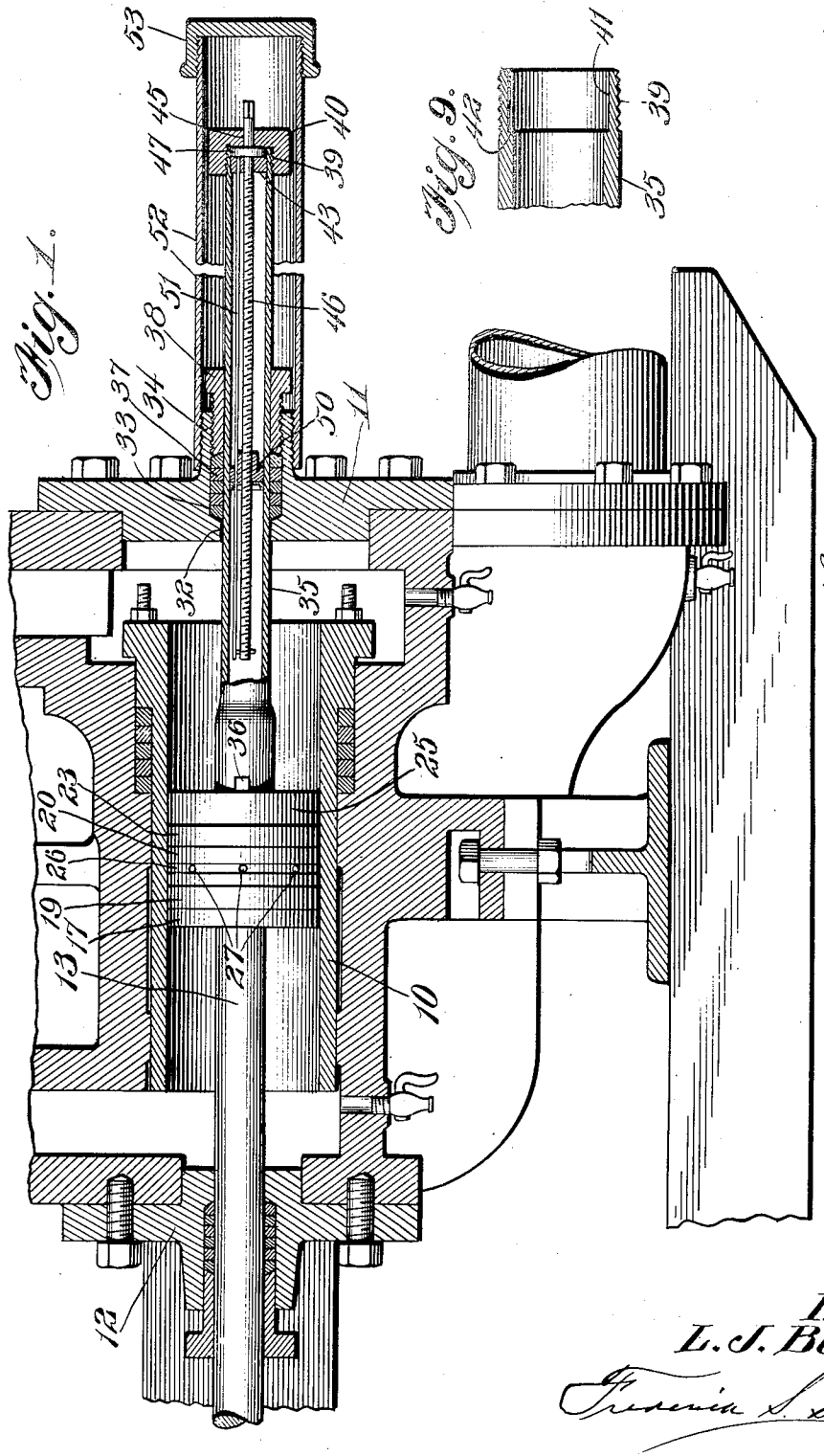
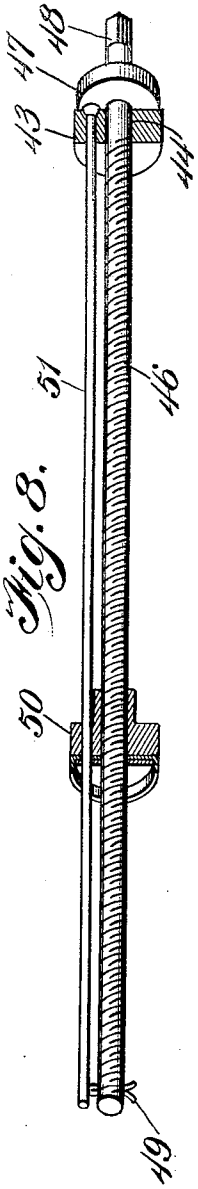
July 14, 1925. 1,545,936

