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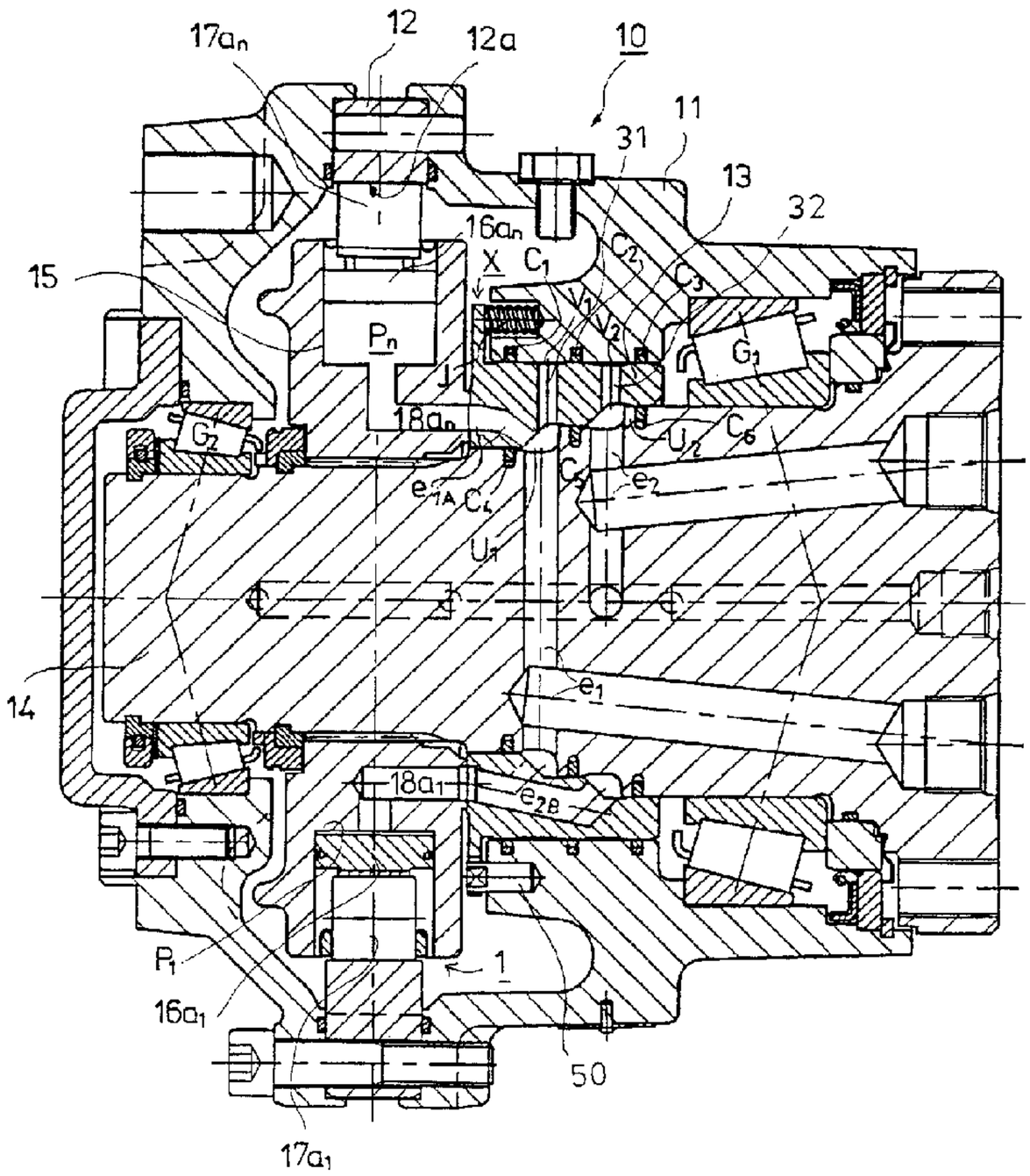
(54) **MOTEUR HYDRAULIQUE A PISTONS RADIAUX**
(54) **RADIAL PISTON HYDRAULIC MOTOR**



(57) L'invention concerne un moteur hydraulique à pistons radiaux (10) comprenant un ou plusieurs blocs-cylindres (1) qui sont mis en position stationnaire, lesdits blocs-cylindres contenant des mécanismes de pistons ($16a_1$, $16a_2$; $17a_1$, $17a_2$...) qui se déplacent radialement

(57) The invention concerns a radial-piston hydraulic motor (10), which comprises one or several cylinder groups (1) placed in a stationary position, which cylinder groups contain piston mechanisms ($16a_1$, $16a_2$,; $17a_1$, $17a_2$...) moving radially back and

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en va-et-vient. Les mécanismes de pistons ($16a_1$, $16a_2$; $17a_1$, $17a_2$...) comprennent un piston ($16a_1$, $16a_2$...) et une roue de pression ($17a_1$, $17a_2$...). On fait circuler un fluide hydraulique dans les espaces cylindres (p_1, p_2...) des mécanismes de pistons de manière à ce que les roues de pression ($17a_1$, $17a_2$...) des pistons ($16a_1$, $16a_2$...) qui sont en phase de travail soient pressées avec force contre la face ondulée (12a) de la couronne à cames (12) afin de communiquer à cette dernière un mouvement de rotation. La couronne à cames (12) est reliée à un carter (11), ce dernier étant relié à une vanne de distribution (13) qui régule l'écoulement en temps voulu d'un fluide sous pression acheminé vers les espaces cylindres (p_1, p_2...) des pistons ($16a_1$, $16a_2$...) qui sont en phase de travail; en même temps, la vanne de distribution (13) relie les espaces cylindres (p_1, p_2...) des pistons ($16a_1$, $16a_2$...) qui commencent leur mouvement de retour pour baisser la pression. La conception de cet équipement permet d'inverser le sens de rotation du moteur par l'inversion du flux de fluide s'écoulant à travers la vanne de distribution (13). Le fluide passe vers la vanne de distribution (13) à travers un ensemble de canaux (e_1, e_2) faits dans l'arbre (14), mis en position stationnaire conjointement avec une ou plusieurs douilles de cylindres (15) faisant partie des blocs-cylindres (1). Selon cette invention, le distributeur (13) comprend un canal (31) qui communique avec une source de pression de travail et s'ouvre sur la face latérale (13a) du distributeur (13). La force s'applique à la face latérale (13 a) du distributeur (13) par le biais du fluide sous pression de travail.

forth. The piston mechanisms ($16a_1$, $16a_2$; $17a_1$, $17a_2$...) comprise a piston ($16a_1$, $16a_2$) and a press wheel ($17a_1$, $17a_2$...). A hydraulic fluid is passed into the cylinder spaces (p_1, p_2...) of the piston mechanisms so that the press wheels ($17a_1$, $17a_2$...) of the pistons ($16a_1$, $16a_2$...) that are at a power stage are pressed with force against the wave-shaped face (12a) of the cam ring (12) and bring the cam ring (12) into a revolving movement. The cam ring (12) is connected with a box frame (11) and the box frame (11) with a distributor valve (13), which controls the pressurized fluid flow at the correct time into the cylinder spaces (p_1, p_2...) of the pistons ($16a_1$, $16a_2$...) that are at the power stage, and that, at the same time, the distributor valve (13) connects the cylinder spaces (p_1, p_2) of the pistons ($16a_1$, $16a_2$...) that start their return movement to a lower pressure. In the equipment, the sense of rotation of the motor can be reversed by reversing the direction of flow of the fluid through the distributor valve (13). The fluid is passed to the distributor valve (13) through the sets of ducts (e_1, e_2) in the shaft (14) which is placed in a stationary position together with the cylinder frame(s) (15) of one or several cylinder groups (1). In the distributor (13) in accordance with the invention, there is a duct (31), which communicates with the power pressure and which is opened on the side face (13a) of the distributor (13). In this connection the force is applied, through the fluid at the power pressure, to the side face (13a) of the distributor (13).

