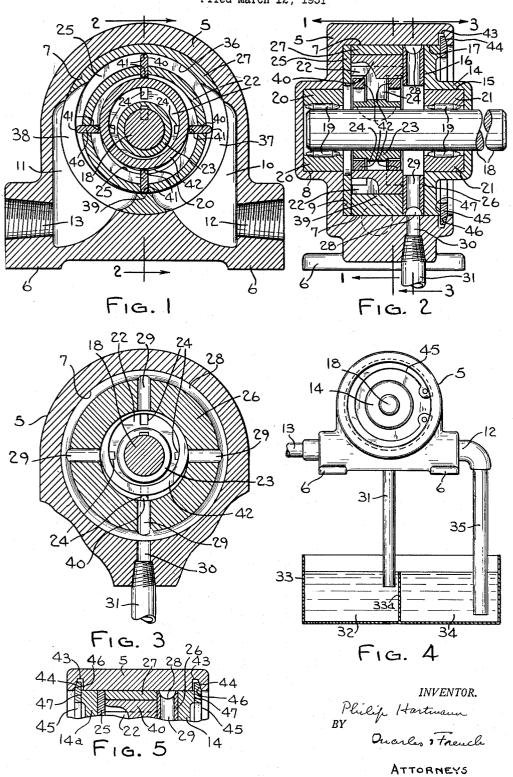
VANE TYPE PUMP OR MOTOR
Filed March 12, 1951



UNITED STATES PATENT OFFICE

2.623.471

VANE TYPE PUMP OR MOTOR

Philip Hartmann, Racine, Wis., assignor to Hartmann Manufacturing Company, Racine, Wis., a corporation of Wisconsin

Application March 12, 1951, Serial No. 215,110

1 Claim. (Cl. 103-136)

The invention relates to vane type pumps or motors.

The main object of the present invention is to provide a new and improved arrangement of housing, working chamber, and pump parts 5 which simplifies the manufacture of pumps or motors of this type and permits a standard size housing to be used with pumps having relatively wide ranges of capacity. According to the present invention, the housing is provided with a bore 10 tain modifications of Fig. 3. to receive the working chamber parts and a bore concentric with the above named bore to receive one of the shaft bearings. This simplifies the machine work on the housing as both the working chamber bore and bearing bore may be 15 turned in one chucking operation of the housing. Also the end plate closing off the open end of the housing is made as a simple flanged plate or disk whose outer periphery has a sliding fit in the working chamber bore of the housing and has a 20 shaft bearing receiving bore concentric with its periphery, so that it may also be finished in one chucking operation. The working chamber parts comprise concentric end plates or rings which slidably fit within the working chamber 25 pump or motor may be run in either direction. bore of the housing and a liner member slidably fitting said working chamber bore of the housing between said end plates and having an eccentric bore which forms the outer wall of the pump chamber. The rotor has a slotted vane 30 receiving body whose peripheral portion is concentric with its shaft and with the housing bore. With the present design the only eccentrically bored part is the liner member, and the capacity of the pump is determined by the eccentricity of $_{35}\,$ the bore 7 in said housing. the bore in said liner member and the outer diameter of the rotor. Thus for a given size or diameter of working chamber bore for the housing, a considerable range of pump capacities may be obtained merely by varying the diameter 40 hereinafter mentioned. of the eccentric bore in the liner and the outer diameter of the rotor working in said liner.

A further object of the invention is to provide a simple and effective arrangement for securing all the working chamber parts and the removable cover plate or plates in assembled relation in the housing by a retaining ring engageable with the housing parts and preferably having a wedging action between these parts, thus doing away with the usual screws or bolts and insuring 50 an efficient pressure engagement between the

The invention further consists in the several features hereinafter described and more particularly defined by the claim at the conclusion 55 hereof.

