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(54) Gear pump

(57) The gear hydraulic means (2) includes a housing (12, 20) containing a first and a second cogwheel (4, 6) engaging for interacting with a hydraulic fluid, each wheel (4, 6) being joint to a respective shaft (8, 10) having the ends rotationally supported to said housing (12, 20), and hydraulic sealing means (42, 60) firmly coupled to respective support means (34, 46, 58); a method for producing gear hydraulic means (2) is furthermore provided, including providing a housing (12, 20) suitable to house a first and a second cogwheel (4, 6) engaging for interacting with a hydraulic fluid, providing furthermore a shaft firmly coupled to each wheel and having the ends rotationally supported to said housing (12, 20), and firmly coupling hydraulic sealing means (42, 60) to respective support means (34, 46, 58).

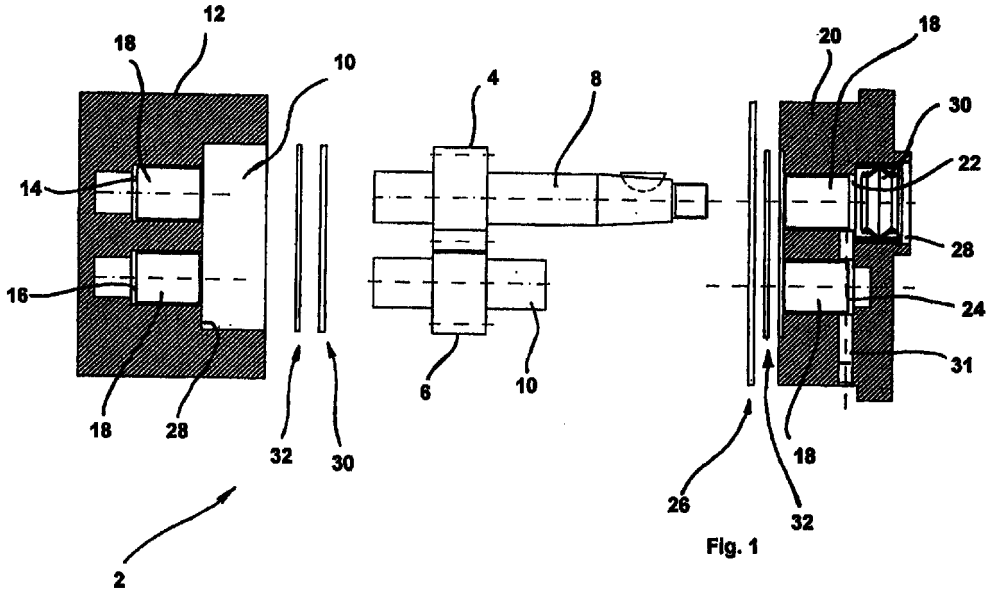

Fig. 1

EP 0 972 941 A2

Description

[0001] The invention relates to hydraulic gear means, in particular pumps, or engines, or flow partitioning gear means.

[0002] The prior art comprises gears pumps wherein a pair of cogwheels mounted on respective shafts, one of which motorized, is rotated in order to produce, from the mutual engaging, oil flow from a low pressure intake section, to a high pressure delivery section.

[0003] The shafts are axially supported by bushes, which are inserted with a certain clearance inside the pump housing body so as to compensate, by moving along each shaft axis, the axial thrusts that occur during the normal operation. An annular sealing gasket is interposed between each bush and the closing end element of the pump.

[0004] Therefore, when the pump is assembled, it is uncomfortable to proceed to the gasket positioning in each bush seat, because the gasket is very flexible and therefore slipping away from the manual grasp of the mounting employed operator.

[0005] A problem then occurs of improving the gear pumps, or, more in general, the gear hydraulic devices for fluid processing.

[0006] According to an aspect of the invention, hydraulic gear means is provided, comprising a closeable housing into which a first cogwheel and a second cogwheel reciprocally engaging and interacting with a fluid are introduced, each cogwheel being joint to a respective shaft having its ends rotationally supported to said housing, hydraulic sealing means coupled to respective support means, characterized in that said hydraulic sealing means is firmly fixed to said support means.

[0007] In a second aspect of the present invention, a method is provided for manufacturing hydraulic gear means, comprising providing a housing suitable to house a first cogwheel and a second cogwheel reciprocally engaging and suitable to interact with a hydraulic fluid, further providing a shaft firmly coupled to each wheel and having its ends rotationally supported to said housing, further providing hydraulic sealing means coupled to respective support means, characterized in that said hydraulic sealing means is firmly fixed to said support means before said housing is closed.