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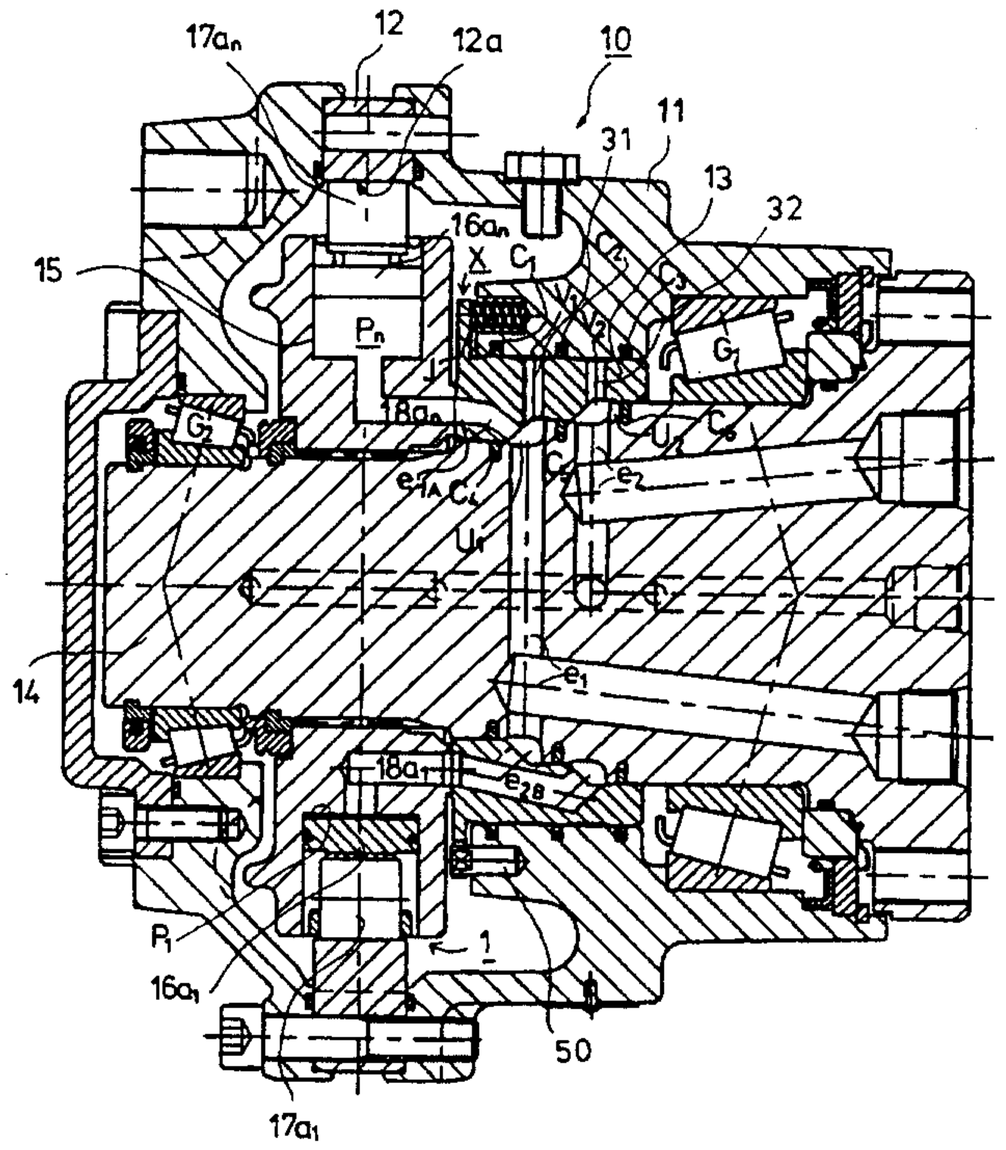
(54) Title: RADIAL PISTON HYDRAULIC MOTOR

(57) Abstract

The invention concerns a radial–piston hydraulic motor (10), which comprises one or several cylinder groups (1) placed in a stationary position, which cylinder groups contain piston mechanisms ($16a_1$, $16a_2$,; $17a_1$, $17a_2$...) moving radially back and forth. The piston mechanisms ($16a_1$, $16a_2$; $17a_1$, $17a_2$...) comprise a piston ($16a_1$, $16a_2$) and a press wheel ($17a_1$, $17a_2$...). A hydraulic fluid is passed into the cylinder spaces (p_1, p_2...) of the piston mechanisms so that the press wheels ($17a_1$, $17a_2$...) of the pistons ($16a_1$, $16a_2$...) that are at a power stage are pressed with force against the wave–shaped face (12a) of the cam ring (12) and bring the cam ring (12) into a revolving movement. The cam ring (12) is connected with a box frame (11) and the box frame (11) with a distributor valve (13), which controls the pressurized fluid flow at the correct time into the cylinder spaces (p_1, p_2...) of the pistons ($16a_1$, $16a_2$...) that are at the power stage, and that, at the same time, the distributor valve (13) connects the cylinder spaces (p_1, p_2) of the pistons ($16a_1$, $16a_2$...) that start their return movement to a lower pressure. In the equipment, the sense of rotation of the motor can be reversed by reversing the direction of flow of the fluid through the distributor valve (13). The fluid is passed to the distributor valve (13) through the sets of ducts (e_1, e_2) in the shaft (14) which is placed in a stationary position together with the cylinder frame(s) (15) of one or several cylinder groups (1). In the distributor (13) in accordance with the invention, there is a duct (31), which communicates with the power pressure and which is opened on the side face (13a) of the distributor (13). In this connection the force is applied, through the fluid at the power pressure, to the side face (13a) of the distributor (13).



Radial-piston hydraulic motor

The invention concerns a radial-piston hydraulic motor.

From the prior art, solutions of radial-piston hydraulic motors are known in which a box frame is rotated and in which the box frame is connected with a distributor attached to the box frame. The distributor is a what is called distributor valve, which comprises bores placed parallel to the longitudinal axis of the distributor sleeve and opening on the front face of the distributor. Inlet ducts pass into the distributor, and outlet ducts pass out of the distributor. The inlet ducts open on the front face of the distributor, and so do the outlet ducts. The ducts at each particular time concerned in the distributor valve communicate alternatingly with pistons spaces, which piston spaces comprise pistons and press wheels connected with the pistons, said press wheels being fitted to move against a cam ring fitted in connection with the box frame. Thus, some of the pistons are in a power stage, and some are not. Pressurized medium is passed into the pistons that are at the power stage through the ducts in the distributor, and in a corresponding way, those pistons that have by-passed the power stage discharge fluid through the distributor through the outlet ducts in the distributor. The press wheels provided on the pistons press the cam ring provided on the box frame. The cam ring has a wave-formed shape, the cam ring and the connected box frame being rotated by means of the press wheels. In order that the distributor should operate as well as possible, the front face of the distributor must be in tight glide fitting against the front face of the cylinder frame, which cylinder frame comprises the ducts passing into the piston spaces.

