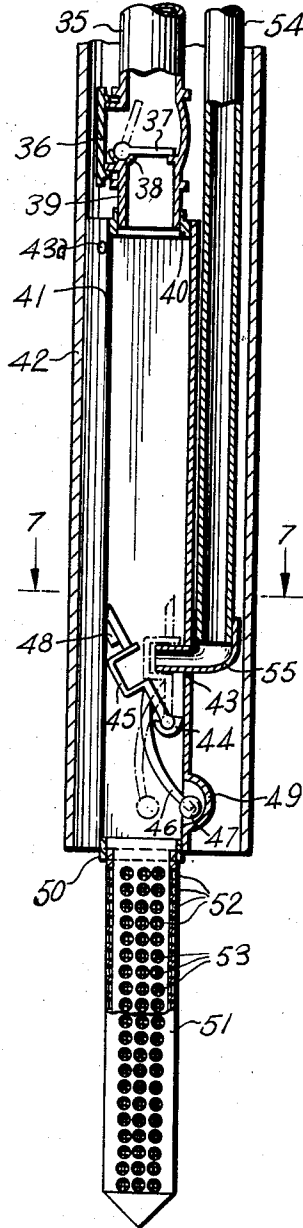


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DEEP WELL PUMP

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FIG. 2



JAMES A. MITCHELL
James Amicus Mitchell

Oct. 6, 1959

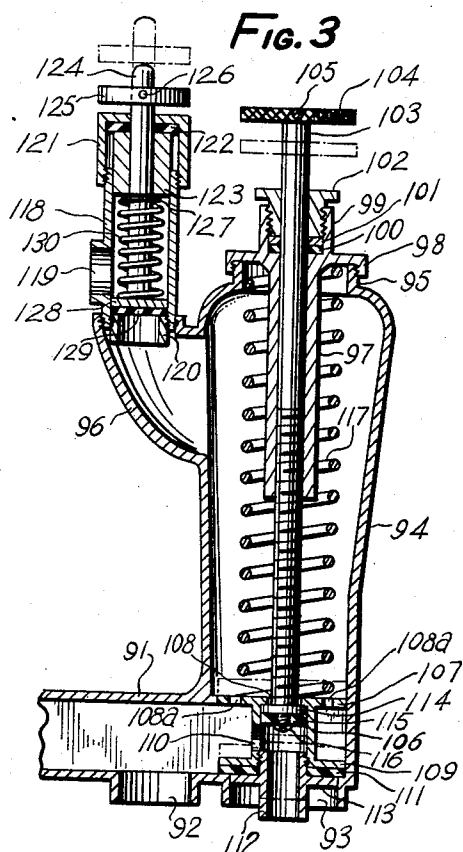
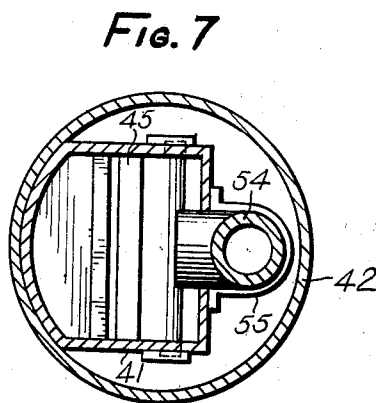
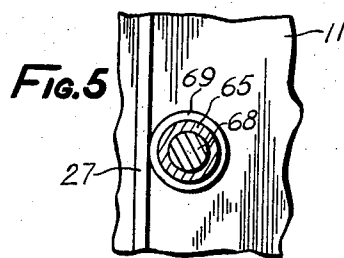
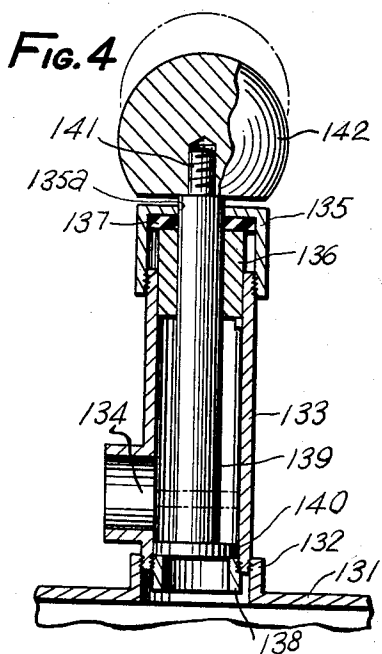
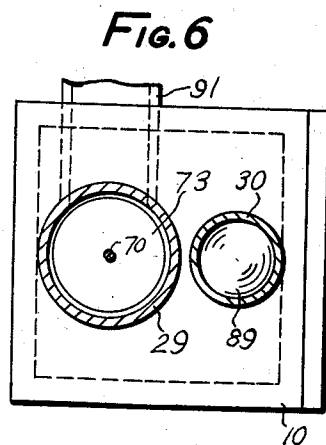
J. A. MITCHELL

2,907,276

DEEP WELL PUMP

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2 Sheets-Sheet 2



INVENTOR.
JAMES A. MITCHELL
James Amicus Mitchell

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2,907,276

DEEP WELL PUMP

James Americus Mitchell, Little Rock, Ark.