[0008] In a third aspect of the invention, a combination is provided comprising support means and hydraulic sealing means firmly fixed to said support means and suitable to be inserted into gear hydraulic means.

[0009] The provision of a firm coupling between the hydraulic sealing means and the respective support means makes dimensionally more stable the hydraulic sealing means and then makes easier the mounting manipulation thereof.

[0010] Furthermore, the firm coupling between the hydraulic sealing means and the respective support means allows to conceive a robotized mounting, for example of a gear pump, that otherwise would not be possible.

[0011] The support bushes of the shaft ends are no more necessary, because the support means can accomplish also the function of compensating the axial thrusts.

[0012] The invention could be better understood and carried into practice with reference to the enclosed drawings, which illustrate an embodiment thereof, wherein:

Figure 1 is a longitudinal, exploded section of a gears pump according to the invention;
Figure 2 is a plan view of first hydraulic sealing means firmly coupled to respective lamina support means;
Figure 3 is broken section III-III, of Figure 2;
Figure 4 is a plan view of second hydraulic sealing means firmly coupled to respective lamina support means;
Figure 5 is broken section V-V, of Figure 4;
Figure 6 is a plan view of anti-friction means;
Figure 7 is an outside plan view of the cover closing the housing;
Figure 8 is section VIII-VIII of Figure 7;
Figure 9 is the inside plan view of the cover of Figure 7;
Figure 10 is an outside plan view of the pump housing body;
Figure 11 is an in-transparence side view of Figure 10, at the delivery side;
Figure 12 is an inside plan view of the pump housing body;
Figure 13 is an in-transparence side view of Figure 12, at the intake side.

[0013] As shown in Figure 1, a gears pump 2 has a pair of cogwheels, a driving cogwheel 4, and a driven cogwheel 6, coupled respectively on a driving shaft 8 and a driven shaft 10. The cogwheels 4, 6 are insertable in a cavity 10, shaped at measure for receving them, of a housing body 12 provided with first blind seats 14, 16 suitable to receive the corresponding ends of the shafts 8, 10, rotatably supporting them. The first seats 14, 16 are provided with anti-friction bearings 18 interposed between each seat and the respective shaft end housed therin.

[0014] A cover 20 is provided to keep tightened the wheels 4, 6 in the cavity 10 by closing it. The cover 20 has second seats 22, 24 in order to receive rotationally the other ends of the shafts 8, 10 with interposition of respective bearings 18. The second seat 22 extends in a hole 28 passing through the cover 20 for the passage through it of an operative end of the driving shaft 8 with interposition of gasket 30. The second seats 22, 24 are interconnected by a draining duct 31 through which leakages are extracted, if any.

[0015] Between the cover 20 and the body 12 first

sealing means 26 is interposed, suitable to avoid liquid leaks from the cavity 10 and obtain the counterbalancing of the axial thrusts.

[0016] Between the pair of wheels 4, 6 and a bottom portion 28 of the cavity 10, as better specified hereinafter, anti-friction means 30 is positioned.

[0017] Second sealing means 32, having the function of protecting the shafts 8, 10 from the thrust which would be produced over them by the delivery pressure, keeping instead them to the intake pressure, is interposed between the anti-friction means 30 and the bottom portion 28, as well as between the first sealing means 26 and the cover 20.

[0018] As shown in Figures 2 and 3, the first sealing means 26 includes a first portion 34 having ring shape running peripherally along the profile of the body 12 and the cover 20, provided with a formation of first holes 36 for the passage through them of rods, not represented, for the packing of the pump 2, and with second holes 38 for centering pins centering on the body 12.

[0019] The first portion 34 surrounds a second portion 40 of the first sealing means 26, with interposition of a peripheral elastic joint 42 constituting union means between the first portion 34 and the second portion 40 and gasket and hydraulic sealing means again the leakage of the liquid processed by the pump.

[0020] The second portion 40 is provided with a first opening 44 which defines a pair of lobes 46 running substantially correspondingly to the development of the wheels 4, 6 to them faced during operation, so that oil will be present on both the faces of the lobes 46. When a differential pressure causes an axial force, the lobes 46 can accomplish restricted displacements, by rotating around elastic hinge means 48, provided at an intact portion of the second portion 40 enclosed between opposing regions of the first opening 44, so as to counterbalance the axial thrusts.

[0021] A second opening 50 is provided in each lobe 46 in order to allow the passage through it of one of the shafts 8, 10.

