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(54) Electromagnetic Relay and Method for Assembling the Same

Elektromagnetisches Relais und Montageverfahren dafür

Relais électromagnétique et son procédé d'assemblage

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Description

[0001] The present invention relates to an electromagnetic relay, more particularly to an electromagnetic relay including an armature component supported pivotally at a middle portion thereof.

[0002] Referring to Figures 1 and 2, U.S. Patent No. 4,881,053 discloses an electromagnetic relay 1 including a casing 11, an electromagnet block 12, and a base 13 that are sealed in the casing 11. The electromagnet block 12 includes a spool 121, two pairs of junction terminals 123 having coil winding portions 122 exposed from opposite longitudinal sides of the spool 121, and coils 124 wound on the spool 121. Each of the coils 124 has one end that is to be wound on one of the coil winding portions 122 of the corresponding pair of the junction terminals 123, and the other end that is to be wound on the other one of the coil winding portions 122 of the corresponding pair of the junction terminals 123. The base 13 includes a base body 131 for accommodating the electromagnet block 12, a pair of common terminals 132 and two pairs of fixed contact terminals 133 inserted into the base body 131 and spaced apart from each other, and two pairs of coil terminals 134 connected respectively and electrically to the junction terminals 123. An armature block 135 is connected electrically to the common terminals 132, and is supported pivotally by the electromagnet block 12.

[0003] When the armature block 135 is affected by an electromagnetic field generated by the electromagnet block 12, the armature block 135 is brought into contact with the left fixed contact terminals 133, so as to establish electrical connection between the common terminals 132 and the left fixed contact terminals 133 while breaking electrical connection between the common terminals 132 and the right fixed contact terminals 133. When the electromagnetic field is not generated, the armature block 135 is brought into contact with the right fixed contact terminals 133, so as to establish electrical connection between the common terminals 132 and the right fixed contact terminals 133 while breaking electrical connection between the common terminals 132 and the left fixed contact terminals 133. Therefore, the electromagnetic relay 1 can serve as a switch unit.

[0004] However, because the coil winding portions 122 of each pair of the junction terminals 123 project from the spool 121 away from each other, the size of the base body 131 is relatively large in order to accommodate the entire electromagnet block 12. Moreover, since there is no mechanism for fixing the electromagnet block 12 in the base body 131, it is difficult to connect the junction terminals 123 accurately to the coil terminals 134 during assembly. Further, the common, fixed contact, and coil terminals 132, 133, 134 are manually welded on both sides of the base body 131, so that the electromagnetic relay 1 cannot be fabricated at a high rate.

[0005] EP0720194 discloses a method for manufacturing an electromagnetic relay in which a base block is monolithically molded to terminals and connector tabs

provided in a lead frame. After separating the terminals from the lead frame and bending the terminals, a permanent magnet and an armature block are assembled into the base block. A case is then pressed down over the base block to separate the base block from the connector tabs of the lead frame.

[0006] EP0313385 describes an electromagnetic relay comprising a U-shaped core carrying an energising coil between its poles. A magnet makes magnetic contact with a central part of the core, and provides at its free end a central fulcrum for an armature which is arranged to cooperate at its ends with the respective core poles. The fulcrum enables a see-saw movement of the armature about a biased neutral position. The document also discloses a method of assembling such an electromagnetic relay.

[0007] Therefore, an object of the present invention is to provide an electromagnetic relay that is easy to assemble and that can be fabricated at a high rate.

[0008] According to a first aspect of this invention, there is provided an electromagnetic relay, as defined in claim 1.

[0009] According to another aspect of this invention, there is provided a method for assembling an electromagnetic relay, as defined in claim 9.

[0010] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

Figure 1 is a partly exploded perspective view illustrating an electromagnetic relay disclosed in U.S. Patent No. 4,881,053;

Figure 2 is a sectional view of the electromagnetic relay disclosed in U.S. Patent No. 4,881,053;

Figure 3 is a partly exploded perspective view illustrating a preferred embodiment of an electromagnetic relay of the present invention;

Figure 4 is a sectional view of the preferred embodiment;

Figure 5 is an exploded perspective view of a semi-product of an electromagnetic unit of the electromagnetic relay of the preferred embodiment, wherein a pair of coil winding pins are inserted through a spool frame set;

Figure 6 is a perspective view of the semi-product of the electromagnetic unit, wherein the coil winding pins have yet to be bent;

Figure 7 is a perspective view of the final product of the electromagnetic unit, wherein the coil winding pins are bent;

Figure 8 is an exploded perspective view of an engaging block and a terminal set of the electromagnetic relay of the preferred embodiment;

Figure 9 is a front perspective view of a relay core member of the electromagnetic relay of the preferred embodiment;

Figure 10 is a rear perspective view of the relay core

member of the electromagnetic relay of the preferred embodiment in Figure 9; and

Figure 11 is a flow chart illustrating a preferred embodiment of a method for assembling an electromagnetic relay of the present invention.

[0011] Referring to Figures 3 and 4, an electromagnetic relay of the preferred embodiment of this invention includes a casing 2 and a relay core member including an electromagnetic unit 3 and a terminal unit 4.

[0012] The casing 2 includes an upper casing body 21 and a bottom casing body 22 that are connected to each other by press fitting.

[0013] The electromagnetic unit 3 is adapted for generating an electromagnetic field, and includes a spool frame set 31 having a pair of opposite first sides (31a) and a pair of opposite second sides (31b), a coil unit 32 being wound on the spool frame set 31 and including at least one coil 32', and a pair of coil winding pins 33. The spool frame set 31 includes a spool frame 310 wound with the coil unit 32, a pair of mounting frames 311, an iron core 312 attached fixedly to the spool frame 310, and a permanent magnet 313 inserted into the spool frame 310 and disposed on a middle portion of the iron core 312. Each of the mounting frames 311 is disposed at and extends along a respective one of the first sides (31a) of the spool frame set 31, and has a pair of through holes 315 formed therethrough and spaced apart from each other. Further, each of the mounting frames 311 includes an outer surface formed with a groove 314. Each of the coil winding pins 33 has a conductive portion 331, and a coil winding portion 332 extending along one of the second sides (31b) of the spool frame set 31. Each of the conductive portions 331 has a horizontal section being exposed from one of the mounting frames 311, and a vertical section extending into a corresponding one of the through holes 315. One end of each of the conductive portions 331 is aligned with an outer surface of the corresponding mounting frame 311, and the coil winding portions 332 of the coil winding pins 33 are disposed in a space 316 defined by the mounting frames 311.

[0014] The terminal unit 4 includes an engaging block 41 configured for accommodating the electromagnetic unit 3, a terminal set 42 inserted into the engaging block 41 and exposed from the bottom casing body 22 of the casing 2, and an armature component 43 being affected by the electromagnetic field generated by the electromagnetic unit 3 and serving as a switch mechanism by cooperating with the terminal set 42. The engaging block 41 includes a pair of opposite sidewalls 414 corresponding respectively to the first sides (31a) of the spool frame set 31, a pair of opposite side surfaces 415 corresponding respectively to the second sides (31b) of the spool frame set 31, a pair of barbs 411 disposed respectively on inner surfaces of the sidewalls 414, and a top surface 412 confronting the armature component 43. Each of the sidewalls 414 of the engaging block 41 is formed with a pair of notches 413, and the horizontal sections of the con-

ductive portions 331 of the coil winding pins 33 are disposed respectively within the notches 413 (see Figure 10). Each of the barbs 411 is configured for engaging a corresponding one of the grooves 314 for preventing separation of the terminal unit 4 from the electromagnetic unit 3. The terminal set 42 includes a pair of common terminals 421, two pairs of fixed contact terminals 422, and two pairs of coil terminals 423. Each of the common, fixed contact and coil terminals 421, 422, 423 is inserted into the top surface 412, and has a portion extending along a corresponding one of the side surfaces 415. The engaging block 41 further includes two pairs of first welding points 424, 425 disposed on the top surface 412 thereof, and a pair of second welding points 426 disposed within the notches 413. The coil terminals 423 are respectively welded to the conductive portions 331 of the coil winding pins 33 at the second welding points 426 for forming electrical connection therebetween. The armature component 43 includes a middle contact portion 431 welded to the common terminals 421 at the welding points 424, 425 and supported pivotally by the spool frame set 31, and two pairs of movable contact portions 432, 433 disposed respectively at two opposite end portions of the armature component 43.

[0015] Referring to Figure 11, a method for assembling the electromagnetic relay of the present invention includes the following steps.

[0016] In step 51, the coil winding pins 33 are inserted through the through holes 315 in one of the mounting frames 311 of the spool frame set 31, and the conductive portions 331 of the coil winding pins 33 are exposed from the through holes 315 as shown in Figure 5.

[0017] Further referring to Figure 6, in step 52, one end of the coil 32' is wound on the coil winding portion 332 of one of the coil winding pins 33, and the coil 32' is wound on the spool frame 310. Thereafter, in step 53 the other end of the coil 32' is wound on the coil winding portion 332 of the other one of the coil winding pins 33. In practice, the ends of the coil 32' can be fixed on the coil winding portions 332 of the coil winding pins 33 by welding with soldering tin.

[0018] In step 54, each of the coil winding portions 332 of the coil winding pins 33 is bent upwardly and toward the corresponding one of the second sides (31b) of the spool frame set 31 as shown in Figure 7. Therefore, the spool frame set 31, the coil unit 32, and the coil winding pins 33 are assembled together to form the electromagnetic unit 3.