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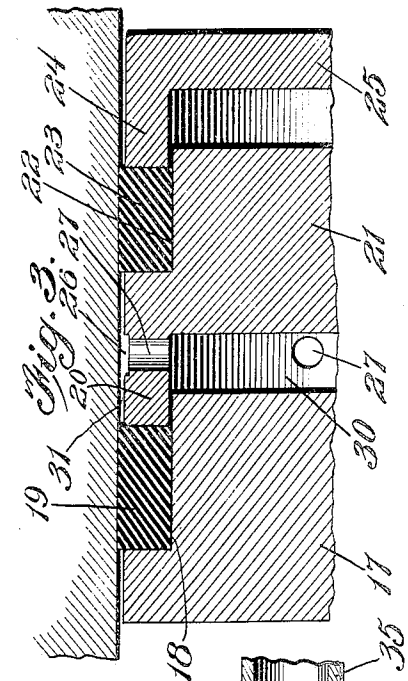
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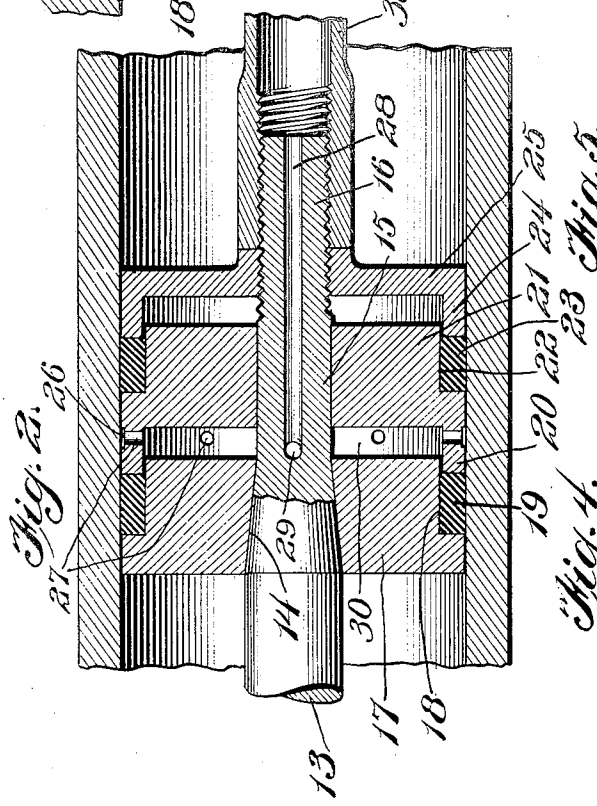
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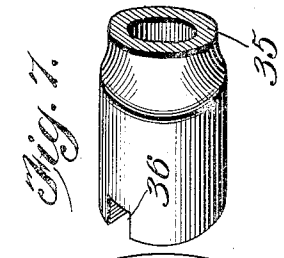
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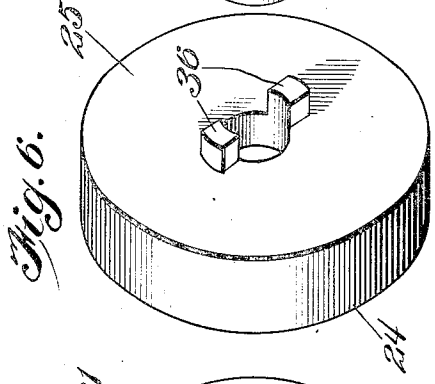
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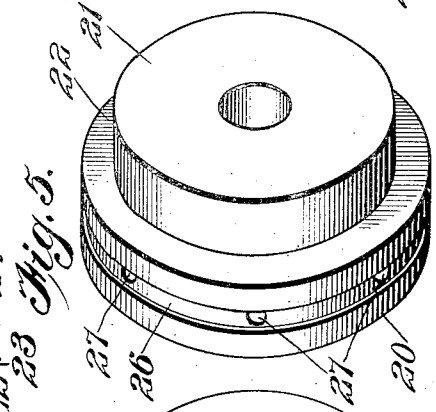
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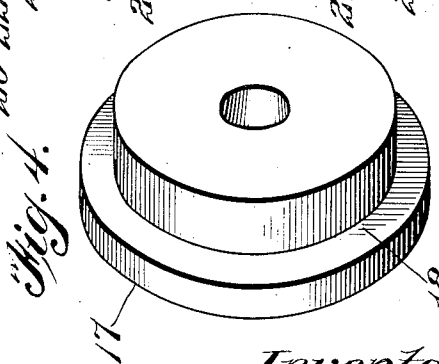












