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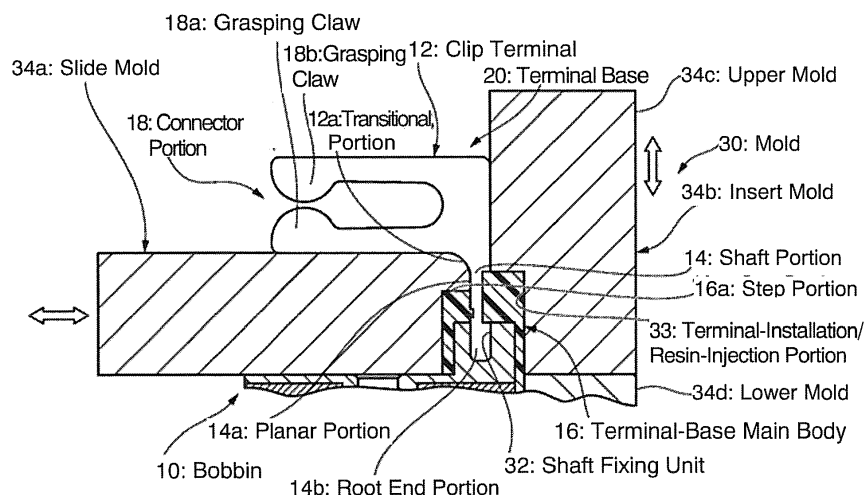
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(54) **TERMINAL BASE OF MAGNETIC COMPONENT, AND MOLD DEVICE FOR FORMING THE TERMINAL BASE**

(57) The terminal base 20 of a magnetic component comprises a conductive terminal unit (a clip terminal 12), and a terminal base main body 16. The clip terminal 12 is connected with a coil 10c wound around a cylindrical bobbin 10, and the clip terminal 12 carries out electrical connection with respect to a user-side terminal unit. Furthermore, a terminal base main body 16 is arranged at a flange unit 10b of the bobbin 10 for holding a shaft portion 14 of the conductive terminal unit 12. And the conductive terminal unit 12 is formed in an L-shape as a whole such that that a connector portion 18 thereof having a connection structure with respect to the user-side

terminal unit protrudes toward the orthogonal direction of the shaft portion 14. The conductive terminal unit 12 and the terminal base main body 16 are formed integrally using molding. A step 16a is provided on a part of the terminal base main body 16 near the protruding side of the connector portion 18 so that this part becomes one step lower than the other parts of the terminal base main body 16. And the shaft portion 14 is exposed over a greater part of its length from the step 16a of the terminal base main body 16 than from the other parts of the terminal base main body 16a.

FIG. 4B **Embodiment**



Description**[Disclosure of the Invention]****[Technical Field]****[Problem to be solved by the Invention]**

[0001] The present invention relates to a terminal base of a magnetic component such as, for example, a solenoid for a vehicle or the like and relates to a mold device for forming that terminal base, and in more detail, the present invention relates to a terminal base of a magnetic component formed by supporting a conductive terminal such as a clip terminal or the like and relates to a mold device for forming that terminal base.

[Background Art]

[0002] As a terminal unit of a solenoid for a vehicle or the like, there has been known from the past a unit composed of: a clip terminal which is connected to a coil wound around a bobbin, and a shaft fixing unit which is attached to the bobbin and which supports the shaft portion of that clip terminal (see Patent Document 1).

[0003] Such a clip terminal is usually constituted so as to grasp a conductive terminal of a corresponding external component by a pair of grasping claws having elasticity and, owing to this configuration, it is possible to electrically connect the solenoid and the conductive terminal of the external component.

[0004] When assembling the terminal unit of such a magnetic component, the fixation thereof is generally accomplished by mounting the shaft portion of each clip terminal onto the shaft fixing unit by using a fastening tool, by fitting the shaft portion into a concave portion of the shaft fixing unit, and so on.

[0005] However, in the case of mounting the shaft portion of each clip terminal on the shaft fixing unit by using a fastening tool in this manner, the terminal unit assembling operation becomes complicated. In addition, in the case of fixing the shaft portion by fitting it into the concave portion of the shaft fixing unit, there is a fear that the clip terminal might fall out from the shaft fixing unit when force is added to the grasping claw and, in addition, there is a fear that fluctuation may occur in the height position of the clip terminal owing to the insertion depth with respect to the shaft fixing unit or the shaft portion.

[0006] As a measure to avoid such a problem, it is conceivable to employ a procedure in which the terminal unit is formed integrally by molding (so-called over-molding, insert-molding: and hereinafter the same shall apply) in which a resin agent is injected into the mold in a state of disposing the clip terminal in the mold.

[Prior-art Document]**[Patent Document]**

[0007] [Patent Document 1] Japanese unexamined patent publication No. 2014-43915

[0008] Meanwhile, in the case of forming a terminal unit by molding as described above, it is essential to study what kind of configuration may be specifically employed for the terminal unit to meet recent needs.

[0009] For example, as shown in a comparative example 1 of FIG. 6, when the distance between a top surface portion 116b of a terminal base main body 116 and the lower end surface of a grasping claw 118a on the lower side is too small, it becomes easy to cause a burr by the molding particularly in a case in which there is provided an r-shaped portion at a transitional portion 112a which extends from the lower end surface of the grasping claw 118a on the lower side to a shaft portion 114, the dimensional accuracy becomes more severe and, in addition, there occurs a problem that the lifetime of the mold becomes short or similar disadvantages arise, so it is desired to set the distance between the top surface portion 116b of the terminal base main body 116 and the lower end surface of the grasping claw 118a on the lower side to be long enough.

[0010] However, because in recent years demand for size-reduction is strong, particularly with regard to electronic components for vehicles or the like, it cannot be said that the technique, in which a clip terminal 212 is pulled up from a terminal base main body 216 (see Comparative Example 2 in FIG. 7) in order to set the distance between the top surface portion 216b of the terminal base main body 216 and the lower end surface of the grasping claw 218a on the lower side to be longer, is a realistic solution.

[0011] The present invention was invented in view of such a situation and is addressed to provide a terminal base of a magnetic component and a mold device for forming the terminal base thereof in which in the case of forming a terminal base by a molding, it is difficult to cause a burr and it is possible to ease-up the dimensional accuracy and, further, in which it is possible to avoid the short-life tendency of the mold and concurrently, it is possible to correspond to the demand for size-reduction for the terminal base as a whole.

[Means for solving the Problem]

[0012] In order to address the aforesaid problem, the terminal base of a magnetic component and the mold device relating to the present invention include the following features.

[0013] The present invention provides a terminal base of a magnetic component comprising:

a conductive terminal unit which is connected to a coil wound around a bobbin and which carries out electrical connection to a user-side terminal unit; and a terminal base main body arranged at a flange unit

of the bobbin for holding a shaft portion of the conductive terminal unit, characterized in that the conductive terminal unit is so constituted, by being formed in an L-shape as a whole, that a connector portion thereof having a connection structure with respect to the user-side terminal unit protrudes toward the orthogonal direction of the shaft portion, the conductive terminal unit and the terminal base main body are formed integrally by molding; a step is provided on a part of the terminal base main body near the protruding side of the connector portion so that said part becomes one step lower than the other parts of the terminal base main body; and the shaft portion is exposed over a greater part of its length from the step of the terminal base main body than from the other parts of the terminal base main body.

[0014] In this case, it is preferable that the exposed portion of the shaft portion includes a corner portion and a planar portion subsequent to this corner portion.

[0015] In addition, it is more effective for the terminal base of a magnetic component relating to the present invention in a case in which an r-shaped portion is formed at the corner portion.

[0016] In addition, it is preferable that the connector portion is provided with a pair of sandwich-pieces which are respectively deformable elastically away from each other and which sandwich the corresponding user-side terminal unit between them.

