Nov. 29, 1960 H. A. MEYER ET AL 2,961,967

AUTOMATIC REVERSING TURBINE PUMP

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FIG. 2

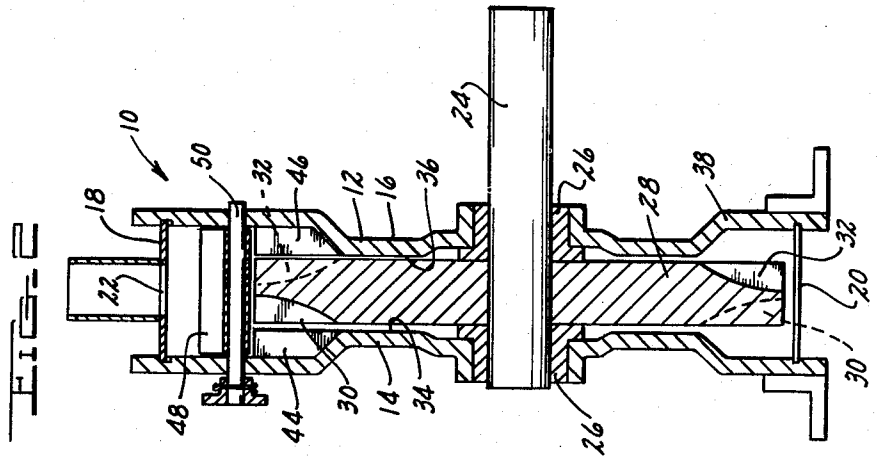


FIG. 1

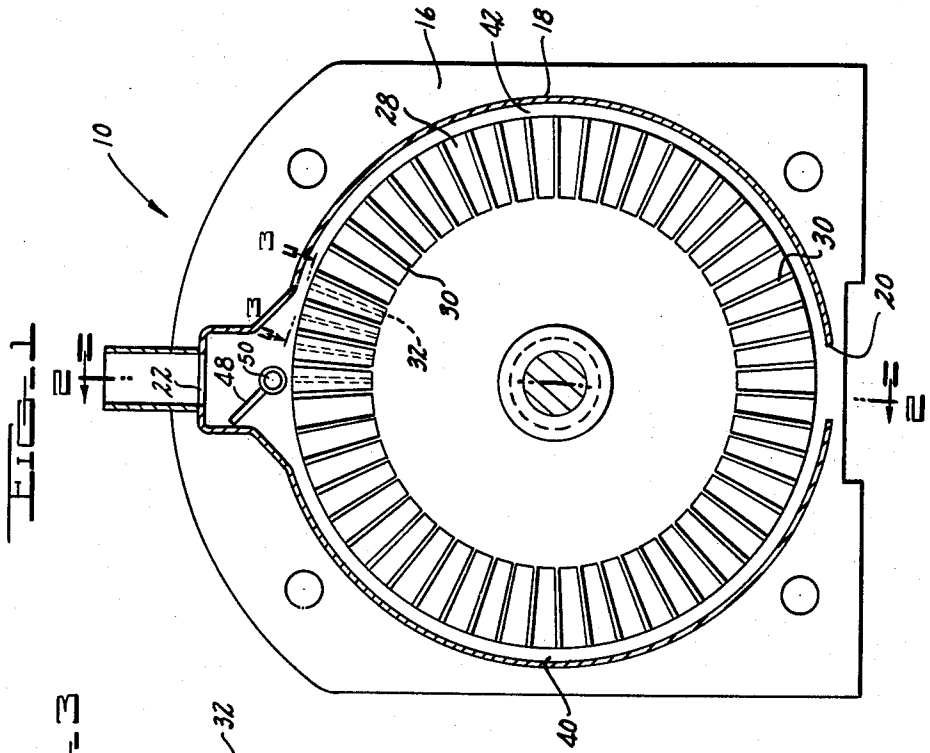
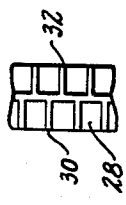


FIG. 3



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AUTOMATIC REVERSING TURBINE PUMP

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The present invention relates to hydraulic pumps, and in particular to turbine-type pumps that are reversible in operation.

