball socket 42 may be located at any appropriate position on the adapter plate 40, such as the approximate center of the adapter plate 40. For example, the hitch ball socket 42 may be configured to receive a removable hitch ball with spring-loaded ball bearings. It should be appreciated, however, that the receptacle may be configured to receive any appropriate type of hitch ball and should not be limited to that described herein.

[0073] The hitch ball socket 42 may include a raised collar 48. The raised collar 48 may be of any appropriate shape or size, such as one that may extend above and approximately perpendicularly to the surface of the adapter plate 40. The raised collar 48 may protrude through or be accessible through an aperture in the bed of a vehicle.

[0074] The underbed hitch mounting system 10 may utilize a puck mounting system whereby the trailer hitch may be installed in the pickup truck bed with only four small holes (not shown). Utilizing a puck mounting system may provide uninhibited use of the truck bed when the hitch is

dismounted. The puck mounting system may also provide for a wider platform and mounting surface, which increases the stability. The puck mounting system may be used with any appropriate trailer hitch mounting kit, such as those that utilize rail mounts 30 or cross members for example, such as with the "Signature Series" produced and sold by Cequent.

[0075] The underbed hitch mounting system 10 may include at least two rail mounts or cross members 30. The cross members 30 may include rails 32 and sockets 34 for attachment with a puck or receiving member. The cross members 30 may be attached to the vehicle framework 52 by any appropriate means, such as with fasteners, by welding or the like.

[0076] Holes may be drilled in the truck bed corresponding to the locations of the sockets 34 in the rails 32 and the hitch ball socket 42. A fifth wheel hitch may be removably connected to the sockets 34 in the rails 32 through the holes located in the truck bed. A hitch ball may be removably connected to the hitch ball socket 42 through the hole in the truck bed, whereby a gooseneck hitch may be utilized.

[0077] Figures 1A, 1B, and 1C illustrate an embodiment of the underbed hitch mounting system 10. The rail mounts 30 are made from bar stock welded tubing or sheet metal parts. The bar stock may be machined or heat treated. The bar stock material may be used at frame mounting points and fifth wheel attachment areas with welded tubing or sheet metal parts. This may allow the system to meet normal layout constraints of existing vehicle frame configurations but also meet strength requirements for connection to the frame and support for the appropriate fifth wheel hitch or gooseneck assembly. Further, the use of bar stock and press broken sheet metal allows for a quick production lead time and lower tooling costs. In one embodiment, the rail mounts 30 and mid rail 40 are made of sheet metal material and the rail members 32 are made of a solid bar stock material that has been heat treated and machined.

[0078] The rail mounts may have a generally rectangular cross section and the mid rail 40 has a C-shaped cross section and extends between the rail mounts 30. The base plate 46 extends under the mid rail 40 and extends along at least a portion of the lengths of the rail mounts 30.

[0079] Figures 2A, 2B, and 2C illustrate another embodiment of the underbed hitch mounting system 10. The mid rail 40 and rail mounts 30 are generally monolithically formed. The rail mounts 30 may be made of folded sheet metal and formed into generally C-shaped frame members wherein the base plate 46 may be a tube steel or C-shaped frame that extends under the mid rail 40 and under and within the rail mounts 30.

[0080] Figures 3A, 3B, and 3C illustrate another embodiment of the underbed hitch mounting system 10. The adapter plate 40 and rail mounts 30 include a top portion 60 (Figure 3C). The top portion 60 may be generally monolithically formed. The top portion 60 may be attached to a bottom portion 62 that is formed into structural tube framing from folded sheet metal. The bottom portion 62 may also be monolithically formed. The bottom portion 62 may be generally monolithically formed separate from the top portion 60. The top and bottom portions 60, 62 may be made of folded sheet metal and formed into frame members wherein the adapter plate 40 and rail mounts 30 may be formed into tube steel framing. The base plate 46 may be a tube steel or C-shaped frame that extends under and within the mid rail 46 and under a portion of the lengths of the rail mounts 30. As illustrated by Figures 3A and 3B, the top and bottom portions may be attached together along cantilevered portions 70 that extend from a perimeter of the tube portions of the structural framing member 10 and may be attached together along vertical portions 72 that extend from a perimeter portion of the structural framing member 10. The cantilevered portions 70 may extend generally perpendicular relative to the vertical portions 72 of attachment. The cantilevered portions may extend from a portion of the perimeters of the mid rail 40 and rail mounts 30.

[0081] In the embodiments illustrated by the figures, the folded sheet metal may be made of various separately formed pieces of folded sheet metal that may be welded together in a structural framing orientation that may support the forces required by a gooseneck or 5th wheel hitch.

[0082] Figures 4, 5A, 5B, 5C, 5D, 5E, 5F, 5G, and 5H illustrate various schematic views of alternate embodiments of possible attachments between the structural frame 52 of the vehicle, the rail member 32, and the frame mount brackets 50 of underbed hitch mounting system 10 of the present invention

[0083] Figures 10-23 illustrate various embodiments of trim member and a cover that may be installed along the bed of a vehicle to cover the exposed portions of the underbed hitch mounting system 10. Figure 10 illustrates a bezel or trim member 100 and a cover 110 attached to a corrugated truck bed 130. The trim member 100 and cover 110 include a profile that is configured to adapt to the corrugated profile of the truck bed and selectively cover the exposed portions of the sockets 34 in the rails 32 and the hitch ball socket 42 of the underbed hitch mounting assembly system 10. The cover 110 may be snap fit to the trim member 100 and the trim member may have an aperture 120 for receiving the sockets 34, 42 therein. The trim member 100 and cover 110 may be made from any materials such as polymers, plastic, rubber or the like. The trim member 100 and cover 110 may be injection molded that follows the shape of the bed 130. The center portion of the trim member 100 may be raised to follow the contours of the corrugated profile of the bed 130 and may include structural support when attached to the vehicle bed. The trim member 100 and cover 110 may be symmetrical and may cover any edges exposed or cut into the bed of the vehicle. In another embodiment, the trim member 100 may include a trim profile and the cover 110 member may include a cover profile wherein the trim profile and the cover profile may be complimentary to a corrugated profile of the bed of the vehicle. See Figures 10-15B.

[0084] In one embodiment, as illustrated by Figures 12A, 12B, and 12C, the trim member 100 may include a gap 140 within the trim along a center portion 150 to receive a raised portion of the contours of the vehicle bed therein (see Figures 10, 11, 12A, 12B, 12C, 16A and 16B). In another embodiment, the trim member 100 may not include a gap 140 (See Figures 15A and 15B).

[0085] The trim member 100 may include an upper flange 160 the generally surrounds the perimeter of the trim member 100. A portion of the upper flange 160 may be positioned along a top surface of the bed 130. The trim member 100 may include a lower flange 165 that extends from a portion of the trim member 100. The lower flange 165 may be positioned along either sides of the trim member 100 along the center portion 150 and may be positionable along a bottom surface of the bed 130. The lower flange 165 may also be along the gap 140 in the upper flange 160. The lower flange 165 may be placed within the gap 140 as the gap 140 may be between the upper flange 160 and the lower flange 165. The lower flanges 165 may allow the trim member 100 to be snap fit within the bed 130.

[0086] The trim member 100 may include a recessed wall 170 having a first height 172 along a first portion of the perimeter and a second height 174 along a second portion of the perimeter such that the second height 174 is greater than the first height 172. The gap 140 may be positioned along the recessed wall along the portion with the second height 174. The trim member 100 can be snap fit within an opening in the bed of the vehicle. The cover 110 may be snap fit to the trim member 100. The cover 110 may include a finger hole 190 for a user to easily attach or remove the cover 110 from the trim member 100.

[0087] In one embodiment, the first height 172 and the second height 174 of the recessed wall 170 may be generally equal wherein the upper flange 160 includes a rim elevation having a common distance from the surface of the corrugated bed 130. See Figures 16A, 16B, 18A, and 18B. Alternatively, the rim elevation of the upper flange 160 may be recessed within the bed 130 such that the rim elevation of the upper flange 160 is generally aligned with the surface of the bed 130. See Figure 20A, 20B, and 20C. In some embodiment, the trim member 100 may include a flap portion 180 that extends between raised portions of the vehicle bed. The flap portion 180 may be positioned under and against the surface of the bed (see Figures 17A, 17B, 18A, 18B, 19A, and 19B) or the flap portion 180 may be positioned over and against the surface

of the bed (see Figures 20A, 20B, and 20C). These embodiments may be used with various bed profiles and aligned along the areas of the vehicle bed as illustrated by Figures 21 and 22.

[0088] Although the embodiments of the present teachings have been illustrated in the accompanying drawings and described in the foregoing detailed description, it is to be understood that the present teachings are not to be limited to just the embodiments disclosed, but that the present teachings described herein is capable of numerous rearrangements, modifications and substitutions without departing from the scope of the claims hereafter. The claims as follows are intended to include all modifications and alterations insofar as they come within the scope of the claims or the equivalent thereof.

CLAIMS

Having thus described the invention, we claim:

1. An underbed hitch mounting system comprising:
 - a structural frame member operably connectable to a frame of a vehicle under a load bed of the vehicle, comprising:
 - first and second rail mounts each having a pair of rail members extending therefrom and inserted into the first and second rail mounts;
 - a mid rail connected to the first and second rail mounts;
 - a socket positioned on each of the rail members, each socket engageable with a receiving member; and
 - a hitch ball socket positioned on the mid rail, the hitch ball socket engageable with a hitch;
 - wherein the rail members are made from at least one of bar stock, welded tubing and sheet metal.
2. The underbed hitch mounting system of claim 1, wherein the rail mounts have a generally rectangular cross section and the mid rail has a generally C-shaped cross section that extends between the rail mounts.
3. The underbed hitch mounting system of claim 1 wherein the mid rail and first and second rail mounts are monolithically formed.
4. The underbed hitch mounting system of claim 1, wherein a base plate extends under the mid rail and extends along at least a portion of the first and second rail mounts.
5. The underbed hitch mounting system of claim 4, wherein the first and second rail mounts are generally C-shaped frame members and the base plate is a generally C-shaped frame member that extends under the mid rail and under and within the first and second rail mounts.
6. The underbed hitch mounting system of claim 1, wherein the mid rail and first and second rail mounts include a top portion that is generally monolithically formed and a bottom

portion that is generally monolithically formed wherein the top portion is formed separate from the bottom portion and then attached to a bottom portion.

7. The underbed hitch mounting system of claim 6, wherein the top and bottom portions are made of folded sheet metal and include a base plate that extends under and within the mid rail and under a portion of the first and second rail mounts.

8. A trim and cover assembly comprising:

a trim member; and

a cover member that is selectively attached to the trim member;

wherein the trim and cover member is installed along the load bed of a vehicle to cover at least one of the socket and hitch ball socket of the underbed hitch mounting system of claim 1.

9. A trim and cover assembly to be installed along a bed of a vehicle comprising:

a trim member; and

a cover member that is selectively attached to the trim member.

10. The trim and cover assembly of claim 9, wherein the trim member is attached to a corrugated portion of the bed of the vehicle.

11. The trim and cover assembly of claim 9, wherein the trim member includes a trim profile and the cover member includes a cover profile, wherein the trim profile and the cover profile are complimentary to a corrugated profile of the bed of the vehicle.

12. The trim and cover assembly of claim 9, wherein the trim member includes an upper flange, wherein a portion of the upper flange is positioned along a top surface of the bed and a lower flange wherein a portion of the lower flange is positioned along a bottom surface of the bed.

13. The trim and cover assembly of claim 12, wherein the upper flange includes a space between the upper flange and the lower flange.

14. The trim and cover assembly of claim 13, wherein the trim member includes a recessed wall having a first height along a first portion of the perimeter and a second height along a

second portion of the perimeter such that the second height is greater than the first height and the space between the upper flange and the lower flange is positioned along the recessed wall along the portion with the second height.

15. The trim and cover assembly of claim 9, wherein the trim member includes a recessed wall having a first height along a first portion of the perimeter and a second height along a second portion of the perimeter such that the second height is greater than the first height.

16. The trim and cover assembly of claim 9, wherein the trim member is snap fit within an opening in the bed of the vehicle.

17. The trim and cover assembly of claim 9, wherein the cover is snap fit to the trim member.

18. The trim and cover assembly of claim 9, wherein the trim member includes an aperture to receive at least one of the socket and hitch socket.

19. The trim and cover assembly of claim 9, wherein a center portion of the trim member is raised to follow the contours of the bed.

20. The trim and cover assembly of claim 9 wherein the trim member and cover include generally symmetrical profiles.

21. The trim and cover assembly of claim 9, wherein the trim member includes a flap portion that extends between a plurality of raised portions of the bed of the vehicle.

22. An underbed hitch mounting system comprising:

a structural frame member operably connectable to a frame of a vehicle under a load bed of the vehicle, comprising:

first and second rail mounts;

first and second rail members each extending from and inserted into the first rail mount;

a mid rail connected to the first and second rail mounts;

a socket positioned on each of the first and second rail members, each socket engageable with a receiving member; and

a hitch ball socket positioned on the mid rail, the hitch ball socket engageable with a hitch;

wherein the first and second rail members are made from at least one of bar stock and sheet metal.

