May 5, 1936. E. I. THORNTON 2,039,570

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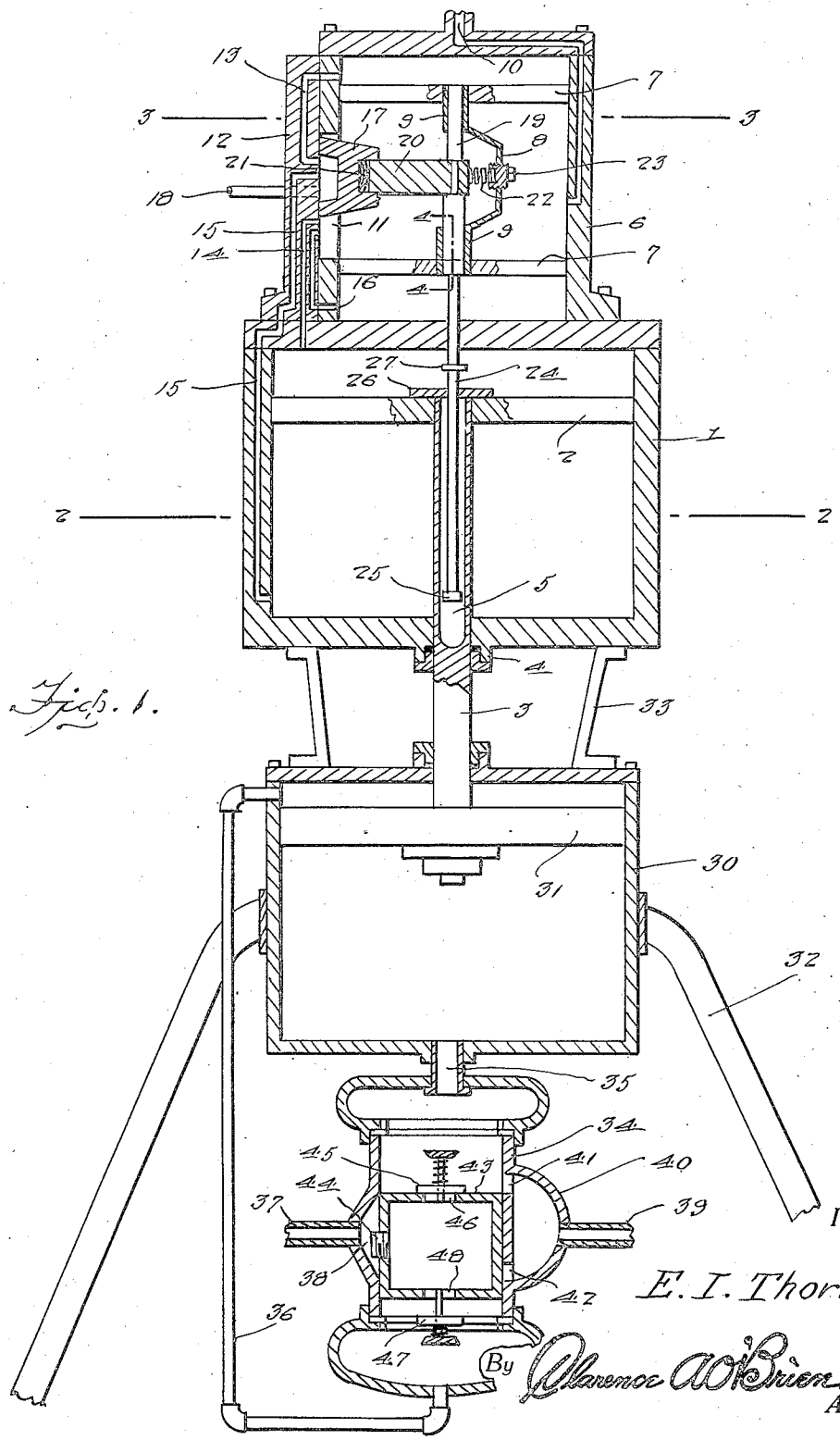


Fig. 1.

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Fig. 2.