[0019] Further referring to Figure 8, the terminal set 42 is formed from a plate. In step 55, the plate is embedded partially in the engaging block 41 such that it has a plurality of plate portions 421', 422', 423' corresponding to the terminals 421, 422, 423 (see Figure 3), and is then bent to form the terminals 421, 422, 423 such that upper ends of the coil terminals 423 are disposed respectively in the notches 413 in the engaging block 41.

[0020] Referring to Figures 8 to 11, in step 56, the electromagnetic unit 3 is inserted into the engaging block 41,

and each of the grooves 314 in the mounting frames 311 of the spool frame set 31 engages a corresponding one of the barbs 411 of the engaging block 41. Therefore, the electromagnetic unit 3 and the terminal unit 4 are assembled together to form the relay core member. At this time, the coil terminals 423 of the terminal set 42 are respectively in electrical contact with the conductive portions 331 of the coil winding pins 33. One end of each of the conductive portions 331 of the coil winding pins 33 is aligned with the outer surface of the corresponding one of the mounting frames 311, and is disposed within the corresponding one of the notches 413. The coil winding portions 332 are disposed in the space 316 between the mounting frames 311.

[0021] Subsequently, in step 57, the common terminals 421 are welded to the middle contact portion 431 of the armature component 43, and the coil terminals 423 are welded to the conductive portions 331 of the coil winding pins 33 at the welding points 424, 425, 426, respectively, using laser welding method.

[0022] Referring to Figures 3, 4 and 11, in step 58, the relay core member including the electromagnetic unit 3 and the terminal unit 4 is finally sealed in the casing 2, and the terminal set 42 is exposed from the bottom casing body 22 of the casing 2.

[0023] When a voltage is applied to the coil terminals 423 to pass electric current through the coil 32', the electromagnetic unit 3 generates the electromagnetic field so as to attract the right movable contact portions 432 of the armature component 43. Therefore, each of the right movable contact portions 432 is pivoted to a connection position, where the corresponding right movable contact portion 432 is electrically connected to a corresponding one of the fixed contact terminals 422. When no voltage is applied to the coil terminals 423, the electromagnetic field is not generated, and therefore each of the right movable contact portions 432 of the armature component 43 is biased to a disconnection position, where the corresponding right movable contact portion 432 is separated from the corresponding one of the fixed contact terminals 422. Thus, the armature component 43 serves as a switch mechanism.

[0024] It should be noted that the electromagnetic unit 3 can also include two pairs of the coil winding pins 33 (not shown), so that the electromagnetic relay of this invention serves as a double-pole-double-throw (DPDT) relay to transmit two control signals. Techniques for transmitting two control signals and the DPDT relay are existing techniques, and descriptions thereof will be omitted herein for the sake of brevity.

[0025] In sum, the electromagnetic relay of the present invention and the method for assembling the same have the following advantages. First, because one end of each of the conductive portions 331 of the coil winding pins 33 is aligned with the outer surface of the corresponding one of the mounting frames 311, and the coil winding portions 332 are disposed in the space 316 between the mounting frames 311, it is possible to reduce the size of the elec-

tromagnetic unit 3. Second, the welding points 424, 425, 426 can be formed using laser welding method, such that the manufacturing process of the electromagnetic relay is relatively simple. Third, each of the barbs 411 engages a corresponding one of the grooves 314 for preventing separation of the terminal unit 4 from the electromagnetic unit 3, so that the coil terminals 423 can be connected accurately to the coil winding pins 33 during assembly of the electromagnetic relay. Therefore, an automated manufacturing process can be utilized for the electromagnetic relay of the present invention.

Claims

1. An electromagnetic relay including:

a casing (2); and
a relay core member sealed in said casing (2), said relay core member including
an electromagnetic unit (3) adapted for generating an electromagnetic field, said electromagnetic unit (3) including a spool frame set (31) that includes a pair of first sides (31a) and a pair of second sides (31b), a coil unit (32) that is wound on said spool frame set (31), and a pair of coil winding pins (33), each of which coil winding pins (33) has a conductive portion (331) exposed from one of said first sides (31a) and a coil winding portion (332) extending along one of said second sides (31b), said spool frame set (31) further including a pair of mounting frames (311), each of which is disposed at and extends along a respective one of said first sides (31a) of said spool frame set (31), and
a terminal unit (4) that includes an engaging block (41) configured for accommodating said electromagnetic unit (3), a terminal set (42) exposed from said casing (2) and embedded partially in said engaging block (41), and an armature component (43) being affected by the electromagnetic field generated by said electromagnetic unit (3) and serving as a switch mechanism by cooperating with said terminal set (42);
characterized in that said engaging block (41) includes a pair of sidewalls (414) corresponding respectively to said first sides (31a) of said spool frame set (31), and a pair of barbs (411) disposed respectively on said sidewalls (414);
in that each of said mounting frames (311) includes an outer surface formed with a groove (314) configured for engaging with a corresponding one of said barbs (411) for preventing separation of said terminal unit (4) from said electromagnetic unit (3);
in that said engaging block (41) includes a pair of notches (413); and
in that said conductive portion (331) of each of

said coil winding pins (33) is disposed within a corresponding one of said notches (413).

2. The electromagnetic relay as claimed in claim 1, wherein each of said mounting frames (311) of said spool frame set (31) is formed with a pair of through holes (315) formed through a corresponding one of said mounting frames (311) and spaced apart from each other; and each of said conductive portions (331) includes a horizontal section being exposed from one of said mounting frames (311), and a vertical section extending into a corresponding one of said through holes (315).
3. The electromagnetic relay as claimed in claim 2, wherein said horizontal sections of said conductive portions (331) of said coil winding pins (33) are disposed respectively within said notches (413), and said coil winding portions (332) of said coil winding pins (33) are disposed in a space defined by said mounting frames (311).
4. The electromagnetic relay as claimed in any one of claims 1 to 3, wherein said engaging block (41) includes a pair of side surfaces (415), and said terminal set (42) of said terminal unit (4) includes a pair of common terminals (421), two pairs of fixed contact terminals (422), and two pairs of coil terminals (423), each of said common, fixed contact and coil terminals (421, 422, 423) having a portion that extends along a corresponding one of said side surfaces (415), said coil terminals (423) being respectively and electrically connected to said conductive portions (331) of said coil winding pins (33).
5. The electromagnetic relay as claimed in claim 4, wherein said armature component (43) includes a middle contact portion (431) electrically connected to said common terminals (421) and supported pivotally by said spool frame set (31), and a pair of movable contact portions (432, 433) that are disposed respectively at two end portions of said armature component (43), each of said movable contact portions (432, 433) being pivotable between a connection position, where a corresponding one of said movable contact portions (432, 433) is connected electrically to a corresponding one of said fixed contact terminals (422), and a disconnection position, where the corresponding one of said movable contact portions (432, 433) is separated from the corresponding one of said fixed contact terminals (422).
6. The electromagnetic relay as claimed in claim 5, wherein said engaging block (41) of said terminal unit (4) includes a top surface (412) having a plurality of welding points (424, 425, 426), said common terminals (421) being welded to said middle contact

portion (431) of said armature component (43) and said coil terminals (423) being welded to said conductive portions (331) of said coil winding pins (33) at said welding points (424, 425, 426), respectively.

7. The electromagnetic relay as claimed in claim 6, wherein said welding points (424, 425, 426) are formed using laser welding method.
8. The electromagnetic relay as claimed in any one of claims 1 to 7, wherein said casing (2) includes an upper casing body (21) and a bottom casing body (22) that are connected to each other by press fitting, and said bottom casing body (22) is further configured to permit said terminal set (42) to be exposed therefrom.
9. A method for assembling an electromagnetic relay that includes a casing (2), an electromagnetic unit (3), and a terminal unit (4), the electromagnetic unit (3) including a spool frame set (31), a coil unit (32), and a pair of coil winding pins (33), the terminal unit (4) including an engaging block (41), a terminal set (42) embedded in the engaging block (41), and an armature component (43) being affected by an electromagnetic field generated by the electromagnetic unit (3) and serving as a switch mechanism by cooperating with the terminal set (42), said method being **characterized by**:
 - a) inserting the coil winding pins (33) respectively through a pair of through holes (315) in the spool frame set (31) at one of a pair of first sides (31a) of the spool frame set (31);
 - b) winding one end of the coil unit (32) on one of the coil winding pins (33);
 - c) winding the coil unit (32) on the spool frame set (31);
 - d) winding the other end of the coil unit (32) on the other one of the coil winding pins (33);
 - e) bending each of the coil winding pins (33) upwardly and toward a corresponding one of a pair of second sides (31b) of the spool frame set (31), such that the spool frame set (31), the coil unit (32), and the coil winding pins (33) are assembled together to form the electromagnetic unit (3);
 - f) inserting the electromagnetic unit (3) into the engaging block (41) of the terminal unit (4) to enable engagement between a pair of grooves (314) in the spool frame set (31) respectively at the first sides (31a) and a pair of barbs (411) disposed respectively on a pair of sidewalls (414) of the engaging block (41) that correspond respectively to said first sides (31a) of said spool frame set (31), so as to assemble the electromagnetic unit (3) and the engaging block (41) together with the terminal set (42) in electrical

contact with the coil winding pins (33); and
g) sealing the electromagnetic unit (3) and the terminal unit (4) in the casing (2) to form the electromagnetic relay.

10. The method as claimed in claim 9, further comprising a step f1) of welding the terminal set (42) to the armature component (43) and the coil winding pins (33) at a plurality of welding points (424, 425, 426) on a top surface (412) of the engaging block (41) after the step f).
11. The method as claimed in claim 10, wherein in the step f1), the terminal set (42) is welded using laser welding method.

