H. J. AND W. R. WOOCK.

DEEP WELL PUMP.

APPLICATION FILED APR. 24, 1919.

1,340,472. **Patented May 18, 1920.**

Fig. 1

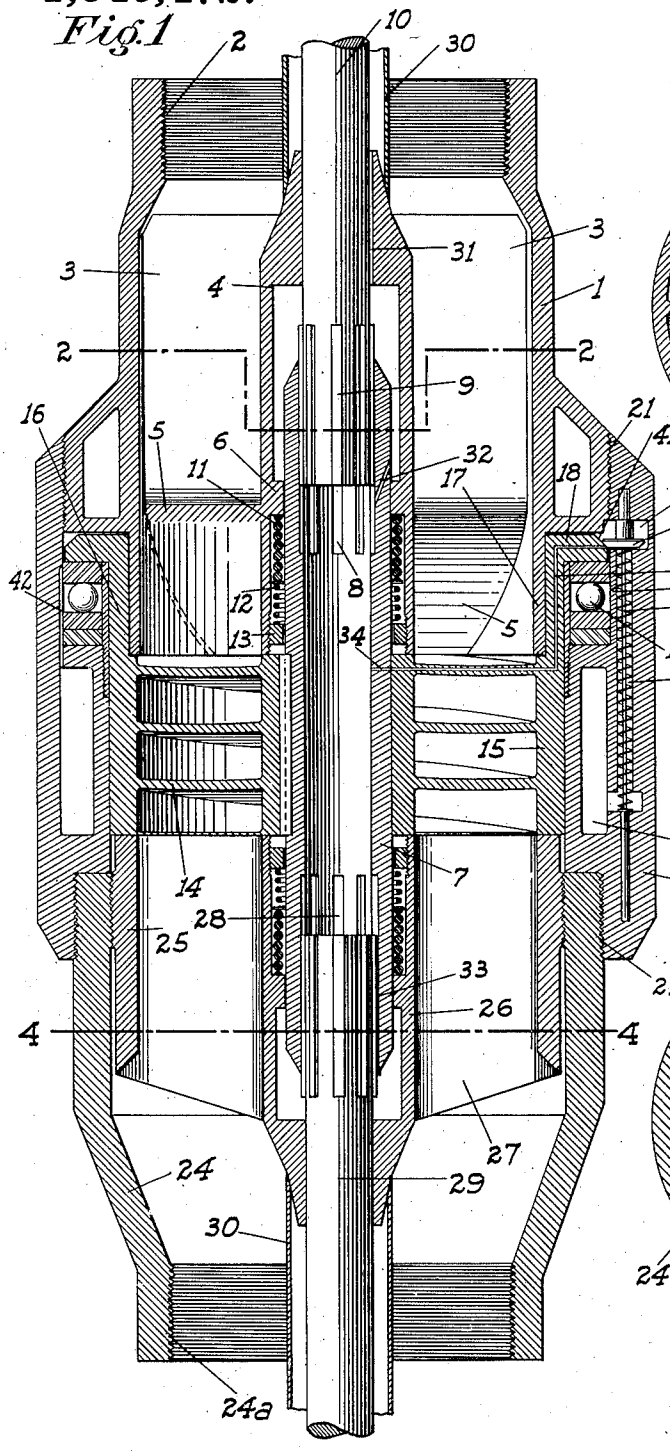


Fig. 2

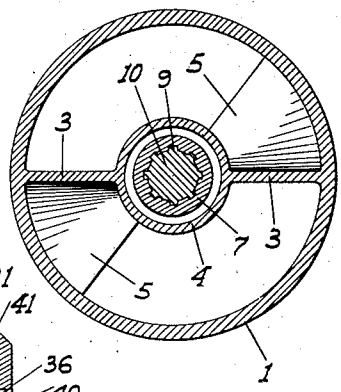


Fig. 3

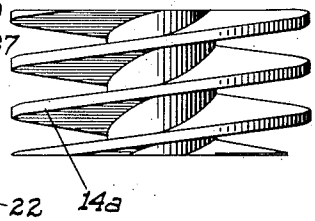
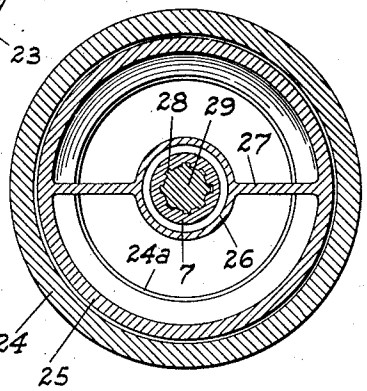


Fig. 4



INVENTORS

Herbert J. Woock

Walter R. Woock

Barry S. Webster

ATTORNEY

UNITED STATES PATENT OFFICE.

HERBERT J. WOOCK AND WALTER R. WOOCK, OF LODI, CALIFORNIA, ASSIGNORS TO SUPERIOR MANUFACTURING COMPANY, OF LODI, CALIFORNIA, A CORPORATION.

DEEP-WELL PUMP.

1,340,472. Specification of Letters Patent. Patented May 18, 1920.

Application filed April 24, 1919. Serial No. 292,515.

To all whom it may concern:

Be it known that we, HERBERT J. WOOCK and WALTER R. WOOCK, both citizens of the United States of America, and residing at Lodi, in the county of San Joaquin, State of California, have invented certain new and useful Improvements in Deep-Well Pumps; and we do declare the following to be a clear, full, and exact description of the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this application.

This invention relates to improvements in pumps and particularly to a type adapted to be installed in a well in spaced relays, being an improvement over that type shown in our copending application for patent Serial No. 255244, filed September 23rd, 1918.

The principal object of the present invention is to provide pump units installed in a well casing at spaced intervals therein in such a manner that all weight of water and metal is taken off the driving shaft, thus reducing friction and tensional strain on the shaft to a minimum.

By the use of our pump, water may be raised from any depth by placing a pump unit in the well about every twenty feet, all the units being operated from the one drive shaft, but each one being mounted independent from the others.

We have also provided means whereby any inaccuracies in the lengths of the pipes connecting the various units will be compensated for without the necessity of making any adjustments in the pump unit affected.