In practice, it has been noticed that the pressurized fluid attempts to work/distort the distributor, and, thus, the contact on said front faces tends to deteriorate.

In view of avoiding this problem, in the present patent application, it is suggested as a solution that the distributor comprises ducts which pass to its side face and which open in annular grooves on the side face of the distributor. In this way it is possible to avoid torques that distort the distributor by passing the force to the side faces of the distributor. The distributor preferably comprises bores passing into a first annular groove on the side face and into a second annular groove on the side face. The first annular groove communicates with the power pressure ducts, and the second annular groove communicates with the return ducts. However, when the sense of rotation of the motor is reversed, the functions of said ducts can be changed so that the power pressure ducts become return ducts, and the return ducts become power pressure ducts. Favourably, on the distributor, on its cylindrical face, there are seals between the annular grooves. Thus, leakage through the annular grooves is prevented. The seals have been fitted favourably at the ends of annular projection edges on the side face of the distributor in separate seal cavities, which are placed on the revolving box frame. The seals are composed of annular seals.

The radial-piston hydraulic motor in accordance with the present invention is characterized in what is stated in the patent claims.

In the following, the invention will be described with reference to some preferred embodiments of the invention illustrated in the figures in the accompanying drawings, the invention being, yet, not supposed to be confined to said embodiments alone.

Figure 1A is a sectional view of a radial-piston hydraulic motor in accordance with the invention.

Figure 1B is an illustration of principle of the coupling and joint operation between the cam ring and the pistons.

Figure 2 shows the area X subject of the present invention in connection with the distributor in Fig. 1A in an enlarged scale.

Figure 3A shows the distributor viewed from the end.

Figure 3B is a sectional view taken along the line I—I in Fig. 3A.

Figure 3C is a sectional view taken along the line II—II in Fig. 3A. The distributor comprises separate ducts passing to the side face of the distributor.

Figure 4A shows an embodiment of the invention in which the pressure is applied to one pressure medium space V_1 only in connection with the side face of the distributor valve.

Figure 4B shows the area A_{10} out of Fig. 4A in an enlarged scale.

Fig. 1A is a sectional view of a radial-piston hydraulic motor 10. Fig. 2 shows the area X subject of the present invention out of Fig. 1A in an enlarged scale. The radial-piston hydraulic motor 10 comprises a rotated box frame 11. The box frame 11 is connected with a cam ring 12. In the embodiment shown in the figure, the box frame 11 is rotated, and the box frame is connected with a distributor 13 placed in a stationary position. The distributor 13 is a distributor valve, which comprises a number of axial bores $e_{1A};e_{2B}$, which communicate with the inlet duct e_1 and the outlet duct e_2 in the central shaft 14. The distributor 13 revolves along with the box frame 11, and the pressurized ducts e_{1A} and the return fluid ducts e_{2B} enter alternatingly into contact with the duct ends of the flow ducts $18a_1,18a_2\ldots$ passing into the cylinder spaces $p_1,p_2\ldots$ for the pistons $16a_1,16a_2\ldots$ provided in the cylinder frame 15. Thus, some of the pistons $16a_1,16a_2\ldots$ in the cylinders are at a power stage, in which case the pressurized medium is passed through the distributor 13 into the cylinder spaces $p_1,p_2\ldots$, and some of the pistons $16a_1,16a_2\ldots$ are at an idle stage, in which case fluid is passed out of the cylinder spaces p_1,p_2 of said pistons $16a_1,16a_2\ldots$ through the distributor 13 into the outlet duct e_2. The non-revolving cylinder frame 15 provided on the non-revolving central shaft 14 comprises a cylinder group 1, and in the cylinder frame 15 there are a number of cylinder spaces $p_1,p_2\ldots$ and a number of pistons $16a_1,16a_2\ldots$ in said cylinder spaces. The piston

$16a_1,16a_2...$ has been fitted to move in the piston space $p_1,p_2...$ by the effect of the fluid pressure introduced into said piston space. As is shown in the figure, each piston 16 comprises a press wheel $17a_1,17a_2...$ of circular section freely mounted on the top face of the piston. When the piston $16a_1,16a_2...$ is pressed with force against the wave-shaped face 12a of the cam ring 12, the cam ring 12 and the connected box frame 11 and the distributor valve 13 connected with the box frame 11 can be made to revolve. Through the ducts 31 and 32, a pressurized medium is passed into the groove V_1 and V_2 provided on the face 13a of the distributor 13. In this connection, an annular radial power effect is produced in the grooves V_1,V_2, and the distributor 13 is kept straight, and its front face f is sealed so that no lateral leakage of fluid occurs through the front face f.

The box frame 11 has been mounted to revolve on the bearings G_1 and G_2 in relation to the central shaft 14.

In the figure, a spring is denoted with the letter J. By means of the spring, the front face of the distributor valve 13 is pressed against the front face of the cylinder frame 15. The function of the spring J is, in the starting situation, to provide an initial force by whose means the dividing face between the parts 13 and 15 is kept tight. The shapes of the spaces U_1,U_2 in the pressure ducts have been chosen so that, after a pressure has been generated in the ducts, the pressure acts upon the distributor valve 13 and presses it with a force axially against the front face of the cylinder frame 15.

Fig. 1B is an illustration of principle of the interaction between the cam ring 12 and the pistons $16a_1,16a_2$. Some of the pistons $16a_1,16a_2$ are at a power pressure, and some of the pistons have been connected through the distributor 13 to the side of the lower return pressure.

As is shown in Fig. 2, the distributor 13 comprises the ducts 31 and 32. The ducts 31 communicate with the annular space U_1 between the central shaft 14 and the distributor 13 and with the annular groove V_1 on the side face of the distributor 13.

Further, the inlet duct e_1 passes into said annular space U_1. The annular groove V_1 on the side face of the distributor has been sealed towards the sides by means of the seal N_1,C_1 and N_2,C_2. Likewise, the annular space U_1 between the central shaft 14 and the distributor 13 has been sealed by means of the seals C_4 and C_5 provided on the shaft. Into the annular space U_1, the pressurized medium, i.e. the power pressure, is passed through the duct e_1. Out of the annular space U_1, ducts e_{1A} pass to the front face of the distributor and further to the pistons. The ends of the ducts e_{1A} are denoted with the reference letters A in Fig. 3A. The annular seals C_1, C_2 and C_3 are placed in annular cavities O_1, O_2 and O_3 in the box frame 11. The seal rings N_1, N_2 and N_3 proper of the seal extend into the cavities O_1, O_2 and O_3. What is concerned is a seal of two parts, which consists of an O-ring C_1, C_2 and C_3 of rubber and of its support ring, i.e. a seal ring N_1, N_2 and N_3, which is favourably made of a teflon-bronze alloy.

The outlet duct e_2 is opened into the second annular space U_2 between the central shaft and the distributor, out of which space a duct 32 passes into the annular groove V_2 placed on the side face of the distributor. The annular groove V_2 has been sealed towards the sides by means of seals N_2,C_2 and N_3,C_3 passing around the distributor. Out of the annular space U_2, ducts e_{2B} also open to the front face f of the distributor 13, and through said ducts e_{2B} the fluid that is displaced by the pistons $16a_1$,$16a_2$ that are not at a power stage is passed first into the annular space U_2 and further into the return duct e_2. When the sense of rotation of the motor is reversed, the functions of the ducts are changed. The seals C_4, C_5 and C_6 are placed on the shaft 14 in its grooves O_4, O_5 and O_6. The seals C_4 and C_5 are placed at both sides of the annular space U_1, and the seals C_5 and C_6 are placed at both sides of the annular space U_2, so that no leakage of fluid takes place towards the sides through the boundary faces between the distributor 13 and the shaft 14.