Patentansprüche

1. Ein elektromagnetisches Relais, das Folgendes umfasst:
- ein Gehäuse (2); und
ein in besagtem Gehäuse (2) abgesiegelttes Relais-Kernelement, das Folgendes umfasst:
- eine elektromagnetische Einheit (3), die zum Erzeugen eines elektromagnetischen Felds geeignet ist, wobei die besagte elektromagnetische Einheit (3) einen Spulenrahmensatz (31) umfasst, der ein Paar erster Seiten (31a) und ein Paar zweiter Seiten (31b), eine auf dem besagten Spulenrahmensatz (31) aufgewickelte Spuleneinheit (32) und ein Paar von Spulenwickelstiften (33) umfasst, wobei jeder Spulenwickelstift (33) eine von einer der besagten ersten Seiten (31a) frei gesetzte leitende Zone (331) sowie eine Spulenwickelzone (332) hat, die sich an einer der besagten zweiten Seiten entlang (31b) erstreckt, wobei der besagte Spulenrahmensatz (31) ferner ein Paar von Montagerahmen (311) umfasst, von denen sich jeder an einer jeweiligen der besagten ersten Seiten (31a) des besagten Spulenrahmensatzes (31) befindet und sich daran entlang erstreckt, sowie
eine Klemmeneinheit (4), die einen zur Aufnahme der besagten elektromagnetischen Einheit (3) konfigurierten Einrückblock (41), einen vom besagten Gehäuse (2) frei gesetzten und teilweise im besagten Einrückblock (41) eingebetteten Klemmensatz (42) und eine Armaturenbaugruppe (43) umfasst, die unter dem Einfluss des von der besagten elektromagnetischen Einheit (3) erzeugten elektromagnetischen Felds steht und durch Kooperation mit dem besagten

Klemmensatz (42) als Schaltmechanismus dient;

dadurch gekennzeichnet, dass der besagte Einrückblock (41) ein Paar von Seitenwänden (414), die jeweils den besagten ersten Seiten (31a) des besagten Spulenrahmensatzes (31) entsprechen, sowie ein jeweils an besagten Seitenwänden (414) angeordnetes Paar von Kerben (411) umfasst;
sowie dass jeder der besagten Montagerahmen (311) eine Außenfläche umfasst, in welcher eine Nut (314) geformt ist, die zum Eingreifen in eine entsprechende Kerbe der besagten Kerben (411) konfiguriert ist um zu verhindern, dass sich die besagte Klemmeneinheit (4) von der besagten elektromagnetischen Einheit (3) trennt;
sowie dass der besagte Einrückblock (41) ein Paar von Einkerbungen (413) umfasst; und
dass die besagte leitende Zone (331) eines jeden der besagten Spulenwickelstifte (33) innerhalb einer entsprechenden Einkerbung der besagten Einkerbungen (413) angeordnet ist.

2. Das Anspruch 1 entsprechende elektromagnetische Relais, wobei jeder der besagten Montagerahmen (311) des besagten Spulenrahmensatzes (31) mit einem Paar von Durchgangslöchern (315) geformt ist, die jeweils durch einen entsprechenden Montagerahmen (311) der besagten Montagerahmen (311) geformt und voneinander beabstandet sind; und
wobei jede der besagten leitenden Zonen (331) einen von einem der besagten Montagerahmen (311) frei gesetzten horizontalen Abschnitt sowie einen vertikalen Abschnitt umfasst, der sich in ein entsprechendes Durchgangsloch (315) der besagten Durchgangslöcher (315) hinein erstreckt.
3. Das Anspruch 2 entsprechende elektromagnetische Relais, wobei die besagten horizontalen Abschnitte der besagten leitenden Zonen (331) der besagten Spulenwickelstifte (33) jeweils innerhalb der besagten Einkerbungen (413) und die besagten Spulenwickelzonen (332) der besagten Spulenwickelstifte (33) in einem von den besagten Montagerahmen (311) definierten Raum angeordnet sind.
4. Das einem der Ansprüche 1 bis 3 entsprechende elektromagnetische Relais, bei welchem der besagte Einrückblock (41) ein Paar von Seitenwänden (415) und der besagte Klemmensatz (42) der besagten Klemmeneinheit (4) ein Paar üblicher Klemmen (421), zwei Paare Festkontaktklemmen (422) und zwei Paare Spulenklammen (423) umfassen, wobei

- jede der besagten üblichen, der Festkontakt- und der Spulenklappen (421, 422, 423) einen Abschnitt hat, der sich jeweils entlang einer entsprechenden Seitenwand (415) der besagten Seitenwände (415) erstreckt, während die besagten Spulenklappen (423) jeweils mit den besagten leitenden leitenden Zonen (331) der besagten Spulenwickelstifte (33) elektrisch verbunden sind.
5. Das Anspruch 4 entsprechende elektromagnetische Relais, wobei die besagte Armaturenbaugruppe (43) einen mit den besagten üblichen Klappen (421) elektrisch verbundenen und vom besagten Spulenrahmensatz (31) drehbar unterstützten mittleren Kontaktabschnitt (431), sowie ein Paar beweglicher Kontaktteile (432, 433) umfasst, die jeweils an zwei Endabschnitten der besagten Armaturenbaugruppe (43) angeordnet sind, wobei jedes der besagten beweglichen Kontaktteile (432, 433) zwischen einer Verbindungsposition, in welcher ein entsprechendes Kontaktteil der besagten beweglichen Kontaktteile (432, 433) mit einer der besagten entsprechenden Festkontaktklappen (422) elektrisch verbunden ist, und einer Abschaltposition drehbar versetzt werden kann, in welcher das entsprechende Kontaktteil der besagten beweglichen Kontaktteile (432, 433) von der entsprechenden Festkontaktklappe (422) der besagten Festkontaktklappen (422) getrennt ist.
6. Das Anspruch 5 entsprechende elektromagnetische Relais, wobei der besagte Einrückblock (41) der besagten Klappeneinheit (4) eine Oberfläche (412) mit einer Vielzahl von Schweißpunkten (424, 425, 426) umfasst, und wobei die besagten üblichen Klappen (421) am besagten mittleren Kontaktabschnitt (431) der besagten Armaturenbaugruppe (43) bzw. die besagten Spulenklappen (423) jeweils an den besagten leitenden Zonen (331) der besagten Spulenwickelstifte (33) an besagten Schweißpunkten (424, 425, 426) angeschweißt sind.
7. Das Anspruch 6 entsprechende elektromagnetische Relais, wobei die besagten Schweißpunkte (424, 425, 426) anhand des Laserschweißverfahrens gebildet werden.
8. Das einem der Ansprüche 1 bis 7 entsprechende elektromagnetische Relais, wobei das besagte Gehäuse (2) einen oberen Gehäusekörper (21) und einen unteren Gehäusekörper (22) umfasst, die durch Einpressen miteinander verbunden sind, und wobei der besagte untere Gehäusekörper (22) ferner konfiguriert ist um zu ermöglichen, dass der besagte Klappensatz (42) von diesem Gehäusekörper frei gesetzt wird.
9. Ein Verfahren zum Zusammenbauen eines elektromagnetischen Relais, das ein Gehäuse (2), eine elektromagnetische Einheit (3) und eine Klappeneinheit (4) umfasst, wobei die elektromagnetische Einheit (3) einen Spulenrahmensatz (31), eine Spuleneinheit (32) und ein Paar Spulenwickelstifte (33) umfasst, wobei die Klappeneinheit (4) einen Einrückblock (41), einen in den besagten Einrückblock (41) eingebetteten Klappensatz (42) und eine Armaturenbaugruppe (43) umfasst, die unter dem Einfluss eines von der besagten elektromagnetischen Einheit (3) erzeugten elektromagnetischen Felds steht und durch Kooperation mit dem Klappensatz (42) als Schaltmechanismus dient, wobei das besagte Verfahren **dadurch gekennzeichnet ist:**
- a) **dass** die Spulenwickelstifte (33) jeweils durch ein Paar von Durchgangslöchern (315) im Spulenrahmensatz (31) eines Paares erster Seiten (31a) des Spulenrahmensatzes (31) eingeführt werden;
- b) **dass** ein Ende von der Spuleneinheit (32) auf einen der Spulenwickelstifte (33) gewickelt wird;
- c) **dass** die Spuleneinheit (32) auf den Spulenrahmensatz (31) gewickelt wird;
- d) **dass** das andere Ende von der Spuleneinheit (32) auf den anderen der Spulenwickelstifte (33) gewickelt wird;
- e) **dass** jeder der Spulenwickelstifte (33) derart nach oben und in Richtung eines entsprechenden Paares zweiter Seiten (31b) des Spulenrahmensatzes (31) gebogen wird, um den Spulenrahmensatz (31), die Spuleneinheit (32) und die Spulenwickelstifte (33) zusammenzubauen und so die elektromagnetische Einheit (3) zu bilden;
- f) **dass** die elektromagnetische Einheit (3) in den Einrückblock (41) der Klappeneinheit (4) eingeführt wird, um den entsprechenden Eingriff zwischen einem Paar von Nuten (314) im Spulenrahmensatz (31) an den ersten Seiten (31a) und einem Paar von Kerben (411) zu ermöglichen, die jeweils auf einem Paar von Seitenwänden (414) des Einrückblocks (41) angeordnet sind, die jeweils den besagten ersten Seiten (31a) des besagten Spulenrahmensatzes (31) entsprechen, um die elektromagnetische Einheit (3) und den Einrückblock (41) zusammen mit dem Klappensatz (42) in elektrischem Kontakt mit den Spulenwickelstiften (33) zusammenzubauen; und
- g) **dass** die elektromagnetische Einheit (3) und die Klappeneinheit (4) im Gehäuse (2) abgesiegelt sind, um das elektromagnetische Relais zu bilden.
10. Das Anspruch 9 entsprechende Verfahren, das ferner einen Schritt f1) umfasst, bei welchem der Klappensatz (42) an der Armaturenbaugruppe (43) so-

wie die Spulenwickelstifte (33) nach dem Schritt f) an einer Vielzahl von Schweißpunkten (424, 425, 426) auf einer Oberfläche (412) des Einrückblocks (41) angeschweißt werden.

