

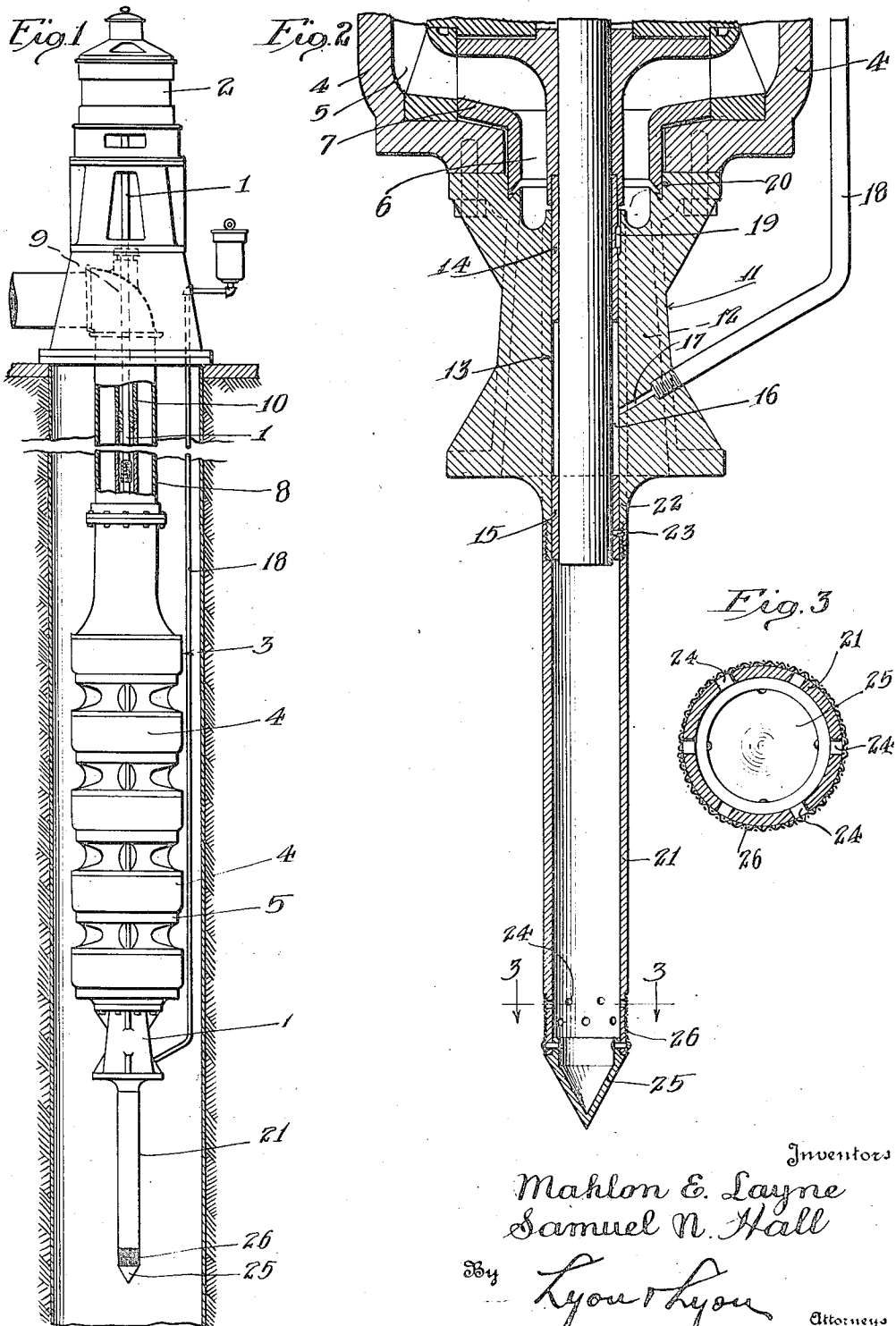
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M. E. LAYNE ET AL

LUBRICATING MEANS FOR PUMP BEARINGS

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UNITED STATES PATENT OFFICE.

MAHLON E. LAYNE, OF HOUSTON, TEXAS, AND SAMUEL N. HALL, OF SOUTH PASADENA, CALIFORNIA, ASSIGNORS TO LAYNE & BOWLER CORPORATION, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

LUBRICATING MEANS FOR PUMP BEARINGS.

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To all whom it may concern:

Be it known that we, MAHLON E. LAYNE, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, and SAMUEL N. HALL, a citizen of the United States, residing at South Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Lubricating Means for Pump Bearings, of which the following is a specification.

This invention relates to rotary pumps of the type employed in deep wells and refers particularly to means for lubricating the lower bearing of the pump. While the features of this invention may be applied to pumps operating above ground on a horizontal or vertical shaft, the invention is found especially applicable to deep well pumps and will be described in connection therewith.

It is common practice in the construction of deep well rotary pumps to provide a series of gang impellers or pump runners disposed one over the other on the same shaft. Below the lower impeller the shaft is provided with a bearing. As the shaft and impellers operate at comparatively high speed there is a decided tendency for the shaft to vibrate or "whip" and this results in considerable wear, especially on this lower pump bearing.

The general object of this invention is to provide means for more efficiently lubricating the lower pump bearing so as to reduce the friction on the same as well as to reduce the tendency of the pump shaft to vibrate or whip when in operation.

More specifically one of the objects of this invention is to provide a construction for the lower pump bearing by which a lubricant may be supplied to the bearing from a grease cup or lubricant reservoir in contact with the shaft and to provide a grease cup or lubricant reservoir which may be supplied with lubricant from the top of the well as desired.