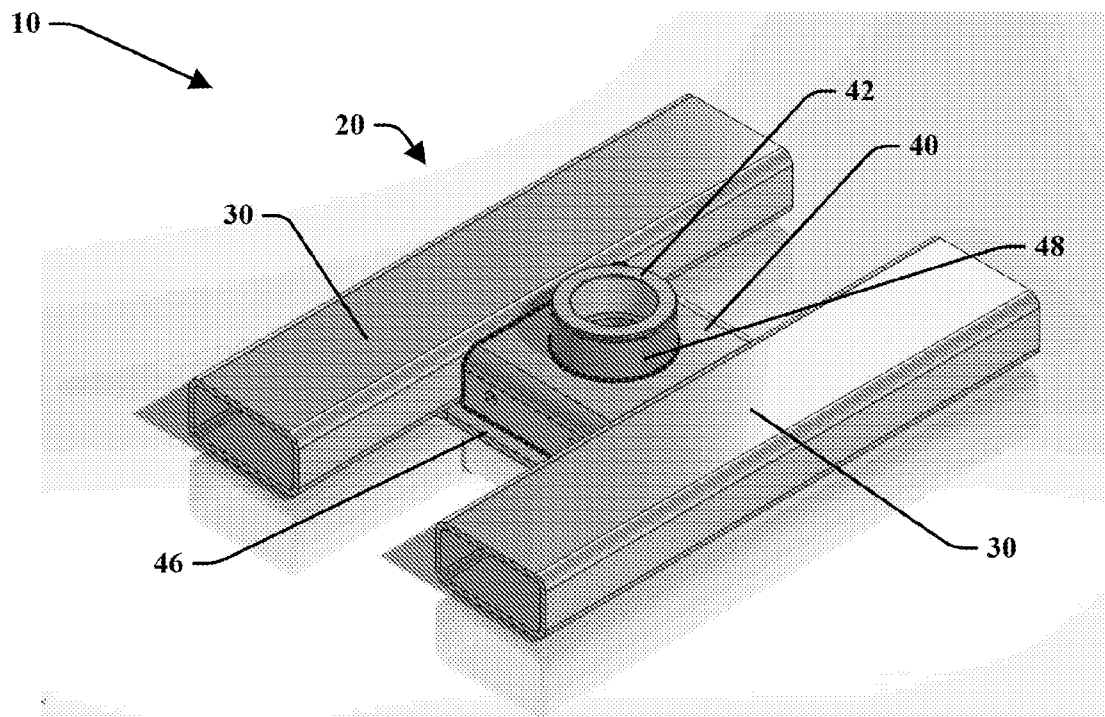


FIG. 1A

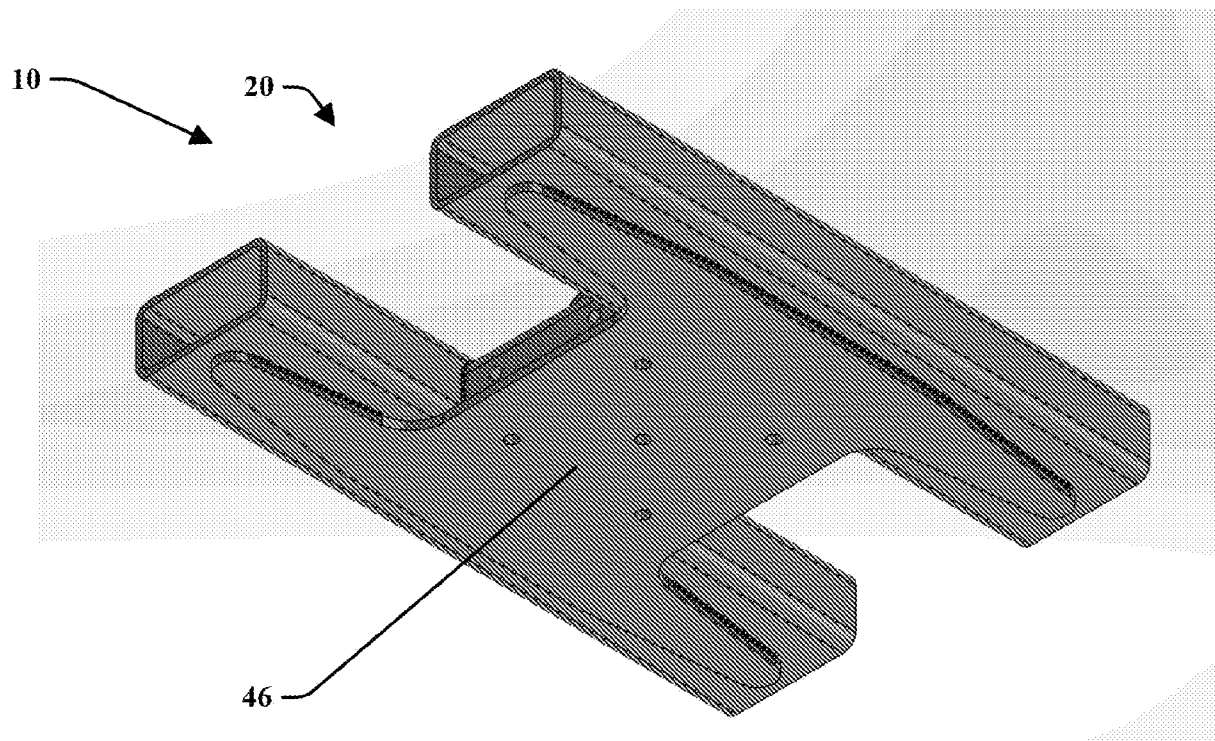
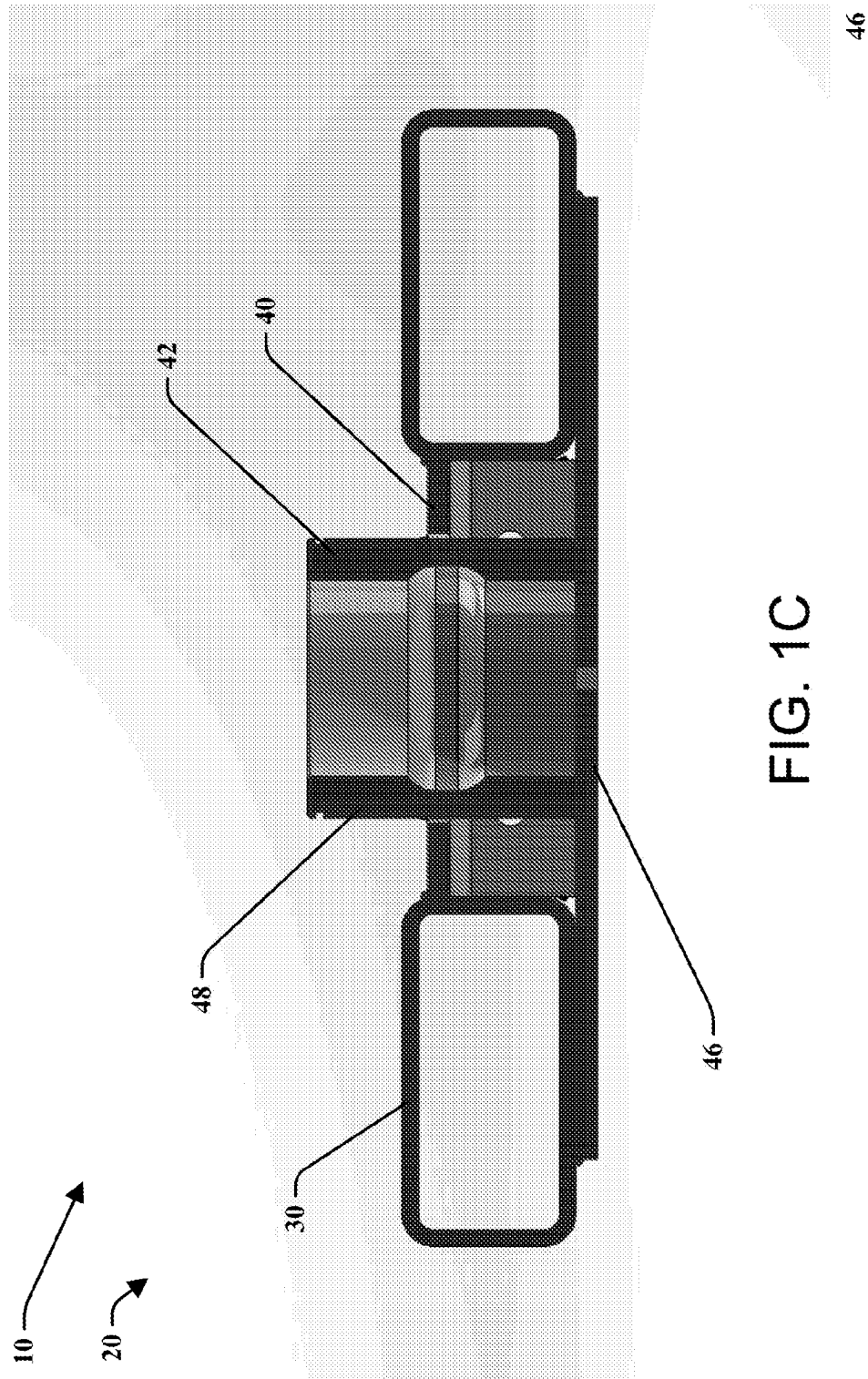


FIG. 1B



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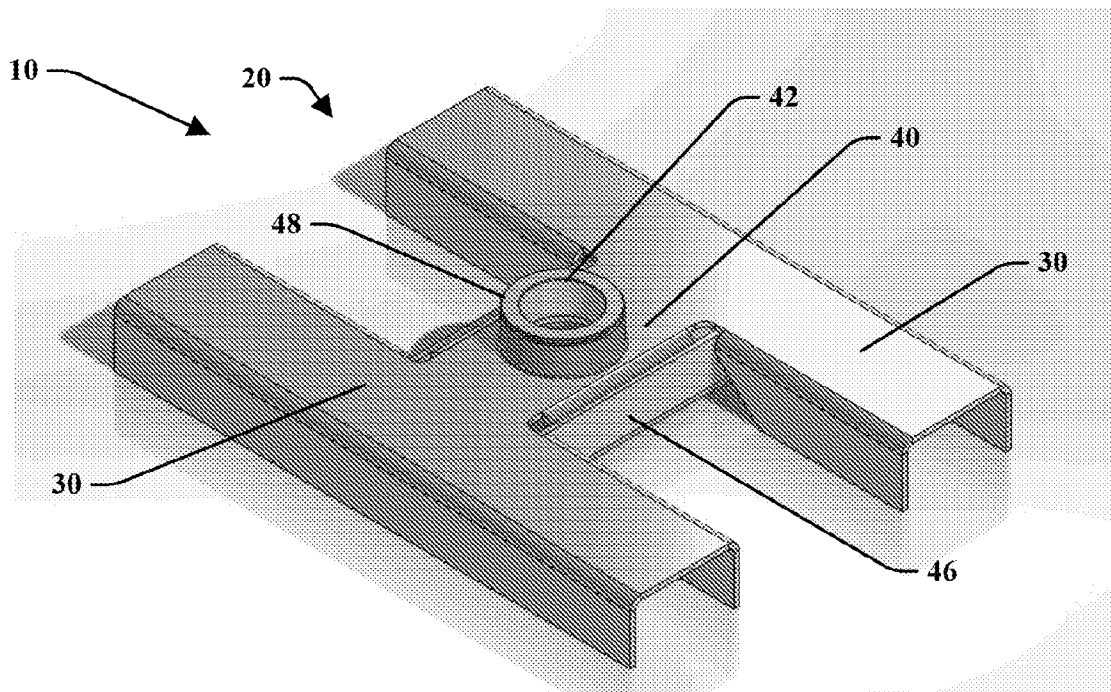


