Oct. 13, 1925. 1,557,193

G. A. BUVINGER ET AL

PUMPING APPARATUS

Filed March 19, 1923 3 Sheets-Sheet 1

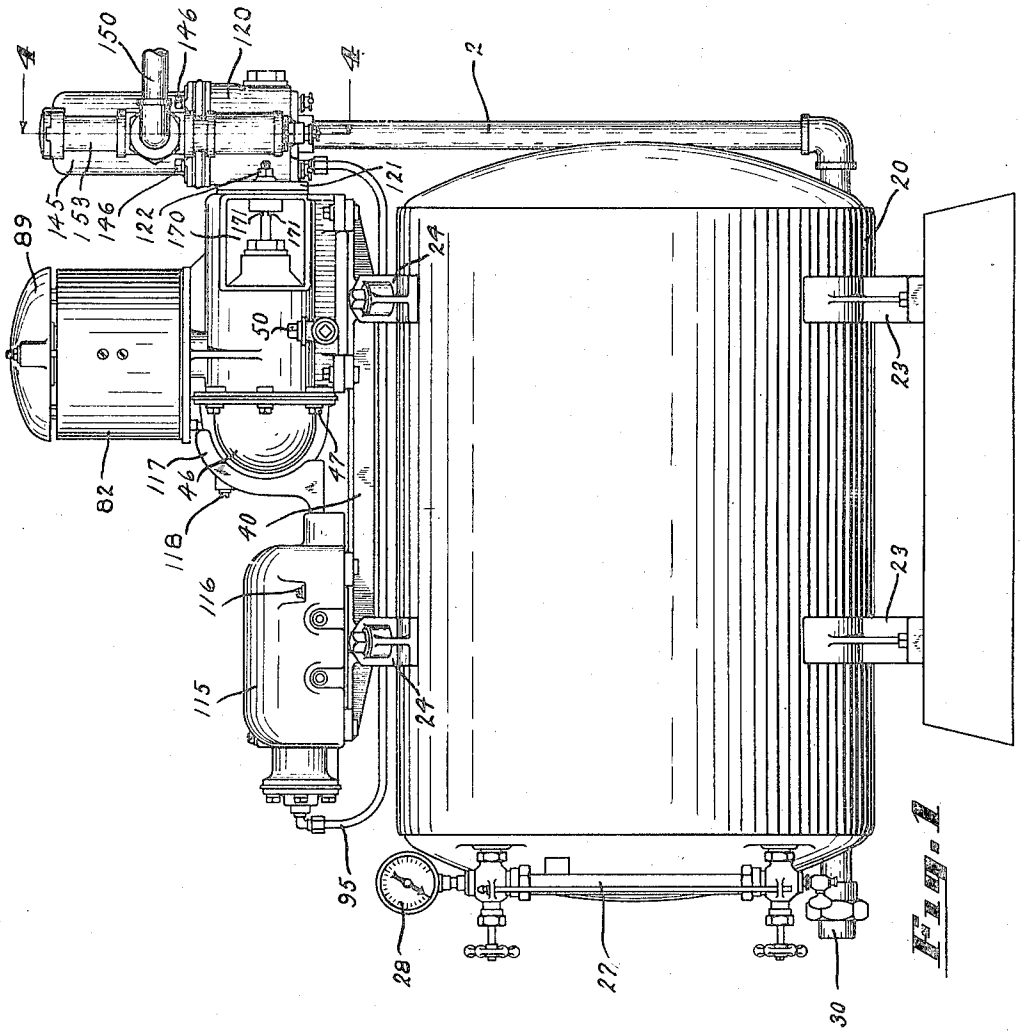


Fig. 1

Witnesses
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Warren Schmeling

Inventors
George A. Buvinger.
And Clarence Warner.
By J. Ralph Dehn
Their Attorney

