

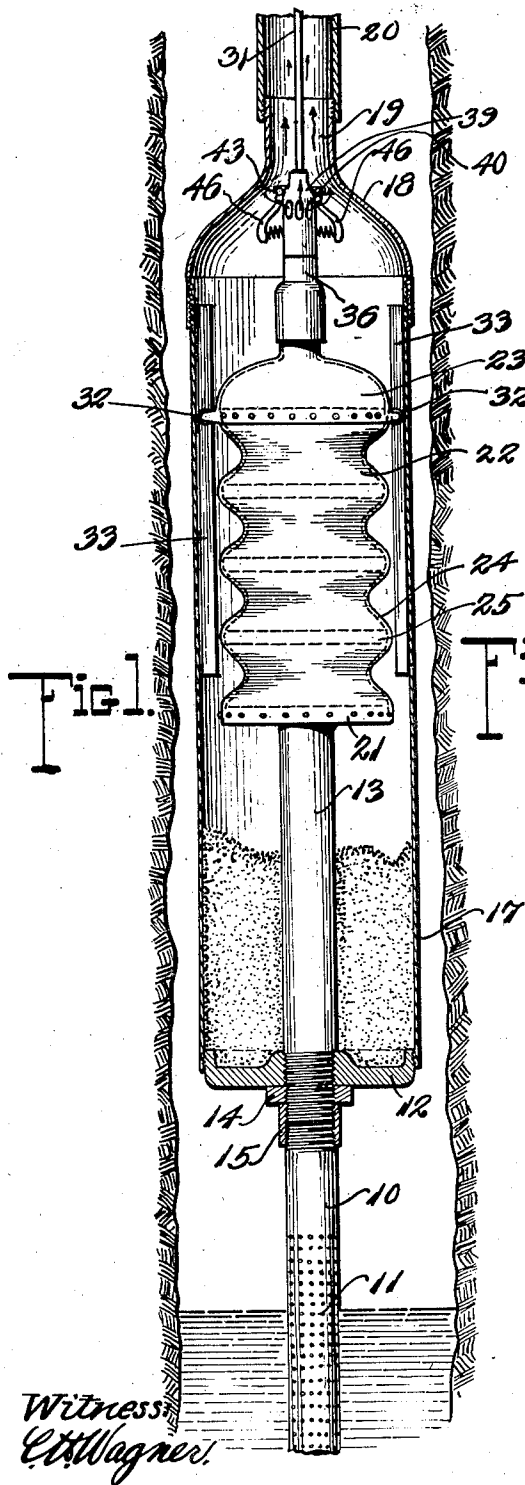
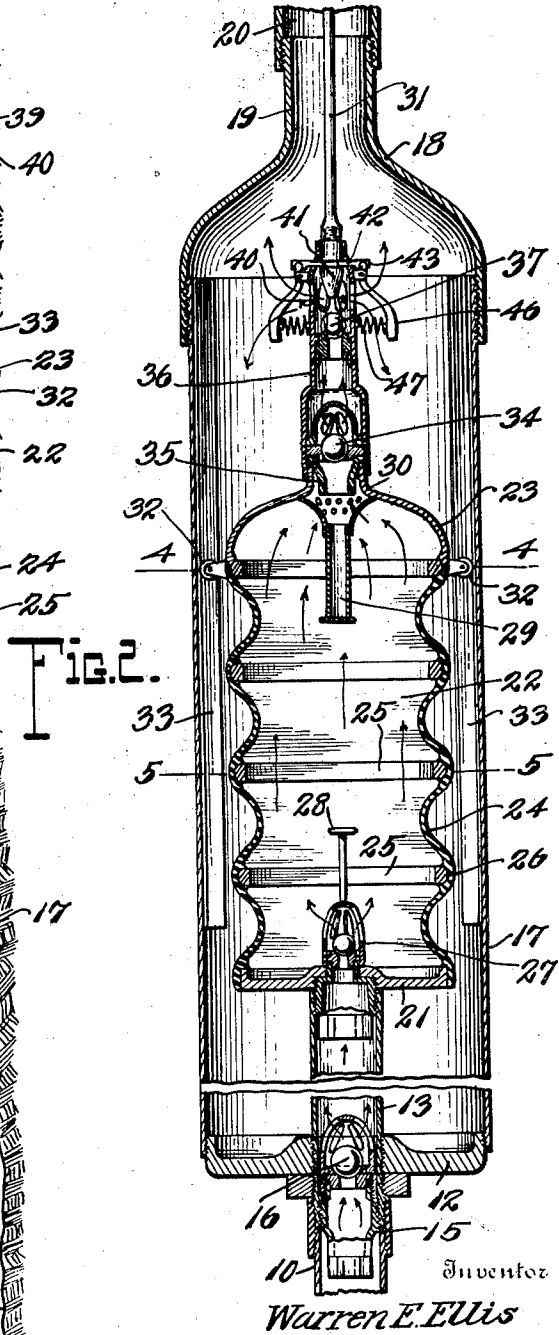
July 21, 1925.