A further object is to provide a lubricating system for such units which will be positive in its action and by means of which all the wearing and running parts of the units will be automatically lubricated without attention on the part of the pump operator.

A still further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purposes for which it is designed.

These objects we accomplish by means of such structure and relative arrangement of the parts as will fully appear by a perusal of the following specification and claims.

On the drawings, similar characters of reference indicate corresponding parts in the several views.

Figure 1 is a vertical section through a pump unit, showing the assembled arrangement of the correlative parts.

Fig. 2 is a cross section taken on a line 2—2 of Fig. 1.

Fig. 3 is a side elevation of a modified form of pump spiral or runner.

Fig. 4 is a cross section taken on a line 4—4 of Fig. 1.

Referring now more particularly to the figures of reference on the drawings, the numeral 1 designates a casing member threaded in its upper end, as at 2, for the reception of a length of plain pipe therein.

This casing is provided with vanes 3 running vertically therein and for the greater part of their length are radial from a tubular hub 4 formed integral therewith. At their lower ends these vanes turn down at a suitable angle as at 5, such angled ends terminating at the bottom of the member 1.

Turnably mounted in the hub 4 and bearing against a shoulder 6 projecting inwardly therefrom is a sleeve 7 having spline-ways 8 cut on the inner face of the upper end thereof for a certain distance to receive the lower splined end 9 of a shaft 10 which extends upwardly to the motive power running the pump or to an upper pump unit.

This sleeve 7 is provided with suitable packing rings 11 thereabout below the shoulder 6, which rings are compressed by means of a spring 12 adjustable by a nut 13 threaded into the hub 4.

