Feb. 11, 1930. L. A. FITZER 1,746,889

ROTARY PUMP

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Fig. 1

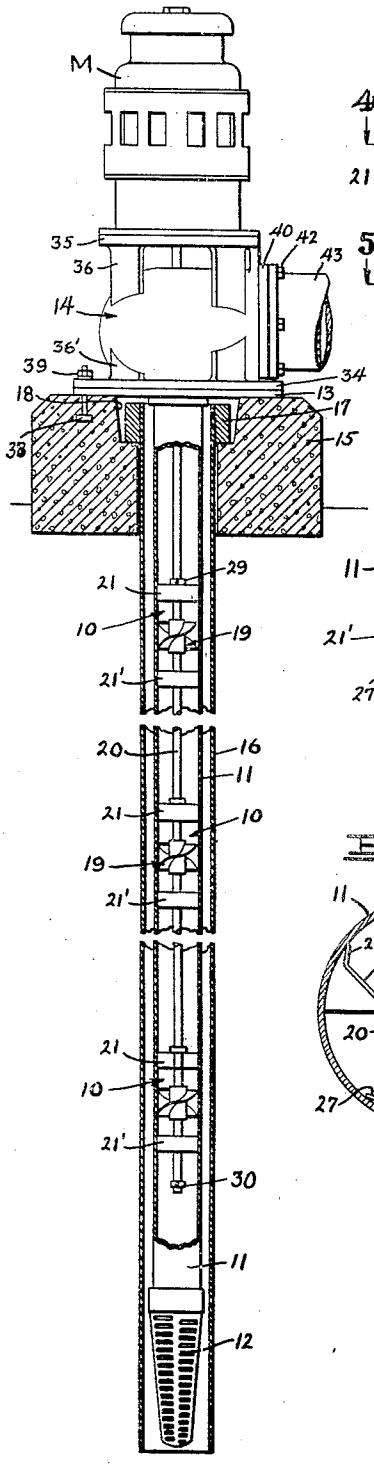


Fig. 2

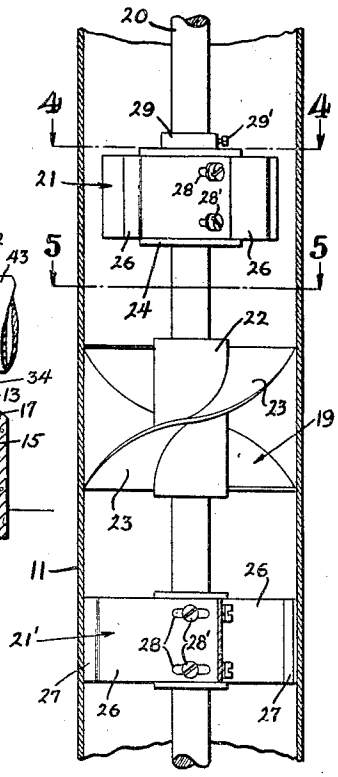


Fig. 3

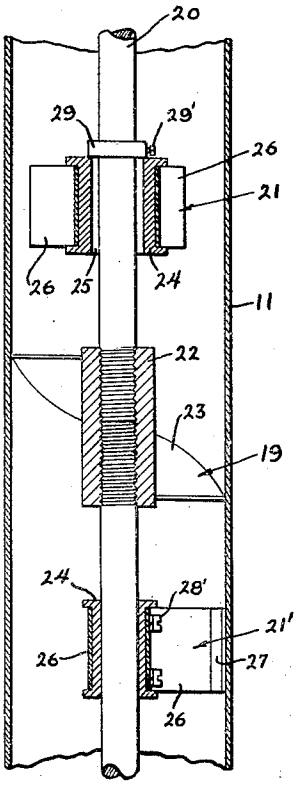


Fig. 4

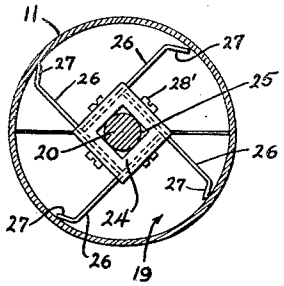
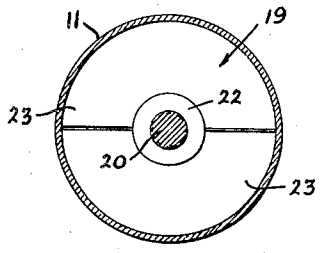


