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ROTARY PUMP

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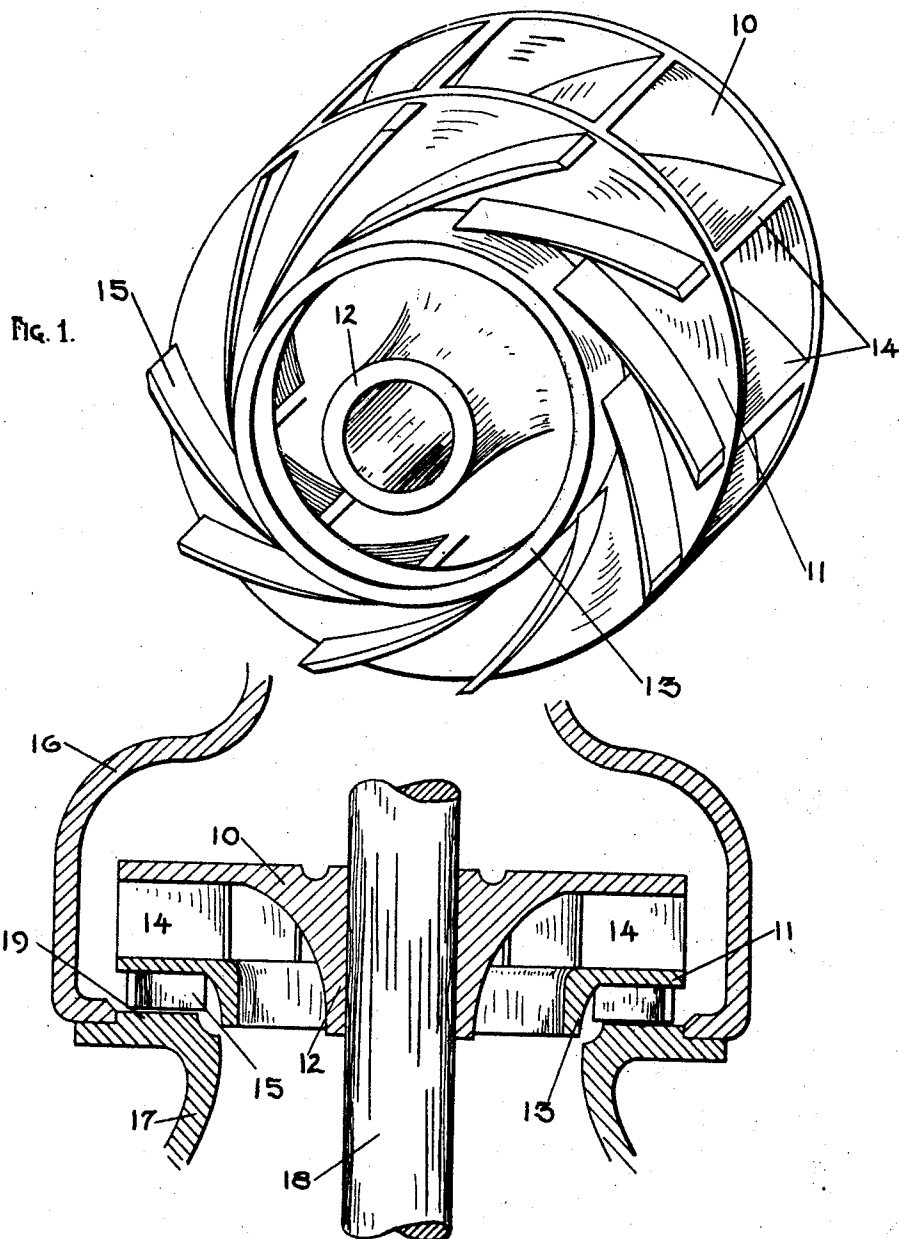


FIG. 2

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ROTARY PUMP

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My invention relates to rotary pumps, its primary object being the provision of features which will enable the pump to much more effectively hold the pressures than the pumps at present in use.

Another of my objects is the provision of a water seal beneath the turbine, the water seal being designed for the purpose of preventing losses in pressure.

It is also my object to provide a turbine in a casing with a water seal in which the water is constantly flowing so as to eliminate any sand which enters the water seal.

Another of my objects is the provision of a rotary pump in the form of a single casting which is so designed that it may readily be cast at a relatively low cost and without requiring much machining or other expensive operations.

Having in view these objects and others which will be pointed out in the following description, I will now refer to the drawing, in which

Figure 1 is a view in perspective of the rotor of the pump;

Figure 2 is a median vertical sectional view of the rotor and of the casing.