[0017] Further, the mold device used for molding the terminal base of a magnetic component of the present invention by inserting a conductive terminal unit, whose connector portion is protruded toward one side, into a predetermined position and forming a resin agent injected around the conductive terminal unit, at least comprises a slide mold member moving in a reciprocating fashion at least in a direction parallel with the protruding direction of the connector portion, and an insert mold member moving in a direction orthogonal to the protruding direction, and by the reciprocating movement of the slide mold member, the resin agent is sandwiched between this slide mold member and the insert mold member.

[Effect of the Invention]

[0018] According to the terminal base of the magnetic component relating to the present invention, a step is provided by molding such that the part of the terminal base main body near the protruding side of the connector portion becomes one step lower than the other parts and, thus, a straight portion (to be exact a planar portion, and the same shall apply hereinafter) of the shaft portion of the conductive terminal unit is formed on the protruding side of the connector portion so as to be exposed over an increased part of its length.

[0019] As described above, the straight portion of the shaft portion of the conductive terminal unit is constituted

on the protruding side of the connector portion so as to be exposed over a greater part of its length (i.e. in the up and down direction in Fig.1) and therefore, it becomes possible, on an occasion of the molding, to press the corresponding portion of the slide mold while reliably being in close contact with respect to the straight portion of the shaft portion. More specifically, it is possible to press the slide mold against the straight portion of the shaft portion over a greater part of the length thereof and therefore, it becomes difficult to cause a resin burr or the like, it is possible to ease-up the management of the dimensional accuracy, and further, it is possible to avoid the short-life tendency of the mold.

[0020] Furthermore, in the direction other than on the protruding side of the connector portion, there is no fear that the corner portion area, which is constituted from the lower end portion of the lower-side grasping portion of the connector portion to the shaft portion, may cause the above problem and since the exposure of the shaft portion is allowed to be minimum, there is no problem even if the shaft portion of the conductive terminal unit is not pulled up toward the upward direction from the terminal base main body and therefore, it is possible to correspond also to the demand for size-reduction for the whole terminal base.

[0021] It should be noted that when an r-shaped portion is formed at the corner portion extending from the lower end portion of the lower-side grasping portion of the connector portion to the shaft portion, if the distance between the top surface portion of the terminal base main body and the lower end surface of the grasping claw of the lower side is small it is difficult to reliably set the r-shaped portion of this conductive terminal unit to be in conformity with the corresponding r-shaped portion of the mold and, therefore, in such a case the effect of the present invention as described above becomes even more advantageous.

[0022] In addition, according to the mold relating to the present invention, there is employed such a structure in which by using a slide mold member which carries out reciprocating movement at least in the direction parallel to the protruding direction of the connector portion, the terminal base of any one of the magnetic components mentioned above will be molded and, therefore, it is difficult to cause a burr and it becomes possible to ease-up the dimensional accuracy. In addition, it is possible to avoid the short-life tendency of the mold and, concurrently, it is possible to correspond to the demand for size-reduction of the whole terminal base, and it is possible to achieve a reduction in the effort and cost on an occasion of the manufacturing.

[Brief Description of Drawings]

[0023]

FIG. 1 is a perspective view seen from the front side, which shows a terminal base of a magnetic compo-

nent according to an embodiment of the present invention;

FIG. 2 is a perspective view seen from the rear side, which shows a terminal base of a magnetic component according to the embodiment of Fig. 1;

FIG. 3 is a side view showing a terminal base of a magnetic component according to the embodiment of Fig. 1 of the present invention;

FIGS. 4A and 4B are schematic diagrams each showing a portion of a mold which forms the terminal base in FIGS. 1 to 3, in which FIG. 4A shows a comparative example 1 and FIG. 4B shows an embodiment of the invention;

FIGS. 5A and 5B are schematic diagrams each showing a shape of the terminal base which is formed by using the mold of FIGS. 4, in which FIG. 5A shows comparative example 1 and FIG. 5B shows the embodiment of the invention;

FIG. 6 is a front-side perspective view showing the terminal base of the magnetic component according to the comparative example 1; and

FIG. 7 is a front-side perspective view showing the terminal base of the magnetic component according to comparative example 2.

[Mode for Carrying Out the Invention]

[0024] Hereinafter, embodiments of the terminal base 20 of the magnetic component and the mold device thereof according to the present invention will be explained in detail with reference to the aforesaid drawings. In the following description, references to the up and down direction, or left and right direction, refer to the appropriate direction according to the orientation illustrated in the relevant drawing.

[0025] It should be noted that this embodiment is to be explained by citing a solenoid for a vehicle as the magnetic component as one example and relates to a terminal unit (terminal base 20 shown in FIGS. 1 to 3) for supplying electric power from the outside to this solenoid for a vehicle. Specifically, for example, this embodiment will be applied to a linear solenoid which drives a spool valve for carrying out a hydraulic control of automatic transmission, but it may be applied to other solenoids for vehicles and it may also be applied to other magnetic components other than solenoids for vehicles.

<Structure of Terminal base>

[0026] As shown in FIGS. 1 to 3, the terminal base 20 of the magnetic component according to one embodiment of the present invention is composed of a clip terminal 12 (corresponding to "the conductive terminal unit") and a terminal base main body 16.

[0027] The clip terminal 12 is constituted by being integrally formed in an L-shape as a whole. The clip terminal 12 comprises a connector portion 18 and a shaft portion 14 which are disposed in directions that are orthog-

onal to each other. The end portion of a coil 10c wound around a bobbin (here a cylindrical-shaped bobbin with a coil wound therearound, and hereinafter the same shall apply.) 10 is connected (the connecting portion exists inside the terminal base main body 16 and is not shown) to the connector portion 18. The connector portion 18 carries out electrical connection with respect to a specified external conductor (corresponding to "the user-side terminal unit"), and the shaft portion 14 is inserted into the terminal base main body 16.

[0028] In addition, an r-shaped portion is formed at a corner portion (transitional portion 12a) which extends from the lower end surface of a grasping claw 18a on the lower side of the connector portion 18 to the surface of the shaft portion 14.

[0029] The reason for forming the r-shaped portion at this transitional portion 12a is as follows. That is to say, such a clip terminal 12 is formed by being punched out by press-forming and if the r-shaped portion is not formed at the corner portion when carrying out this punch-out work, it becomes easy to cause a sagging at the corner portion of a press die for punching out the clip terminal 12 and therefore, there is employed a configuration in which a gentle curve is provided by forming the r-shaped portion at this corner portion (transitional portion 12a) such that a pinpoint force will not be applied thereto.

[0030] It should be noted that the bobbin 10 is a bobbin for coil winding which relates, for example, to a solenoid for a vehicle and is provided with a center hole 10a, which is a through-hole, at the center portion, and a movable iron core is pulled and attracted toward this center hole 10a in response to an electric current which is supplied to the coil 10c from the outside and the bobbin functions as a part of a so-called pull solenoid.

[0031] In addition, a step portion 16a is formed on the terminal base main body 16 near the protruding side (front side) of the aforesaid connector portion 18 so as to let the part of the terminal base main body 16 near the protruding side (front side) of the aforesaid connector portion 18 be one step lower than the other parts of the terminal base main body 16, and the planar portion 14a of the shaft portion 14 near the protruding side (front side) of the connector portion 18, is exposed over a predetermined range in the up and down direction in Fig. 1.

[0032] In other words, the terminal base 20 of a magnetic component comprises a conductive terminal unit, i.e. the clip terminal 12, and a terminal base main body 16. The clip terminal 12 is connected to a coil 10c wound around a cylindrical bobbin 10, and the clip terminal 12 carries out electrical connection with respect to a user-side terminal unit. Furthermore, a terminal base main body 16 is arranged at a flange unit 10b of the bobbin 10 for holding a shaft portion 14 of the conductive terminal unit 12. And the conductive terminal unit 12 is so constituted by being formed in an L-shape as a whole that a connector portion 18 thereof having a connection structure with respect to the user-side terminal unit protrudes toward the orthogonal direction of the shaft portion 14.

The conductive terminal unit 12 and the terminal base main body 16 are so constituted by being formed integrally by using molding. A step 16a is provided on a part of the terminal base main body 16 near the protruding side of the connector portion 18 so that this part becomes one step lower than the other parts of the terminal base main body 16. And the shaft portion 14 is exposed from the step 16a of the terminal base main body 16 over a greater part of its length (a longer range in the up and down direction in Fig. 1).