Application February 7, 1957, Serial No. 638,858

2 Claims. (Cl. 103—9)

This invention relates to pumping devices and more particularly to pumps adapted to lift water from wells and the like.

It is an object of the present invention to provide a pump for lifting water from wells or the like which can be both power and manually operated and which will produce a pressure sufficiently high enough to perform a variety of jobs.

It is another object of the present invention to provide a pump of the above type which will pressurize and mix water and air simultaneously with substantially no loss in the process.

Other objects of the invention are to provide a pump bearing the above objects in mind which is of simple construction, has a minimum number of parts, is inexpensive to manufacture and efficient in operation.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a side view shown partly in elevation and partly in section of a preferred embodiment of the present invention;

Figure 2 is a vertical sectional view of another part of the invention;

Figure 3 is a vertical sectional view of another part of the invention;

Figure 4 is a vertical sectional view of a modified form of a portion of Figure 3;

Figure 5 is a vertical sectional view taken along line 5—5 of Figure 1;

Figure 6 is a horizontal sectional view taken along line 6—6 of Figure 1; and

Figure 7 is a horizontal sectional view taken along line 7—7 of Figure 2.

Referring now more in detail to the drawing, and particularly to Figures 1 and 2 thereof, a pump made in accordance with the present invention is shown to include a hollow crankcase 10 that is provided with an internal wall 11 and a square outlet opening 12. The upper end of the crankcase is provided with a plurality of bearing caps 13 that are secured thereto, such as by bolts 14. A crankshaft 16 is rotatably supported upon the bearing caps 13 and within openings 15 in the crankcase. This crankshaft is provided with diametrically opposite throws 17, 18, the intermediate portion thereof being rotatably supported upon the internal wall 11.

A driven gear 20 is secured to the crankshaft 16 and is in meshing engagement with a speed reduction gear 21. The gear 21 is rotatably supported upon the shaft 23 and includes an integral pulley 22. A handcrank 24 is rotatably supported at one end upon the shaft 23 and is provided with a rotatable handle 25 at the opposite end. A set screw 26 extends through the central portion of the crank 24 and is adapted to be connected to a peripheral portion of the reduction gear 21 to selectively and drivingly connect the crank handle 24 with the gear 21.

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A plurality of vertical rails 27 are secured within the crankcase 10. A first large diameter cylinder 29 and a second smaller diameter cylinder 30 are vertically disposed in parallel relationship within the inner end of the crankcase 10. A rectangular base 31, integral with the cylinders 29, 30, is provided with a flange 32 that is adapted to be secured to a base or support 34, such as by bolts 32.

As is more clearly shown in Figure 2, a cylinder 35 is secured to the upper end of the base 31 and in axial alignment with the larger cylinder 29. This cylinder is provided with a valve housing 36 at its lower end which has a normally closed flap-valve 37 that is pivotally mounted within a socket 38 that is secured within the valve housing 36 to a housing extension 39 that is open at its lower end. A circular sleeve 40 is secured to the lower end of the extension 39 of the housing 36 and is also secured within the upper end of an elongated sleeve 41. A circular casing 42 is secured at its upper end to the base 34 and is open at its lower end. The cylinder 41 has an opening 43 at its lower extremity and an opening 43a at its upper extremity, and further includes a socket 44 that runs transversely through and is secured to its lower end. A rectangularly recessed flap-valve 45, having an arcuate arm 46 secured at its lower end, is pivotally received within the socket 44. A spherical counter balance ball 47 is secured to the arm 46. A stop member 48 is secured within the cylinder 41 while a semicircular dome 49 extends from and is secured to the cylinder 41 and receives a ball 47.

A sleeve 50 is secured within the lower extremity of the cylinder 41 and is adapted to securely receive an elongated hollow square pyramid shaped tripped strainer 51 that is provided with a wire mesh screen 53 having a plurality of openings 52.

A vertical cylinder 54 secured at its upper end to the base 31 and is secured at its lower end within the uppermost end of a hollow elbow 55 that is secured within the opening 43 in the cylinder 41. This elbow 55 projects into the cylinder 41 and is operative to be engaged by the valve 45. A downwardly depending, angularly disposed sleeve 56 is in communication with the cylinder 30 at its upper end and is externally threaded at its lower end. A housing 57, having a hollow and axially extending portion 58 at its lower end, is threadingly received upon the lower end of the sleeve 56. An opening 59 extends transversely through the extension 58, the effective size of which may be adjusted by a metering screw 60 that is threaded into the extension 58. A spherical check-valve ball 62 is adapted to be supported upon the conical check-valve seat 61.

