May 3, 1932. R. A. LIGON 1,857,026

BOOSTER PUMP FOR WINDMILLS

Filed May 2, 1929 2 Sheets-Sheet 1

Fig. 1

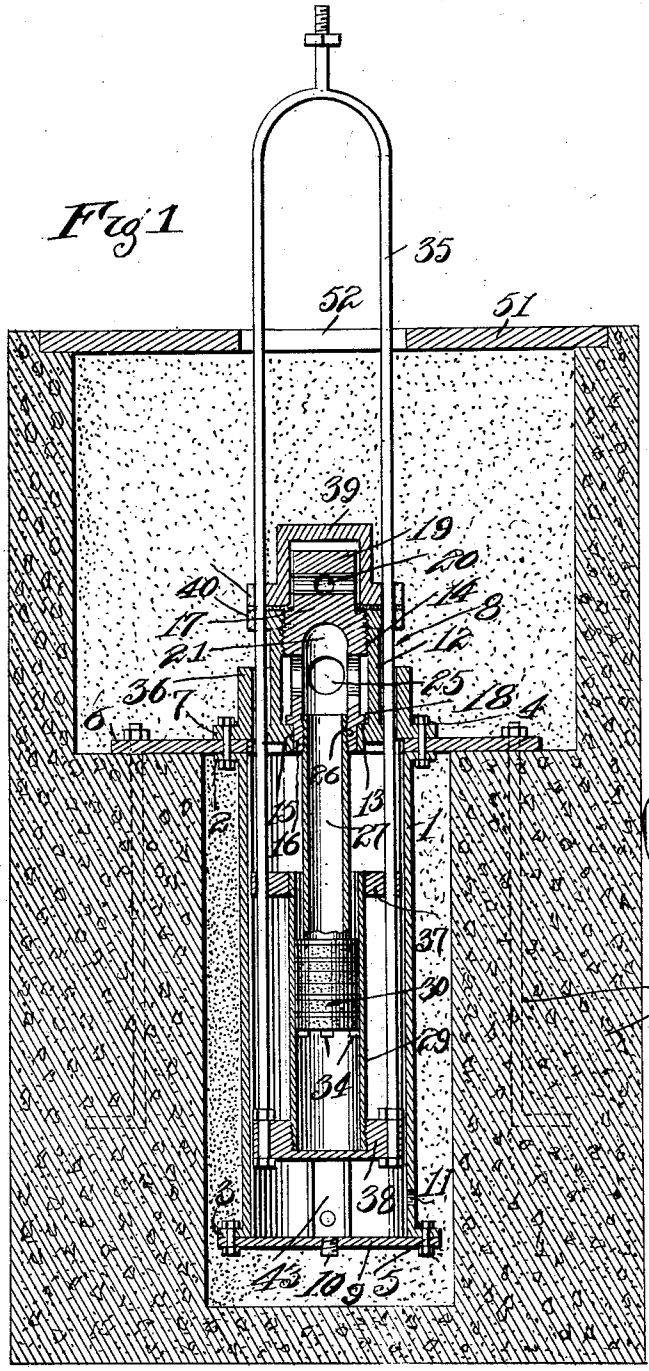


Fig. 3.

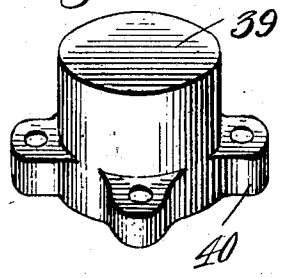


Fig. 2.

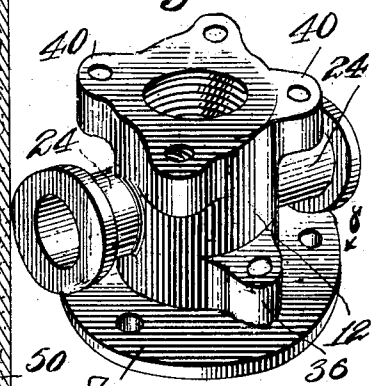
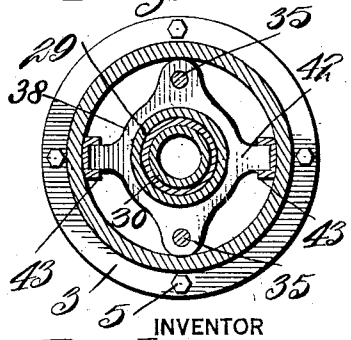


Fig. 7.



