S. T. BRIZENDINE.

DOUBLE ACTING PUMP AND OPERATING MECHANISM.

APPLICATION FILED MAY 13, 1920.

1,376,315.

Patented Apr. 26, 1921.

3 SHEETS—SHEET 1.

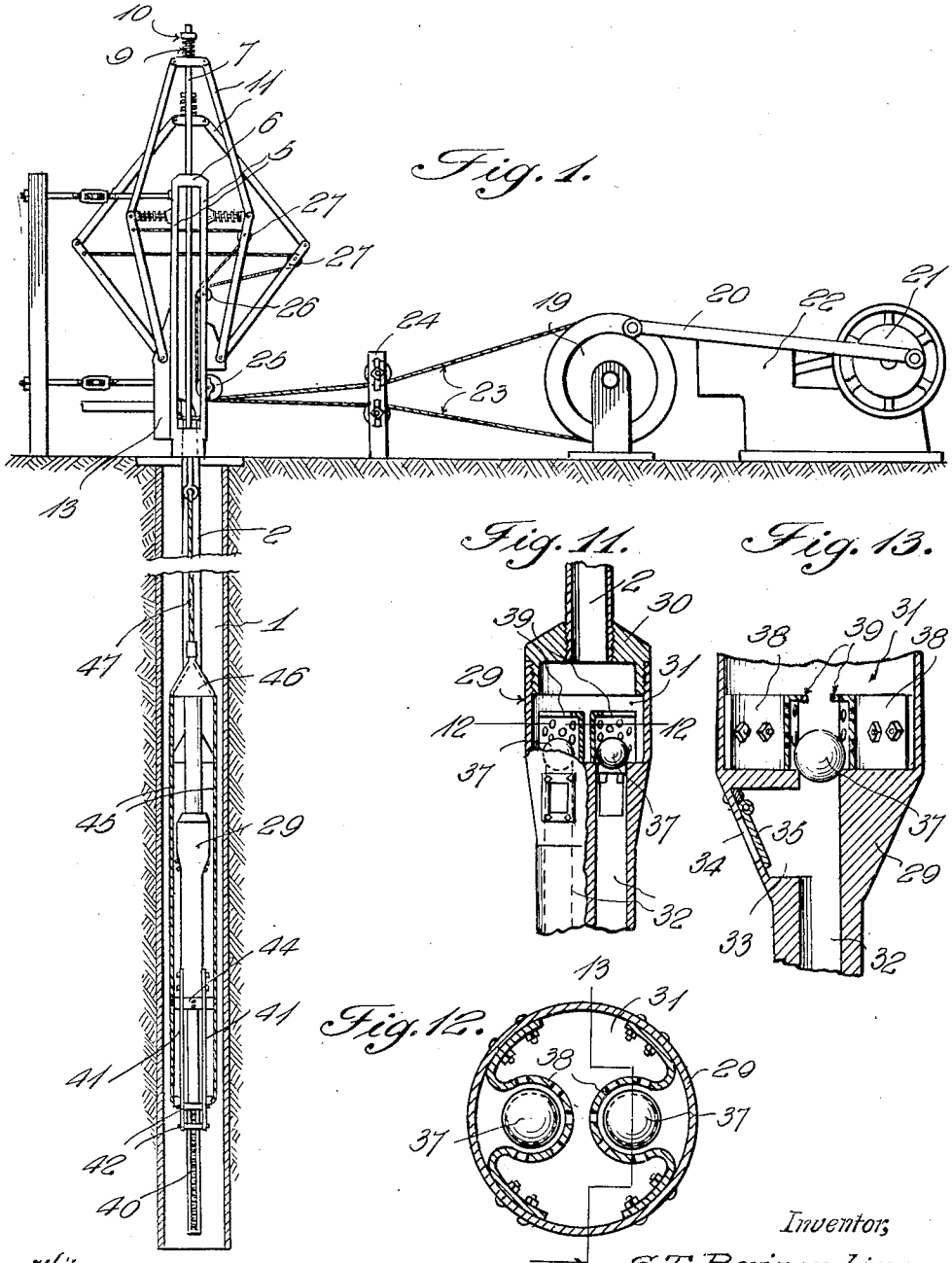


Fig. 1.