Fig. 5



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Fig. 6

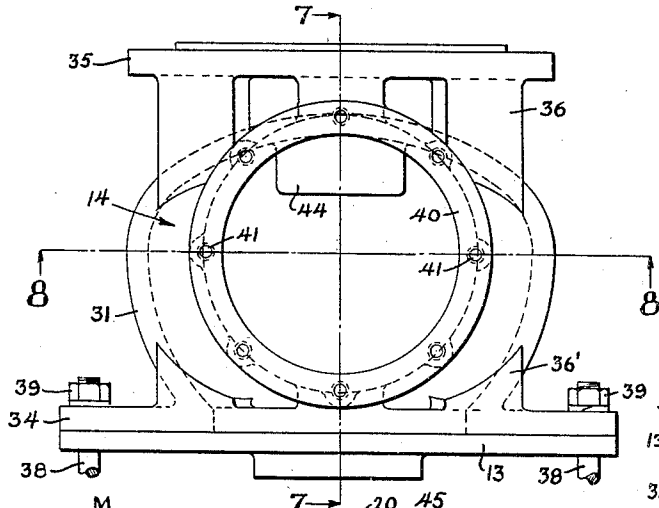


Fig. 9

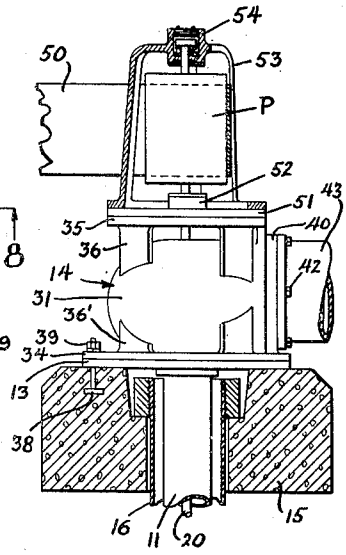


Fig. 7

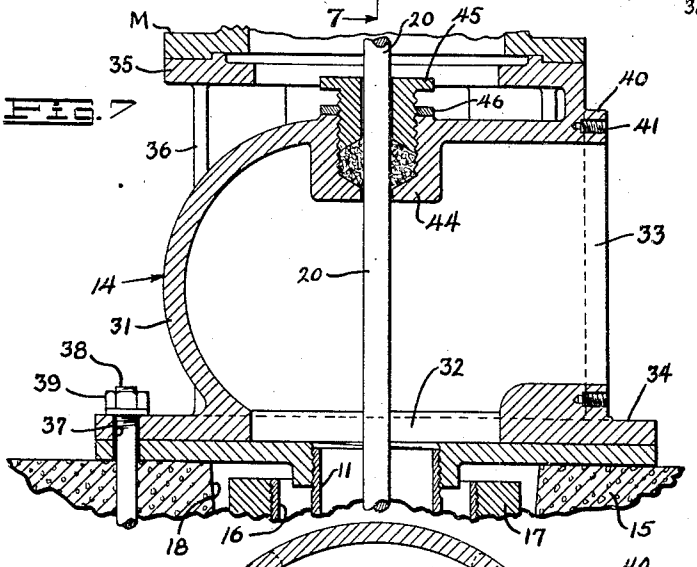


Fig. 10

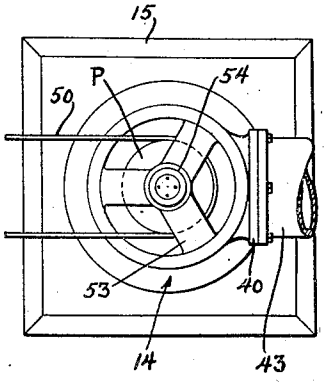
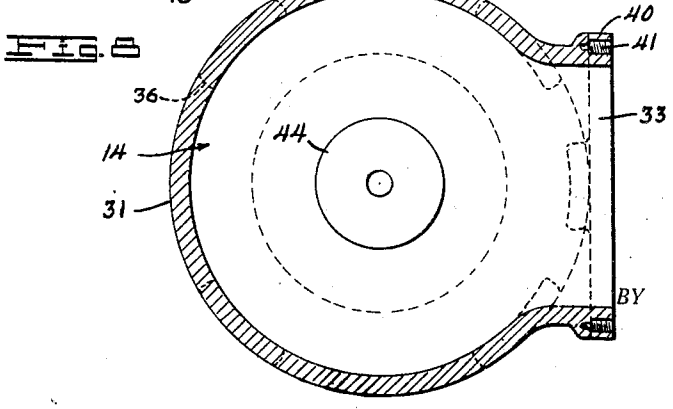


Fig. 8



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Patented Feb. 11, 1930 1,746,889

UNITED STATES PATENT OFFICE

LOUIS A. FITZER, OF LOS ANGELES, CALIFORNIA

ROTARY PUMP

Application filed November 6, 1926. Serial No. 146,618.

