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(54) Rotation device for working units in lift trucks or the like

(57) The present device is provided with conceptually new means which allow an angular displacement of the fork-carrying or tool-carrying plate, which means are very advantageous in comparison with the known solutions as the conventional system of rotation on ball bearings is no more necessary.

In general, such means comprise a device of rotation (1) which is obtained in a fixed element or casing (2) on the rear side of which there are fixing clamps (2') which are to be coupled with corresponding front clamps (3) which are fixed to the self-moving lift truck.

The fixed element or casing (2) is provided with a hollow seat in which a crown (4) is inserted.

The crown (4) represents the rotating part on which an outer fork-carrying unit is mounted. A supporting plate (5) is included in the fork-carrying unit.

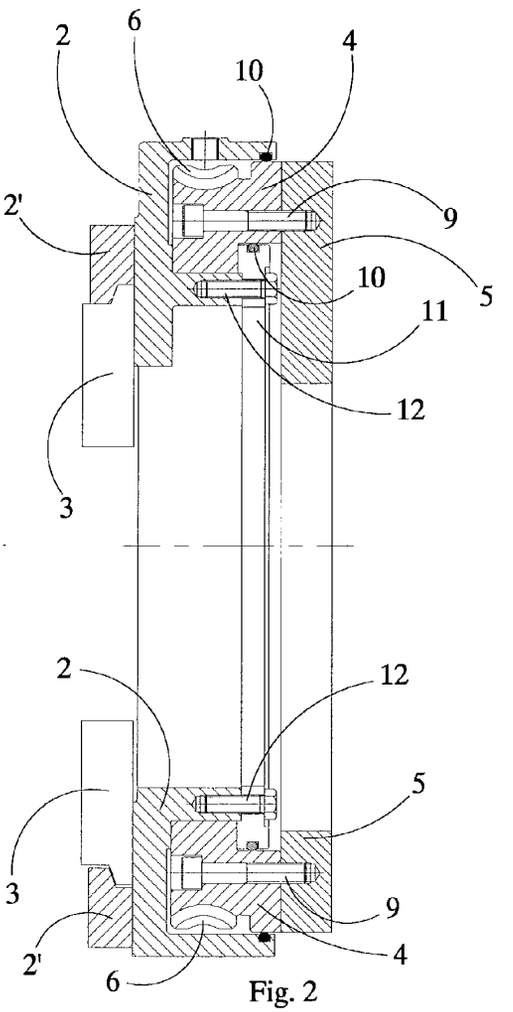

Fig. 2

EP 1 134 181 A2

Description

[0001] The present invention proposes a device of rotation for working units in lift trucks or the like.

[0002] The present device acts through an endless screw provided with a crawling crown which is mounted in particular on lift machines such as fork-carrying trucks, tool-carrying trucks or the like.

[0003] This device of rotation is conceptually new as far as means allowing an angular displacement of the fork-carrying plate are concerned.

[0004] Unlike the known solutions, the present invention allows many advantages referring to the production costs and mounting costs as well as the practical use which becomes safer thanks to a better visibility due to a certain increase in the field of vision.

[0005] As is known, there are several appliances in the field of lift trucks referring to the mounting of the front moving and shifting units. Firstly, the differences among these appliances depend on the parcels to be transported and secondarily, the differences depend on the different way of transport.

[0006] For instance, in certain lift trucks the more typical appliance refers to a front fork-carrying unit or tool-carrying unit or the like. By utilizing these lift trucks it is possible to move pallets and items of different kind in the most various fields of use.

[0007] Usually, the front fork unit (but it may be another tool unit) is mounted on the front part of the truck through a coupling plate which allows both the support of the forks or other tools and their translation according to movements of mutual moving-off or approaching so as to obtain suitable variations in the distance of the interaxis.