[0022] As shown in Figure 3, the second portion 40 is provided with a coating 52 of anti-friction material at the contact face with the wheels pair 4, 6.

[0023] As shown in Figure 6, the anti-friction means 30 is formed by a body 54 which corresponds to the shape and the dimensions of the pair of cogwheels 4, 6 and has holes 56 for the passage of the shafts 8, 10.

[0024] As shown in Figures 4 and 5, the second sealing means 32 is formed by a body 58 provided with lobes substantially corresponding to the shape of the pair of cogwheels 4, 6 with holes 61 for the passage of the shafts 8, 10. The second sealing means 32 is provided with gasket means 60 disposed so as to preserve the shafts 8, 10 from the delivery pressure and keep them to the intake pressure, in order to avoid the arising of loads which would lead to the flexion of the shafts themselves.

[0025] The gasket means 42, 60 can be vulcanized on the respective support bodies 34, 46 and 58 or glued to them, or engaged on them through a shape coupling.

[0026] Between the gasket means 60 and the body 58 provided with lobes an anti-extrusion means 62 is interposed in order to protect the gasket means 60.

[0027] As shown in Figure 9, the cover 20 further includes holes 64 for the passage of the closing rods of the pump 2. As shown in Figures 11, 12 and 13, the body 12 includes an intake duct 66 (Figure 13), a delivery duct 68 (Figure 13) and holes 70 for the passage of the pack fastening rods of the pump 2.

[0028] In variant not shown, the anti-friction means 30 is associated to the second sealing means 32, or constitutes coating therof.

Claims

1. Hydraulic gear means, comprising a closeable housing (12, 20) into which a first cogwheel (4) and a second cogwheel (6) reciprocally engaging and interacting with a hydraulic fluid are introduced, each of said wheels (4, 6) being joint to a respective shaft (8,10) having its ends rotationally supported to said housing (12, 20), hydraulic sealing means (42, 60) coupled to respective support means (34, 46, 58), characterized in that said hydraulic sealing means (42, 60) is firmly fixed to said support means (34, 46, 58).

2. Hydraulic gear means according to claim 1, wherein said support means (34, 46, 58) cooperates with anti-friction means (52, 54) on at least one face.

3. Hydraulic gear means according to claim 1, or 2, wherein said hydraulic sealing means (42) interconnects a first portion (34) of lamina support and a second portion (46) of lamina support, the second portion (46) of lamina support being surrounded by the first portion (34) of lamina support.

4. Hydraulic gear means according to claim 3, wherein said second portion (46) is provided with an opening (44) defining elastic hinge means (48) suitable to accomplish limited displacements to a central region of said second portion (46).

5. Hydraulic gear means according to any of claims 1, or 2, wherein said hydraulic sealing means (60) cooperates with anti-extrusion means (62) fixed to common support means (58).

6. A method for producing hydraulic gear means, comprising providing a housing (12, 20) suitable to house a first cogwheel (4) and a second cogwheel (6) reciprocally engaging and suitable to interact with a hydraulic fluid, providing furthermore a shaft (8, 10) firmly coupled to each wheel (4, 6) and hav-

ing the ends rotationally supported to said housing (12, 20), further providing hydraulic sealing means (42, 60) coupled to respective support means (34, 46, 58), characterized in that said hydraulic sealing means (42, 60) is firmly fixed to said support means (34, 46, 58) before said housing (12, 20) is closed.

7. A method according to claim 6, wherein said hydraulic sealing means (42, 60) is vulcanized to said support means (34, 46, 58).

8. A method according to claim 6, wherein said hydraulic sealing means (42, 60) is glued to said support means (34, 46, 58).

9. A method according to claim 6, wherein said hydraulic sealing means (42, 60) is jointed to said support means (34, 46, 60) by shape coupling.

10. A combination including support means (34, 46, 60) and hydraulic sealing means (42, 60) firmly fixed to said support means (34, 46, 60) suitable to be inserted into gear hydraulic means (2).

11. A combination according to claim 10, and including furthermore anti-friction means (52) on a face of said support means (46).

12. A combination according to claim 10, or 11, and including furthermore anti-extrusion means (62) of said hydraulic sealing means (60).

13. A combination according to claim 10, or 11, wherein said hydraulic sealing means (42) interconnects a first portion (34) of lamina support and a second portion (46) of lamina support, the second portion (46) of lamina support being surrounded by the first portion (34) of lamina support.