FIG. 2A

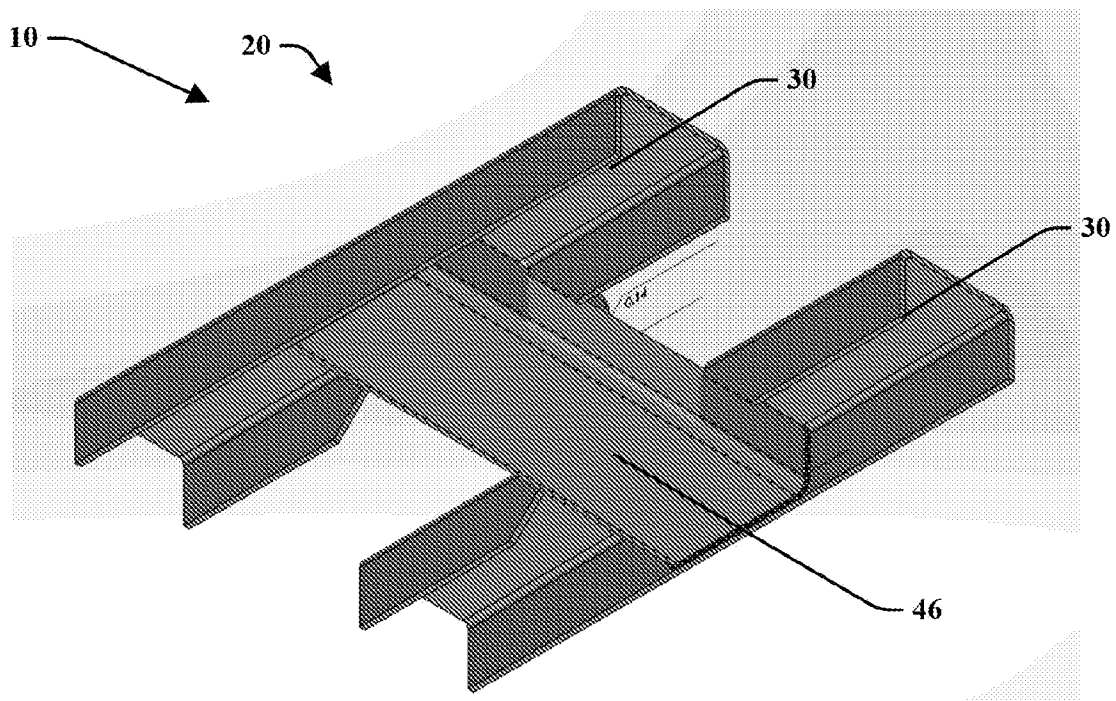


FIG. 2B

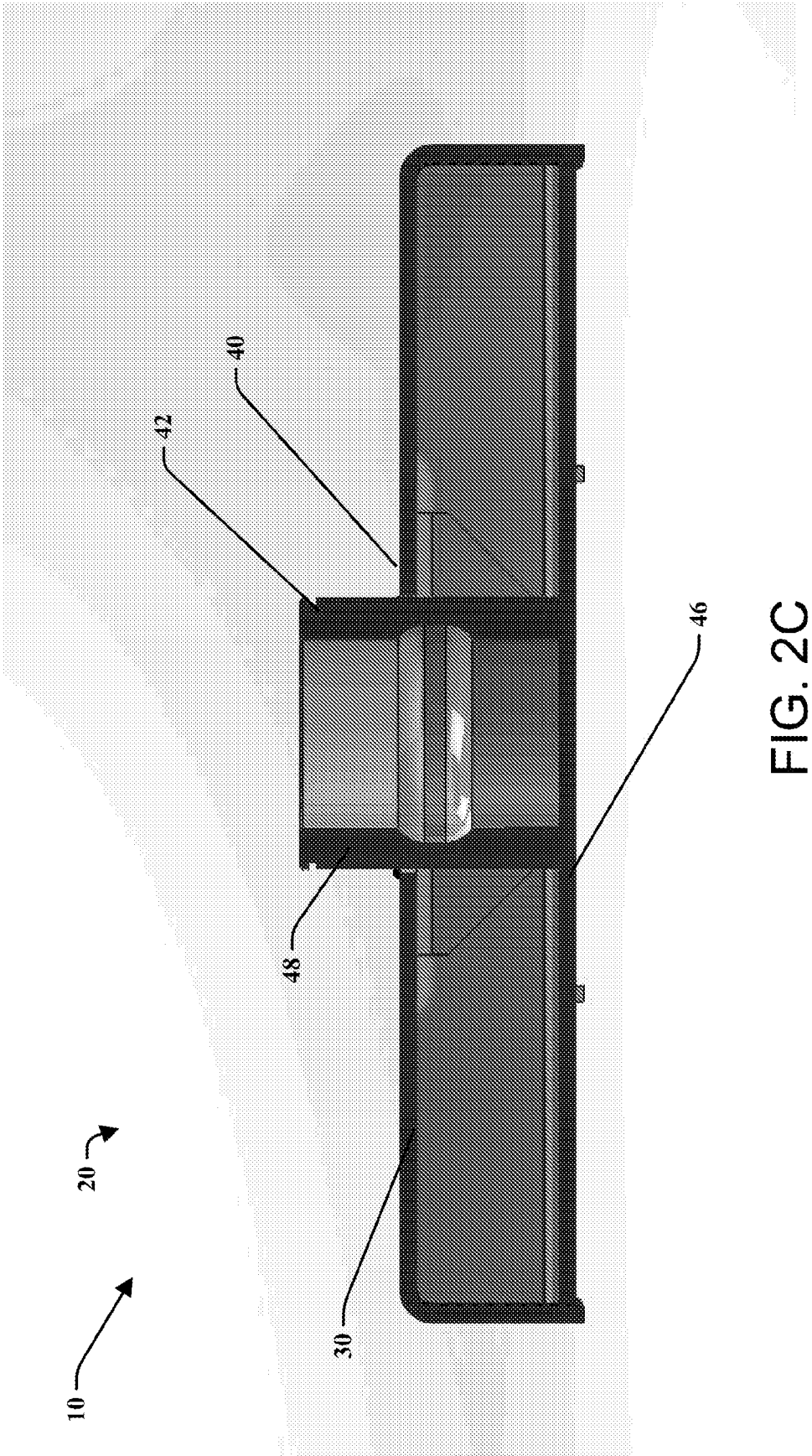


FIG. 2C

5/25

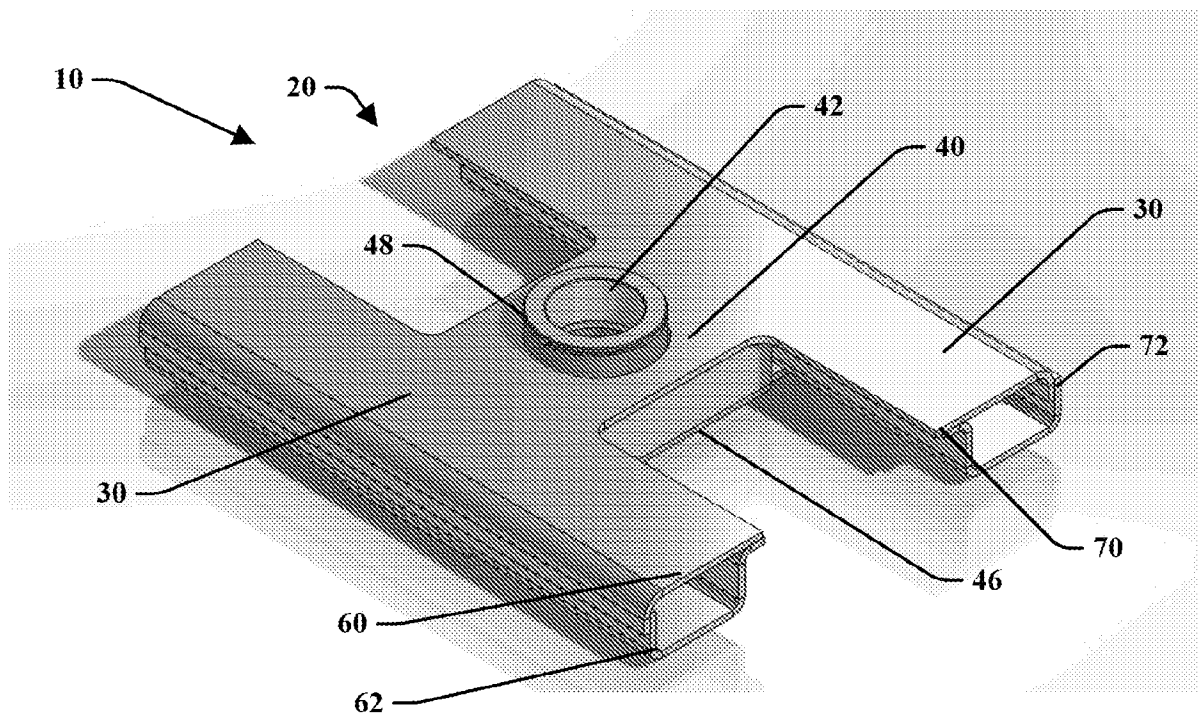


FIG. 3A

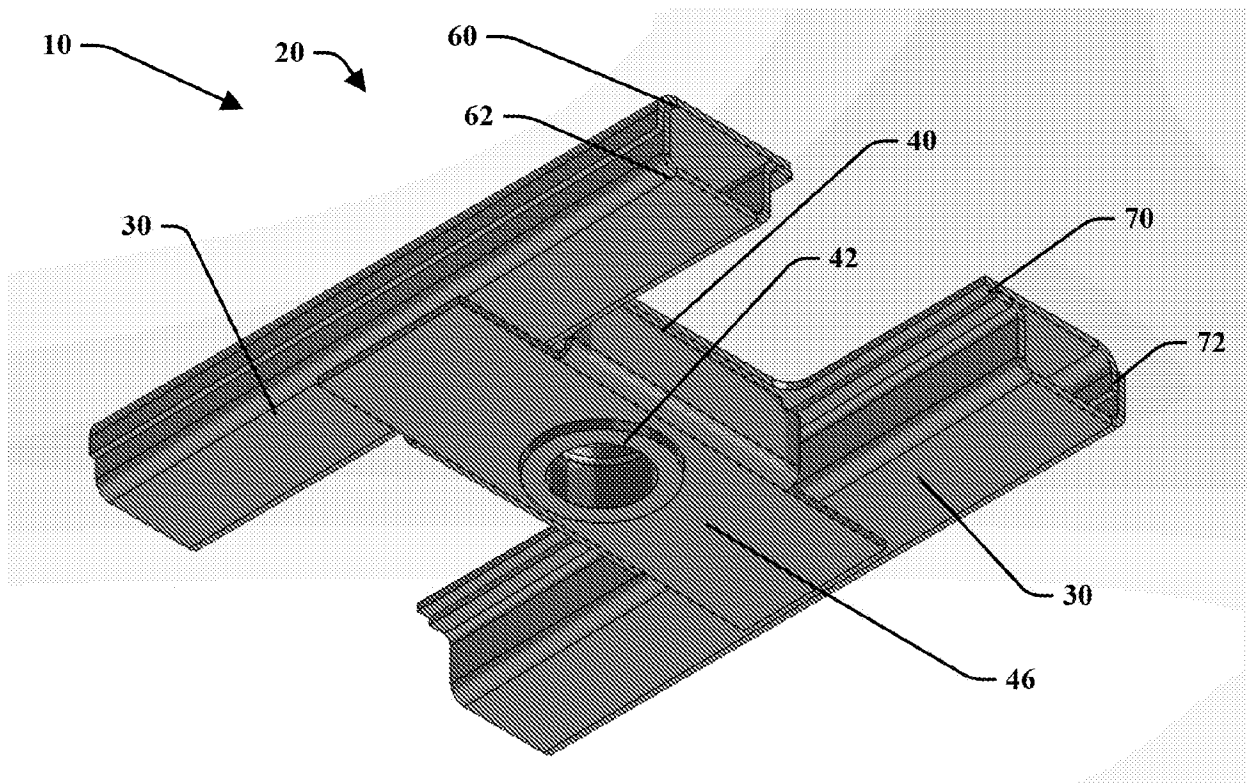


FIG. 3B

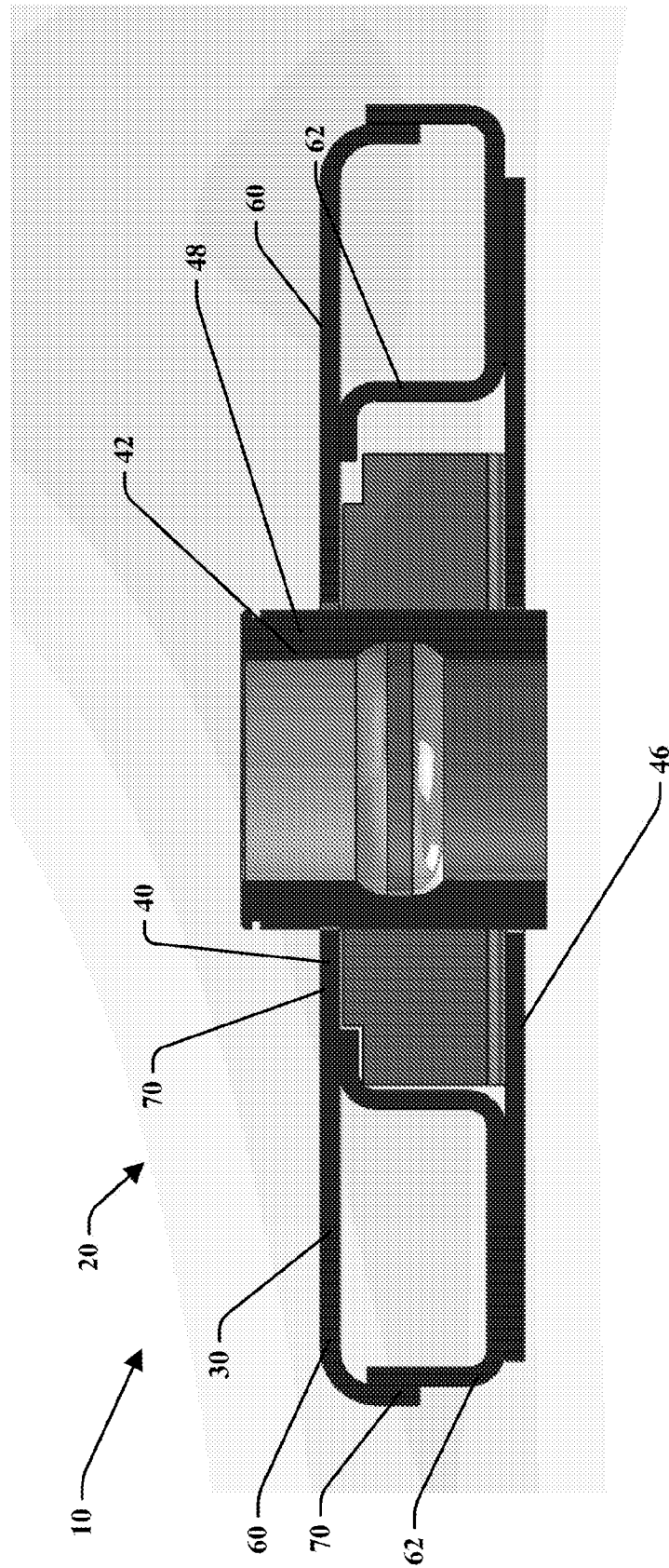


FIG. 3C

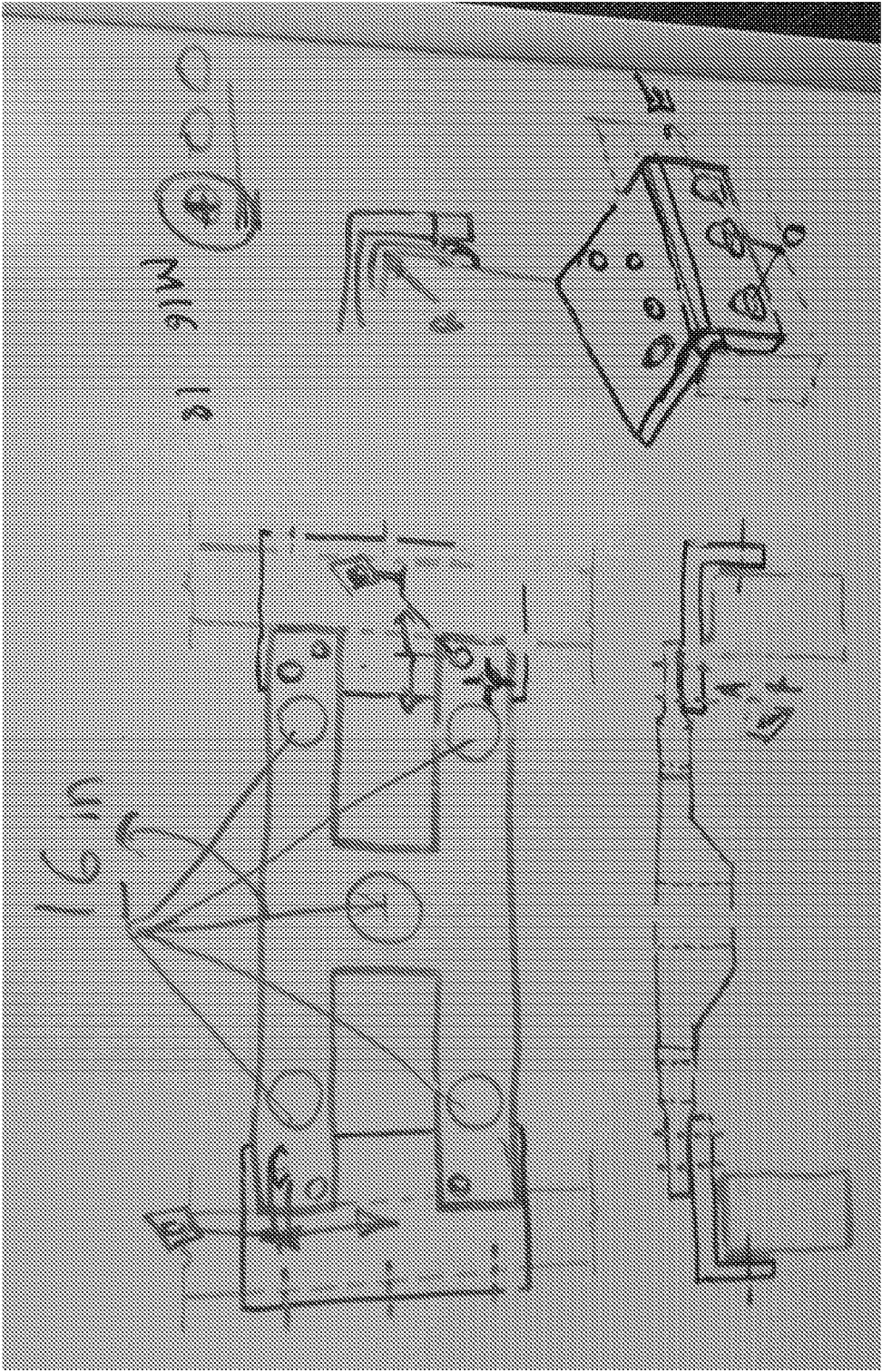
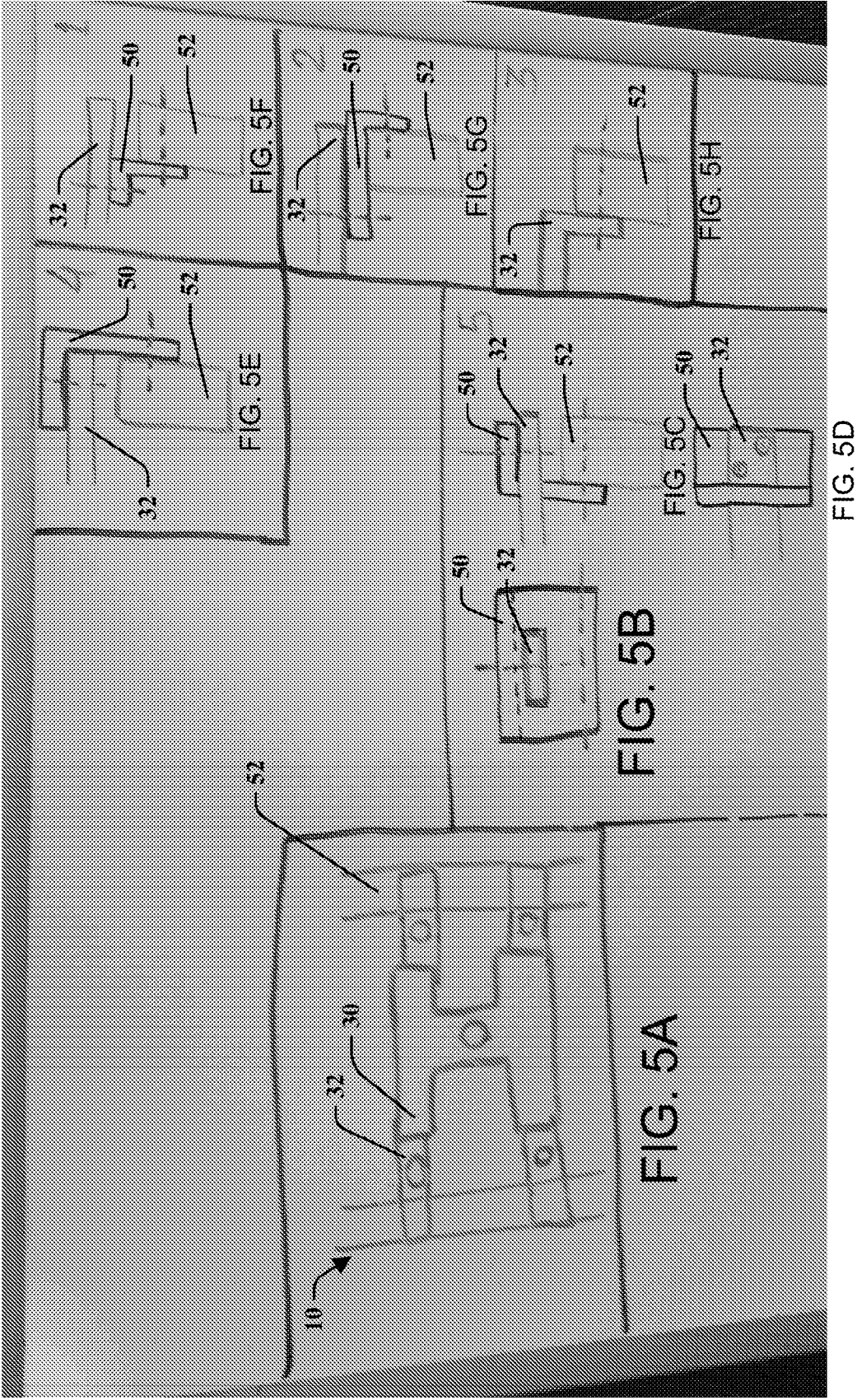


