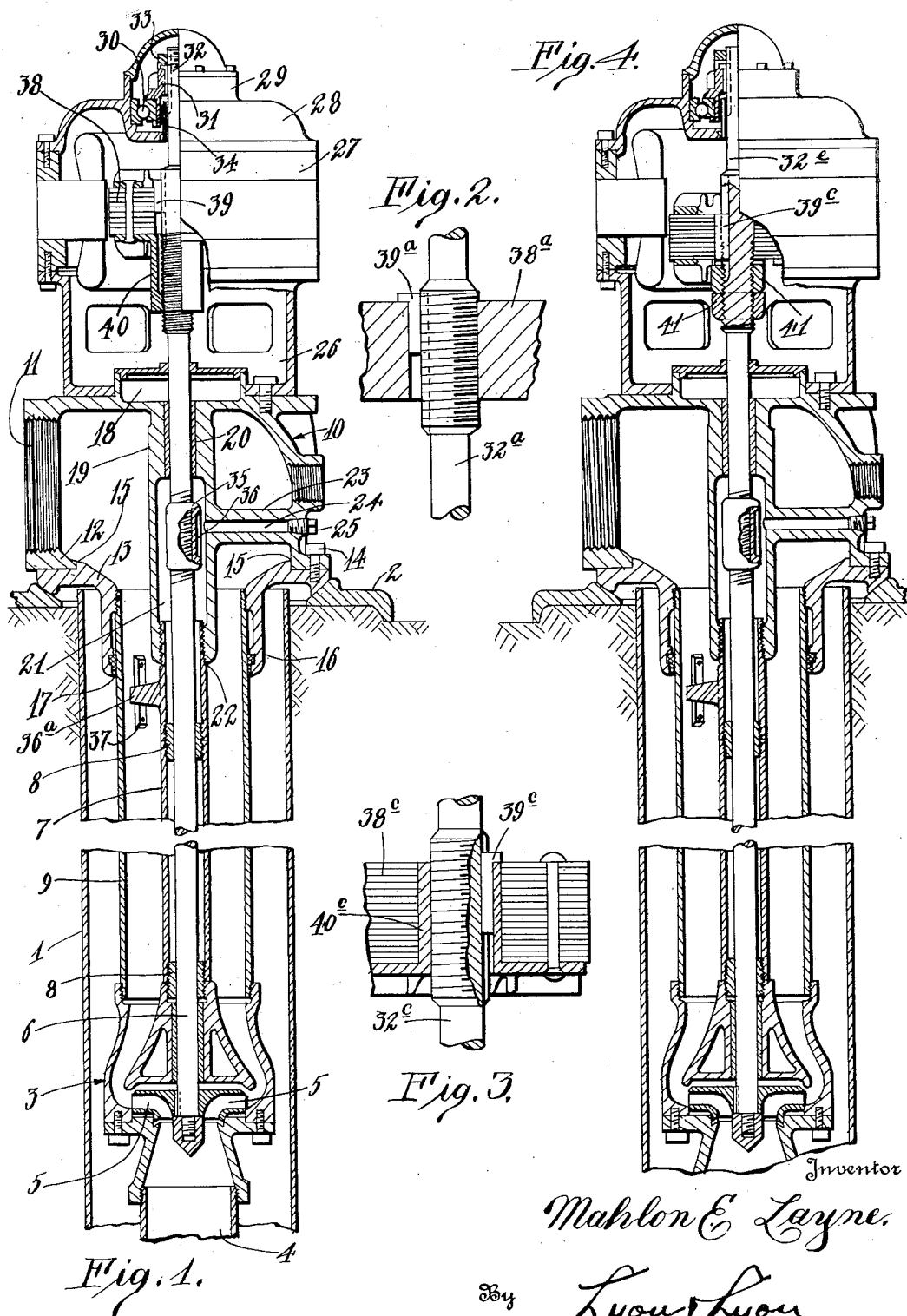


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M. E. LAYNE
ROTARY WELL MECHANISM

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MAHLON E. LAYNE, OF HOUSTON, TEXAS, ASSIGNOR TO LAYNE & BOWLER CORPORATION, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

ROTARY WELL MECHANISM.

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This invention relates to a rotary well pumping mechanism and refers particularly to the type of deep well pumping mechanism employed in water wells, or the like, and in which the pump proper is suspended in the well usually by means of its discharge casing.

