



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 974 752 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
01.03.2006 Bulletin 2006/09

(51) Int Cl.:
F03C 1/04 ^(2006.01) **F04B 49/12** ^(2006.01)

(21) Application number: **99202332.5**

(22) Date of filing: **15.07.1999**

(54) **Feedback control circuit for a variable speed hydromotor**

Rückkoppelungsregelkreis für einen Hydromotor variabler Drehzahl

Système de régulation de la vitesse d'un moteur hydraulique rotatif

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

(30) Priority: **24.07.1998 IT MI981719**

(43) Date of publication of application:
26.01.2000 Bulletin 2000/04

(73) Proprietor: **PARKER CALZONI S.r.l.**
Anzola dell'Emilia (Bologna) (IT)

(72) Inventor: **Breviglieri, Alessandro**
Casalecchio di Reno (Bologna) (IT)

(74) Representative: **Raimondi, Margherita et al**
Dott. Ing. Prof. Alfredo Raimondi S.r.l.,
Piazzale Cadorna, 15
20123 Milano (IT)

(56) References cited:
EP-A- 0 651 159 US-A- 2 052 472
US-A- 3 796 136 US-A- 4 347 778

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a hydraulic engine/pump according to the preamble of claim 1.

[0002] In the art hydraulic engines with radial/axial propulsors which, acting on the eccentric drive shaft, cause rotation thereof are known; in order for the said propulsors to operate, a rotating distributor must cause the correct succession of the phases for supplying/discharging each of them.

[0003] It is also known that the supply fluid requires a certain amount of time to pass through the ducts which lead from the rotating distributor to each propulsor (supply stage) and vice versa (discharge stage), resulting in the need to determine beforehand the correct phase-timing of the engine, or the instant at which opening/closing of the duct supplying/discharging the fluid to some of the propulsors occurs, so that it is synchronized with the corresponding discharging/supplying of the other propulsors.

[0004] In order to keep the operation of all the propulsors synchronized and compensate for the delay with which the fluid actually reaches the associated propulsor after opening of the duct by the rotating distributor, it is attempted to adjust the so-called "advance" of the engine, namely the advance with which the rotating distributor opens/closes the said duct with respect to the instant at which the fluid is expected to actually reach the corresponding propulsor.

[0005] This adjustment of the advance is, however, necessarily associated with the speed of rotation of the engine since, with an increase in the speed of the engine and hence the speed with which each propulsor changes phase (supplying/discharge), the delay in supplying/discharging of the fluid causes malfunctioning of the engine. An engine with means for controlling the supply timing according to the preamble of claim 1 is disclosed in US 2,052,472.

[0006] The technical problem which is posed, therefore, is that of providing a device which allows control and adjustment of opening/closing of the ducts supplying/discharging each propulsor of an hydraulic/oleodynamic propulsor upon variation in the number of revolutions of the engine itself.

[0007] Within the scope of this problem a further requirement is that said device should be simple and low-cost to manufacture and should be able to be operated both manually and automatically by associated control means.

[0008] These technical problems are solved according to the present invention by a hydraulic-engine or pump according to the characteristic of claim 1. Further details may be obtained from the following description of a non-limiting example of embodiment of the invention provided with reference to the accompanying drawings in which:

- Figure 1 shows a cross-sectional view, along a plane

indicated by I-I in Fig. 2, of an oleodynamic motor according to the present invention;

- Figure 2 shows a cross-section along a plane indicated by II-II in Fig. 1;
- Figure 3 shows an enlarged cross-sectional view of the detail relating to the rotating distributor of the fluid actuating the cylinders;
- Figure 4a shows a cross-section along the plane indicated by IVa-IVa in Fig. 3 illustrating the devices for actuating the plate with automatic operating means;
- Figure 4b shows a cross-section along the plane indicated by IVb-IVb in Fig. 4a;
- Figure 5a shows a cross-section similar to that of Fig. 4a with the plate rotated in the clockwise direction;
- Figure 5b shows a cross-section similar to that of Fig. 4a with the plate rotated in an anti-clockwise direction;
- Figs. 6a, 6b show variations of examples of embodiment of the means for actuating rotation of the plate;
- Figure 7a shows the device for performing positioning of the plate using means for automatic operation and control of the angular position of the plate itself;
- Figure 7b shows a cross-section along the plane indicated by VIIb-VIIb in Fig. 7a;
- Figure 8 shows the device for performing positioning of the plate using manual-type operating means;

[0009] As illustrated in Figs. 1 and 2 an engine 10 of the oleodynamic type is composed essentially of a casing 11 which is closed by covers 12 and houses, internally, radial cylinders 13, each of which is placed in communication with a rotating distributor 20 (Fig. 2) which designed to open/close the ducts for supplying/discharging the cylinders so that the latter supplying/discharging the cylinders so that the latter are cyclically compressed/discharged and are able to exert their thrusting action on an eccentric shaft 14 which is supported on the casing 11 of the engine by means of associated bearings 11b.

