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(54) **VACUUM, PRESSURE OR LIQUID PUMP**

VAKUUM-, DRUCK- ODER FLÜSSIGKEITSPUMPE

POMPE À VIDE, À PRESSION OU À LIQUIDES

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Description

[0001] Vacuum, pressure or liquid pump, of the type that comprises driving means with a shaft connected to an eccentric, at least two membranes that block a similar number of apertures in a box, characterised in that it comprises: a connecting rod, in whose centre houses a single bearing for each eccentric through which the referred shaft passes and at least two actuators that join the membranes to the connecting rod, being said actuators articulating with the connecting rod.

BACKGROUND OF THE INVENTION

[0002] The use of pumps is known in the state of the art, with one or two heads, one on each side of the motor, or even two on the same side (opposite with traditional connecting rods and a similar number of bearings). If more extraction capacity is required additional, heads can be added, or they can be over-dimensioned, which involves the use of as many connecting rods, bearings and membranes as required heads, increasing sizes and motor powers.

[0003] Thus, Spanish utility model 0244030 "A DEPRESSION OR VACUUM MEMBRANE PUMP" is known from 1979, in the name of PIERBURG BMBH & CO.KG, which refers to a depression or vacuum membrane pump, especially for conditioning automobile elements, such as servo brakes, the membrane of which is operated from a main shaft via a connecting rod and the chamber that is next to the head is sealed against the atmosphere, the chamber is connecting with the atmosphere by means of at least one valve that allows access the air and prevents the air exit from chamber to the atmosphere. In a similar fashion another valve performs the same process to expulse the air.

[0004] It is known in the state of the art the document FR2049347, in the name of Albert Cozic, that refers to bilge pump for a boat or vessel of any type is provided which is operative in response to any movement of the boat in which the pump is provided, such as pitching or rolling. The pump includes preferably two or three diaphragm-type pumps mounted in a housing. A vertical shaft is rotatably mounted in a housing, the shaft is secured to an unbalanced mass exterior responsive to the movements of the boat to effect the rotation of the shaft. The end of the shaft remote from the end at which the mass is secured comprises an eccentric journal which is connected to a two- or three-arm member by a bearing and whose arms are in turn connected to the diaphragms for operating same successively to take in bilge water through intake pipes and valves and discharge same through outlet valves and pipes.

[0005] The driving means of pump are an unbalanced mass and do not comprise any motor. The movements of the mass depend on movements of the sea, which are variable by its nature. Actually, this document forms part of the prior art in respect to bilge pumps for a boat or

vessel which are operative only in the sea.

[0006] US4931000 discloses another pump according to the state of the art.

DISCLOSURE OF THE INVENTION

[0007] This application is framed within the sector of vacuum, pressure and liquid pumps. The present invention relates to a pump according to claim 1.

[0008] With this invention, the inventor intends to operate with a single connecting rod, more heads, in other words, using a single connecting rod, be able to place as many actuators with membranes as permitted the connecting rod size, so that, to larger size of the connecting rod, greater number of actuators can be operate. This results in economic savings for both the manufacturer and the end buyer.

[0009] This means that the need for independent regulation of force centring and work loads is eliminated. Currently, each head incorporated into the pump requires a different load point along the shaft for each one. This invention uses a single bearing for each eccentric on which point all forces are balanced and stabilised. This is because only one connecting rod is required independently of the number of heads.

[0010] Thus, greater performances are obtained with less space because a smaller pump can provide identical or even better results than larger pumps. Similarly, this means that this smaller size leads to significant space and weight savings.

[0011] In this way, the present pump can operate a determined number of membranes with the same connecting rod and all forces caused by the heads and membranes are centred with respect to each other at the same working point. When an expulsion force is generated, another intake force is produced at the opposite point, with these being equal at all cycle points.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] In order to facilitate the description, this report is accompanied by four sheets of drawings that represent a practical exemplary embodiment, which is given as an example that does not limit the scope of this invention.

- Figure 1 is a general view of the invention, in which the membranes and heads have been eliminated.
- Figure 2 is a close-up without the box, membranes and heads.
- Figure 3 is a close-up of an actuator, a part that is connected by means of a hinge joint to the connecting rod.
- Figure 4 is a side view of the invention applied to an end product.