Fig. 3A shows the distributor as viewed from ahead. Fig. 3B is a sectional view taken along the line I—I in Fig. 3A. Fig. 3C is a sectional view taken along the line II—II in Fig. 3A.

In Fig. 3A, the reference letters A denote the duct ends of the power pressure ducts e_{1A} on the front face f of the distributor 13. The ducts e_{1A} open at the opposite end in the annular space U_1 between the central shaft 14 and the distributor 13. The end openings of the return ducts e_{2A} are denoted with the reference letters B. Said ducts e_{2B} open in the annular space U_2 between the central shaft 14 and the distributor 13 and further in the return duct e_2.

Fig. 3B is a sectional view taken along the line I—I in Fig. 3A. As is shown in the figure, a duct e_{1A} passes from the annular space U_1 in the distributor to the front face f of the distributor. Similarly, from the other annular space U_2, which has been formed between the distributor 13 and the central shaft 14, a return duct e_{2B} passes to the front face f.

Fig. 3C is a sectional view taken along the line II—II in Fig. 3A. As is shown in Fig. 3C, the ducts 31 open at opposite sides of the distributor 13 on the side face 13a of the distributor 13 in the first annular groove V_1 on the side face and, similarly, from the annular space U_2, at opposite sides of the distributor, the ducts 32 open on the side face 13a of the distributor in the second annular groove V_2 on the side face 13a.

In the embodiment illustrated in the figures above, the fluid at the power pressure has been passed into a groove V_1,V_2 provided on the side face of the distributor which groove is defined both by the construction of the distributor and by the opposite backup face, which is composed of the box frame 11 in the embodiments described above. The box frame 11 has been connected with the distributor valve 13 so that the box frame 11 rotates the distributor valve 13. Said coupling has been permitted by means of cotter pins 50, which are illustrated in the figures above. Between the face T_1 of the box frame 11 and the face 13a of the distributor valve 13, there is a glide fitting. Said arrangement permits application of a backup force against the distributor by passing a pressure into the grooves V_1,V_2. The cotter pin 50 transfers the rotation torque to the distributor valve 13, in which connection the distributor valve 13 revolves while rotated by the box frame 11. The play of the

cotter pin, however, permits an axial movement of the distributor valve 13, in which connection, by means of the spring force of the spring J and by means of hydraulic pressure, the distributor valve 13 can be pressed against the cylinder frame in order that a tight dividing face could be obtained.

Within the scope of the present invention, an embodiment as shown in Figs. 4A and 4B is also possible, in which the groove V_2 has been formed in the same way as in the embodiments described above on the side face 13a of the distributor valve 13, but the backup face is the inner face 60' of a separate ring 60. The ring 60 is placed freely on the face 13a of the distributor valve 13 between the shoulder 130 on the distributor valve 13 and the locking ring 70. The seal construction is similar to that in the embodiments described above, and the ring 60 comprises seals N_1,C_1 and N_2,C_2 pressed against the distributor valve 13 and fitted in the grooves in the ring so as to seal the space V_2 towards the sides, while the space V_2 has, in this embodiment, been formed in the ring 60 on its inner face 60'.

In the embodiment shown in Figs. 4A and 4B, the box frame 11 has been connected by means of cotter pins 80 with the locking ring 70, while the locking ring 70 has been connected with the distributor valve 13 by means of pins 90. The cotter pin 80 has been connected with the locking ring 70 with a loosely fitting glide fitting, in which case an axial movement between the distributor valve 13 and the connected locking ring 70 is permitted. The cotter pins 80 and 90 interconnect the parts 13, 70 and the box frame 11 so that the rotation torque is transferred to the distributor valve 13 from the box frame 11. Thus, the distributor valve 13 revolves while rotated by the box frame 11 and along with the box frame. The ring 60 is placed freely with a glide fitting on the side face 13a of the distributor 13. The space V_2 communicates with the pressurized fluid duct through the duct 32.

In order that the distributor valve 13 could revolve reliably in relation to the central shaft and in order that there should not be any resistance to rotation, the locking ring 70 must be connected with the box frame 11 so that a certain radial movement is also permitted for the locking ring in relation to the central shaft 14. Said radial

movement is permitted so that a groove a_1 has been made into the locking ring 70, into which groove a_1 a pin 90 has been fitted. The pin 90 is further connected with a pin hole a_2 in the distributor valve 13. Thus, the locking ring 70 is kept axially in a stationary position in relation to the distributor valve 13, but a certain radial movement is permitted for the locking ring. Thus, the locking ring 70 can position itself freely in a suitable radial position. On the other hand, by means of the cotter pin 80 between the locking ring 70 and the box frame 11, an axial movement is permitted for the distributor valve 13, but the locking ring 70 and the box frame 11 are kept radially immobile in relation to one another. By means of the cotter pin 80 passed through the holes b_1 in the locking ring 70, the rotation drive and the torque are, however, transferred from the box frame 11 to the distributor valve 13.

In the embodiment of the invention shown in Figs. 4A and 4B, the pressurized medium is passed into one annular space V_2 only, which space has been fitted in the right-side end of the distributor, as shown in the figure. In practice, it has been noticed that this part of the distributor valve 13 is less rigid, in which case the greatest advantage is obtained from the arrangement in accordance with the invention so that the pressure space V_2 is placed in said portion of the distributor valve 13. Thus, in the embodiment shown in Figs. 4A and 4B, there is one groove V_2 only, which has been made onto the inner face 60' of the ring 60 in this embodiment, and said groove communicates with the duct 32 and further with the rest of the system of ducts in the way shown in the figures. The embodiment shown in these figures can also be such that it is fully similar to the earlier embodiments, and, thus, there are two grooves, i.e. the grooves V_1 and V_2, on the inner face 60' of the ring 60. The arrangement of supply of the pressure medium is similar to that of the earlier embodiment. Figs. 4A and 4B, however, show a simplified embodiment, in which the supply of pressure has been arranged at the portion of the construction at which a compensation of forces is expressly needed.

Claims

1. A radial-piston hydraulic motor (10), which comprises one or several cylinder groups (1) placed in a stationary position, which cylinder groups contain piston mechanisms ($16a_1$,$16a_2$;$17a_1$,$17a_2$...) moving radially back and forth, which piston mechanisms ($16a_1$,$16a_2$;$17a_1$,$17a_2$...) comprise a piston ($16a_1$,$16a_2$...) and a press wheel ($17a_1$,$17a_2$...), and in which equipment a hydraulic fluid is passed into the cylinder spaces (p_1,p_2...) of the piston mechanisms so that the press wheels ($17a_1$, $17a_2$...) of the pistons ($16a_1$,$16a_2$...) that are at a power stage are pressed with force against the wave-shaped face (12a) of the cam ring (12) and bring the cam ring (12) into a revolving movement, and that the cam ring (12) is connected with a box frame (11) and the box frame (11) with a distributor valve (13), which controls the pressurized fluid flow at the correct time into the cylinder spaces (p_1,p_2...) of the pistons ($16a_1$,$16a_2$...) that are at the power stage, and that, at the same time, the distributor valve (13) connects the cylinder spaces (p_1,p_2) of the pistons ($16a_1$,$16a_2$...) that start their return movement to a lower pressure, and in which equipment the sense of rotation of the motor can be reversed by reversing the direction of flow of the fluid through the distributor valve (13), and that the fluid is passed to the distributor valve (13) through the sets of ducts (e_1,e_2) in the shaft (14) which is placed in a stationary position together with the cylinder frame(s) (15) of one or several cylinder groups (1), **characterized** in that, in the distributor (13), there is a duct (31), which communicates with the power pressure and which is opened on the side face (13a) of the distributor (13), in which connection the force is applied, through the fluid at the power pressure, to the side face (13a) of the distributor (13).