Fig. 11.

Fig. 13.

Fig. 12.

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3 SHEETS—SHEET 2.

Fig. 2.

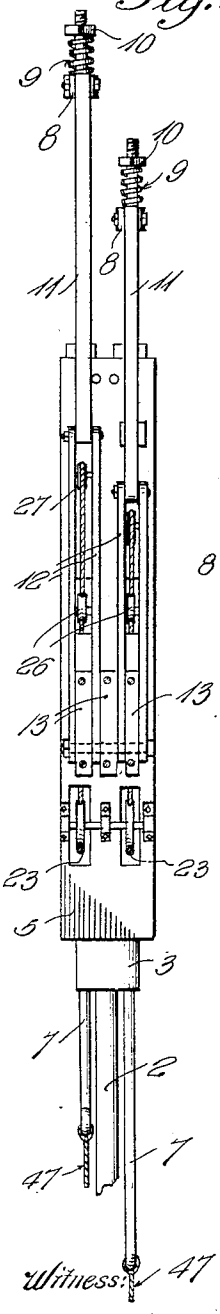


Fig. 3.

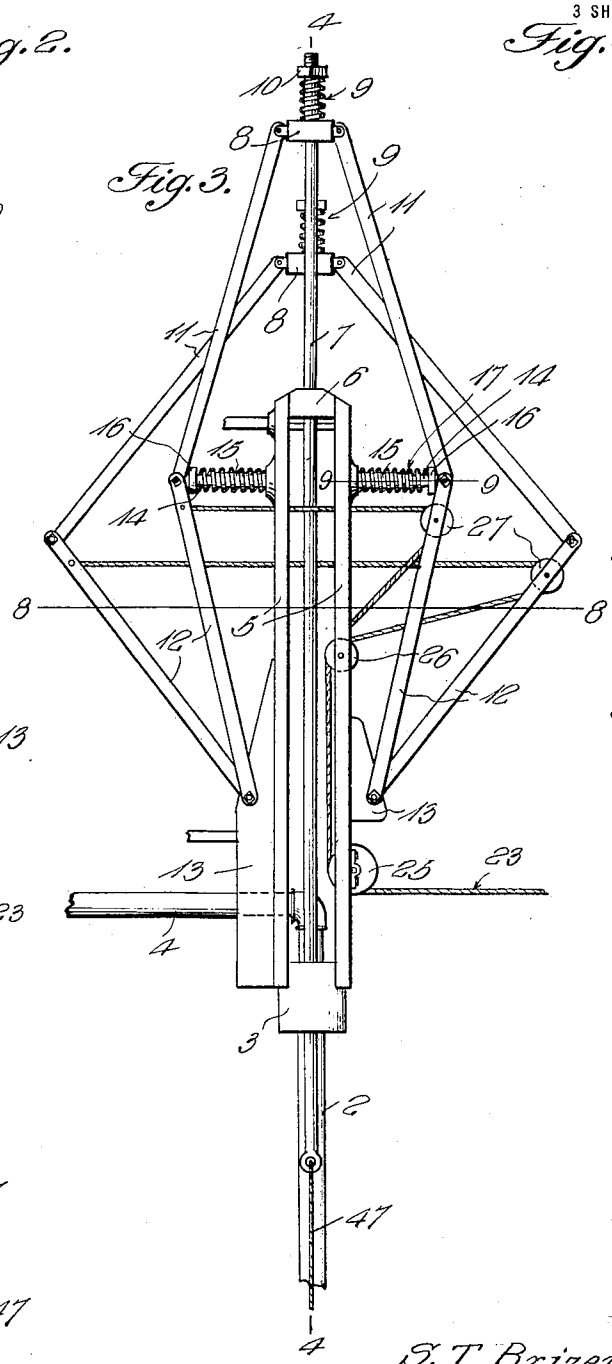
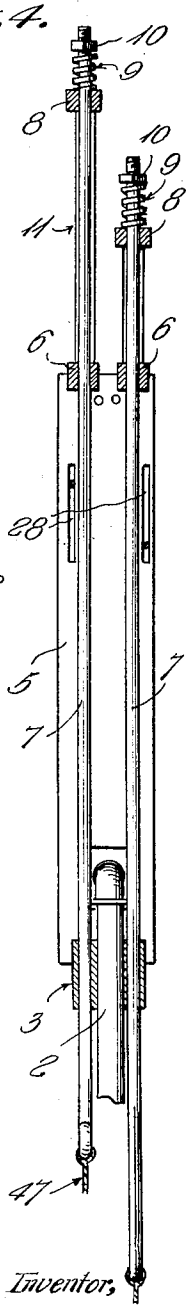