[0008] Concerning the fork unit, it can obviously be shifted vertically along vertical guides of the truck. It can sometimes be necessary to adjust the angle with a suited turntable in order to rotate the forks on a horizontal axis, for instance in case it is necessary to move ladles and casting "poche" in the foundries. In this case, when the cast material must be poured in the teeming aisle after its transport from the oven, the cast material can flow out of the ladle as the ladle is gradually inclined. The gradual inclination of the ladle is obtained by means of the angular displacement of the fork units of the truck.

[0009] The conventional system used to allow an angular rotation of the fork units or tool units in lift trucks consists in utilizing a turntable which is mounted on the fork unit. A ball bearing system of rotation is positioned on the turntable. The fork unit is mounted on the ball bearing system.

[0010] In the middle of the turntable there is an opening that represents an important point of observation for the user of the truck so that the user can effect all the suitable displacements and turnings of the transported parcel on controlling them directly.

[0011] This system of rotation for the forks is universally used by all the manufacturers. However, this system is not free from defects which are mainly due to two reasons:

a) the first reason refers to a certain constructive difficulty since it is necessary to utilize and assemble different components which are necessary for the movement on ball bearsings;
b) the second reason refers to the limited possibility of control through the opening in the middle of the turntable since this opening is limited owing to the presence of the cumbersome mechanical components which are required for the ball bearing rotation.

[0012] The object of the present invention is to remove the aforesaid inconveniences by utilizing a conceptually new system of rotation which is not based on a use of ball bearings but on a system of crawling rotation which allows to simple the constructive operations as well as to better the operative conditions during the working phases.

[0013] Within this general object, the present invention proposes in particular a system of rotation to be carried out by utilizing a smaller number of components which in addition can be assembled more simply than the conventional systems. In this way, it is possible to considerably limit the costs of production since the ball bearings are no more necessary.

[0014] Another advantage consists in a betterment of the operative conditions during the working phases, which betterment is made possible by the possibility of manoeuvre with a widest field of vision than the conventional systems, which is very advantageous.

[0015] All the aforesaid objects and advantages are reached according to the present invention by a device of rotation which is mounted on working units in lift trucks or the like and acts through an endless screw with crawling crown, which device is mounted in particular on lift machines such as fork-carrying trucks or the like, characterized in that of comprising a casing which is provided with crawling means on which a counter-casing is mounted for supporting forks or the like so as to form a rotary support for the angular adjustment, on an essentially horizontal axis, of the tool unit of the lift truck.

[0016] Further features and details of the present invention can be better understaood from the following specification on the hand of the accompanying drawing wherein:

- Fig. 1 shows a schematic front view of a constructive example of the device of rotation for working units of lift trucks or the like according to the invention on the whole, as represented from the rear or truck;
- Fig. 2 shows a schematic view of the device of rotation, as represented laterally;
- Fig. 3 shows a schematic view of the unit of rotation as represented from the rear side thereof;

- Fig. 4 shows a schematic view of the supporting plate for the fork unit as mounted on the casing of rotation;
- Fig. 5 and Figg. 6-8 show schematic views of details of the unit of rotation;
- Fig. 9 and Figg. 10-12 show schematic views of the system of lubrication which is suitable to allow a rotation of the rotary unit without friction.

[0017] With reference to the accompanying drawings, number 1 denotes a device of rotation according to the present invention for working units in lift trucks or the like, which device of rotation acts through an endless screw with crawling crown and is mounted in particular on lift machines such as fork-carrying trucks or the like.

[0018] As it can be seen in the section of Fig. 2, the device of rotation 1 consists of a fixed element or casing 2 on the rear side of which there are fixing clamps 2' which are to be coupled with corresponding front clamps 3 which are fixed to the self-moving lift truck.

[0019] The fixed element or casing 2 includes a hollow seat in which there is provided a crown 4 which represents the rotary part on which an outer fork-carrying unit or other outer tool-carrying unit is coupled, which unit comprises a supporting plate 5.

[0020] The outside of the crown 4 is provided with a series of teeth 6 which are intercepted by an endless screw 7 with vertical axis. A motor 8 actuates the endless screw 7.

