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(54) HYDRAULIC CYLINDER

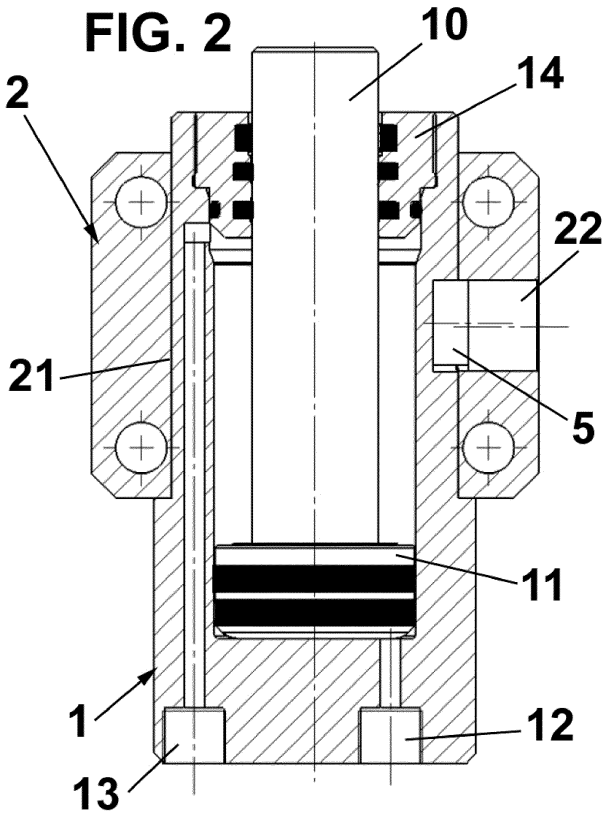
(57) The invention relates to a hydraulic cylinder comprising a cartridge (1) which comprises a rod (10) provided with a piston (11) and a fastening block (2; 3; 4; 6) mounted on said cartridge (1).

Furthermore, said cartridge (1) comprises a housing (15) for a position lock (5) and said fastening block comprises a through hole (22; 32; 42) for housing said position lock (5).

Preferably, said position lock (5) comprises two cylindrical sections (51, 52) with different diameters, which are eccentric with respect to one another.

It allows a modular hydraulic cylinder to be provided, which comprises a cartridge provided with a rod and the piston of the cylinder, while all of the complexity of the applications is standardized by simple manufacturing blocks.

FIG. 2



EP 3 712 443 A1

Description

[0001] The present invention relates to a hydraulic cylinder, and in particular to a hydraulic cylinder used in the manufacturing of molds.

Background of the invention

[0002] Due to the easy installation thereof, the hydraulic cylinders used in the manufacturing of molds are usually of the hydraulic block model, which is a hydraulic cylinder in which the outer faces have a rectangular profile instead of the classic cylindrical profile.

[0003] Each cylinder manufacturer develops their catalog to adapt it to the needs of molders, modifying the outer part of the block for a better adaptation to the different needs of each design.

[0004] The result of all of this is that, over time, a standardized catalog of cylinders has been created which, in practice, are not standardized at all, given that there is a large number of possible variants in each cylinder that have made the product practically into an individualized prototype in each application.

[0005] Given that hydraulics manufacturers generally have between six and eight different cylinder sizes, and each cylinder consists of ten path references, and each one of these cylinders can have up to ten fastening systems, as well as different ways of connecting the hydraulic pipes, as well as other characteristics, adapted to each cylinder, such as a purge system or damping system, or sensor systems for the end of the stroke, the truth is that the aim of achieving a standardized product for immediate delivery is practically impossible, given that in the stock for a product of this category there are more than 20,000 combinations, while in reality there are few references that cover more than 90% of the applications.

[0006] As such, one object of the present invention is to provide a modular hydraulic cylinder, which comprises a cartridge provided with a rod and a piston of the cylinder, while all of the complexity of the applications is standardized by blocks that are easy to manufacture.

Description of the invention

[0007] The hydraulic cylinder of the invention resolves the aforementioned drawbacks and has other advantages which are described below.

[0008] The hydraulic cylinder according to the present invention comprises:

- a cartridge comprising a rod provided with a piston, and
- a fastening block mounted on said cartridge.

[0009] Preferably, said cartridge comprises a housing for a position lock and said fastening block comprises a through hole for housing said position lock.

[0010] According to a preferred embodiment, said position lock comprises two cylindrical sections with different diameters which are eccentric with respect to one another, and a housing with a polygonal cross section, hexagonal for example.

[0011] According to a preferred embodiment, said cartridge comprises two cylindrical cross sections with different diameters.

[0012] Furthermore, said fastening block advantageously comprises a through hole wherein a cylindrical section of said cartridge is housed.

[0013] Preferably, said cylindrical section which is housed in the through hole of the fastening block is the cylindrical section with the smaller diameter.

[0014] Said fastening block also comprises at least a fastening hole for housing fastening screws, for the fastening thereof to a mold, for example.

[0015] If so desired, said fastening block can also comprise a cooling circuit for cooling the hydraulic cylinder during the use thereof.

[0016] Said fastening block can also comprise at least a housing for a sensor and at least a housing for a positioning bushing.

[0017] Based on the type of fastening one desires, said fastening block can be a front fastening block, an upper fastening block or a flange.

[0018] Moreover, advantageously, said cartridge comprises an inlet and and outlet for fluid.

[0019] The hydraulic cylinder according to the present invention achieves an effective standardization of hydraulic cylinders for molds.

[0020] With the aforementioned standardized fastening blocks, all of the needs of the molding sector are covered: one block would be for the parallel fastening of the rod of the hydraulic cylinder to the mold, another block for the perpendicular fastening, and the cooled fastening block would serve to cover the ever more frequent needs of molds that must work at temperatures above 80° Celsius.

[0021] This way, duly standardized hydraulic cylinders for molds are available on the market.

[0022] With the hydraulic cylinder according to the present invention, with five diameter dimensions of the piston and ten standardized paths per model, in other words, with only 50 units of the cartridge, and with four fastening blocks (including a flange), it is possible to cover practically all of the hydraulic cylinders that are used in a mold.

[0023] Thus, the object of the present invention is to standardize four basic aspects to cover the large majority of essential features for the functional use thereof.

[0024] First of all is the starting point, the dimension of the piston, which is equivalent to the force to be developed by each size, second are the most common paths, third, the placement of the connections and fourth, the way of fastening the same in the molds.

[0025] Since the size of the piston defines the force of each cylinder, our aim is to focus on five base diameters which are considered essential within the sector, and

these diameters are: 25, 32, 40, 50 and 63 millimeters, since these measurements cover 95% of the hydraulic cylinders used with molds.

