

G. A. HUMASON AND J. A. BURTSCHEL.
PUMP.

APPLICATION FILED JUNE 21, 1920.

Patented Dec. 6, 1921.

2 SHEETS—SHEET 1.

1,398,967.

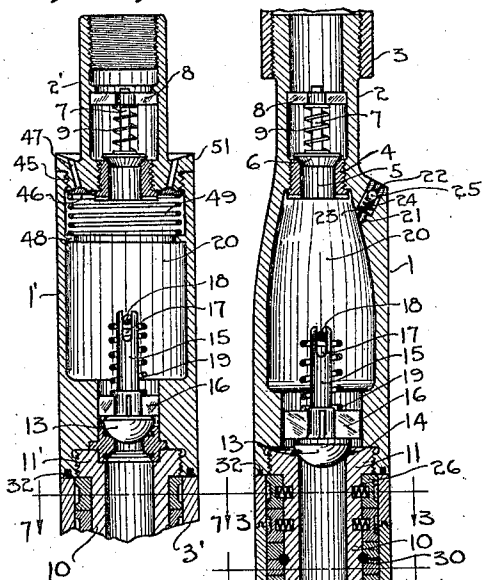


FIG. 6

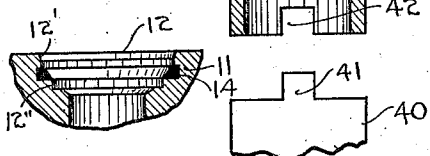


FIG. 8

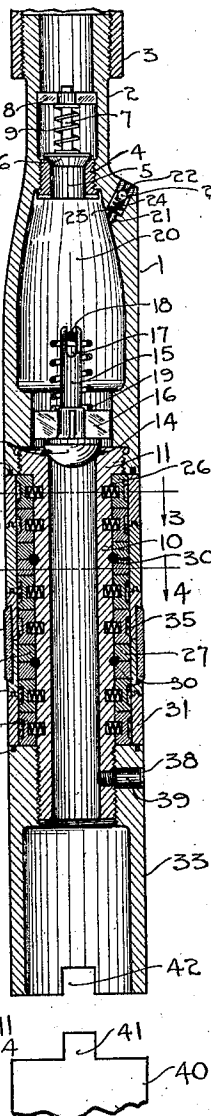


FIG. 1

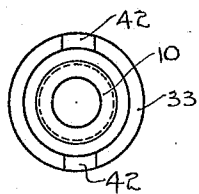


FIG. 5

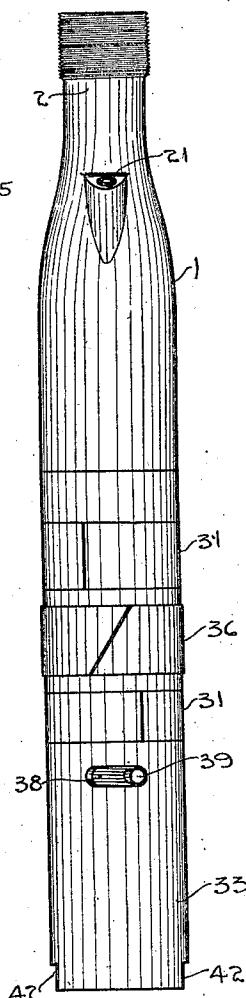


FIG. 2

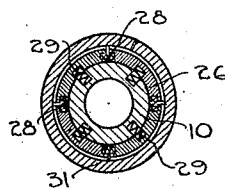


FIG. 3

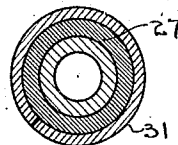


FIG. 4

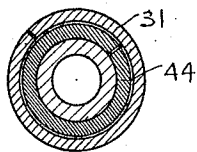


FIG. 7

INVENTORS
Gerrard A. Humason
Julius A. Burtchel
BY
Hawley & Co.
ATTORNEYS

G. A. HUMASON AND J. A. BURTSCHEL.

PUMP.

APPLICATION FILED JUNE 21, 1920.

1,398,967.

Patented Dec. 6, 1921.