[0021] The supporting plate 5 and the toothed crown 4 are connected with each other through screws 9, arranged radially.

[0022] Both the fixed element 2 and the toothed crown 4 and the supporting plate 5 are open in their centre and the openings are large enough so as to allow the operator to effect operations of displacement with the highest precision, which gives rise to remarkable practical advantages.

[0023] Advantageously, elastic seal rings or o-rings 10 are positioned in the outside and inside of the toothed crown 4. In addition, through an inner disc 11 the crown 4 is fixed to the casing by means of screws 12.

[0024] As described before, the system of lubrication of the crown is a crawling-type system in that it is obtained with a fluid and the reducer acts as a bath of lubricant (oil or grease) which is collected from channels 13 and holes, as represented in Figures 9-12.

[0025] Then, the lubricating fluid flows in helical channels 14 in the inner part of the crown, that is the part interested by the crawling. The helical channels 14 convoy the lubricant between the crown and the support thereof.

[0026] As it can be understood, the angular displacement of the plate 5 and its supported unit is actuated by the motor 8 which rotates the endless screw 7 on provoking the angular displacement of both the toothed crown 4 and the supporting plate 5. The supporting plate in turn rotates the fork unit or other similar tool unit.

[0027] It is possible to note that all the above-indicated objects are reached with the so-described solution, in particular the object relating to the utilization of a conceptually new system of rotation which is not based on the use of ball bearings but it is a crawling system of rotation which allows to simple the constructive operations as well as to better the operative conditions during the working phases.

[0028] A technician of this field can make some amendments and variants in the described and illustrated invention and obtain solutions to be considered as included in the scope of protection of the invention itself as defined by the following claims.

Claims

1. Device of rotation applicable on working units of lift trucks or the like and acting through an endless screw provided with a crawling crown, which device is mounted in particular on lift machines such as fork-carrying trucks or the like, **characterized in that** of comprising a casing which is provided with crawling means on which a toothed crown is mounted and is provided with a front plate for the support of forks or the like, the said casing and toothed crown are coupled each other through crawling means so as to form a rotary support for an angular displacement of the tool unit of the lift truck on an essentially horizontal axis.

2. Device of rotation applicable on working units of lift trucks or the like as claimed in the foregoing claim, **characterized in that** the device of rotation (1) comprises a fixed element or casing (2) which represents an outer support and is the part to be connected with the front fixed clamps (3) of the self-moving lift truck by means of fixing clamps (2').

3. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** the said fixed element or casing (2) includes a hollow seat in which a crown (4) is inserted and represents the rotary part on which the outer fork-carrying unit or other outer tool-carrying unit is coupled, the supporting plate (5) being part of the said fork-carrying unit.

4. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** the said crown (4) is provided on its outer surface with a series of teeth (6) which are intercepted by the endless screw (7) with vertical axis, which screw is actuated by means of a motor (8).

5. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** the said supporting plate (5) and the toothed crown (4) are

connected each other through screws (9) which are arranged radially.

6. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** both the fixed element (2) and the toothed crown (4) and the supporting plate (5) are centrally open and the openings are large enough to allow the operator to effect the operations of displacement with the utmost precision, which is very advantageous.

7. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** there are provided elastic sealing rings or o-rings (10) or the like, which are positioned in the outside and inside of the toothed crown (4).

8. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** there is also provided an inner disc (11) or the like, which keeps the crown on the casing through screws 12 and allows the lubricant to flow in suitable grooves.

9. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** the system of lubrication of the crown is a crawling type system which is obtained with fluid for the reducer acts as a bath of lubricant (oil or grease) which is collected from channes (13) and holes.

10. Device of rotation applicable on working units of lift trucks or the like, **characterized in that** the lubricating fluid flows in helical channels (14) in the inside of the crown which is the crawling part, which channels allow the lubricant to be deposited between the crown and the support thereof.