14. A combination according to claim 13, wherein said second portion (46) is provided with an opening (44) defining elastic hinge means (48) suitable to allow limited displacements to a central region of said second portion (46).

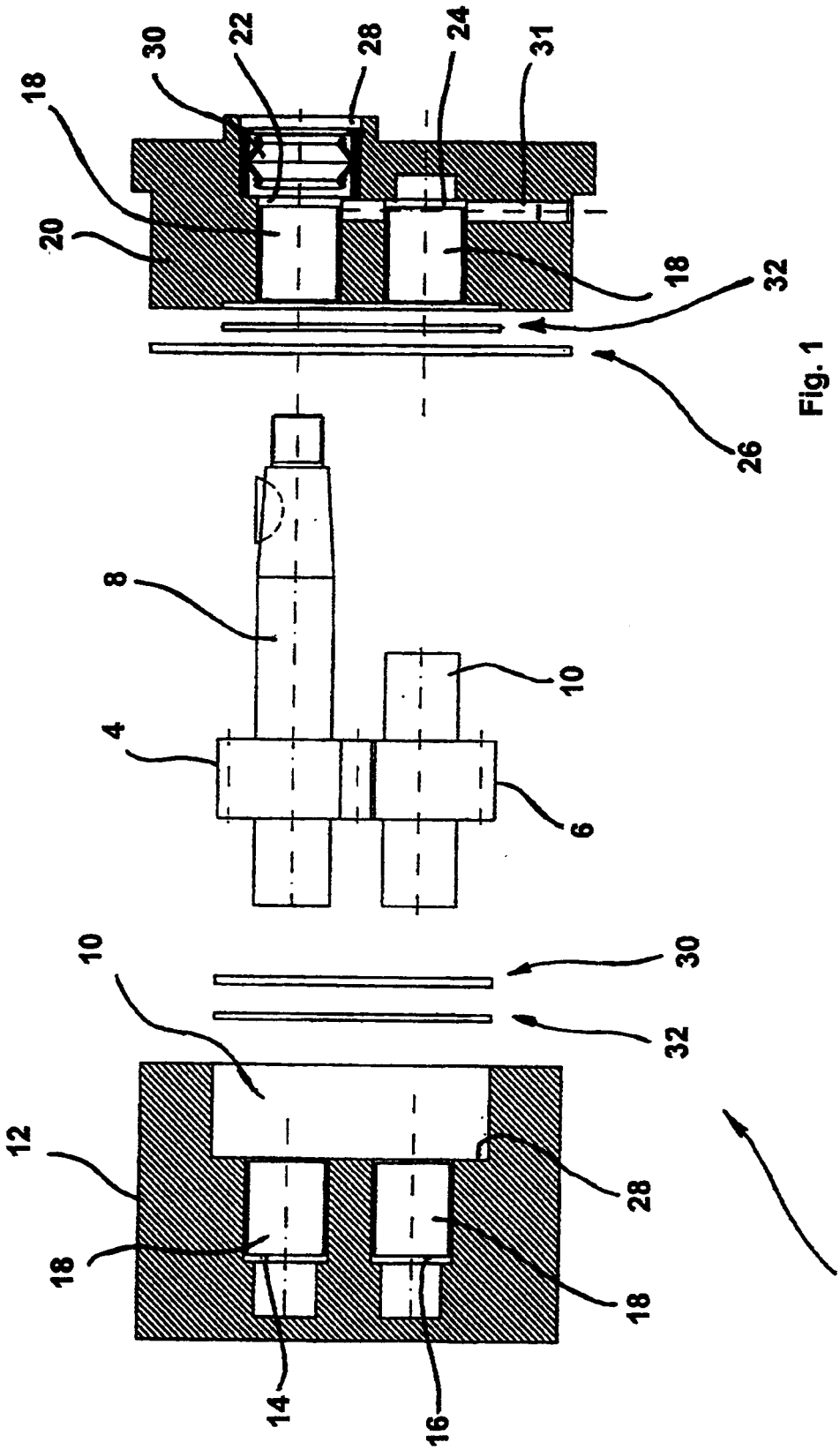

Fig. 1

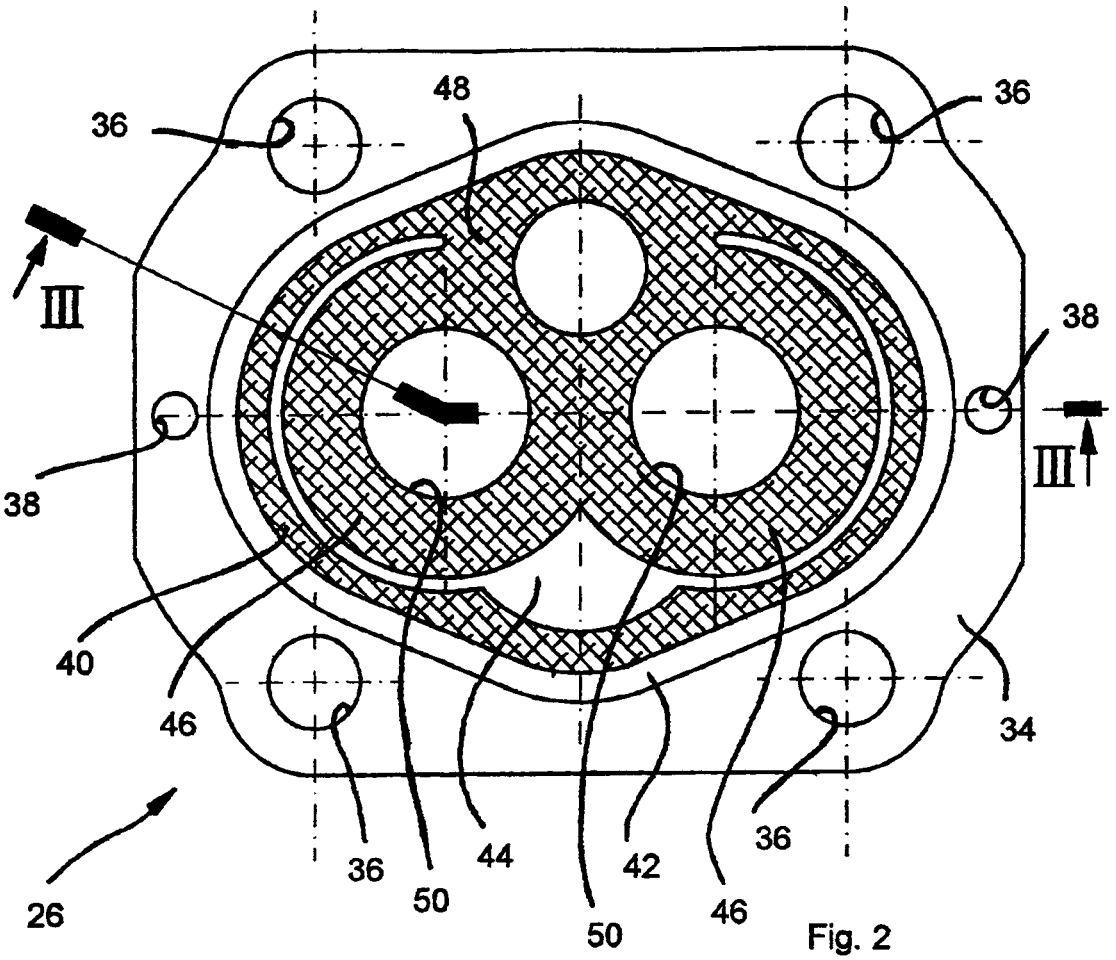

Fig. 2

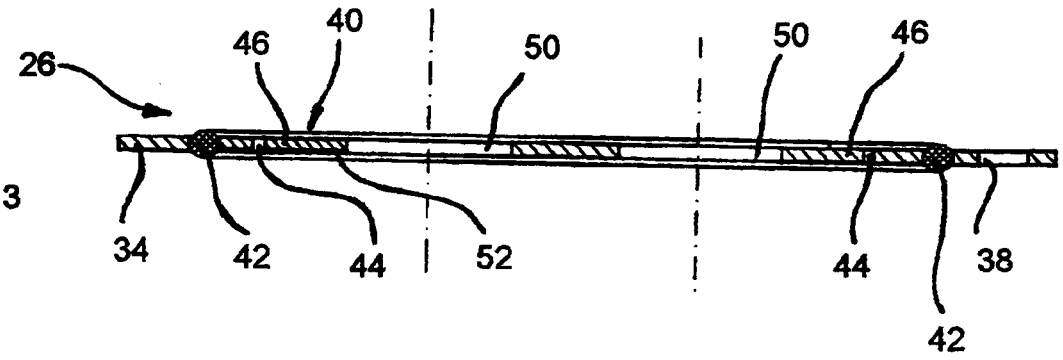