Various other objects and advantages of the invention will appear from a description of a preferred embodiment of the invention. The invention comprises certain novel parts and combination of parts, all of which con-

tribute to the preferred embodiment of the invention as described herein.

In the drawings:

Figure 1 is a vertical elevation and pump mechanism embodying the invention, illustrating the pump positioned in a well casing which is shown in vertical section.

Fig. 2 is a vertical section of the lower portion of the pump disclosing the novel construction of the pump bearing and lubricating means.

Fig. 3 is a transverse section on the line 3-3 of Fig. 2.

In the drawings 1 indicates the actuating shaft of the pump which extends vertically to the top of the well and is there connected to a suitable driving means such as the electric motor indicated at 2. The shaft 1 is mounted to rotate in a pump casing 3 which consists of a plurality of unit casings or pump housings 4 disposed one above the other and constructed so that the outlet 5 of each lower housing delivers to the inlet 6 of the next adjacent upper housing. Each housing encloses an impeller or runner 7 which is adapted to draw a fluid through the inlet 6 of the housing and force same out of the outlet 5.

The outlet from the upper housing discharges water into a casing 8 which is positioned concentrically around the actuating shaft 1 of the pump and connected to a discharge elbow 9. 10 indicates a casing for enclosing the shaft 1 from contact with the water in casing 8.

The construction of the pump so far described is well understood in the art and may vary in specific details without affecting the nature of this invention. This invention is particularly directed to the construction of a lower bearing 11 which incorporates a novel construction tending to overcome any vibration or whipping tendency in the shaft 1. The bearing 11 is provided with an annular intake opening 12 through which the water flows into the lowest housing 4. The bearing 11 is provided with a bore 13 of somewhat larger diameter than the diameter of the shaft 1 and to provide a bearing surface for the shaft the bearing is provided with two sleeves 14 and 15 which provide the bearing or rubbing

faces of the bearing and are separated from each other by a space whereby an annular lubricant chamber 16 is provided between the sleeves. To provide means for supplying lubricant to this reservoir the bearing is provided with an oil duct or grease duct 17 which is connected by a pipe 18 to the mouth of the well. The upper bearing sleeve 14 is fixed from rotating with the shaft 1 by a key 19 and preferably extends above the bearing 11 and loosely engages in an annular recess 20 provided by the lower end of the impeller or runner 7 in the lowermost housing 4. By this construction the fluid entering the annular opening 12 in the bearing 11 is prevented from coming into direct contact with the upper end of the sleeve 14 and tendency of the fluid to work into the bearing surface of the shaft 1 is thereby materially reduced.

Means are also provided such as grease cup 21 for maintaining a quantity of grease or other lubricant in contact with the lower end of the shaft at the lower end of the bearing 11. In the preferred embodiment of the invention the grease cup is formed in tubular form, the upper end of the cup being threaded to a lower extension 22 of the bearing 11. 23 indicates a pin extending through said lower extension 22 and the lower sleeve 15 to hold the sleeve 15 from rotating with the shaft 1. The lower end of the grease cup 21 is provided with perforations or openings 24 which permit fluid to be admitted under pressure into the lower end of the grease cup 21 so that the pressure of the fluid may operate to flow or force the grease upwardly and automatically maintain it in contact with the lower end of the shaft 1 while the pump is in operation. Preferably the grease cup 21 is closed at the end with conical tip or cap 25 which acts as a protector for the cup. Around the perforations 25 a cylindrical screen 26 is secured to prevent debris from being admitted into the cup 21.

When the pump is in use from time to time grease or other lubricant may be forced down the tube 18 into the annular lubricant chamber 16.

It is understood that the embodiment of the invention described herein is only one form of the many embodiments this invention may take and this invention is not limited to the specific construction of the device herein illustrated but various modifications may be made within the spirit of the invention. This invention is of the scope set forth in the accompanying claims.

We claim:

1. In a rotary pump having a vertical shaft, the combination of a casing in which the shaft rotates, a pump runner carried by the shaft, a bearing for the shaft below the casing, a grease cup for carrying a lubricant in contact with the lower end of the shaft and disposed below the lower end of the shaft, and means for conducting lubricant to the interior of the grease cup.

2. In a rotary pump having a vertical shaft, the combination of a casing in which the shaft rotates, a pump runner carried by the shaft, a bearing for the shaft below the casing, a grease cup for carrying a lubricant in contact with the lower end of the shaft, and means for conducting lubricant to the interior of the grease cup, said grease cup operating to contain a quantity of grease when the pump is in operation, the lower end of said cup being in communication with the water chamber within the well, whereby the upward pressure of the water tends to force the grease up from the cup into the bearing.

3. Lubricating means for a vertical shaft comprising the combination of a casing having a bearing for the shaft, a grease cup attached to the bearing over the end of the shaft for containing a quantity of grease, said grease cup being open below, whereby fluid pressure exerted at the lower portion of the grease cup, operates to force the grease up against the lower end of the shaft at the bearing.

4. A lubricating device for a rotary pump comprising the combination of a casing with a bearing at the underside thereof, a shaft carried in said bearing, a grease cup attached below the shaft, so that grease contained in the cup may come in contact with the lower end of the shaft at the end of the bearing, said grease cup being open below, whereby water pressure exerted in the lower portion of the cup will force the grease up into the bearing.

5. In a rotary pump, the combination of a shaft, a casing carrying the shaft, an impeller carried on the shaft, a lower bearing for the shaft having an upper bore fitting the shaft and forming a bearing face therefor and a lower bore fitting the shaft forming another bearing face therefor, said bearing having a recess around the shaft between the two bearing faces, and means for supplying lubricant to the said recess.

Signed at Los Angeles, California, this 4th day of December, 1923.

MAHLON E. LAYNE.
SAMUEL N. HALL.