[0026] With regard to the paths, the strokes of up to 120 mm represent 73% of the total, and when including strokes up to 200 mm, they represent 94% of the total.

[0027] With this information, the range of hydraulic cylinders with standardized paths of 20, 40, 60, 80, 100, 125, 150, 175 and 200 millimeters is standardized. To cover the intermediate strokes, one can use the one that is immediately greater than the same, since this allows for the less common stroke.

[0028] Currently each cylinder has different connection forms for connecting the hydraulic feed pipes, and in the hydraulic cylinder according to the present invention the connections are preferably situated in the rear part of the cartridge, making it possible for the pipes to rotate 360°, aiming them in the desired direction.

[0029] Since the cartridge perfectly adapts to each one of the different fastening blocks, this way all of the needs can be covered, with a stock that is relatively simple to achieve and at a much lower cost than conventional costs.

[0030] The cartridge further has another application for very specific cases, in which the same can be directly embedded in the mold, using a fastening flange, which is cheaper and easier to instal.

[0031] As was previously stated, they are essentially envisaged to cover practically all of the hydraulic cylinders used in molds, with five dimensions of piston diameters and ten standardized paths per model, thus, we are talking about only 50 cartridges and four fastening blocks for five cylinder diameters.

Brief description of the drawings

[0032] For the purpose of helping to make the foregoing description more readily understandable, it is accompanied by a set of drawings which, schematically and by way of illustration and not limitation, represent an embodiment.

Figure 1 is a transverse cross-sectional view of a cartridge of a hydraulic cylinder according to the present invention;

Figure 2 is a transverse cross-sectional view of the cartridge in figure 1 with a first fastening block mounted on said cartridge;

Figure 3 is a front view of said first fastening block of the hydraulic cylinder according to the present invention;

Figure 4 is a cross-sectional view of said first block along the IV-IV line indicated in figure 3;

Figure 5 is a front view of a second fastening block of the hydraulic cylinder according to the present invention;

Figure 6 is a cross-sectional view of said second block along the VI-VI line indicated in figure 5;

Figure 7 is a front view of a third fastening block of the hydraulic cylinder according to the present invention;

Figure 8 is a cross-sectional view of said third block along the VIII-VIII line indicated in figure 7;

Figure 9 is a cross-sectional view along the IX-IX line indicated in figure 10 of a position lock that is used in any of the previous fastening blocks;

Figure 10 is a front view of the position lock shown in figure 9;

Figure 11 is an exploded perspective view of a cartridge and a fourth fastening block in the form of a flange;

Figure 12 is a longitudinal cross-sectional view of a second embodiment of the cartridge shown in figures land 2 with the first fastening block mounted on the same.

Description of a preferred embodiment

[0033] The hydraulic cylinder according to the present invention comprises a cartridge 1 on which a fastening block is mounted, the four variants of which will be described below, as a function of the requirements.

[0034] Said cartridge 1 can be provided in different measurements, as was previously explained, and comprises a rod 10 provided with a piston 11 and inlet 12 and and outlet 13 for fluid.

[0035] It also comprises a stopper 14 arranged next to the end of the rod 10 that is furthest from the piston 11, preferably threaded, and a housing 15 for a position lock, which will be described below.

[0036] Said cartridge 1 is made up of two cylindrical sections 16, 17, a section with a larger diameter 16 and a section with a smaller diameter 17.

[0037] A first fastening block 2 is described in relation to figures 2 to 4.

[0038] Said first fastening block 2 comprises a through hole 21 in which the section with the smaller diameter 17 of the cartridge 1 is housed, as shown in figure 2.

[0039] Furthermore, said first fastening block 2 comprises a through hole 22 in coincidence with said housing 15 of the cartridge 1 and a plurality of fastening holes 23 for fastening screws (not shown) for fastening the hydraulic cylinder to a mold.

[0040] This first fastening block 2 is used for the front fastening of the hydraulic cylinder to a mold.

[0041] Figures 5 and 6 show a second fastening block 3, which also defines a polygonal profile, such that the form of the fastening block 3 is substantially cubic or a parallelepiped, and also comprises a through hole 31 in which the section with the smaller diameter 17 of the cartridge 1 is housed.

[0042] Furthermore, said second fastening block 3 also comprises a through hole 32 in coincidence with said housing 15 of the cartridge 1 and a plurality of fastening holes 33 for fastening screws (not shown) for fastening the hydraulic cylinder to a mold.

[0043] This second fastening block 3 is used for the lateral fastening of the hydraulic cylinder to a mold, which is why the fastening holes 33 are aimed in a different direction to that of the housings 23 of the first fastening block.

[0044] Furthermore, this second fastening block 3, according to the embodiment shown, comprises housings 34 for positioning bushings (not shown) and a housing 35 for a sensor (not shown).

[0045] Figures 7 and 8 show a third fastening block 4, which also defines a polygonal profile, such that the form of the fastening block 4 is substantially cubic or a parallelepiped, and also comprises a through hole 41 in which the section with the smaller diameter 17 of the cartridge 1 is housed.

[0046] Furthermore, said third fastening block 4 also comprises a through hole 42 in coincidence with said housing 15 of the cartridge 1 and a plurality of fastening holes 43 for fastening screws (not shown) for fastening the hydraulic cylinder to a mold.

[0047] The main difference of this third fastening block 4 with respect to the first and second fastening blocks is that it also comprises a cooling circuit 44, shown in greater detail in figure 8, which allows the hydraulic cylinder to be cooled by a cooling fluid if necessary.

[0048] Figure 9 shows a position lock 5, which is placed in the housing 15 of the cartridge 1 in the position of use thereof, as shown in figure 2.

[0049] This position lock 5 comprises a first cylindrical section 51 and a second cylindrical section 52 with different diameters and a housing 53 with a polygonal cross section, for example a hexagonal cross section.

[0050] The cylindrical sections 51, 52 of the position lock 5 are eccentric with respect to one another, as can be seen in figure 10, thereby ensuring the positioning thereof in an integral way with the housing 15 of the cartridge.

[0051] Figure 11 shows a fourth fastening block 6, in this case a flange, which also comprises housings 61 for screws (not shown).

[0052] This fourth fastening block 6 comprises a curved surface 62 which allows for the fastening thereof on the outer surface of the cartridge by means of a position lock 5, in this embodiment in the form of a bolt.

[0053] Figure 12 shows a second embodiment of the cartridge 1. For reasons of simplicity, in this second embodiment, the same numerical references are used to indicate the same elements or similar elements.

[0054] The main difference between this cartridge with respect to the cartridge shown in figures 1 and 2 is that the inner diameter through which the piston 11 slides is a through hole. On one end a stopper 14 is attached which hermetically seals this end of the cartridge.