1,546,973

W. E. ELLIS  
COLLAPSIBLE PUMP

Filed May 26, 1924

2 Sheets-Sheet 1



By *Robert Robb Steel* Attorneys

July 21, 1925.

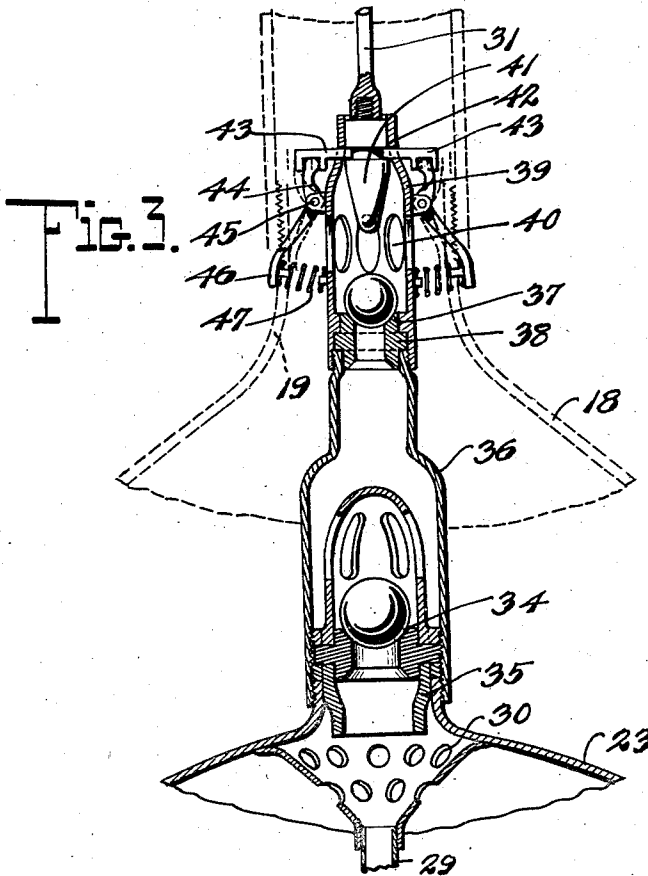
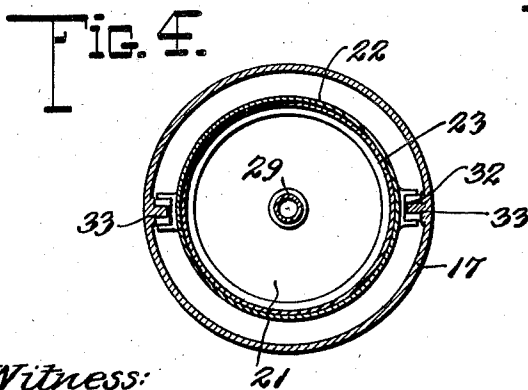
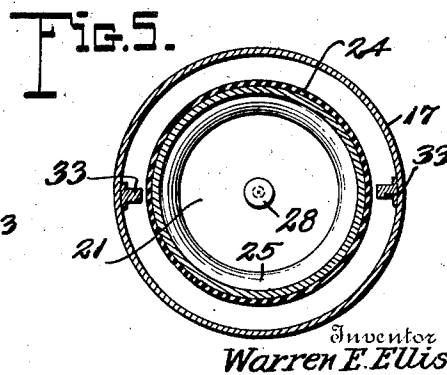
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2 Sheets-Sheet 2



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*E. Wagner*

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By *Robert Robert Steel*  
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# UNITED STATES PATENT OFFICE.

WARREN E. ELLIS, OF GRIDLEY, KANSAS, ASSIGNOR OF ONE-HALF TO WAYNE M. TRAYLOR, OF WINFIELD, KANSAS.

## COLLAPSIBLE PUMP.

Application filed May 26, 1924. Serial No. 715,953.

*To all whom it may concern:*

Be it known that I, WARREN E. ELLIS, a citizen of the United States, residing at Gridley, in the county of Coffey and State of Kansas, have invented certain new and useful Improvements in Collapsible Pumps, of which the following is a specification.

