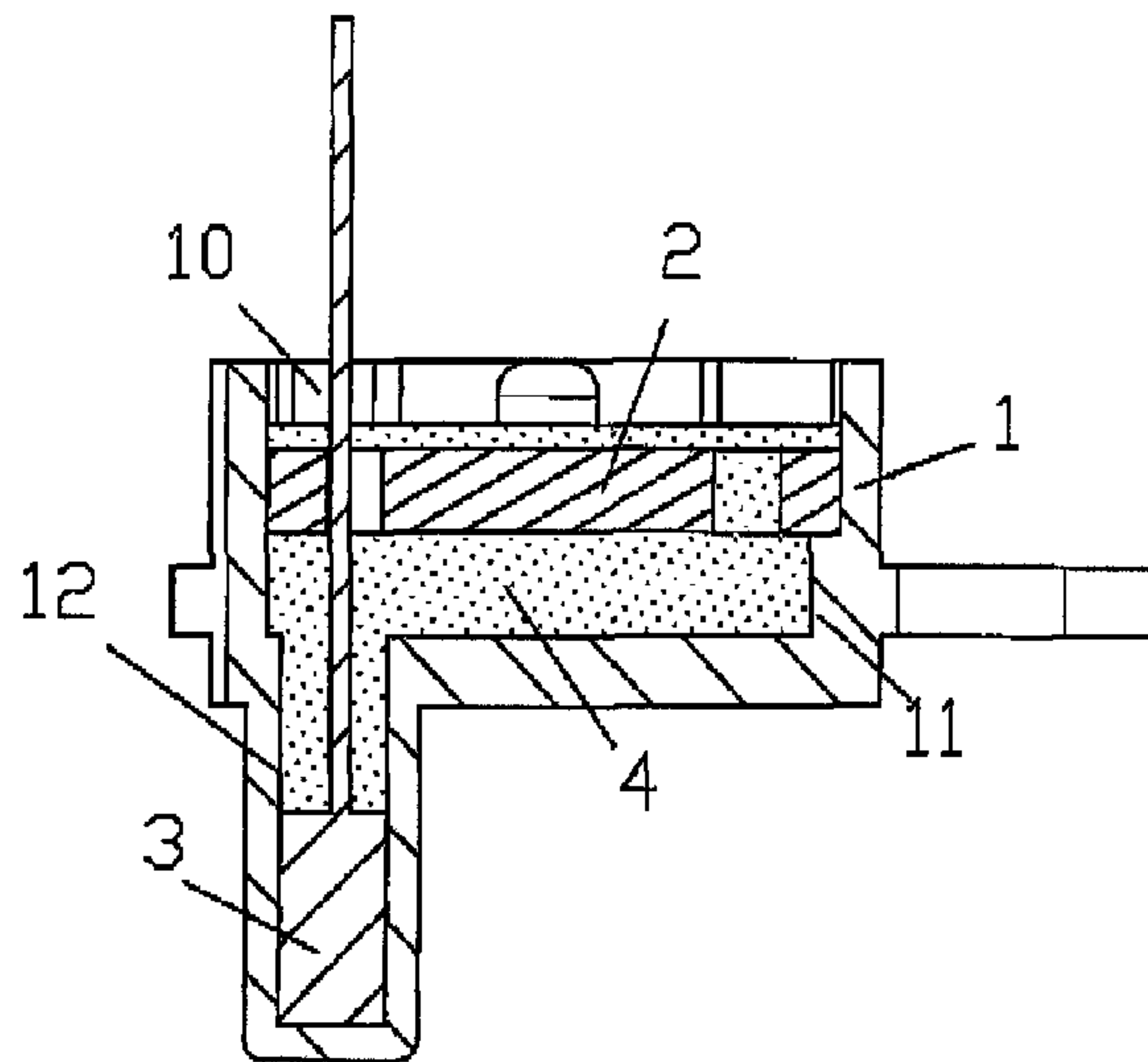




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(54) Titre : STRUCTURE D'ETANCHEITE D'ELEMENT A EFFET HALL ET MOTEUR L'UTILISANT
 (54) Title: HALL ELEMENT SEALING STRUCTURE AND MOTOR USING SAME



(57) **Abrégé/Abstract:**

A hall element sealing structure and a motor using same. The hall element sealing structure comprises a box (1), a hall circuit board (2), and a hall element (3) installed on the hall circuit board. A cavity (10) is formed in the middle of the box (1). A supporting boss (11) is disposed on the bottom wall of the cavity (10), and the bottom wall of the cavity (10) is recessed to form an installing groove (12). The hall circuit board (2) is supported on the top surface of the supporting boss (11), and the hall element (3) on the hall circuit board (2) extends into the installing groove (12). A sealant (4) is poured into the cavity (10). The sealant (4) seals the hall element (3) in the installing groove (12) and covers the outside of the hall circuit board (2). The sealing structure is simple in structure, convenient to install, and firm, has good sealing and waterproof performance and can work reliably.

ABSTRACT

A hall element sealing structure and a motor using same. The hall element sealing structure comprises a box (1), a hall circuit board (2), and a hall element (3) installed on the hall circuit board. A cavity (10) is formed in the middle of the box (1). A supporting boss (11) is disposed on the bottom wall of the cavity (10), and the bottom wall of the cavity (10) is recessed to form an installing groove (12). The hall circuit board (2) is supported on the top surface of the supporting boss (11), and the hall element (3) on the hall circuit board (2) extends into the installing groove (12). A sealant (4) is poured into the cavity (10). The sealant (4) seals the hall element (3) in the installing groove (12) and covers the outside of the hall circuit board (2). The sealing structure is simple in structure, convenient to install, and firm, has good sealing and waterproof performance and can work reliably.

HALL ELEMENT SEALING STRUCTURE AND MOTOR USING SAME

TECHNICAL FIELD

[0001] The invention relates to a sealing structure of a Hall element and a motor comprising the same.

DESCRIPTION OF RELATED ART

[0002] Typically, the circuit board of motors for mounting a Hall element is often directly installed on the terminal insulator of the stator assembly, and the Hall element protrudes out of the circuit board and leans against the outer end of the rotor assembly to detect position signals of the rotor. However, the installation structure of the Hall element is often unreliable, and the circuit board and the Hall element are easily detached from the terminal insulator when the motor is running or when vibration happens. Meanwhile, because the circuit board and the Hall element are exposed, they tend to be stained or contaminated, which adversely affects the operation of the motor, and requires high maintenance costs, and decreases the market competitiveness of products.

SUMMARY OF THE INVENTION

[0003] In view of the above-described problems, it is one objective of the invention to provide a sealing structure of a Hall element and a motor comprising the same. The sealing structure features simple, convenient and reliable installation. The circuit board and the Hall element of the sealing structure have good sealing and waterproof properties, and stable working performance. The motor features simple structure and convenient installation, and strong market competitiveness.

[0004] To achieve the above objective, in accordance with one embodiment of the invention, there is provided a sealing structure of a Hall element, comprising: a box body, a circuit board, and a Hall element disposed on the circuit board. The box body is provided with a chamber comprising a bottom wall. The bottom wall of the chamber is provided with a supporting boss, and the circuit board is supported by an upper surface of the supporting boss. The bottom wall of the chamber is depressed to form a mounting slot. The Hall element of the circuit board is inserted into the mounting slot. Sealing glue is injected into the chamber to seal the Hall element in the mounting slot and coat the circuit board.