WITNESSES

F. H. Sayre

J. F. Schroot

INVENTOR

R. A. Ligon.

BY

Munn & Co

ATTORNEY

May 3, 1932. R. A. LIGON 1,857,026

BOOSTER PUMP FOR WINDMILLS

Filed May 2, 1929 2 Sheets-Sheet 2

Fig. 4.

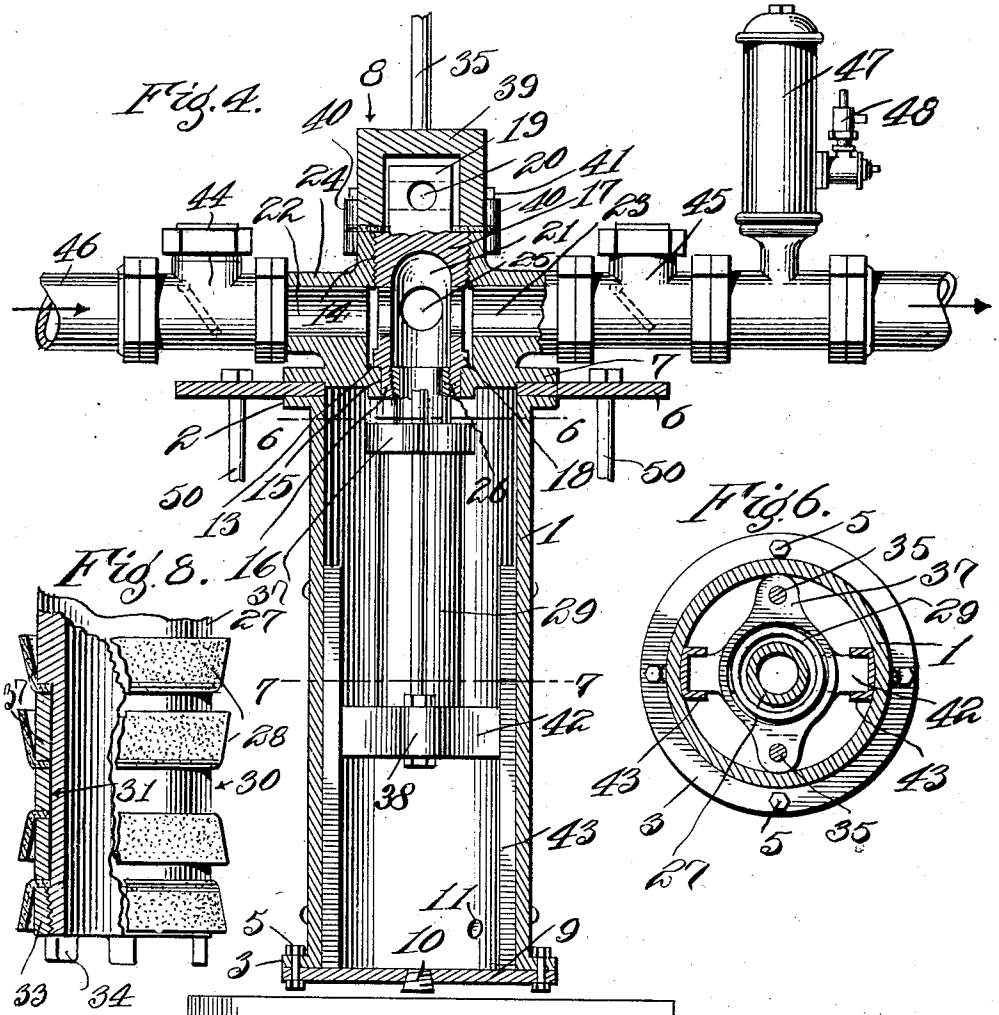
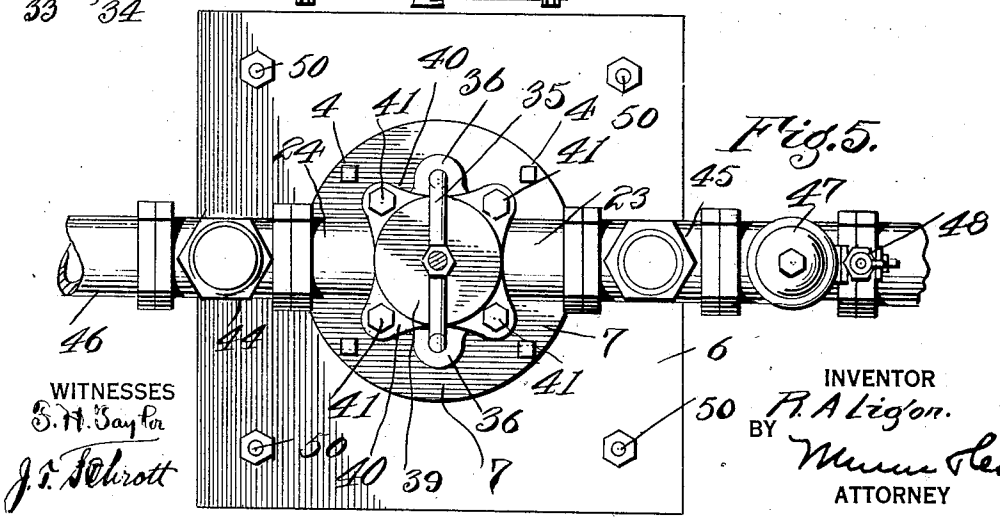