[0033] Also the exposed portion of the shaft portion 14 includes a corner portion, transitional portion 12a, and a planar portion 14a subsequent to this corner portion.

[0034] In addition, each connector portion 18 of the clip terminals 12 is provided with a pair of grasping claws (sandwich-pieces) 18a, 18b which sandwich a corresponding specified conductor by being elastically deformed away from each other.

[0035] At the distal portions of these pair of grasping claws 18a, 18b, there are provided convex portions 18c at the positions facing each other and it is constituted such that at the distal portions of the connector portions 18, it is possible to grasp the corresponding user-side terminal easily by the elastic forces thereof.

[0036] Here, the corresponding user-side terminal is a conductive terminal for supplying an electric current to the bobbin 10 and it is possible for the connector portions 18 to be coupled with the user-side terminal, which is formed in various kinds of shapes, simply and also reliably.

[0037] This embodiment is constituted such that this clip terminal 12 and the terminal base main body 16 are integrally formed using molding.

[0038] As described above, according to the terminal base according to the present embodiment of the present invention, the terminal base is formed by using molding and therefore it becomes unnecessary to employ a procedure, such as a conventional case in the past, for fixing the clip terminal 12 to the terminal base main body 16 such as by fastening the terminal base main body 16 and the clip terminal 12, by taking a procedure of fitting the clip terminal 12 into the inside of the terminal base main body 16 or the like, and also it becomes possible to reliably maintain the relative positional relation between the two objects. Thus, it becomes possible to produce the terminal base speedily and also highly accurately.

<Structure of Mold Device>

[0039] As shown in FIG. 4B, a mold 30 relating to an embodiment of the present invention is provided with a terminal-installation/resin-injection portion 33, a slide mold 34a which carries out a reciprocating movement in the right and left direction of this terminal-installation/resin-injection portion 33, and an insert mold 34b (in which while an upper mold 34c moves up and down, a lower mold 34d is fixed and on an occasion of the molding, they are made to be in a state of being abutted to each other

at the position illustrated in the drawing).

[0040] In the terminal-installation/resin-injection portion 33 within the mold 30, the root end portion 14b of the shaft portion 14 of the clip terminal 12 is disposed in a state of being fitted into a shaft fixing unit 32 which is subsequent to the upper portion of the bobbin 10, a resin agent is injected therearound, the slide mold 34a slides and comes as far as the terminal-installation/resin-injection portion 33 and when the slide mold 34a is fixed in the right and left direction, the molding of the clip terminal 12 and the terminal base main body 16 is carried out between the slide mold 34a and the insert mold 34b.

[0041] It should be noted that there is no clear description in FIG. 4B about the mold-processing of the bobbin 10, but that is carried out before the molding of this terminal base 20. More specifically, the whole bobbin 10, around which the coil 10c is wound, is housed in the lower mold and there is carried out such a processing in which the resin agent is overcoated on the outer surface around this housed bobbin 10.

[0042] In other words, a mold device 30 is used for molding the terminal base 20 of the magnetic component by inserting a conductive terminal unit 12, whose connector portion 18 is protruded toward one side, into a predetermined position and forming a resin agent injected around the conductive terminal unit 12. The mold device 30 at least comprises a slide mold member 34a and an insert mold member 34b. The slide mold member 34a moves in a reciprocating fashion at least in the direction parallel with the protruding direction of the connector portion 18 and the insert mold member 34b moves in a direction orthogonal to the protruding direction of the connector portion 18. By the reciprocating movement of the slide mold member 34a, the resin agent is sandwiched between this slide mold member 34a and the insert mold member 34b.

<Characterized Configurations of This Embodiment >

[0043] Meanwhile, there are a lot of advantages in molding the terminal base main body 16 and the clip terminal 12 integrally by using molding such as this inventive example. On the other hand, in a case of this inventive example in which the r-shaped portion is formed at the corner portion (transitional portion 12a) which extends from the lower end surface of the grasping claw 18a on the lower side of the connector portion 18 to the surface of the shaft portion 14, as shown in the comparative example 1 of FIG. 6 (each member shown in FIG. 6 is indicated correspondingly by being applied with a reference numeral in which 100 is added to the corresponding reference numeral of the member shown in FIG. 1, and this is the same for FIG. 4A and FIG. 5A), when the distance between the top surface portion 116b of the terminal base main body 116 and the lower end surface of the grasping claw 118a of the lower side is too short, there occurs such a problem that it becomes easy for a burr to occur by the molding, more severe dimensional accuracy

is to be required, and in addition, the lifetime of the mold becomes short, or like problems arise, which is undesirable.

[0044] However, as shown in the comparative example 2 shown in FIG. 7 (each member shown in FIG. 7 is indicated correspondingly by being applied with a reference numeral in which 200 is added to the corresponding reference numeral of the member shown in FIG. 1), when the whole clip terminal 212 is pulled up from the terminal base main body 216 in order to set the distance between the top surface portion 216b of the terminal base main body 216 and the lower end surface of the grasping claw 218a of the lower side to be larger, the height of the whole terminal base 220 becomes higher and this goes counter to the demand for size-reduction of the component.

[0045] Therefore, as shown in FIGS. 1 to 3, in this embodiment, there is employed such a constitution that there is provided a step portion 16a in which the front side (in the direction to which connector portion 18 is faced) of the terminal base main body 16 becomes low by one step and the planar portion 14a is exposed over a predetermined length in the up and down direction only on the front side of the shaft portion 14.

[0046] More specifically, on this front side, there is employed a configuration in which not only the transitional portion 12a formed with the r-shaped portion which extends from the lower end surface of the grasping claw 18a on the lower side to the surface of the shaft portion 14 but also the planar portion 14a which is subsequent to the transitional portion 12a are exposed and at the time of the molding, the shaft portion 14 is in contact with the slide mold 34a over a wide range of the transitional portion 12a and the planar portion 14a, in which this shaft portion 14 is pressed together with the resin agent which is injected in the terminal-installation/resin-injection portion 33.

[0047] Further, the shaft portion 14 is pressed over a wide range by being in tight contact with the slide mold 34a not only at the place of the transitional portion 12a but also at the place of the planar portion 14a which extends in a plane form, so that it becomes difficult to cause a burr at the time of molding compared with the comparative examples 1, 2 in which the pressing was carried out in a narrow range of only the transitional portion 12a and, also, it becomes sufficient if the mold is designed not by targeting the r-shaped portion of the transitional portion 12a but by targeting the plane of the planar portion 14a as the reference thereof and therefore, it is possible to ease-up the dimensional accuracy drastically.

[0048] In addition, the slide mold 34a is abutted against the transitional portion 12a and the planar portion 14a of the shaft portion 14 over a wide range thereof and therefore, when comparing with the comparative examples 1, 2 in which the abutment is applied only over a narrow range of the transitional portion 12a, the pressing force at the time of the abutment is dispersed and it is possible to achieve lifetime extension of the mold.

[0049] The matters described above will be explained

by using FIGS. 4A, 4B and FIGS. 5A, 5B. When comparing FIG. 4A showing the comparative example 1 with FIG. 4B showing the embodiment, the terminal-installation/resin-injection portion 133 is formed in a simple rectangular shape in the comparative example 1, so that the slide mold 134a is abutted against the clip terminal 112 only by the corner portion with the r-shaped portion (which corresponds to the transitional portion 112a of the clip terminal 112) on the upper side. On the other hand, in this embodiment, the terminal-installation/resin-injection portion 33 is formed in a shape of being cut-out so as to provide a step at the corner portion on the left upper side thereof in the drawing, so that the slide mold 34a is abutted against the clip terminal 12 by a wide area of the corner portion with the r-shaped portion on the right upper side in the drawing and the subsequent distal-end planar portion (which correspond to the transitional portion 12a and the planar portion 14a of clip terminal 12).

[0050] For this reason, the height (area) of the area by which the slide mold 34a is abutted against the clip terminal 12 is largely different when comparing the two cases.