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PUMPING APPARATUS

Filed March 19, 1923 3 Sheets-Sheet 2

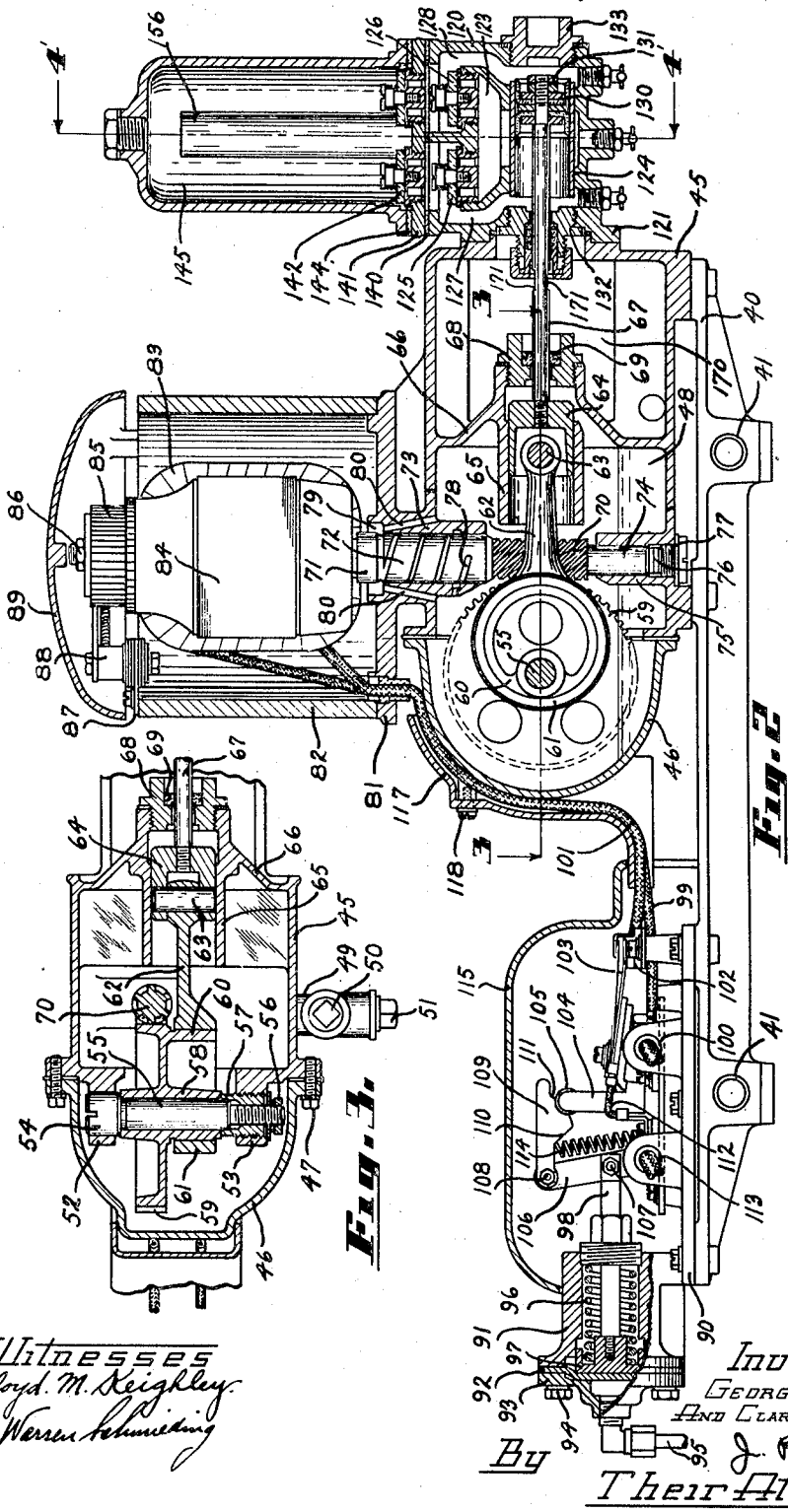


Fig. 2.

Fig. 3.