[0005] In a class of this embodiment, a plurality of columns protrudes upward from the bottom wall of the chamber. The columns are sheathed in vias on the circuit board.

[0006] In a class of this embodiment, an outer wall of the box body is provided with a plurality of mounting feet. The mounting feet are provided with mounting holes.

[0007] A motor comprises a rotary shaft, a rotor assembly, a stator assembly, a shell assembly, a box body, a circuit board, and a Hall element. The rotor assembly is disposed on the rotary shaft. The stator assembly and the shell assembly are integrated and sleeved on the rotor assembly. The stator assembly comprises a stator core, a terminal insulator, and coil windings. The terminal insulator is disposed on one end of the stator core. The coil windings are coiled on the terminal insulator. The box body is disposed on the terminal insulator, and the box body is provided with a chamber comprising a bottom wall. The bottom wall of the chamber is provided with a supporting boss, and the circuit board is supported by an upper surface of the supporting boss. The bottom wall of the chamber is depressed to form a mounting slot. The Hall element of the circuit board is inserted into the mounting slot. Sealing glue is injected into the chamber to seal the Hall element in the mounting slot and coat the circuit board.

[0008] In a class of this embodiment, the outer wall of the box body is provided with

three mounting feet. The terminal insulator comprises a circular yoke, and a plurality of tooth portions stretching out of the circular yoke. Winding slots are formed between every two tooth portions. At an inner side of one winding slot, a left support column and a right support column are disposed on the upper surface of every two adjacent tooth portions. At an outer side of the winding slot, a first support column is disposed on the upper surface of the circular yoke. The box body is disposed on upper surfaces of the first support column, the left support column, and the right support column via the three mounting feet.

[0009] In a class of this embodiment, the bottom wall of the chamber is depressed to form the mounting slot, and a lug boss is formed on the bottom of the box body. A left base is disposed on the bottom of the left support column, and the upper surface of the tooth portion. A right base is disposed on the bottom of the right support column, and the upper surface of the tooth portion. A slot is formed between the left base and the right base. The lug boss is sheathed in the slot and is supported by the upper surface of the tooth portion. The Hall element is sheathed in the mounting slot and leans outside of the rotor assembly.

[0010] In a class of this embodiment, a plurality of columns protrudes upward from the bottom wall of the chamber. The columns are sheathed in vias on the circuit board.

[0011] Compared with existing technologies, advantages of the sealing structure of a Hall element and a motor comprising the same are summarized as follows:

[0012] 1. The bottom wall of the chamber is provided with a supporting boss and the circuit board is supported by the upper surface of the supporting boss. The bottom wall of the chamber is depressed to form a mounting slot. The Hall element of the circuit board is inserted into the mounting slot. Sealing glue is injected into the chamber to seal the Hall element in the mounting slot and coat the circuit board. The sealing structure features simple, convenient and reliable installation. The circuit board and the Hall element of the

sealing structure have good sealing and waterproof properties, thus avoiding damage from contaminants, and guaranteeing the reliable operation thereof.

[0013] 2. A plurality of columns protrudes upward from the bottom wall of the chamber. The columns are sheathed in vias on the circuit board. The arrangement is simple; the positioning is convenient and the assembling efficiency is high.

[0014] 3. The outer wall of the box body is provided with a plurality of mounting feet. The mounting feet are provided with mounting holes, so it is convenient to install the box body on the stator assembly.

[0015] 4. The motor features simple structure and convenient installation. The circuit board and the Hall element have good sealing and waterproof properties, and reliable working performance. The motor has strong market competitiveness.

[0016] 5. The box body is disposed on the upper surfaces of the first support column, the left support column and the right support column via three mounting feet. The arrangement is simple and the installation is convenient and reliable.

[0017] 6. The lug boss is sheathed in the slot and is supported by the upper surface of the tooth portion. The Hall element is sheathed in the mounting slot and leans against the outer end of the rotor assembly. The arrangement is simple, and the installation is convenient and reliable, thereby guaranteeing the reliability of the Hall element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. 1 is a stereogram of a sealing structure of a Hall element in accordance with one embodiment of the invention;

[0019] FIG. 2 is an exploded view of a sealing structure of a Hall element in accordance with one embodiment of the invention;

[0020] FIG. 3 is a top view of a sealing structure of a Hall element in accordance with one embodiment of the invention;

[0021] FIG. 4 is a cross-sectional view taken from line A-A in FIG. 3 in accordance with one embodiment of the invention;

[0022] FIG. 5 is a stereogram of a motor in accordance with one embodiment of the invention;

[0023] FIG. 6 is an exploded view of a motor in accordance with one embodiment of the invention;

[0024] FIG. 7 is an enlarged view taken from B-B part in FIG. 6 in accordance with one embodiment of the invention;

[0025] FIG. 8 is a top view of a motor in accordance with one embodiment of the invention;

[0026] FIG. 9 is a cross-sectional view taken from line C-C in FIG. 8 in accordance with one embodiment of the invention; and

[0027] FIG. 10 is an enlarged view taken from D-D part in FIG. 9 in accordance with one embodiment of the invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0028] For further illustrating the invention, experiments detailing a sealing structure of a Hall element and a motor comprising the same are described below. It should be noted that the following examples are intended to describe and not to limit the invention.

Example 1

[0029] As shown by FIGS. 1-4, a sealing structure of a Hall element comprises: a box body 1, a circuit board 2, and a Hall element 3 disposed on the circuit board 2. A box body 1 comprising a chamber 10. A bottom wall of the chamber 10 is provided with a supporting boss 11, and the circuit board 2 is supported by an upper surface of the supporting boss 11. The bottom wall of the chamber 10 is depressed to form a mounting slot 12. The Hall element 3 of the circuit board 2 is inserted into the mounting slot 12. Sealing glue 4 is injected into the chamber 10 to seal the Hall element 3 in the mounting slot 12 and coat the circuit board 2.

[0030] A plurality of columns 13 protrudes upward from the bottom wall of the chamber 10. The columns 13 are sheathed in vias 21 on the circuit board 2. An outer wall of the box body 1 is provided with a plurality of mounting feet 14. The mounting feet 14 are provided with mounting holes 140.