11. Das Anspruch 10 entsprechende Verfahren, wobei das Schweißen des Klemmensatzes (42) bei Schritt f1) anhand des Laserschweißverfahrens vorgenommen wird.

Revendications

1. Un relais électromagnétique comprenant :

un boîtier (2) ; et

un élément de noyau de relais scellé dans ledit boîtier (2), ledit élément de noyau de relais comprenant

une unité électromagnétique (3) adaptée pour générer un champ électromagnétique, ladite unité électromagnétique (3) comprenant un ensemble de cadre de bobine (31) qui comprend une paire de premiers côtés (31a) et une paire de second côtés (31b), une unité de bobinage (32) qui est enroulée sur ledit ensemble de cadre de bobine (31), et une paire de broches d'enroulement de bobinage (33), chacune desquelles broches d'enroulement de bobinage (33) possède une partie conductrice (331) exposée à partir d'un desdits premiers côtés (31a) et une partie d'enroulement de bobinage (332) s'étendant le long d'un desdits seconds côtés (31b), ledit ensemble de cadre de bobine (31) comprenant en outre une paire de cadres de montage (311), chacun desquels est disposé à et s'étend le long d'un côté respectif d'un desdits premiers côtés (31a) dudit ensemble de cadre de bobine (31), et

une unité de bornes (4) qui comprend un bloc d'engagement (41) configuré pour recevoir ladite unité électromagnétique (3), un ensemble de bornes (42) exposé à partir dudit boîtier (2) et encastré partiellement dans ledit bloc d'engagement (41), et un composant d'armature (43) étant affecté par le champ électromagnétique généré par ladite unité électromagnétique (3) et servant de mécanisme de commutation en coopérant avec ledit ensemble de bornes (42) ;

caractérisé en ce que ledit bloc d'engagement (41) comprend une paire de parois latérales (414) correspondant respectivement auxdits premiers côtés (31a) dudit ensemble de cadre de bobine (31), et une paire de barbelures (411) disposées respectivement sur lesdites parois latérales (414) ;

en ce que chacun desdits cadres de montage

(311) comprend une surface extérieure formée avec une rainure (314) configurée pour s'engager avec une barbelure correspondante desdites barbelures (411) pour empêcher la séparation de ladite unité de bornes (4) de ladite unité électromagnétique (3) ;

en ce que ledit bloc d'engagement (41) comprend une paire d'entailles (413) ; et

en ce que ladite partie conductrice (331) de chacune desdites broches d'enroulement de bobinage (33) est disposée à l'intérieur d'une entaille correspondante desdites entailles (413).

2. Le relais électromagnétique selon la revendication 1, dans lequel chacun desdits cadres de montage (311) dudit ensemble de cadre de bobine (31) est formé avec une paire de trous de passage (315) formés au travers d'un cadre correspondant desdits cadres de montage (311) et espacés l'un de l'autre ; et chacune desdites parties conductrices (331) comprend une section horizontale étant exposée à partir d'un desdits cadres de montage (311), et une section verticale s'étendant à l'intérieur d'un trou correspondant desdits trous de passage (315).

3. Le relais électromagnétique selon la revendication 2, dans lequel lesdites sections horizontales desdites parties conductrices (331) desdites broches d'enroulement de bobinage (33) sont disposées respectivement à l'intérieur desdites entailles (413), et lesdites parties d'enroulement de bobinage (332) desdites broches d'enroulement de bobinage (33) sont disposées dans un espace défini par lesdits cadres de montage (311).

4. Le relais électromagnétique selon l'une quelconque des revendications de 1 à 3, dans lequel ledit bloc d'engagement (41) comprend une paire de surfaces latérales (415), et ledit ensemble de bornes (42) de ladite unité de bornes (4) comprend une paire de bornes communes (421), deux paires de bornes de contact fixes (422), et deux paires de bornes de bobinage (423), chacune desdites bornes communes, de contact fixe et de bobinage (421, 422, 423) possédant une partie qui s'étend le long d'une surface correspondante desdites surfaces latérales (415), lesdites bornes de bobinage (423) étant respectivement et électriquement connectées aux dites parties conductrices (331) desdites broches d'enroulement de bobinage (33).

5. Le relais électromagnétique selon la revendication 4, dans lequel ledit composant d'armature (43) comprend une partie de contact centrale (431) électriquement connectée aux dites bornes communes (421) et supportée de manière pivotante par ledit ensemble de cadre de bobine (31), et une paire de parties de contact mobiles (432, 433) qui sont dis-

- posées respectivement à deux parties d'extrémité dudit composant d'armature (43), chacune desdites parties de contact mobiles (432, 433) pouvant être pivotée entre une position de connexion, où une partie correspondante desdites parties de contact mobiles (432, 433) est connectée électriquement à une borne correspondante desdites bornes de contact fixes (422), et une position de déconnexion, où la partie correspondante desdites parties de contact mobiles (432, 433) est séparée de la borne correspondante desdites bornes de contact fixes (422).
6. Le relais électromagnétique selon la revendication 5, dans lequel ledit bloc d'engagement (41) de ladite unité de bornes (4) comprend une surface supérieure (412) possédant une pluralité de point de soudage (424, 425, 426), lesdites bornes communes (421) étant soudées à ladite partie de contact centrale (431) dudit composant d'armature (43), et lesdites bornes de bobinage (423) étant soudées aux dites parties conductrices (331) desdites broches d'enroulement de bobinage (33) auxdits points de soudage (424, 425, 426), respectivement.
7. Le relais électromagnétique selon la revendication 6, dans lequel lesdits points de soudage (424, 425, 426) sont formés en utilisant un procédé de soudage au laser.
8. Le relais électromagnétique selon l'une quelconque des revendications de 1 à 7, dans lequel ledit boîtier (2) comprend un corps de boîtier supérieur (21) et un corps de boîtier inférieur (22) qui sont connectés l'un à l'autre par pressage, et ledit corps de boîtier inférieur (22) est configuré en outre pour permettre audit ensemble de bornes (42) d'être exposé de celui-ci.
9. Un procédé pour assembler un relais électromagnétique qui comprend un boîtier (2), une unité électromagnétique (3), et une unité de bornes (4), l'unité électromagnétique (3) comprenant un ensemble de cadre de bobine (31), une unité de bobinage (32), et une paire de broches d'enroulement de bobinage (33), l'unité de bornes (4) comprenant un bloc d'engagement (41), un ensemble de bornes (42) encasté dans le bloc d'engagement (41), et un composant d'armature (43) étant affecté par un champ électromagnétique généré par l'unité électromagnétique (3) et servant de mécanisme de commutation en coopération avec l'ensemble de bornes (42), ledit procédé étant **caractérisé par** :
- a) insérer les broches d'enroulement de bobinage (33) respectivement au travers d'une paire de trous de passage (315) dans l'ensemble de cadre de bobine (31) à une paire de premiers côtés (31a) de l'ensemble de cadre de bobine (31) ;
- b) enrouler une extrémité de l'unité de bobinage (32) sur une des broches d'enroulement de bobinage (33) ;
- c) enrouler l'unité de bobinage (32) sur l'ensemble du cadre de bobine (31) ;
- d) enrouler l'autre extrémité de l'unité de bobinage (32) sur l'autre des broches d'enroulement de bobinage (33) ;
- e) plier chacune des broches d'enroulement de bobinage (33) vers le haut et vers un côté correspondant d'une paire de second côtés (31b) de l'ensemble de cadre de bobine (31), de telle sorte que l'ensemble de cadre de bobine (31), l'unité de bornes (32), et les broches d'enroulement de bobinage (33) sont assemblés entre eux pour former l'unité électromagnétique (3) ;
- f) insérer l'unité électromagnétique (3) dans le bloc d'engagement (41) de l'unité de bornes (4) pour permettre un engagement entre une paire de rainures (314) dans l'ensemble de cadre de bobine (31) respectivement aux premiers côtés (31a) et une paire de barbelures (411) disposées respectivement sur une paire de parois latérales (414) du bloc d'engagement (41) qui correspondent respectivement auxdits premier côtés (31a) dudit ensemble de cadre de bobine (31), de manière à assembler l'unité électromagnétique (3) et le bloc d'engagement (41) avec l'ensemble de bornes (42) en contact électrique avec les broches d'enroulement de bobinage (33) ; et
- g) sceller l'unité électromagnétique (3) et l'unité de bornes (4) dans le boîtier (2) pour former le relais électromagnétique.
10. Le procédé selon la revendication 9, comprenant en outre une étape f1) de soudage de l'ensemble de bornes (42) au composant d'armature (43) et aux broches d'enroulement de bobinage (33) à une pluralité de points de soudage (424, 425, 426) sur une surface supérieure (412) du bloc d'engagement (41) après l'étape f).
11. Le procédé selon la revendication 10, dans lequel dans l'étape f1), l'ensemble de bornes (42) est soudé en utilisant un procédé de soudage au laser.