FIG. 4



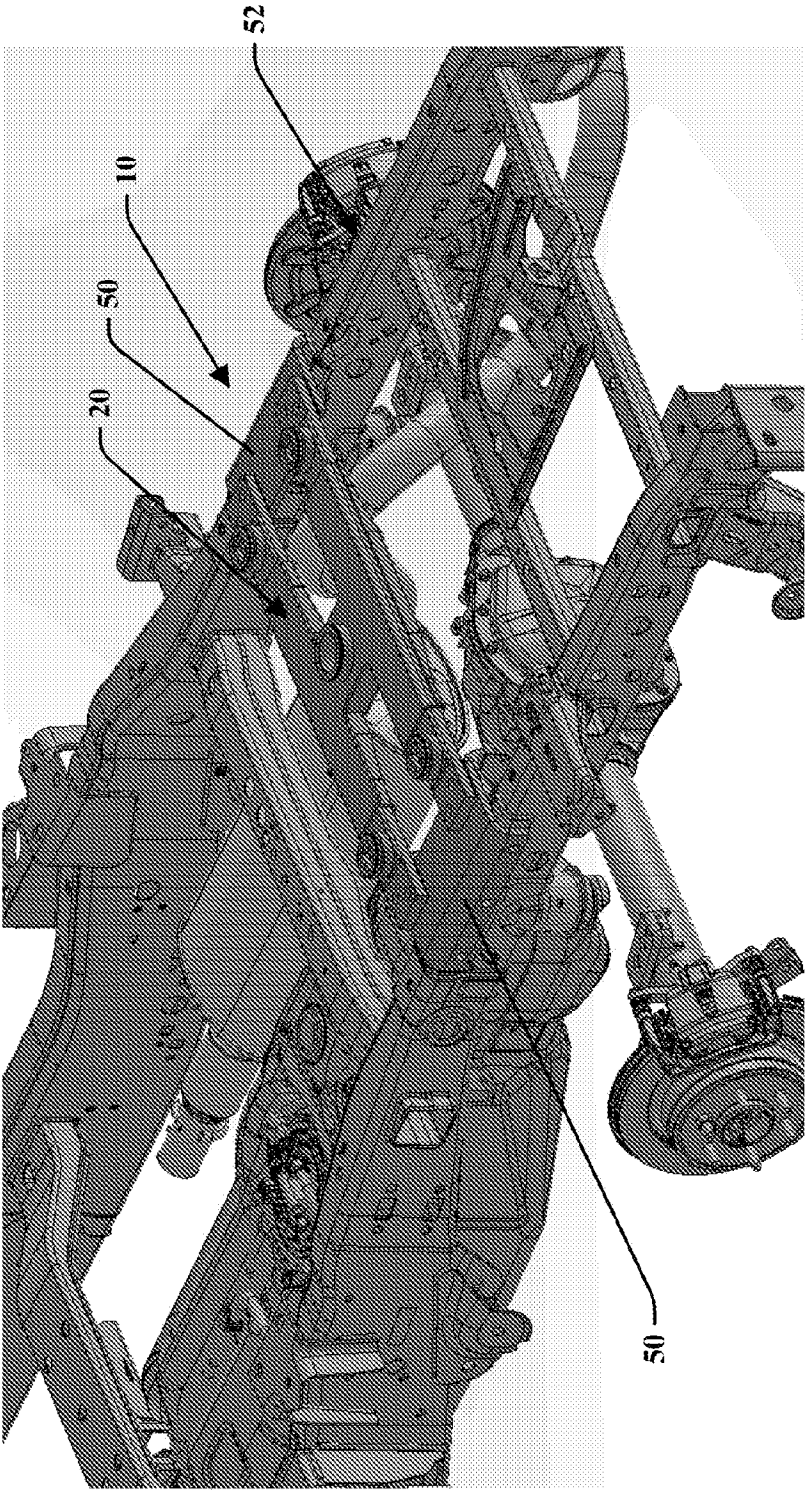


FIG. 6

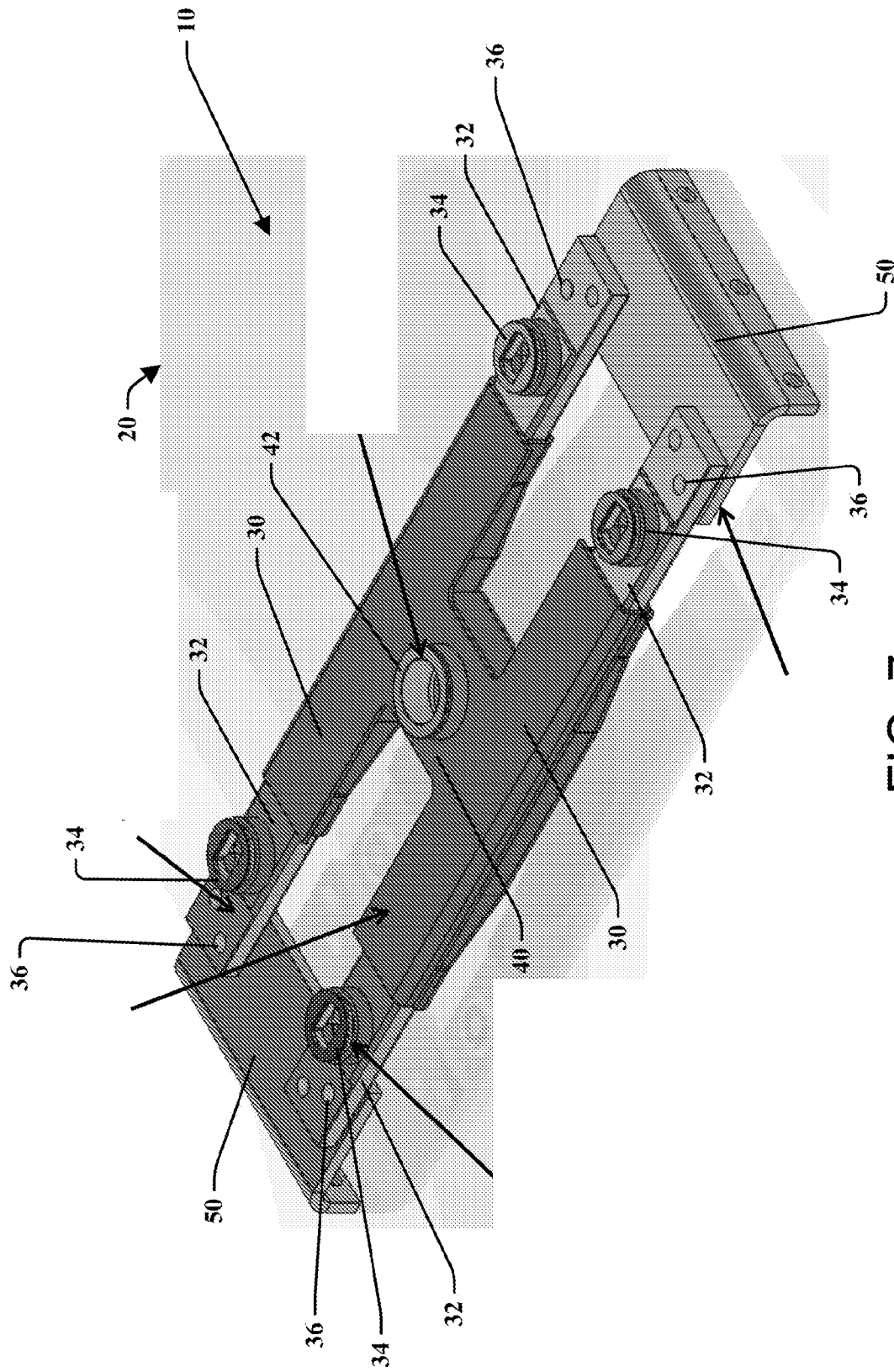


FIG. 7

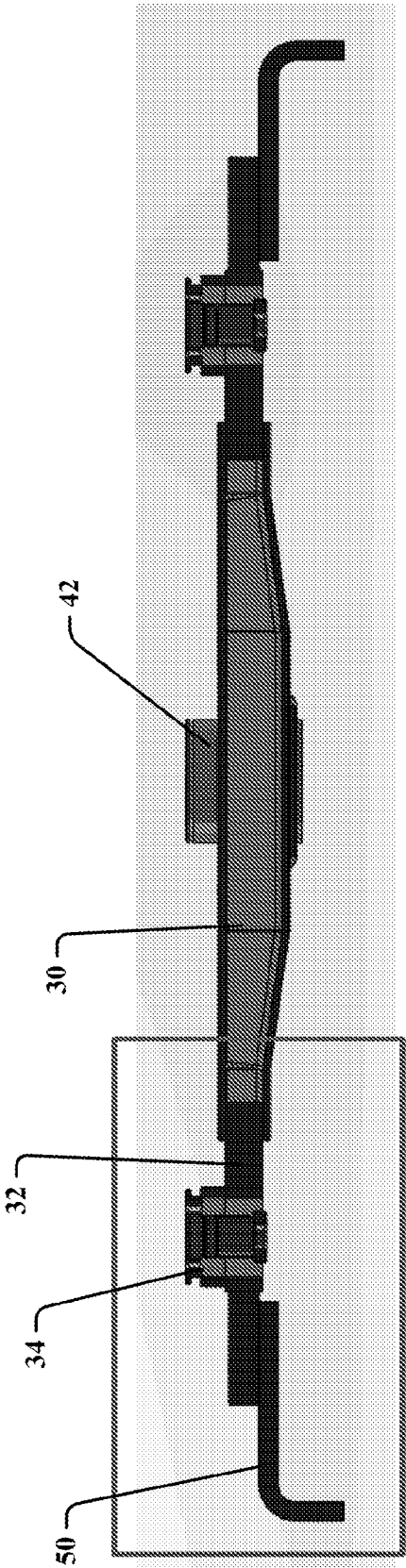


FIG. 8A

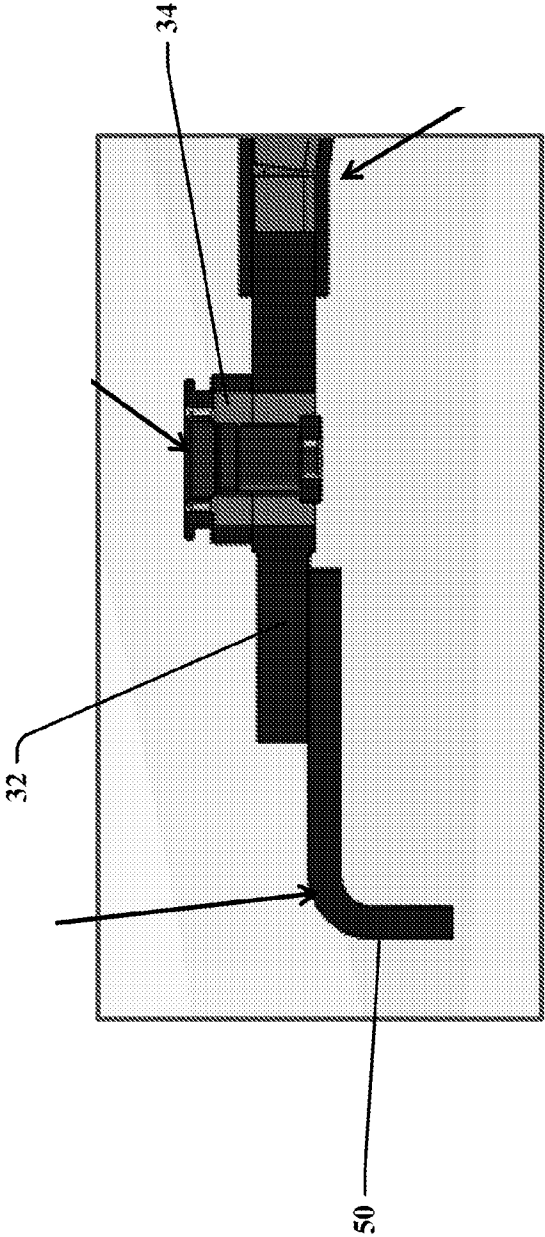