[0010] Said rotating distribution group (Fig. 3) consists of an external container 21 which is fixed to the casing 11 by means of bolts 21a and which has inside it, arranged coaxially, a plate 22 mounted idle on an extension 14a of the shaft 14 on which it may rotate in both directions.

[0011] The plate 22 is provided with openings 22a for connection to the ducts 13a supplying/discharging the cylinders 13.

[0012] A rotating distribution disk 23 bears against the plate 22, coaxially therewith, and is in turn provided with through-ducts 23a and pushed against the plate 22 by a reaction ring 24 provided with a prestressed spring (not shown) arranged between the ring 24 and the cover 21 of the distributor.

[0013] The plate 22 has a radial extension 22b which is designed to engage with the device 30 for adjusting the advance in accordance with the invention which caus-

es rotational actuation thereof.

[0014] In a first embodiment, said actuating device 30 (Fig. 4) consists of a pair of cylinders 31 formed in the casing 11 of the engine in an opposite position with respect to that of the radial extension 22b of the plate 22.

[0015] Said cylinders 31 are closed towards the outside by an end-piece 31a and have, arranged inside them, corresponding coaxial pistons 32 provided with associated seals 32 which act on the opposite radial surfaces of the extension 22b of the plate 22.

[0016] As illustrated in Figs. 5a and 5b, respectively, the appropriate supplying/discharging of the two cylinders 31 causes the corresponding advance/retraction of the two pistons 32 towards/away from the radial extension of 22b the plate 22 with the consequent thrust on either side thereof and rotation in the clockwise/anti-clockwise direction of the plate itself.

[0017] Said rotation of the plate 22 causes the desired effect of an advance in the opening/closing of the supply/discharge ducts of the cylinders 13 since it causes the angular displacement of the circumferential position of the holes 22a where the openings of the plate are aligned with the openings 23a of the rotating disk 23, allowing flowing of the fluid.

[0018] Figs. 6a and 6b illustrate respective variations in examples of embodiment of the device according to the invention and comprising: two cylinders 131 with a single piston 132 provided with a seat 132a designed to engage with the extension 22b of the plate 22 (Fig. 6a); or a single double-delivery cylinder 231 with piston 132 having a seat 132a for engagement with the extension 22b (Fig. 6b).

[0019] In order to be able to operate externally the actuating device according to the invention, control means 40 which are designed to supply correspondingly the fluid to the cylinders 31 are envisaged.

[0020] In a first version said automatic control means 40 comprise a sensor 41 which is designed to detect the speed of rotation of a disk 41a associated with the drive shaft 14 and send a corresponding signal to a control board 42 which emits pulses operating a distributor 43 which, in turn, drives a metering valve 44, the outputs of which control supplying/discharging of the two cylinders 31 and the consequent advance/retraction of the pistons 31.

[0021] In this case the operating group 40 causes total supplying/discharging of the two cylinders and the consequent displacement of the pistons 32 as far as the respective end-of-travel stop, on either side; this means that the plate 32 rotates between two fixed angular positions and stops only in said positions, causing a predefined advance suitable for a predetermined and precise value of the speed of rotation of the drive shaft.

[0022] As illustrated in Figs. 7a and 7b, it is also possible to envisage means 140 for automatically operating and controlling the angular position of the plate 22.

[0023] Said means comprise all the operating means 40 already described above and a blocking valve 145

arranged between the metering valve 44 and the cylinders 31; the blocking valve is designed to ensure balanced supplying of the two cylinders 31, blocking the pistons 32 in any intermediate position between the two end-of-travel positions.

[0024] In this case it is therefore possible to adjust continuously the advance of the engine depending on the variation in its speed of rotation.

[0025] As illustrated in Fig. 8, means 150 for manual operation of the device for rotational actuation of the plate are also provided.

[0026] In this case the radial extension 22b of the plate 22 engages in a seat 152a of a rod 152, one end of which is connected to a screw 151, the other end of which projects outside the casing 11 of the engine and is integral with a manual operating knob 151a.

[0027] As illustrated, the opposite end of the rod 152 has a fork 152b inside which a safety end-of-travel pin 153 preventing rotation of the rod 152 about its longitudinal axis is inserted.

[0028] Although not illustrated, the manual operating system could also be realized by means of the metering valve 44 supplied by means of a circuit, the opening/closing of which is controlled manually by the operator.

[0029] It is envisaged, moreover, that said means for performing rotation of the plate 22 may be directly connected to the engine supply so as to provide automatic adjustment in both directions of rotation of the phase advance of the distribution.

[0030] It is therefore obvious how the device according to the invention allows simple and effective manual or automatic adjustment of the advance with which the rotating group for distribution of the fluid open/closes the supply/discharge ducts of the cylinders of the engine, allowing perfect phase-timing thereof even when there is a variation in the speed of rotation of the engine.

[0031] It is also within the grasp of a person skilled in the art to envisage the application of the device according to the invention to apparatus acting as pumps rather than engines.