2 SHEETS—SHEET 2.

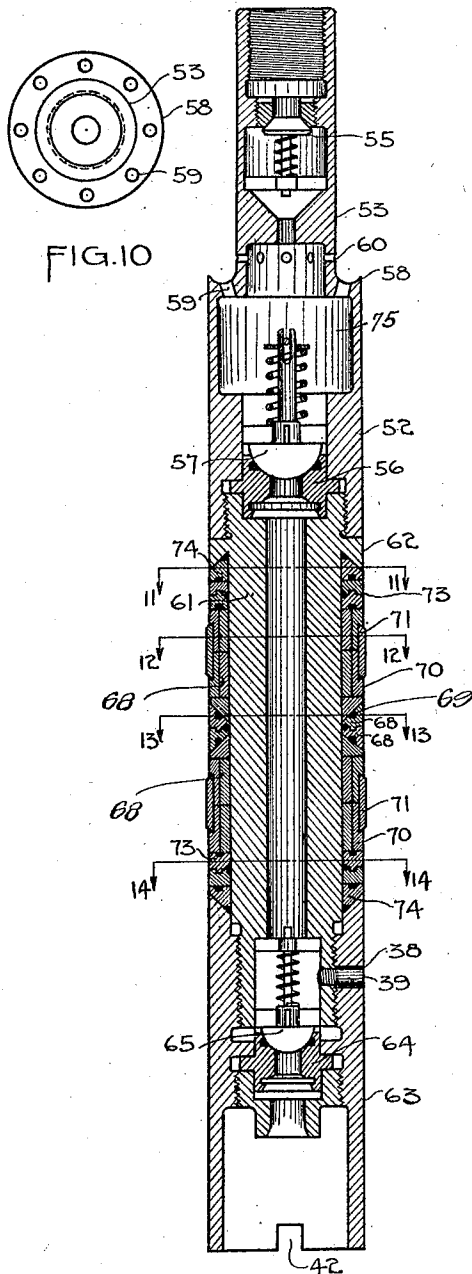


FIG. 9

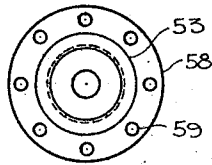


FIG. 10

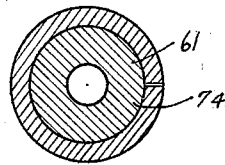


FIG. 11

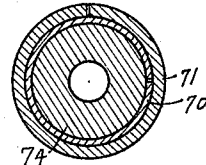


FIG. 12

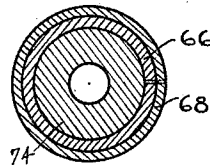


FIG. 13

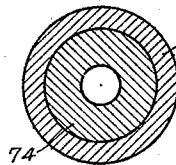


FIG. 14

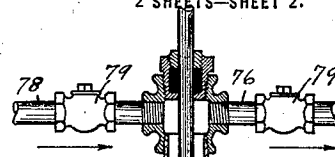


FIG. 15

INVENTOR S.
G. A. Humason & J. A. Burtischel
 BY
Hardaway & Cushing
 ATTORNEYS

UNITED STATES PATENT OFFICE.

GRANVILLE A. HUMASON AND JULIUS A. BURTSCHER, OF HOUSTON, TEXAS,
ASSIGNORS TO DR. A. L. MILLER, OF HARRIS COUNTY, TEXAS.

PUMP.

1,398,967.

Specification of Letters Patent.

Patented Dec. 6, 1921.

Application filed June 21, 1920. Serial No. 390,514.

To all whom it may concern:

Be it known that we, GRANVILLE A. HUMASON and JULIUS A. BURTSCHER, citizens of the United States, residing at Houston, in the county of Harris and State of Texas, have invented a certain new and useful Improvement in a Pump, of which the following is a specification.

This invention relates to new and useful improvements in a pump, specially designed for use in deep wells, such as oil wells, and has more particular relation to a novel construction of the working plunger thereof.

One object of the invention is to provide a pump having a plunger constructed with novel means of packing which is carried by said plunger and interposed between it and the working barrel, and which will prevent the leakage of fluid past between said plunger and barrel.

Another object is to provide, in a pump, a plunger which will be very durable so that it will not have to be often renewed.