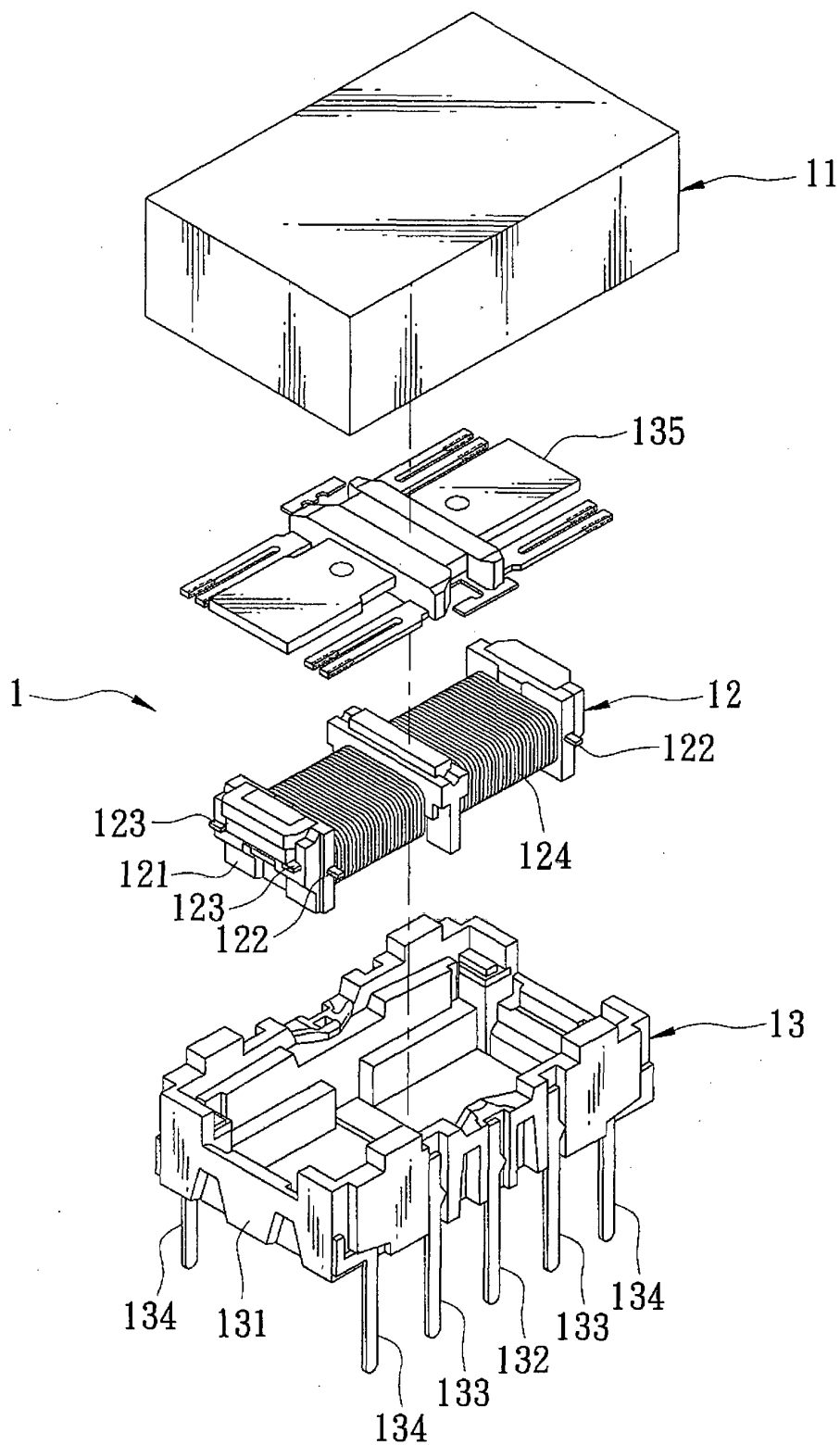


FIG. 1
PRIOR ART

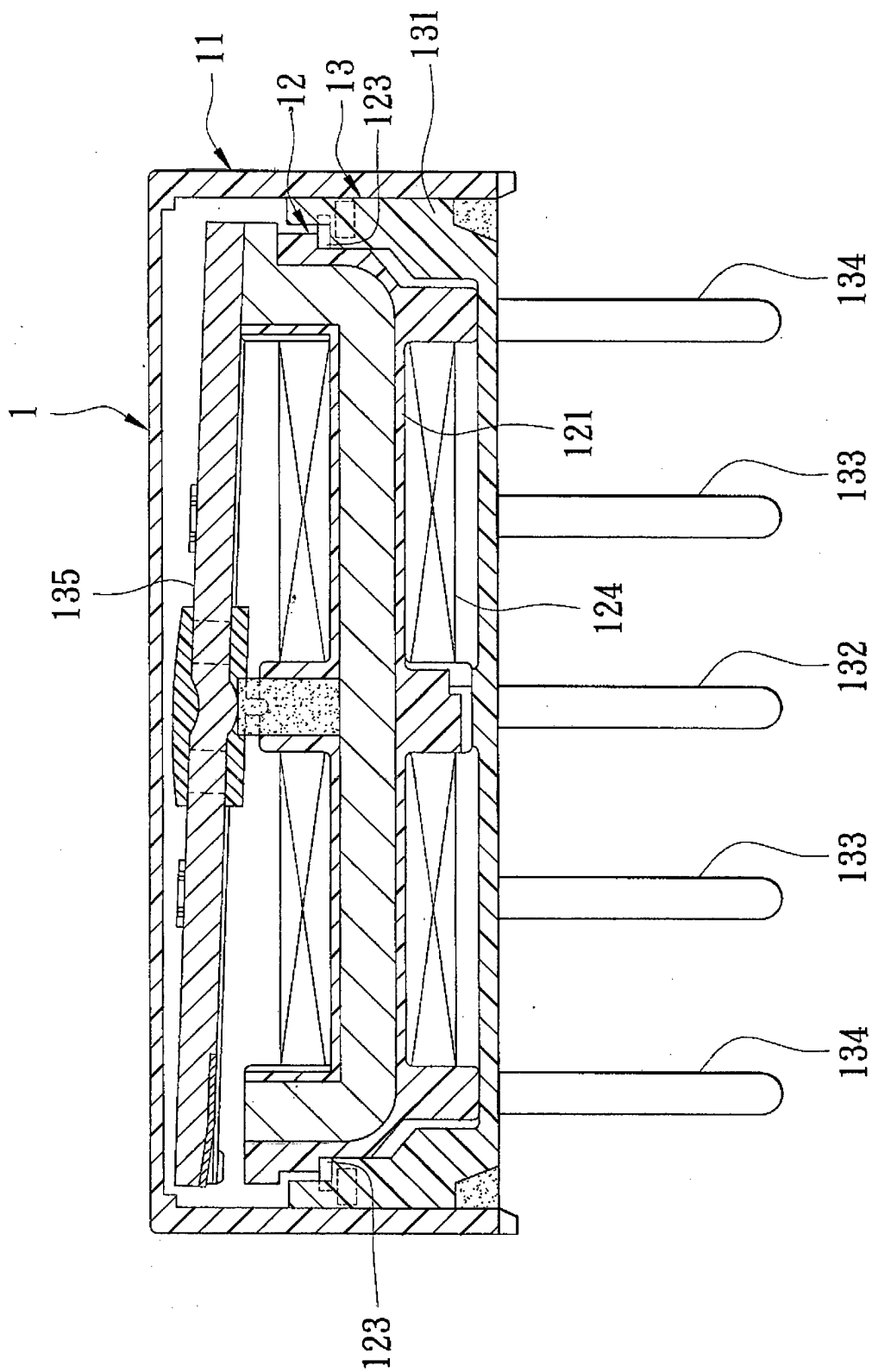


FIG. 2
PRIOR ART

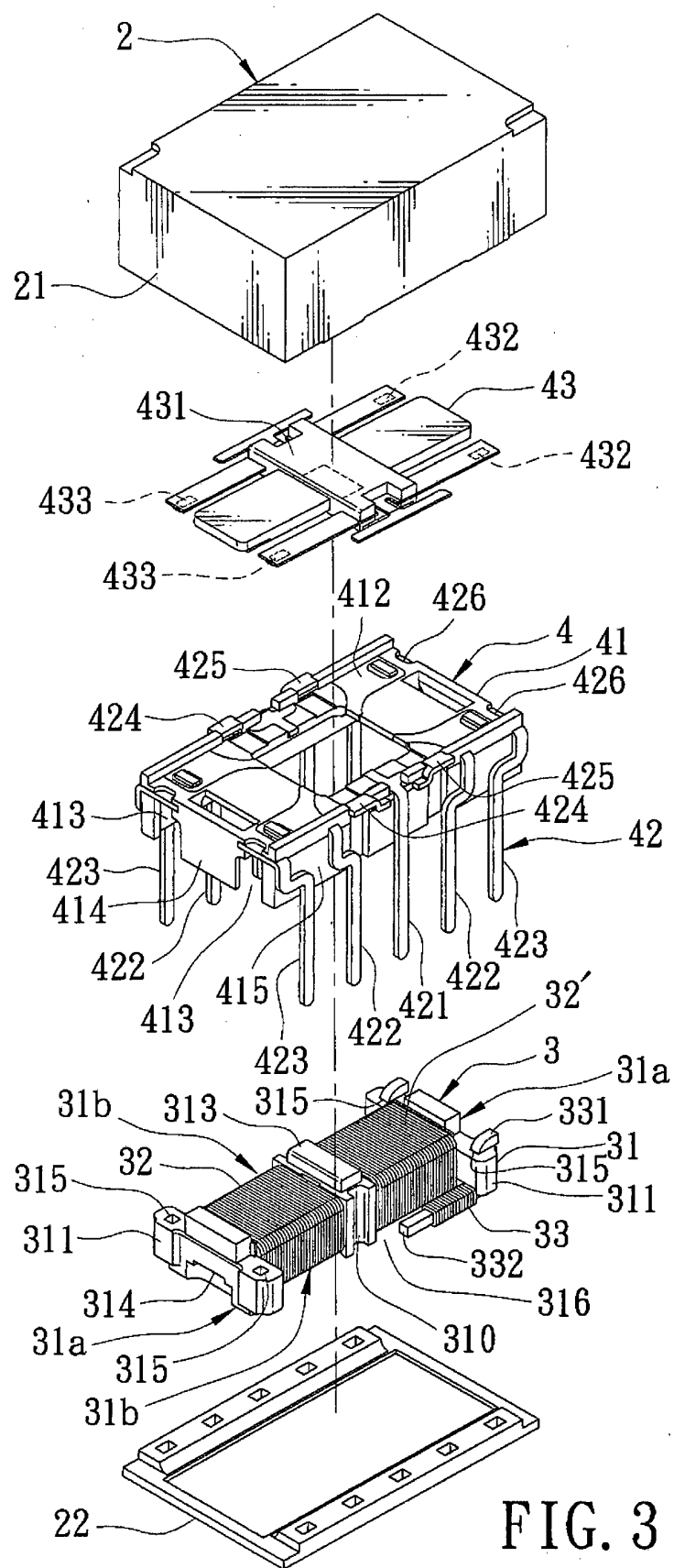