Rotary well mechanisms of the type to which this invention relates, are generally driven either by a pulley at the top of the well or by an electric motor set over the casing head of the pump. In view of the varying length of the shafting and the depth of the well, it is necessary in a rotary well pumping mechanism of this type to provide some means for proper adjustment of the pump shaft after the mechanism is installed. Accordingly, it is not generally practical to directly connect the pump shaft of the mechanism with the shaft of the electric motor so that the motor shaft and pump motor becomes one rigid shaft. Such a construction does not provide for the proper regulation or longitudinal adjustment of the pump shaft to properly center the impellers of the pump. Moreover, the difficulties encountered in connecting and assembling such apparatus are extremely great and cannot generally be practically carried out.

It is an object of the present invention to provide the rotary pump mechanism driven by an electric motor in which the electric motor shaft and the pump shaft may be rigidly connected together to act as one rigid shaft and still provide for an adjustment of the pump shaft to center the impellers in the pump.

Another object of the present invention is to provide a simplified pump construction which is provided with one vertical shaft carrying both the impellers and the rotor of the shaft so that the load of the rotor and the impellers on the shaft may all be received upon the same bearings.

Another object of the present invention is to provide a rotary pump mechanism combining an electric motor adjustable upon the pump shaft.

Various other objects and advantages of the present invention will appear from the description of the preferred example or examples of rotary pump mechanism embodying the invention for which advantages ref-

erence is made to the accompanying drawings in which the rotary pump mechanism is illustrated in its preferred forms.

In the drawings:

Fig. 1 is an elevation mainly in vertical section of a rotary pump mechanism.

Fig. 2 is a fragmentary view illustrating the modified adjustable connection between the rotor and shaft of the mechanism.

Fig. 3 is a similar view of a further modified form.

Fig. 4 is an elevation mainly in vertical section of another modified form of the invention.

Referring to the drawings, with reference first to the mechanism shown in Fig. 1, the rotary pump mechanism there illustrated is shown as positioned in a well hole in which 1 indicates the well casing and 2 a foundation at the top of the well. 3 indicates the rotary pump proper connected at its lower end with an inlet pipe 4. The rotary pump proper includes one or more impellers 5 mounted upon a pump shaft 6. The pump shaft 6 extends from the pump vertically to the top of the well and may be built of a number of sections if desired. The pump shaft is enclosed by a shaft casing 7 which likewise extends from the pump to the top of the well and may be built in sections provided with bearing blocks 8. The water pumped is passed through a discharge casing 9 concentric with the shaft and surrounding the shaft casing 7. This discharge casing 9 likewise extends to the top of the well and serves, together with the shaft casing 7, as means for suspending the pump proper 3 in the bottom of the well. The discharge casing 9 is connected at its upper end with a casing head 10 having the usual lateral discharge 11, said casing head being built in two pieces, the upper portion 12 being the major portion of the casing head, the lower portion 13 merely constituting a detachable bottom of such casing head, the two parts being bolted or otherwise held together by suitable means, such as indicated at 14 and the parts 13 and 12 are provided with interlocking faces 15 so that the two parts are always assembled in predetermined position. The part 13 provides a depending neck 16 which is screwed to the upper end of the discharge casing 9 and is provided with a

groove or grooves 17 for the reception of packing to hold the discharge casing and casing head solidly together.

The upper end of the discharge casing provides a reservoir 18 for holding lubricant to the bearings of the shaft 6 and below the reservoir the discharge casing provides a neck 19 the upper portion of which supports a sleeve bearing 20 for the shafting. Below the sleeve bearing 20 the neck is provided with an enlarged bore 21 and is threaded at its lower end as indicated at 22 to the upper end of the shaft casing 7. The neck 19 is integral with a web 23 extending laterally from the middle portion of the neck to the side of the discharge head and the web 23 is bored out as indicated at 24 and normally closed by a plug 25.

Mounted upon a discharge head 11 is a motor stand or base 26 supporting the stator 27 of the electric motor. Said electric motor is provided with a cover 28 mounted on the stator which forms a cup shaped portion 29 for mounting a combined radial thrust bearing 30 preferably of the ball type which bearing 30 supports a collar 31 keyed to the motor shaft 32 by a spline key, the weight of said motor shaft 32 being imposed upon the collar 31 and hence the bearing 30 by a nut 33 which is adjustable to longitudinally adjust the motor shaft 32.

An oil-retaining sleeve 34 is provided extending upwardly from the bottom of the cup 29 surrounding the shaft and serves to permit the lubricant to be retained therein. The motor shaft 32 extends into the discharge head 11 and utilizes the sleeve bearing 20 as a lower radial bearing to the motor and is coupled within the enlarged bore 21 of the neck 19 of the discharge head with the pump shaft 6, the shafts being connected by coupling 35.