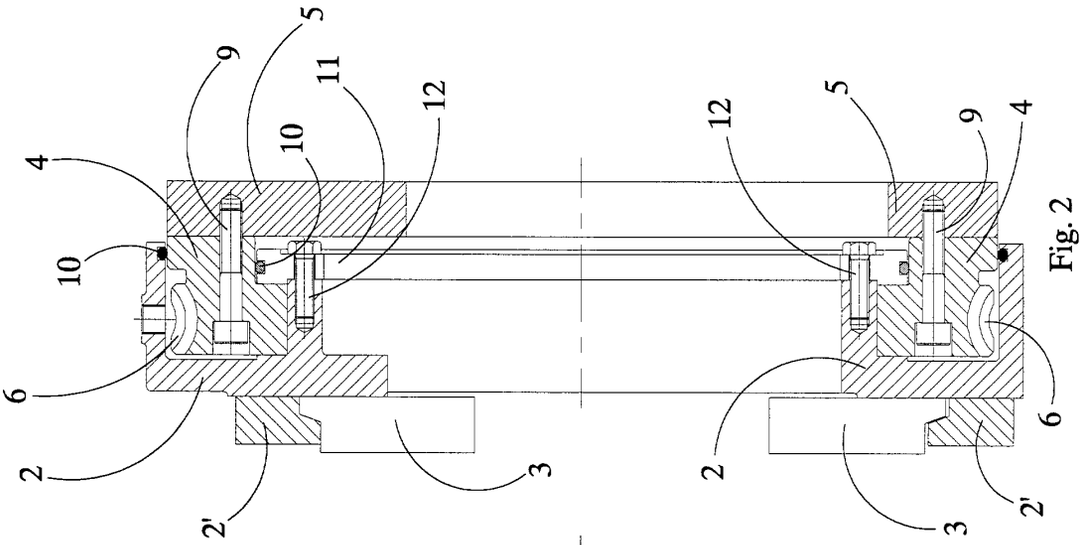

Fig. 2

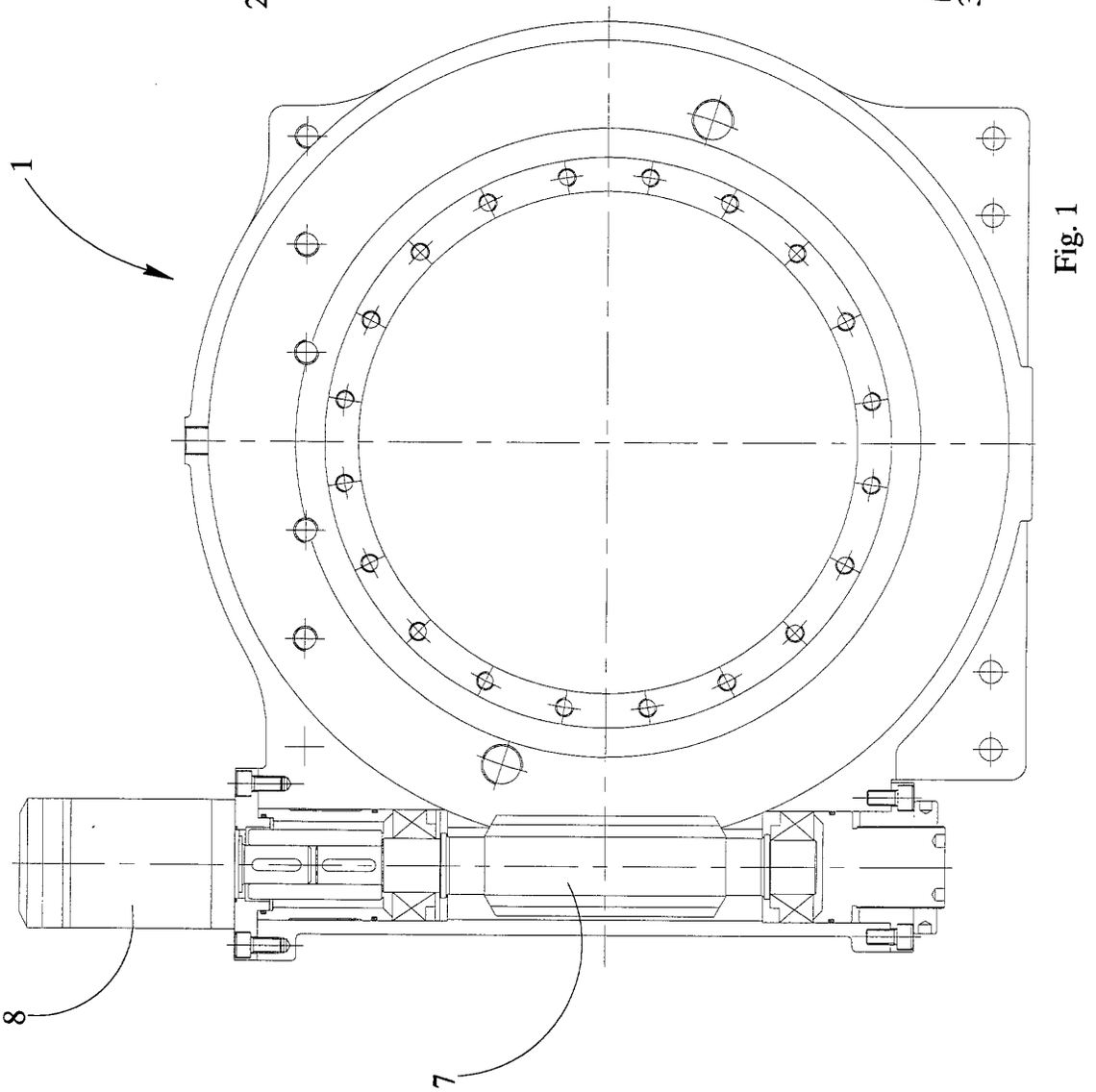

Fig. 1

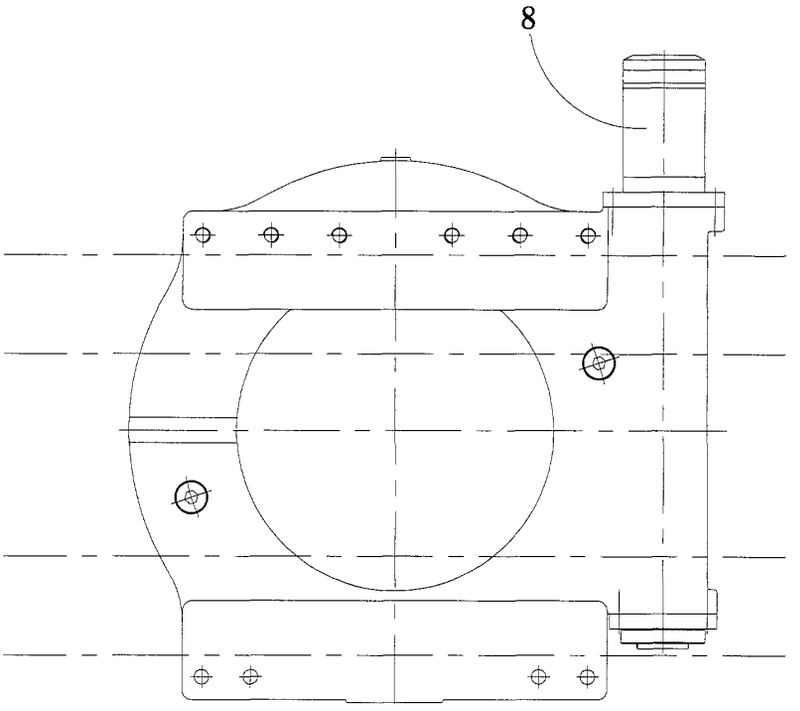