FIG. 3

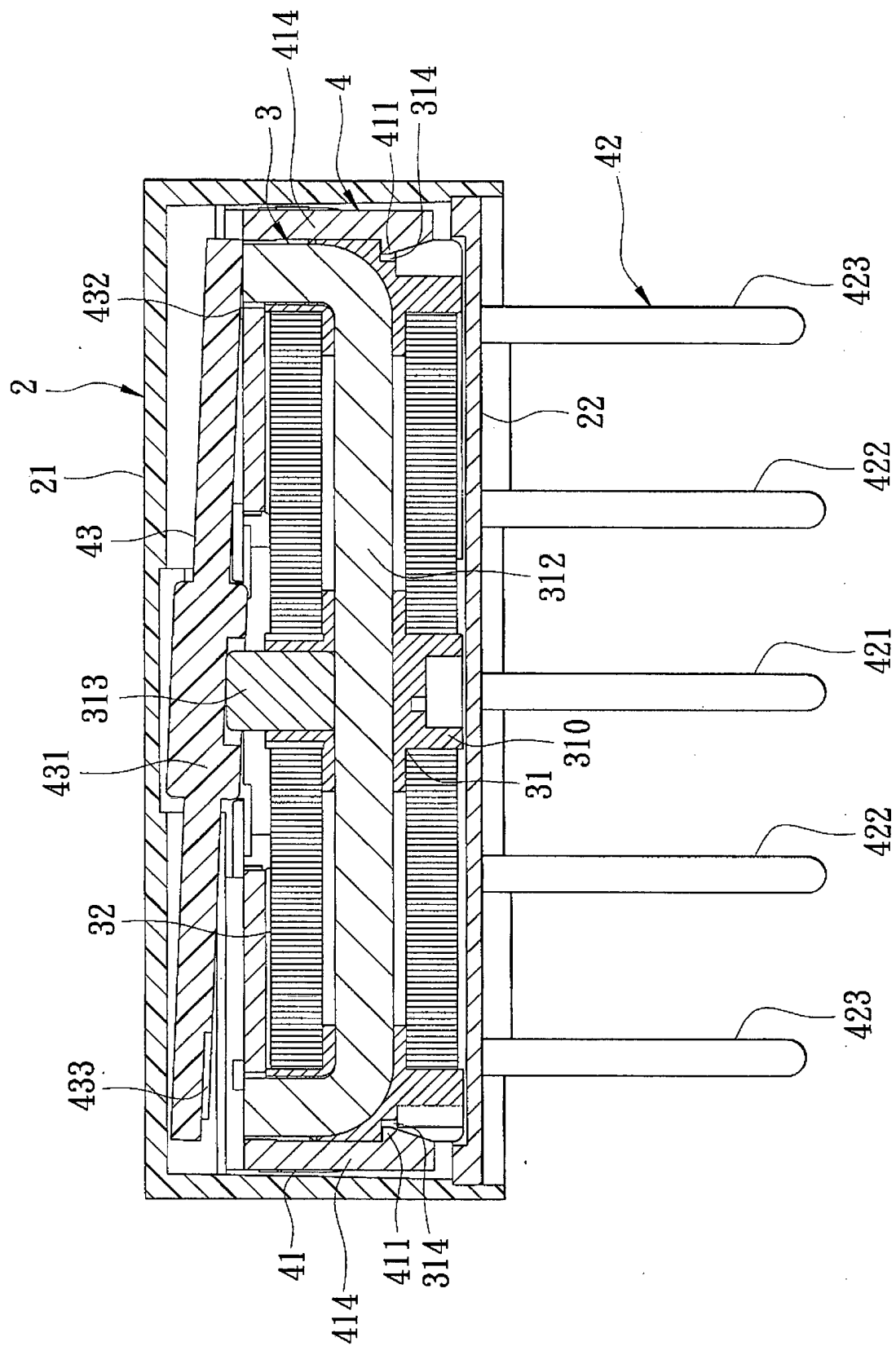


FIG. 4

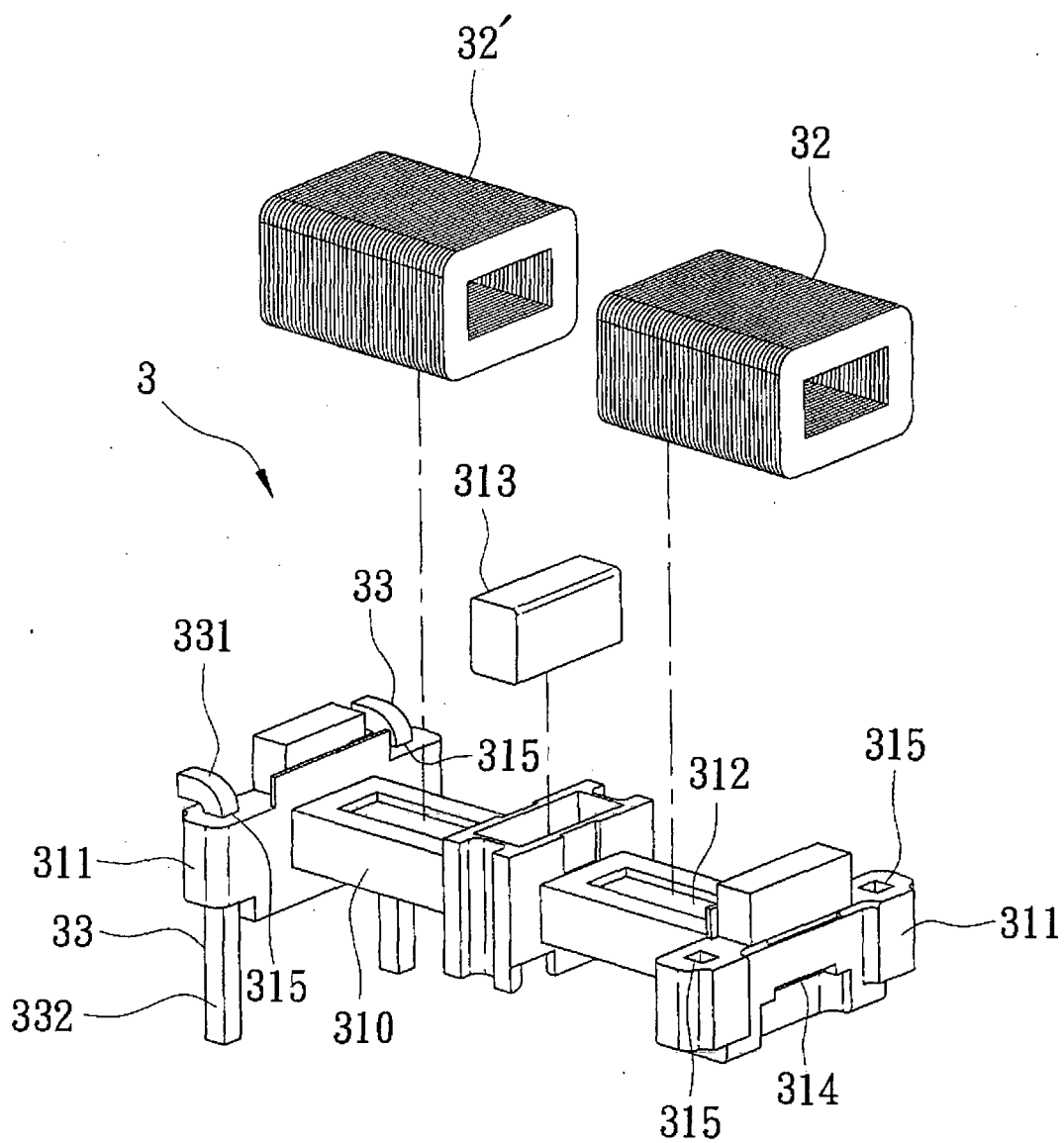


FIG. 5

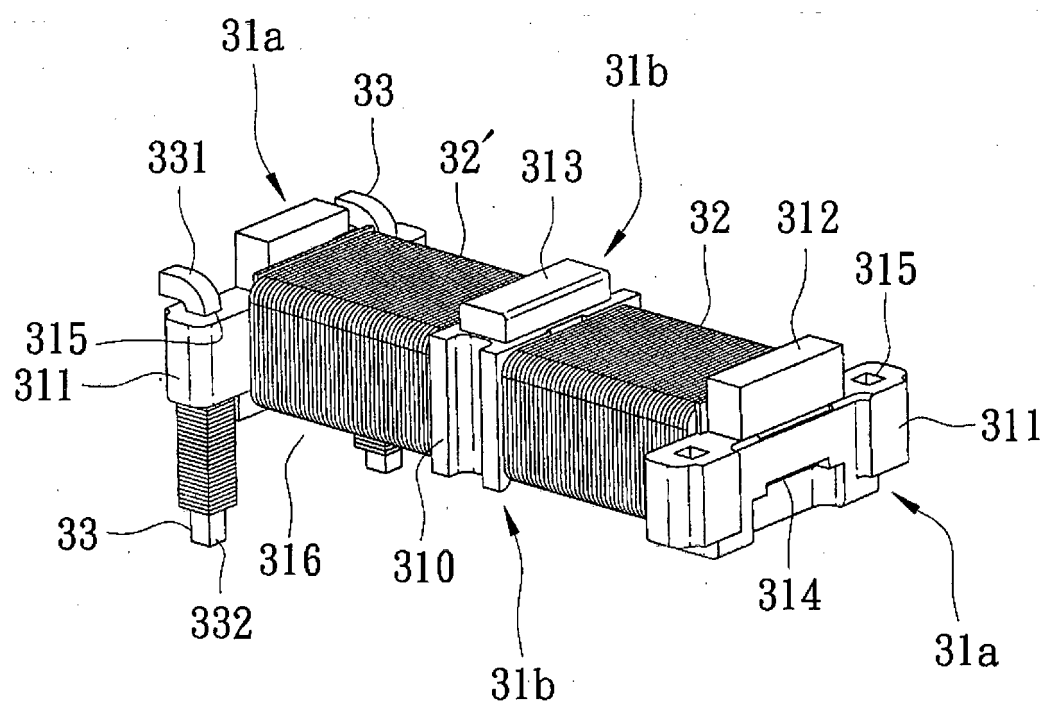


FIG. 6