Example 2

[0031] As shown by FIGS. 5-10, a motor comprises a rotary shaft 5, a rotor assembly 6, a stator assembly 7, a shell assembly 8, a box body 1, a circuit board 2, and a Hall element 3. The shell assembly 8 comprises a shell 81 and a cover 82. The rotor assembly 6 is disposed on the rotary shaft 5. The stator assembly 7 and the shell 81 are integrated and sleeved on the rotor assembly 6. The cover is disposed on the two ends of the shell 81. The two ends of the rotary shaft are supported by the bearing of the cover 82. The stator assembly 7 comprises a stator core 71, a terminal insulator 72, and coil windings 73. The terminal insulator 72 is disposed on one end of the stator core 71. The coil windings 73 are coiled on the terminal insulator 72. The box body 1 is disposed on the terminal insulator 72, and the box body 1 comprising a chamber 10. A bottom wall of the chamber 10 is provided with a supporting boss 11, and the circuit board 2 is supported by an upper surface of the supporting boss 11. The bottom wall of the chamber 10 is depressed to

form a mounting slot 12. The Hall element 3 of the circuit board 2 is inserted into the mounting slot 12. Sealing glue 4 is injected into the chamber 10 to seal the Hall element 3 in the mounting slot 12 and coat the circuit board 2. The outer wall of the box body 1 is provided with three mounting feet 14. The terminal insulator 72 comprises a circular yoke 721, and a plurality of tooth portions 722 stretching out of the circular yoke 721. Winding slots 723 are formed between every two tooth portions 722. At an inner side of one winding slot 723, a left support column 7221 and a right support column 7222 are disposed on the upper surface of every two adjacent tooth portions 722. At an outer side of the winding slot 723, a first support column 7211 is disposed on the upper surface of the circular yoke 721. The box body 1 is disposed on upper surfaces of the first support column 7211, the left support column 7221, and the right support column 7222 via the three mounting feet 14. The bottom wall of the chamber 10 is depressed to form the mounting slot 12, and a lug boss 15 is formed on the bottom of the box body 1. A left base 7223 is disposed on the bottom of the left support column 7221, and the upper surface of the tooth portion 722. A right base 7224 is disposed on the bottom of the right support column 7222, and the upper surface of the tooth portion 722. A slot 7225 is formed between the left base 7223 and the right base 7224. The lug boss 15 is sheathed in the slot 7225 and is supported by the upper surface of the tooth portion 722. The Hall element 3 is sheathed in the mounting slot 12 and leans outside of the rotor assembly 6. A plurality of columns 13 protrudes upward from the bottom wall of the chamber 10. The columns 13 are sheathed in vias 21 on the circuit board 2.

[0032] While particular embodiments of the invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects, and therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of the invention.

CLAIMS

1. A sealing structure of a Hall element, **characterized by** comprising:
 - a) a box body (1), the box body (1) comprising a chamber (10) comprising a bottom wall;
 - b) a circuit board (2); and
 - c) a Hall element (3), the Hall element being disposed on the circuit board (2);wherein

the bottom wall of the chamber (10) is provided with a supporting boss (11), and the circuit board (2) is supported by an upper surface of the supporting boss (11);

the bottom wall of the chamber (10) is depressed to form a mounting slot (12);

the Hall element (3) of the circuit board (2) is inserted into the mounting slot (12);

sealing glue (4) is injected into the chamber (10) to seal the Hall element (3) in the mounting slot (12) and coat the circuit board (2).
2. The sealing structure of claim 1, **characterized in that** a plurality of columns (13) protrudes upward from the bottom wall of the chamber (10); the columns (13) are sheathed in vias (21) on the circuit board (2).
3. The sealing structure of claim 1 or 2, **characterized in that** an outer wall of the box body (1) is provided with a plurality of mounting feet (14); the mounting feet

(14) are provided with mounting holes (140).

4. A motor, characterized by comprising:

- a) a rotary shaft (5);
- b) a rotor assembly (6);
- c) a stator assembly (7);
- d) a shell assembly (8);
- e) a box body (1);
- f) a circuit board (2); and
- g) a Hall element (3);

wherein

the rotor assembly (6) is disposed on the rotary shaft (5);

the stator assembly (7) and the shell assembly (8) are integrated and sleeved on the rotor assembly (6);

the stator assembly (7) comprises a stator core (71), a terminal insulator (72), and coil windings (73); the terminal insulator (72) is disposed on one end of the stator core (71); the coil windings (73) are coiled on the terminal insulator (72); the box body (1) is disposed on the terminal insulator (72), and the box body (1) comprises a chamber (10) comprising a bottom wall;

the bottom wall of the chamber (10) is provided with a supporting boss (11), and the circuit board (2) is supported by an upper surface of the supporting boss (11); the bottom wall of the chamber (10) is depressed to form a mounting slot (12); the Hall element (3) of the circuit board (2) is inserted into the mounting slot (12);

- sealing glue (4) is injected into the chamber (10) to seal the Hall element (3) in the mounting slot (12) and coat the circuit board (2).
5. The motor of claim 4, **characterized in that** an outer wall of the box body (1) is provided with three mounting feet (14); the terminal insulator (72) comprises a circular yoke (721), and a plurality of tooth portions (722) stretching out of the circular yoke (721); winding slots (723) are formed between every two tooth portions (722); at an inner side of one winding slot (723), a left support column (7221) and a right support column (7222) are disposed on the upper surface of two adjacent tooth portions (722); at an outer side of the winding slot (723), a first support column (7211) is disposed on the upper surface of the circular yoke (721); the box body (1) is disposed on upper surfaces of the first support column (7211), the left support column (7221), and the right support column (7222) via the three mounting feet (14).
6. The motor of claim 5, **characterized in that** the bottom wall of the chamber (10) is depressed to form the mounting slot (12), and a lug boss (15) is formed on the bottom of the box body (1); a left base (7223) is disposed on the bottom of the left support column (7221) and on the upper surface of the tooth portion (722); a right base (7224) is disposed on the bottom of the right support column (7222) and on the upper surface of the tooth portion (722); a slot (7225) is formed between the left base (7223) and the right base (7224); the lug boss (15) is sheathed in the slot (7225) and is supported by the upper surface of the tooth portion (722); the Hall element (3) is sheathed in the mounting slot (12) and leans outside of the rotor assembly (6).

7. The motor of claim 4, 5, or 6, **characterized in that** a plurality of columns (13) protrudes upward from the bottom wall of the chamber (10); the columns (13) are sheathed in vias (21) on the circuit board (2).