This invention relates to pumps.

The general object of my invention is to provide an improved deep well pump wherein impellers are used to raise the water to the surface.

A more specific object of my invention is to provide an improved bearing for the shaft of a pump.

Another object of my invention is to provide a water cooled bearing which will occupy only a small portion of the cross sectional area of the tubing in which it is placed.

A further object is to provide means tending to prevent the water being raised from revolving.

An additional object of my invention is to provide a deep well pump wherein the bearings and the impellers may be lowered into and withdrawn from the tubing by means of the impeller drive shaft.

Another object is to provide a pump head which will assist in raising the water.

Still another object is to provide a pump head which will fit various sizes of tubing without interfering with the water flow.

Other objects and advantages of my invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a vertical section of a water well showing my invention, partly in section.

Fig. 2 is an enlarged vertical section through the well tubing showing one of the elevating stages.

Fig. 3 is a vertical section through one of the elevating stages and shows the same positioned in the well tubing.

Fig. 4 is a cross section through the well tubing taken on line 4—4 of Fig. 2.

Fig. 5 is a view similar to Fig. 4 taken on line 5—5 of Fig. 2.

Fig. 6 is an enlarged exterior view of the pump head showing the outlet.

Fig. 7 is a sectional view of the head taken on line 7—7 of Fig. 6, and showing a working assembly.

Fig. 8 is a section of the well head taken on line 8—8 of Fig. 7.

Fig. 9 is a view of the top of a well provided with my improved type of pump head showing the impeller shaft as driven by a pulley, and

Fig. 10 is a top plan view of the construction shown in Fig. 9.

In the accompanying drawings I have shown my pump as comprising a plurality of stages 10 which are mounted in a tubing 11. The tubing 11 comprises a plurality of jointed sections and is provided at its lower end with the usual form of perforated tubing 12 which while it allows the water to enter acts as a strainer to prevent any large stones from entering the pump tubing and damaging the pumping mechanism.

The upper end of the tubing 11 is supported by screw threaded engagement on a plate 13 of a head member 14. The plate in turn is supported by a concrete base 15. Surrounding the tubing 11 is a well casing 16 supported at its upper end by a collar 17 which rests on the bottom of a cavity 18 formed in the concrete base 15.

Each lifting stage 10 comprises an impeller 19 driven by a shaft 20 and upper and lower shaft positioning bearings 21 and 21′. The shaft 20 may be driven either by direct connection to a motor M mounted on the pump head 14 as shown in Fig. 1, or by a pulley P as shown in Figs. 9 and 10.

Each impeller comprises a hub portion 22 provided with two sets of lifting vanes 23 which compose a half of a double spiral. The hub 22 is bored for the passage therethrough of the shaft 20 and may be threaded to form a shaft coupling as shown in Fig. 3. I prefer to couple the shaft as shown but in certain cases it may be more convenient to connect the impeller to the shaft other ways.

The bearings 21 and 21′ comprise a square body portion 24 which is preferably made of bronze, flanged at both ends and provided with a central square bore 25 for the passage therethrough of the shaft 20. On each of the four sides of the body 24 positioning fingers 26 are secured. These fingers are preferably made of flat strips of resilient metal having their outer ends bent at 27 and provided adjacent their inner ends with pairs of slots 28 for the passage therethrough of securing screws 28′. The slots 28 allow for radial ad-

justment of the fingers in relation to the body 24.

Above the top bearing of each stage there is provided a collar 29 rigidly secured to the shaft 20 by a set screw 29′, and at the lower end of the shaft 20 there is provided a collar 30, whose main function is to force the lower bearing 21′ upwardly when the pumping mechanism is being removed from the tubing. This collar 30 also prevents the bearing from becoming accidentally detached from the shaft while in the well.