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Patented July 14, 1925. 1,545,936

UNITED STATES PATENT OFFICE.

LEE J. BLACK, OF BEAUMONT, TEXAS.

PUMP.

Application filed April 12, 1924. Serial No. 706,090.

To all whom it may concern:

Be it known that I, LEE J. BLACK, a citizen of the United States, residing at Beaumont, in the county of Jefferson and State of Texas, have invented certain new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to improvements in pumps and more particularly to an improvement in the construction of slush pumps and has for a primary object thereof the provision of means whereby the packing of the pump may be compressed while the pump is in operation and a lubricant likewise fed to the pump piston during operation.

It is well known to those familiar with the art that heavy duty slush pumps, such as are employed for circulating water in rotary well drilling apparatus, handle a class of fluid which carries a considerable amount of gritty substances with it and for this reason the packing employed in the pump wears rapidly requiring frequent replacements or adjustments necessitating a shut-down of the pump and accordingly temporary shut-down of the drilling operation. These shut-downs are undesirable for the reason that during such shut-downs, the water not being in circulation, sediment has a tendency to collect at the bottom of the bore being formed interfering seriously with starting up of the drill at the end of the shut-down and generally causing annoyance to the drillers outside of the loss of time in the drilling operation. Furthermore, the packing which is ordinarily employed on such a pump is difficult to lubricate. The application of oil or grease to the packing when applied serves only to lubricate the cylinder during the first few hours of the pump's use after such packing. After this period the heavy grit and dirt carried by the fluid which is being pumped rapidly carries away the grease and with the grease removed embeds itself in the packing, resulting in scored cylinders and rapidly worn packing necessitating frequent replacements of both elements. Even while the packing is provided with a lubricant the dirt and grit has a tendency to collect in the lubricant itself. Accordingly, an important object of this invention, as outlined above, is the provision of apparatus permitting tightening of the packing without shutting down the pump and to feed a lubricant to the packing, and more specifically it is the purpose of this invention to so feed the lubricant to the packing that it will tend to remove from the packing by its application thereto any collected grit engaged with the packing.

A further and more specific object of the invention is to provide a device of this character in which the means for adjusting or tightening the packing provides a means for introducing to the piston the lubricating element employed.

A further and still more specific object of the invention is to provide an adjusting means for the packing whereby the packing may be adjusted during operation of the pump forming a grease barrel and having means adjustable longitudinally thereof for forcing the grease contained in the barrel through ports in the rod and piston to the walls of the cylinder of the pump.