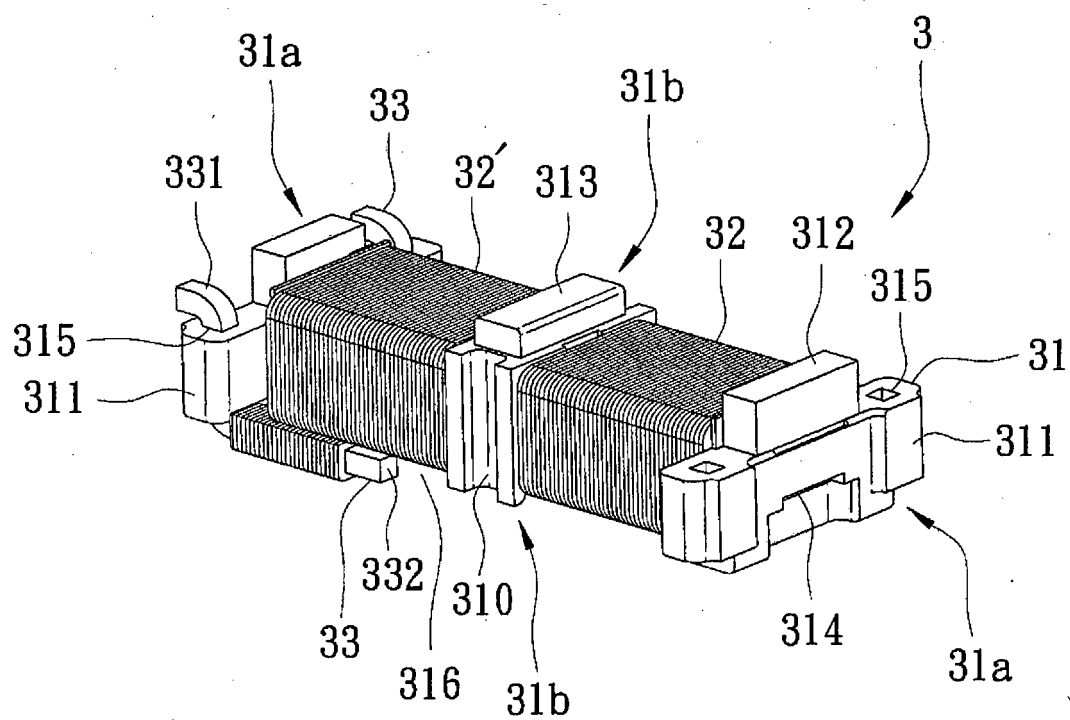


FIG. 7

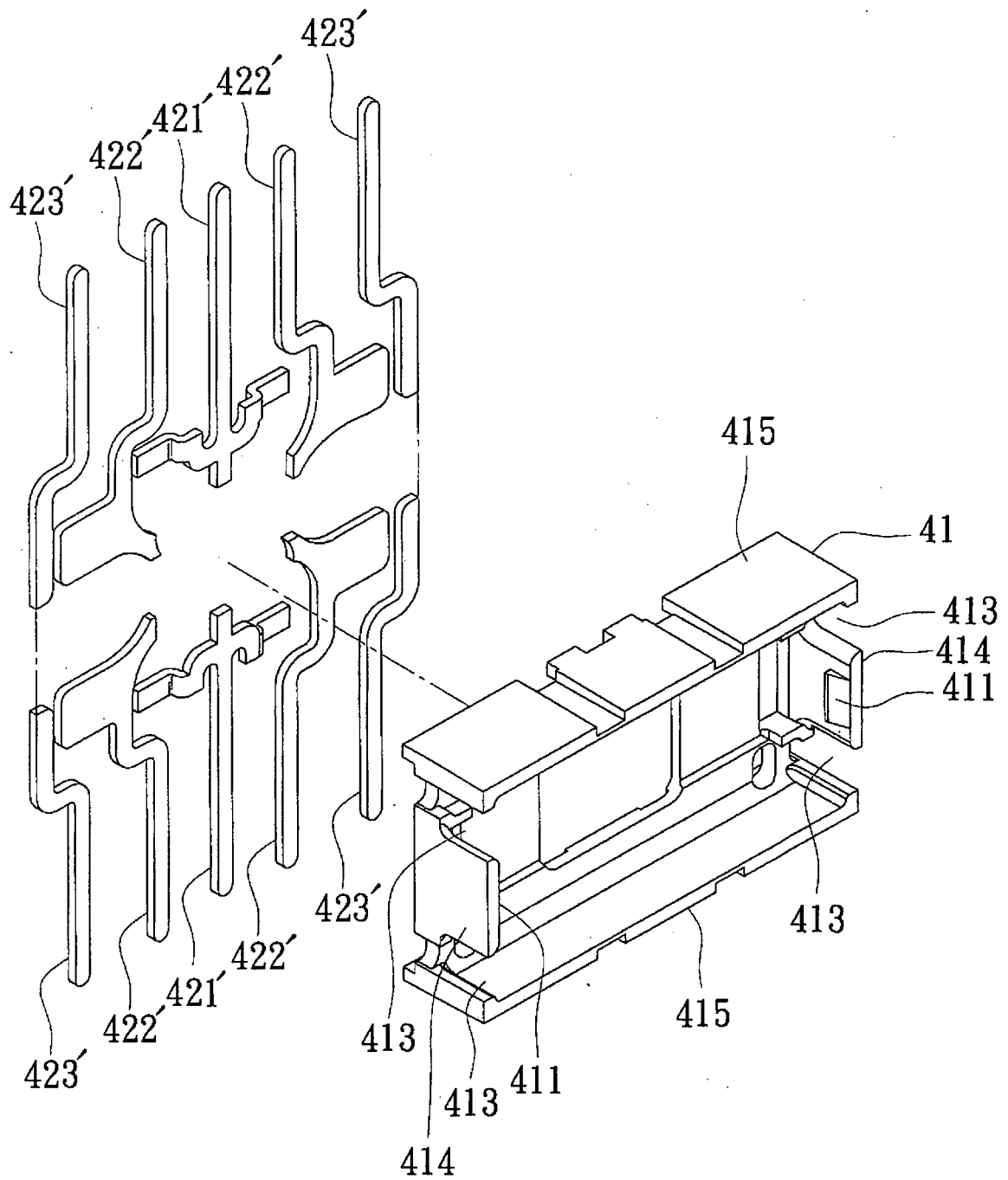


FIG. 8

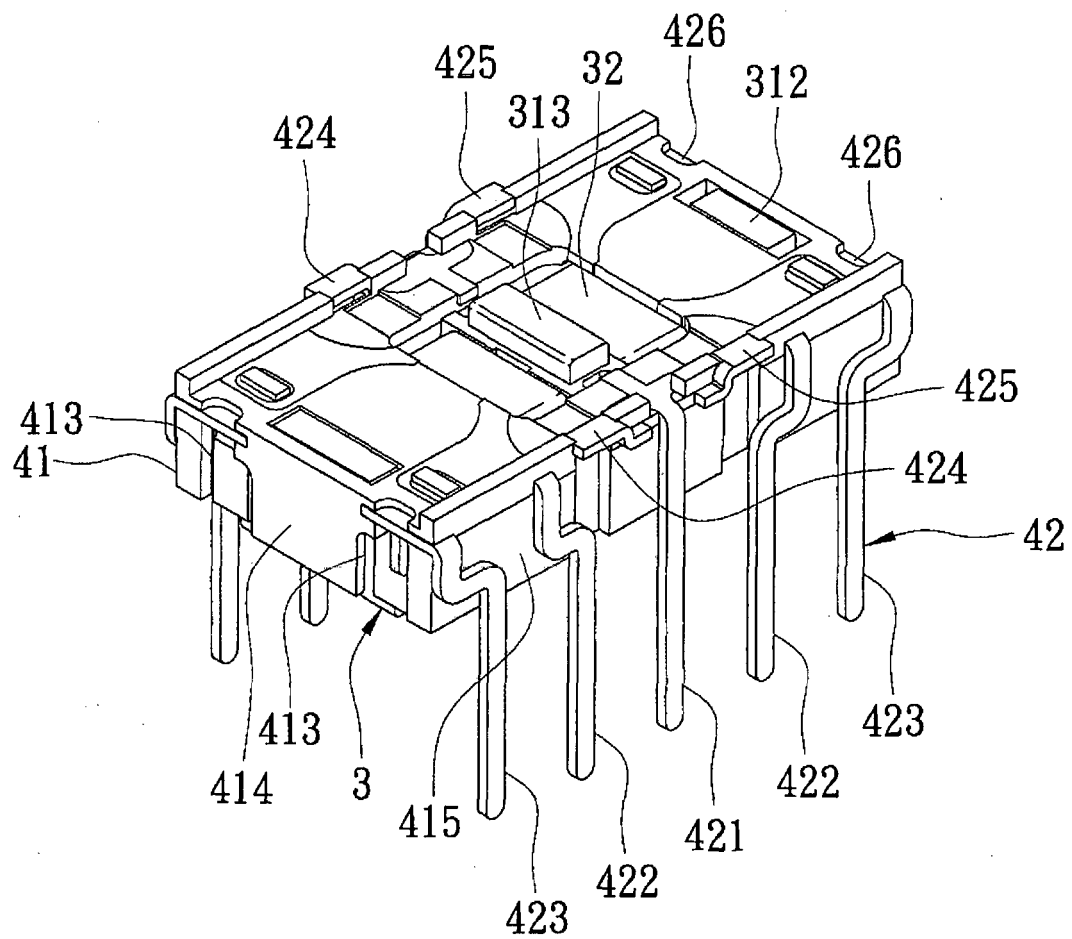


FIG. 9

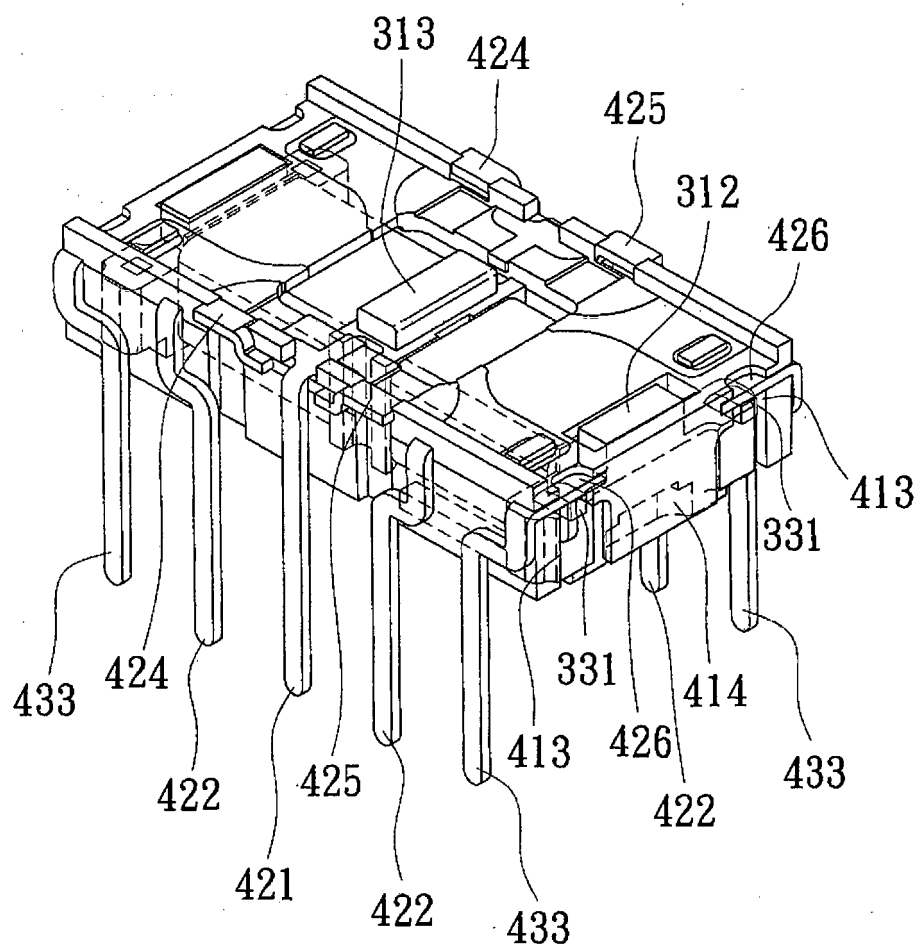