Fig. 8.

Fig. 6.

Fig. 5.



WITNESSES

S. H. Sayler

J. F. Schrott

INVENTOR

R. A. Ligon.

BY Munn & Co.

ATTORNEY

Patented May 3, 1932 1,857,026

UNITED STATES PATENT OFFICE

ROBERT A. LIGON, OF FORT STOCKTON, TEXAS

BOOSTER PUMP FOR WINDMILLS

Application filed May 2, 1929. Serial No. 359,919.

This invention relates to improvements in pumping apparatus and it consists of the constructions, combinations and arrangements herein described and claimed.

One of the outstanding objects of the invention is to provide a pumping apparatus having a stationary piston and a movable working barrel producing a combination of particular merit when used in connection with a windmill, to which end the working barrel is so connected with the windmill that the pumping operations occur on the upstrokes of the latter rather than the down strokes, as is generally customary in apparatus of this kind.

Another object of the invention is to enable the complete elimination of stuffing boxes, or packing tubes in pumping apparatus of this kind, particular reliance being placed upon a peculiar arrangement of cup leathers on the stationary piston for preventing the leakage of water therearound.

A further object of the invention is to make provision for the ready removal of the piston and its accessories from its stationary location in the apparatus so that the cup leathers can be renewed as may be needed without completely disorganizing the structure.

A still further object of the invention is to produce a unitary pumping apparatus, that is to say, an apparatus which is a unit within itself, and as such, can be transported and set up in a working position upon a suitable foundation.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawings, in which:

Figure 1 is a vertical section of the pumping apparatus and the foundation upon which it is mounted,

Figure 2 is a perspective view of the supporting and guide head,

Figure 3 is a perspective view of the cap,

Figure 4 is a vertical section taken at right angles to the view in Figure 1, parts being shown in elevation,

Figure 5 is a plan view of the pumping apparatus,

Figure 6 is a cross-section taken on the line 6—6 of Figure 4,

Figure 7 is a cross-section taken on the line 7—7 of Figure 4,

Figure 8 is a detail view of the pump piston partially being shown in section and elevation to particularly illustrate the arrangement of cup leathers.