[0055] Furthermore, the inlet 12 and outlet 13 for the fluid is placed on the lower part of the cartridge, one directly at the beginning of the piston 11 chamber and the other which directs the fluid to the end of said chamber. The inlet 12 and outlet 13 are concentric with housings 24 machined on the fastening block 2 for connectors 25.

[0056] Furthermore, on the rear part a hole 18 is machined which communicates with a hole in communication with the end of the piston 11 chamber. This hole 18, on the end thereof, includes a housing for placing a stopper (not shown).

[0057] As was previously stated, they are essentially envisaged to cover practically all of the hydraulic cylinders used in molds, five dimensions of piston diameters and ten standardized paths per model, and thus, we are talking about only 50 cartridges and four fastening blocks for five cylinder diameters.

[0058] Despite the fact that reference has been made to a specific embodiment of the invention, it is evident for a person skilled in the art that numerous variations and changes may be made to the hydraulic cylinder described, and that all the aforementioned details may be substituted by other technically equivalent ones, without detracting from the scope of protection defined by the attached claims.

Claims

1. A hydraulic cylinder, **characterized in that** it comprises:

   - a cartridge (1) comprising a rod (10) provided with a piston (11), and
   - a fastening block (2; 3; 4; 6) mounted on said cartridge (1).

2. The hydraulic cylinder according to claim 1, wherein said cartridge (1) comprises a housing (15) for a position lock (5).

3. The hydraulic cylinder according to claim 2, wherein said fastening block comprises a through hole (22; 32; 42) for a housing said position lock (5).

4. The hydraulic cylinder according to claim 2 or 3, wherein said position lock (5) comprises two cylindrical sections (51, 52) with different diameters, which are eccentric with respect to one another.

5. The hydraulic cylinder according to any one of the claims 2 to 4, wherein said position lock (5) comprises a housing (53) with a polygonal cross section.

6. The hydraulic cylinder according to claim 1, wherein said cartridge (1) comprises two cylindrical sections (16, 17) with different diameters.

7. The hydraulic cylinder according to claim 1, wherein said fastening block (2; 3; 4) comprises a through hole (21; 31; 41) which houses a cylindrical section (17) of said cartridge (1).

8. The hydraulic cylinder according to claims 6 and 7, wherein said cylindrical section (17) which is housed in the through hole (21; 31; 41) of the fastening block (2; 3; 4) is the cylindrical section (17) of the smaller diameter.

9. The hydraulic cylinder according to claim 1, wherein said fastening block (2; 3; 4) comprises at least a fastening hole (23; 33; 43).

10. The hydraulic cylinder according to claim 1, wherein said fastening block (4) comprises a cooling circuit (41).

11. The hydraulic cylinder according to claim 1, wherein said fastening block (3) comprises at least a housing (35) for a sensor.

12. The hydraulic cylinder according to claim 1, wherein said fastening block (3) comprises at least a housing (34) for a positioning bushing.

13. The hydraulic cylinder according to claim 1, wherein said fastening block is a front fastening block (2), an upper fastening block (3), a cooled fastening block (4) or a flange (6).

14. The hydraulic cylinder according to claim 1, wherein said cartridge (1) comprises an inlet (12) and an outlet (13) for fluid.