The sleeve 7 projects considerably below the member 1, and has a double thread spiral propeller or runner 14 keyed thereto immediately below the casing 1. This spiral is inclosed in an integrally formed casing 15 projecting above the same as at 16, this latter portion having a running fit on its inner face with the outer face of the lower end 17 of the member 1. The pitch of the spirals 14 is the opposite to that of the angled portions 5 of the vanes 3.

The upper end of the portion 16 has an outwardly projecting flange 18 thereon, the casing 1 above the same extending slightly beyond the edge of this flange.

This flange rests on a ball bearing 19 mounted in a casing 20 threaded to the casing 1 at its upper end, as at 21, the outer face of the casing 15 being a running fit against the inner face of the casing 20. The member 20 is cored out below the ball race 19 to form a reservoir 22 for a purpose as will appear.

Threaded into the lower end of the casing 20, as at 23, is a lower casing 24 having its lower end threaded, as at 24ª, for connection with a plain pipe. Threaded into the member 24 and abutting against the lower edge of the runner member 14 is a casing 25 having a hub 26 thereon similar in shape and construction to the hub 4 and being connected to the casing 25 by webs 27. The lower end of the sleeve 7 which terminates in the hub 26 is provided with splineways 28 to receive the upper end of a spline shaft 29 which extends downward to the pump unit below. The lower end of the casing 24 is threaded internally as at 29 for the connection of a plain pipe thereto.

The shafts 10 and 29 are inclosed for their entire lengths by means of tubes 30 placed over the same from one hub 4 to the hub 26 in the unit above the same, or vice-versa and adapted to form a water-tight wedging connection with the said hubs.

Our improved oiling system for the pump units is as follows:—

Supposing a quantity of oil to have been placed in the space between the tube 30 and the upper shaft 10, this oil gradually passes down into the tubular hub 4 above the shoulder 6 therein through a groove 31 therein adjacent the shaft 10, and thence through a hole 32 through the sleeve 7, thus admitting the oil into the interior of the sleeve 7. From this point some of it passes down to lubricate the lower shaft 28 through a groove 33 cut adjacent one of the splines of the said shaft, while a portion of the oil, which would run slowly down the walls of the interior of the sleeve 7, is forced by the centrifugal action of the turning of the sleeve through an orifice 34 suitably positioned therein and communicating with an orifice 35 in the runner 14 and extending up through the casing 16 and out through the flange 18. Here it empties into a pocket 36 in the casing 20 which has a vertical orifice 37 communicating with the reservoir 22, also partially filled with oil. The oil from this reservoir is raised through the orifice 37 to the level of a passageway 38 from the said orifice to the ball race 19 by means of a spiral conveyer 39 positioned therein and having a cone 40 on its upper end adapted to bear against the beveled face 41 of the flange 18 and be rotated thereby. The overflow from the ball race and orifice 35 passes back into the reservoir 22 through a passageway 42.

Thus, it will be evident that a continuous and complete circulation of oil is maintained against all wearing and friction surfaces.

In the form of runner shown in Fig. 3, the casing 15 is done away with, the spirals 14ª bearing directly against the sides of the casing 1 extended downwardly for the purpose. This type of runner is adapted to be used for low heads and pressures only, the runner member being keyed directly to the pump shaft and the weight carried thereby, and also the ball race 19 will be dispensed with, as shown in our co-pending application hereinbefore mentioned. In operation, supposing water, etc., to be pumped from a deep well, one of these pump units is interposed in the pipe line at suitable intervals therein, usually about every twenty feet.

By means of our improved runner mounting construction, no weight is carried on the pump shafts, as each runner rests on its ball race independent of the shaft, which has an allowance for vertical sliding motion in the spline ways of the sleeves 7 should such be necessary for any reason, such as a short length of pipe between any two units, etc.

The unit at the bottom of the well of course has no shaft 29 therebelow, the sleeve 7 being plugged up to prevent any water getting therein.