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5.

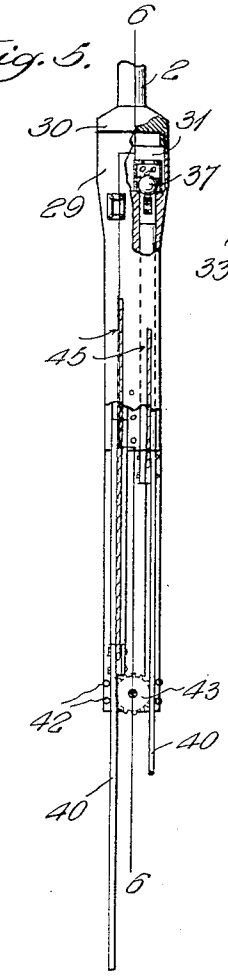


Fig. 6.

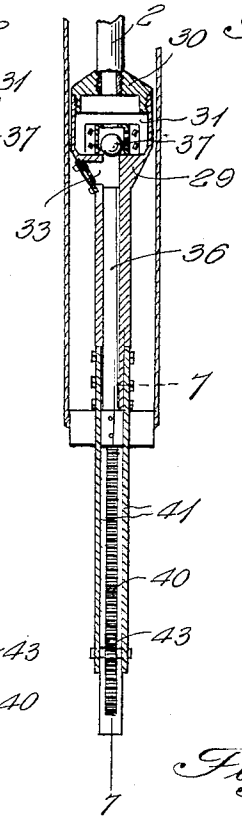


Fig. 7.

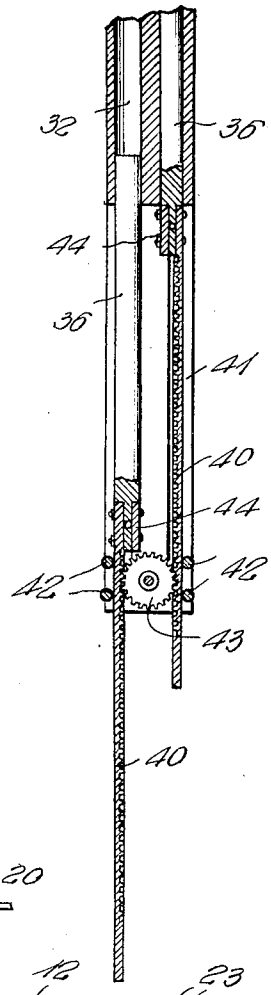


Fig. 10.

