

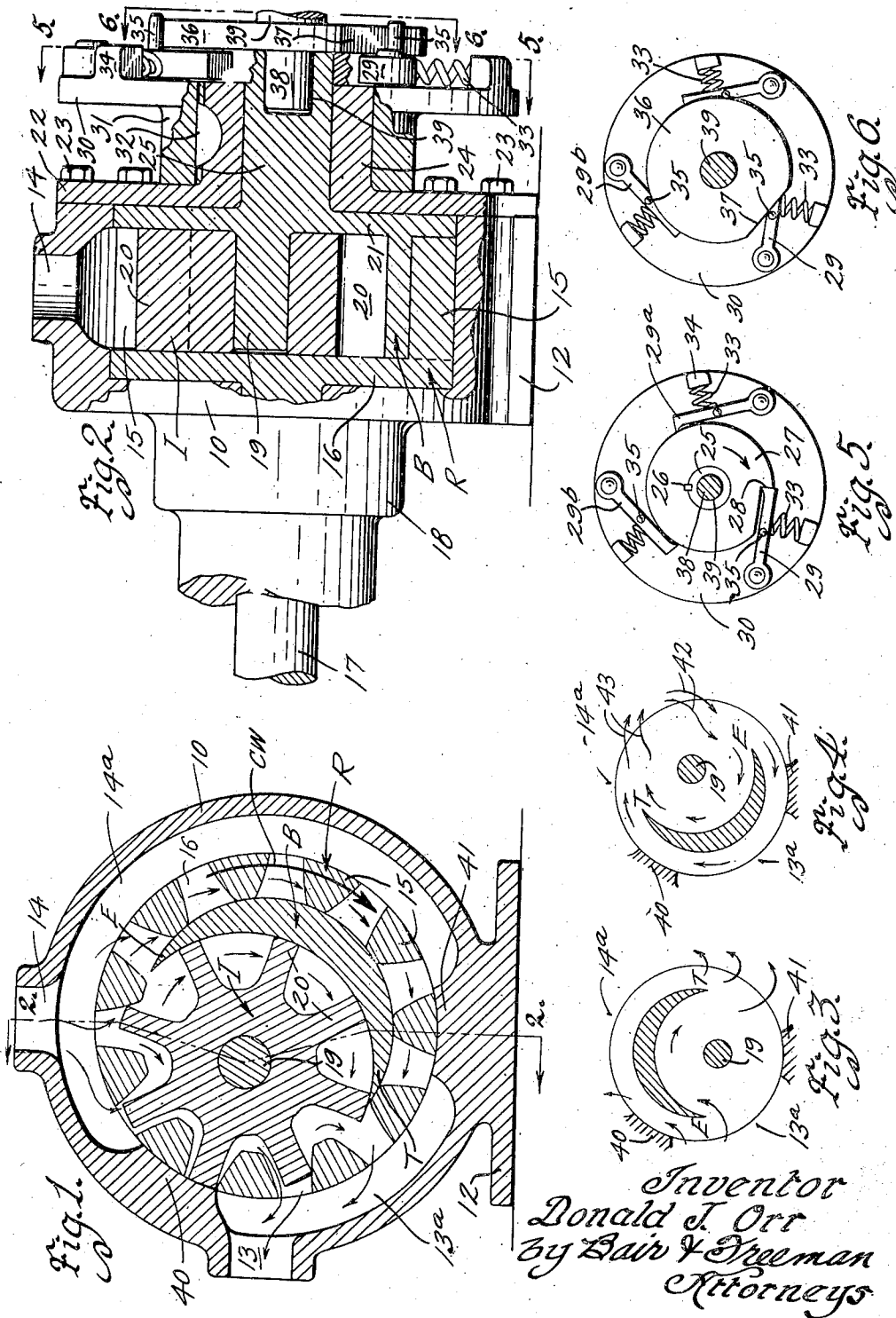
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REVERSIBLE HYDRAULIC PUMP

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REVERSIBLE HYDRAULIC PUMP

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7 Claims. (Cl. 103—3)

My present invention relates to a reversing mechanism for a pump of the type generally known as "Viking."