Claims

1. **Hydraulic engine/pump comprising a device** for adjusting the advance and being provided with propulsors (13) actuating a drive shaft (14a) mounted on an eccentric cam (14) and with a rotating group (20) for distribution of the fluid actuating the propulsors (13), which comprises at least one plate (22) located between the rotating distribution group (20) itself and the supply ducts (13a) of the propulsors (13), which plate is axially fixed and idle with respect to the drive shaft (14a), and further comprising operating means (31;131;231;151) which are designed to co-operate with said plate (22) for rotational operation thereof relative to the cam (14), said rotation being able to be actuated in both directions so as to

produce a corresponding angular phase-timing between the eccentric cam (14) and the plate (22), said plate (22) being coaxially mounted on an extension (14a) of the drive shaft,

said plate (22; 122b) has at least one radial extension (22b) which is designed to co-operate with said actuating means (31; 131; 231; 331),

characterized in that said operating means (31; 131; 231; 151) are arranged tangentially with respect to the plate (22).

2. **Hydraulic engine/pump** according to Claim 1, **characterized in that** said means for the rotational actuation of the plate (22) comprise at least one double-delivery cylinder (231), the piston (232) of which has a seat (232a) for engagement with said radial extension (22b) of the plate.

3. **Hydraulic engine/pump** according to Claim 1, **characterized in that** said means for rotational actuation of the plate (22) comprise a pair of opposing cylinders (131) with a common piston (132) which has a seat (132a) for engagement with said radial extension (22b) of the plate.

4. **Hydraulic engine/pump** according to Claim 1, **characterized in that** said means for rotational actuation of the plate (22) comprise a pair of opposing cylinders (31), the associated pistons (32) of which are arranged on opposite sides of the said radial extension (22b) of the plate (22) on which they alternately exert a thrusting action.

5. **Hydraulic engine/pump** according to Claim 2 or 3 or 4, **characterized in that** said cylinders (31; 131; 231; 331) are supplied so as to be compressed/discharged by means of corresponding operating means (40; 140; 150).

6. **Hydraulic engine/pump** according to Claim 5, **characterized in that** said means for performing supplying of the cylinders (31) for rotational actuation of the plate (22) are of the automatic type.

7. **Hydraulic engine/pump** according to Claim 6, **characterized in that** said automatic operating means comprise at least one sensor (41; 41a) which is designed to detect the speed of rotation of the drive shaft (14) and emit a corresponding electric signal, at least one device (42) for transforming said electric signal into a signal for operating a valve (44) for distribution of the fluid operating the cylinders (31; 131; 231) and at least one metering valve (44) arranged downstream of said distribution valve (43).

8. **Hydraulic engine/pump** according to Claim 5, **characterized in that** said operating means comprise means for automatic control of the angular po-

sition of the plate (22) in relation to the speed of rotation of the drive shaft (14).

9. **Hydraulic engine/pump** according to Claim 8, **characterized in that** said automatic control means comprise a valve (145) for blocking the cylinders (31; 131; 231) for rotational actuation of the plate (22), arranged between said adjusting valves (44) and cylinders (31; 131; 231).

10. **Hydraulic engine/pump** according to Claim 1, **characterized in that** said means for performing rotation of the plate (22) are of the manual type.

11. **Hydraulic engine/pump** according to Claims 10, **characterized in that** said manual operating means consist of a rod (151), one end of which is connected to an end of a screw (152), the other end of which projects outside the casing (11) of the engine and is integral with a manual operating knob (152a), said rod being provided with a seat (151a) for engagement with the radial extension (22b) of the plate (22).

12. **Hydraulic engine/pump** according to Claim 11, **characterized in that** said rod (151) for actuation of the plate (22) has a free end opposite to that connected to the screw in the form of a fork (151a) for engagement with an end-of-travel pin (153).

13. **Hydraulic engine/pump** according to Claim 10, **characterized in that** manual operating means consist of a valve (41) for distribution of the fluid for actuation of the manually operated cylinders (31; 131).

14. **Hydraulic engine/pump** according to Claim 1, **characterized in that** said means for performing rotation of the plate (22) are directly connected to the engine supply.

Patentansprüche

1. Hydraulikmotor/-pumpe, umfassend eine Vorrichtung zum Einstellen der Zuführung, wobei die Vorrichtung mit Antriebsteilen (13), versehen ist, welche eine Antriebswelle (14a) antreiben, die auf einem exzentrischen Nocken (14) montiert ist, und mit einer Drehbaugruppe (20) zum Verteilen des Fluides versehen ist, welches die Antriebsteile (13) antreibt, wobei die Drehbaugruppe (20) mindestens eine Platte (22) aufweist, die zwischen der Drehbaugruppe (20) und den Zufuhrrohrleitungen (13) der Antriebsteile (13) angeordnet ist, wobei die Platte bezüglich der Antriebswelle (14a) axial fixiert und freilaufend ist, und wobei die Hydraulikpumpe ferner Betätigungsmittel (31; 131; 231; 151) aufweist, welche so konstruiert sind, daß sie mit der Platte (22) für einen Drehbetrieb der Platte relativ zu dem Nocken (14)