SPECIFIC EXEMPLARY EMBODIMENT OF THIS INVENTION

[0013] Thus, Figure 1 illustrates a box 1, driving means or motor 2, apertures in the box 4, which houses the membranes and heads, a shaft 5, an eccentric 8, a connecting rod 6, actuators 7 and the connecting rod pass-through orifices 10 (at the actuator 7 positions).

[0014] Figure 2 shows driving means 2, connecting rod 6, eccentric 8, shaft 5, connecting rod pass-through orifices 10 and actuators 7.

[0015] Figure 3 illustrates the actuator 7 that is joined to the connecting rod via the actuator pass-through orifice 11, with a pin to form a hinge joint.

[0016] Lastly, Figure 4 represents box 1, heads 3, box apertures 4, connecting rod 6, actuators 7, shaft 5, connecting rod pass-through orifices 10, pins 12 that form hinge joints and a bearing 9 housing the eccentric.

[0017] Thus, in a specific exemplary embodiment, the product is basically configured as follows: it comprises a box 1, driving means 2, with shaft 5 connected to eccentric 8, two membranes (as many as necessary, three, four, six, despite the fact that, although there are two in this embodiment, they cannot be seen because they are housed inside), which block the orifices in box 4 of cited box 1.

[0018] Regarding actuators 7 and the membranes, it is possible to configure as many as desired, starting with two by taking into account the positions of actuators 7 so that they compensate the forces as well as possible. For example, with three actuators 7, each one could be positioned at 120°, which would then largely balance the forces. Five actuators would be positioned every 72° and so on according to the desired number. The idea is to divide the circumference by the desired number of actuators 7.

[0019] Unlike known pumps, this invention includes a single bearing 9 for each eccentric 8.

[0020] It also comprises connecting rod 6, the centre of which houses a single bearing 9, through which the referred shaft 5 passes and at least two actuators 7 that connect the membranes housed inside heads 3 to connecting rod 6, with said actuators 7 articulating with connecting rod 6 by, for example, pins.

[0021] When motor 2 is switched on, it turns shaft 5 which, by means of eccentric 8 produces a similar movement of connecting rod 6.

[0022] Actuators 7 are articulated to connecting rod 6 by joints that employ pins 12 in this embodiment to form hinge joints.

[0023] Moreover, in this invention the connecting rods 6 partially house actuators 7 just as shown in figures 1, 3 and 4. In this embodiment, connecting rod 6 articulates by means of a first pass-through orifice 10 through which actuator 7 passes, facing it via pin 12 (Figure 4), which passes through actuator 7, leaving both pass-through orifices 10 and 11 aligned (Figures 1, 2 and 4).

[0024] This enables actuators 7 to continue pushing

the membranes housed inside head 3 so that they continue to block and unblock the respective entrances and exits inside head 3. Even when the eccentric movement is produced, the connecting rod forces that the movement on the membrane is linear because actuator 7 articulation on connecting rod 6 allows any membranes position to be recovered while these maintain their respective positions over apertures 4.

[0025] In fact, connecting rod 6 becomes the connection between actuator 7 and bearing 9 and eccentric 8, thus permitting the membranes to work and adapt to any position as forced by the eccentric.

[0026] This invention patent describes a new vacuum, pressure or liquid pump. The exemplary embodiments described here do not limit this invention, which can have various applications and/or adaptations within the scope of the following claims.

Claims

1. A vacuum, pressure or liquid pump, of the type comprising driving means (2), with shaft (5), connected to an eccentric (8), at least three membranes that block a same number of apertures (4) in a box (1), wherein the pump comprises:

- a single connecting rod (6), the centre of which houses a single bearing (9) for the eccentric (8), through which the referred shaft (5) passes,
- at least three actuators (7) equidistantly situated around the connecting rod (6) joining membranes (3) to it, with said actuators (7) articulated to connecting rod (6) by forming hinge joints, and
- said driving means are a motor (2)

wherein said connecting rod (6) comprises two plates faced to each other such that they partially house the actuators (7) between them, said actuators (7) articulate with the said connecting rod (6) by means of a first pass-through orifice (10) of connecting rod (6) faced to a second pass-through orifice (11) of actuator (7), wherein both pass-through orifices (10, 11) are joined by a pin (12), such that actuators (7) are articulated in an equidistant manner from each other to the connecting rod (6).