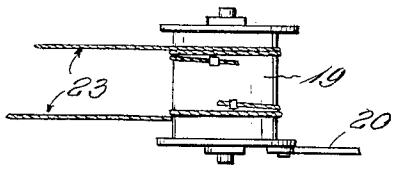


Fig. 8

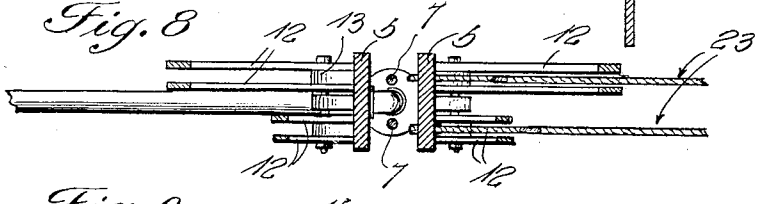
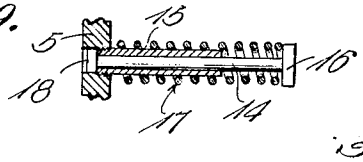


Fig. 9.



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UNITED STATES PATENT OFFICE.

SAMUEL T. BRIZENDINE, OF KANSAS CITY, MISSOURI.

DOUBLE-ACTING PUMP AND OPERATING MECHANISM.

1,376,315. Specification of Letters Patent. Patented Apr. 26, 1921.

Application filed May 13, 1920. Serial No. 381,141.

To all whom it may concern:

Be it known that I, SAMUEL T. BRIZENDINE, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Double-Acting Pumps and Operating Mechanisms; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved double-acting pump and operating mechanism for the same, and one object of the invention is to provide a pump so constructed that a clear passage will be provided from the suction head, this being accomplished by positioning the pistons below the valve chamber of the head to draw fluid into the piston cylinders and then force the fluid past inwardly opening check valves into the valve chamber from which it will pass into the outlet pipe.

Another object of the invention is to so construct the pump that the actuating means for the pistons may be operated externally of the suction head and outlet pipe which passes up through the well.

Another object of the invention is to so construct the suction head and so mount the actuating means for the pistons that the pistons may have longitudinal sliding movement in opposite directions to each other.

Another object of the invention is to provide an improved type of guard for retaining the check valves of the valve chamber in the proper position with respect to the inlets from the cylinders.

Another object of the invention is to provide improved means for imparting reciprocating movement to pump rods connected with the pistons, the operating mechanism for the rods including links pivotally mounted and having loose connection with the pump rods.

Another object of the invention is to so mount the links or toggles for operating the pump rods that they may be independently moved and one moved in an opposite direction to the second.

Another object of the invention is to so construct the actuating mechanism that the toggles may be operated through the medium of cables wound upon a drum and rotating first in one direction and then rotating in the opposite direction.

This invention is illustrated in the accompanying drawing wherein:

Figure 1 is a view in side elevation showing the improved pump in an operative position with respect to a well opening section.

Fig. 2 is an enlarged view in elevation showing the operating mechanism at the top of the well.

Fig. 3 is a view in elevation taken at right angles to the view shown in Fig. 2.

Fig. 4 is a vertical sectional view taken along the line 4—4 of Fig. 3.

Fig. 5 is a view showing the suction head partially in side elevation and partially broken away and shown in section.

Fig. 6 is a vertical sectional view through the pump head taken along the line 6—6 of Fig. 5.

Fig. 7 is an enlarged view taken along the line 7—7 of Fig. 6.

Fig. 8 is a transverse sectional view taken along the line 8—8 of Fig. 3.

Fig. 9 is a fragmentary detail view in section taken along the line 9—9 of Fig. 3.

Fig. 10 is a top plan view of the winding drum shown in Fig. 1.

Fig. 11 is an enlarged fragmentary view of the suction head shown principally in vertical section and partially in elevation.

Fig. 12 is a transverse sectional view taken along the line 12—12 of Fig. 11.

Fig. 13 is a sectional view taken along the line 13—13 of Fig. 12.