Fig. 3

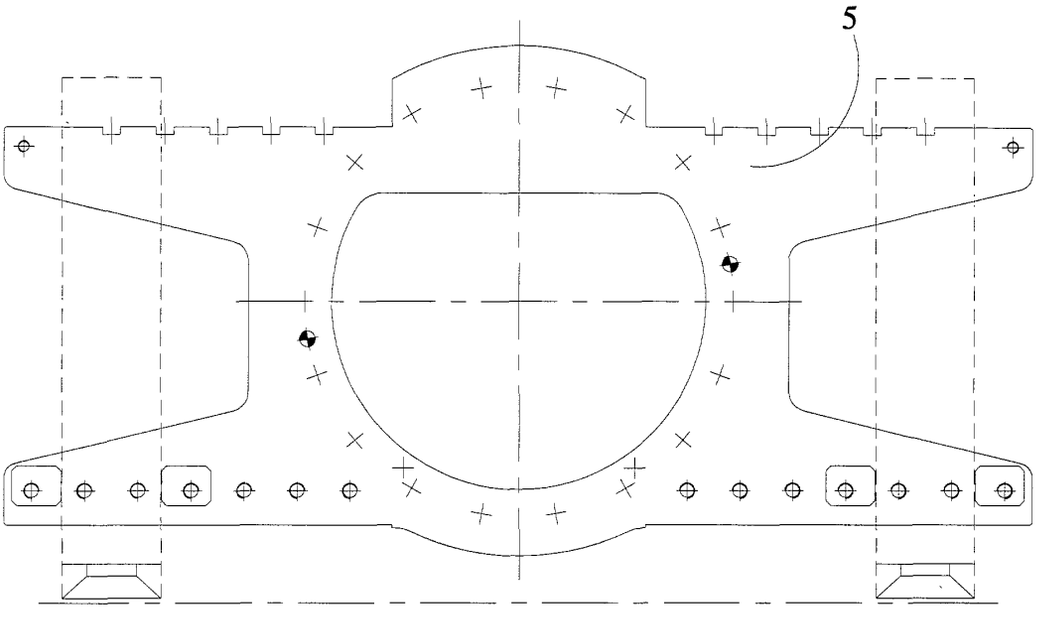

Fig. 4

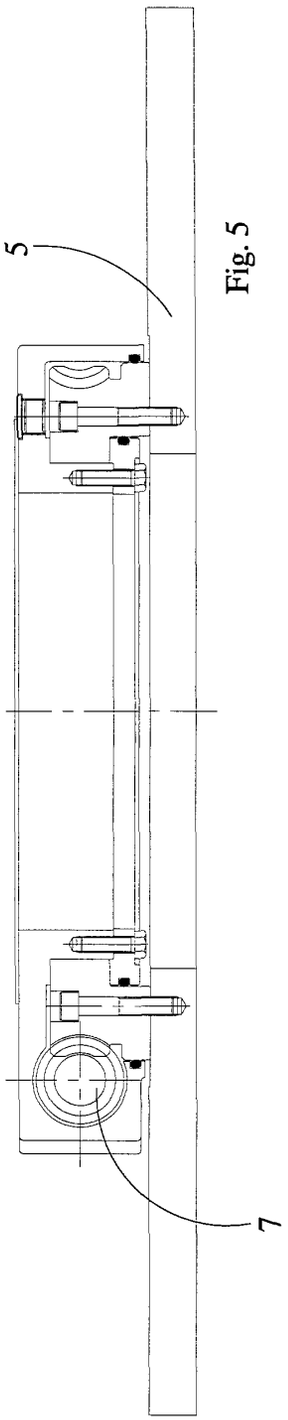

Fig. 5

Fig. 6