As previously pointed out in one of the foregoing statements of the objects of the invention, one of the purposes of the improved pumping apparatus is to ease the operation of a windmill with which it may be connected. It is practically an established practice that the working strokes of a windmill pump occurs on the down-strokes thereof and should the said windmill be working under a heavy load there is a grave likelihood of wrecking or disabling the mechanism. By arranging the apparatus in such a manner that the mode of operation can be reversed as indicated, the effort of the mill will be considerably lessened and both light and heavy loads can be negotiated with equal facility.

Attention is directed to the drawings. The pumping apparatus comprises an outer casing 1 which is flanged at 2 and 3 at the top and bottom respectively for the reception of bolts 4 and 5 which in one instance secure a bed plate 6 and the flange 7 of a supporting and guide head 8 together, and in the other instance secure a closure plate 9 to the bottom of the casing. The closure plate has a plug 10 which may be removed for the release of an entrapped substance. An adjacent hole 11 provides for air circulation and the drainage of any water that might accumulate through condensation or otherwise.

The hollow body 12 of the head 8 has a faced shoulder 13 at one end and internal threads 14 at the other. The shoulder merges with a bore 15 which is occupied by the extension 16 of a support plug 17 which is externally threaded and screwed into the threads 14 until an annular stop 18 engages the shoulder 13. The latter being faced as stated, provides a tight joint at this particular place, water entering and leaving the apparatus at an adjacent point as presently explained, cannot leak past the joint which

the shoulder 13 and stop 18 compose into the outer casing 1.

A boss 19 on the upper end of the plug 17 has crossed holes 20 into which a bar may be inserted for the turning of the plug should a heavy wrench not be instantly available. The boss is of square or other non-circular cross-sectional shape so that the foregoing wrench may be applied. But should a wrench not be handy any conventional bar of small enough size can be inserted in the holes 20 so that sufficient leverage either for the screwing down or loosening of the plug 17 may be had.

A chamber 21 in the plug 17 has communication with inlet and outlet passages 22 and 23 in the tubular extensions 24 of the head 8 through openings 25. The lower end of the chamber 21 and consequently the extension 16, is internally threaded at 26 so that the tubular piston rod 27 can be screwed in place. This piston rod is open at each end. The lower end is suitably formed to receive a plurality of cup leathers 28 (Fig. 8).

These cup leathers are oppositely directed, that is to say, some point upwardly and others downwardly. The idea is to maintain a leak-proof joint on both the up and down strokes of the working barrel 29 which moves in respect to the piston generally designated 30 and with which the foregoing cup leathers are a fixed part. The mode of mounting the cup leathers is not material nor is the particular number of cup leathers employed an essential feature. Attention will be paid to the use of a sufficient number of cup leathers to serve the purpose, and these will be so mounted that when the plug 17 and its accessories are removed the cup leathers are readily detachable for replacement.

Figure 8 illustrates one mode by which this can be accomplished. A reduction 31 of the piston rod receives the cup leathers and spacers 32 of appropriate lengths in alternation. The lower extremity of the reduction is threaded to receive a locking collar 33. When the collar is screwed up tight by means of its lugs 34, the cup leathers will be held in firm position.

It will be understood from the description thus far that the piston 30 maintains a stationary position, this being by virtue of its suspension from the fixed support plug 17. The working barrel 29 is rendered movable by virtue of its connection with a yoke 35 which is adapted to be joined with the reciprocating rod (not shown) of a windmill. The reciprocation of the yoke 35 is rectilinear, to which end the head 8 has guides 36, and a bracket 37, affixed to the upper end of the working barrel, has openings receiving the shafts of the yoke.

The lower end of the yoke is secured to a combined spider and cylinder cap 38. The lower end of the working barrel is suitably secured in the spider, and the spider constitutes a closure for the working barrel. As the barrel 29 works up and down around the stationary piston 30, water is drawn in at the inlet 22 and discharged at the outlet 23. A cap 39 conceals the boss 19 from view. The cap 39 and head 8 have matched flanges 40 through which bolts 41 are passed to secure the cap in position. The spider 38 has lugs 42 that ride in guides 43 along the walls of the casing 1 and impart to the spider the additional function of a crosshead.