This invention relates to a collapsible pump, and particularly to a construction adapted to separate sand from the liquid during the pumping action.

In this art it is important to remove sand from the liquid pumped and to retain it within the pump casing to prevent excessive abrasion caused by the pumping of the sand or dirt-laden liquid through the well tubing which causes such wear of the parts as to require frequent replacement, and also the further separation of the sand from the liquid after it is delivered from the pump. Furthermore, it is necessary that the collapsible pumping element be fully supported and guided in its contracting and expanding movement as the liquid pressure is otherwise liable to produce irregular distention of the collapsible member causing it to operate out of direct alignment and an abrading action thereof against the walls of the casing which results in damage to the parts.

The present invention has for an object to provide a novel and improved construction of pump casing having a stand pipe extended upward from its base to form a sand chamber and carrying at its upper end a collapsible pumping member provided with inlet and outlet valves at its opposite ends.

A further object of the invention is to provide an improved construction of collapsible pump member having a cap supported within the pump casing to insure its movement in a single path during operation and the provision of means within such member to limit its collapsing movement and to support the flexible walls thereof against improper distention.

Another object of the invention is to present an improved connection with the pumping or sucker rod involving a clutch attachment to the outlet from the collapsible pumping member which is adapted to be automatically engaged therewith or released under conditions of use.

Other objects and advantages of the invention will be hereinafter set forth and the

novel features thereof defined in the appended claims.

In the drawings:

Figure 1 is a vertical section through the pump casing;

Figure 2 is a similar view on a large scale through the collapsible pumping member;

Figure 3 is an enlarged detail section of the clutch connection to the sucker rod;

Figure 4 is a detail section on the line 4—4 of Figure 2; and

Figure 5 is a similar view on the line 5—5 of Figure 2.

Like numerals refer to like parts throughout the several figures of the drawings.

The invention is adapted for application for general pumping purposes but particularly for use in oil pumping where the liquid contains a body of sand or dirt which is drawn into the pump under the sucking action and is adapted to be retained within the pump casing. In the application of the invention shown the intake pipe 10 is provided at its lower end with suitable apertures 11 and at its upper portion with a base plate 12, these parts being of any desired construction or configuration and the plate may be supported by threaded connection with the lower portion of a stand pipe 13, as shown in Figure 1, where it rests upon a collar 14 threaded thereon. This stand pipe is connected with the intake pipe by a suitable coupling 15 and is provided at its base with a valve 16 of any desired character, for instance of the ball and cage type herein shown which is disposed within the stand pipe 13.

The base plate 12 has properly secured thereto the pump casing 17 which is closed at its upper end by a cap or dome 18 having a reduced discharge neck 19 the walls of which are inclined inwardly for a purpose to be hereinafter described. From this neck the usual delivery pipe 20 extends to the upper portion of the well.

The upper end of the stand pipe 13 is provided with a plate 21 forming the lower portion of the collapsible pumping member 22, the upper portion of which comprises a convex head 23 which is connected with the plate 21 by the flexible walls 24, these parts being preferably of circular configuration. The flexible wall 24 is adapted during the pumping action to be collapsed

or compressed in bellows-like form and for the purpose of maintaining this wall in proper position for that purpose bracing rings 25 are disposed at proper intervals therein and connected to the walls in any desired manner, for instance by disposition within the seat 26 therein. The bottom plate 21 of the collapsible pumping member is provided with an inlet valve 27, for instance of the ball and cage type, and extending therefrom is a bumper 28 which co-operates with a tubular bumper 29 carried by the perforated outlet 30 upon the member 23 at the top of the bumper. These bumpers when in engagement limit the downward or compressing movement of the collapsible member and are so disposed as to be commensurate with the stroke of the pumping or sucker rod 31. For the purpose of guiding this movement to maintain the parts in proper alignment and position, the cap or top 23 is provided at opposite points with rollers 32 which travel in suitable ways 33 upon the interior face of the casing 17.

The top 23 of the collapsible member is provided with an outlet valve 34 shown as of ball and cage type and from which a depending collar 35 extends and acts to properly guide the liquid into alignment with the valve so as to readily lift the same in the discharging action. From this valve a sleeve 36 is extended upward and carries a further discharge valve 37 disposed upon a seat 38 and provided with an elongated cage 39 formed with discharge openings 40 in its side walls. This cage is adapted to support the connecting means for the sucker rod 31 and this is effected by means of the conical head 41 on the rod having the circumferential groove 42 adapted to cooperate with the clutch jaws 43 mounted in the walls of the elongated cage. These clutch members are supported and actuated by means of levers 44 pivotally mounted at 45 and having depending actuating arms 46 normally projected away from the cage by tension springs 47. When so projected the clutch members are forced into engagement with the head of the sucker rod and maintain a firm contact therewith during the pumping action.