The invention further resides in the novel construction and arrangement of the various parts employed as disclosed in the accompanying drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention and wherein:—

Figure 1 is a vertical sectional view through the cylinder of the water end of a slush pump constructed in accordance with my invention, the piston being shown in elevation;

Figure 2 is an enlarged detail sectional view through the piston and a portion of the rod;

Figure 3 is a further enlarged detail view in section showing the grease space formed between the cylinder, piston and the packings of the piston;

Figure 4 is a perspective of the piston proper;

Figure 5 is a perspective of the intermediate follower head;

Figure 6 is a perspective of the follower;

Figure 7 is a perspective of the follower head engaging end of the adjusting element for the follower;

Figure 8 is a perspective view showing the construction and mounting of the grease or lubricant feeding follower contained within the follower head adjusting element;

Fig. 9 is a detailed cross-sectional view of the upper end of the adjusting sleeve.

Referring now more particularly to the drawings, the numeral 10 generally indi-

cates the water cylinder of a slush pump and 11 and 12 the piston and rod heads of the cylinder. Through a packing gland in the rod head 12 a rod 13 operates in the usual manner. In accordance with this invention, the rod at the piston end thereof is provided with a taper 14 spaced from such end and tapering toward such end. The straight portion of the rod beyond the taper in forming the end is divided into a plain section 15 arranged next adjacent the taper 14 and a threaded section 16 extending to the end of the rod.

The piston proper, indicated at 17, is seated upon the taper of the rod and has its periphery rabbetted at that end thereof next adjacent the piston head as indicated at 18. This rabbet receives a packing 19 and the end of a flange 20 formed upon what I term an intermediate follower head 21 slidably mounted upon the straight portion 15 of the rod 13. The periphery of the intermediate follower head 21 at that side thereof next adjacent the piston end head 11 of the cylinder is provided with a rabbet 22 similar to the rabbet 18 of the piston 17 and this rabbet receives a packing 23 and a flange 24 formed upon a follower head 25 threaded upon the section 16 of the rod 13. The flange 20 of the intermediate follower head is provided in approximate alignment with the front face of the follower head or that face next adjacent the piston 17 and in its periphery with an annular groove 26 and through the flange are formed radially directed openings 27 placing the space between the piston 17 and intermediate follower head 21 in communication with the groove 26. The straight portion 15, 16 of the rod is provided with a longitudinal bore 28 which at its rear end opens through the end of the rod and at its forward end communicates with a radial outlet port or ports 29 communicating with the space 30 between the piston and intermediate follower head at a point immediately rearwardly of the rear face of the piston head 17.

It will be obvious that lubricant fed longitudinally of the groove 28 will enter the space 30 and from this space will pass through the radial openings 27 to the groove 22. It is pointed out that lubricant so delivered to the face of the piston and to the cylinder walls is delivered intermediate the packings 19 and 23 and accordingly in passing through these packings will tend to remove from the faces thereof any collected grit or dirt. It is, of course, understood that in the actual construction of the piston and cylinder the piston proper is slightly smaller than the cylinder in which it operates, the packing filling this space. Accordingly, between the wall of the piston and the wall of the cylinder and between the packings 19 and 23 a space 31 is formed in which the lubricant may collect. Accordingly, there will always be lubricant upon the surface of the piston between the packings for delivery to the walls of the cylinder. Attention is further directed to the fact that if the space 30 be filled with grease and the follower head 25 adjusted to tighten the packings 23, the grease or lubricant within the space 30 by the shifting movement of the intermediate follower head 21 will be compressed and forced outwardly through the openings 27 provided, of course, return of the grease through the ports 29, 28 is checked in any manner. Thus during the tightening operation grease is supplied to the walls of the cylinder.

The piston end head 11 of the cylinder is provided with a bore 32 aligned with the piston 13, the outer end of this bore being enlarged as at 33. About the edges of the bore upon the outer surface of the piston a gland flange 34 is formed which is preferably threaded interiorly and exteriorly. Threaded upon the end 16 of the piston rod 13 is a sleeve 35 which extends through and fits the bore 32. The piston follower 25 and the inner end of the sleeve 35 are provided with coacting clutch teeth, as at 36, so that upon rotation of the sleeve 35 the follower head 25 is rotated. The enlargement 33 of the bore 32 has packing 37 disposed therein which is compressed by a gland nut 38 engaged with the interior threads of the gland flange 34. The outer end of the sleeve 35 is exteriorly threaded, as at 39, for engagement by a cap 40 the exterior of which is shaped for engagement by a wrench whereby the sleeve may be rotated, the sleeve being so constructed that it abuts the inner end of the bore of the cap to limit its movement upon the sleeve.