In the drawings:

Fig. 1 is a vertical sectional view through the pump or motor embodying the invention, taken on the line i—i of Fig. 2;

Fig. 2 is a vertical sectional view of the pump or motor taken on the line 2-2 of Fig. 1, parts being broken away;

Fig. 3 is a detailed vertical sectional view taken on the line 3-3 of Fig. 2;

Fig. 4 is an end elevation view of the improved pump or motor with its sump tank shown in section:

Fig. 5 is a fragmentary sectional view of cer-

Referring to the drawings, the numeral 5 designates a pump housing having a base 6 and a body provided with concentric bores 7 and 8. The bore 7, the working chamber bore, extends inwardly from one side of the housing and has a surface 9 from which the bore 8, the bearing bore extends into the solid side of the body of the housing. Both of the bores 7 and 8 may be machined out in one setting of the housing. Communicating with the bore 7 are passages 10 and 11 connected with passages 12 and 13 formed in the housing. Either the passage 10 or the passage II may be a fluid inlet passage and the other passage a fluid discharge passage, so that the

The pump housing 5 is provided with a cover or end closure member 14 in the form of a disk having a centrally disposed bearing bore 15, an inner flat side 16 and a periphery 17 which slidably fits in the bore 7.

The pump or motor shaft 13 is journalled in needle bearings 19 mounted in race members 20 and 21, respectively fitted in the bores 8 and 15. so that the axis of this shaft is concentric with

A rotor 22 has its hub 23 keyed to the shaft 18 and is preferably of T-shaped section which is provided with a series of radially disposed vane slots 24. The rotor works between the end plates

The working chamber is formed by parts mounted in the housing 5 and comprising end plates 25 and 26 and a liner member 27. The end plate 25 is a flat sided metal ring of an outer diameter to fit the bore 7 and one of whose sides abuts the surface 9 of the housing. The end plate 26 is also a flat sided metal ring of an outer diameter to fit the bore 7 and one of whose sides is adapted to abut the inner side 16 of the cover member 14. The end plate 26 is preferably of the type shown, described, and claimed in my copending application Serial No. 181,720, filed August 28, 1950, for "Vane Type Pump or Motor," whereby the use of a shaft seal is eliminated, and objectionable back pressures due to such seals are avoided, and for this purpose said plate has a peripheral groove 28 connected with the interior of the ring by radially disposed passages 29, the housing 5 having a passage 30 extending into 60 said bore 7 in alinement with the groove 28 to

permit free drainage of oil through the pipe 31 to the output compartment 32 of a sump tank 33 which has an oil intake compartment 34 connected by a pipe 35 to either the passage 12 or 13, said compartments being separated by a partition 33a.

The liner member 27 is a flat sided metal ring of an outer diameter to tightly fit the bore 7 and whose sides abut the rings or plates 25 and 26. The tight or snug fit of the liner in the bore 10 also holds the plate 25 against the side 9 of the housing 5. This liner is provided with a bore 36 which is eccentric to the shaft 18, the outer diameter of the rotor 22 and the bore 7 and has oppositely disposed ports 37 and 38 communicating with the ports 10 and 11 and equidistantly disposed relative to the axis of the rotor 22, so that the pump or motor may be run in either direction without any change since either the ports 37, 10 or 38, 11 may be an inlet port and 20 the other a discharge port. The ports 37 and 38 are centrally located relative to the sides of the member 27 and are of a width less than that of said member, and there is preferably only a short bridge 39 between these ports. The port 30 may 25 enter the bore 7 at any point of its circumference depending on how the pump housing 5 is positioned, and so that the oil will have a gravity discharge to the sump.

A series of vanes 40 in the form of hardened 30 metal rectangular blocks with radially curved end edges 41 are mounted to slide in the slots 24 of the rotor, the length of these vanes being equal to the width of the rotor. These vanes are held in operative position relative to the bore 36 of the liner by a pair of floating metal rings 42 which bear on the back edges 4! of the vanes. said rings being positioned adjacent each side of the web of the T-section of the rotor, as shown in Fig. 2, and serving to cause the vanes to move 40 in a circular path relative to the bore 36 while moving with the rotor and lengthwise of the slots 24 in the same.