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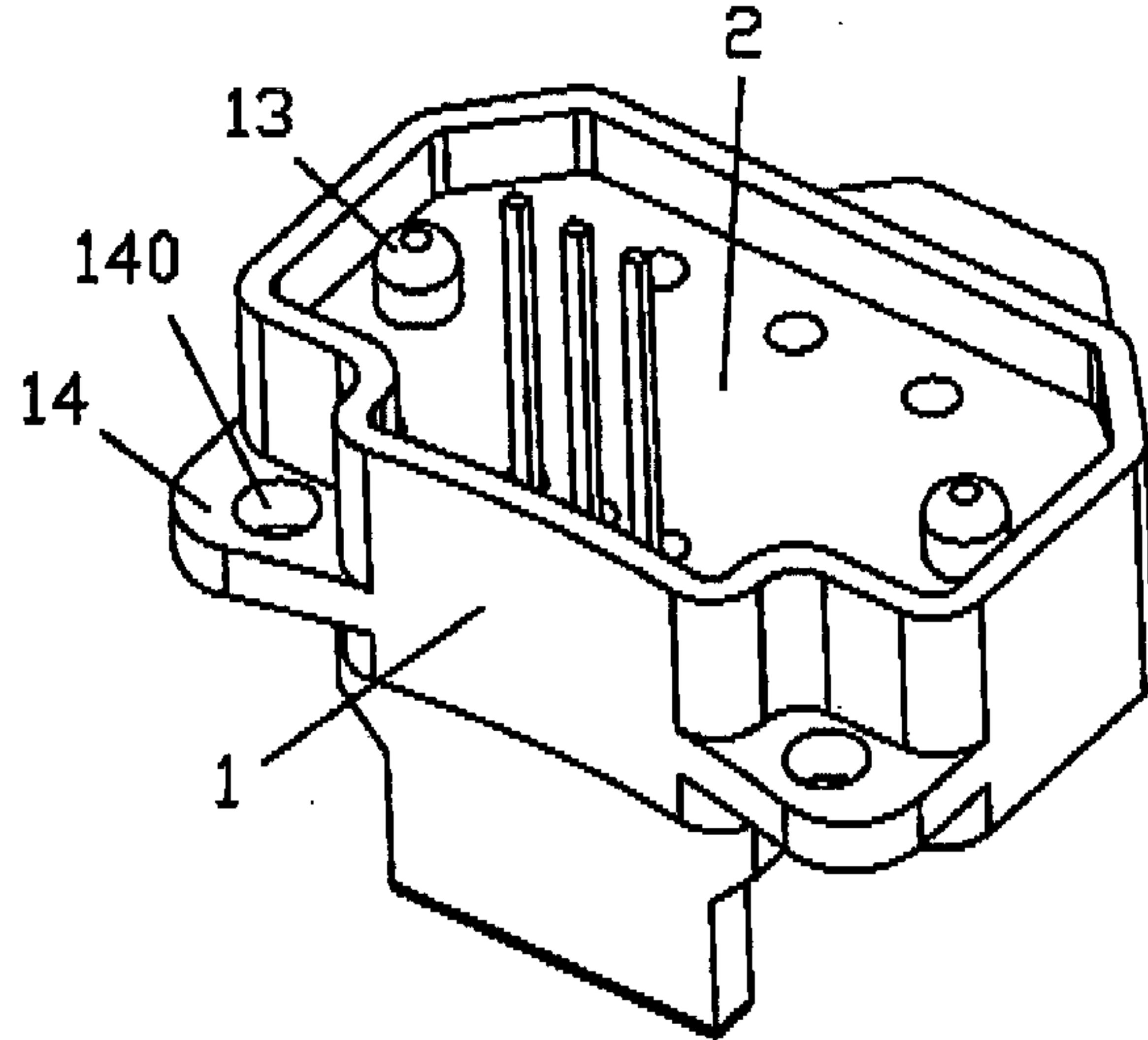