Witnesses
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PUMPING APPARATUS

Filed March 19, 1923 3 Sheets-Sheet 3

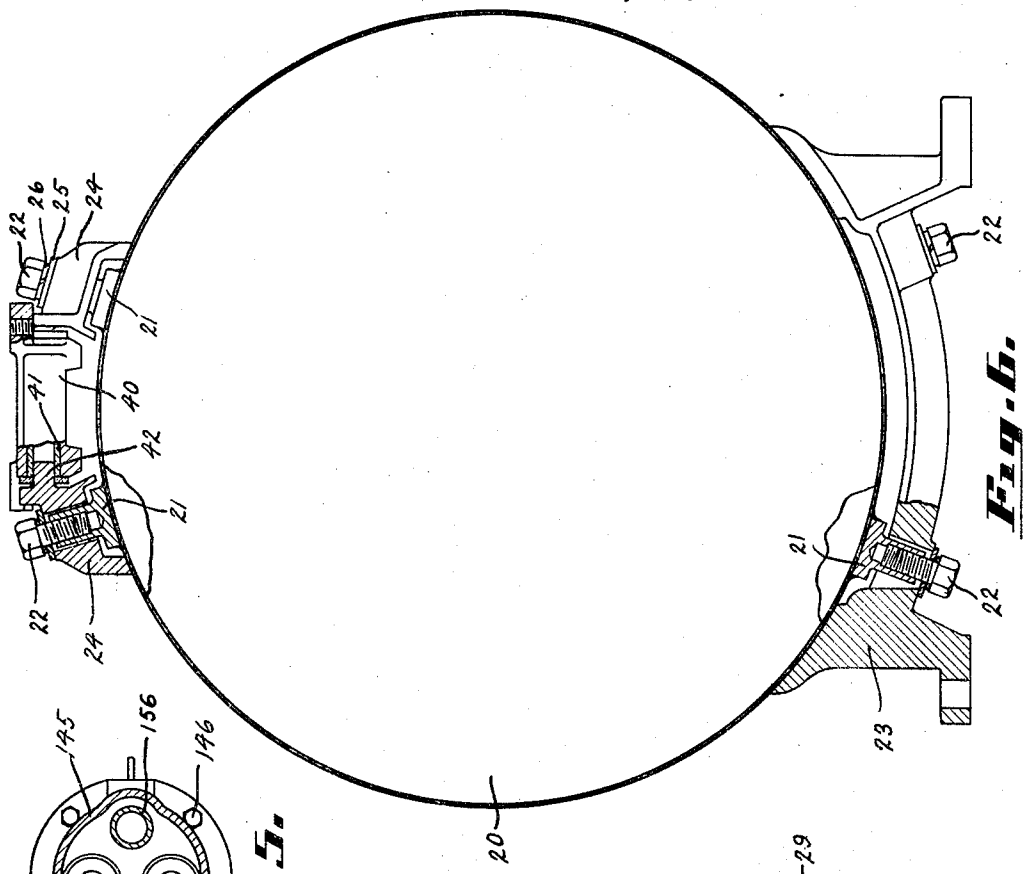


Fig. 6.

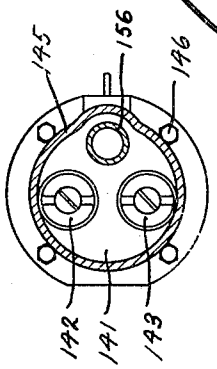


Fig. 5.