- zusammenwirken, wobei die Drehung eingerichtet ist, in beide Richtungen so betätigt zu werden, daß eine entsprechende Winkelphasenabstimmung zwischen der exzentrischen Nocke (14) und der Platte (22) geschaffen wird, wobei die Platte (22) koaxial auf einer Erstreckung (14a) der Antriebswelle montiert ist, und wobei die Platte (22; 122b) mindestens eine Radialerstreckung (22b) besitzt, welche konstruiert ist, mit den Betätigungsmitteln (31; 131; 231; 331) zusammenzuwirken, **dadurch gekennzeichnet, daß** die Betätigungsmittel (31; 131; 231; 151) bezüglich der Platte (22) tangential angeordnet sind.
2. Hydraulikmotor/-pumpe nach Anspruch 1, **dadurch gekennzeichnet, daß** die Mittel für die Drehbetätigung der Platte (22) mindestens einen Doppelzufuhrzylinder (231) aufweisen, wobei der Kolben (232) des Zylinders einen Sitz (232a) aufweist, um in die Radialerstreckung (22b) der Platte einzugreifen.
 3. Hydraulikmotor/-pumpe nach Anspruch 1, **dadurch gekennzeichnet, daß** die Mittel für die Drehbetätigung der Platte (22) ein Paar einander entgegengesetzter Zylinder (131) mit einem gemeinsamen Kolben (132) aufweisen, wobei der Kolben einen Sitz (132a) besitzt, um in die Radialerstreckung (22b) der Platte einzugreifen.
 4. Hydraulikmotor/pumpe nach Anspruch 1, **dadurch gekennzeichnet, daß** die Mittel für die Drehbetätigung der Platte (22) ein Paar einander entgegengesetzter Zylinder (31) aufweisen, wobei die zugehörigen Kolben (32) der Zylinder auf einander gegenüberliegenden Seiten der Radialerstreckung (22b) der Platte (22) angeordnet sind, auf welche sie eine alternierende Schubbewegung ausüben.
 5. Hydraulikmotor/-pumpe nach Anspruch 2 oder 3 oder 4, **dadurch gekennzeichnet, daß** die Zylinder (31; 131; 231; 331) so versorgt werden, daß sie mittels entsprechender Betätigungsmittel (40; 140; 150) aufeinander zubewegt oder voneinander fortbewegt werden.
 6. Hydraulikmotor/-pumpe nach Anspruch 5, **dadurch gekennzeichnet, daß** Mittel zum Durchführen der Versorgung der Zylinder (31) für die Drehbetätigung der Platte (22) automatische Betätigungsmittel sind.
 7. Hydraulikmotor/-pumpe nach Anspruch 6, **dadurch gekennzeichnet, daß** die automatischen Betätigungsmittel aufweisen: mindestens einen Sensor (41, 41a), welcher konstruiert ist, um die Drehgeschwindigkeit der Antriebswelle (14) zu erfassen und ein entsprechendes elektrisches Signal abzugeben, mindestens eine Vorrichtung (42) zum Umwandeln des elektrischen Signals in ein Signal zum Betätigen eines Ventils (44) zum Verteilen des Fluides, um die Zylinder (31; 131; 231) zu betätigen, und mindestens ein Dosierventil (44), welches stromabwärts von dem Verteilventil (43) angeordnet ist.
 8. Hydraulikmotor/-pumpe nach Anspruch 5, **dadurch gekennzeichnet, daß** die Betätigungsmittel Mittel zur automatischen Steuerung der Winkelposition der Platte (22) bezüglich der Drehgeschwindigkeit der Antriebswelle (14) aufweisen.
 9. Hydraulikmotor/-pumpe nach Anspruch 8, **dadurch gekennzeichnet, daß** die automatischen Steuerungsmittel ein Ventil (145) aufweisen, um die Zylinder (31; 131; 231) für eine Drehbetätigung der Platte (22) zu blockieren, wobei das Ventil (145) zwischen den Einstellventilen (44) und Zylindern (31; 131; 231) angeordnet ist.
 10. Hydraulikmotor/pumpe nach Anspruch 1, **dadurch gekennzeichnet, daß** die Mittel zum Durchführen der Drehbetätigung der Platte (22) handbetätigte Mittel sind.
 11. Hydraulikmotor/-pumpe nach Anspruch 10, **dadurch gekennzeichnet, daß** die handbetätigten Mittel eine Stange (151) aufweisen, wobei ein Ende der Stange mit einem Ende einer Schraube (152) verbunden ist, wobei das andere Ende aus dem Gehäuse (11) des Hydraulikmotors hervorsteht und mit einem Handbetätigungsgriff (151a) einstückig ausgebildet ist, wobei die Stange mit einem Sitz (152a) versehen ist, um in die Radialerstreckung (22b) der Platte (22) einzugreifen.
 12. Hydraulikmotor/-pumpe nach Anspruch 11, **dadurch gekennzeichnet, daß** die Stange (151) zum Betätigen der Platte (22) ein freies Ende besitzt, welches entgegengesetzt ist zu jenem Ende, welches mit der Schraube verbunden ist, wobei das freie Ende in der Form einer Gabel (151a) ausgebildet ist, um in einen Endlagenstift (153) einzugreifen.
 13. Hydraulikmotor/-pumpe nach Anspruch 10, **dadurch gekennzeichnet, daß** die handbetätigten Mittel ein Ventil (41) zum Verteilen des Fluides aufweisen, um die handbetätigten Zylinder (31; 131) anzutreiben.
 14. Hydraulikmotor/-pumpe nach Anspruch 1, **dadurch gekennzeichnet, daß** die Mittel zum Durchführen der Rotation der Platte (22) direkt mit der Motorzufuhr verbunden sind.