One object of the invention is to provide a simple and inexpensive means for reversing the action of such a pump without interfering with the operation thereof whereby the pump may be reversed while being driven at its usual speed.

Another object is to provide reversing mechanism in the form of a rotatable supporting means for the crescent-shaped barrier and idler stud of the pump whereby the entering and trailing edges of the barrier may be adjusted for communication with the desired inlet and outlet openings of the pump housing or both arranged in communication with one of them to stop the pumping action while the pump continues to operate.

Still another object is to provide a simple power driven means for moving the adjusting means to any desired position by permitting the fluid resistance in the pump to carry the supporting means for the barrier and stud in the direction of rotation, holding pawls being associated with a notched disk to lock the adjusting means at such position.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawing, wherein:

Figure 1 is a vertical sectional view through a "Viking" type pump which has been modified to include my invention;

Figure 2 is a vertical sectional view on the line 2—2 of Figure 1;

Figures 3 and 4 are diagrammatic views showing different positions of the parts;

Figure 5 is a sectional view, on a reduced scale, on the line 5—5 of Figure 2, showing the holding pawl arrangement; and

Figure 6 is a similar sectional view on the line 6—6 of Figure 2, showing the adjusting cam for the pawls.

On the accompanying drawing I have used the reference numeral 10 to indicate a pump housing. The housing 10 is provided with feed 12 for anchorage purposes. The housing 10 is provided with a pair of openings 13 and 14, either of which may be inlet and the other outlet, as will hereinafter appear.

Within the housing 10 there is a toothed rotor, indicated generally at R, and a toothed idler, indicated generally at I. The teeth of the rotor

R are designated 15, and these teeth are formed on a rotating disk 16. The disk 16 is secured to an operating shaft 17 passing through a bearing 18 of the casing 10. The idler I is rotatable on a stud 19 and has teeth 20. The teeth 15 and 20 mesh with each other, as shown in Figure 1, the mesh being full at the upper left side of Figure 1, but the teeth unmeshing on the lower right side because of the eccentric mounting of the idler relative to the rotor. Between the idler and the rotor a barrier B is provided, the barrier being crescent-shaped and fitting the inner ends of the teeth 15 and the outer ends of the teeth 20.

The foregoing construction is the usual arrangement in a "Viking" pump, and forms no part of my present invention.

In action, the barrier B may be considered as having an entering edge E and a trailing edge T, so that, upon the shaft being driven and rotating the rotor R in a clockwise direction, as indicated by the arrow CW in Figure 1, oil or other fluid being pumped is taken in from the opening 14 and discharged from the opening 13. Unnumbered arrows indicate the path of the oil which enters the spaces between the teeth 15 and 20 adjacent the entering edge E of the barrier B, and these spaces form chambers sealed off by the barrier for carrying the oil toward the trailing edge T of the barrier. Adjacent the trailing edge, where the teeth 15 and 20 commence meshing again, they squeeze the oil out so that it is discharged from the opening 13.

My invention contemplates a reversing mechanism which includes a rotatable supporting disk 21 on which the barrier B and the stud 19 are formed or mounted. This disk is rotatable in the housing 14 between a cover plate 22 for the housing and the rotor R and idler I. The cover plate may be suitably gasketed and held in position as by cap screws 23. The cover plate 22 has a bearing 24 through which a shank 25 of the disk 19 rotatably extends. This shank has secured to its outer end, as by a key 26, a notched disk 27, the notch thereof being indicated at 28. A plurality of holding pawls 29, 29^a and 29^b are pivoted to a stationary disk 30 which, in turn, has a hub 31 secured to the bearing 24 as by a key 32.

The holding pawls 29, 29^a and 29^b are biased toward the notched disk 27 by springs 33 interposed between the holding pawls and lugs 34, projecting from the stationary disk 30. For controlling the holding pawls each one is provided with a projecting pin 35 adapted to contact the periphery of a cam disk 36 or a depression 37 thereof. The cam disk 36 is rotatably mounted,

as by having a stud 38 projecting into a socket 39 of the shank 25. An operating shaft 39 extends from the cam disk 36 to any convenient point where an operating handle may be secured thereto and provided with means to hold it positioned in any one of three positions, as will hereinafter appear.