FIG. 1

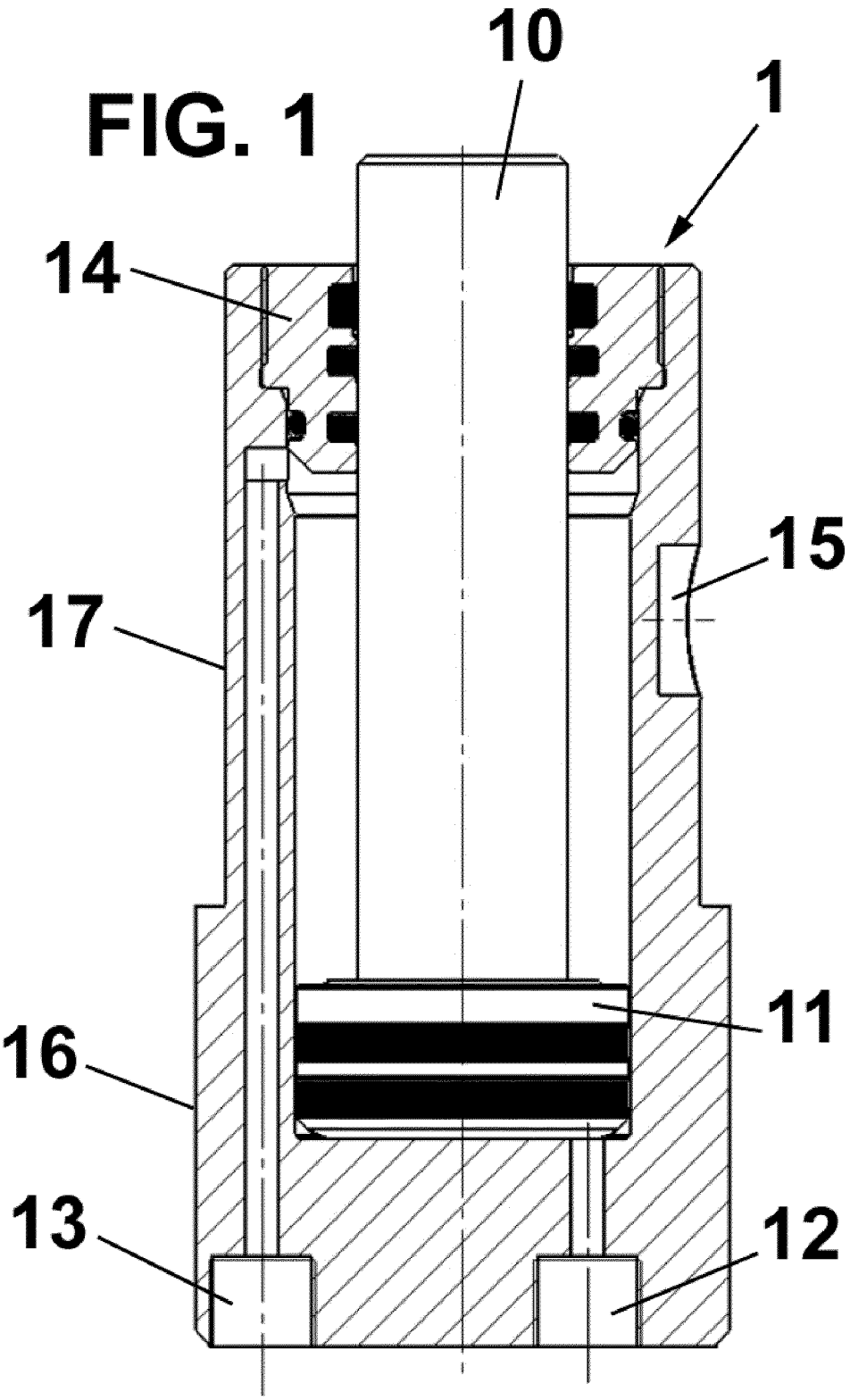


FIG. 2

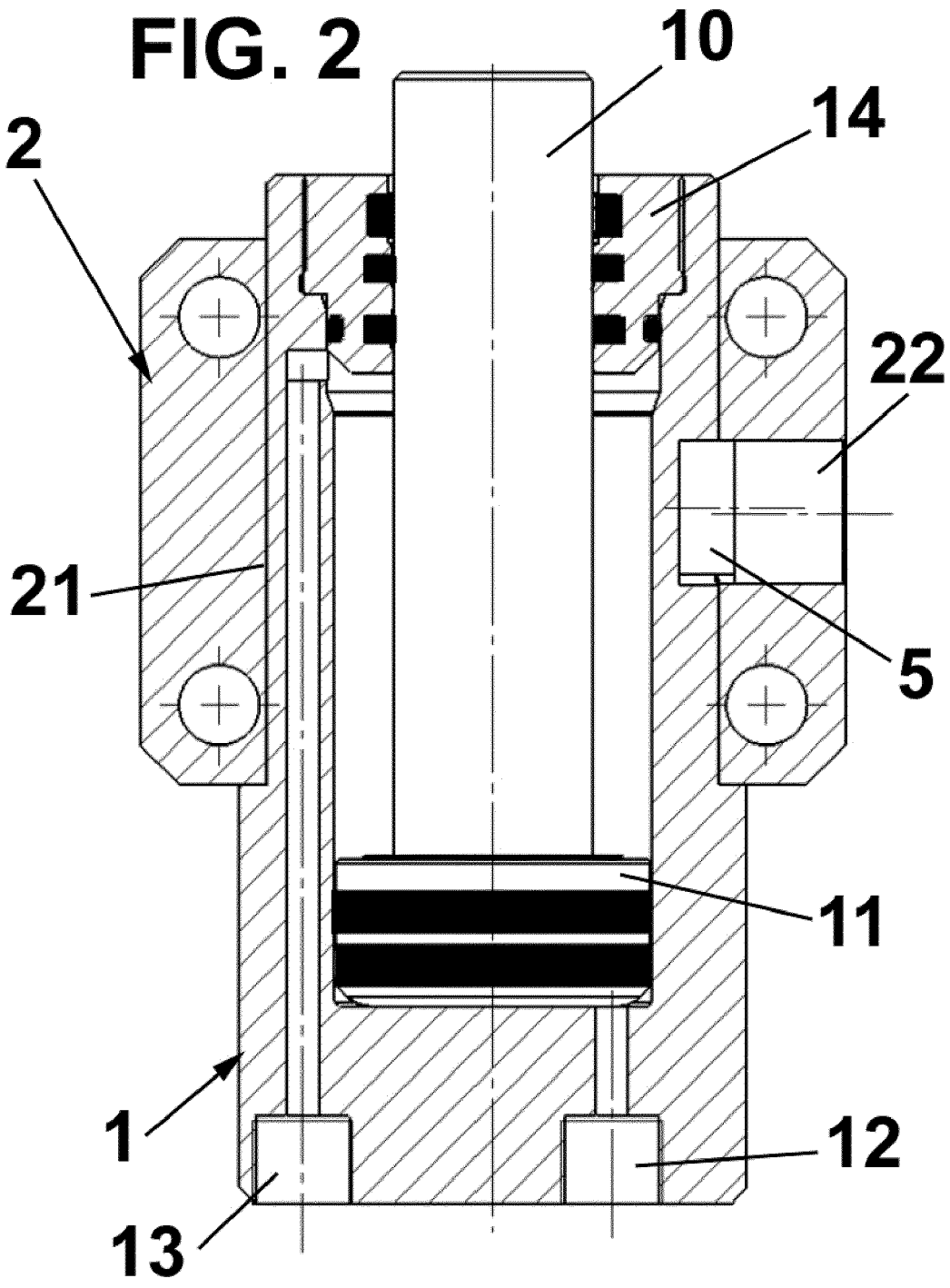


FIG. 3

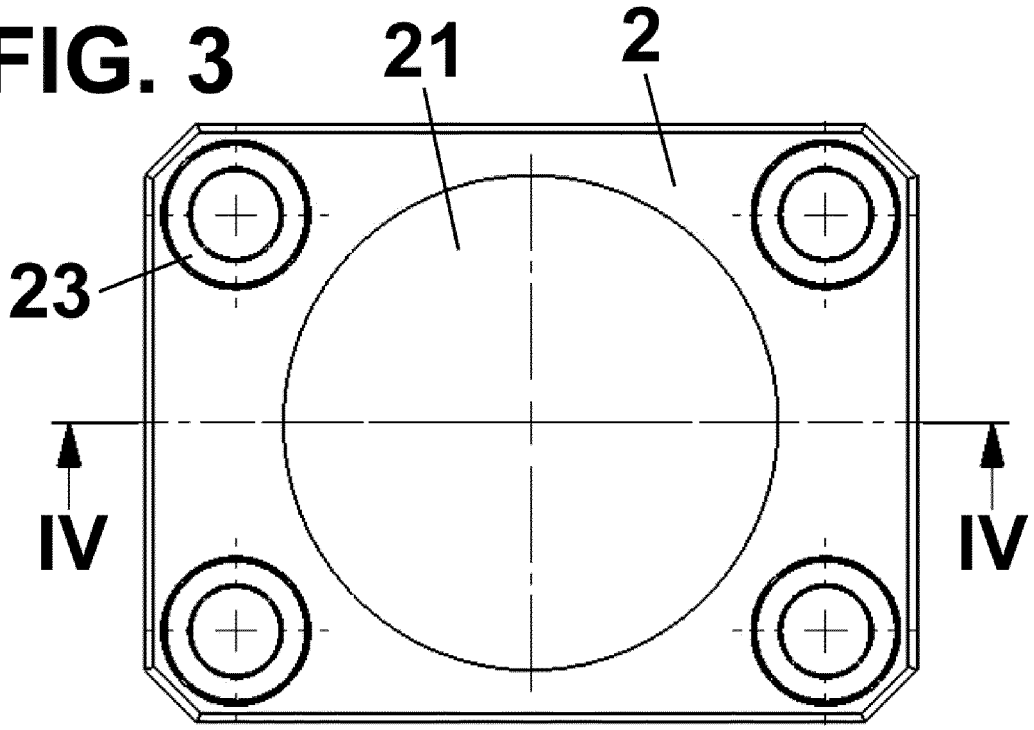


FIG. 4

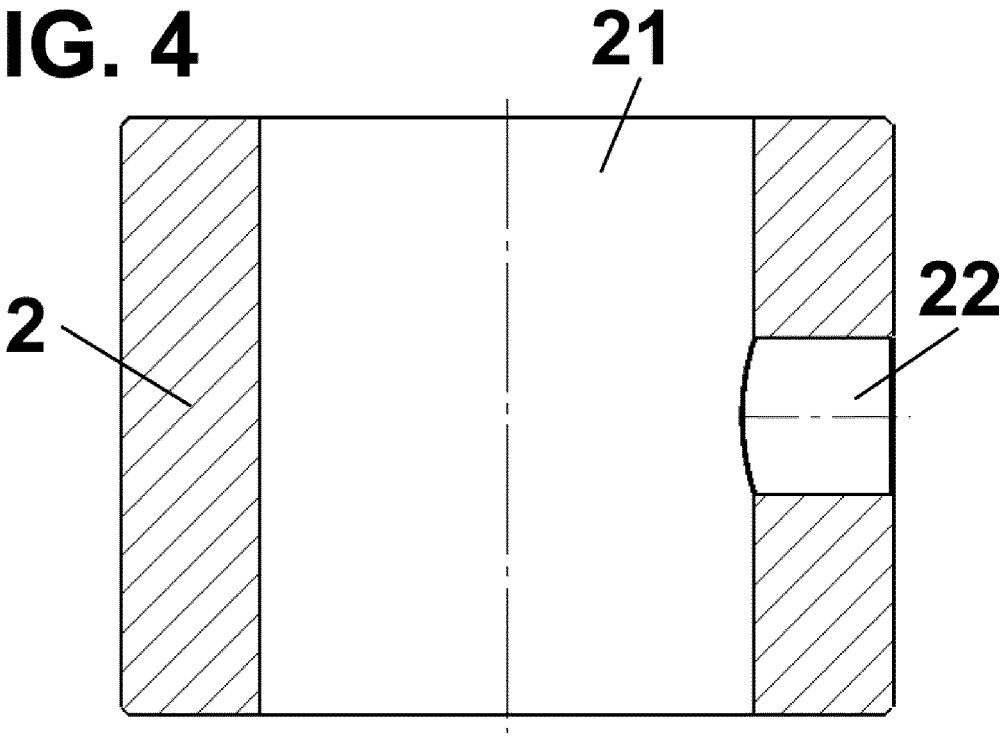


FIG. 5

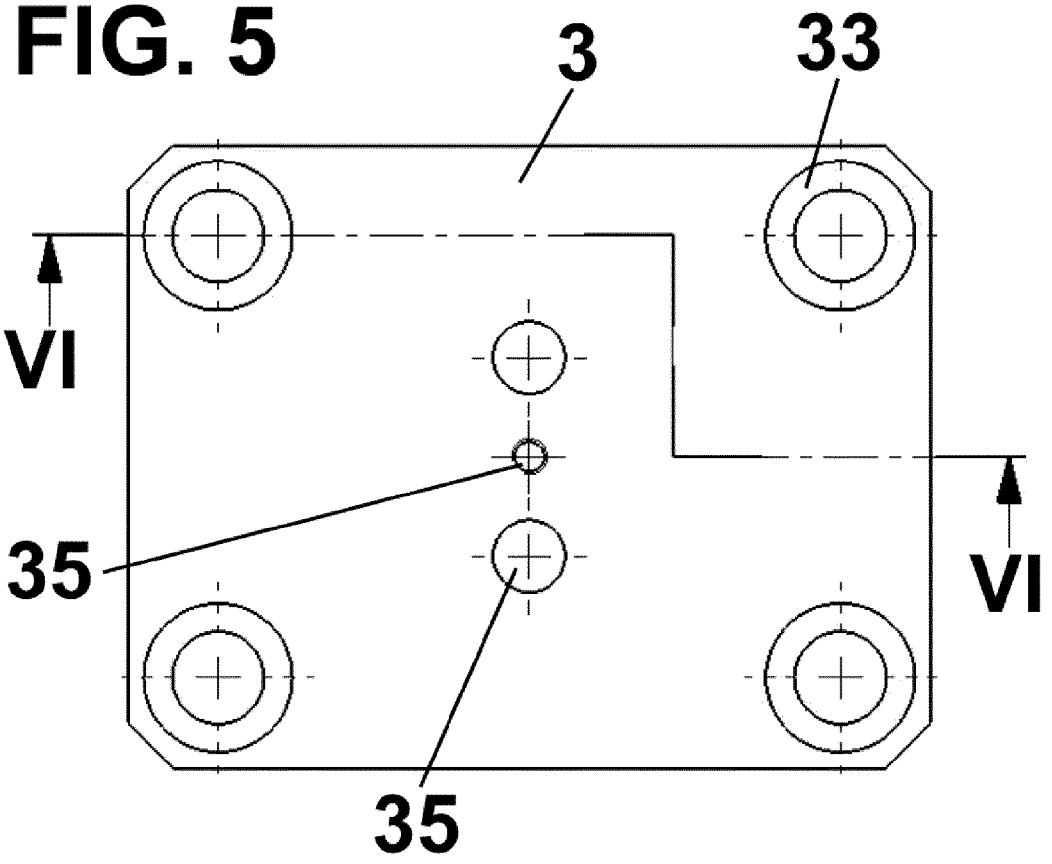