Fig. 3

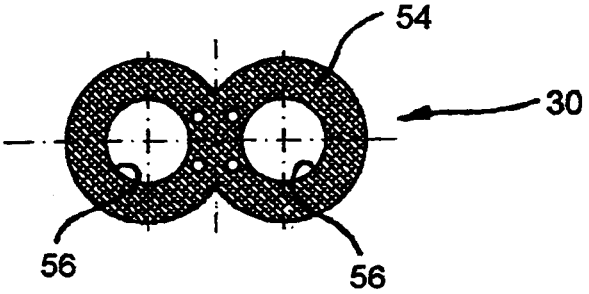

Fig. 6

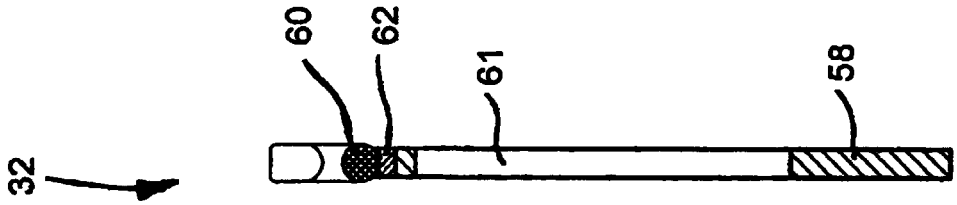

Fig. 5

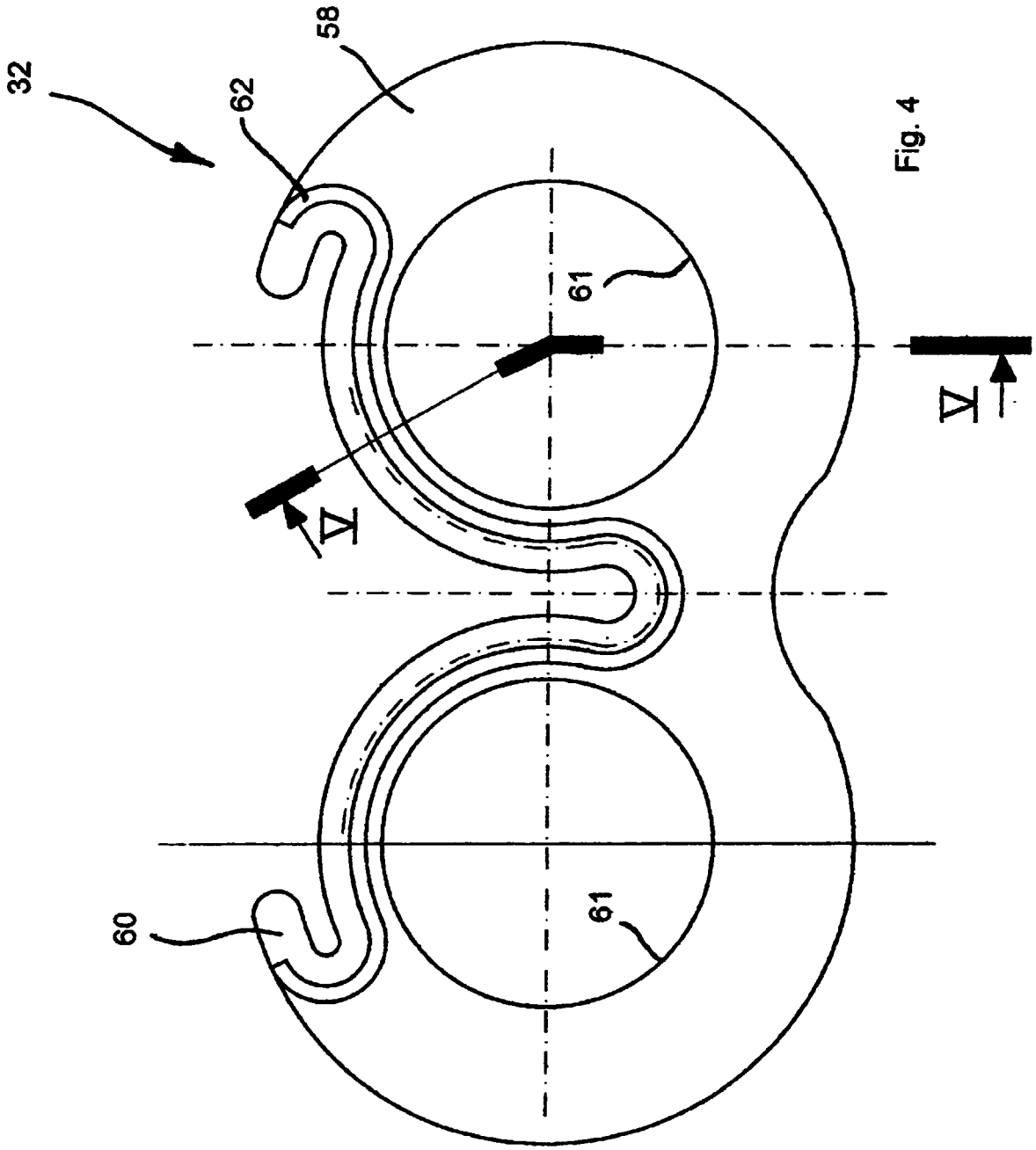

Fig. 4