This pump is for use in pumping fluid such as oil or water from a well and will be set up with the actuating means positioned at the upper end of the well tube 1 and with the outlet pipe 2 extending up through the well tube through the collar 3 and connected with a service pipe 4 which may lead to a suitable storage receptacle. This actuating mechanism is provided with a frame having side bars 5 which extend upwardly from the collar 3 and have their upper ends connected by blocks or cross-heads 6. These cross-heads are provided with openings positioned above openings formed in the collar 3 upon opposite sides of the pipe 2 thus permitting the pump rods 7 to be slidably mounted for vertical movement.

Blocks 8 are slidably mounted upon the pump rods 7 and are engaged by the springs

9 the upper ends of which are engaged by the spring-nuts 10 which also serve as compressing means for the springs and these blocks 8 are loosely connected with the upper links 11 of the toggles. These toggles have their lower links 12 pivotally connected with veins 13 which extend outwardly from the side bars 5 and as the toggles are extended and contracted the pump rods will be moved vertically. The springs 9 provide cushioning means which will prevent the breakage of parts from sudden stops or reversal in the movement of the pump rods and this is assisted by additional bumpers consisting of plunger rods 14 which are slidably mounted in tubes 15 and provided at their outer ends with heads 16 held in engagement with one set of toggles by springs 17 and limited in their outward movement by inner heads 18. Only one set of toggles has been shown provided with the bumpers shown in Figs. 3 and 9 but it is to be understood that if desired similar bumpers may be provided for the second set of toggles.

In order to impart movement to the toggles for opening and closing them there has been provided a drum 19 which is rotatably mounted and is engaged by the pitman rod 20 leading from the drive wheel 21 of a suitable motor 22. This drum is of a greater diameter than the driving wheel 21 and therefore as the wheel 21 rotates and the pitman reciprocates the drum will be oscillated and rotated first in one direction and then in the reverse direction. Cables 23 are wound upon the drum in opposite directions as shown in Fig. 10 and are carried through a guide 24 and after passing about pulleys 25 and 26 are led around pulleys 27 carried by the lower links of the toggles at one side and extended through slots 28 in the side bars 5 and connected with the lower links of the toggles upon the opposite side of the frame. By winding the cables upon the drum in reverse directions one cable will be wound upon the drum while the second is unwinding and therefore as the drum oscillates the toggles will be oppositely acted upon and one contracted while the second is extended. Therefore one pump rod will be moved upwardly while the second is moved downwardly.

The outlet pipe 2 extends down into the well tube and is provided at its lower end with a suction head indicated in general by the numeral 29. This suction head 29 is provided with a removable cap 30 which connects the suction head with the lower end of the pipe 2 and this head is provided in its upper end portion with a valve chamber 31 closed by the cap 30. The head is bored longitudinally from its lower end to provide cylinders 32 which communicate with the valve chamber 31 and each of them is provided adjacent its upper end with an offset or side pocket 33 provided with an inclined outer wall. This outer wall is provided with an inlet opening 34 and in order to control the passage fluid through the opening there has been provided a flap valve 35 which is hingedly mounted as shown in Fig. 13 and will normally rest in a closed position to prevent passage of the fluid from the cylinder 32 through the opening 34. The fluid must therefore pass from the cylinders into the valve housing 31 when the pistons 36 move upwardly. In order to prevent the fluid in the valve chamber from passing back into the cylinders when the pistons move downwardly there has been provided valve balls 37 which are positioned loose in the valve chamber and held against undue movement therein by guard strips 38. These guard strips 38 are formed from strips of perforated metal which have their perforated portions bent to extend about the entrances to the cylinders as shown in Fig. 12 and have their end portions bent for engagement with the sides of the valve chamber. Securing bolts or other similar fasteners will be passed through the walls of the valve chamber and through the end portions of the strips 38 thus releasably securing the valve guards in place. In addition to preventing the valve balls from moving out of the approximate vicinity of the cylinder outlets these guards are intended to limit upward movement of the valves and in order to do so the strips are provided at their upper edges with inwardly extending flanges 39. When the valve balls move upwardly and engage these flanges they might have a tendency to retard flow from the cylinders but this is prevented due to the fact that the strips forming the guards are perforated and further the balls when in a raised position do not close the space between the constructed portions of the guards and the walls of the valve chamber. This construction is clearly shown in Fig. 12 and from an inspection of this figure it will be readily seen that the fluid can readily pass from the cylinders into the valve chamber and out of the valve chamber through the outlet pipe.