FIG. 6

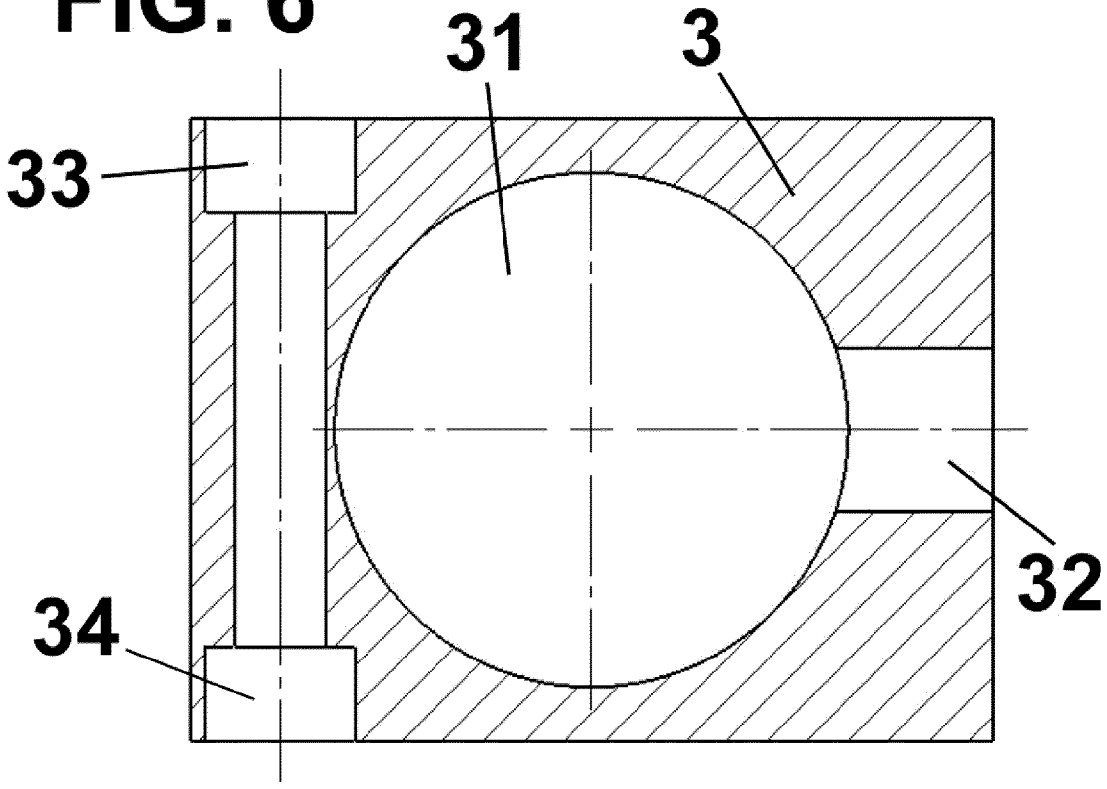


FIG. 7

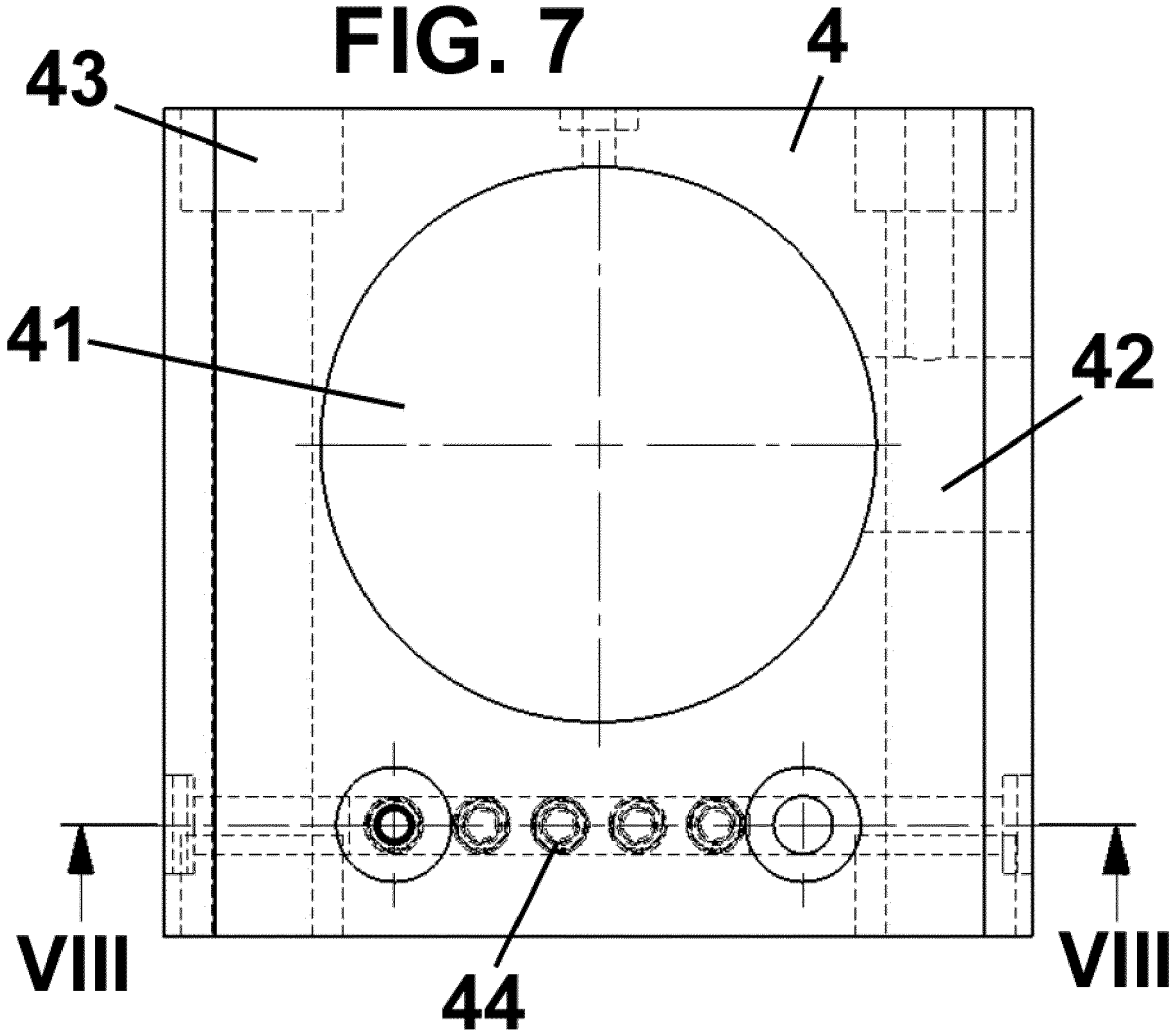


FIG. 8

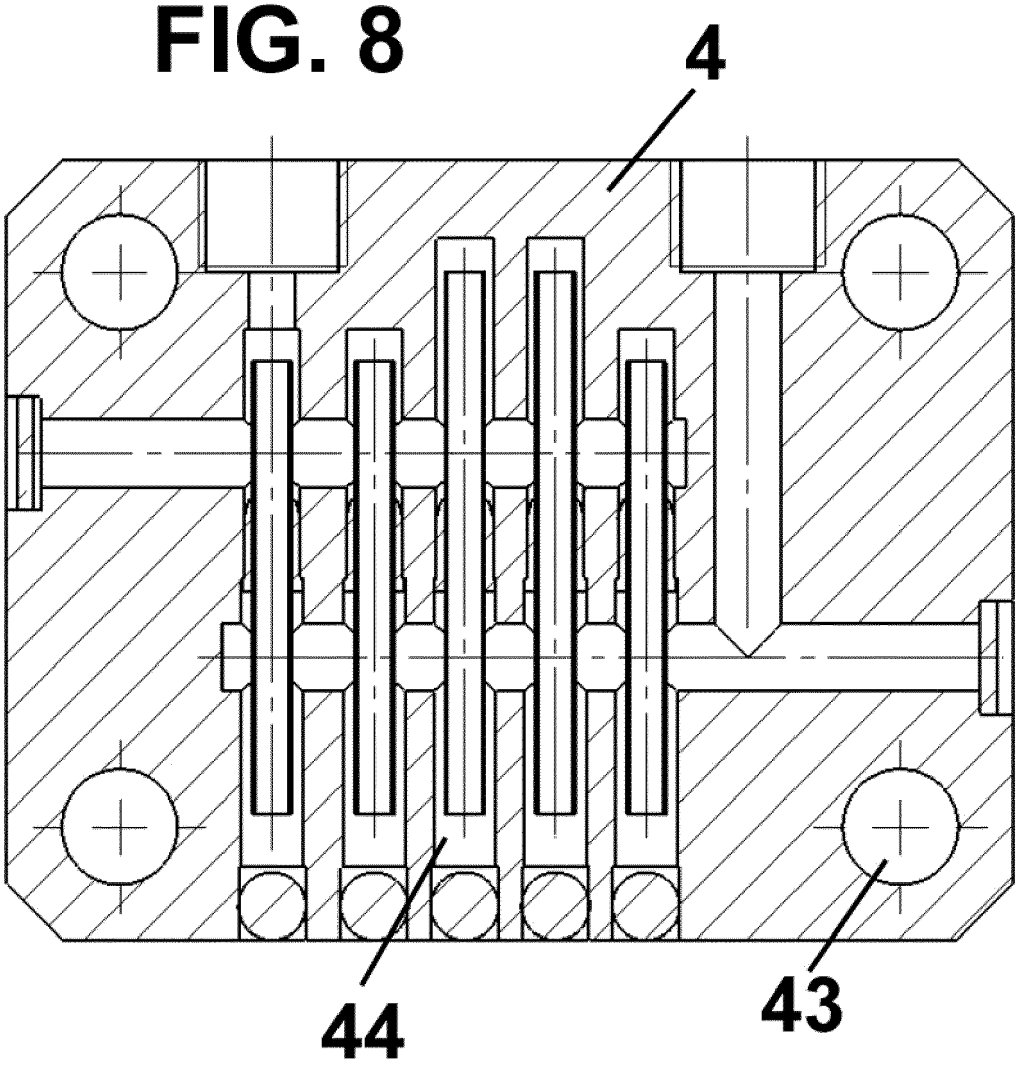


FIG. 9

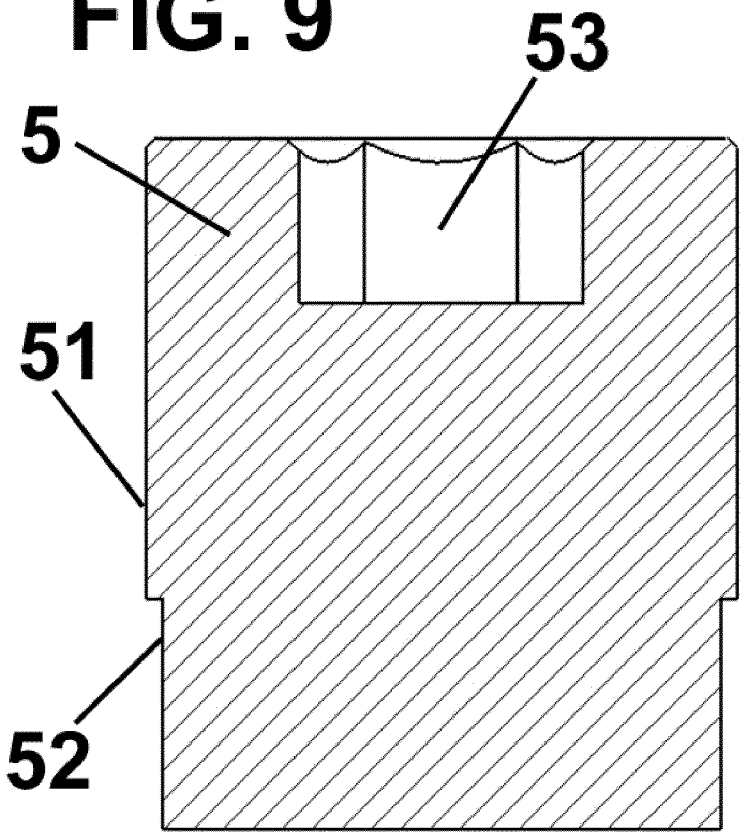


FIG. 10

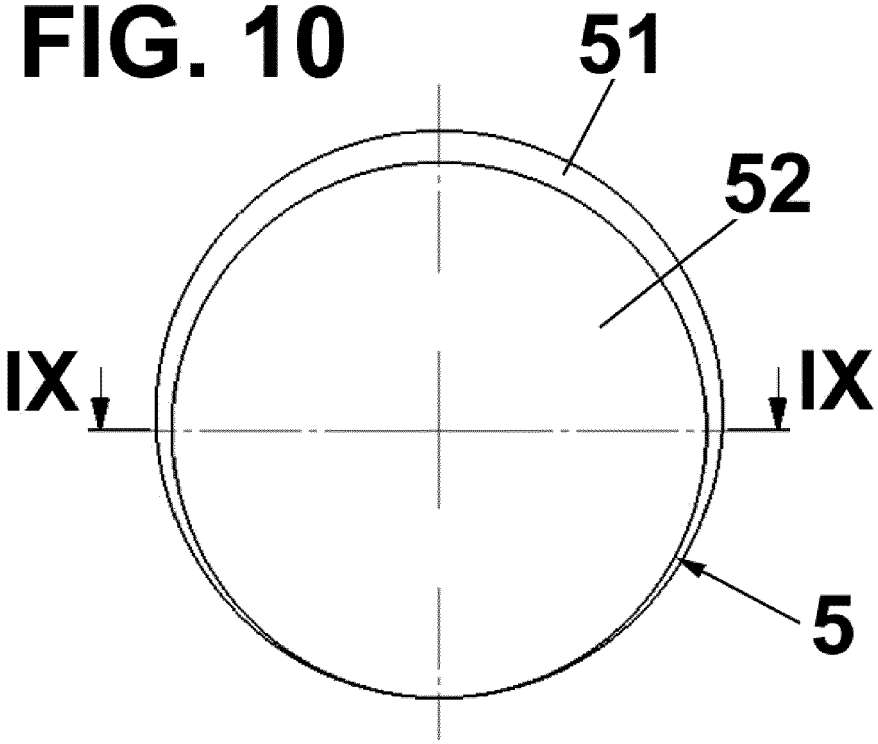