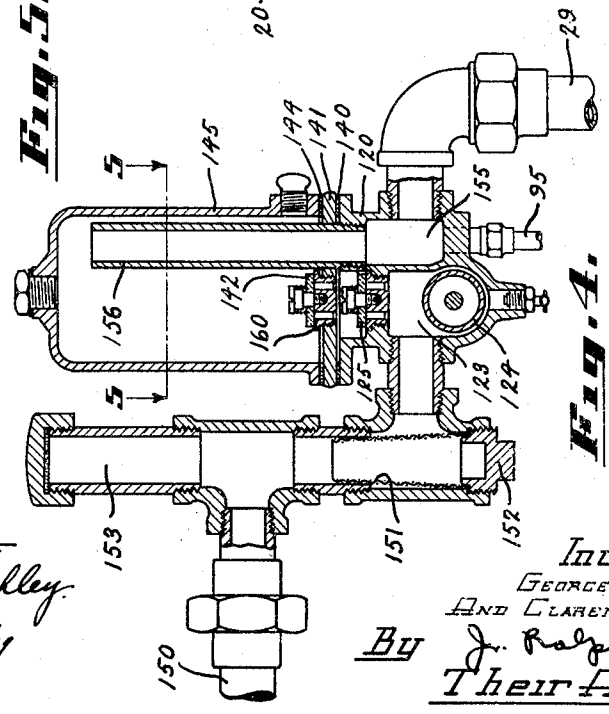


Fig. 4.

Witnesses
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Patented Oct. 13, 1925. 1,557,193

UNITED STATES PATENT OFFICE.

GEORGE A. BUVINGER AND CLARENCE WARNER, OF DAYTON, OHIO, ASSIGNORS TO DELCO-LIGHT COMPANY, OF DAYTON, OHIO, A CORPORATION OF DELAWARE.

PUMPING APPARATUS.

Application filed March 19, 1923. Serial No. 626,174.

To all whom it may concern:

Be it known that we, GEORGE A. BUVINGER and CLARENCE WARNER, citizens of the United States of America, residing at Dayton, county of Montgomery, State of Ohio, have invented certain new and useful Improvements in Pumping Apparatus, of which the following is a full, clear, and exact description.

This invention relates to liquid pumps of the suction type and particularly pumps adapted for drawing water from shallow wells or cisterns.

Among the objects of the invention is to provide a simple and compact pump unit including the pump, driving mechanism, and pressure storage tank which is adapted to be assembled as a unit and shipped in assembled condition to the user with a minimum amount of plumbing and electrical wiring for the installation of the pumping outfit.

More particularly it is an object to provide a simple and compact pump which is capable of high speed operation and in which the lubrication has been much simplified and in which the arrangement of parts is such that will facilitate adjustment and repairs.

A further object is to utilize the storage tank as part of the frame for supporting the pump and driving mechanism instead of using separate supporting means.

Other and further objects and advantages of the present invention will be apparent from the following description thereof, reference being made to the accompanying drawings:

Fig. 1 is a side elevation of a preferred embodiment of the machine;

Fig. 2 is a sectional view through the pump and operating mechanism;

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 1; and on 4′—4′ of Fig. 2;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is an end view partly in elevation and partly in section of the supporting structure of the unit.

This invention contemplates the making of a pumping outfit by assembling together a number of previously completed subassemblies or subunits, namely, a pump unit and a tank unit in which the tank is employed as a supporting structure for the unit; the pump unit comprises a number of subassemblies, namely the pump, the electric motor, the transmission mechanism from the motor to the pump, and the automatic controller for the motor.

Tank unit.

Upon the exterior surface of a storage tank 20 are secured by welding or otherwise a plurality of lugs 21 which are tapped to receive bolts 22 by means of which the foot brackets 23 and the pump base brackets 24 are attached to the tank. In case of damage to the tank it may be removed and replaced by simply removing the screws 22. Each screw 22 is provided with a plain washer 25 and a lock washer 26. The tank is provided with the usual water level glass 27 and pressure gauge 28. The tank inlet is indicated at 29 and the outlet at 30.

Pump driving mechanism.

As shown in Figs. 1 and 6 the brackets 24 support a base 40 upon which the pump and driving mechanism are supported. Base 40 is provided with sleeves 41 of rubber or other vibration absorbing material which is adapted to be engaged by bosses 42 extending from the brackets 24. Upon the base 40 is mounted a transmission housing including a frame 45 and a cover 46 attached thereto by means of screws 47. This housing provides a lubricant reservoir 48 for containing a quantity of lubricant introduced through a filler L 49. The filler opening is closed by plug 50 and the drain plug is indicated at 51 in Fig. 3.