With the above construction for any given size of bore 7, pumps or motors with different capac- 45 ities may be produced by varying the diameter of the eccentric bore 36 in the liner 27 and the outer diameter of the rotor 18.

To hold the parts in assembled position, the housing 5, near its open end, is provided with 50 an annular groove 43 whose outer side 44 is tapered. A resilient split retainer ring 45 of known form having a tapered side 46 is adapted to be sprung into the groove 43 and abut at its inner side 47 against the outer side of the cover plate 55 member between said ports at the point of 14, the groove 43 being so located relative to the greatest eccentricity of the inner bore of said length of the bore 7 and the over-all width of the parts 25, 27, 26, and 14 assembled in the bore 1 that the ring 45 through the tapered surfaces 44 and 46 and the cover 14 wedges the end plate 60 bore in said liner member. 26 into firm abutting relation with the liner member 27 and holds the cover 14 in the housing and provides a simple, cheap and easily assembled connection for the parts of the pump above referred to.

In those instances where it is desired to have the pump shaft project through both sides of the housing a ring, similar to the ring 26, may be used in place of the ring 25 and the bore 8 extends straight through.

While the construction shown in Fig. 2 is preferred, the housing 5 may be formed with a straight through bore 7, as shown in Fig. 5, and an end plate 14a similar to the end plate 14 be secured at the other end of this bore by a retainer ring 45 in the same way as the end plate 14 is secured to the housing body.

The pump or motor above described operates in the usual manner of a vane type pump or motor, that is, the vanes 40 and the rotor 22 working in the eccentrically disposed bore 36 in the pump or motor chamber formed by the liner 27 and the plates 25 and 26 associated therewith act to provide expansible and contractible chambers associated with the passages 37, 10 and 38. If whereby when the shaft 18 is driven, the device will act as a pump to discharge pressure fluid through one of said passages, or when pressure fluid is introduced through one of said passages, the device will act as a motor and the rotor 22 with the shaft 18 will be revolved.

I desire it to be understood that this invention is not to be limited to any particular form or arrangement of parts except in so far as such limitations are included in the appended claim.

What I claim as my invention is:

A vane type pump or motor comprising a sectional housing formed of a body part and a cover part, said parts having alined shaft bearings mounted therein and the body part having a large bore concentric with the axes of said bearings, a shaft mounted in said bearings with its axis concentric with said large bore, a ring forming a liner member having a peripheral portion snugly engaging said larger bore and provided with an inner bore eccentrically disposed relative to said large bore, said body part and said liner member having passages providing inlet and outlet ports connected with said bore of the liner member, end plates disposed on opposite sides of said liner member in the form of rings fitting said large bore and forming the sides of the working chamber of the pump or motor, said body part provided with an annular groove extending into said bore and having a tapered side, said cover part snugly engaging said large bore and abutting the adjacent end plate, a split retainer ring engageable with said cover member and having a tapered side in wedging engagement with the tapered side of said groove to firmly hold said liner, end plates and cover in assembled pressure clamped position in said bore, a slotted rotor mounted on said shaft and having a peripheral portion concentric with said large bore and working in the eccentrically disposed inner bore of said liner and having a running fit with said liner liner, vanes slidably mounted in the slots of said rotor, and means for holding the outer edges of said vanes in working contact with the eccentric

PHILIP HARTMANN.

REFERENCES CITED

The following references are of record in the 65 file of this patent:

UNITED STATES PATENTS

70	Number 2,312,655 2,312,891 2,372,816 2,525,619	Name Lauck Ferris Deschamps et al Roth et al	Mar. 2, 1943 - Apr. 3, 1945
----	--	--	--------------------------------