FIG. 11

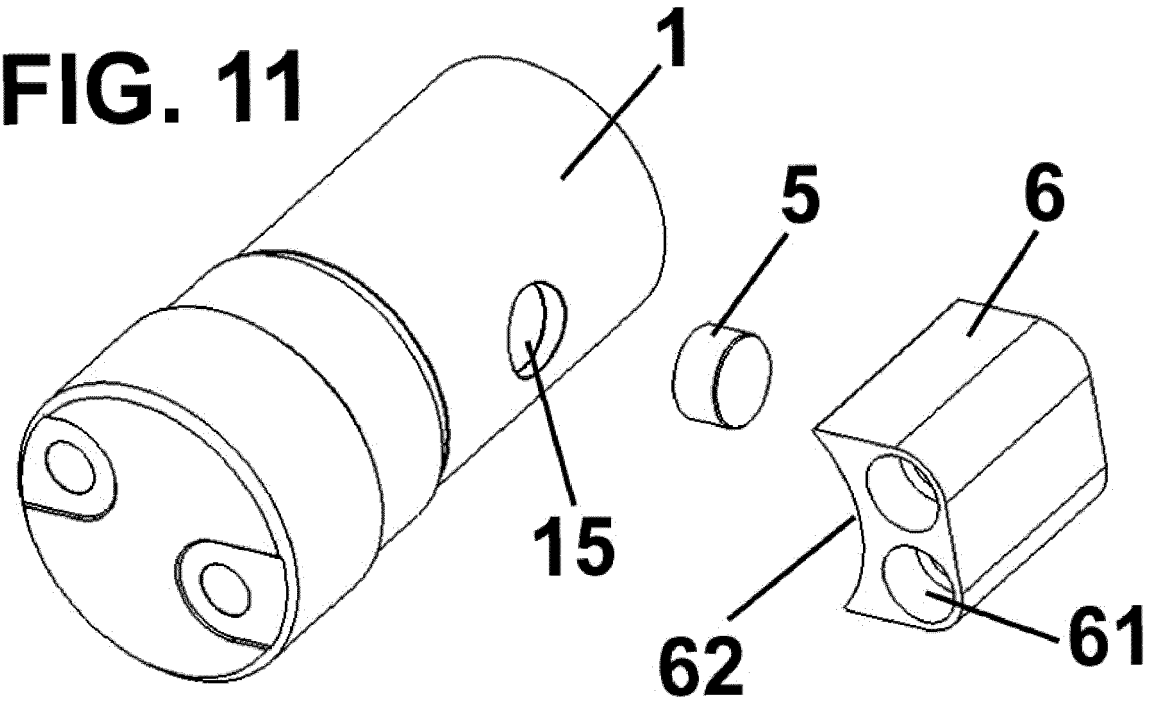
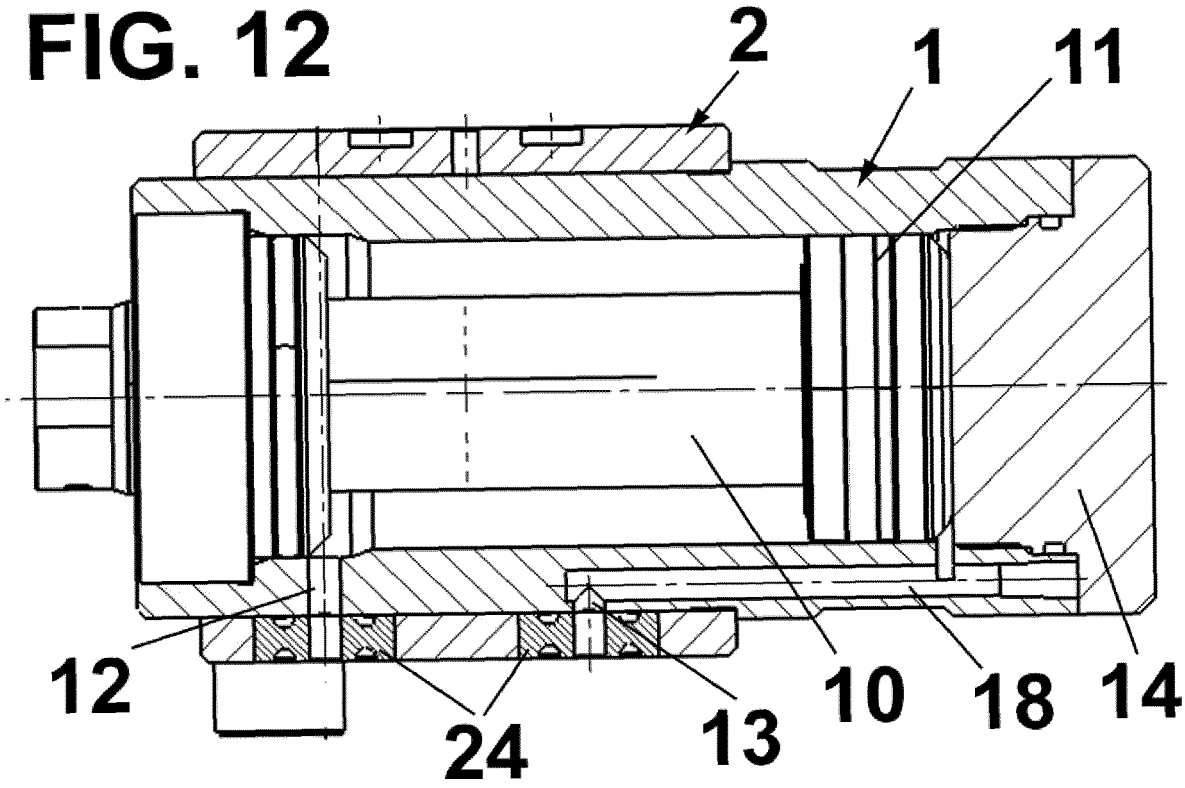


FIG. 12



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EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2202

DOCUMENTS CONSIDERED TO BE RELEVANT

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	24 July 2019	Deligiannidis, N

CATEGORY OF CITED DOCUMENTS

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EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2202

DOCUMENTS CONSIDERED TO BE RELEVANT

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			TECHNICAL FIELDS SEARCHED (IPC)

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 38 2202

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82