A further feature consists in the provision of means whereby steam, air or similar fluids, under pressure, may be utilized to assist in lifting the fluid, to be pumped, from the well.

A still further feature resides in an improved form of valve seat employed.

With the above and other objects in view the invention has particular relation to certain novel features of construction, operation and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Figure 1 is a vertical sectional view of one form of plunger employed, shown in its relation to the standing valve.

Fig. 2 is a side elevation thereof.

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 shows a bottom end view.

Fig. 6 shows a fragmentary vertical sectional view of a modified form of plunger.

Fig. 7 shows a transverse sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 shows an enlarged fragmentary sectional view of the valve seat.

Fig. 9 shows a vertical sectional view of another form of a plunger.

Fig. 10 shows a top plan view thereof.

Fig. 11 shows a transverse sectional view taken on the line 11—11 of Fig. 9.

Fig. 12 shows a transverse sectional view taken on the line 12—12 of Fig. 9.

Fig. 13 shows a transverse sectional view taken on the line 13—13 of Fig. 9.

Fig. 14 shows a transverse sectional view taken on the line 14—14 of Fig. 9, and

Fig. 15 shows a side view of a complete pump as located in a well.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures the numeral 1 designates the valve casing whose upper end is reduced forming the neck 2, which is outwardly threaded to receive the lower end of the tubing 3 which extends up through the bore to the ground surface. The lower end of this neck has a valve seat 4 threaded therein, having a fluid passage way 5 therethrough, controlled by the valve 6 thereabove. This valve has the upstanding stem 7 which works through a central bearing in the spider 8 which is anchored in the neck 2, and surrounding this stem and interposed between said valve and spider there is a coil spring 9 which normally holds the valve seated.

The numeral 10 designates a long tubular nipple whose upper end is formed into an enlarged outwardly threaded head 11 which is screwed into the lower end of the valve casing 1. The upper end of this head is formed into a double valve seat 12 which is controlled by the valve 13, located above the seat. The under side of this valve is convex so as to seat perfectly on the seat 12. This seat is formed with two annular shoulders, 12' above and 12'' beneath it and between said shoulders there is an annular groove provided to receive the packing ring 14. When the shoulder 12' wears too much to form a close fitting seat for the valve, said valve will then seat on the shoulder 12'' which with the packing ring 14 will form a perfect seat for said valve to prevent leakage of the fluid past said seat.

The valve 13 has an upstanding stem 15, which has radiating guides 16 adjacent the valve which prevent the wobbling of the valve and cause a true reciprocation thereof, up and down. The upper end of the stem has a transverse slot 17 and extending

through the casing there is a rod 18 which extends through said slot and whose ends are anchored to the casing. Surrounding the stem 15 and interposed between the guides 16 and rod 18 there is a coil spring 19 which holds the valve 13 seated.

As shown the valve casing 1 has an internal chamber 20 and through the casing wall there is an upwardly inclined passage 21 into the outer end of which there is screwed a valve seat 22. The inner end of the passageway 21 is restricted forming an annular shoulder 23 and within the passageway there is a coil spring 24 which is seated on this shoulder and whose outer end supports a ball valve 25 which is held, by said spring, against the inner end of the seat 22.

Surrounding the nipple 10 are the sectional rings 26, arranged in pairs which are separated by the continuous rings 27, also arranged in pairs. The adjacent ends of the sections of the rings 26 have registering recesses in which are located the coil springs 28, and the inner side of each section has a recess, which registers with an opposing recess in the periphery of the nipple 10 and in these respective recesses are the pressure springs 29, said springs 28 and 29 serving to cause the rings 26 to expand in all directions uniformly. Surrounding the nipple 10 and located between the members of each pair of continuous rings 27 are the annular packing gaskets 30 which prevent any leakage between the nipple and its surrounding rings.