Revendications

1. Moteur/pompe hydraulique comprenant un dispositif

- pour régler l'avance, et qui est équipé de propulseurs (13) qui actionnent un arbre d'entraînement (14a) monté sur une came désaxée (14) et d'un groupe rotatif (20) pour distribuer le fluide qui actionne les propulseurs (13), qui comprend au moins une plaque (22) située entre le groupe rotatif distributeur (20) lui-même et les conduits d'alimentation (13a) des propulseurs (13), laquelle plaque est fixée de manière axiale et montée folle par rapport à l'arbre d'entraînement (14a), et comprenant en plus des moyens d'actionnement (31 ; 131 ; 231 ; 151) qui sont conçus pour coopérer avec ladite plaque (22) pour un fonctionnement rotatif de celle-ci par rapport à la came (14), ladite rotation pouvant être enclenchée dans les deux sens de manière à produire un réglage de phase angulaire correspondant entre la came désaxée (14) et la plaque (22), ladite plaque (22) étant montée de manière coaxiale sur un prolongement (14a) de l'arbre d'entraînement, ladite plaque (22 ; 122b) comportant au moins une extension radiale (22b) qui est conçue pour coopérer avec lesdits moyens d'actionnement (31 ; 131 ; 231 ; 331),
- caractérisé(e) en ce que** lesdits moyens d'actionnement (31 ; 131 ; 231 ; 151) sont disposés de manière tangentielle par rapport à la plaque (22).
2. Moteur/pompe hydraulique selon la revendication 1, **caractérisé(e) en ce que** lesdits moyens pour l'actionnement rotatif de la plaque (22) comprennent au moins un cylindre à double refoulement (231), dont le piston (232) comporte un siège (232a) destiné à un engagement avec ladite extension radiale (22b) de la plaque.
 3. Moteur/pompe hydraulique selon la revendication 1, **caractérisé(e) en ce que** lesdits moyens d'actionnement rotatif de la plaque (22) comprennent une paire de cylindres opposés (131) avec un piston commun (132) qui comporte un siège (132a) destiné à un engagement avec ladite extension radiale (22b) de la plaque.
 4. Moteur/pompe hydraulique selon la revendication 1, **caractérisé(e) en ce que** lesdits moyens pour l'actionnement rotatif de la plaque (22) comprennent une paire de cylindres opposés (31) dont les pistons (32) associés sont disposés sur les côtés opposés de ladite extension radiale (22b) de la plaque (22) sur laquelle ils exercent par alternance une action de poussée.
 5. Moteur/pompe hydraulique selon la revendication 2, ou 3, ou 4, **caractérisé(e) en ce que** lesdits cylindres (31 ; 131 ; 231 ; 331) sont alimentés de manière à être comprimés/évacués à l'aide de moyens d'actionnement (40 ; 140 ; 150) correspondants.
 6. Moteur/pompe hydraulique selon la revendication 5, **caractérisé(e) en ce que** lesdits moyens destinés à alimenter les cylindres (31) pour l'actionnement rotatif de la plaque (22) sont du type automatique.
 7. Moteur/pompe hydraulique selon la revendication 6, **caractérisé(e) en ce que** lesdits moyens d'actionnement automatiques comprennent au moins un capteur (41, 41 a) qui est conçu pour détecter la vitesse de rotation de l'arbre d'entraînement (14) et émettre un signal électrique correspondant, au moins un dispositif (42) destiné à transformer ledit signal électrique en un signal destiné à actionner une vanne (43) de répartition du fluide qui actionne les cylindres (31 ; 131 ; 231) et au moins une soupape de dosage (44) disposée en aval de ladite vanne de répartition (43).
 8. Moteur/pompe hydraulique selon la revendication 5, **caractérisé(e) en ce que** lesdits moyens d'actionnement comprennent des moyens pour le contrôle automatique de la position angulaire de la plaque (22) en fonction de la vitesse de rotation de l'arbre d'entraînement (14).
 9. Moteur/pompe hydraulique selon la revendication 8, **caractérisé(e) en ce que** lesdits moyens de contrôle automatiques comprennent une vanne (145) destinée à bloquer les cylindres (31 ; 131 ; 231) pour l'actionnement rotatif de la plaque (22), disposée entre lesdites soupapes de réglage (44) et les cylindres (31 ; 131 ; 231).
 10. Moteur/pompe hydraulique selon la revendication 1, **caractérisé(e) en ce que** lesdits moyens destinés à faire tourner la plaque (22) sont du type manuel.
 11. Moteur/pompe hydraulique selon la revendication 10, **caractérisé(e) en ce que** lesdits moyens d'actionnement manuels se composent d'une tige (151), dont une extrémité est reliée à une extrémité d'une vis (152), dont l'autre extrémité saille à l'extérieur du carter (11) du moteur et est solidaire d'un bouton d'actionnement manuel (152a), ladite tige étant munie d'un siège (151a) destiné à un engagement avec l'extension radiale (22b) de la plaque (22).
 12. Moteur/pompe hydraulique selon la revendication 11, **caractérisé(e) en ce que** ladite tige (151) pour l'actionnement de la plaque (22) comporte une extrémité libre opposée à celle qui est reliée à la vis sous la forme d'une fourche (151a) destinée à un engagement avec une broche de fin de course (153).
 13. Moteur/pompe hydraulique selon la revendication 10, **caractérisé(e) en ce que** les moyens d'actionnement manuels se composent d'une vanne (41) de répartition du fluide destinée à actionner les cylin-