FIG. 1

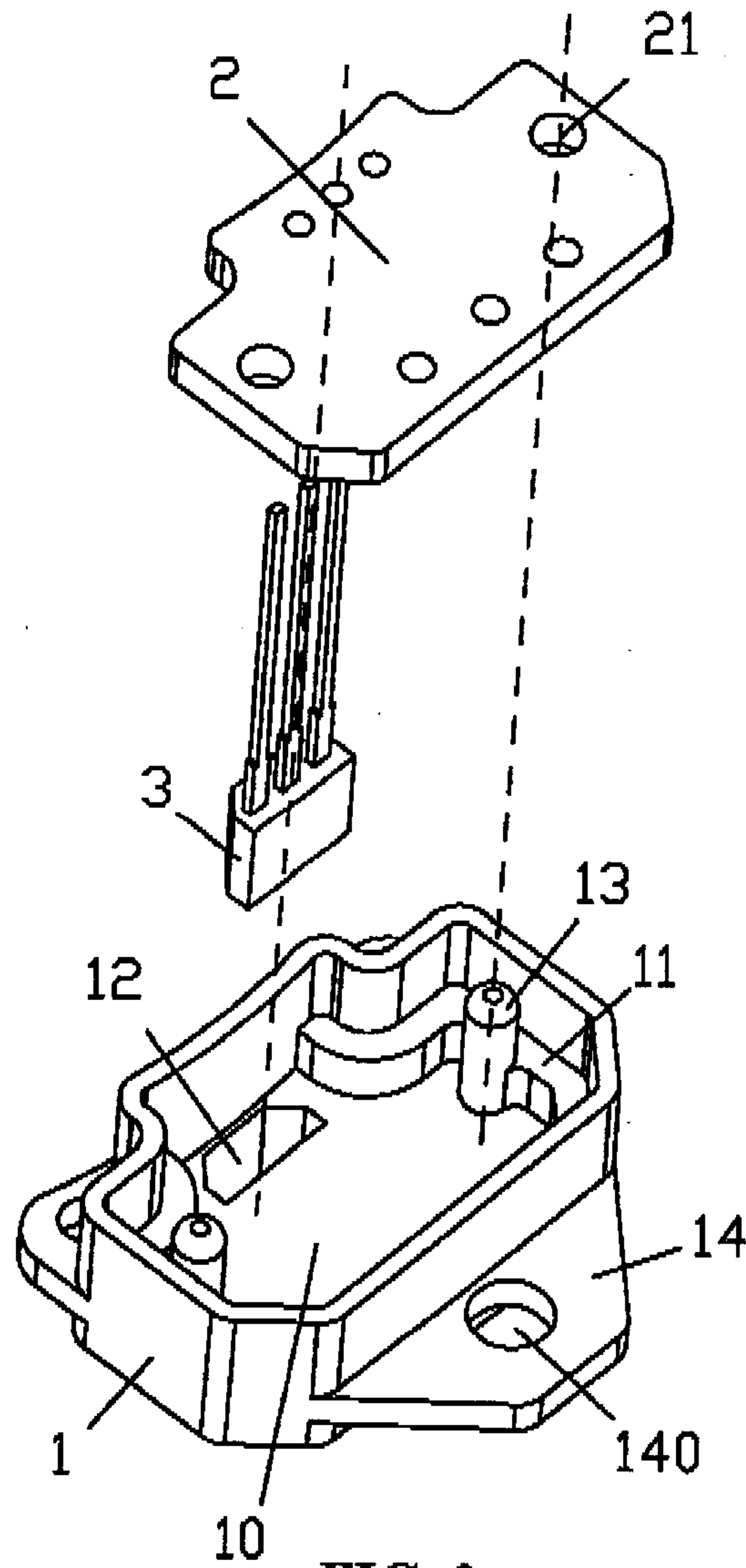


FIG. 2

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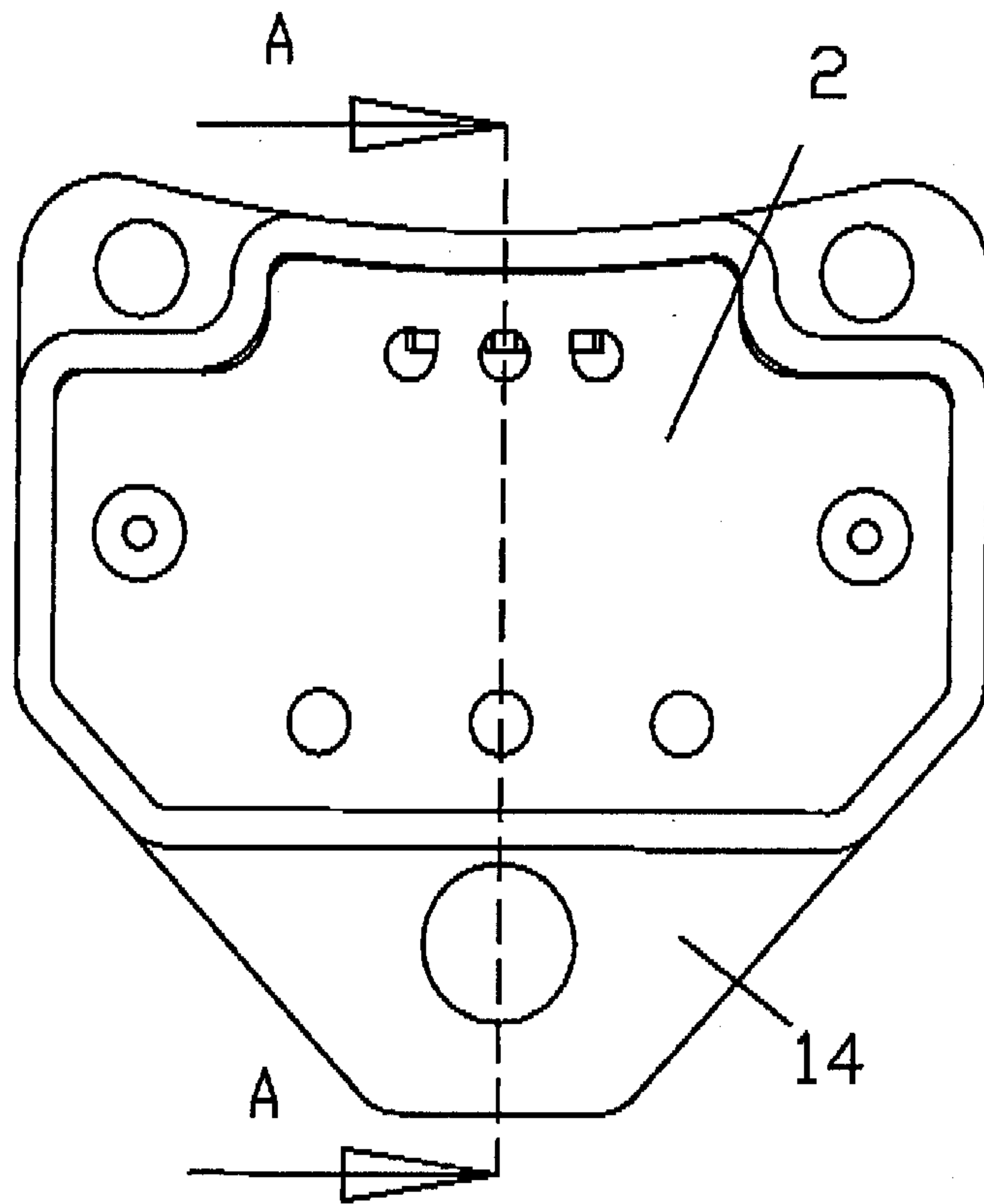