There is a particular need for reversible pumps in certain fields, such as in reversible fluid couplings or the like, wherein hydraulic fluids must be transferred by a pump which is driven from the input shaft of the coupling. Previous efforts have been made to develop such a pump, but the results have not been entirely satisfactory because of the cost factor.

It is an object of the present invention to overcome the shortcomings of the prior art devices and to provide a reversible turbine-type pump that is characterized by the simplicity of its design, the absence of wearing parts, the low cost of manufacturing its components and of assembling the same, and the optimum results obtained therefrom when placed in operation.

It is still another object of the present invention to provide a pump of the foregoing character which is submersible so that it can be operated without encountering priming problems, and which can be lubricated by the fluid in which it is submersed.

It is still another object of the present invention to provide a pump of the foregoing character which is constructed and arranged so that it can be driven by a chain drive or the like from a rotary input member and which will have the same operating characteristics irrespective of the direction of rotation of said input member.

It is still another object of the present invention to provide a rotary turbine-type pump of the foregoing character which is constructed and arranged so that a minimum of recirculation of hydraulic fluid within the pump occurs.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

Figure 1 is an elevation of one embodiment of the invention with one of the side plates removed;

Figure 2 is a vertical section taken on the line 2 of Figure 1 with both side plates in operative positions; and

Figure 3 is a fragmentary view taken on the lines 3—3 of Figure 1.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and not of limitation.

Referring now to the drawings a more detailed description of the invention will be given. The pump 10

has a casing 12 which may be constructed in various ways and in the illustrated embodiment is formed from side plates 14 and 16 and a scroll 18 which is circular in shape and has a suction inlet 20 at the bottom and a discharge outlet 22 at the top.

A shaft 24 is carried in casing 12 in bearings 26. Mounted on the shaft 24 for rotation therewith is an impeller wheel 28 which is of uniform thickness and has a plurality of radial vanes 30 and 32 formed in opposite sides thereof. The impeller wheel may be formed by a die casting operation and the vanes 30 and 32 are preferably arranged in staggered relation, rather than in back-to-back relation, for purposes of strength. The impeller wheel 28 is dimensioned so that it is closely spaced from the radially inward side portions 34 and 36 of the side plates 14 and 16.

The outer peripheral portion of the casing 12 is enlarged as at 38 to provide two semicircular passageways 40 and 42 through which liquid may be pumped from suction inlet 20 to discharge outlet 22, depending on the direction of rotation of the impeller wheel 28. Thus, if the wheel, as viewed in Figure 1, is turned clockwise, the liquid will enter at the inlet 20, will flow through passageway 40, and will be discharged through outlet 22. Conversely, the passageway 42 will be in use when the wheel 28 is turned in a counterclockwise direction. For the purpose of carrying out the pumping action in a most efficient manner, the vanes 30 and 32 are of sufficient length to extend substantially across the enlarged periphery 38 of the casing 12.

In order to prevent the liquid from being recirculated through the inactive side of the pump, stationary baffle plates 44 and 46 are secured at the top of the casing 12 and direct the pumped liquid upward toward discharge outlet 22. Also, a reversible baffle or clack valve 48 is pivotally mounted on pin 50 and is positioned to extend from one side plate to the other and radially outward of the impeller wheel periphery. The reversible clack valve 48 is automatic in operation so that if the direction of rotation of the impeller wheel 28 is reversed, the pressure of the pumped liquid will flip the valve over, thereby blocking the top of the inactive passageway while allowing free flow through the discharge outlet 22.

In normal use, the pump 10 will be submersed in liquid to a level above the shaft 24. In this manner there will be no air sucked into the pump casing through the shaft bearings 26. Also, since the suction inlet is below the level of the liquid, there will be no problem of priming the pump when it is started. Furthermore, the liquid, which normally will be a hydraulic oil, can serve as the lubricant for the pump.

Another advantage of the present pump is that a chain drive (not shown) can be connected to the shaft 24 and the pumped liquid can then serve as the lubricant for the chain drive. In such an arrangement the pump can be turned in either direction, and in view of the symmetrical arrangement of the passageways 40 and 42 the same output from the pump will be realized.