FIG. 8B

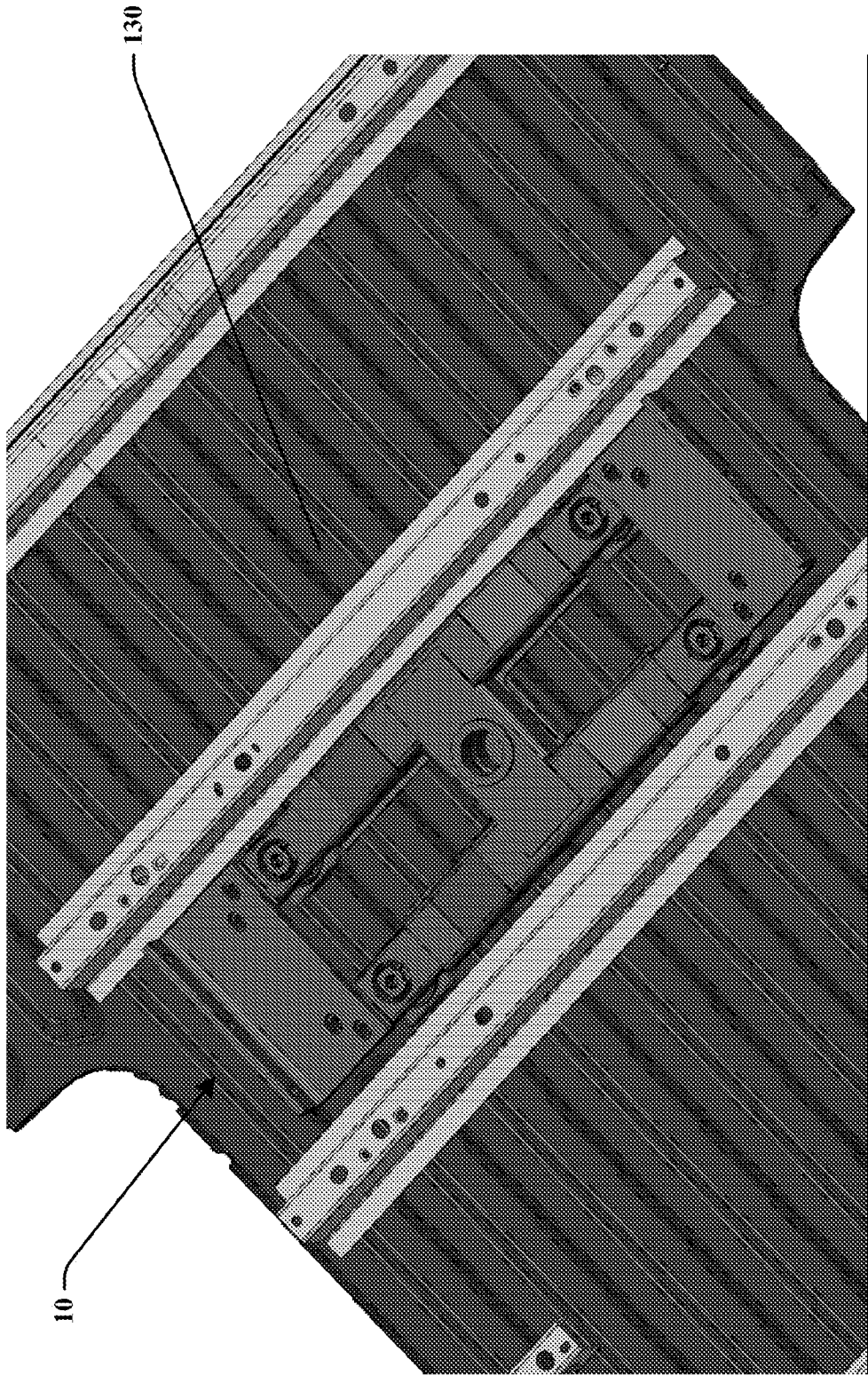


FIG. 9

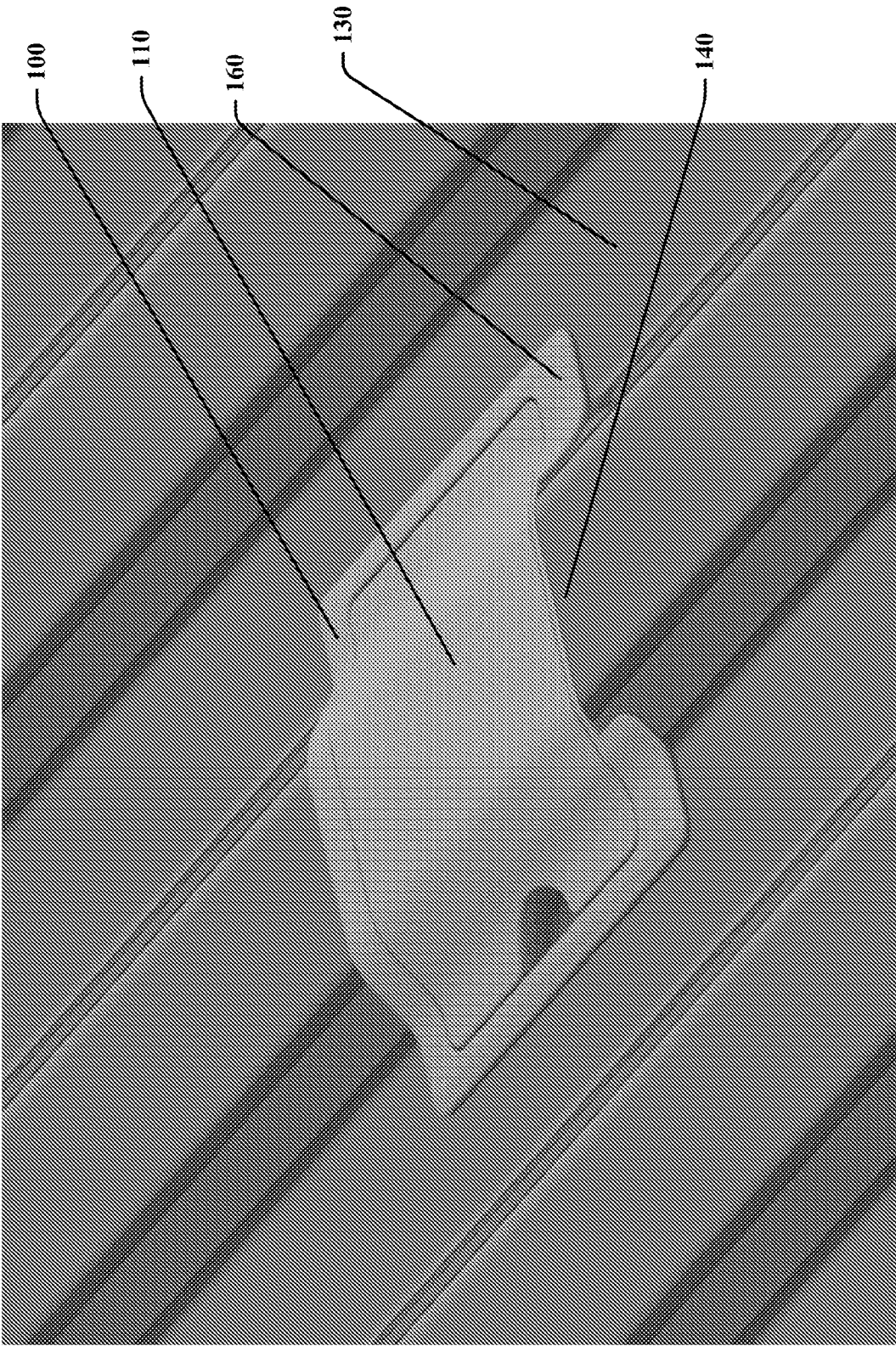


FIG. 10

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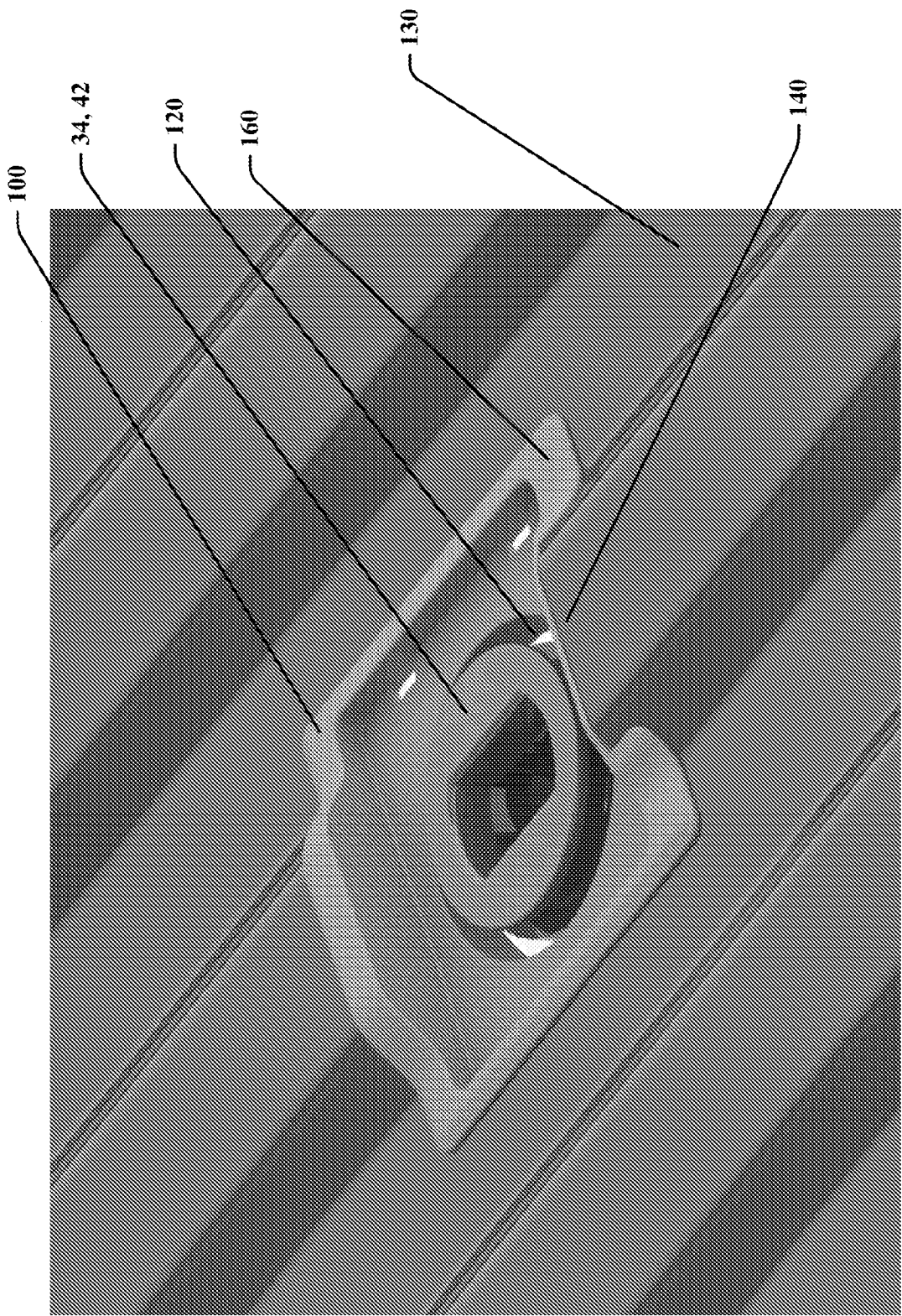