FIG. 10

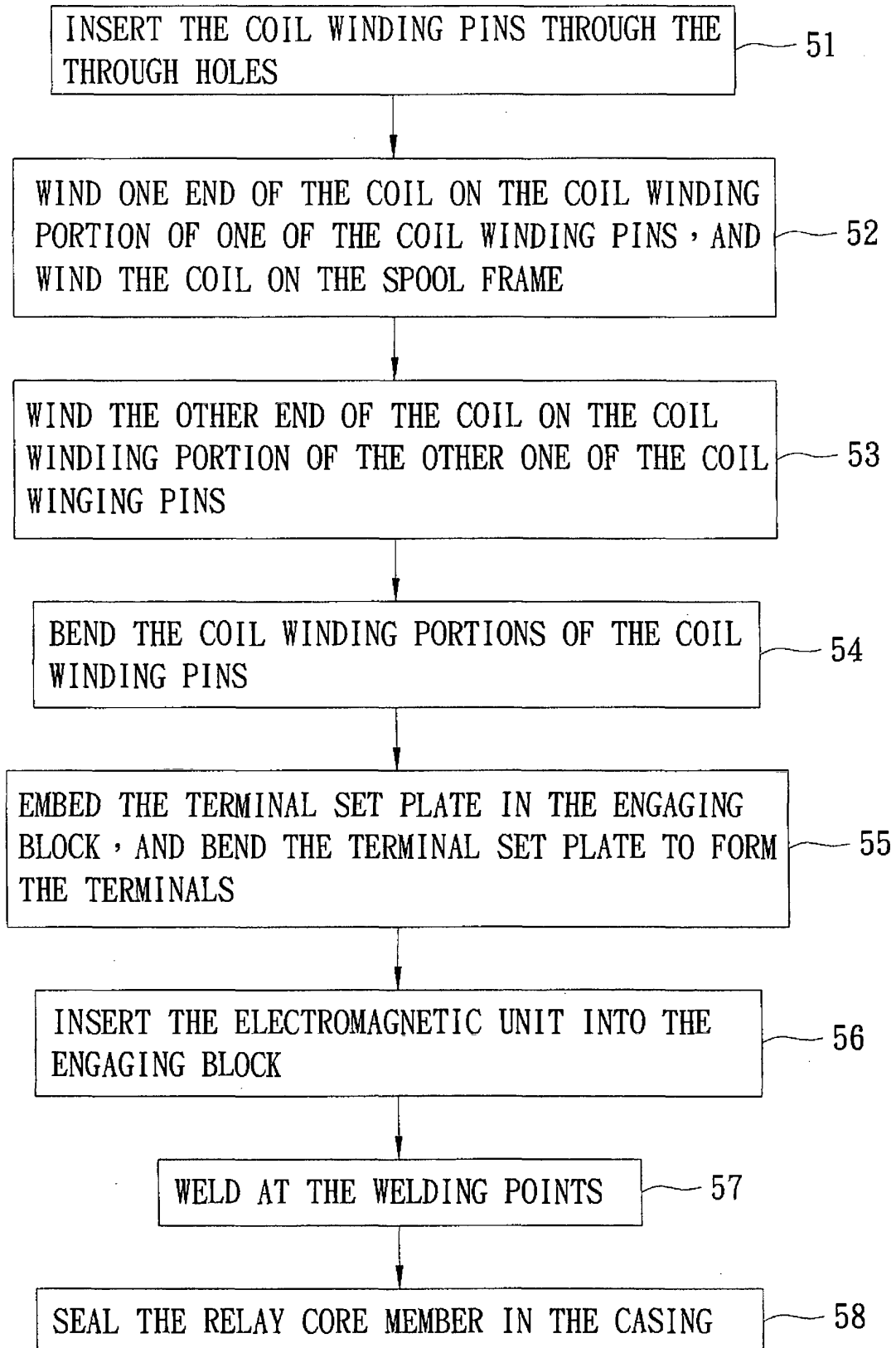


FIG. 11

REFERENCES CITED IN THE DESCRIPTION

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