Practical operation

Considering Figure 1, and the pump rotating clockwise, oil enters the spaces between the teeth of the rotor and idler at the entering edge E of the barrier, and leaves at the trailing edge T thereof. Accordingly, the oil flows from a port 14^a communicating with the opening 14 into a port 13^a communicating with the opening 13. The opening 14 is accordingly an inlet, and the opening 13 an outlet. With the barrier B rotated 240 degrees to the right, it would assume the position shown in Figure 3, and oil would then flow from the port 13^a toward the entering edge E of the barrier, and leave from the trailing edge T. Accordingly, the flow of oil is reversed so that it flows from 13^a to 14^a.

In passing from the position of Figure 1 to the position of Figure 3, the barrier B would assume a position such as shown in Figure 4, so that both the entering and trailing edges E and T communicate with the port 14^a. Accordingly, there can be no displacement of oil from the teeth of the rotor and idler which would then be meshing at the half-way point in the port 14^a instead of between the ports 13^a and 14^a, as in Figure 1, where this point is indicated as 40, or as in Figure 3, where it is indicated as 41. Therefore, the oil would merely rotate around with the teeth and be displaced into the port 14^a as indicated by the arrows 43, and then go back into the teeth from the port 14^a, as indicated by the arrows 42. In this position of the parts the pump can continue to operate without any pumping effect.

By utilizing the arrangement shown in Figures 5 and 6 it is possible to permit the power operating the pump to effect adjustment thereof to either direction, as in Figures 1 and 3, or to the neutral position of Figure 4. For instance, assuming the notched disk 27 in Figure 5 corresponding to the position of the barrier and stud in Figure 1, if the cam disk 36 is rotated one-third turn clockwise, it will lift the pawl 29 and permit the pawl 29^b to drop into the notch 28 as soon as the notch is brought to the position registering with the pawl 29^b. The neutral position of Figure 4 would then be assumed by the supporting disk 21 and its barrier and stud B and 19. Similarly, the cam disk 36 may be rotated another one-third turn for permitting the notch 28 to be stopped by the holding pawl 29^a, whereupon the position of Figure 3 would prevail. Thus I have provided a simple power means for adjusting the pump to its various positions, and, inasmuch as the resistance of the fluid to motion within the pump is sufficient to exert a turning movement on the disk 21, its shank 25 and the disk 27, to rotate them slowly. Obviously, however, the shank 25 could be extended to a control handle which could be moved manually to any of the three positions and locked in that position.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reason-

ably included within their scope without sacrificing any of the advantages thereof.

I claim as my invention:

1. A reversible hydraulic pump comprising a casing having a pair of openings, a toothed rotor, a rotatable shaft for supporting said rotor, a toothed idler meshing therewith and in eccentric relation thereto, a barrier between the teeth of said rotor and idler, said rotor, idler and barrier being mounted within the casing, a supporting disk rotatable in said casing and carrying said barrier, a stud on which said idler rotates, said stud being carried by said supporting disk, and means for rotating said supporting disk for either end of said barrier to communicate with one of said openings and the other end thereof to communicate with the other opening, said means comprising a notched disk connected with said supporting disk, a plurality of holding pawls therefor pivoted to said casing and biased toward the notched disk, and an adjusting cam operable to permit a predetermined one of said holding pawls to drop into the notch of said notched disk.

2. In a pump of the type having a casing provided with a pair of openings, a toothed rotor, a rotatable shaft for supporting said rotor, a toothed idler meshing therewith and in eccentric relation thereto, and a barrier between the teeth of said rotor and idler, said rotor, idler and barrier being mounted within said casing; a supporting disk rotatable in said casing and carrying said barrier and a stud on which said idler rotates, and means for rotating said supporting disk for either end of said barrier to communicate with one of said openings and the other end thereof to communicate with the other opening for flow of pumped fluid through the housing and said openings in either direction, said means for rotating said supporting disk comprising a notched disk connected with said supporting disk, a plurality of holding pawls therefor pivoted to said casing and biased toward the notched disk, and means to permit a predetermined one of said holding pawls to drop into the notch of said notched disk while retaining the other pawls raised.