FIG. 11

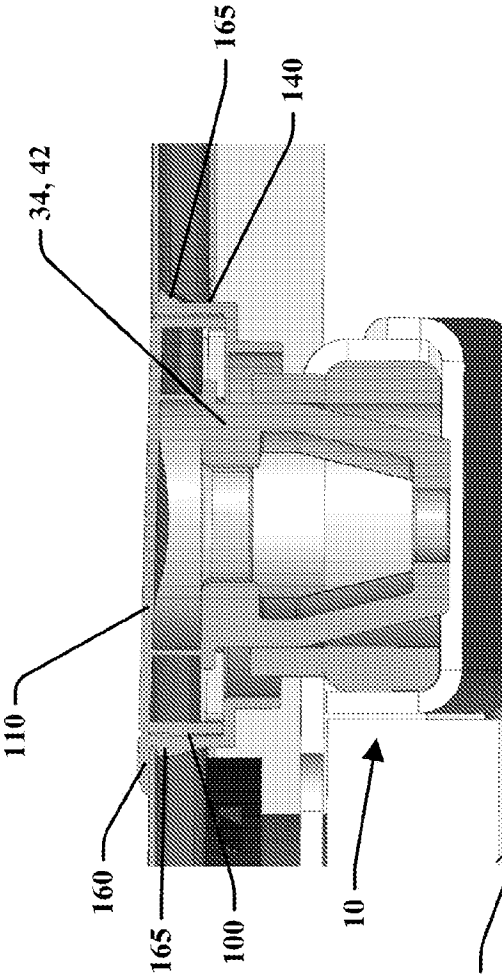


FIG. 12A

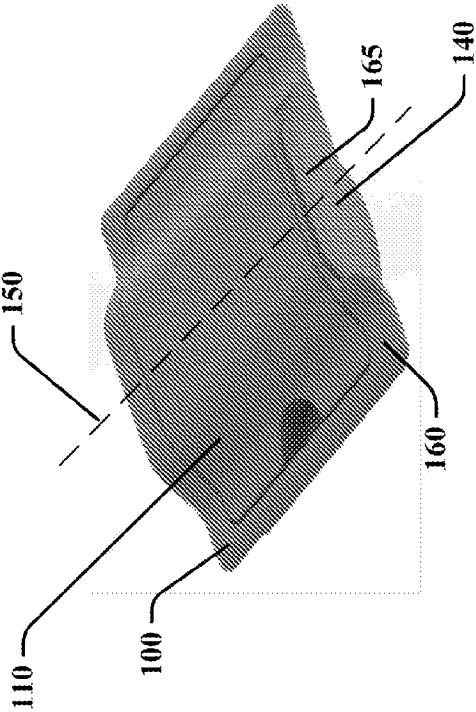


FIG. 12B

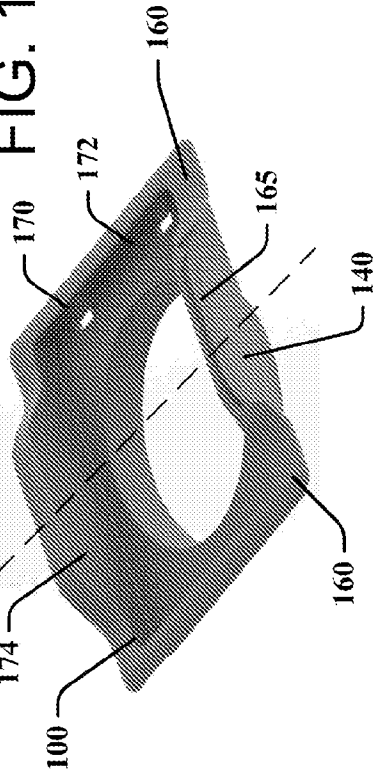


FIG. 12C

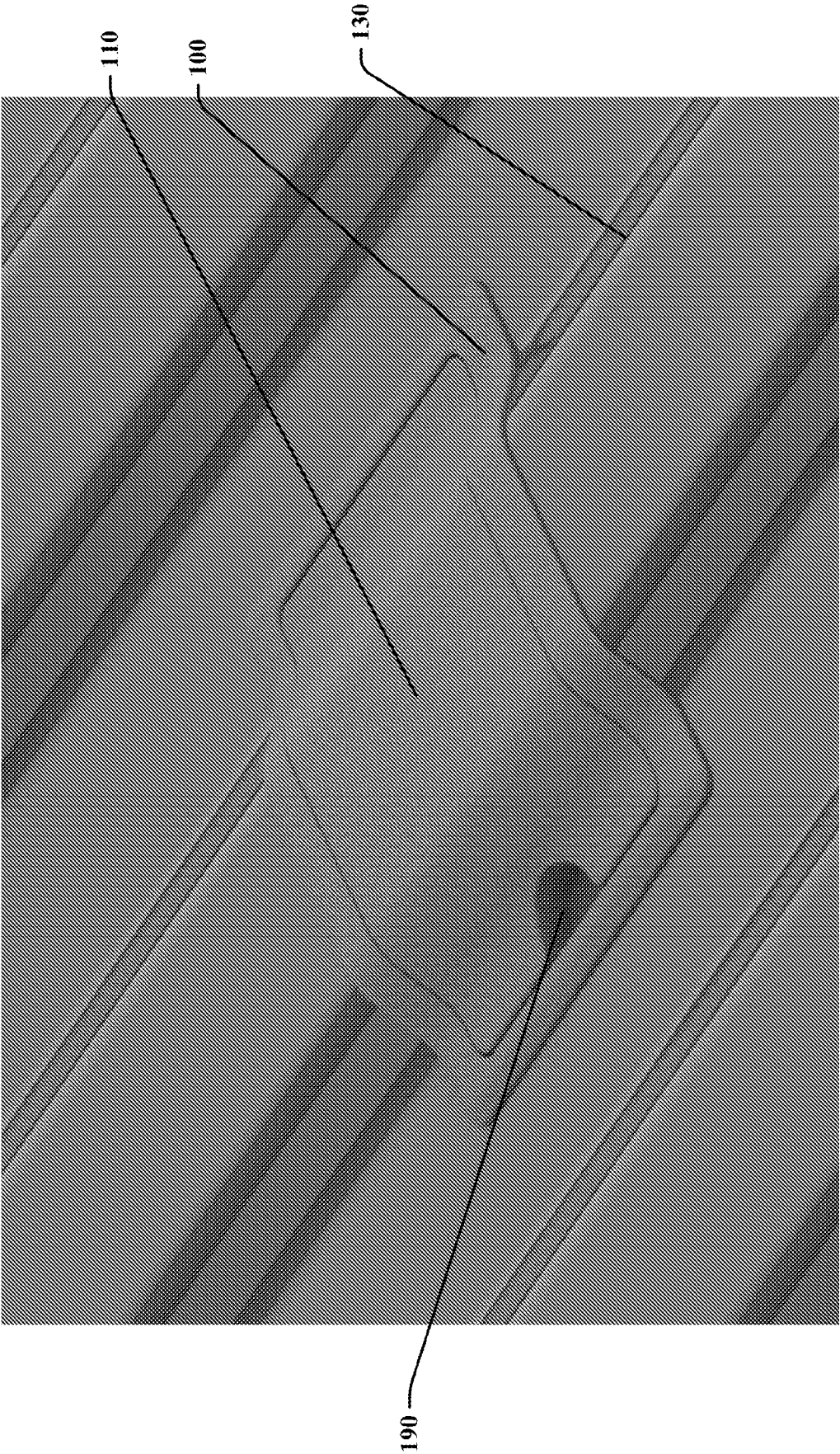


FIG. 13

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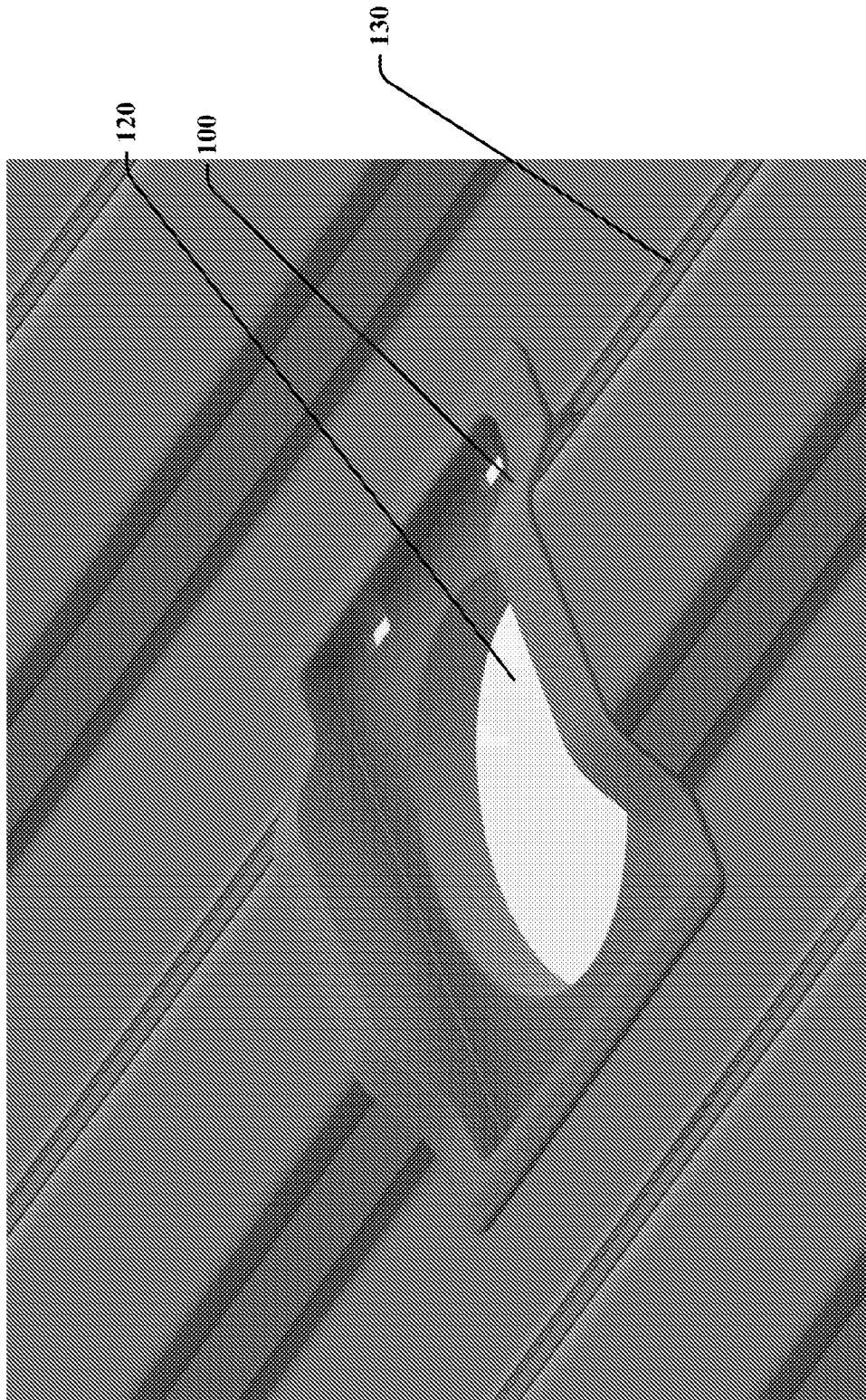