dres (31 ; 131) actionnés manuellement.

14. Moteur/pompe hydraulique selon la revendication 1, **caractérisé(e) en ce que** lesdits moyens destinés à faire tourner la plaque (22) sont directement reliés à l'alimentation du moteur.

10

15

20

25

30

35

40

45

50

55

Fig.1

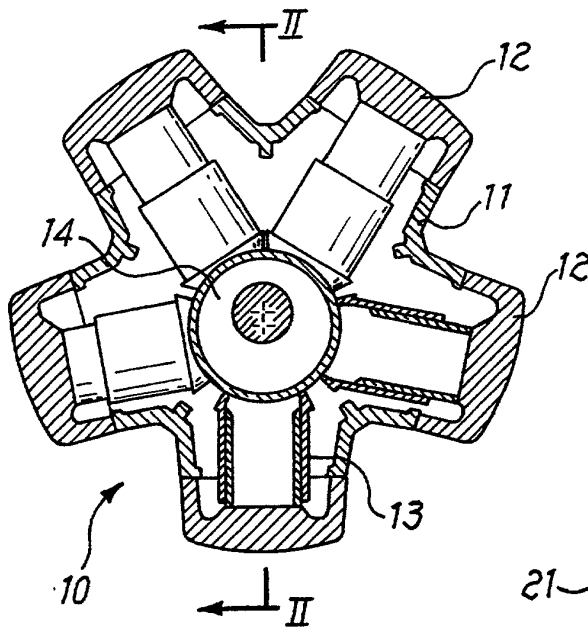


Fig.2

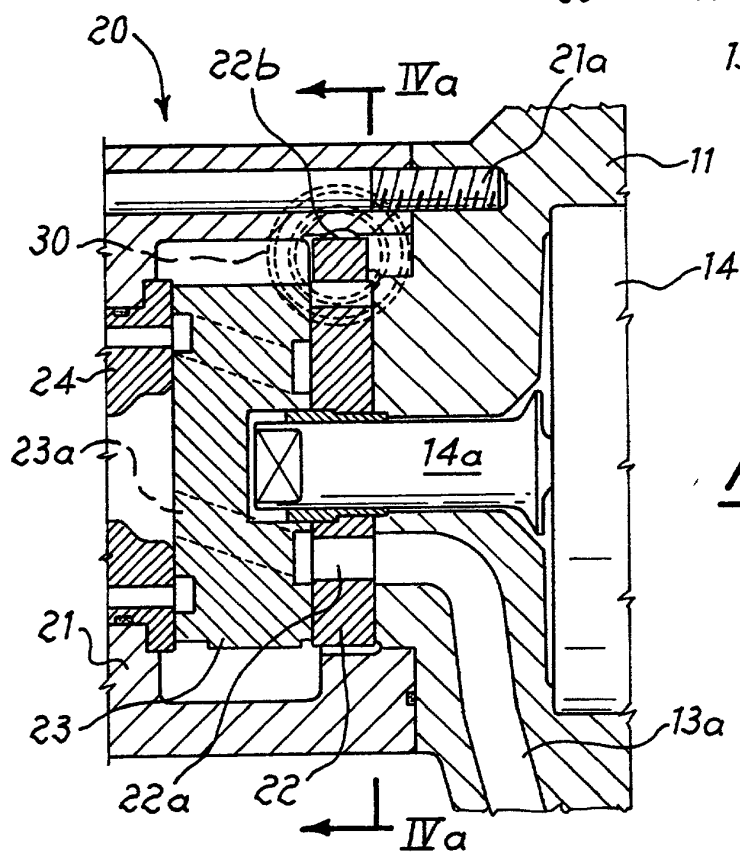
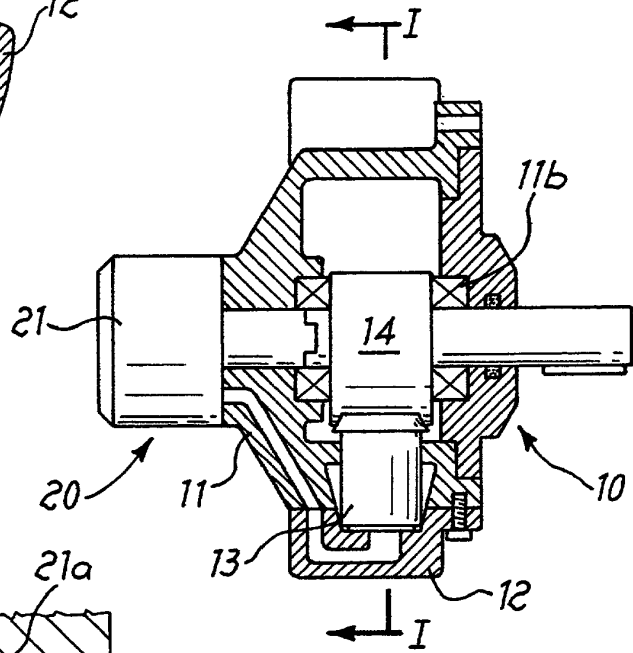