Frame 45 is provided with lugs 52 and 53 provided with horizontally aligned holes. The hole in lug 52 receives the head 54 of a screw 55 having threaded connection with a nut 56. Screw 55 passes through a bushing 57 having threaded connection with the tapped hole of lug 53. The hub 58 of worm gear 59 and of eccentric 60 is loosely mounted upon the bolt 55 and is confined between the head 54 and the end of bushing 57. Eccentric 60 cooperates with eccentric strap 61 and link 62, and wrist pin 63 to reciprocate cross head 64, which is slidable in cross head guide 65 formed integrally with the wall 66 of frame 45. A pump piston rod 67 is threaded into cross head 64 and passes

through a bushing 68 threaded into wall 66 and also projects through an oil wiper 69 supported by the bushing 68. The gear 59 is driven by worm 70 formed integrally with motor shaft 71 having a journal 72 rotating within a bearing 73, and a journal 74 rotating within a bearing 75. Bearings 73 and 75 are formed integrally with top and bottom walls, respectively, of the frame 45. The shaft 71 is supported by set bearings 76 retained by a plug 77. Rotation of the shaft 71 is such as to cause oil which collects on the journal 72 to be elevated by means of a spiral oil groove 78 to a cup 79 provided on the frame 45, the excess oil returning through the ducts 80. The bearing 73 is provided with a horizontally extending flange 81 which provides the bottom end frame for the electric motor for driving the pump. The flange 81 supports a field shell 82 carrying a plurality of field poles, each provided with a field winding. One of these windings is shown at 83. Shaft 71 supports a motor armature 84 and commutator 85, these parts being mounted on a sleeve which may be removed from the shaft upon the removal of a nut 86. The details of construction of the armature mounting do not of themselves form a part of the present invention but are shown in the co-pending application of Charles F. Kettering and George A. Buvinger, Serial No. 624,323 filed March 12, 1923. The field frame 82 supports a brush mounting plate 87 carrying brush rigging 88, and the upper end of the motor is covered by a cover 89 also attached to the field frame 82.

Motor controller.

The base 40 supports a motor control frame 90 carrying a diaphragm box 91 to which is secured a diaphragm 92 by means of flange 93 and bolts 94, the left hand side of diaphragm 92 is in communication with the water pressure on the outlet side of a pump, to be described. Water pressure being conducted through a tube 95. Water pressure on the left side of diaphragm 92 is balanced by the action of a spring 96 bearing against the inside of box 91 at its right end and at its left end against a disk 97 attached to a rod 98. One of the motor terminal wires 99 is attached directly to a switch terminal 100, while the other wire 101 is attached to a switch contact 102 adapted to be engaged by a leaf spring contact 103 mounted on a pivoted arm 104 carrying a roller 105. A lever 106 pivoted at its lower end, is connected with rod 98 intermediate its end at the point 107, and is connected at its free end 108 with a lever 109 having pressure surfaces 110 and 111. The switch blade 103 is connected by a wire 112 with switch terminal 113[a], spring 114 is attached at its upper end to lever 109 and at its lower end to a stationary part. When the water pressure falls below a certain amount the spring 96 will move the rod 98 to the left to the position shown in Fig. 2 thereby causing the lever 109 to present its surface 111 against the roller 105, thereby causing the lever 104 to move clockwise to press the switch blade 103 into engagement with the contact 102. After the pump has operated the pressure will build up in the pressure storage tank 20 so that the spring 96 will finally be overcome by pressure at the left of diaphragm 92, whereupon the rod 98 will be moved to the right causing the lever 109 to present its surface 110 to the roller 105. This will cause the lever 104 to move counter-clockwise to interrupt the circuit to the motor. The switch mechanism is enclosed by a cover 115 attached to the frame 40 by screws 116. The wires leading from the switch to the motor are housed within a field 117 having an arcuate portion conforming to the outer surface of the cover 46. Shield 117 is secured by the screw 118 to the cover 46 therefore substantially hiding the wires leading from the switch to the motor.