2. A radial-piston hydraulic motor as claimed in claim 1, **characterized** in that the means for passing the pressurized medium to the side face (13a) of the distributor (13) consist of a duct (31) which has been formed into the distributor (13) and which communicates with a groove (V_1) provided on the side face (13a) of the distributor (13), which groove runs preferably around the distributor (13).

3. A radial-piston hydraulic motor as claimed in the preceding claim, **characterized** in that the duct (31) is opened at one end in the groove (V_1) placed between the side face (13a) of the distributor (13) and the box frame (11) and, at the opposite end, in an annular space (U_1), which has been formed between the central shaft (14) and the distributor (13) and from which annular space ducts (e_{1A}) pass to the front face (f) of the distributor, and the distributor (13), when it revolves, distributes the pressurized medium further to the pistons ($16a_1$,$16a_2$...) at the power stage.

4. A radial-piston hydraulic motor as claimed in any of the preceding claims, **characterized** in that the groove (V_1) has been formed onto the side face of the distributor, and that the groove has been sealed towards the sides by means of O-ring seals (C_1,C_2) and by means of seal rings (N_1 and N_2), which have been fitted into seal cavities (O_1,O_2) provided in the box frame (11).

5. A radial-piston hydraulic motor as claimed in any of the preceding claims, **characterized** in that there is a second duct (32), which communicates with the return fluid flow coming from the pistons ($16a_1$,$16a_2$...).

6. A distributor as claimed in the preceding claim, **characterized** in that the duct (32) that is connected with the return fluid flow is opened into the annular groove (V_2) placed on the side face (13a) of the distributor (13) and, from the opposite end, in the annular space (U_2) provided between the central shaft (14) and the distributor (13), from which annular space (U_2) ducts (e_{2B}) pass to the front face (f) of the distributor and into the outlet duct (e_2), and that the annular groove (V_2) has been sealed towards the sides by means of O-ring seals (C_2 and C_3) and seal rings (N_2 and N_3), which have been fitted into the seal cavities (O_2,O_3) in the box frame (11).

7. A radial-piston hydraulic motor as claimed in any of the preceding claims, **characterized** in that, when the sense of rotation of the hydraulic motor is reversed, the pressurized medium is passed into the duct (e_2) and further into the annular space (U_2) and further through said space into the second annular groove (V_2) provided on the side face (13a) of the distributor (13) and to the front face (f) of the

distributor, and similarly, the return flow from the pistons ($16a_1$,$16a_2$...) is passed through the ducts (e_{1A}) into the annular space (U_1) between the distributor and the shaft and further, through said space, into the return duct (e_1), in which connection the functions of the sets of ducts have been reversed in respect of the power pressure and the return pressure, as compared with the reversed drive of sense of rotation.

8. A radial-piston hydraulic motor as claimed in any of the preceding claims, **characterized** in that the radial-piston hydraulic motor comprises seals (C_4,C_5 and C_6) in connection with the annular spaces (U_1 and U_2) placed between the distributor (13) and the shaft (14), in which connection, at both sides of the annular space (U_1), there are the seals (C_4 and C_5), and at both sides of the annular space (U_2), there are the seals (C_5 and C_6), in which way leakage through the boundary face between the central shaft (14) and the distributor (13) is prevented.

9. A radial-piston hydraulic motor as claimed in claim 1, **characterized** in that the pressurized medium is passed into a space (V_2), preferably a groove, placed between the side face (13a) of the distributor (13) and a separate ring (60) fitted around the distributor (13).

10. A radial-piston hydraulic motor as claimed in the preceding claim, **characterized** in that the groove (V_2) has been formed on the inner face (60') of the ring (60), and that the groove (V_2) has been sealed at both sides by means of seals (N_2,C_2, N_3,C_3).

11. A radial-piston hydraulic motor as claimed in the preceding claim, **characterized** in that the ring (60) has been fitted between a shoulder (130) on the side face of the distributor valve (13) and a locking ring (70) connected with the distributor valve (13), and that the locking ring (70) has been coupled with the box frame (11) of the radial-piston hydraulic motor (10) by means of cotter pins (80) so that the locking ring is mobile in the axial direction but has no play in the direction of rotation, in which case, by means of the cotter pins (80), the movement of rotation of the box frame (11) is transferred to the locking ring (70) and further, through the

ring, to the distributor valve (13), in which connection the distributor valve (13) is rotated through the box frame (11) along with the box frame, and in which construction an axial movement of the distributor valve (13) is, however, permitted while a spring (J) presses the front face of the distributor valve (13) tightly against the front face of the cylinder frame (15).

