L. H. HANEY.

PUMP.

APPLICATION FILED NOV. 11, 1920.

1,423,496. Patented July 18, 1922.

Fig. 1.

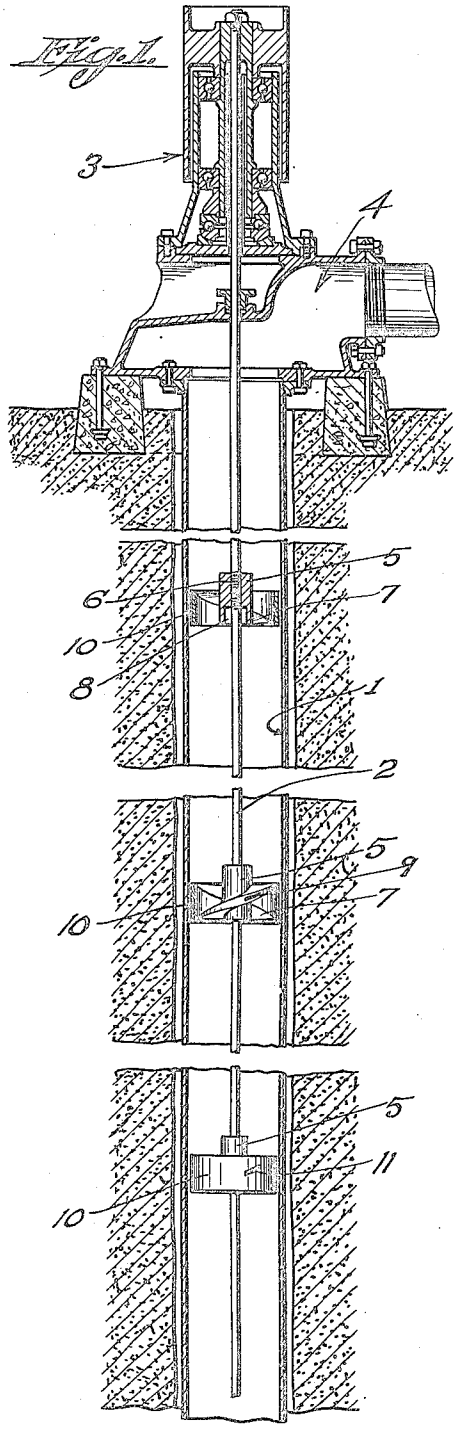


Fig. 2.

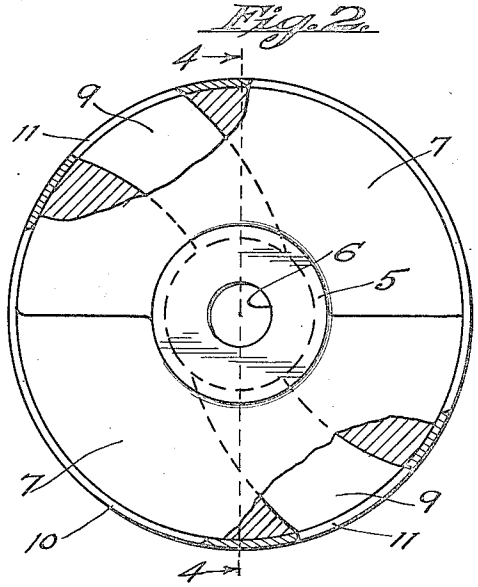


Fig. 3.

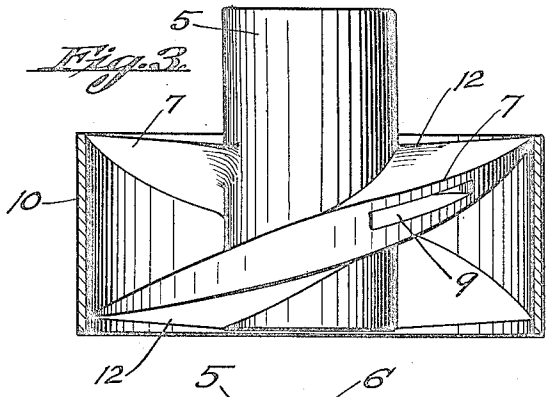
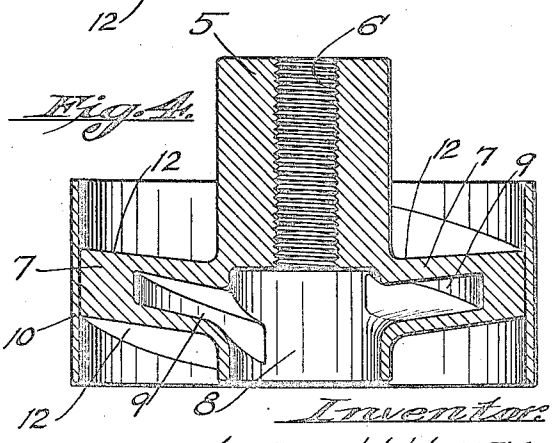


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PUMP.

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To all whom it may concern:

Be it known that I, LEWIS H. HANEY, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Pumps, of which the following is a specification.