FIG. 14

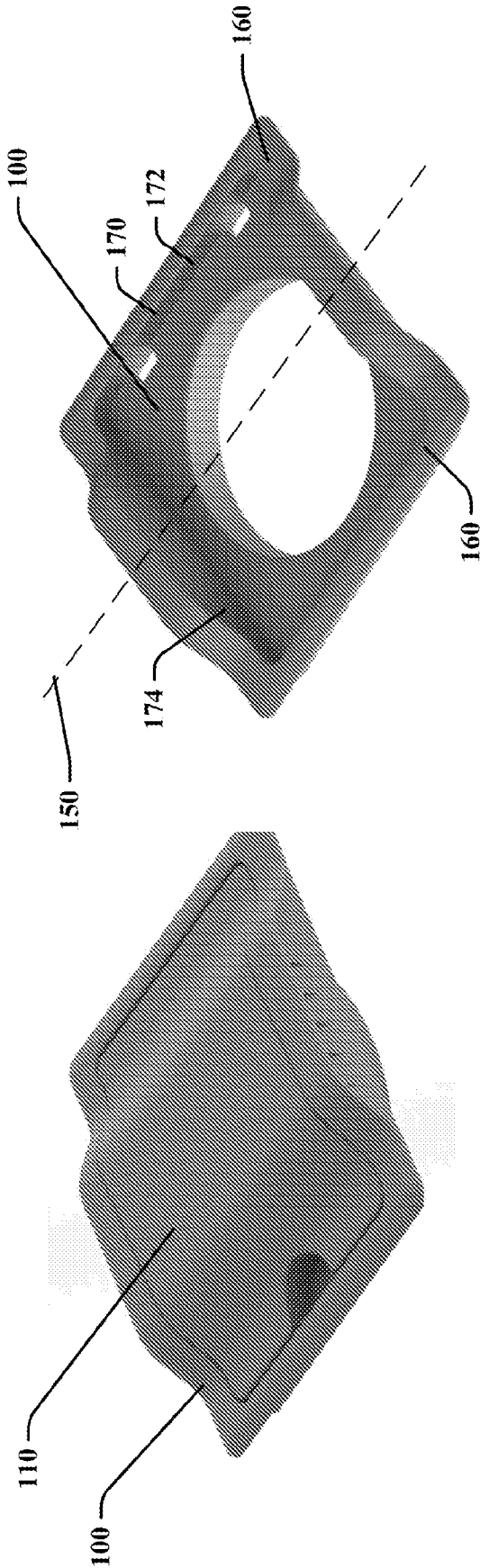


FIG. 15B

FIG. 15A

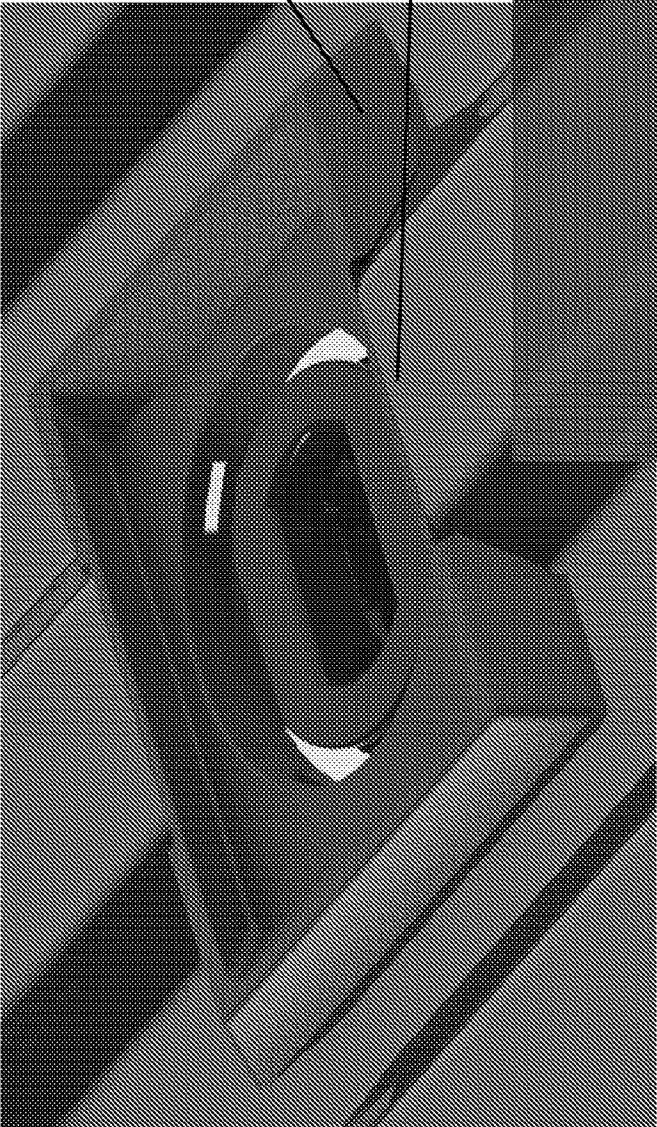


FIG. 16A

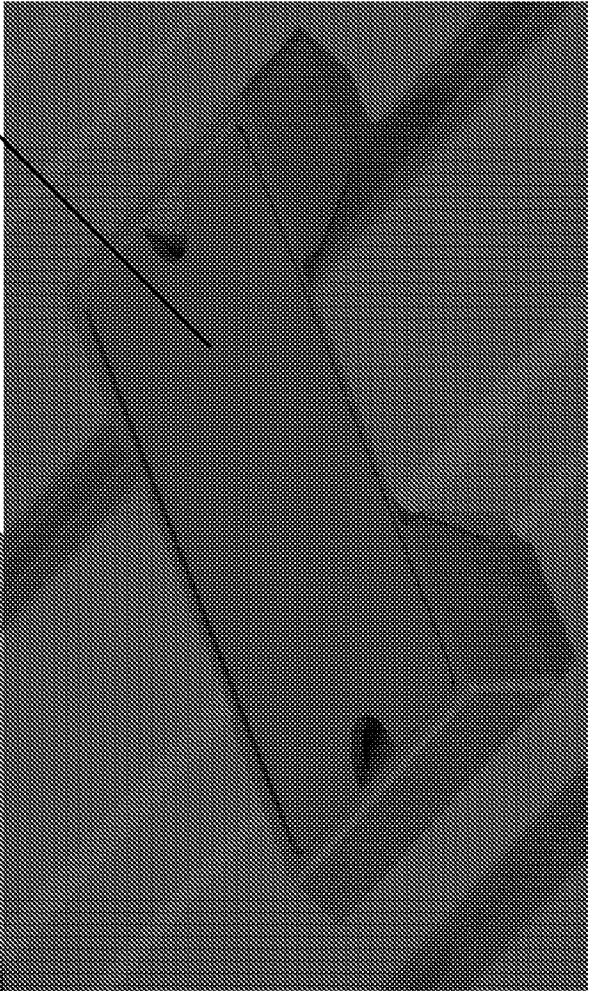


FIG. 16B

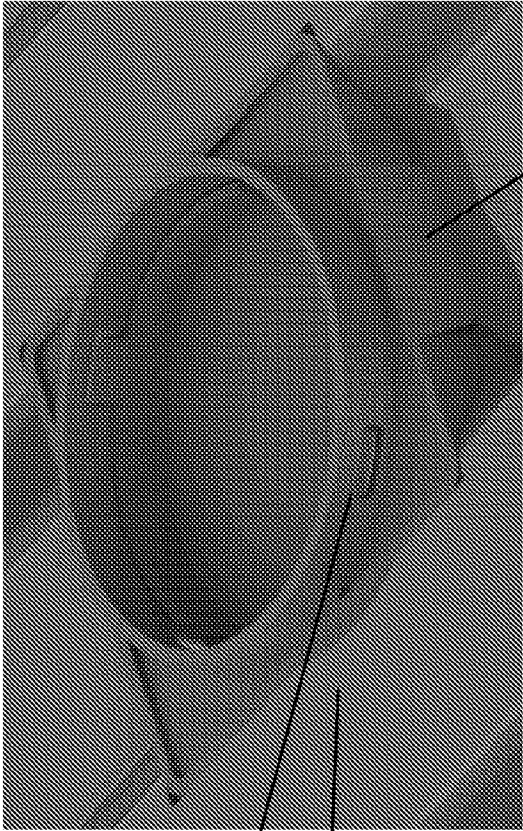


FIG. 17B

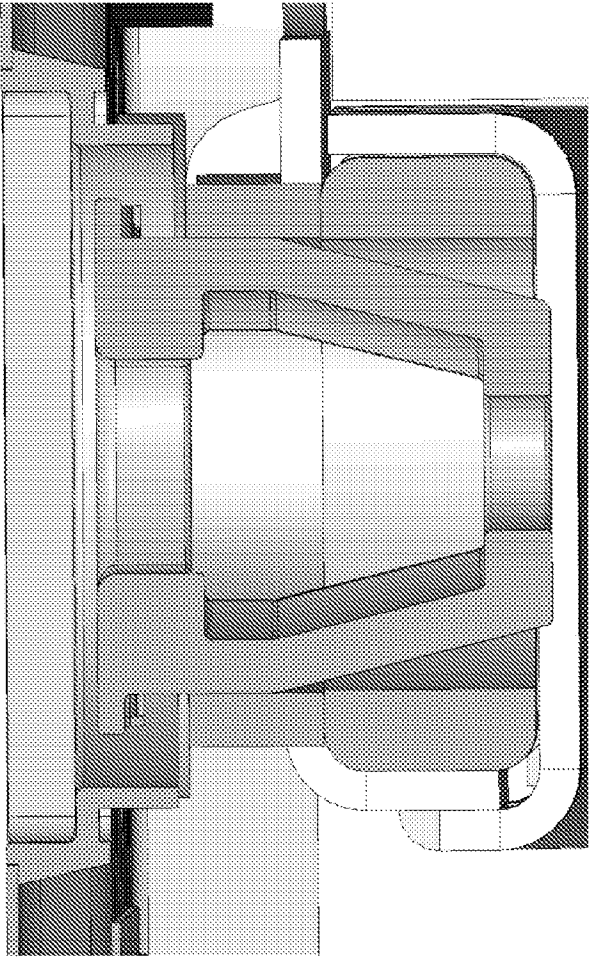


FIG. 17A

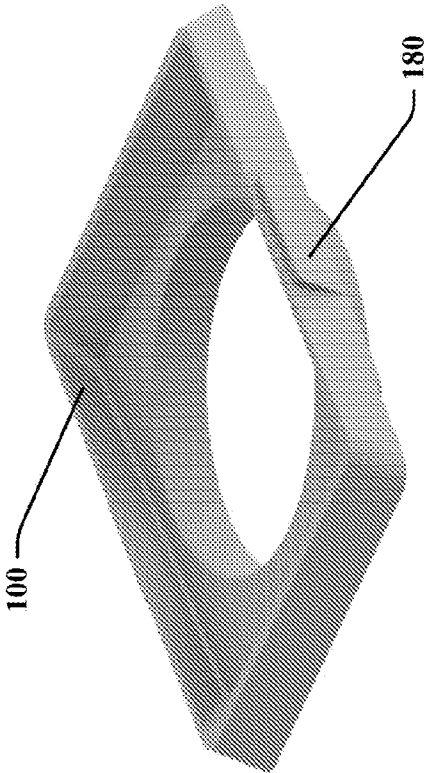


FIG. 18B

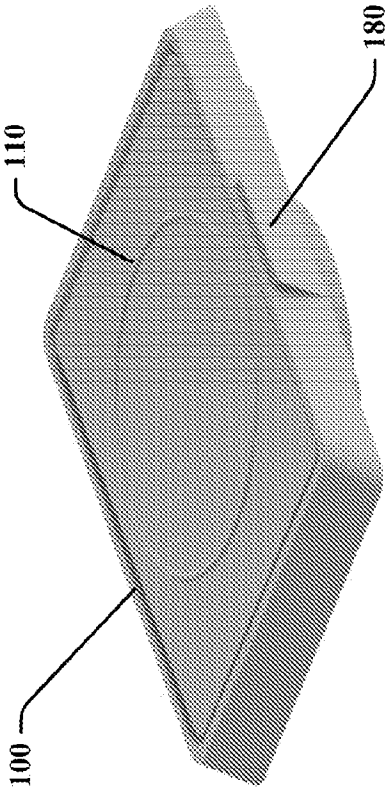
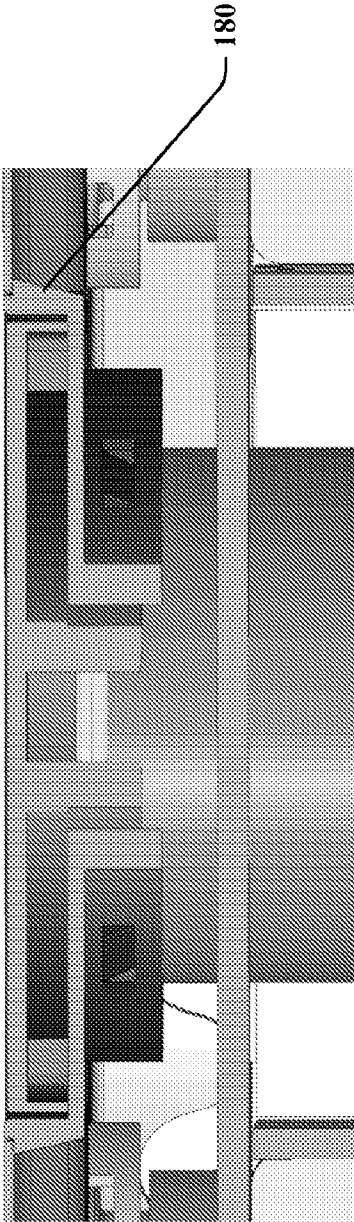
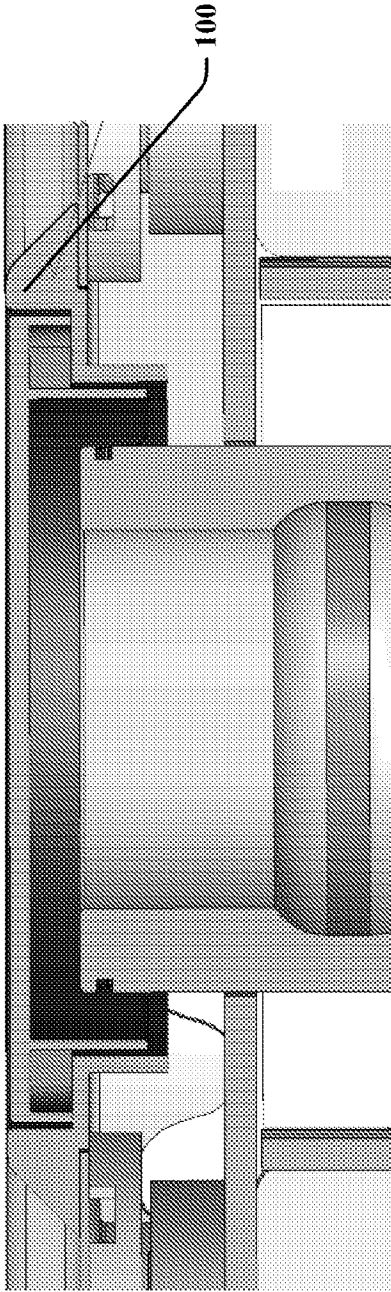