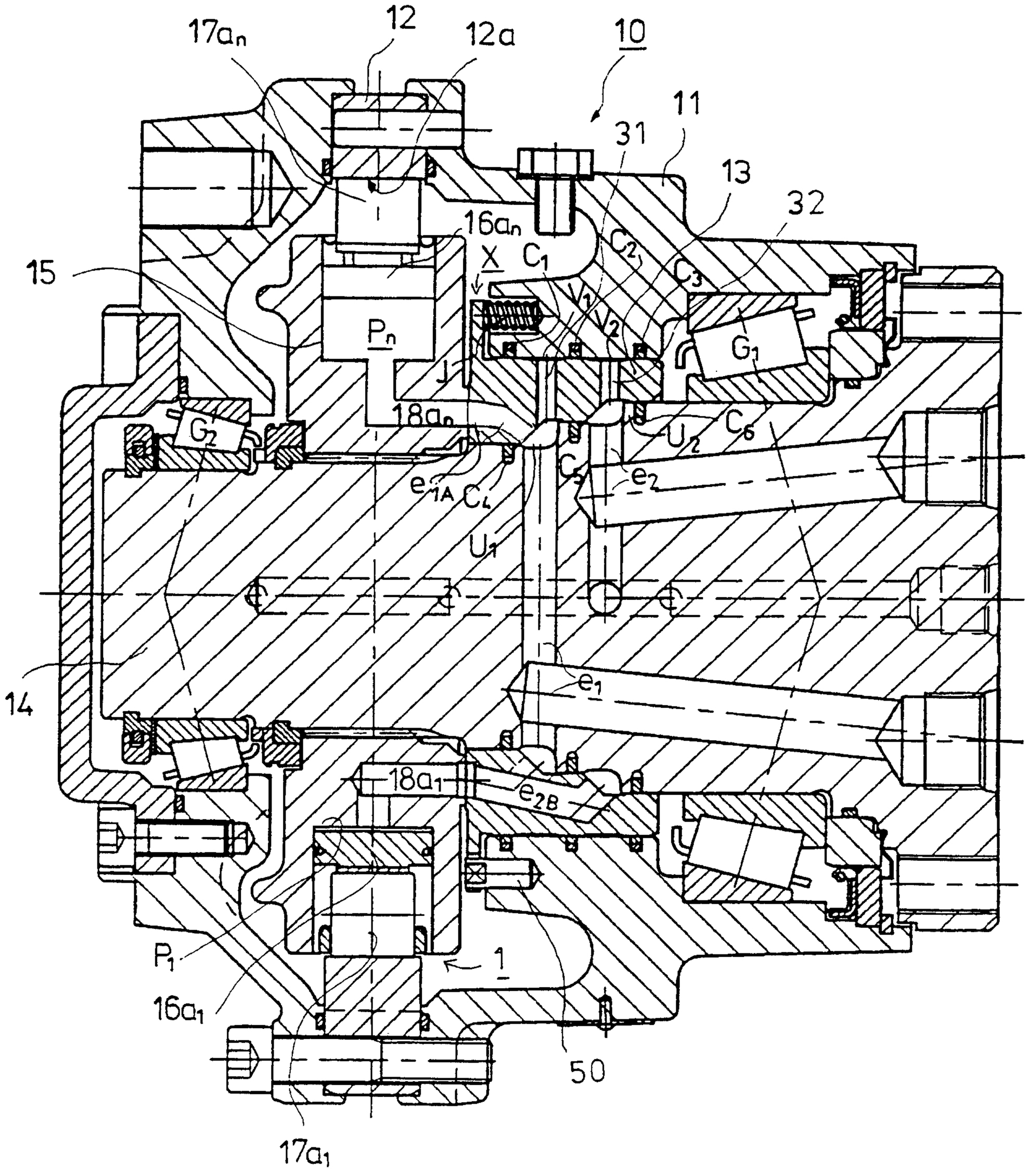

17an
12
12a
10
11
31
13
32
16an
X
C1
C2
C3
15
V1
V2
G1
Pn
J
18an
G2
U2
C6
C5
e2
e1A
C4
U1
14
e1
18a1
e28
P1
1
16a1
50
17a1

FIG. 1A

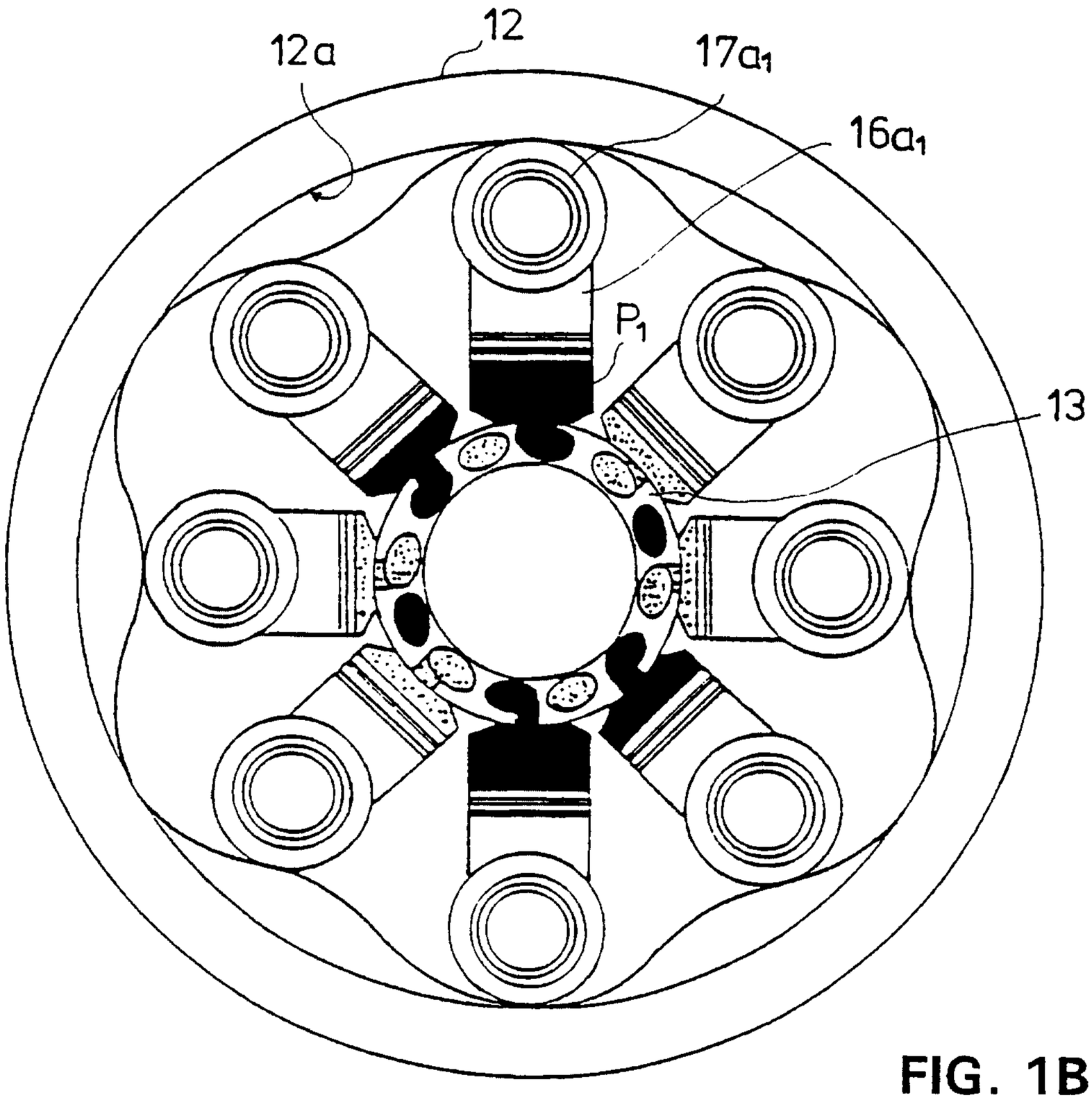

12a
12
17a1
16a1
P1
13

FIG. 1B

FIG. 2

T1
A
11
C1
O1
N1
V1
C2
O2
N2
V2
O3
N3
C3
13
31
130
32
18an
e28
U2
C6
O6
e1A
15
U1
C5
O5
e2
C4
O4
14
e1