Patentansprüche

1. Vakuum-, Druck- oder Flüssigkeitspumpe von dem Typ, der Folgendes aufweist: eine Antriebseinrichtung (2) mit einer Welle (5), die mit einem Exzenter (8) verbunden ist, und mindestens drei Membranen, die die gleiche Anzahl von Öffnungen (4) in einem Kasten (1) blockieren, wobei die Pumpe Folgendes aufweist:

- eine einzige Verbindungsstange (6), deren Zentrum ein einziges Lager (9) für den Exzenter (8) aufnimmt, durch welches die genannte Welle (5) hindurchgeht,
- mindestens drei Aktoren (7), die äquidistant um die Verbindungsstange (6) herum angeordnet sind und Membranen (3) damit verbinden, wobei die Aktoren (7) an der Verbindungsstange (6) angelenkt sind, wobei sie Gelenkverbindungen bilden, und
- wobei die Antriebseinrichtung ein Motor (2) ist,

wobei die Verbindungsstange (6) zwei Platten aufweist, die einander gegenüberliegen, sodass sie die Aktoren (7) zwischen einander teilweise unterbringen, wobei die Aktoren (7) an der Verbindungsstange (6) mittels einer ersten Durchgangsöffnung (10) der Verbindungsstange (6) angelenkt sind, die einer zweiten Durchgangsöffnung (11) des Aktors (7) gegenüberliegt, wobei beide Durchgangsöffnungen (10, 11) durch einen Stift (12) verbunden sind, sodass die Aktoren (7) in einer äquidistant beabstandeten Weise voneinander an der Verbindungsstange (6) angelenkt sind.

Revendications

1. Pompe à vide, à pression ou à liquide, du type comprenant un moyen d'entraînement (2) avec un arbre (5), relié à un excentrique (8), au moins trois membranes qui bloquent un même nombre d'ouvertures (4) dans un boîtier (1), où la pompe comprend :

- une bielle unique (6), dont le centre abrite un palier unique (9) pour l'excentrique (8), par lequel passe l'arbre cannelé (5),
- au moins trois actionneurs (7) situés à équidistance autour de la bielle (6) reliant les membranes (3) à celle-ci, lesdits actionneurs (7) étant articulés à la bielle (6) en formant des charnières, et
- lesdits moyens d'entraînement sont un moteur (2)

dans lequel ladite bielle (6) comprend deux plaques en regard l'une de l'autre de telle sorte qu'elles logent partiellement les actionneurs (7) entre elles, lesdits actionneurs (7) s'articulent avec ladite bielle (6) au moyen d'un premier orifice de passage (10) de la bielle (6) en regard d'un second orifice de passage (11) de l'actionneur (7), dans lequel les deux orifices de passage (10, 11) sont reliés par une broche (12), de telle sorte que les actionneurs (7) soient articulés de manière équidistante les uns par rapport aux autres sur la bielle (6).