[0051] FIGS. 5A and 5B are drawings showing this difference between the two cases. When comparing FIG. 5A showing the comparative example 1 with FIG. 5B showing the embodiment, with regard to the heights of the areas by which the slide molds 34a, 134a are abutted against the clip terminals 12, 112, the height becomes "P" for comparative example 1 and, on the other hand, the height becomes "Q" for the inventive example. For example, "Q" becomes around two times larger with respect to "P" (the contrast area thereof is also the same) and in addition, in this embodiment, the slide mold 34a is abutted also against the planar portion 14a of the shaft portion 14 and therefore, as mentioned above, it is possible for this embodiment to exert various kinds of useful effects such as an effect that it is difficult to cause a burr, an effect that it is possible to ease-up the dimensional accuracy, an effect that it is possible to achieve lifetime extension of the mold, and the like.

[0052] In addition, for the three directions other than the front-side direction mentioned above, there is not provided such a step portion as the step portion 16a as mentioned above, and in these three directions the distance between the top surface portion 10a of the bobbin 10 and the lower end surface of the grasping claw 18a on the lower side is set to be similar to that of the comparative example 1 and therefore, in contrast with the comparative example 2 shown in the aforementioned FIG. 7, there is no fear that this go counter to the demand for size-reduction of the terminal base 20 as a whole.

<Modified Embodiment>

[0053] Various embodiments of the present invention were described above, but the present invention is not to be limited by the embodiments mentioned above and it is possible to change the embodiments variously.

[0054] For example, in the embodiments mentioned above, clip terminals are used for the conductive terminals, but the invention is not limited to use of these clip terminals for the conductive terminals and, for example, it is allowed to use other input-output terminals such as binding terminals for the coils, or the like.

[0055] In addition, in the embodiment mentioned above, for the configuration of the connector portion of the clip terminal, there is used a configuration in which two grasping claws face each other, but for this configuration of the connector portion it is possible to employ various kinds of configurations insofar as there is employed a configuration in which the connector portion extends in the orthogonal direction with respect to the shaft portion and the lower end surface of this connector portion and the shaft portion cross each other in the orthogonal direction to form a corner portion. In addition, the terminal base is particularly effective for a case in which the r-shaped portion is formed at this corner portion, but it is not always necessary for the terminal base of the magnetic component of the present invention to provide a configuration in which the r-shaped portion is formed at the corner portion.

[0056] In addition, the number of connector portions is not limited to two as shown in the embodiment mentioned above, it is allowed to be one or it is allowed to be three or more.

[0057] In addition, also with regard to the configuration of the terminal base main body, the configuration is not to be limited by the configuration described in the embodiment mentioned above and, in any event, it is enough if a step is provided on the front side (in the direction to which the connector portion protrudes) of the conductive terminal and, by this step, the front side portion of the conductive terminal is constituted so as to be exposed largely toward the up and down direction. For example, it is allowed for the step not to be provided over a wide range in the width direction of the terminal base and it is allowed to employ such a configuration in which the portion corresponding to the shaft portion of the conductive terminal is cut-out in a slit shape having a narrow width and this shaft portion is exposed in the up and down direction.

[0058] In addition, also with regard to the mold of the present invention, the mold is not to be limited by the aforesaid embodiments, and it is possible to employ various kinds of modifications in the embodiments. For example, it is allowed to provide a slide mold shape by which a portion corresponding to the shaft portion of the terminal base is cut out in a slit shape so as to correspond to the above-mentioned modified embodiment of the terminal base and that shaft portion is to be formed so as to be exposed in the up and down direction.

[0059] In addition, in this embodiment, the front and back sides seen from the paper plane showing FIG. 4B are constituted such that on an occasion of the molding, the slide mold 34a and the slide mold 34b are abutted against each other in the range in which the terminal-

installation/resin-injection portion 33 is not provided, but depending on the situation, it is allowed, also in the direction from the front side to the depth side seen from the paper plane, to provide slide molds similar to the slide molds 34a, 34b and to move one of or both of the provided slide molds in a reciprocating fashion in synchronization with the reciprocating movement of the slide mold 34a.

[Description of Reference Numerals]

[0060]

10, 110, 210: bobbin (with wound-coil)
 10a, 110a, 210a: center hole
 10b, 110b, 210b: flange unit
 10c, 110c, 210c: coil
 12, 112, 212: clip terminal
 12a, 112a, 212a: transitional portion
 14, 114, 214: shaft portion
 14a: planar portion
 14b, 114b: root end portion
 16, 116, 216: terminal base main body
 16a: step portion
 16b, 116b, 216b: top surface portion
 18, 118, 218: connector portion (conductive terminal unit)
 18a, 18b, 118a, 118b, 218a, 218b: grasping claw
 18c, 118c, 218c: convex portion
 20, 120, 220: terminal base
 30, 130: mold
 32, 132: shaft fixing unit
 33, 133: terminal-installation/resin-injection portion
 34a, 134a: slide mold
 34b, 134b: insert mold
 34c, 134c: upper mold
 34d, 134d: lower mold

Claims

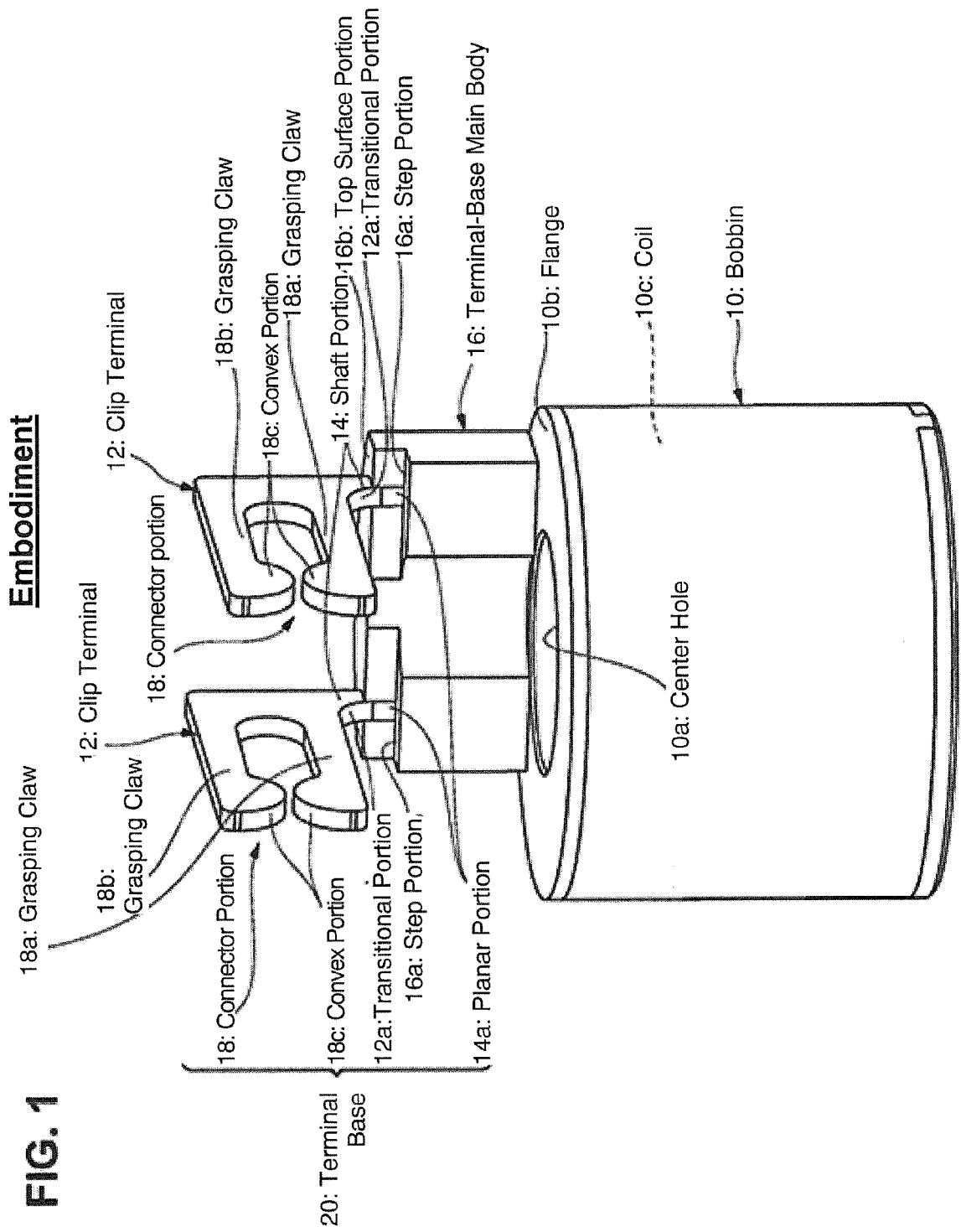
1. A terminal base (20) of a magnetic component comprising:

a conductive terminal unit (12) which is connected to a coil wound around a bobbin and which carries out electrical connection with respect to a user-side terminal unit; and
 a terminal base main body (16) arranged at a flange unit of the bobbin for holding a shaft portion (14) of the conductive terminal unit (12),
characterized in that
 the conductive terminal unit (12) is formed in an L-shape as a whole and a connector portion (18) thereof having a connection structure with respect to the user-side terminal unit protrudes toward the orthogonal direction of the shaft portion (14),
 the conductive terminal unit (12) and the termi-

nal base main body (16) are formed integrally using molding such that;
 a step (16a) is provided on a part of the terminal base main body (16) near the protruding side of the connector portion (18) so that this part (16a) becomes one step lower than the other parts of the terminal base main body (16); and
 the shaft portion (14) is exposed over a greater part of its length from the step (16a) of the terminal base main body (16) than from said other parts.

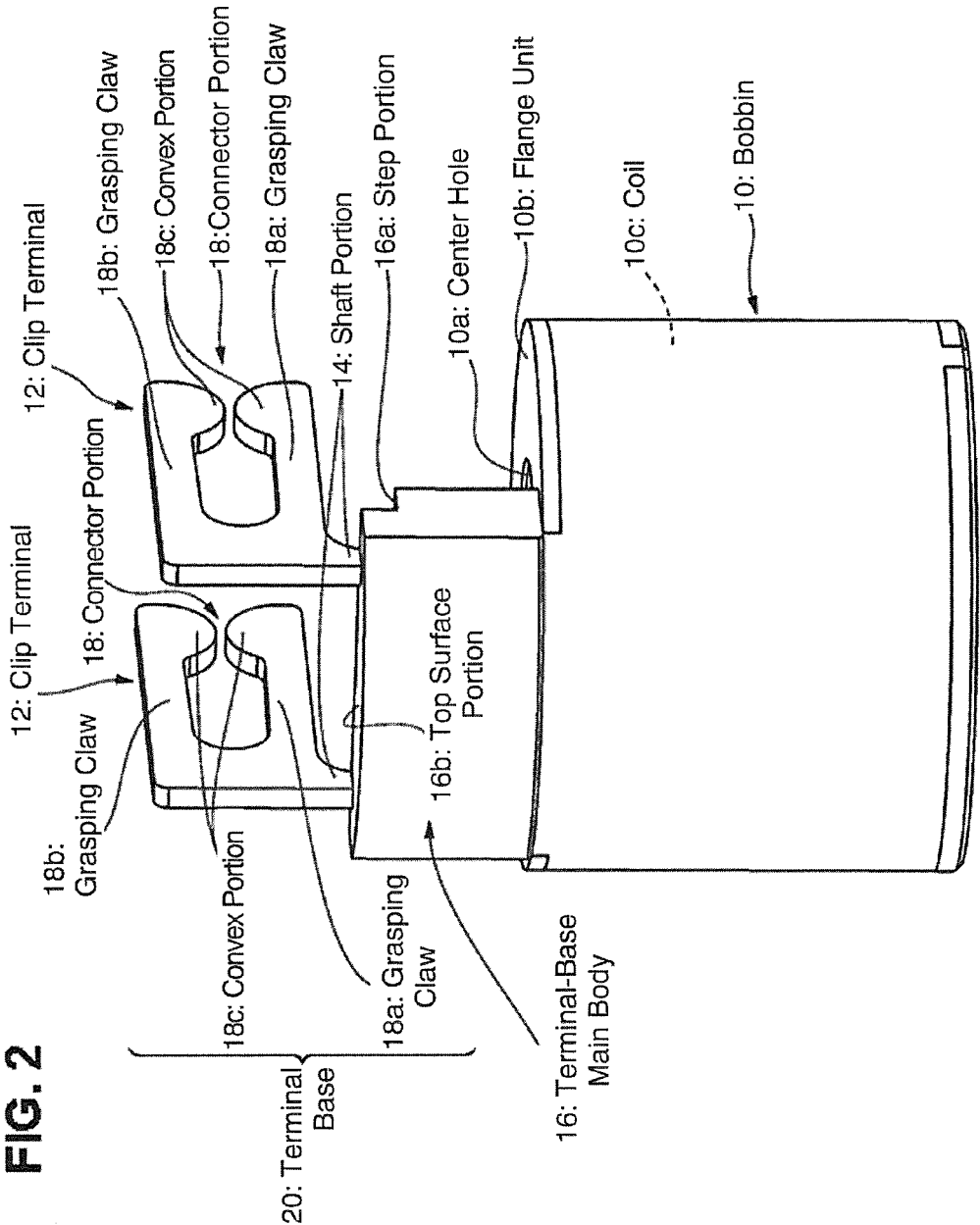
2. The terminal base (20) of a magnetic component according to claim 1, **characterized in that** the exposed portion of the shaft portion includes a corner portion and a planar portion (14a) subsequent to this corner portion.
3. The terminal base (20) of a magnetic component according to claim 1, **characterized in that** an r-shaped portion is formed at the corner portion.
4. The terminal base (20) of a magnetic component according to any one of claims 1 to 3, **characterized in that** the connector portion (18) is provided with a pair of sandwich-pieces (18a, 18b) which are respectively deformable elastically away from each other for sandwiching the corresponding user-side terminal unit therebetween.
5. A mold device (30) used for molding the terminal base (20) of a magnetic component according to any one of claims 1 to 4 by inserting a conductive terminal unit (12), whose connector portion (18) is protruded toward one side, into a predetermined position and forming a resin agent injected around the conductive terminal unit (12), said mold device comprising:

a slide mold member (34a) moving in a reciprocating fashion at least in a direction parallel with the protruding direction of the connector portion (12), and
 an insert mold member (34b) moving in a direction orthogonal to the protruding direction, wherein the slide mold member (34a) and insert mold member (34b) are configured such that by the reciprocating movement of the slide mold member (34a), the resin agent is sandwiched between this slide mold member (34a) and the insert mold member (34b).