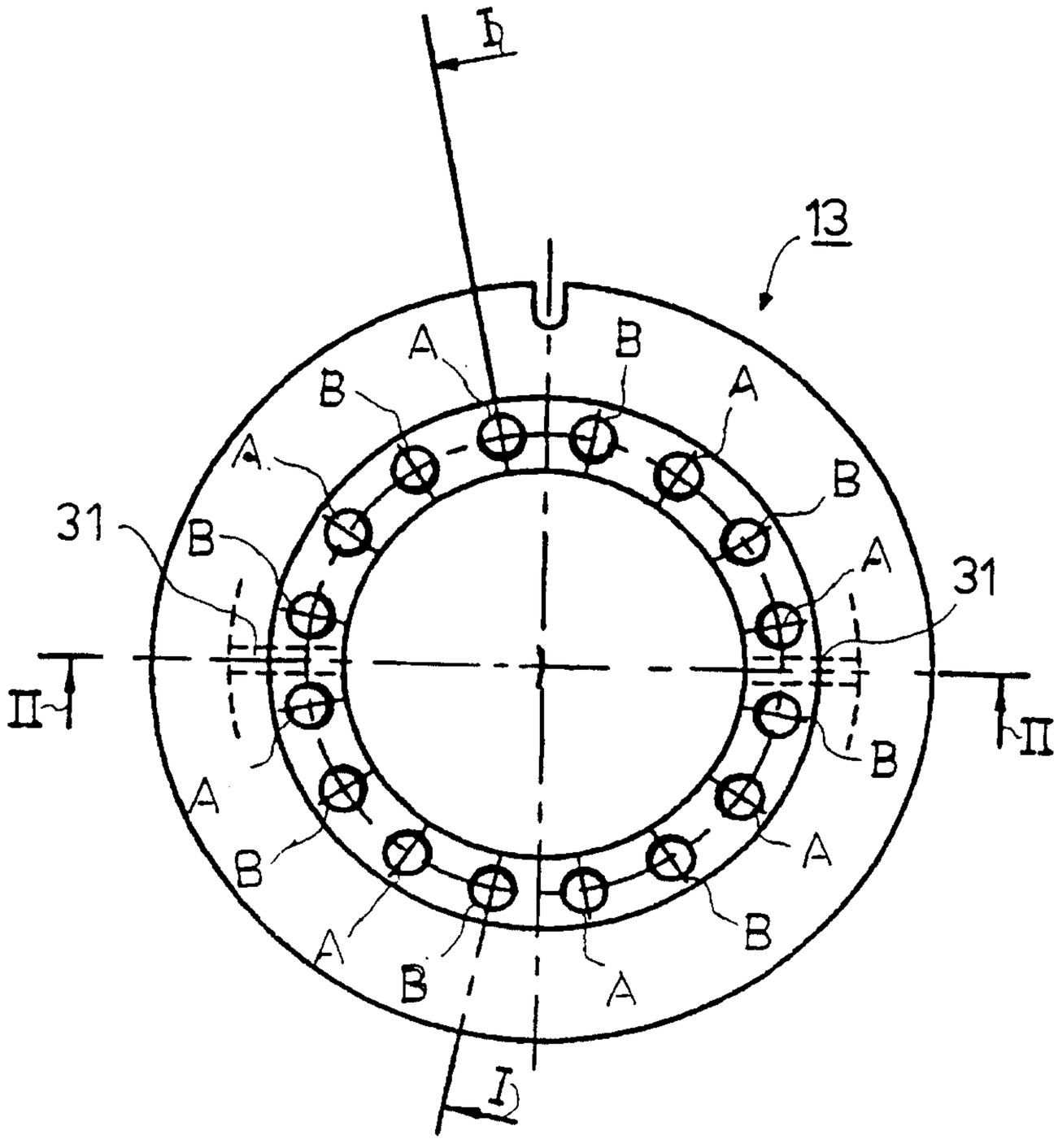


FIG. 3A

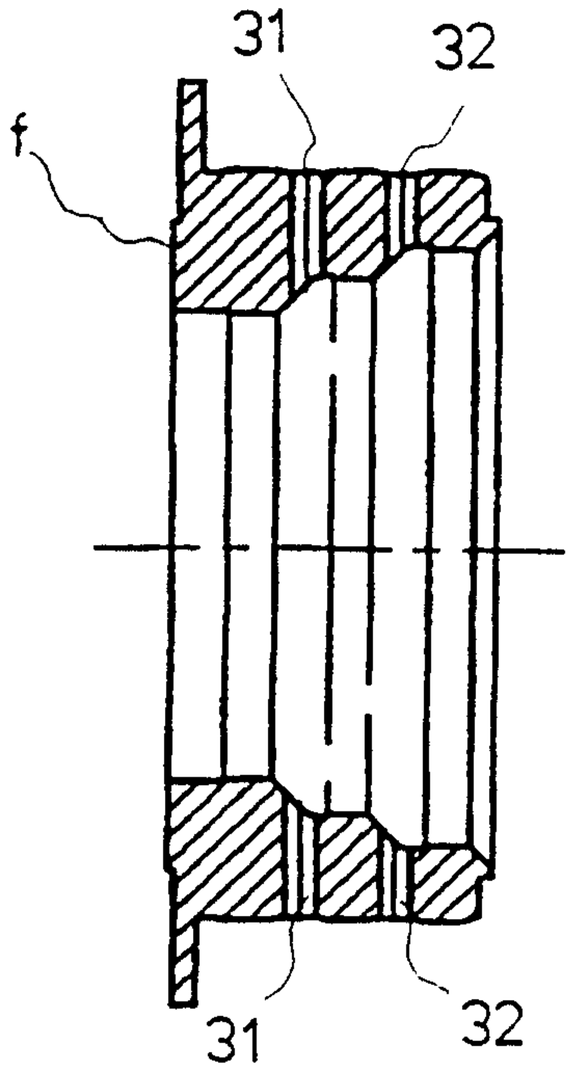


FIG. 3C

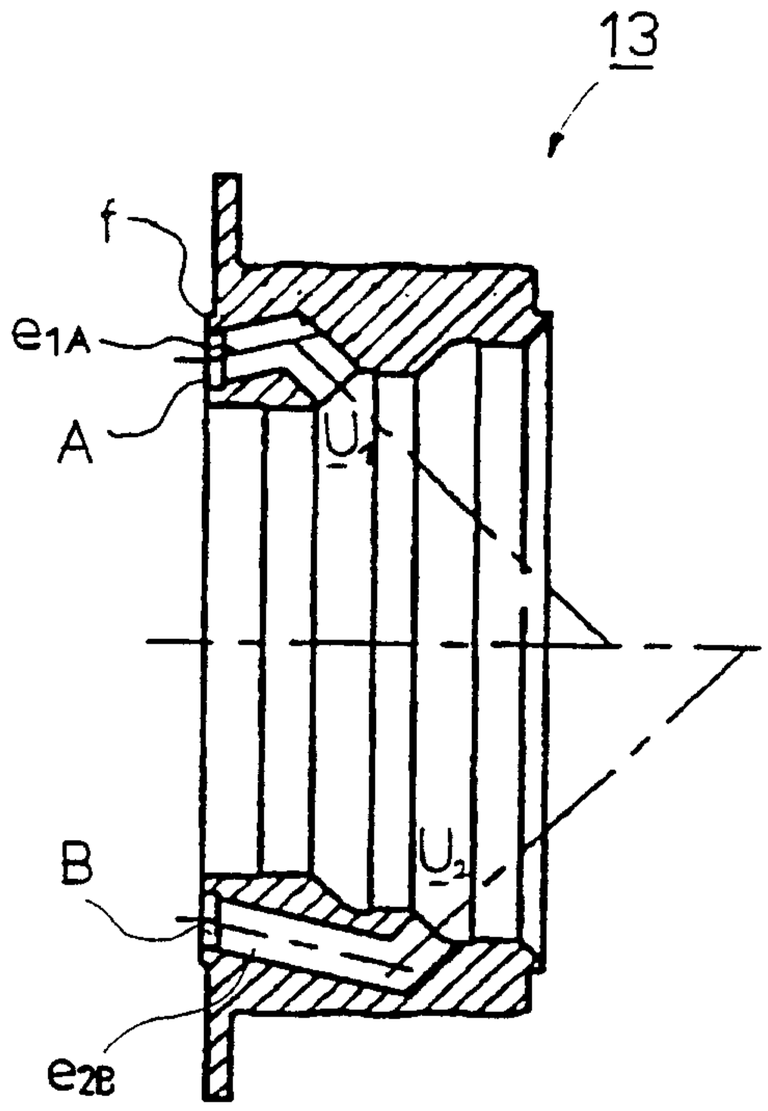