Surrounding the rings 26 and 27 there are the expansible split relatively wide, bands 31 arranged adjacent and whose adjoining edges have tongue-and-groove joints. The upper band abuts against the lower end of the casing 1 and interposed between them is the packing ring 32 which is seated in an annular groove in the casing. An extended collar 33 is threaded onto the lower end of the nipple and its upper end abuts against the lower band 31 and interposed between them is the packing ring 34 which is seated in an annular groove in the upper end of said sleeve. The periphery of each sectional ring 26 is grooved to receive the surrounding packing rings 35 interposed between them and the opposing bands 31. A relatively wide packer element 36, formed of leather, or other similar material surrounds the plunger and is seated in a dove-tailed groove in adjoining bands 31, and this element works closely against the working barrel 37 to prevent any leakage between the working barrel and plunger. The sleeve has a transverse slot 38 cut through one side thereof and a pin 39 is threaded into the lower end of the nipple 10 and projects out through said slot.

In assembling the device the valves of the casing 1 are first mounted therein and the

rings 26 and 27 are then slipped onto the nipple 10 from beneath. A suitable surrounding clamp-sleeve is then fitted around said rings to clamp them closely around the nipple. The sleeve 33 is then screwed onto the lower end of the nipple tightly against the rings to clamp them between the upper end of said sleeve and the head 11 so as to prevent their expansion until released. The clamp-sleeve is then removed and the bands 31 are slipped over said rings from above and the nipple is then screwed into the valve casing and the pin 39 inserted and screwed home.

The plunger as thus assembled is then attached to the pump tubing 3 and let down into the working barrel 37. Fixed in this barrel then is a standing valve 40, of conventional form whose upper end has the up-stand lugs 41 provided to seat in opposing notches 42 in the lower end of the sleeve 33.

It is to be noted that the nipple 10 is connected to the valve casing 1 by means of right hand threads and the sleeve 33 is connected to the nipple 10 by means of left hand threads. When the notches 42 are seated over the lugs 41 the working barrel is then turned to partially unscrew the nipple 10 from the sleeve 33, the slot 38 and pin 39 permitting this but preventing the detachment of said sleeve, and the expanding rings 26 will thus be released and will expand forcing the bands 31 out against the working barrel.

In the form shown in Fig. 6 the seat 43 is reversible and is clamped between the head 11' of the nipple 10 and the lower end of the valve casing 1'. This seat embodies the improved features disclosed in that form shown in Fig. 8 and hereinbefore described. In this form of plunger the continuous split rings 44 surround the nipple 10 and lie adjacent and surrounding them are the bands, as 31, and these rings and bands are assembled in the same manner as those of the form shown in Fig. 1, hereinbefore described. In the form of plunger now being considered the lower end of the reduced neck 2' is enlarged forming a head 45 which is threaded into the upper end of the valve casing 1'. The underside of this head has an annular groove 46 leading from which, upwardly through the head, are the passageways 47, 47. Within the casing 1' there is an annular shoulder 48 and resting on this there is a coil spring 49 which supports a ringlike valve 50 whose upper face is of a contour to seat in the groove 46 where it is normally held seated by the spring 49, to close the passageways 47. The upper end of the casing 1' is formed to present a sharp cutting edge 51 which scrapes the inside of the working barrel, within which it fits, to keep said barrel cleansed and to prevent sediment or other foreign matter from working in between said barrel and plunger.

Upon up stroke this fluid is forced up through the tubing 3, through which the plunger is operated, to the top of the ground and additional fluid is drawn into the working barrel through the standing valve 40. Fluid under pressure may be introduced into the working barrel above the plunger and forced into the chamber 20, through the valve controlled passageways, above described, and this will pass up through the tubing 3 and assist in driving the fluid, being pumped, up through said tubing. This pressure fluid will usually be steam or air. In case the valves become clogged for any reason a cleansing fluid such as hot steam, gasoline or the like may be forced down into the chamber 20 to wash out and remove the offending substance.

In the form shown in Figs. 9 to 15, inclusive the valve casing 52 has its upper end reduced forming the neck 53 to which the lower end of the tubular sucker rod 54 is attached and whose lower end is normally closed by the back pressure valve 55. The lower end of the valve casing 52 has a valve seat 56 secured therein and controlled by the inlet valve 57. The lower end of the neck 53 also has radiating discharge ports 60. Threaded onto the lower end of the casing 53 is the nipple 61 whose upper end has the under-cut annular shoulder 62 and threaded onto the lower end of this nipple, by means of left hand threads, there is the extended sleeve 63 whose upper end is flared, said sleeve containing the seat 64 controlled by the inlet valve 65. The sleeve 63 has the slot 38 to receive the pin 39 which is threaded into the nipple 61 for a purpose hereinbefore explained.