Inlet and outlet check valves 44 and 45 are connected with the corresponding passages 22 and 23. The pumping apparatus is connected in a pipe line 46, the latter including an air chamber 47 which has a relief valve 48 of any known construction. Reverting to the bed plate 6 it is observed in Figures 1 and 5 that this is held down to the foundation 49 by anchor bolts 50. This foundation may comprise the concrete lining of a pit, the purpose of the foundation being to support the pumping apparatus in a firm position. A plate 51 covers the large upper chamber of the foundation but has an opening 52 in which the yoke 35 reciprocates.

The operation is readily understood. The yoke 35 is connected with a rod or other reciprocating part of a windmill, and as the yoke reciprocates the movable working barrel 29 is caused to move up and down in respect to the stationary piston 30. Upon the performance of a down-stroke the tendency toward the creation of a vacuum in the chamber of the barrel 29 below the piston 30 will draw water through the inlet check valve 44 and passage 22.

The following up-stroke of the windmill and consequently of the working barrel 29 will cause a discharge of the water in the outlet passage 23 and through the check valve 45. The oppositely directed cup leathers 28 prevent the leakage of water past the piston 30 on the respective strokes of the working barrel.

Should it become necessary to replace the cup leathers it is only necessary to unscrew the support plug 17 from its mounting in the head 8. It is observed in Figure 4 that the body of the plug comes substantially flush with the top of the head 8. Thus, when the cap 39 is removed, the boss 19 will be fully accessible, either for the application of a wrench or of a bar in the crossed holes 20. Upon unscrewing the plug the entire piston and its tubular rod can be lifted out. It will be unnecessary to disturb the working barrel 29 or any other part. It is not necessary to disconnect the yoke 35.

It is further observed that the pumping apparatus is in unitary form. The bed plate 6 constitutes the support of the entire apparatus. The various parts of the apparatus

can be assembled upon the bed plate, and when the bed plate is mounted upon the foundation 49 the entire apparatus will have been placed in its working position. Reverting to the cup leathers 28, the statement will bear emphasis that these constitute the packings against the leakage of water in the apparatus.

Pumping apparatuses usually require a stuffing box or packing tube of some kind in addition to the customary cup leathers on the piston. Generally the piston cup leathers point in one direction so that a leakage of water can occur on the suction stroke. But by providing cup leathers of the form in Figure 8, one set will check any possible leakage past the other, the cooperation being such as to obviate the need of a stuffing box between the working barrel and the piston rod.

While the construction and arrangement of the improved pumping apparatus is that of a generally preferred form, obviously modifications and changes may be made without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In pumping apparatus, a head and a hollow body communicable with a pipe line, having a bore merging with a shoulder in the body, a tubular rod having a hollow piston, and a hollow plug carrying the rod, being fitted in the body and said bore to suspend the piston, having openings for communication of the pipe line with said rod and a stop engaging the shoulder to make a water seal at said bore.

2. In a pumping apparatus, a head having a tubular rod and hollow piston stationarily suspended therefrom, a movable working barrel receiving the piston and having a cross head, and an outer casing suspended from the head having internal guides receiving the cross head.

3. In pumping apparatus, a fixed head having a tubular rod and hollow piston suspended therefrom, a movable working barrel receiving the piston having a bracket and a cross head, a reciprocating yoke attached to the cross head and held in position in respect to the barrel by the bracket, and an outer casing containing the working barrel having guides receiving the cross head.

4. A unitary pumping apparatus comprising a bed plate, an outer casing and a head connected to opposite sides of the plate, a working barrel guided within the casing, reciprocating means in connection with the barrel being guided by the head, a tubular rod and hollow piston extending into the barrel and having communication with a pipe line attached to the head, and means through which said communication is established being fixed in position in the head for the suspension of the rod and piston.

ROBERT A. LIGON.