In this way it is seen that when assembled the rotary pump mechanism has one rigid shaft supporting both the impellers of the pump and the rotor of the electric motor. The coupling 35 is provided with a notch 36 engageable by a wrench inserted through the opening 24 of the web 23 and supported in position by such web. The shaft casing 7 is shown as provided with an arm 36^a extending radially into position to engage an abutment 37 on the discharge casing 9.

38 indicates the rotor of the electric motor which may be of any preferred or customary construction in regard to the electrical details, the rotor being shown as the customary laminated core of an induction motor. Said rotor 38 is formed so that it is vertically adjustable relative to the shaft 32 and this adjustment may be accomplished by various desired means.

In this embodiment of the invention, the rotor 38 is shown as being provided with a spline key 39 connecting it with the shaft

32 and provided with a neck 40 extending below the rotor proper and pivoted at its lower end to a threaded portion of the shaft 6.

In Fig. 2 is illustrated a modified form 70 which is provided with the spline key connection 39^a, but the core of the rotor 38^a is shown directly threaded to the shaft 32^a.

Referring to Fig. 3, the rotor core 38^c is illustrated as having an inner sleeve 40^c extending upwardly within the core proper and such sleeve threaded to the shaft 32^c and keyed thereto as indicated at 39^c.

Referring to Fig. 4, said figure illustrates a construction of rotary pump mechanism similar to Fig. 1, except that the spline key 39^e is made slidable on the motor shaft 32^e and plurality of nuts 41 threaded onto the shaft below the rotor.

With each of the foregoing described embodiments of the invention, the motor shaft and the shaft pump proper are made, when assembled, into one rigid shaft which may be longitudinally adjusted to center the impellers 5 of the pump by adjustment of the nut 33 threaded to the top of the shaft or by any other preferred means. The weight of the shafting and rotor of the motor hydraulic lead developed in operation of the mechanism are all imposed upon the same bearings 30 which are preferably mounted above the electric motor so that the core and shafting are hung plumb from such bearings. The adjustment of the shafting effects centering of the impellers 5 and the core of the electric motor and rotor then adjusted to properly center this element in the electric motor.

The difficulties of assembling a rotary pump mechanism having a directly connected electric motor are eliminated by the construction herein provided which incorporates the use of the two part discharge head to the mechanism of which the lower part is detachable and employs the enlarged coupling 35 in the engagement of the neck 19 of the discharge head which can be held by wrenches in web 23 while the shafting 38 is being screwed into place. The arm 36 on the shaft casing 7 engages the abutment 37 during such operation to prevent this shaft from being turned during assemblage of the discharge head 11.

While the rotary pump mechanism herein described is well adapted to accomplish the objects of this invention, it is understood that various modifications may be made without departing from the spirit of the invention, and the invention includes all such modifications, changes and substitutions as come within the scope of the appended claims.

I claim:

1. In a rotary well pumping mechanism, the combination with a rotary pump, a dis-

- charge casing extending vertically from the pump, a casing head at the upper end of the discharge casing, an electric motor mounted above the casing head, a shaft mounting both the impellers of the pump and the rotor of the electric motor, such shaft being longitudinally adjustable, the rotor of the electric motor being longitudinally adjustable on said shaft.
2. In a rotary well pumping mechanism, the combination with a rotary pump and its discharge casing, of an electric motor mounted over the discharge casing, a shaft mounting both the impellers of the pump and the rotor of the electric motor, a bearing for such shaft supported above the rotor of the motor the rotor of the motor being longitudinally adjustable on said shaft.
3. In a rotary well pumping mechanism, the combination with a rotary pump having a discharge casing, a casing head forming the upper head of the discharge casing, an electric motor mounted over said discharge casing, a vertical shaft mounting the impellers of the pump and the rotor of the electric motor, a thrust bearing for such shaft supported above the rotor of the motor, and a sleeve bearing for such shaft provided by the discharge head, the rotor of the electric motor being vertically adjustable on said shaft.
4. In a rotary well pumping mechanism, the combination with a rotary pump and a vertical discharge casing of the pump of a two-part casing head, the lower portion of which is detachable, the upper portion being provided with a depending neck, a shaft enclosing casing connected to said neck, said neck having a central engagement and a hollow web extending radially to the side of the discharge head, a pump shaft supporting the impellers of the pump extending vertically from the shaft enclosing casing, an electric motor mounted upon the discharge head and having its rotor adjustable on the motor shaft the motor shaft extending into the discharge head and coupled to the pump shaft in engagement with the discharge head neck.

Signed at Los Angeles, Calif., this 17 day of February, 1926.

MAHLON E. LAYNE.