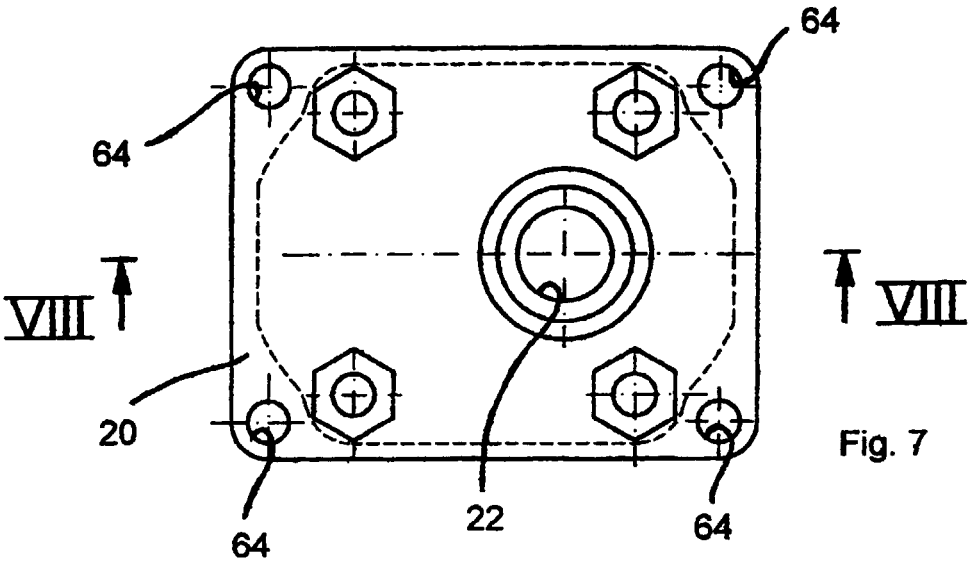

Fig. 7

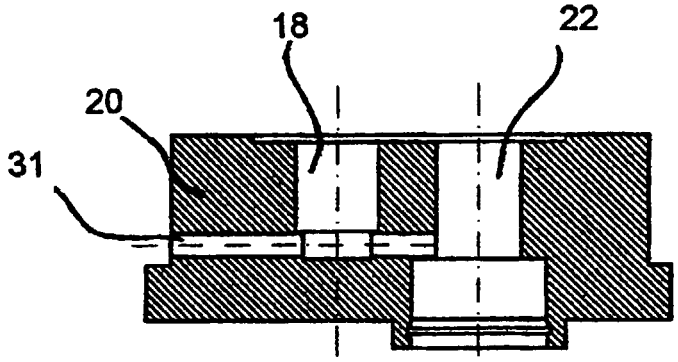

Fig. 8

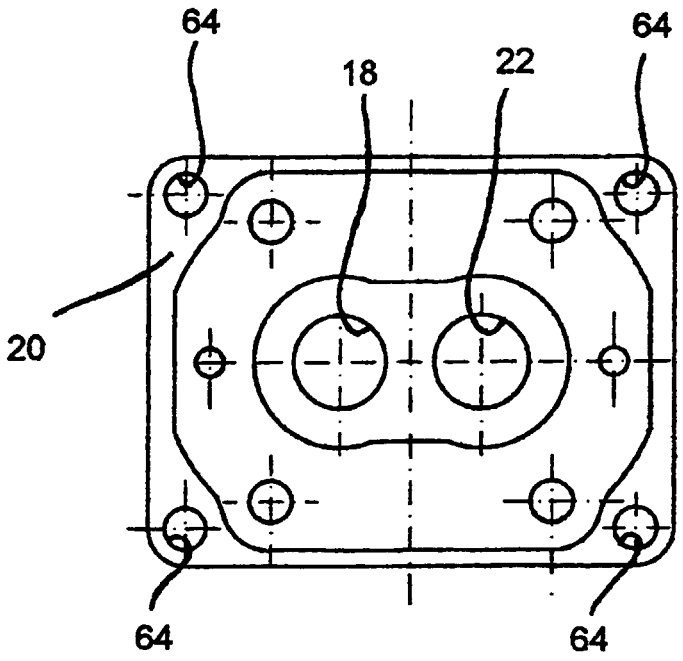

Fig. 9

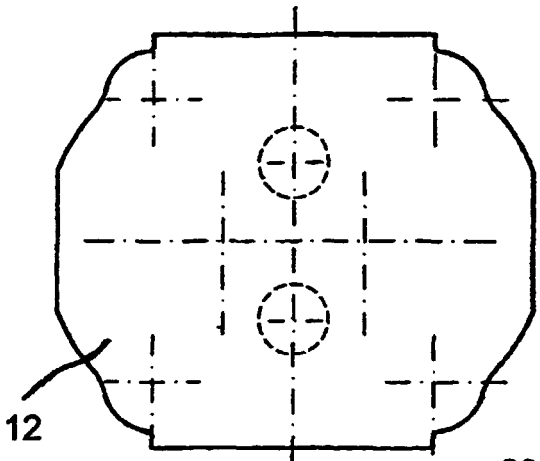