If it be desired to disengage this rod from the pumping member for the purpose of its removal, the rod is moved upward for a distance greater than its normal stroke which brings the actuating levers 46 into contact with the tapering walls 19 of the cap or dome 18 which effects an inward movement of the levers and releases the clutch jaws from the head upon the sucker rod permitting the convenient withdrawal of the latter. The compressible member being guided in a straight path it will be seen that this rod may be readily re-engaged by forcing the same downward so that the conical

head 41 will press outward the clutch members until they are in alignment with the seat 42 when the springs will throw them positively into engagement and interlock the parts. Means are thus provided for an automatic engagement and disengagement of these members.

In the operation of the invention, with the parts in the position shown in Figure 2, a downward movement of the sucker rod compresses the collapsible member for the full length of its stroke and thus ejects therefrom the liquid contained within said member through the outlet valves above described, causing such liquid to enter the chamber surrounding the collapsible member. At this point space is provided at the base of the pump casing by the use of the stand pipe to permit the settling of sand or dirt to the lower portion of the casing from which it may be removed by withdrawing the casing at convenient intervals. As the liquid is constantly entering this casing during the successive pump strokes, the body thereof increases until it is forced upward through the delivery pipe in the usual manner.

Upon the up stroke of the sucker rod the collapsible member is distended and by suction action refilled with liquid through the intake valves at the base thereof. This distention increases the surface area of the collapsible member and consequently tends to displace a portion of the contents of the pump casing, thereby effecting through the action of the head of the collapsible member a supplemental pumping action designed to establish a continuous flow of liquid from the pump.

The invention presents a very simple, efficient and economically manufactured form of pump adapted for effective action in wells where the liquid is laden with more or less of a solid content which can be caught and retained in the pump casing for subsequent removal.

While the specific construction of the collapsible member and its clutch connection with the sucker rod have been shown and described, the invention is not confined thereto as changes and alterations can be made without departing from the spirit of the invention as defined by the following claims.

Having thus described my invention, what I claim as new is:—

1. In a pump, a casing having a stand pipe extending upward from its base, a check valve within the stand pipe at the base of said chamber, and a collapsible member supported at the upper end of said stand pipe at a distance from the bottom of the casing to form an independent sand chamber beneath said member and provided with an intake valve at said end and an

outlet valve to said chamber, whereby a reserve chamber is provided in the stand pipe intermediate its controlling valves.

2. In a pump, a casing having a stand pipe extending upward from its base to form a sand chamber, a collapsible member supported at the upper end of the stand pipe provided with an intake valve at said stand pipe connection and an outlet valve to said chamber at its upper end, bearing rollers extended from the free end of said collapsible member, and guide ways upon the interior walls of said casing to receive said rollers.

3. In a pump, a base plate, a stand pipe supported therefrom, a pump casing carried by said plate, a cap for said casing, a bottom plate carried by the upper end of the stand pipe spaced from the base of the casing, an intake valve within the stand pipe at said base, an intake valve disposed at said plate, a flexible pump member connected to said bottom plate, a head carried by said pump member, and an outlet valve disposed in said head.

4. In a pump, a base plate, a stand pipe supported therefrom, a pump casing carried by said plate, a cap for said casing, a bottom plate carried by the upper end of

the stand pipe, an intake valve disposed at said plate, a flexible pump member connected to said bottom plate, a head carried by said pump member, an outlet valve disposed in said head, and cooperating bumpers carried by said plate and head.

5. In a pump, a base plate, a stand pipe supported therefrom, a pump casing carried by said plate, a cap for said casing, a bottom plate carried by the upper end of the stand pipe, an intake valve disposed at said plate, a flexible pump member connected to said bottom plate, a head carried by said pump member, an outlet valve disposed in said head, bracing rings disposed at intervals within said flexible body, bearing rollers carried by the outer face of said body, and guide ways upon the inner wall of the casing cooperating with said rollers.

6. A collapsible pump member comprising a base plate, a head, flexible walls connecting these members, an inlet valve upon said bottom plate and having a bumper rod extended therefrom, an apertured outlet carried by said head, and a bumper extended from said outlet.

In testimony whereof I affix my signature.

WARREN E. ELLIS.