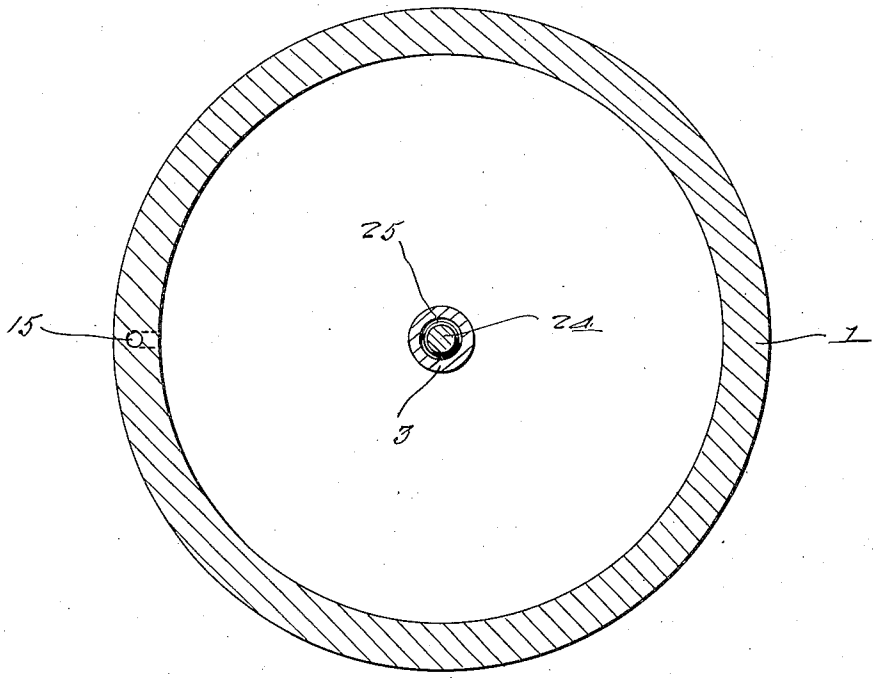
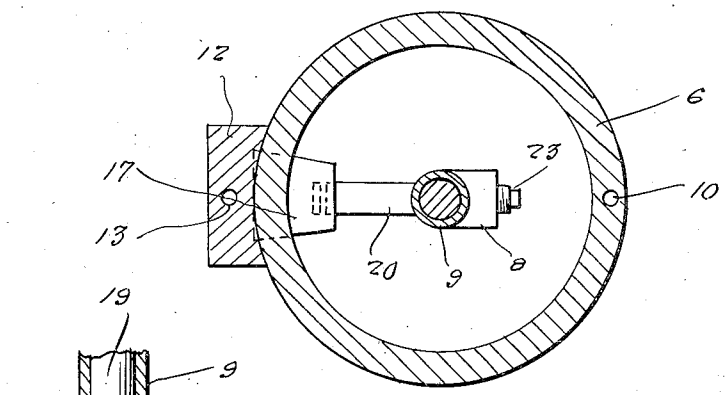


Fig. 3.



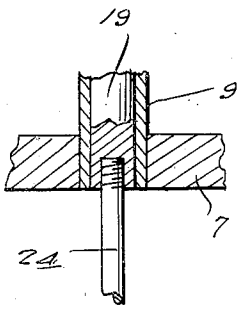


Fig. 4.

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UNITED STATES PATENT OFFICE

2,039,570

PUMP

Elliot I. Thornton, Slaton, Tex.

Application May 16, 1935, Serial No. 21,851

1 Claim. (Cl. 103—175)

This invention relates to a pump, the general object being to provide a pump which can be used for a large number of different purposes such as in deep and shallow wells, for feeding boilers and which can also be used as an air pump.

This invention also consists in certain other features of construction and in the combination and arrangement of several parts, to be hereinafter fully described, illustrated in the accompanying drawings and specifically pointed out in the appended claim.

In describing the invention in detail, reference will be had to the accompanying drawings wherein like characters denote like or corresponding parts throughout the several views, and in which:—

Figure 1 is a vertical sectional view through the pump showing the same as used as a boiler feed pump.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 1.

In these drawings the numeral 1 indicates the cylinder of the pump operating means and the numeral 2 indicates a piston reciprocating in the cylinder and having a rod 3 connected therewith which extends through a gland 4 in the bottom of the cylinder. The upper portion of the rod 3 is hollow as shown at 5. A steam chest 6 is attached to the top of the cylinder 1 and contains the two pistons 7 which are connected together by the yoke 8 which has tubular ends 9 which are connected with the pistons 7. A conduit 10 is connected to a supply of steam or other motive fluid and enters the chest between the pistons 7 so that the chamber between the pistons is always filled with steam. An opening 11 is formed in one side of the chest and a cover member 12 is fastened to said side of the chest and covers the opening and has a passage 13 therein extending from the opening 11 into the space in the chest above the upper piston and said member is provided with a passage 14 which extends from the opening into the top part of the cylinder 1 and passages 15 in the member 12 and in the cylinder 1 connect the opening 11 with the lower part of the cylinder 1. A passage 16 connects the opening 11 with the lower part of the chest below the lower piston 7. A sliding valve 17 has a recess part operating in the opening 11 for controlling those ends of the passages which open into the opening 11 and also for controlling the exhaust conduit 18. A stem 19 has an end passing through the tubular parts 9 of the yoke 8 and this stem carries the member 20 which extends into a notch in the valve 17, a spring 21 being located in the notch for permitting yielding movement between the valve and the member 20. A spring 22 bears against one end of the member 20 which receives the stem 19 and said spring is adjustable by means of a nut 23 carried by the yoke and bearing against the spring. This spring 22 frictionally connects the stem 19 and the member 20 with the yoke so that these parts will be moved with the pistons 7 and said parts can be moved without movement of the pistons. A rod 24 has its upper end threaded in the stem 19 as shown in Figure 4 and this rod extends into the hollow part of the rod 3 and has a head 25 at its lower end. The rod 24 passes through a plate 26 attached to the upper face of the piston 2 and a collar 27 is connected with the upper part of the rod 24 within the cylinder 1.