FIG. 3

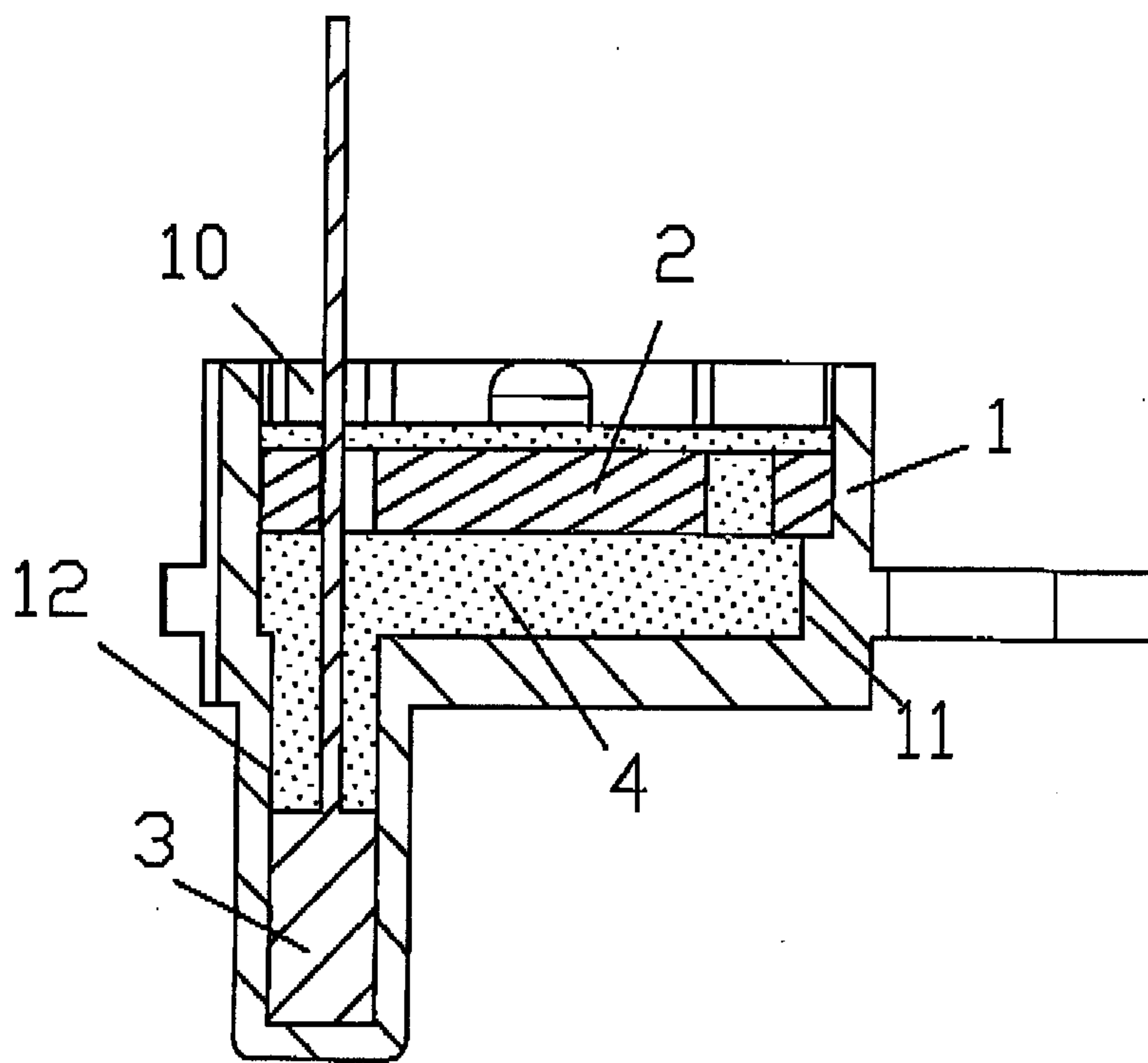


FIG. 4

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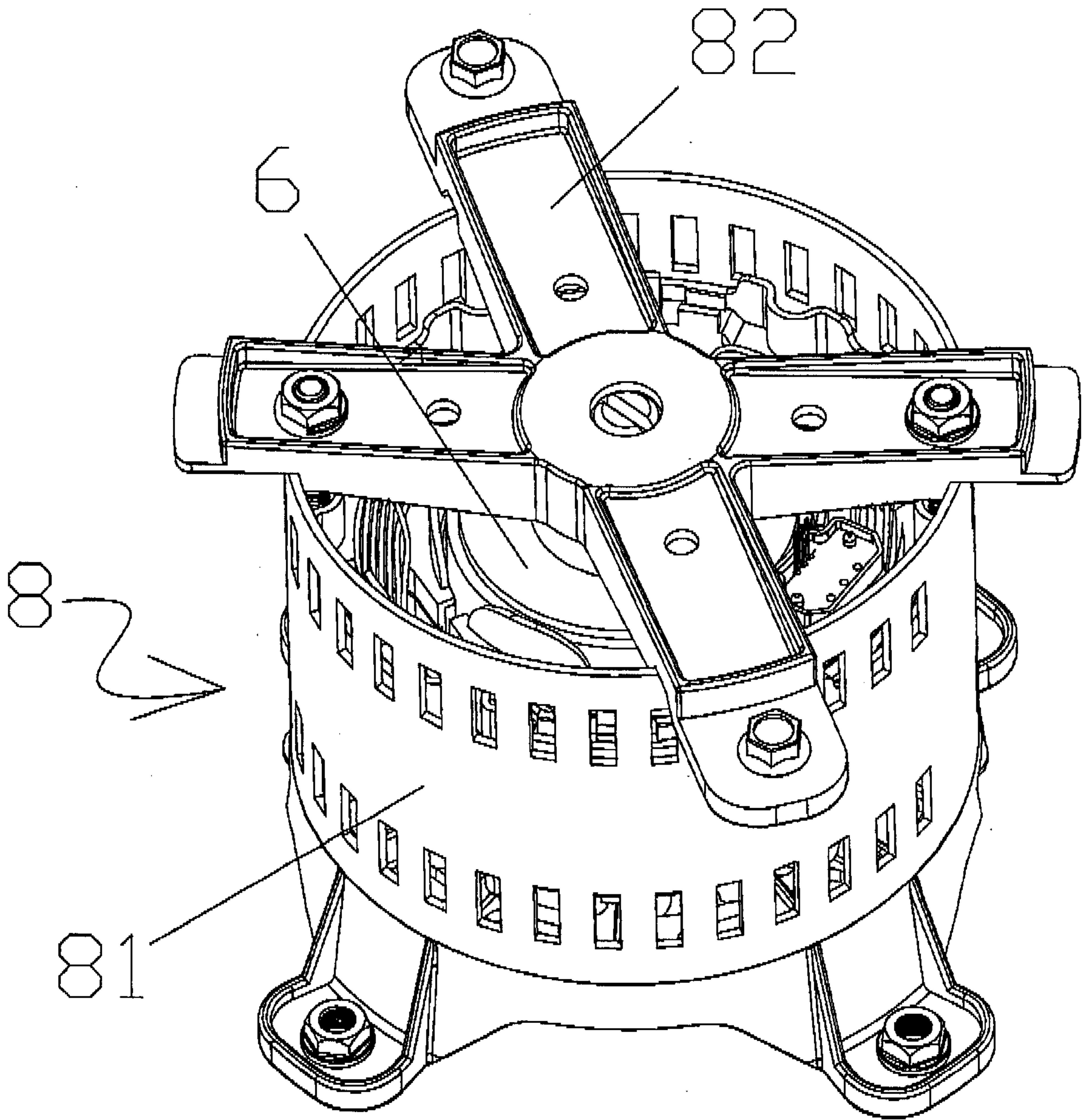


FIG. 5

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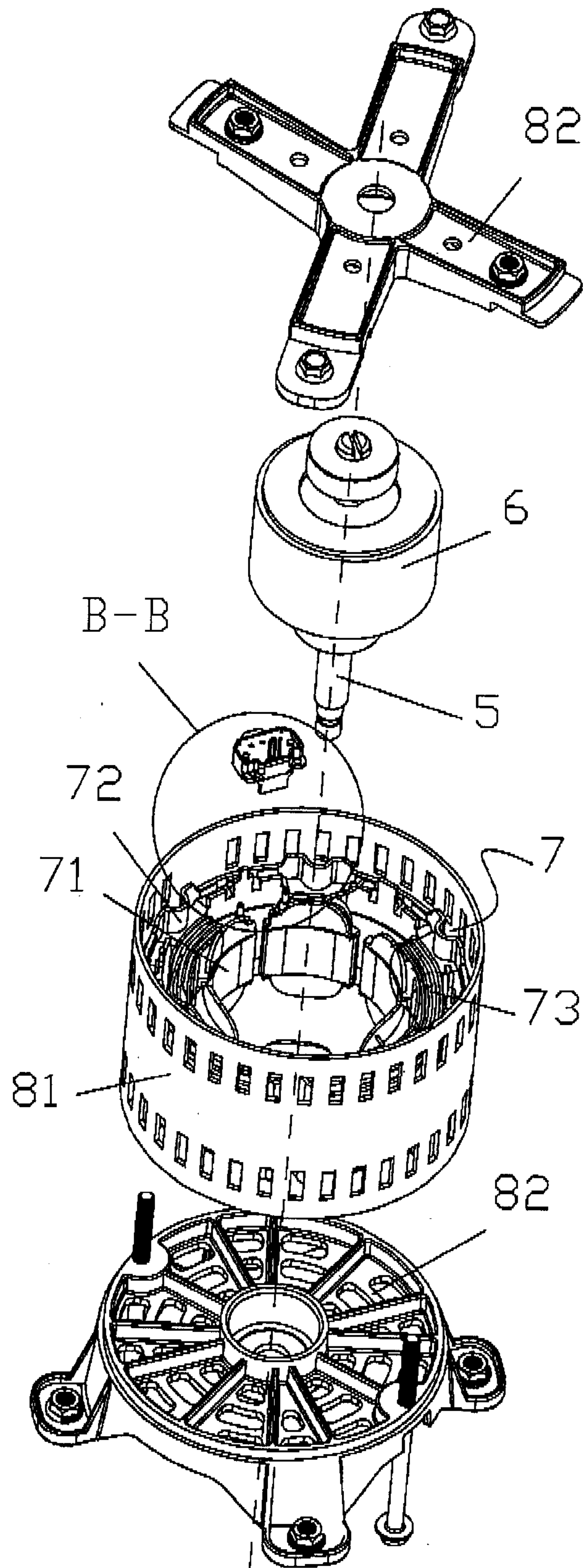