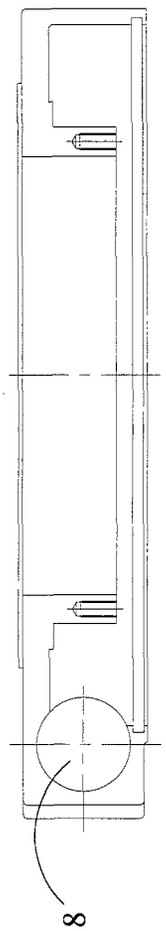

Fig. 7

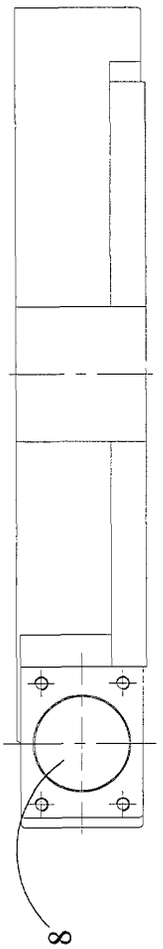

Fig. 8

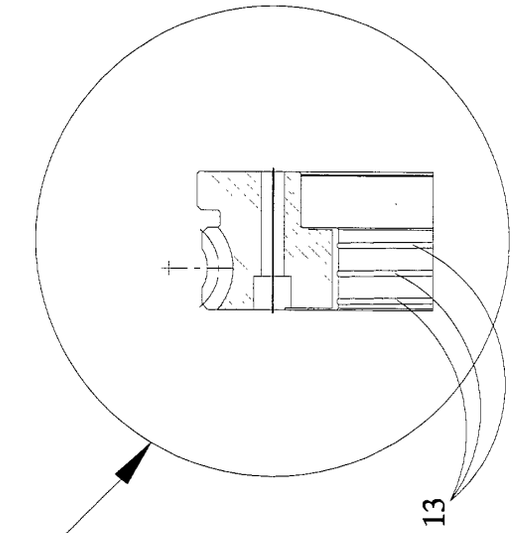