Embodiment

FIG. 2



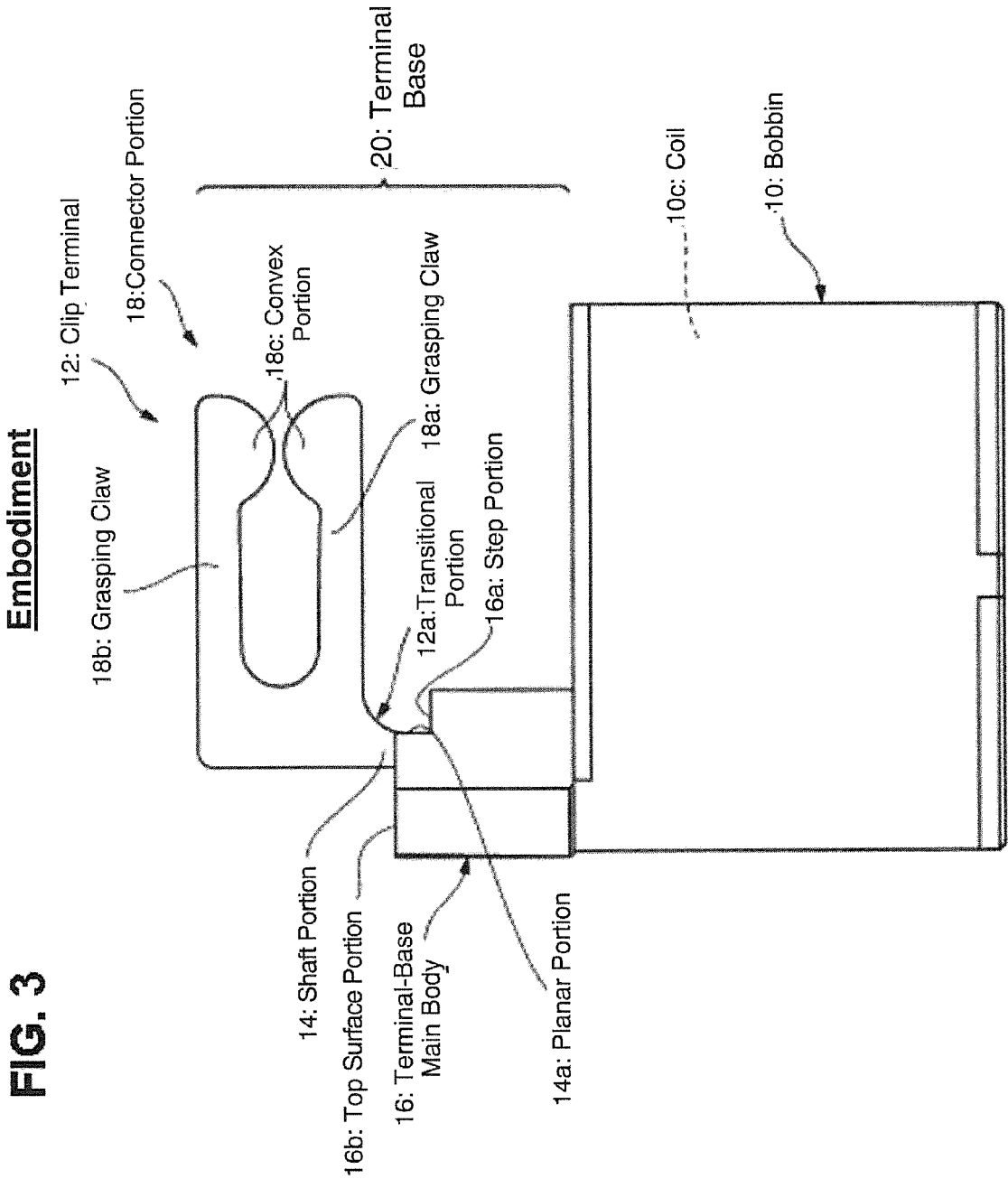


FIG. 4A Comparative Example 1

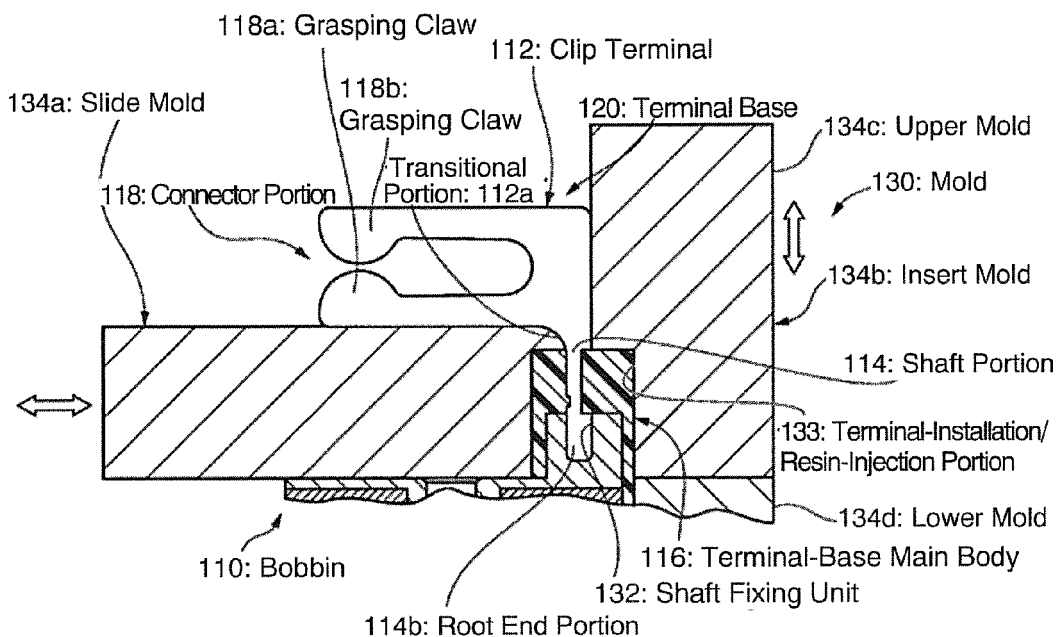


FIG. 4B	<u>Embodiment</u>
	FIG. 4B is a schematic diagram of a system architecture. A central block labeled "System" is connected to a block labeled "User". The "System" block is also connected to a block labeled "Database". The "Database" block is connected to a block labeled "Network". The "Network" block is connected to a block labeled "Server". The "Server" block is connected to a block labeled "Client". The "Client" block is connected to a block labeled "Mobile Device". The "Mobile Device" is connected to a block labeled "Wearable Device". The "Wearable Device" is connected to a block labeled "Sensor". The "Sensor" is connected to a block labeled "Actuator". The "Actuator" is connected to a block labeled "Controller". The "Controller" is connected to a block labeled "Power Source". The "Power Source" is connected to a block labeled "Output Device". The "Output Device" is connected to a block labeled "Input Device". The "Input Device" is connected to a block labeled "Display". The "Display" is connected to a block labeled "Speaker". The "Speaker" is connected to a block labeled "Microphone". The "Microphone" is connected to a block labeled "Camera". The "Camera" is connected to a block labeled "GPS". The "GPS" is connected to a block labeled "Accelerometer". The "Accelerometer" is connected to a block labeled "Gyroscope". The "Gyroscope" is connected to a block labeled "Compass". The "Compass" is connected to a block labeled "Barometer". The "Barometer" is connected to a block labeled "Thermometer". The "Thermometer" is connected to a block labeled "Humidity Sensor". The "Humidity Sensor" is connected to a block labeled "Air Quality Sensor". The "Air Quality Sensor" is connected to a block labeled "Light Sensor". The "Light Sensor" is connected to a block labeled "Sound Sensor". The "Sound Sensor" is connected to a block labeled "Vibration Sensor". The "Vibration Sensor" is connected to a block labeled "Proximity Sensor". The "Proximity Sensor" is connected to a block labeled "Infrared Sensor". The "Infrared Sensor" is connected to a block labeled "Ultrasonic Sensor". The "Ultrasonic Sensor" is connected to a block labeled "Laser Sensor". The "Laser Sensor" is connected to a block labeled "Radar Sensor". The "Radar Sensor" is connected to a block labeled "Thermal Sensor". The "Thermal Sensor" is connected to a block labeled "X-ray Sensor". The "X-ray Sensor" is connected to a block labeled "Gamma Ray Sensor". The "Gamma Ray Sensor" is connected to a block labeled "Neutron Sensor". The "Neutron Sensor" is connected to a block labeled "Alpha Particle Sensor". The "Alpha Particle Sensor" is connected to a block labeled "Beta Particle Sensor". The "Beta Particle Sensor" is connected to a block labeled "Positron Sensor". The "Positron Sensor" is connected to a block labeled "Electron Sensor". The "Electron Sensor" is connected to a block labeled "Photon Sensor". The "Photon Sensor" is connected to a block labeled "Neutrino Sensor". The "Neutrino Sensor" is connected to a block labeled "Graviton Sensor". The "Graviton Sensor" is connected to a block labeled "Higgs Boson Sensor". The "Higgs Boson Sensor" is connected to a block labeled "Top Quark Sensor". The "Top Quark Sensor" is connected to a block labeled "Bottom Quark Sensor". The "Bottom Quark Sensor" is connected to a block labeled "Strange Quark Sensor". The "Strange Quark Sensor" is connected to a block labeled "Charm Quark Sensor". The "Charm Quark Sensor" is connected to a block labeled "Up Quark Sensor". The "Up Quark Sensor" is connected to a block labeled "Down Quark Sensor". The "Down Quark Sensor" is connected to a block labeled "Lepton Sensor". The "Lepton Sensor" is connected to a block labeled "Neutrino Sensor". The "Neutrino Sensor" is connected to a block labeled "Photon Sensor". The "Photon Sensor" is connected to a block labeled "Electron Sensor". The "Electron Sensor" is connected to a block labeled "Positron Sensor". The "Positron Sensor" is connected to a block labeled "Beta Particle Sensor". The "Beta Particle Sensor" is connected to a block labeled "Alpha Particle Sensor". The "Alpha Particle Sensor" is connected to a block labeled "Neutron Sensor". The "Neutron Sensor" is connected to a block labeled "Gamma Ray Sensor". The "Gamma Ray Sensor" is connected to a block labeled "X-ray Sensor". The "X-ray Sensor" is connected to a block labeled "Thermal Sensor". The "Thermal Sensor" is connected to a block labeled "Radar Sensor". The "Radar Sensor" is connected to a block labeled "Laser Sensor". The "Laser Sensor" is connected to a block labeled "Ultrasonic Sensor". The "Ultrasonic Sensor" is connected to a block labeled "Infrared Sensor". The "Infrared Sensor" is connected to a block labeled "Proximity Sensor". The "Proximity Sensor" is connected to a block labeled "Vibration Sensor". The "Vibration Sensor" is connected to a block labeled "Sound Sensor". The "Sound Sensor" is connected to a block labeled "Light Sensor". The "Light Sensor" is connected to a block labeled "Air Quality Sensor". The "Air Quality Sensor" is connected to a block labeled "Humidity Sensor". The "Humidity Sensor" is connected to a block labeled "Thermometer". The "Thermometer" is connected to a block labeled "Barometer". The "Barometer" is connected to a block labeled "Compass". The "Compass" is connected to a block labeled "Gyroscope". The "Gyroscope" is connected to a block labeled "Accelerometer". The "Accelerometer" is connected to a block labeled "GPS". The "GPS" is connected to a block labeled "Camera". The "Camera" is connected to a block labeled "Microphone". The "Microphone" is connected to a block labeled "Speaker". The "Speaker" is connected to a block labeled "Display". The "Display" is connected to a block labeled "Input Device". The "Input Device" is connected to a block labeled "Output Device". The "Output Device" is connected to a block labeled "Power Source". The "Power Source" is connected to a block labeled "Controller". The "Controller" is connected to a block labeled "Actuator". The "Actuator" is connected to a block labeled "Sensor". The "Sensor" is connected to a block labeled "Wearable Device". The "Wearable Device" is connected to a block labeled "Mobile Device". The "Mobile Device" is connected to a block labeled "Client". The "Client" is connected to a block labeled "Server". The "Server" is connected to a block labeled "Network". The "Network" is connected to a block labeled "Database". The "Database" is connected to a block labeled "System". The "System" is connected to a block labeled "User".