FIG. 6

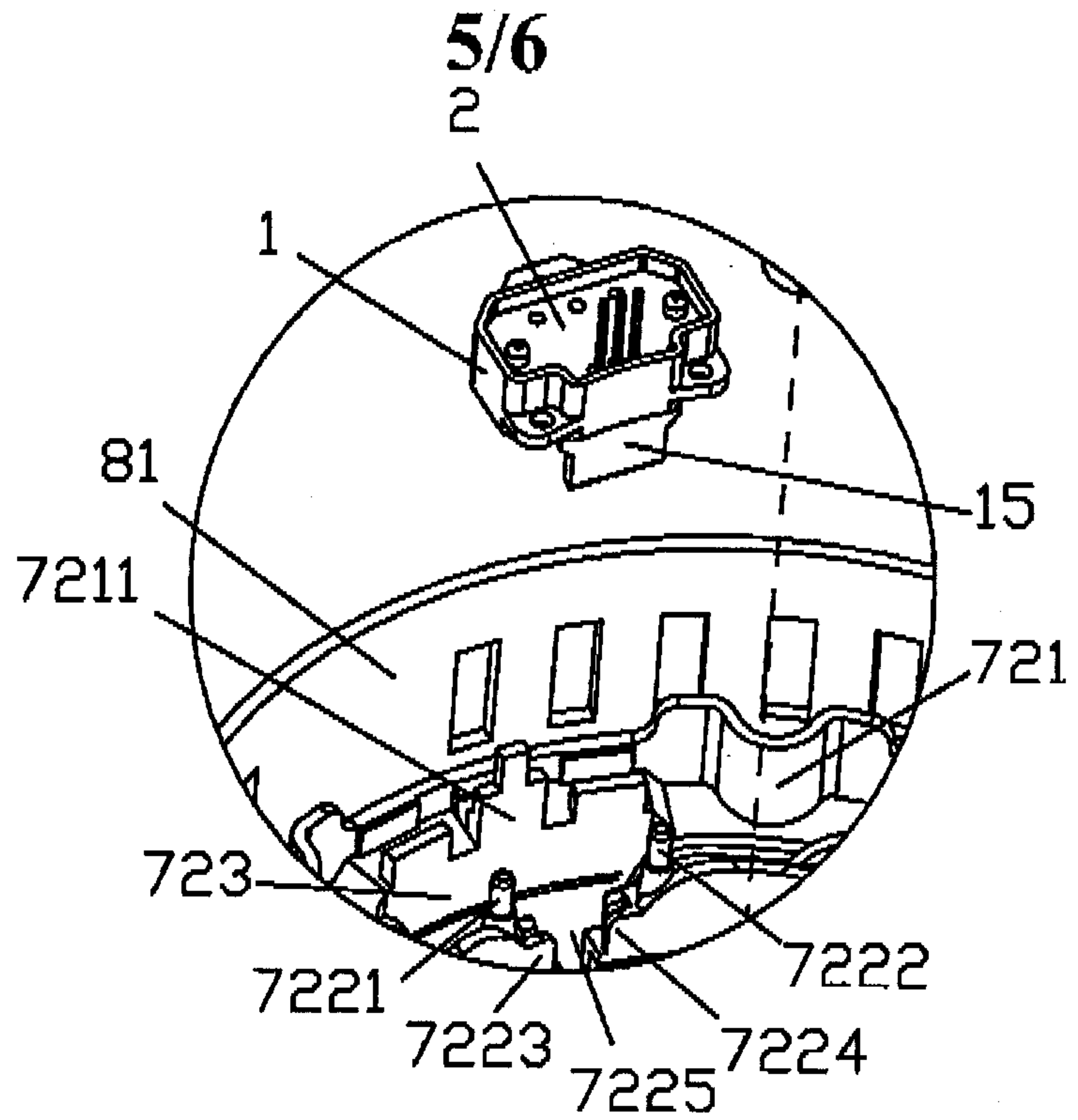


FIG. 7

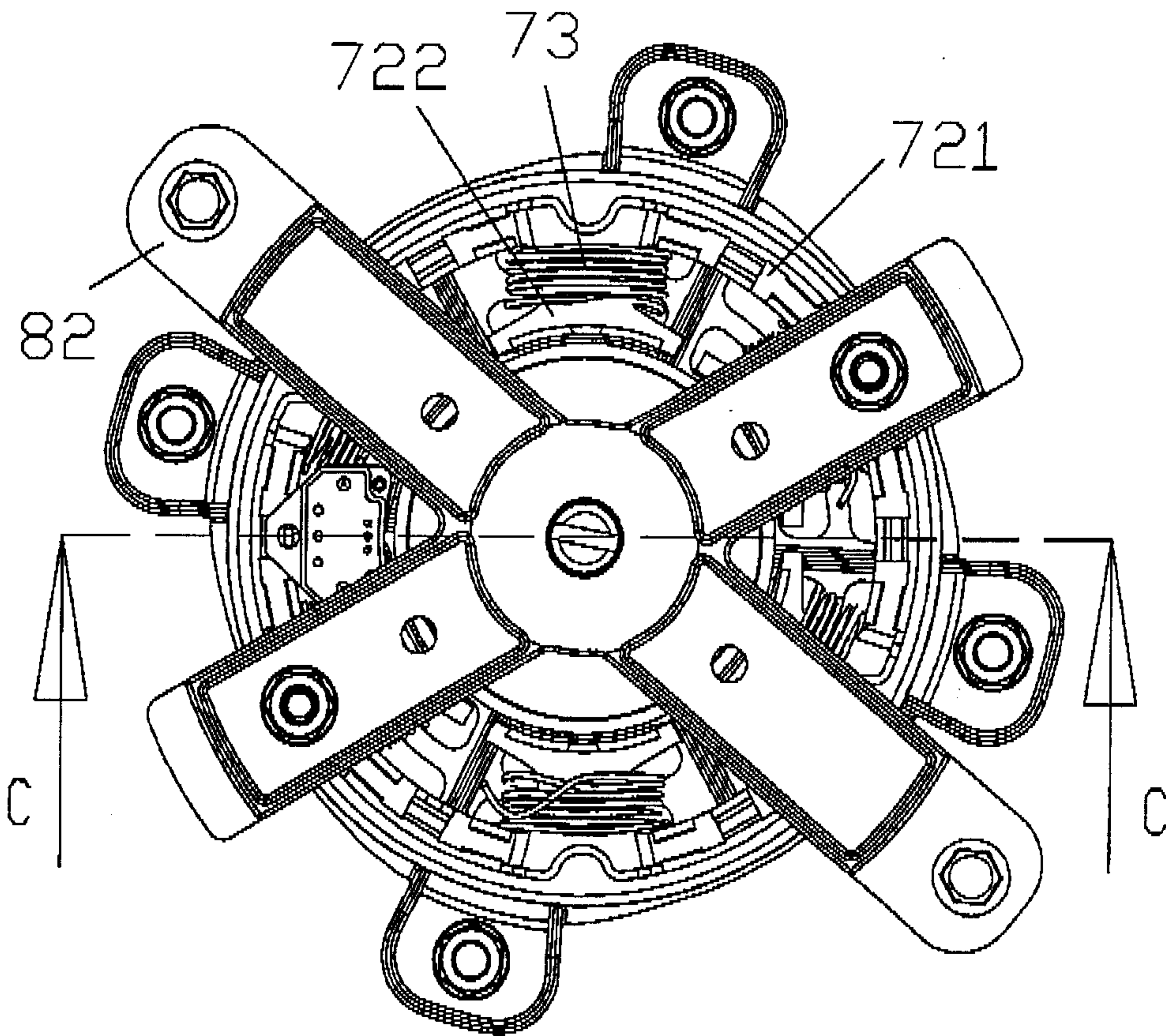


FIG. 8