Surrounding the center of this nipple is the pair of outwardly taking spacer rings 66, 66 joined together by a tongue-and-groove joint and having the packing gasket 67 between them and the nipple. These spacer rings are confined between the expanding rings 68 and the packing gaskets 69 are arranged between them. Above and below these respective expanding rings 68 are the pairs of bands 70, 70 whose joints are broken by the annular packer elements 71, 71 which are seated in annular peripheral grooves cut in said bands. Between the expanding ring 66, 66 and the bands 70, 70, are the packing gaskets 72, 72. Above and below the respective bands 70 are the jointed rings 73, 73 which abut against the respective wedge shaped rings 74, 74 formed to conform to the adjacent under cut shoulder 62 and flared end of the sleeve 63. These elements surrounding the nipple 61 are assembled in a manner similar to that hereinbefore explained.

As the plunger is reciprocated fluid is admitted through the valve 65 and passes through the valve 57 and is discharged

through the ports 59 and 60 and passes on up around the sucker rod 54 to the ground surface.

Air or steam may be forced under pressure down through the sucker rod 54 by the valve 55 and into the chamber 75 of the valve casing 52, which will pass thence through the ports 59 and 60 and assist in lifting the oil or other fluid being pumped. For cleansing the valves hot steam, gasoline or other cleanser may be in like manner forced down through said rod 54 into the valve casing and its valves thereby cleansed.

The fluid passing up through the working barrel 37, will be discharged out through the discharge pipe 76, which is controlled by suitable outlet valve 77. In case additional fluid pressure is required to assist in discharging the fluid through the pipe 76, as in case where the fluid is to be delivered into a tank or other receptacle, at a considerable distance from the well, air or steam may be forced under pressure through the line 78, which is connected into the top of the casing, and which is controlled by the inlet valve 79.

The forms of plunger hereinabove described, are very effective in preventing the pump from becoming clogged, by means of sand or other sediment, which may settle around the standing valve 40, or which may collect in the working barrel, underneath the plunger. In case the pump should become clogged, pressure fluid, such as air or steam, is forced down through the working barrel and into the chamber 20, and up through the tubing 3, in the form shown in Figs. 1 to 8, inclusive, or it is forced down through the sucker rod 54 into the chamber 75, and back up through the working barrel, thus discharging the oil above the plunger, and the oil underneath will then flow through the plunger and carry up the settled sand or sediment with it, and thereafter as the plunger is reciprocated, said sediments will be carried up and out, thus relieving the pump of all clogging matter.

What we claim is:—

1. In a pump, a plunger including an elongated nipple, expansible sectional packing rings surrounding the nipple, resilient members interposed between the sections, and also between said sections and the nipple, spacer rings between said sectional rings and means for confining said rings on the nipple.

2. In a pump, a plunger including an elongated nipple, expansible packing rings surrounding the nipple, spacer rings arranged between the expansible rings, expansible bands surrounding said rings, a ringlike packing element surrounding the bands and dovetailed therein and means for confining the rings and bands on said nipple.

3. In a pump, a plunger including a nipple, a valve casing screwed onto the upper end thereof by means of right hand threads, a sleeve screwed onto the other end thereof by means of left hand threads and packing rings on said nipple confined between said casing and sleeve, and inter-engaging means carried by said sleeve and nipple, respectively, and limiting the range of rotation of the sleeve relative to the nipple.
4. In a pump, a plunger including a nipple, a valve casing screwed onto one end thereof by means of right hand threads, a sleeve screwed onto the other end thereof by means of left hand threads, said sleeve having a transverse slot cut through one side thereof, a pin screwed into the nipple and projecting into the slot, and packing confined on the nipple between the valve casing and sleeve.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GRANVILLE A. HUMASON.

JULIUS A. BURTSCHER.

Witnesses:

E. V. HARDWAY,
R. M. SMITH.