In order to insure movement of the pistons in opposite directions each piston will be provided with a rack bar 40 which is connected with the flattened lower end of the piston and extends downwardly between the side plates 41 secured to and extending below the suction head. These rack bars are engaged by the guide rollers 42 and have their teeth meshing with the teeth of the pinion 43 which is rotatably mounted between the lower ends of the guide plates. Therefore when one piston is moved downwardly the pinion will be rotated and the second piston moved upwardly. Cross arms 44 are connected with the lower ends of the

pistons and extend through vertically extending slots in the guide plates 41 and have their outer ends engaged by lines 45 which extend downwardly from the spacing blocks 46. These spacing blocks 46 are carried by cables 47 which extend through the well tube 1 upon opposite sides of the pipe 2 and are connected with the lower ends of the pump rods 7.

When in use the pump is set up as shown and when the motor is started the drum will oscillate and alternately draw upon and release the cables 23. The toggles will be opened and closed and as they are extended the pump rods will be moved upwardly. As they are contracted or drawn downwardly the pump rods will be moved downwardly and since the pistons are connected with the pump rods as previously brought out, the pistons will be reciprocated in the two cylinders in opposite directions. When a piston moves downwardly the fluid will be drawn into its cylinder past the valve controlled inlet 34 and when the piston moves upwardly the fluid will be forced past the control valve into the valve chamber and out of this valve chamber through the outlet pipe into the service pipe. Since one piston is moving upwardly while the other is moving downwardly there will always be one piston forcing fluid into the valve chamber and thus a continuous flow of fluid into the valve chamber and from the valve chamber into the outlet pipe. The operating mechanism for the piston is positioned outside the pipe 2 and suction head and therefore the entire space of the valve chamber and outlet pipe will be opened to the fluid instead of being partially taken up by the actuating mechanism. It will thus be seen that there has been provided a double-acting pump and an operating mechanism for the same which will be very efficient in operation and which will be comparatively simple in construction.

What is claimed is:

1. In a pump, a chamber having an inlet and an outlet, a valve ball in the chamber for closing the inlet, a guard strip positioned in the chamber and having its end portions secured to the walls thereof and its intermediate portion bent to extend partially about the inlet, and a flange extending inwardly from the intermediate portion of the guard strip to limit movement of the valve ball through engagement of the flange by the valve ball when moved out of operative relation to the inlet.

2. A double acting pump including cylinders, pistons sliding in the cylinders, and driving means comprising a frame, rods slidably carried by the frame and connected with the pistons, toggles pivotally connected with the frame and having sliding engagement with the rods, resilient means yieldably holding the toggles against sliding movement upon the rods, and means for moving the toggles to actuate the pistons.

3. A double-acting pump comprising an outlet pipe, a valve chamber connected with the pipe and having cylinders extending therefrom, pistons sliding in the cylinders, means connecting the pistons for movement in opposite directions, and driving means comprising a frame, rods slidably carried by the frame and connected with the pistons, toggles pivotally connected with the frame and having loose connection with the rods, resilient means yieldably holding the toggles against movement, and means for moving the toggles to actuate the pistons.

4. A double-acting pump comprising an outlet pipe, a head at the lower end of the pipe having an upper chamber communicating with the pipe and cylinders communicating with the chamber through the bottom thereof, valve balls in the chamber, perforated guard strips connected with the walls of the chamber and having their intermediate portions bent to extend about the valve balls and having their upper edge portions bent to provide flanges limiting upward movement of the balls, and pistons sliding in the cylinders.

In testimony whereof I have hereunto set my hand.

SAMUEL T. BRIZENDINE.