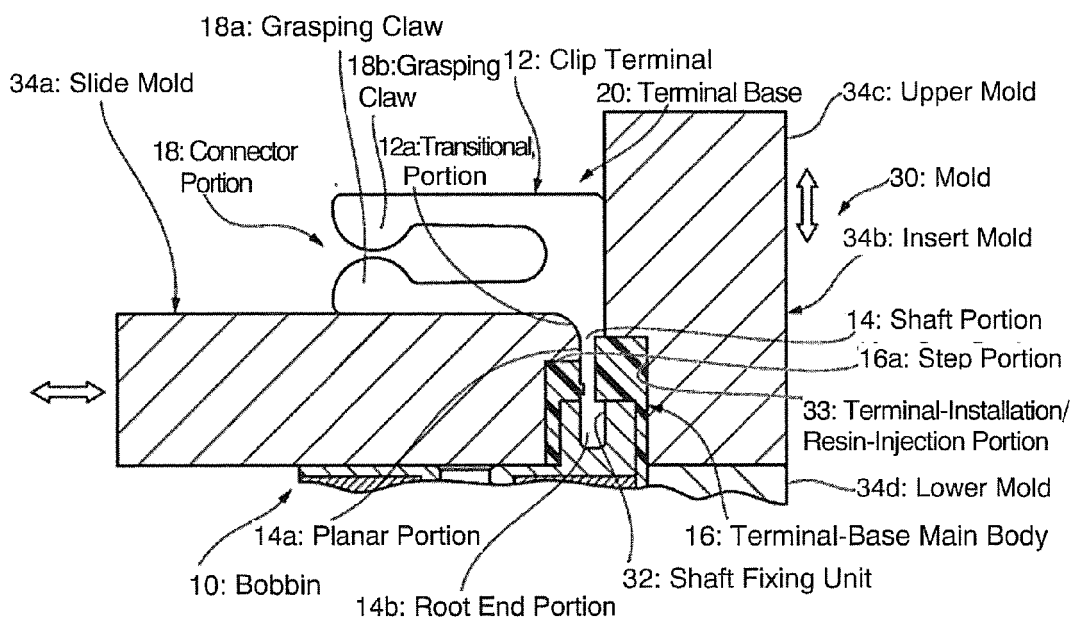
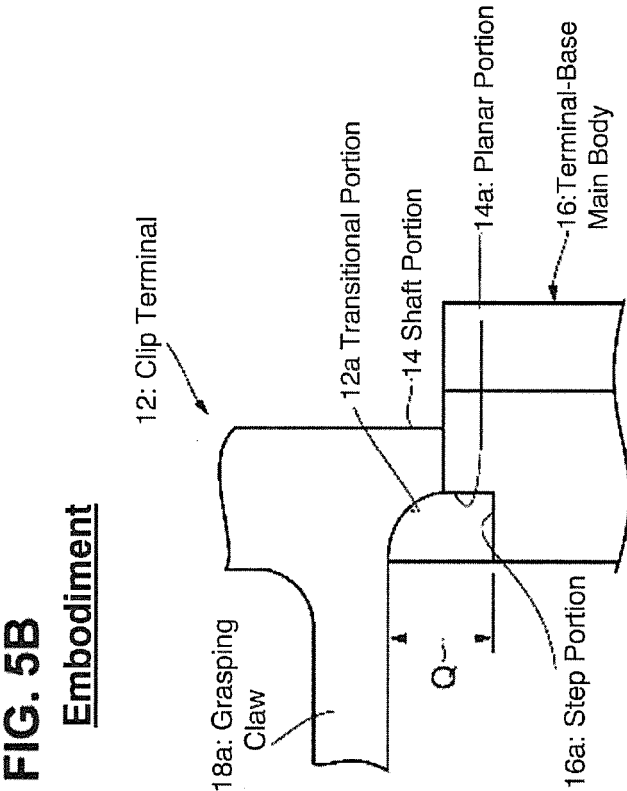
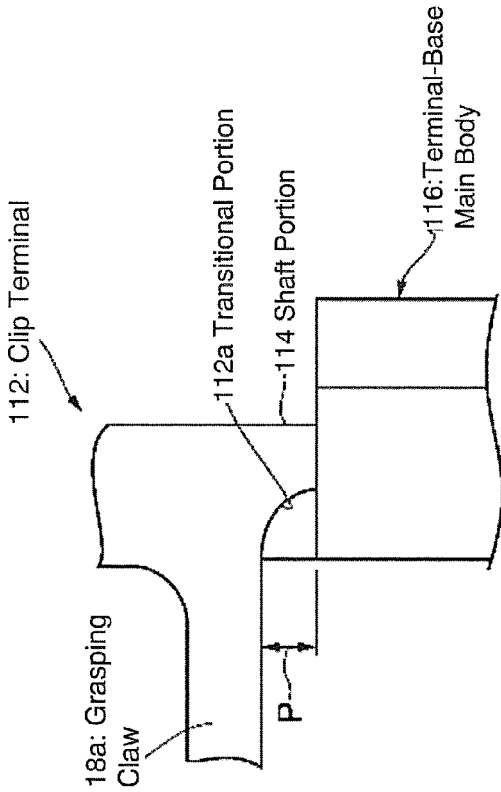
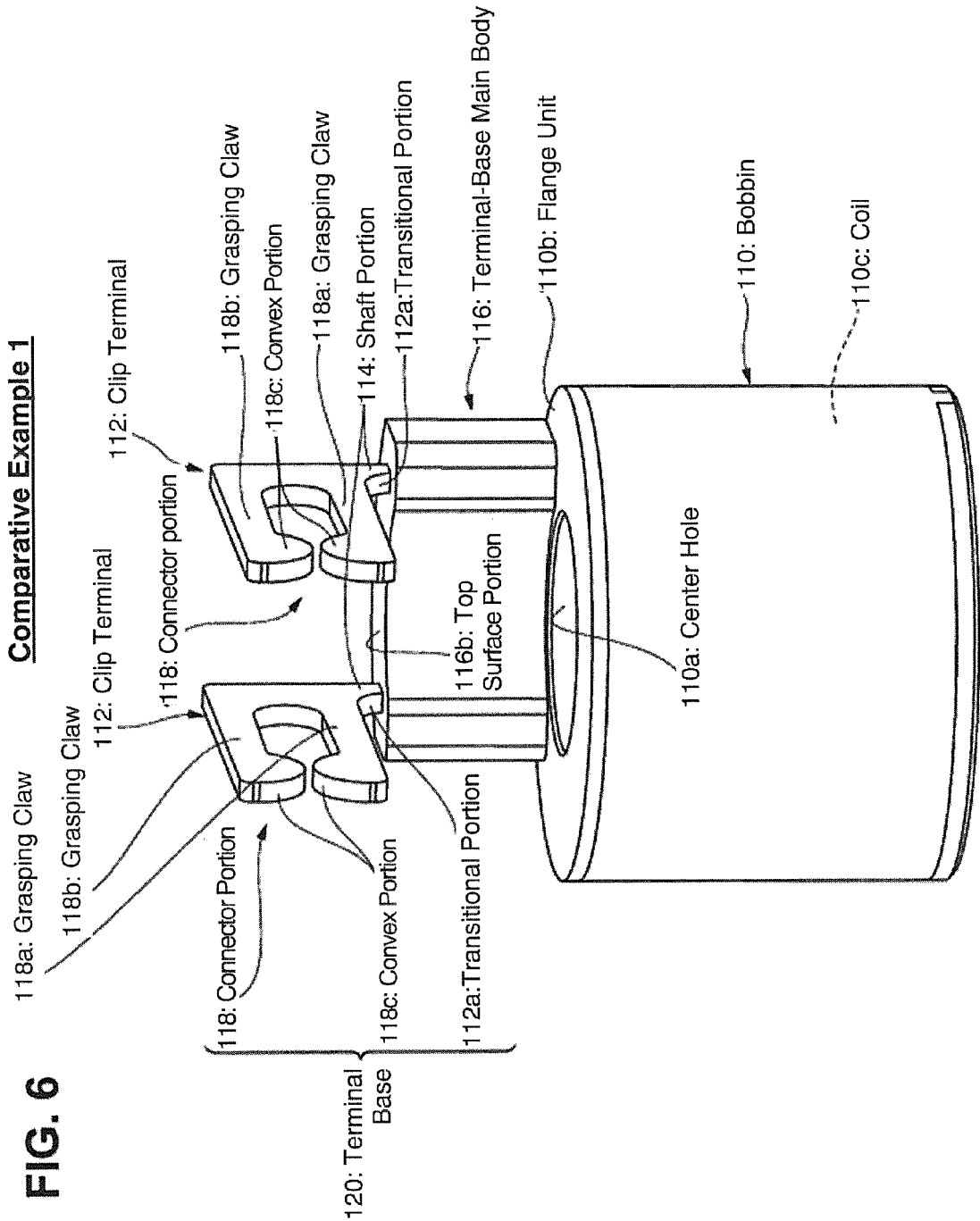