Thus, from the foregoing description it will readily be seen that we have produced such a device as substantially fulfils the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice, such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described our invention, what we claim as new and useful and desire to secure by Letters Patent is:—

1. A pump for deep wells comprising a plurality of rotary pump units spaced apart, each unit including a sleeve having sliding connection with a separate drive shaft at each end, a rotary runner secured to the sleeve, and means whereby the runner and sleeve are held in horizontal position relative to but independent of the shafts.

2. A pump for deep wells comprising a plurality of rotary pump units spaced apart, each unit comprising an upper and a lower casing spaced apart and connected by a third casing, the first named casings being adapted for connection to well casings and being provided with hubs central thereof, a sleeve turnably mounted in the hubs and extending from one to the other, the sleeve being adapted for sliding driving connection with independent drive shafts at its upper and lower ends, an inclosed spiral pump runner keyed to the sleeve between the first two

named casings and having a running fit with the walls of the third casing, and means whereby the runner and sleeve are held in a fixed horizontal position relative to the shafts and independent thereof.

3. A pump for deep wells comprising a plurality of rotary pump units spaced apart, each unit comprising an upper and a lower casing spaced apart and connected by a third casing, the first named casings being adapted for connection to well casings and being provided with hubs central thereof, a sleeve turnably mounted in the hubs and extending from one to the other, the sleeve being adapted for sliding driving connection with independent drive shafts at its upper and lower ends, an inclosed spiral pump runner keyed to the sleeve between the first two named casings and having a running fit with the walls of the third casing, and means whereby the runner and sleeve are held in a fixed horizontal position relative to the shafts and independent thereof, such means including an outwardly projecting flange on the runner adapted to rest on a ball race positioned thereunder and mounted in the third named casing.

4. A pump for deep wells comprising a plurality of rotary pump units spaced apart, each unit comprising an upper and a lower casing spaced apart and connected by a third casing, the first named casings being adapted for connection to well casings and being provided with hubs central thereof, a sleeve turnably mounted in the hubs and extending from one to the other, the sleeve being adapted for sliding driving connection with independent drive shafts at its upper and lower ends, and a spiral pump runner keyed to the sleeve between the first two named casings, the upper of said casings having vertical vanes therein angled at their lower ends on a pitch opposite to that of the spirals of the runner and terminating adjacent thereto, whereby the water thrown from the spiral will be diverted upwardly through the compartments formed by the vanes.

5. A pump for deep wells comprising a plurality of rotary pump units spaced apart, each unit comprising an upper and a lower casing spaced apart and connected by a third casing, the first named casings being adapted for connection to well-casings and being provided with hubs central thereof, a sleeve turnably mounted in the hubs and extending from one to the other, the sleeve being adapted for sliding driving connection with independent drive shafts at its upper and lower ends, an inclosed spiral pump runner keyed to the sleeve between the first two named casings and having a running fit with the walls of the third casing, and means whereby the sliding and rotatable members will be automatically lubricated with the rotation of the driving shafts.

6. A pump for deep wells comprising a plurality of rotary pump units spaced apart, each unit comprising an upper and a lower casing spaced apart and connected by a third casing, the first named casings being adapted for connection to well-casings and being provided with hubs central thereof, a sleeve turnably mounted in the hubs and extending from one to the other, the sleeve being adapted for sliding driving connection with independent drive shafts at its upper and lower ends, an inclosed spiral pump runner keyed to the sleeve between the first two named casings and having a running fit with the walls of the third casing, and means whereby the sliding and rotatable members will be automatically lubricated with the rotation of the driving shafts, such means including chambers in the hubs and sleeve adapted to contain oil, a reservoir formed in one of the casings in communication with the chamber in the sleeve, a screw conveyer operable with the rotation of the pump runner adapted to lift the oil contained in the reservoir and distribute it about the bearing parts of the runner and means whereby surplus oil will drain back into the reservoir.

In testimony whereof we affix our signatures in presence of two witnesses.

HERBERT J. WOOCK.
WALTER R. WOOCK.

Witnesses:
VERADINE WARNER,
BERNARD PRIVAT.