Fig.3

Fig. 4a

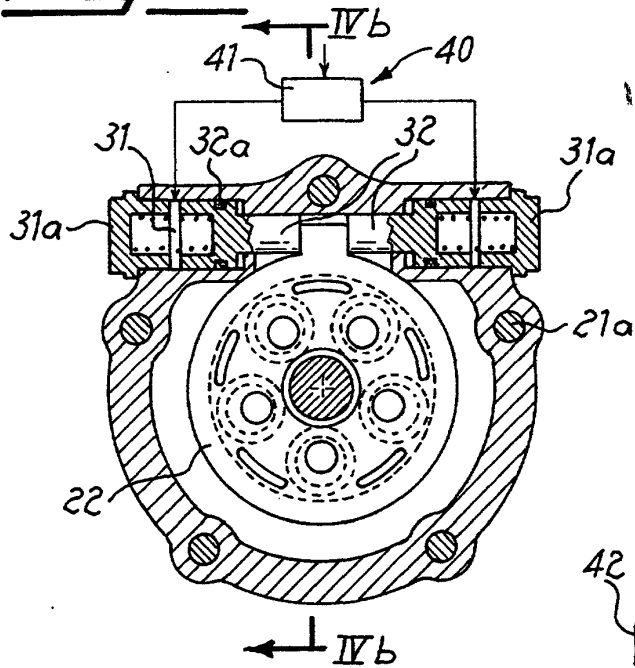


Fig. 4b

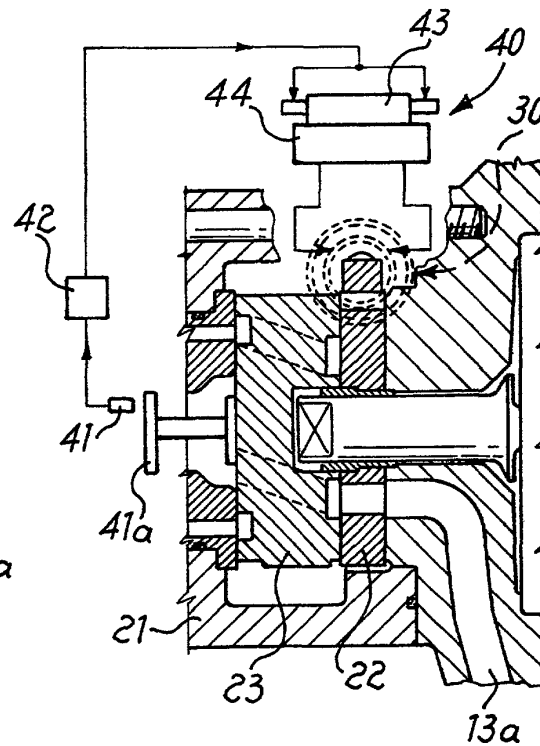


Fig. 5a

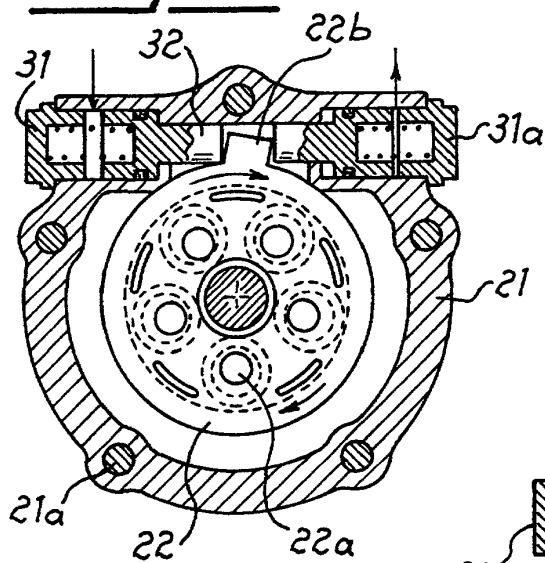


Fig. 5b

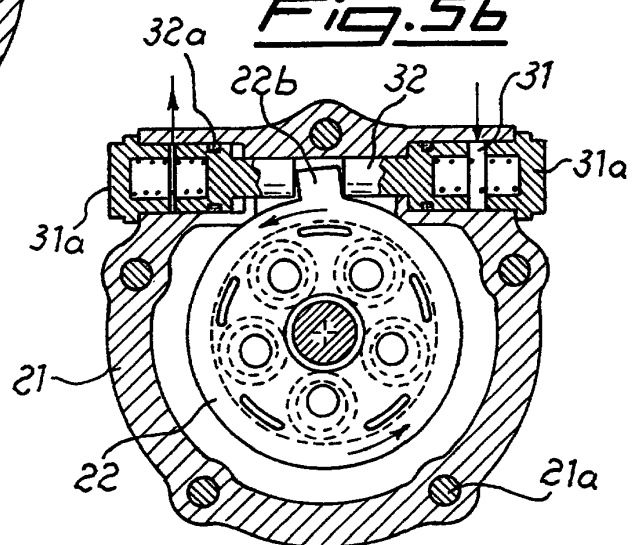