A connecting rod 63 is rotatably secured at its upper end, such as by bolts 64, to the throw 17. The lower end of the rod 63 is secured to an upwardly extending portion 66 of a yoke 65. The downwardly extending portion 67 of the yoke is in axial alignment with the upper portion 66 and is threadingly engaged by a downwardly depending vertical piston rod 70. A horizontal shaft 68 having end bearings 69 is secured within the yoke 65 by the adjacent end of the rod 63. The upper end of the rod 70 is secured in place by a pin 71, while the bottom end thereof terminates in a bell shaped member 70a. A flanged bushing 72 is threadingly received within a plug 73 that is threadingly engaged within the upper end of the cylinder 29. This bushing 72 and plug 73 slidably receives the rod 70 and guides it for reciprocating vertical movement.

A normally close floating valve 74 of substantially circular shape and provided with an overlying stem 74a is slidably disposed within the neck of the bell 70a. This bell is also provided with a circular base having a plurality

of circumferentially spaced openings 75. A flanged circular piston 76 is secured within the lower extremity of the bell 70a and includes a circular rubber ring 77 that is secured thereto by the bell 70a. A piston rod 78 is rotatably supported at its upper end, such as by bolts 64, to the throw 18. The opposite end of the rod 78 is secured to the hollow yoke extension 80 of the yoke 79. The opposite side of the yoke 79 is provided with a downwardly depending extension 81, while a horizontal shaft 82 is secured within the yoke 79 by the rod 78. A pair of rollers 83 rotatably supported upon the shaft 82 are in rotatable engagement with the rails 28. A free floating wrist pin 84 running transversely through the extension 81 is provided with a threaded extension 85 that threadingly receives the associated element of the depending member 86. This member 86 defines a chamber 87 which houses a vertical and centrally mounted adjustment screw 88 that is threaded into a convex piston head 89. A circular recessed rubber ring 90 is secured to the member 86 and piston head 89.

Referring now to Figure 3, a sleeve 91 extends perpendicularly from the crankcase 10 and is provided with a circular opening 92 and a larger circular opening 93. A vertical cylindrical housing 94, having an open and externally threaded neck 95, is provided with an upward hollow projecting extension 96. This extension is provided with a central bushing 97 having an internally threaded flange 98 and is threaded upon the neck 95. The circular extension 99 is internally threaded and secured upon the flange 98. A circular and centrally hollow packing washer 100 is frictionally secured within the extension 99. The circular hollow spacer 101 is compressed upon the washer 100 by a threaded plug 102 that is threaded into the extension 99.

The plug 102, spacer 101, washer 100, and bushing 97 slidably receive an adjustable stem 103 having the knurled wheel 104 at its upper end, secured thereto by a set screw 105. The stem 103 is rotatably received by a bushing 106 having a flange 107 that is provided with a plurality of openings 108a, and a central opening 108. At the lower end of the bushing 106, is an internally threaded flange 109. The bushing 106 is provided with a horizontal opening 110, while a rubber packing washer 111 is secured to the flange 109 by a circular bushing 112 that is threaded upon the bushing 106. The flange 113 of the bushing 112 urges the washer 111 toward the flange 109 of the bushing 106. The shoulder 114 of the stem 103 is in abutment with the flange 107. A rubber washer 115 is secured to the shoulder 114, such as by a set screw 116. A coil spring 117 receives the bushing 97 therein and normally urges the flange 107 in a downward direction.

An internally threaded vertical sleeve 118 is threaded into the extension 96 at its lower end and at its upper end is open and externally threaded. An opening 119 is provided at one side and another opening at the bottom of the sleeve 118 receives a bushing 120. A circular cap 121 is secured upon the upper end of the sleeve 118. A rubber packing washer 122 is secured to the top of the bushing 123 that is in turn secured within the sleeve 118. A circular stem 124 has a circular weight 125 secured to its upper end by a pin 126. The mid portion of the stem 124 is provided with a shoulder 127 that is in abutment with the underside of the bushing 123. A circular flange 128 and circular packing washer 129 are secured to the stem 124. A coil spring 130, disposed within the stem 124, normally exerts a downward pressure against the flange 128.