The outer end of this sleeve is interiorly relieved, as at 41, to form a shoulder 42 against which is seated a supporting disk 43, this disk being of less thickness than the depth of the relief 41, so that when seated against the shoulder 42 at the forward end of this relief it is spaced from the adjacent face of the end of the cap 40. The disk and cap are formed with axial bores 44, 45 through which are rotatably directed a shaft 46, the shaft, intermediate the adjacent faces of the cap and disk, being provided with an enlargement 47 which prevents displacement of the shaft. The outer end of the shaft is formed for engagement with a wrench, as at 48, while the inner end thereof which projects into the sleeve 35 for a considerable distance is threaded, the inner extremity of the shaft being provided with a removable stop member 49. Mounted upon the shaft is a follower head 50 having threaded engagement therewith, so that upon rotation of the shaft the head is forced longitudinally of the sleeve to drive before

it the lubricant contained within the sleeve. Means are provided, as at 51, and in the present instance shown as consisting of a guide rod carried by the disk 43, for preventing rotation of the follower head within the sleeve. In order to protect the outer end of the sleeve and shaft from damage by accidental engagement therewith, a housing therefor is preferably provided consisting of a sleeve 52 threaded at its inner end for engagement with the outer face of the gland flange 34 and at its outer end for engagement by a cap 53, this sleeve being bodily removable to afford access for adjustment of the sleeve 35 or shaft 46.

In the use of the device packing is placed in the rabbets 18 and 26 and the complete piston assembled, the sleeve 35 placed in position, after which the head 11 is placed upon the cylinder. The sleeve 35 is then filled with grease or other lubricant and the disk 43 and shaft 46 placed in position, the follower head 50 having been first withdrawn until it lies immediately adjacent the disk 43. The cap 40 is then placed in position and tightened until sufficient pressure has been placed upon the packing, after which the shaft 46 is rotated to force the lubricant well into the spaces 30 and 31. The protecting casing is then placed in position and the pump may be operated. When further adjustments are necessary these may be made without stopping the pump, if so desired, or if the pump is stopped it will be obvious since all adjustments can be made from the exterior of the pump these will occupy but very few moments. Even though the pump is stopped for tightening the packing and applying lubricant to the packing it will be obvious that the protecting casing can be removed during the operation of the pump so that very little time will be lost by the shut-down, the time, in fact, being so short that there is no necessity for a suspension of drilling operations.

It will be obvious that the specific construction hereinbefore set forth is intended only to illustrate a particular preferred form of my invention and is capable of a considerable range of change and modification without departing from the spirit of the invention and I accordingly do not limit myself to such specific structure except as hereinafter claimed.

I claim:—

1. In a pump of the character described, a cylinder, a piston operating therein, packings carried by the piston, and means disposed exteriorly of the pump for tightening said packings, the piston including relatively movable sections affording therebetween a chamber for the reception of lubricant, said means for tightening said packing relatively moving said sections during compression of the packing to lessen the size of the chamber, said chamber being in communication with the exterior of the piston between the packings.

2. In a pump of the character described, a cylinder, a piston operating therein and having a packing groove, packing disposed within the groove, a follower head associated with the piston compressing packings within the groove, means for shifting said follower operable from the exterior of the cylinder of the pump, comprising a hollow member operatively engaged with the follower and projecting through a packing gland carried by the cylinder head, said hollow member forming a grease chamber and being in communication with the outer surface of the piston head through the piston rod, and means for ejecting grease from the chamber.

3. In a pump of the character described, a cylinder, a piston operating therein and having a packing groove, packing disposed within the groove, a follower head associated with the piston compressing packings within the groove, means for shifting said follower operable from the exterior of the cylinder of the pump, comprising a hollow member operatively engaged with the follower and projecting through a packing gland carried by the cylinder head, said hollow member forming a grease chamber and being in communication with the outer surface of the piston head through the piston rod, means for ejecting grease from the chamber including a follower disposed within the hollow member, and means for shifting the follower longitudinally of the hollow member disposed exteriorly of the pump.