It is the object of this invention to provide a pump for wells and the like wherein the impellers of the pump are so arranged as to be properly journaled in the well casing without necessitating the employment of bearings for the drive shaft of the pump.

It is a further object of the invention to provide impellers which not only form self-bearing means but which are also arranged to cause uniform circulation of the column of fluid raised by the pump.

The invention will be readily understood from the following description of the accompanying drawings, in which;

Figure 1 is a longitudinal section through a well casing and pump constructed in accordance with the invention.

Fig. 2 is a plan view of one of the impellers of the pump.

Fig. 3 is a side elevation of the same with its casing broken away.

Fig. 4 is a vertical section on the line 4—4 of Fig. 2.

The improved pump may be employed in connection with a well casing 1 of usual construction, and the drive shaft 2 of the pump may be actuated by usual driving mechanism 3 positioned over the upper end of the well casing and forming the discharge conduit 4 communicating with the well casing so as to draw off the fluid pumped from the well casing.

The pumping mechanism includes a plurality of impellers fixed upon drive shaft 2 in spaced relation and arranged through rotation of the same to lift the column of fluid within the well casing.

The impellers each comprise a central hub 5 having a threaded bore 6 adapted to receive sections of drive shaft 2 extending upwardly and downwardly from the impeller.

Spiral blades 7 extend radially from the hub 5, and in the present instance I have shown the hub as provided with two such blades starting from diametrically opposed points at the lower end of the hub and winding around said hub so as to terminate at diametrically spaced points. A portion of the hub extends upwardly beyond the blade 7 to form the coupling for the shaft sections, and the portion of the hub opposite the blades 7 is, preferably, provided with an axial conduit 8 extending from the lower end of the hub and communicating with ports 9 which extend through the blades 7 to the peripheries of the latter.

A sleeve 10 is received over the blades 7 and is fixed to the peripheries of the latter. The ports 9 of the blades are in alinement with similar ports 11 provided in the sleeve 10 so that a passageway is formed through the lower end of hub 5 and thence through ports 9 and 11 to the space between sleeve 10 and the well casing. The impellers of the pump are of such size, that when the pump is lowered into a well casing a slight space is left between the sleeves 10 and the casing, and when the pump is rotated so as to raise the column of liquid by means of the spiral blades 7 a portion of the liquid will also be raised through the axial bores 8 of the impellers, and from thence will be drawn by centrifugal force outwardly through ports 9 and 11. A film of fluid is thus provided between sleeves 10 and the well casing, and this film will form bearings for the impellers, and as a consequence the necessity of providing drive shaft 2 with bearings is obviated.

In pumps of this general type, as heretofore constructed, the column of liquid being raised has been subjected to a churning action and lost motion, due to the fact that the pitch of the spiral blades at the axial hub is necessarily greater than the pitch of said blades at their periphery. In order to eliminate this lost motion and churning action the spiral blades 7 are arranged with their faces 12 inclined upwardly toward the periphery of the blades, as clearly shown in Fig. 4. It has been found that blades as thus constructed acting upon the column of liquid to elevate the same, will move the column of liquid without the above mentioned objectionable churning action.

It will thus be seen that I have provided a construction wherein the rotating impellers of a pump will move smoothly and without vibration of the parts or churning of the liquid raised by the same. It will be further noted that these results are accomplished without necessitating the employment of bearings for the drive shaft of the pump arranged within the well casing between the adjacent impellers.

Various changes may be made without departing from the spirit of the invention as claimed.

What is claimed is:

1. The combination with a liquid impelling device including a rotatable impeller having a spiral blade provided with a radial port communicating with the bore of said impeller so as to discharge a portion of the liquid between the periphery of said impeller and its casing to form a fluid bearing.

2. The combination with a liquid impelling device including a rotatable impeller having a spiral blade and a sleeve received over the same, said sleeve and blade having a radial port communicating with the bore of said impeller so as to discharge a portion of the liquid between the periphery of said sleeve and the casing for the impeller to form a fluid bearing.

3. In a pump, a vertical drive shaft, a casing in which the drive shaft is mounted, a plurality of impellers fixed upon the drive shaft and spaced apart, each impeller comprising a central hub, spiral blades extending radially from the hub, there being an axial conduit extending from the lower end of the central hub, and ports extending from the conduit through the blades to their peripheries so that a portion of the fluid will pass through the conduit and ports.

4. In a pump, a vertical drive shaft, a casing in which the drive shaft is mounted, a plurality of impellers fixed upon the drive shaft and spaced apart, each impeller comprising a central hub having a central screw-threaded bore in which sections of drive shaft are inserted both ways, two radially spiral blades extending from the bottom of the hub each blade reaching half way around the hub, a large axial conduit extending upwardly into the blades against the lower end of the hub so that a drive shaft section will pass upwardly through the conduit into the hub without obstructing the conduit and there being ports leading from the conduit through the blades to their peripheries, and a sleeve mounted around the blades and having ports registering with the ports in the blades, said sleeve extending upwardly and downwardly from the blades.

In testimony whereof I have signed my name to this specification.

LEWIS H. HANEY.