Fig. 12

Fig. 11

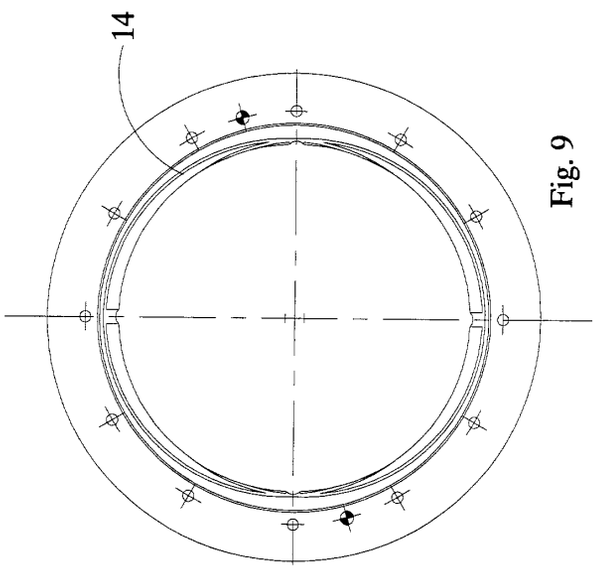

Fig. 9

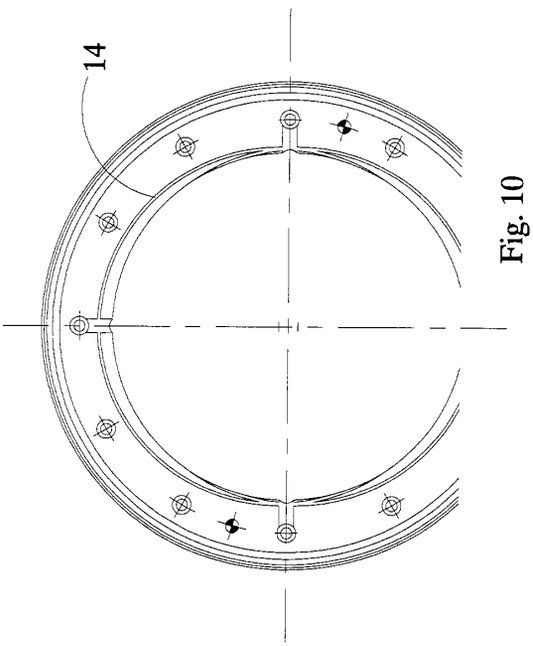

Fig. 10