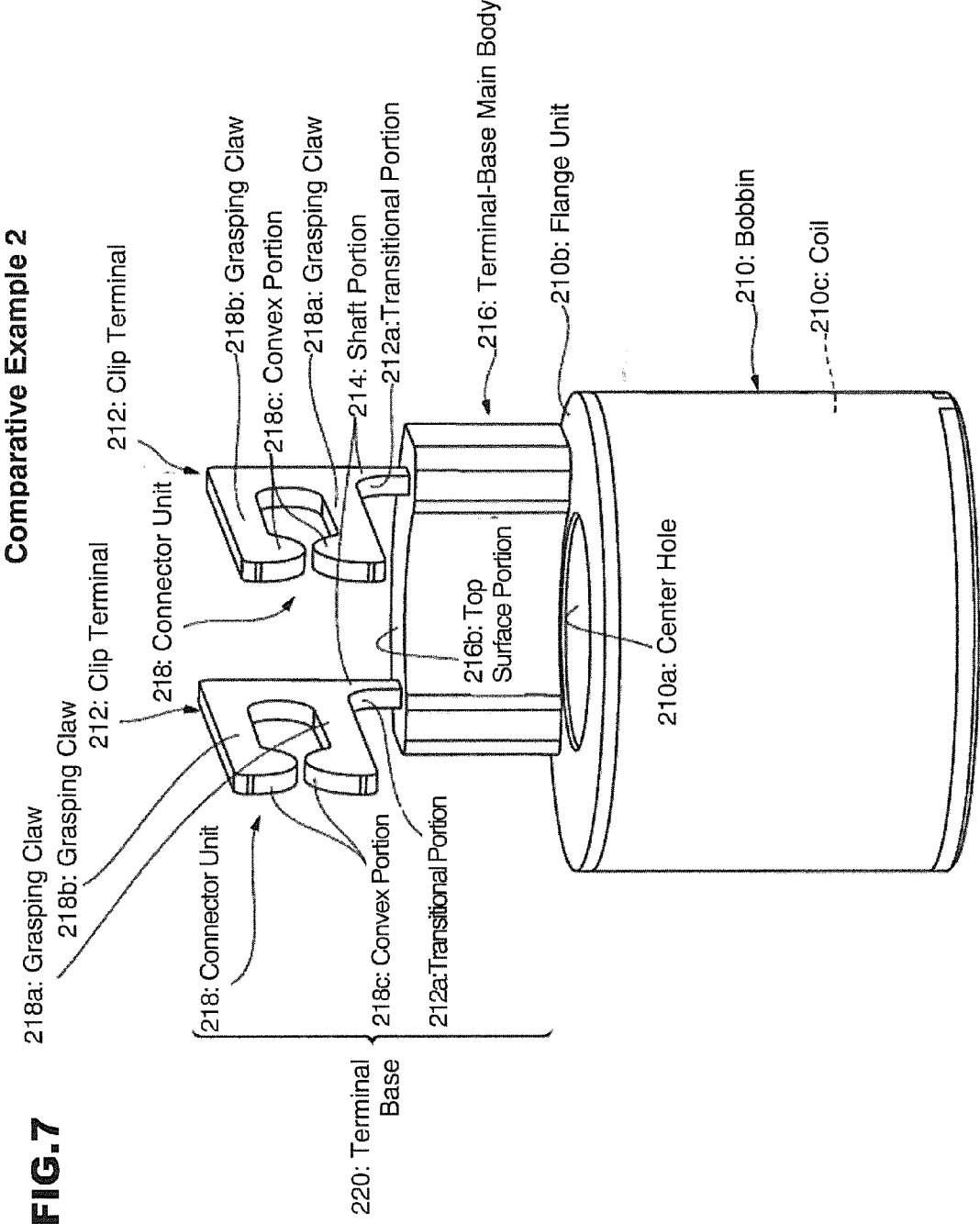


FIG. 5A
Comparative Example 1







REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2014043915 A [0007]