In operation, the casing 42 is submerged up to the support 34. The gear is rotated by the crank 24 or by a power source acting through the driving pulley 22. Consequently, the gear 21 rotates the driven gear 20 and the associated crankshaft 16 which rotates the throws 17, 18. The downward stroke piston 89 compresses the

residual air under atmospheric pressure in the cylinder 39 into the cylinder 54, and this pressurized air simultaneously urges the ball 62 against its seat 61 thereby checking the escape of air through the intake. The compressed air in the cylinder 54 is then forced through the elbow 55, urging the flap-valve 45 toward the stop 48 and mixes with the water in the cylinder 41. The valve 45 blocks any outward flow of air and water in the cylinder 41. Simultaneously, as piston 89 moves downwardly in the cylinder 30, the other piston 76 moves upwardly in the adjacent cylinder 29. During this motion, the valve 37 in the housing 36 is lifted by a differential in pressure of the pressurized air and water below it and the partial vacuum above it that is caused by the upward stroke of the piston 76. The water and air pressure travels upwardly to cylinder 35 and further upwardly into the cylinder 29.

Upon reaching the top of its stroke, the piston 76 starts downwardly, whereupon the valve 74 and stem 74a are forced upwardly in the bell 70a thereby opening the ports 75 to allow the water and air under pressure in the cylinder 29 to pass upwardly through the center of the piston 76 into the interior of the bell 70a, from which it passes outwardly from the openings 76 and into the discharge outlet 12. During this procedure, the valve 37 will be closed preventing any downward flow of air and water.

As the piston 89 is carried upwardly, a differential in pressure is created in the cylinder 30 and cylinder 29. This causes the ball 62 to lift out of the seat 61, air passing from atmosphere through the openings 59, and from there into the sleeve 56 and into the cylinder 30. The flap-valve 45 is also drawn over the elbow 55, restricting the flow of water into the cylinder 54 on the aforementioned air intake stroke.

As the aforementioned cycle takes place, water is filtered of foreign particles by being drawn through the openings 52 of the strainer 51. Water and air under pressure from the pump passes through the sleeve 91 and outwardly through the openings 92, the housing 94 and sleeve 118 being filled by pressure fluid entering the openings 108a of the bushing 106. Water and air under pressure also pass outwardly through the bushing 112 after entering the opening 110 of the bushing 106. The amount of water discharged from the opening 93 is regulated by rotating the wheel 104 to thereby increase or decrease the flow from the opening 93. In the event that the pressure of the water entering the sleeve 91 exceeds a predetermined maximum, it will urge upwardly against the washer 129 to urge the flange 128 upwardly together with the weight 125, thereby permitting flow through the opening 119.

Referring now to Figure 4, the sleeve 131 having an internally threaded opening 132 is threaded upon a sleeve 133. A hollow projection 134 is disposed adjacent to the lower end of the sleeve 133. A cylinder bushing 136 is secured to the upper end of the sleeve 133 in abutment with a packing washer 137 that abuts with the upper end of a cap 135. A threaded sleeve 138 is disposed within the lower end of the sleeve 133, while a stem 139 having a flange 140 at its lower end and an upwardly disposed extension 141 is threadingly received within a spherical ball 142. The stem 139 is slidably received within the bushing 136, cap 135, and washer 137. The flange 140 of the stem 139 is slidably received within the sleeve 133. Thus, in operation, when the pressure of the water and air flow in the sleeve 131 exceeds a predetermined maximum, an upward force is created against the flange 140, thereby lifting the stem and ball 142 to permit a release of the pressure through the projection 134.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

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What I claim as new and desire to protect by Letters Patent of the United States is:

1. A pump comprising, in combination, a vertical crank case having a plurality of cylinders, a shaft projecting horizontally outwardly from one side of said crank case, a drive gear rotatably supported upon said shaft, a crank shaft mounted upon the top of said crank case having an outwardly disposed driven gear in meshing engagement with said drive gear, and a separate piston rod extending downwardly from said crank shaft into each one of said cylinders, each of said cylinders comprising a plurality of vertical guide rails, a hollow flanged piston slidably supported within one of said cylinders each of said piston rods comprising a plurality of bearings in vertically guided engagement with said guide rails, the lower extremity of one of said piston rods being provided with a bell shaped member having a circular base and a narrow neck portion, said bell shaped member being in securing engagement with said hollow flanged piston, a ring secured around said hollow flanged piston, said base

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of said bell shaped member having a plurality of circumferentially spaced openings, and a floating valve secured within said neck portion of said bell shaped member for reciprocating movement therewithin between an open and a closed position in response to reciprocating longitudinal movement of said hollow flanged piston.

2. The combination according to claim 1, wherein said cylinders include a large diameter cylinder, a plug in the top of said large diameter cylinder and a bushing threaded into said plug, said plug and said bushing slidably receiving said one piston rod, and a rectangular opening in said crankcase and large diameter cylinder adapted to discharge water and air from said pump.

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