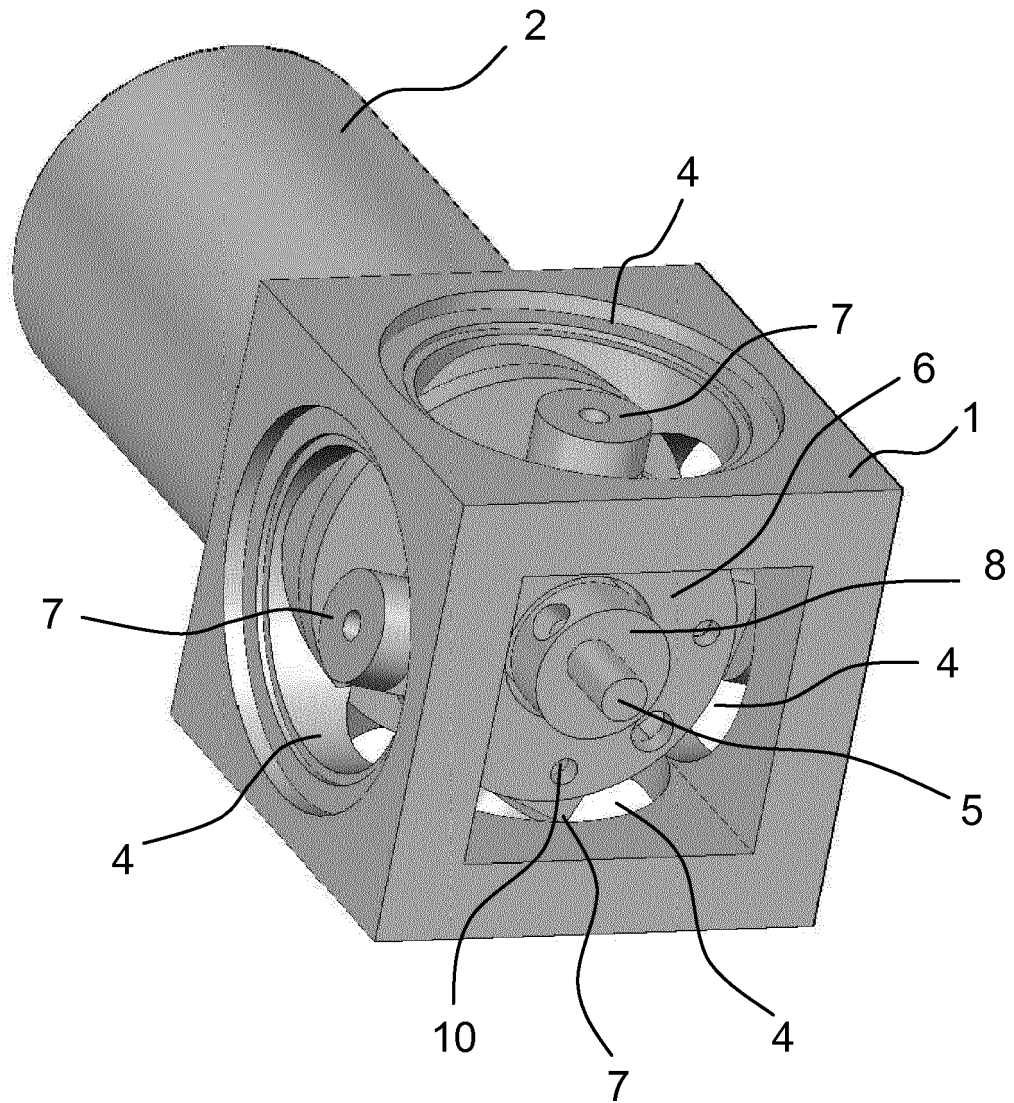


FIG. 1

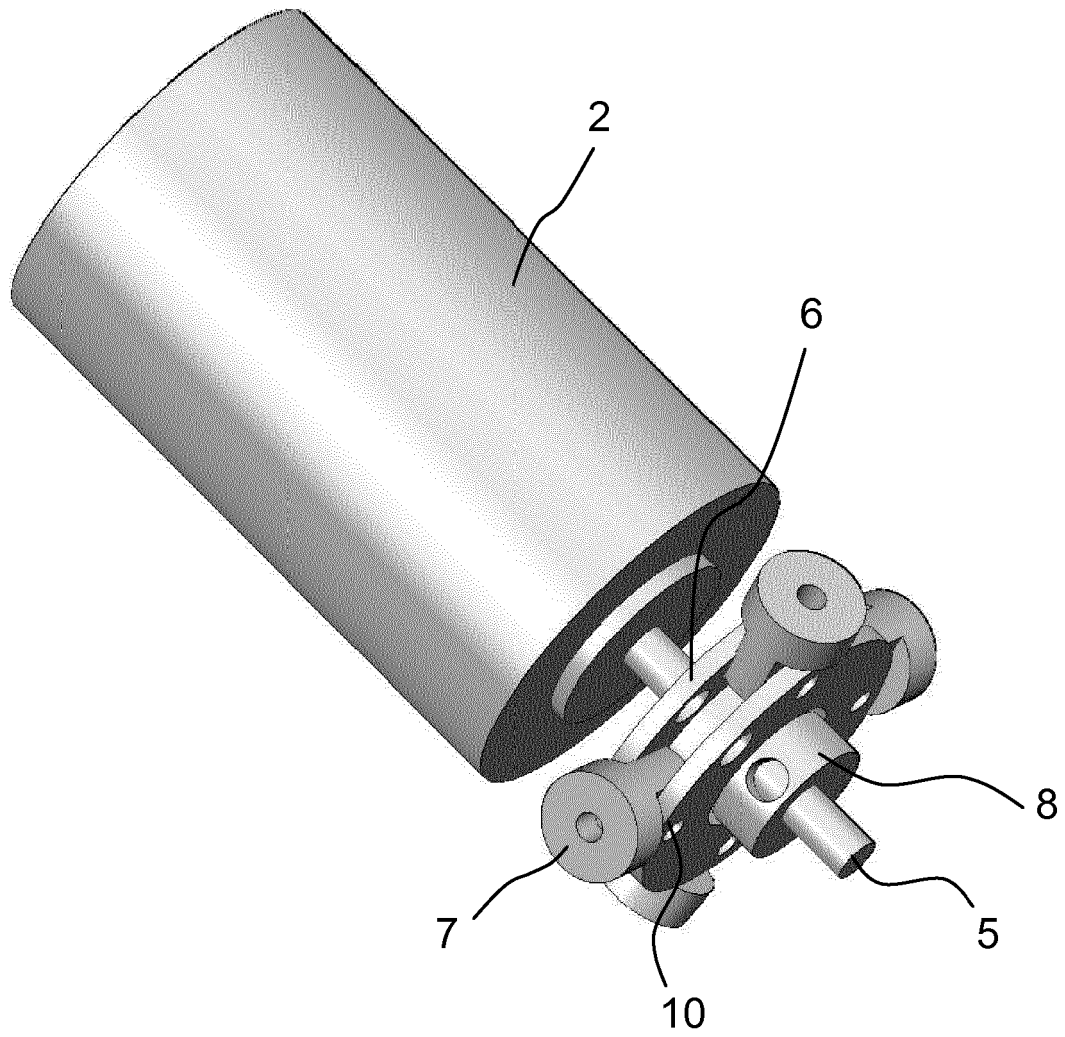


FIG. 2