Having thus described our invention, we claim:

1. A reversible pump comprising an upright casing having a circular scroll open at the bottom and top forming respectively a suction inlet and a discharge outlet, the side walls of the casing being flared apart adjacent the juncture with said scroll to form two semicircular passageways from said inlet to said outlet, an impeller wheel rotatably mounted between said side walls and having its peripheral portion projecting through said passageways, said peripheral portion having radial vanes on each side for impelling liquid from the inlet to the outlet through one or the other of said passageways depending on the direction of rotation of said impeller wheel, stationary

baffles extending transversely of the upper ends of said passageways, and a reversible clack valve mounted in said outlet transversely thereof for closing off the outer peripheral portion of the inactive passageway, said stationary baffles and reversible clack valve being operative to prevent recirculation of fluid from the discharge of said active passageway.

2. A reversible pump comprising an upright casing having a scroll open at the bottom and top forming respectively a suction inlet and a discharge outlet, the side walls of the casing being flared apart adjacent the juncture with the scroll to form two symmetrical passageways from said inlet to said outlet, an impeller wheel rotatably mounted between said side walls and having its peripheral portion projecting into said passageways, said peripheral portion having radial vanes for impelling liquid from said inlet to said outlet through one or the other of said passageways depending on the direction of rotation of said impeller wheel, stationary baffles in said passageways for directing liquid from said passageways into said discharge outlet, and a reversible clack valve mounted transversely of said outlet for closing off the outer peripheral portion of the inactive passageway, said stationary baffles and reversible clack valve being operative to prevent recirculation of fluid from the discharge of said active passageway.

3. A reversible pump comprising a casing having opposed side walls and a peripheral wall therebetween; peripheral portions of said casing being provided with an inlet and an outlet spaced therefrom; the outer portions of the side walls cooperating with the peripheral wall to define two separate arcuate peripheral passageways from said inlet to said outlet, an impeller wheel rotatably mounted between said side walls and having its peripheral portion projecting into said peripheral passageways, said wheel peripheral portion having radial vanes for impelling liquid from said inlet to said outlet through one or the other of said passageways depending on the direction of rotation of said impeller wheel, and valve means in said casing at the outlet to prevent recirculation of liquid from the discharge of one passageway through the other passageway.

4. A reversible pump comprising a casing having opposed side walls and a peripheral wall therebetween defining an annular passageway; an impeller rotatably mounted within the casing with its peripheral portion projecting into the annular passageway; said peripheral portion having vanes for impelling liquid within the passageway; said peripheral wall being open at diametrically spaced points to form a continuously acting suction inlet and a continuously acting discharge outlet; and fluid pressure-operated valve means movable to isolate the outlet from different portions of the annular passageway in accordance with the direction of fluid flow therein; whereby when the impeller is rotating in one direction liquid is delivered from the suction inlet through one portion of the annular passageway to the outlet, and when the impeller is rotating in the opposite direction liquid is delivered from the suction inlet through the remaining portion of the annular passageway to the outlet.

5. A reversible pump comprising a casing, the periphery of which defines an annular passageway; an impeller rotatably mounted within the casing with its peripheral portion projecting into the annular passageway; said peripheral portion having vanes for impelling liquid within the passageway; said casing being opened at spaced points on its periphery to define a suction inlet and a discharge outlet for said passageway; and fluid pressure-operated valve means movable to isolate the outlet from different portions of the annular passageway in accordance with the direction of fluid flow therein; whereby when the impeller is rotating in one direction liquid is delivered from the inlet through one portion of the annular passageway to the discharge outlet and when the impeller is rotating in the opposite direction liquid is delivered from the inlet through another portion of the annular passageway to the discharge outlet.

6. A reversible pump comprising a casing, the periphery of which defines an annular passageway; an impeller rotatably mounted within the casing with its peripheral portion projecting into the annular passageway; said peripheral portion having vanes for impelling liquid within the passageway; said casing being opened at spaced points along its periphery to define a suction inlet and a discharge outlet for said passageway; and fluid pressure-operated valve means movable to isolate the outlet from different portions of the annular passageway in accordance with the direction of fluid flow therein; whereby when the impeller is rotating in one direction liquid is delivered from the inlet through one portion of the annular passageway to the discharge outlet and when the impeller is rotating in the opposite direction liquid is delivered from the inlet through another portion of the annular passageway to the discharge outlet.

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