The rotor as shown in Figure 1 includes two parallel annuli 10 and 11, both of which are flanged at their inner peripheries. The flange 12 of the annulus 10 constitutes a hub for the shaft which drives the rotor. The wall is thickened at the corner of the annulus 10 and its flange 12 and this wall is curved as shown in Figure 2 so as to facilitate the passage of water. The annulus 11 is narrower than the annulus 10 but its external diameter is equal to that of the annulus 10. It is provided with a flange 13 terminating somewhat short of the free extremity of the flange 12. The flanges 12 and 13 are spaced from each other a distance which is approximately equal to the distance between the annuli 10 and 11. The annuli 10 and 11 are connected to each other by means of a plurality of turbine blades 14, these being of integral construction with the two annuli. The outer extremities of the turbine blades 14 are beveled so that their surfaces lie within the cylindrical surface determined by the

external peripheries of the two annuli. The inner ends of the blades 14 are similarly beveled in a manner such that their movement determines a cylindrical surface.

When the pump as above described is in position within a casing as shown in Figure 2 and when it is rotated rapidly by means of a central shaft, the water will be drawn from the well and forced outwardly between the annuli 10 and 11, the pressure being exerted by centrifugal force after the water begins to assume a substantially horizontal path. This principle of operation, however, is more or less common to nearly all rotary pumps.

The mounting of rotary pumps in their casing is often such that a differential in pressures is set up with resultant loss of power. In order to obviate this difficulty I have provided a water seal for preventing the release of pressure. On the lower surface of the annulus 11 I provide a series of blades 15. In the present instance these blades have the general form of the blades 14, the number and position of the blades 14 and 15 being also equal. The blades 15, however, terminate short of the flange 13 and at their outer extremities they also terminate short of the outer periphery of the annulus 11. The blades 15 are also beveled into cylindrical form at their rear or free extremities while the forward or inner extremities are beveled on both surfaces into wedge shape. This and the general shape of the blades 15 gives the entire blade assembly more or less of a stream-line form, thus reducing the friction of the water against their surfaces.

The casing includes two interfitting parts 16 and 17 adapted to receive the rotor and its shaft 18. In pumps of this type it is sometimes desirable that they be arranged in stages so as to provide the maximum lift. By arranging the casing in the form of complementary parts, the casing may be built up to any desired height to provide a series of chambers for successive rotors. The annular platform 19 of the casing member 17 is spaced a slight distance below the lower edges of the blades 15. The water within the casing above and below the platform

19 is under considerable pressure and it is in constant movement. The pressures of the two bodies of water above and below the platform 19 are, however, different so that a flow will occur through the water seal which will carry with it all of the sand and grit and which will thus prevent the undue wear on the rotor and on the platform 19.

When the rotary pump is arranged as shown in Figure 2 either singly or in stages and when the rotor moves rapidly on its axis, there is a constant flow of water in an upward direction within the casing. The differences in pressures above and below the platform 19 ordinarily cause a drop in pressure because of the leakage and therefore result in a loss of power. The arrangement of the blades 15, however, prevents excessive leakage, so that the power may be fully utilized. At the same time all grit is automatically removed, so that the wear is reduced to a minimum.

The rotor as shown is cast in one piece and its manufacture is simple and relatively inexpensive. The rotor is in the form of a single casting, and, since it is symmetrical about its central axis, the machining may all be done with a simple operation on the lathe.

Having thus described my invention in such full, clear, and exact terms that its construction and operation will be readily understood by others skilled in the art to which it pertains, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A rotary pump including a vertical shaft surrounded by pairs of casing members adapted for assembly in stages, each pair of said casing members containing a rotor adapted to be driven by said vertical shaft, said rotor including a circular disc having turbine blades projecting upwardly therefrom, and a plurality of spiral turbine blades depending from said circular disc and positioned tangentially with respect to said rotor, the lower of said casing members of each pair having an annular upper surface cooperating with said depending blades to provide a water seal in the form of a slowly moving body of water.

2. A rotary pump including a vertical shaft surrounded by pairs of casing members adapted for assembly in stages, each pair of said casing members containing a rotor adapted to be driven by said vertical shaft, said rotor including a circular disc having turbine blades projecting upwardly therefrom, and a plurality of spiral turbine blades depending from said circular disc and positioned tangentially with respect to said rotor, the lower of said casing members of each pair having an annular upper surface cooperating with said depending blades to provide a water seal in the form of a slowly moving body of water, the inlet to the passageway

between said depending blades and said casing member being reduced to retard the flow into the passageway for reducing the velocity and thereby causing sand and other foreign matter to settle.

In testimony whereof I affix my signature.
ANDREW G. JOHNSON.

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