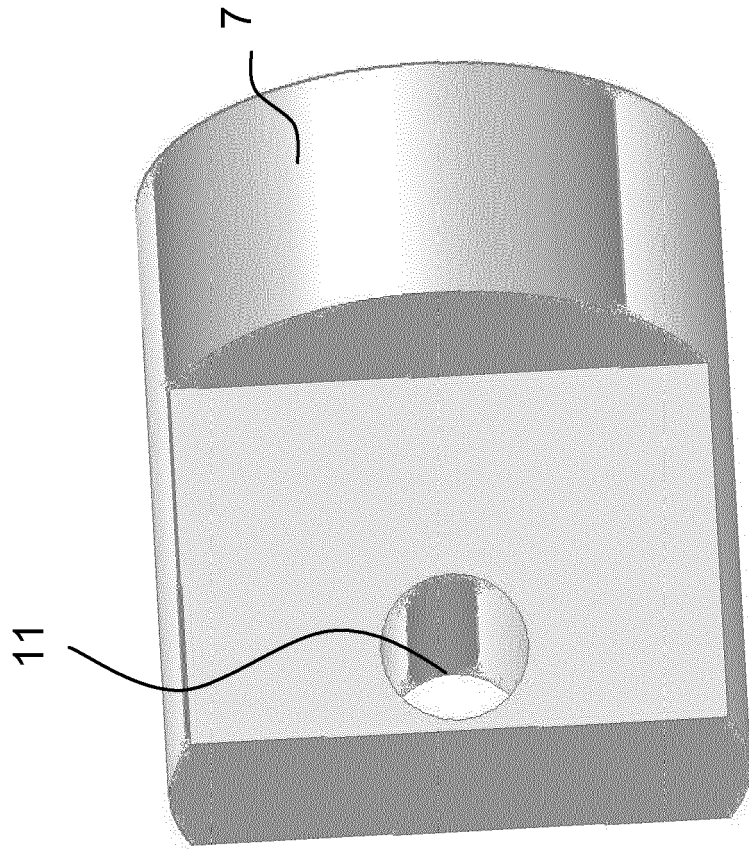


FIG. 3

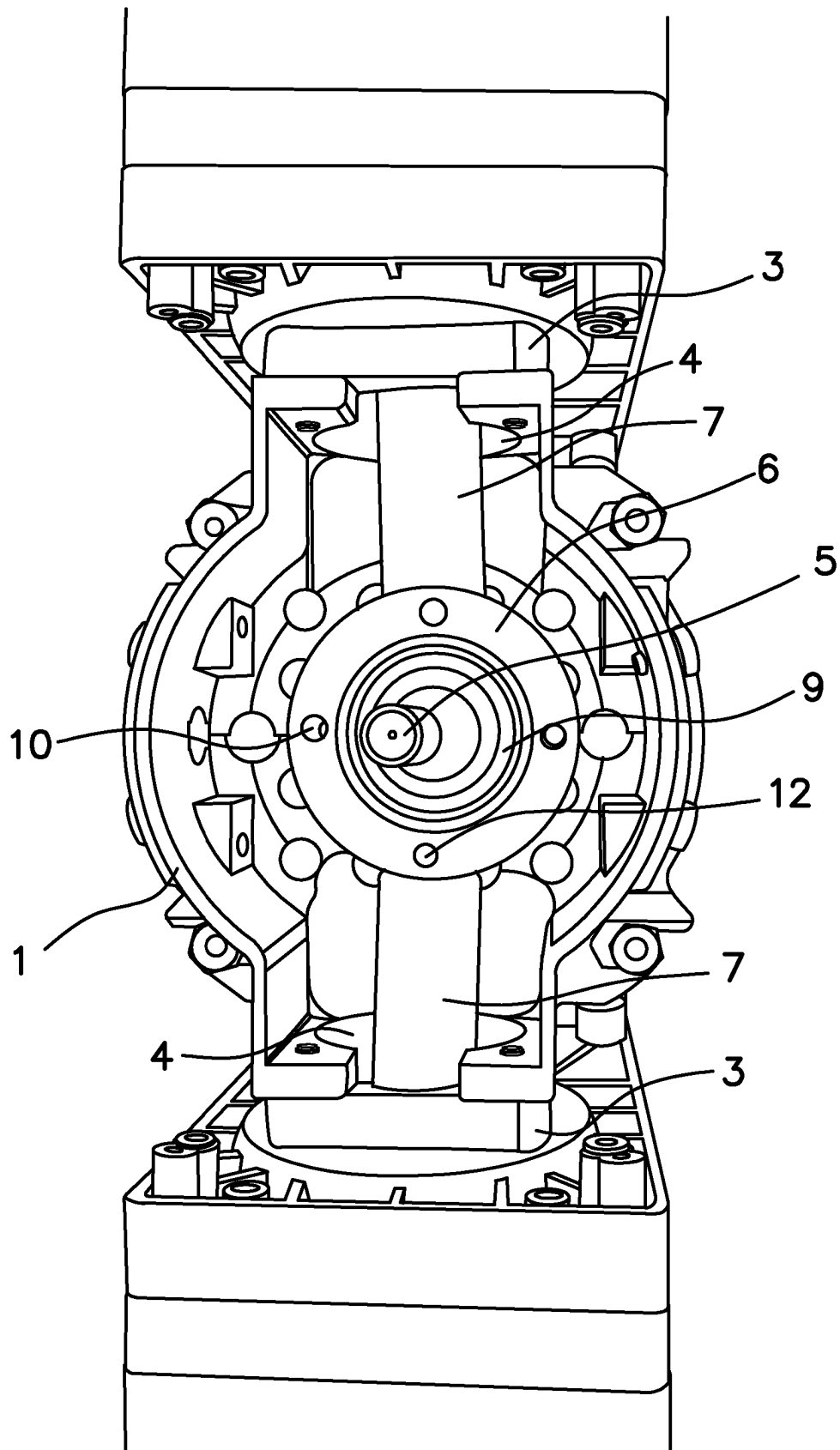


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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