3. In a hydraulic device of the type having a casing with a pair of openings, a shaft rotatable in said casing, a toothed rotor carried by said shaft, a toothed idler meshing therewith and in eccentric relation thereto, and a barrier between the teeth of said rotor and idler, said rotor, idler and barrier being mounted within the casing; a supporting disk rotatable in said casing and carrying said barrier and a stud on which said idler rotates, and means for rotating said supporting disk for either end of said barrier to communicate with one of said openings and the other end thereof to communicate with the other opening, said means comprising a second disk connected with said supporting disk, a plurality of holding pawls therefor pivoted to said casing and means for engaging a predetermined one of said holding pawls with a predetermined point of said second disk.

4. In a hydraulic device of the type including a toothed rotor, a shaft for supporting said rotor, a toothed idler meshing with said rotor and in eccentric relation thereto, and a barrier between the teeth of said rotor and idler; a supporting disk rotatable in said casing and carrying said barrier and a stud on which said idler rotates, and means for rotating said supporting disk comprising a notched disk connected therewith, a

plurality of holding pawls for said notched disk pivoted to said casing and biased toward the notched disk, and means operable to permit a predetermined one of said holding pawls to drop into the notch of said notched disk.

5. In a reversible hydraulic pump of the type having a casing provided with a pair of openings a shaft journaled in said casing, a toothed rotor supported by said shaft, a toothed idler meshing therewith and in eccentric relation thereto, and a barrier between the teeth of said rotor and idler, said rotor, idler and barrier being mounted within the casing; a supporting disk rotatable in said casing and carrying said barrier and a stud on which said idler rotates, and means for rotating said supporting disk for either end of said barrier to communicate with one of said openings and the other end thereof to communicate with the other opening for flow of pumped fluid through the housing and said openings in either direction or to position both ends of the barrier in communication with one of said openings to prevent fluid from being pumped while permitting the pump to continue in operation, said means for rotating said supporting disk comprising a notched disk connected therewith, a plurality of holding pawls therefor pivoted to said casing, and an adjusting means operable to engage a predetermined one of said holding pawls with the notch of said notched disk while retaining the remaining pawls disengaged therefrom.

6. In a reversible hydraulic pump of the type having a casing provided with a pair of openings, a shaft journaled in said casing, a toothed rotor supported by said shaft, a toothed idler meshing therewith and in eccentric relation thereto, and a barrier between the teeth of said rotor and idler, said rotor, idler and barrier being mounted within the casing; a supporting disk rotatable in said casing and carrying said barrier and a stud on which said idler rotates, and means for rotating said supporting disk for either end of said barrier to communicate with one of said openings and the other end thereof to communicate with

the other opening for flow of pumped fluid through the housing and said openings in either direction or to position both ends of the barrier in communication with one of said openings to prevent fluid from being pumped while permitting the pump to continue in operation, said means for rotating said supporting disk comprising a notched disk connected therewith and rotatable by fluid resistance in the pump, three holding pawls for said notched disk pivoted to said casing and means for engaging the notch of said supporting disk with any one of said holding pawls.

7. In a reversible hydraulic pump of the type having a casing provided with a pair of openings, a toothed rotor, a rotatable shaft for supporting said toothed rotor, a toothed idler meshing therewith and in eccentric relation thereto, and a barrier between the teeth of said rotor and idler, said rotor, idler and barrier being mounted within the casing; a supporting disk rotatable in said casing and carrying said barrier and a stud on which said idler rotates, and means for rotating said supporting disk for either end of said barrier to communicate with one of said openings and the other end thereof to communicate with the other opening for flow of pumped fluid through the housing and said openings in either direction or to position both ends of the barrier in communication with one of said openings to prevent fluid from being pumped while permitting the pump to continue in operation, said means for rotating said supporting disk comprising a disk connected therewith and rotatable by fluid resistance in the pump, said disk having a single notch, and three means carried by said casing for selectively engaging said notch at any one of three different positions by releasing the means that is in engagement with the notch, said three means being biased to notch engaging position whereby the next successive means engages the notch when said means that is in engagement with the notch is disengaged therefrom.

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