FIG. 3B

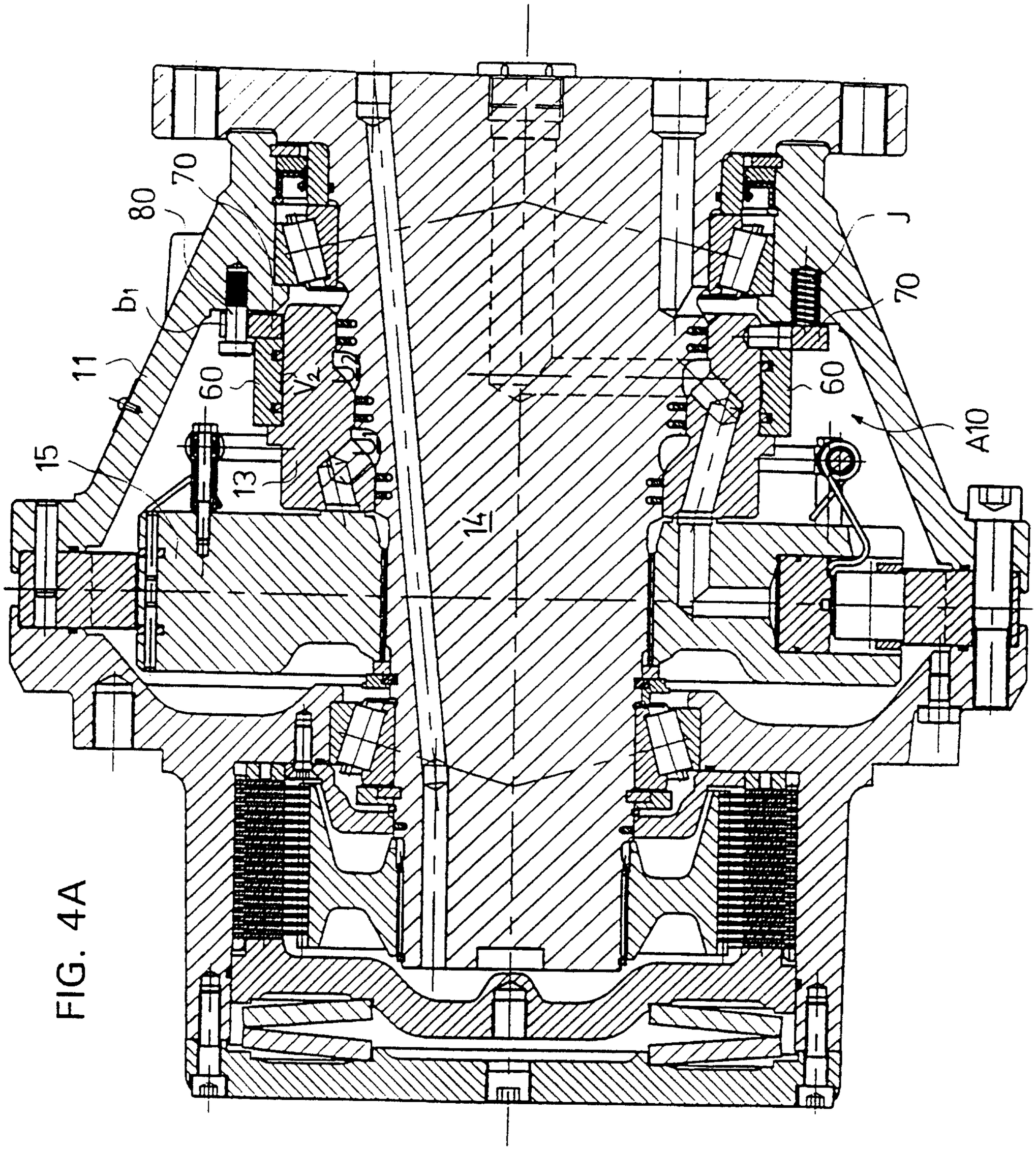


FIG. 4A

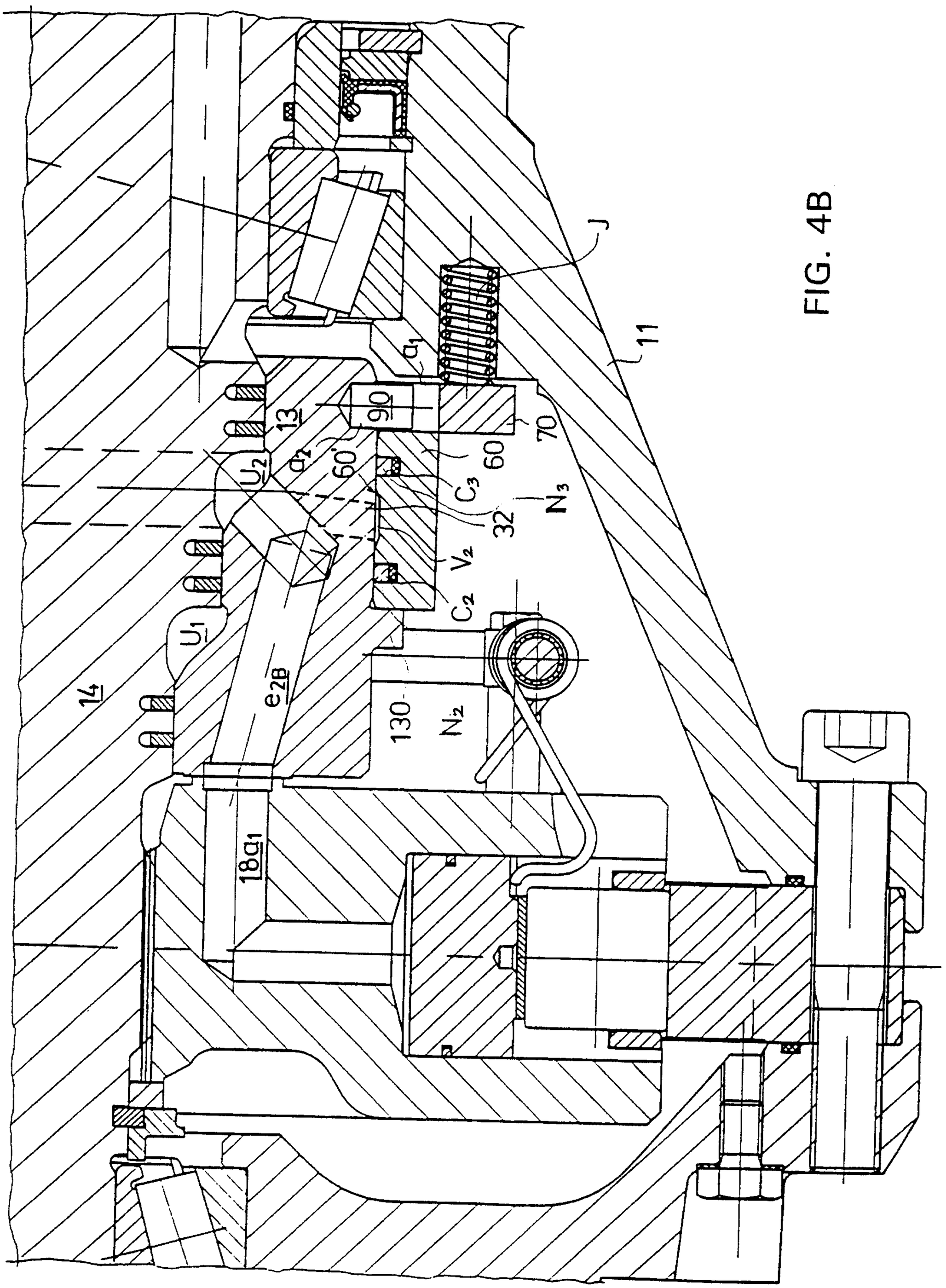


FIG. 4B