The steps involved in installing my well pump in a well, consist of first lowering into the well casing the tubing 11 and securing the upper end of the last section of tubing to the plate 13 to thereby support the tubing. After the tubing has been placed in the casing the actuating means which consists of stages 10 is lowered into the tubing. The method of assembling the stages 10 for lowering into the tubing consists of first securing to the shaft 20 the collar 30, then the lower bearing 21′, and then coupling the section of shaft together with the impeller 19, then placing on the shaft a bearing 21 and then securing to the shaft a collar 29.

After the parts have been assembled the fingers 26 of the bearings are sprung into the tubing 11 and the assembled stage is forced downwardly in the tubing. As the shaft 20 is forced downwardly the collar 29 will force the bearing 21 to travel with it and the impeller 19 will force the bearing 21′ downwardly. It will do no harm if the bearings 21 and 21′ work to such a position as to abut the ends of the impeller hub 22. When the bearings are placed in position in the well tubing the fingers' ends are compressed and thus have frictional engagement with the inner walls of the tubing and as the direction of rotation of the shaft 20 is clockwise and as the end portions 27 of the fingers 26 point in a like direction, the bearing will not revolve, because any revolving tendency of the bearing will cause the finger end portions 27 to more tightly grip the inner wall of the tubing 11.

The bearings 21 and 21′ perform another function other than to position the shaft. This function consists of guiding the water just before it reaches the impeller and just after it leaves the same. As the water is forced upwardly by the impellers, the said impellers impart a swirling motion to the water and as the water passes the bearings 21 and 21′ the fingers 27 tend to cause the water to flow vertically.

As the water flows upwardly past the bearings 21 and 21′, water will fill the space of the square bore 25 of the bearings, which is not occupied by the shaft 20, and thus form a water cooled bearing.

The head 14 which I show in conjunction with my pumping means is so constructed as to not retard the flow of water from the well tubing. It is also constructed in such a manner that one head may be used for various sizes of well tubing and furthermore it is constructed in such a manner as to allow the shaft 20 to be driven by either a direct motor connection or by a belt and pulley drive.

The head 14 consists of a body portion 31 having an inlet 32, an outlet 33, a base 34, and a top flange 35 joined to the body by legs 36. Joining the body and the base are other legs 36′ which are for strengthening purposes. The base 34 is apertured as at 37 for the passage therethrough of anchoring bolts 38 which are shown as embedded in the concrete base 15, and are provided with nuts 39.

Around the outlet 33 there is provided a flange 40 apertured as at 41 for the reception of bolts 42 for securing the head to an outlet pipe 43. At the top of the body 31 there is provided a stuffing box 44, apertured for the passage therethrough of the shaft 20, and internally threaded for the reception of a packing gland 45 which may be retained in a fixed position by a lock nut 46. The body portion 31 of the head is so proportioned that the area of that part which coincides with a horizontal plane passing through the center of the hole 33, is greater than the combined cross sectional area of the inlet 32 and the outlet 33. By so proportioning the head the water is not retarded when it passes through the same.

When it is desired to install the head 14 on a well it is only necessary to set the head over the shaft 20, aline the holes 37 with the bolts 38, set the head on the plate 13 and secure the two to the concrete base by the nuts 39. As previously mentioned the plate 13 supports the well tubing 11 by screw threaded engagement with the same and when it is desirous to use a different size tubing it is only necessary to provide a plate 13 having a larger or smaller bore.

After the head has been secured to the concrete base 15 a motor M may be secured on the flange 35 of the head and coupled to the shaft 20.

If it is desired to use a pulley drive as shown in Figs. 9 and 10 a pulley is mounted in the shaft 20. This pulley may be driven by a belt 50. For supporting and positioning the pulley P a spider 51 may be mounted on the flange 35 of the head. This spider is provided with a radial bearing as indicated at 52. Mounted on the spider 51 a frame 53 is provided which extends above the pulley and is provided with a down-thrust bearing as indicated by 54.

From the foregoing description it will be apparent that I have provided an improved pump which can be economically manufac-

tured, which is adapted for a wide range of use, and which is highly efficient in use.

What I claim is:

In combination with a pump tubing, a shaft, and means on said shaft to prevent whip thereof, said means comprising a member engaging said shaft and having fingers thereon, said fingers comprising strips of flat metal, the body portion of said strips being straight, said strips having bent ends, said bent ends being straight and forming an acute angle with the interior surface of said tubing.

In testimony whereof, I hereunto affix my signature.

LOUIS A. FITZER.