4. In a pump of the type described, a piston having spaced packing grooves each having a packing therein, means for simultaneously compressing the packings within the grooves, and means for delivering a lubricant to the exterior of the piston between the packings including a chamber reduced in capacity by operation of said means to compress the packing.

5. In a pump of the type described, a piston having spaced packing grooves each having a packing therein, means for delivering a lubricant to the exterior of the piston between the packings including a lubricant storage chamber in communication with the exterior of the piston, and means operable from the exterior of the cylinder for contracting the chamber.

6. In a pump of the type described, a rod, a piston fixed upon the rod, a follower adjustable upon the rod and an intermediate follower disposed between the follower and piston and shiftable upon the rod, the piston and intermediate follower having peripheral packing receiving rabbets at the ends thereof next adjacent the follower, the

follower and intermediate follower having portions entering the packing rabbets of the intermediate follower and piston respectively to compress the packings therein, the compressing portion of said intermediate follower being perforated to permit passage of a lubricant disposed in the space intermediate said piston and intermediate follower to the exterior of the piston.

7. In a pump of the type described, a rod, a piston fixed upon the rod, a follower adjustable upon the rod and an intermediate follower disposed between the follower and piston and shiftable upon the rod, the piston and intermediate follower having peripheral packing receiving rabbets at the ends thereof next adjacent the follower, the follower and intermediate follower having portions entering the packing rabbets of the intermediate follower and piston respectively to compress the packings therein, the compressing portion of said intermediate follower being perforated to permit passage of a lubricant disposed in the space intermediate said piston and intermediate follower to the exterior of the piston, and means for delivering a lubricant longitudinally of the rod to such space.

8. In a pump of the type described, a rod, a piston fixed upon the rod, a follower adjustable upon the rod and an intermediate follower disposed between the follower and piston and shiftable upon the rod, the piston and intermediate follower having peripheral packing receiving rabbets at the ends thereof next adjacent the follower, the follower and intermediate follower having portions entering the packing rabbets of the intermediate follower and piston respectively to compress the packings therein, the compressing portion of said intermediate follower being perforated to permit passage of a lubricant disposed in the space intermediate said piston and intermediate follower to the exterior of the piston, and means for delivering a lubricant longitudinally of the rod to such space operable from the exterior of the cylinder.

9. In a pump of the type described, a rod, a piston fixed upon the rod, a follower adjustable upon the rod and an intermediate follower disposed between the follower and piston and shiftable upon the rod, the piston and intermediate follower having peripheral packing receiving rabbets at the ends thereof next adjacent the follower, the follower and intermediate follower having portions entering the packing rabbets of the intermediate follower and piston respectively to compress the packings therein, the compressing portion of said intermediate follower being perforated to permit passage of a lubricant disposed in the space intermediate said piston and intermediate follower to the exterior of the piston, and means disposed exteriorly of the cylinder for shifting said follower head upon the rod to thereby compress the packings within said rabbets and decrease the space between the intermediate follower and piston and drive lubricant disposed in said space through such perforations.

10. In a pump of the type described, a piston having spaced packing grooves, each having a packing therein, means for simultaneously compressing the packings within the grooves, and a chamber in communication with the exterior of the piston between the grooves contracted upon operation of said means.

11. A piston comprising relatively shiftable sections adapted to support therebetween a packing to be compressed upon shifting of the sections, the sections combining to provide a chamber, said chamber being in communication with the exterior of the piston and adapted for the reception of a lubricant, and means for relatively shifting said sections.

12. In a pump of the type described, a cylinder, a piston operating therein and comprising sections relatively shiftable longitudinally of the cylinder, a packing supported between the sections and adapted to be compressed upon such relative shifting of the sections, said sections combining to form a chamber for the reception of lubricant, the chamber being in communication with the exterior of the piston, and means operable exteriorly of the cylinder for relatively shifting said sections.

In testimony whereof I affix my signature.

LEE J. BLACK.