Fig. 10

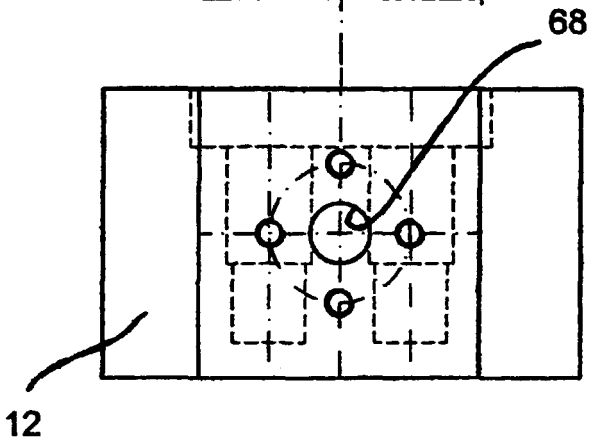

Fig. 11

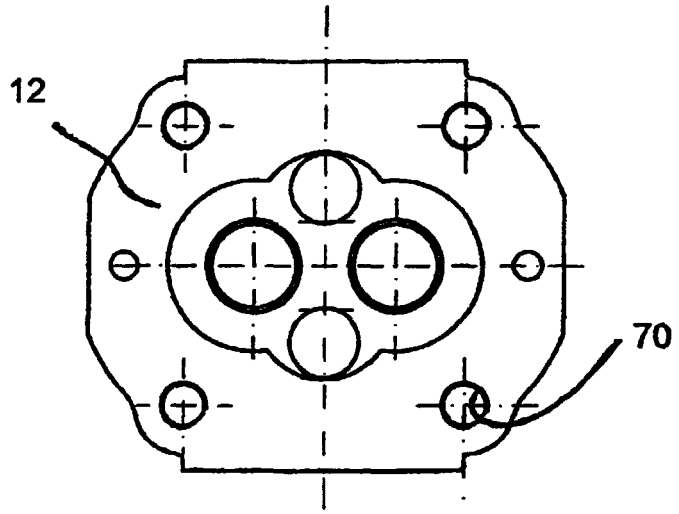

Fig. 12

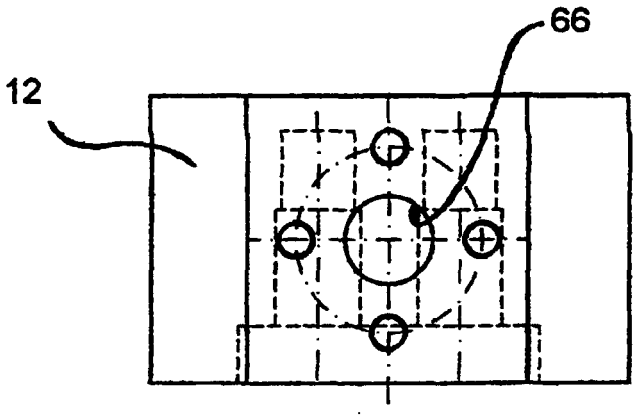

Fig. 13