FIG. 18A



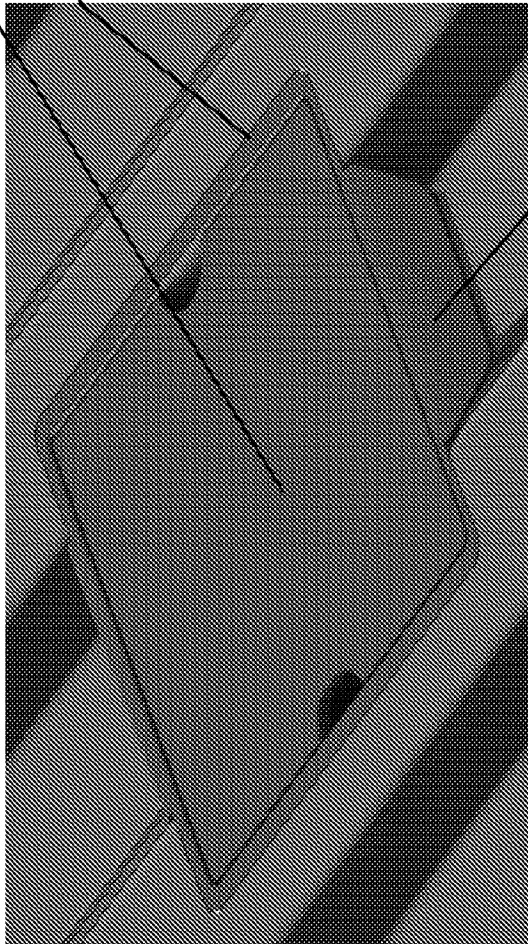


FIG. 20C

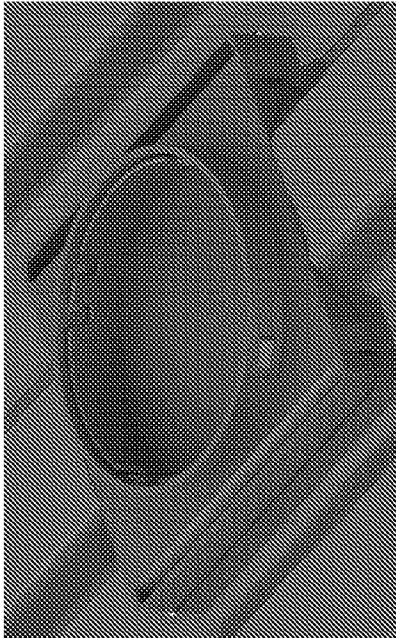


FIG. 20A

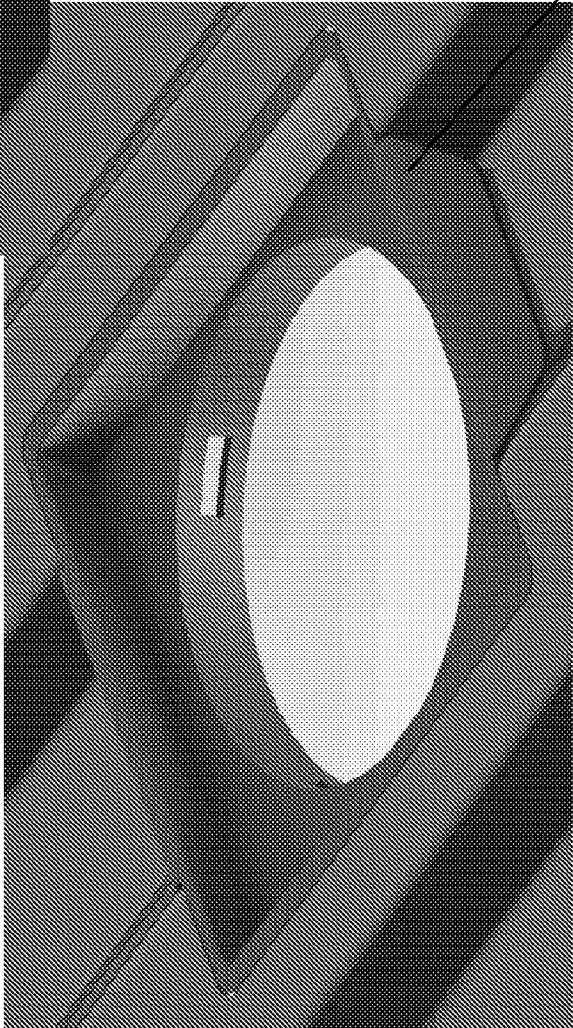


FIG. 20B

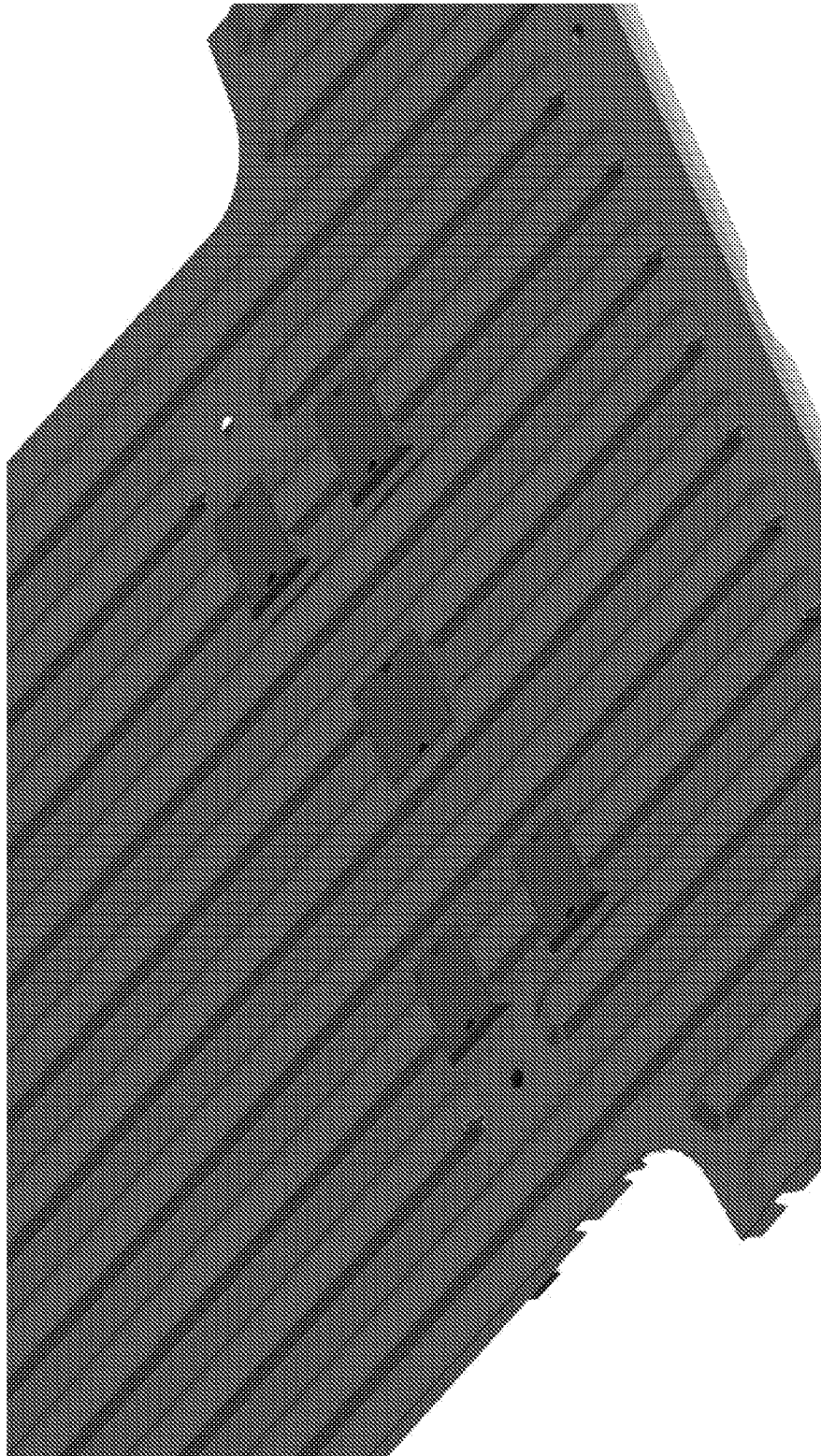


FIG. 21

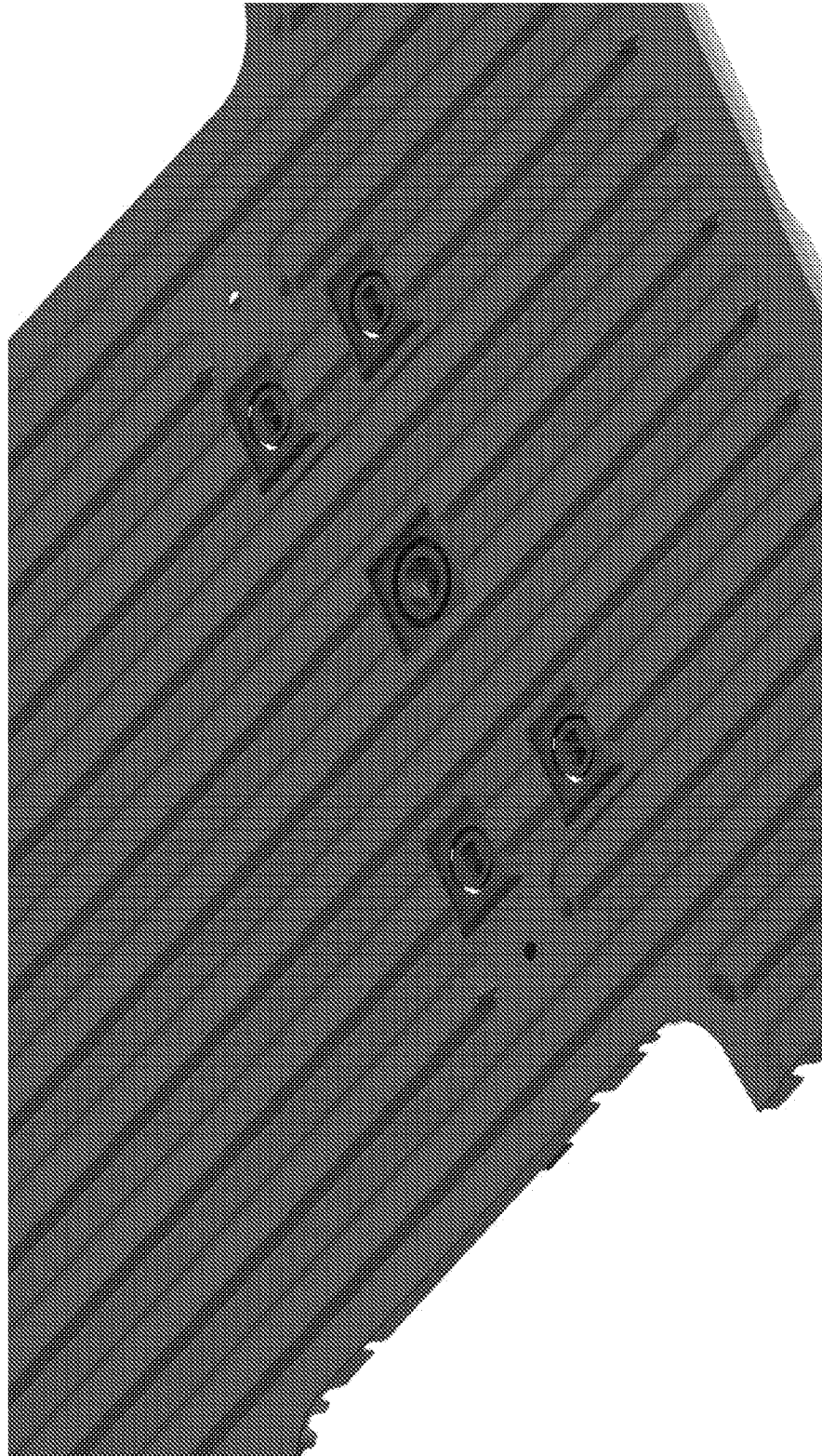


FIG. 22

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/037182

A. CLASSIFICATION OF SUBJECT MATTER
 INV. B60D1/48 B60D1/60
 ADD.

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)

B62D B60D

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)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2010/109285 A1 (STANIFER ERIC J [US] ET AL) 6 May 2010 (2010-05-06)	1-7,22
Y	paragraphs [0020], [0027], [0028], [0029], [0030], [0031], [0034], [0035] figures 4,5	8

X	US 7 793 968 B1 (WITHERS SEAN [US]) 14 September 2010 (2010-09-14)	1-7,22
Y	column 2, line 59 - column 3, line 11 figures 1,2	8

	-/--	



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 application or patent 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

13 September 2016

Date of mailing of the international search report

11/11/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Schmidt, Rémi

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2016/037182

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Anonymous: "5th wheel Prep Package hole cover trouble - Ford Truck Enthusiasts Forums", 10 March 2012 (2012-03-10), XP055301760, Retrieved from the Internet: URL:http://www.ford-trucks.com/forums/1045039-5th-wheel-prep-package-hole-cover-trouble.html [retrieved on 2016-09-12] Post from 10-03-2012 by cmunson1 -----	8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2016/037182

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:

see additional 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 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.:

1-8, 22

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 22

underbed hitch mounting system

2. claims: 9-21

trim cover assembly

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2016/037182

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010109285 A1	06-05-2010	CA 2684201 A1	30-04-2010
		US 2010109285 A1	06-05-2010
		US 2013187362 A1	25-07-2013
		US 2015273962 A1	01-10-2015

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		CN 101927670 A	29-12-2010
		DE 102010029798 A1	30-12-2010
		US 7793968 B1	14-09-2010