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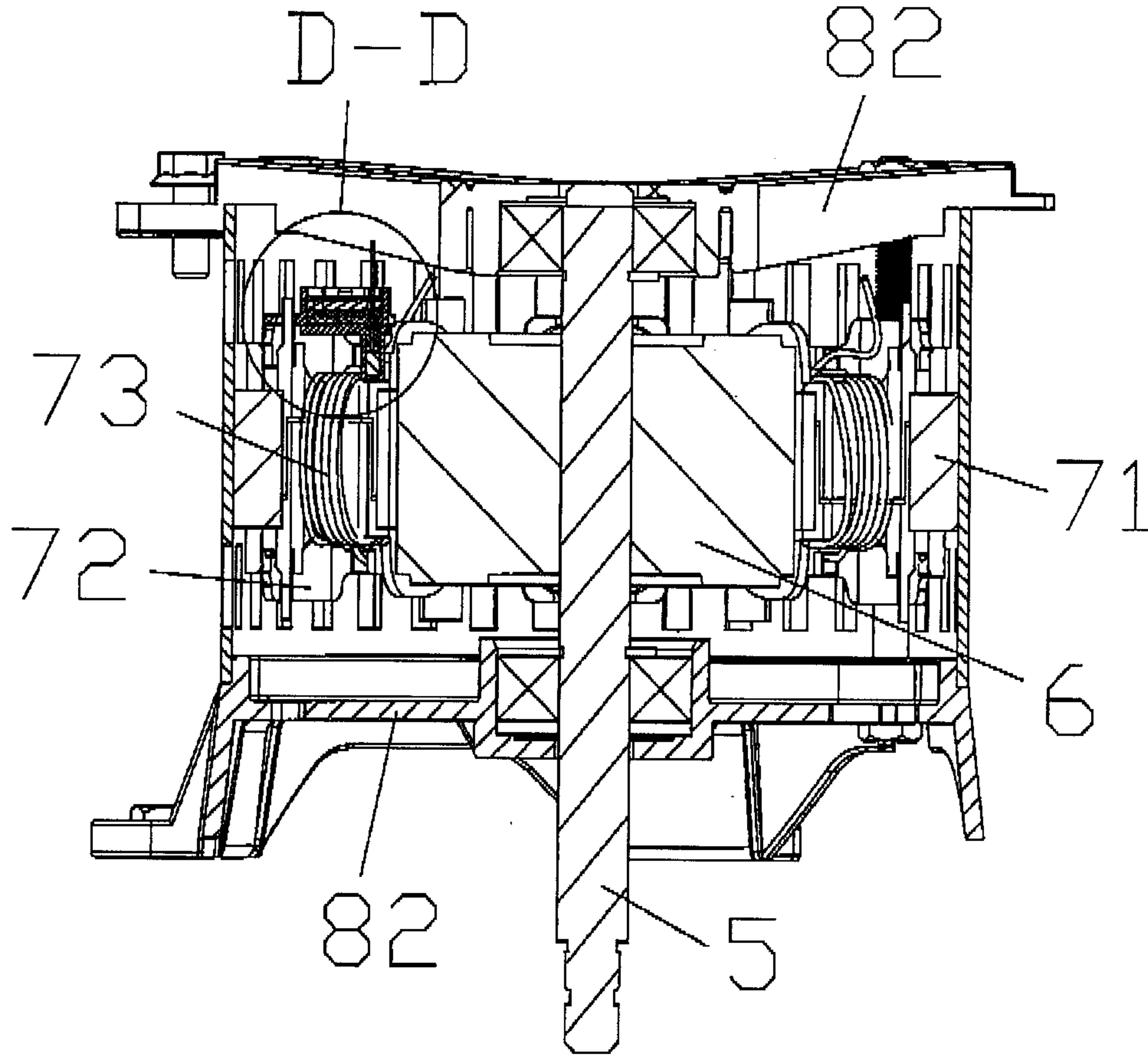


FIG. 9

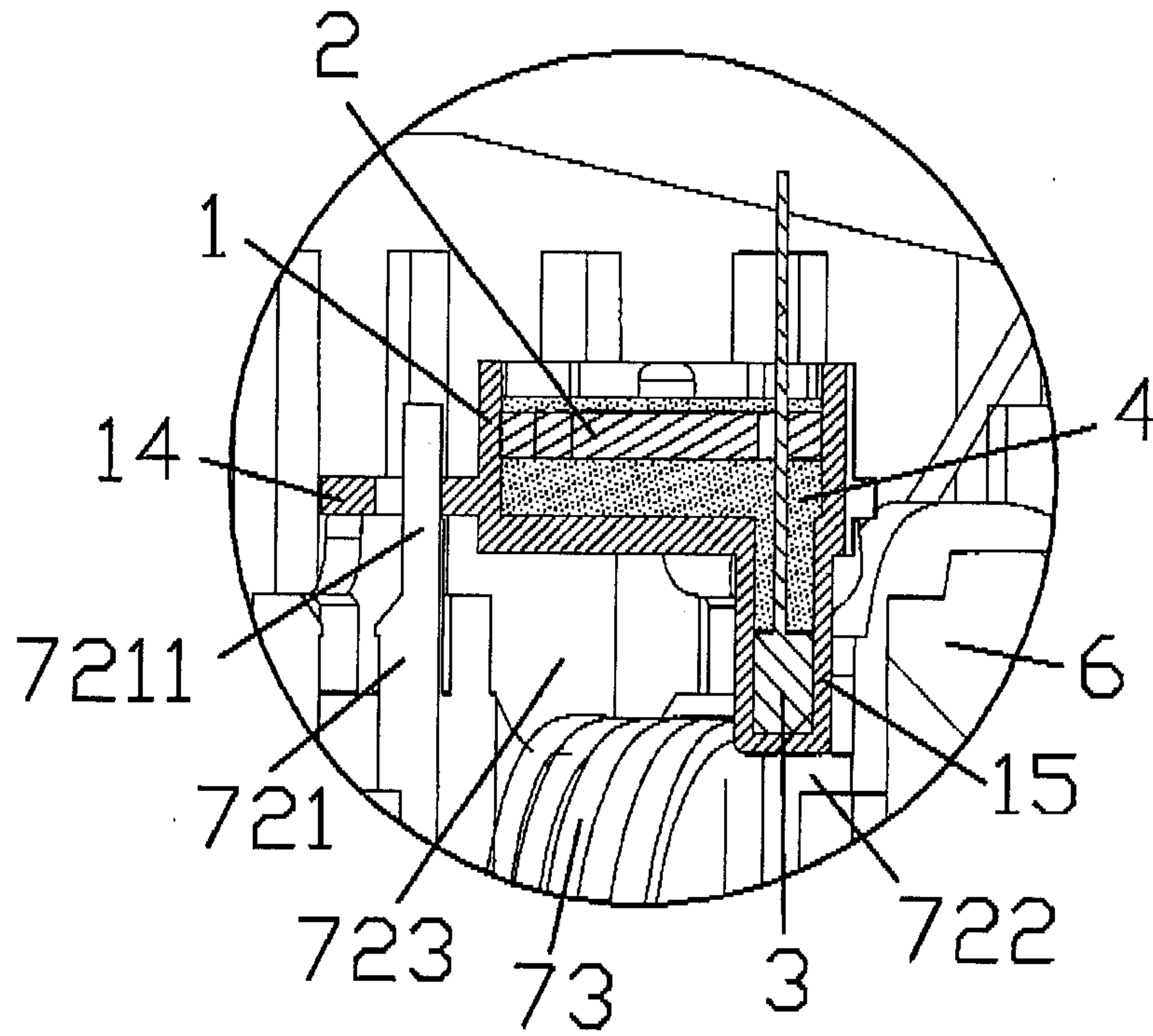


FIG. 10