Fig. 6a

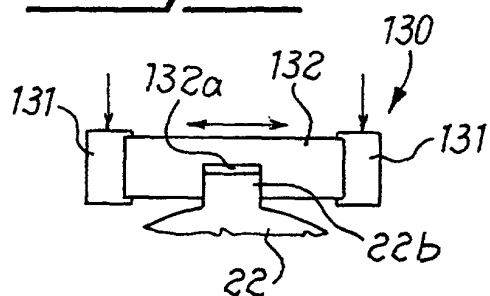


Fig. 6b

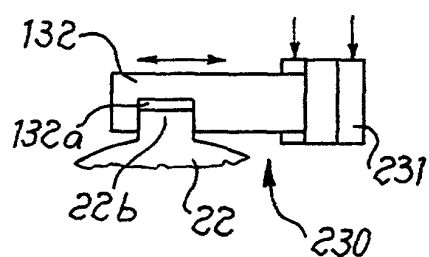


Fig. 7b

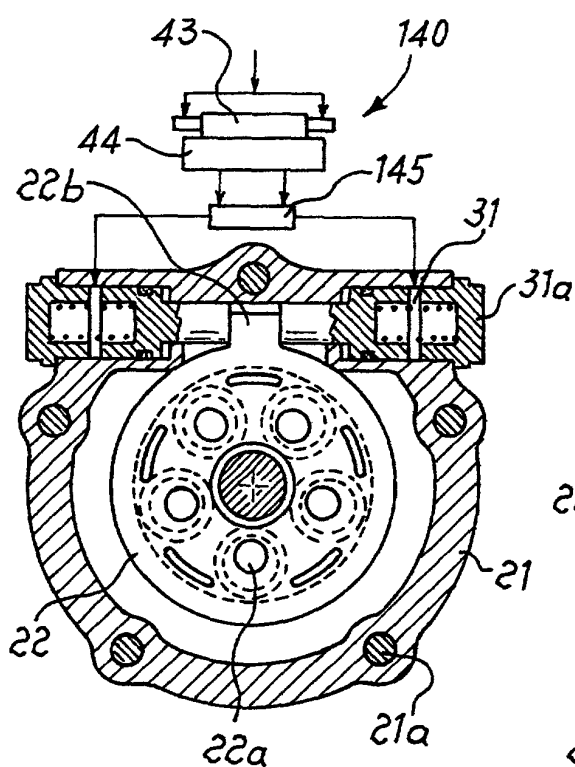


Fig. 7a

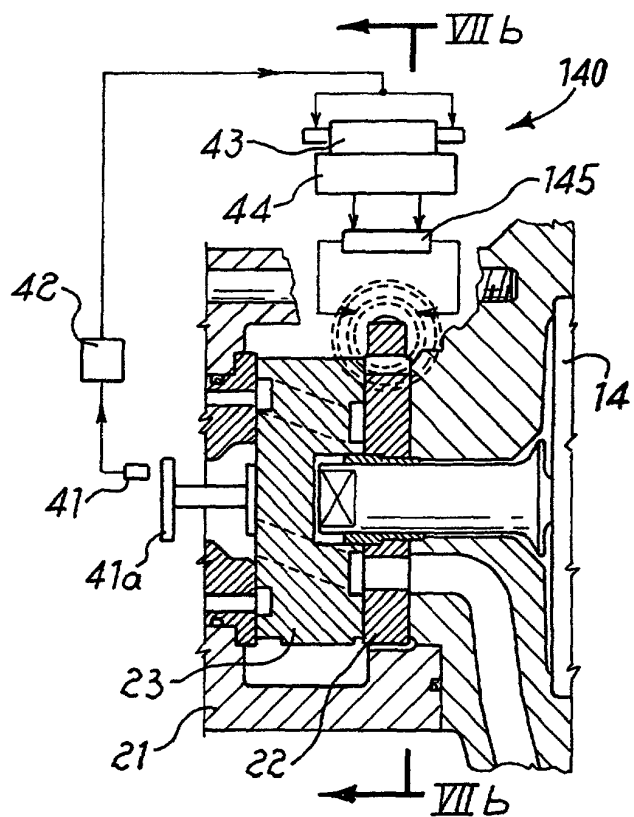


Fig. 8