From the foregoing it will be seen that with the parts shown in Figure 1 steam is passed from the chamber between the two pistons of the chest through the passage 14 into the upper end of the cylinder 1 and forces the piston 2 downwardly while the steam is exhausting from under the piston 2 through the passages 15 through the recess of the valve 17 and out through the exhaust conduit 18. The chamber above the upper piston 7 of the chest is also connected to exhaust through the passage 13 and the chamber under the lower piston 7 is connected with the steam supply through the passage 16. The passages 13 and 16 are so arranged that they will be uncovered on the respective strokes by valve 17, slightly before the passages 14 and 15 are uncovered. As the piston 2 moves downwardly the plate 26 will strike the head 25 of the rod 24 and thus the rod will be moved downwardly, pulling the stem 19 with it which causes the valve 17 to connect the passages 14 and 16 with the exhaust 18 and connect the passages 13 and 15 with the steam supply and thus the piston 2 will be moved upwardly as the steam is entering the lower part of the cylinder 1 while the upper part of the cylinder is connected with the exhaust. As soon as the valve 17 rides over the passages 14 and 16 the lower chamber of the chest is placed in communication with the exhaust so that pressure is removed from the bottom of the lower piston 7 and thus the two pistons can move downwardly without resistance and as the valve 17

and the rod 19 is moved downwardly before the pistons 7 move these pistons 7 are not resisted in the downward movement and the same action occurs when the parts are moving upwardly, the pistons 7 operating to finish the movement of the valve 17 after its initial movement by the rod 24 and the stem 19.

The pump cylinder is shown at 30 and the piston at 31, said piston being connected with the lower end of the rod 3 and the cylinder 30 is supported by the stand 32 and may be connected with the cylinder 1 by the brackets 33. A valve housing is shown at 34 and is in communication with the bottom of the cylinder 30 by a tubular connection 35 and a pipe line 36 connects the bottom of the housing with the top of the cylinder 30. An intake pipe 37 is connected to an intermediate part of the housing and in communication with an elongated port 38. The outlet pipe is shown at 39 and is in communication with a substantially semi-circular enlargement 40 at the side of the housing. A port 41 connects the upper part of the housing with the part 40 and a port 42 connects the lower part of the housing with the part 40. A sliding valve casing 43 is mounted in the intermediate part of the housing and controls the ports 41 and 42 and has a nipple 44 in its side thereof which is in communication with the port 38, the engagement of the projecting part of the nipple with the walls of the port 38 preventing turning movement of the casing 43. A spring pressed valve 45 controls a port 46 in the top of the casing and a spring-pressed valve 47 controls a port 48 in the bottom of the casing. Thus on the downward stroke of the piston 31 the fluid in the cylinder 30 under the piston 31 will be forced through the tubular part 35 into the upper part of the housing 34 and the pressure thereof will close the valve 45 and force the casing 43 downwardly so that the port 42 will be closed when the port 41 opens and thus the fluid can pass into the part 40 and escape through the discharge 39. The suction created by the downwardly moving piston 31 will cause a suction in the lower part of the housing by means of the pipe 36 so that the valve 47 will be moved to open position and the liquid flowing from the pipe 37 through the ports 38 and 44 into the valve casing 43 will be drawn from the bottom of the housing through the pipe 36 into the top of the cylinder 30. Then on upward stroke the liquid in the top of the cylinder 30 will be forced therefrom by the piston 31 through the pipe 36 into the lower part of the housing 34 and this liquid will raise the valve casing so as to close the port 41 and open the port 42 so that liquid can escape through the pipe 39 and the liquid flowing into the casing 43 will flow by the valve 45 through the coupling 35 into the lower part of the cylinder 30.

It is thought from the foregoing description that the advantages and novel features of the invention will be readily apparent.

It is to be understood that changes may be made in the construction and in the combination and arrangement of the several parts, provided that such changes fall within the scope of the appended claim.

What is claimed is:—

A pump of the class described comprising a cylinder, a piston therein, means for reciprocating the piston, a valve housing having its upper end in communication with the bottom of the cylinder, a pipe connecting the lower end of the housing with the upper end of the cylinder, a slide valve casing in the housing, a supply pipe always in communication with the interior of the valve casing, upper and lower spring-pressed valves controlling upper and lower parts in the valve casing, an outlet member having upper and lower ports in communication with the housing, said ports being controlled by the sliding movement of the valve casing.

ELLIOT I. THORNTON.