Pump.

The frame 45 provides for the support of a pump body 120 having a flange 121 providing for the mounting of body 120 upon the frame 45 by the use of screws 122. Pump body 120 provides a water inlet passage 123 partly surrounding pump cylinder 124 and partly above it as shown in Figs. 2 and 4. This inlet chamber is not in communication directly with the pump cylinder but the passage of water from this chamber is provided through alternately operating valves 125 and 126 leading respectively to separate chambers 127 and 128 which are directly in communication with the left hand open end of cylinder 124 and with the right hand open end of cylinder 124, respectively. A piston 130 mounted on the reduced end of pump rod 67 and secured thereto by means of nuts 131, reciprocates in the cylinder 124. The pump rod 67 slides through a stuffing box 132 threaded into the left end wall of the pump body 120. In alignment with this stuffing box 132 and the cylinder 124 is a plug 133 slightly larger in diameter than the piston 130.

Upon the pump body 120 there is mounted a gasket 140, a valve plate 141 carrying alternately operating pump valves 142 and 143, a gasket 144, and a priming chamber 145. All these parts are secured in position by cap screws 146. The pump inlet is provided with piping 150 which includes a detachable screen 151 secured by a plug 152 and communicates with an air dome or air cushion chamber 153. The pump body 120 provides an outlet passage 155 connected with tank inlet pipe 29, with water pressure

pipe 95 and with a pipe 156 extending up through the valve plate 141 and into the priming chamber 145. Although water may run out of pipe 156 while the pump is idle some water will remain in the priming chamber 145 and will keep the pump valves and pistons submerged for a considerable period. The seats for the valves 142 and 143 are notched as indicated at 160 in Fig. 4 in order that some of the water in chamber 145 may leak past the valve.

Operation of pump mechanism.

When water has been drained from the storage tank 20 to a certain extent the pressure therein will be decreased so that the motor switch will close in the manner described causing the motor to operate and the shaft 71 to be rotated. The electrical circuits are constructed so that the shaft 71 will rotate counter-clockwise looking down upon the upper end of this shaft. Where the worm is constructed as shown the thrust on shaft 71 is downward therefore no thrust bearing is necessary to keep the shaft 71 in position. The thrust on the worm gear 59 will be toward the lug 53 shown in Fig. 3 and this thrust is taken up by the bushing 57 which is adjustable in the lug 53. Obviously rotation of the gear permits the reciprocation of the pump rod 67. Water will be drawn from the well or cistern connected with the pipe 150 and the pump will continue to operate until sufficient pressure is built up in the tank 20 to cause the switch contacts 102 and 103 to be separated, thereby causing the motor to stop.

The frame 45 is provided with openings 170 so as to permit access to the bushing 68 and to the flats 171 provided on the pump rod 67. These flats permit the use of a wrench for unscrewing the rod 67 from the cross head 64. After the pump has been disconnected from the driving mechanism and from the inlet and outlet pipes it can be removed from the frame 45 for replacement or repairs.

In case of damage to the motor armature the motor cover 89 and the brush rigging 88 can be removed permitting the armature 84 to be pulled out of the driving mechanism. Quite obviously the motor field frame may be removed from the pump structure without disturbing other elements thereof.

In case of repairs or replacement of the automatic switch, this switch can be removed without disturbing other parts of the driving mechanism and the motor can be controlled by a hand operated switch.

When necessary to inspect the transmission mechanism the shield 117 and cover 46 are removed thereby permitting the removal of bolt 54 and then the gear 59, eccentric 60, strap 61, link 62, pin 63, and cross head 64 can be pulled out of the frame 45.

It is apparent therefore that the construction of the pump has been simplified and is arranged to facilitate repairs of certain units of the structure without disturbing others. The present invention provides for the assembling together of a number of previously completed subassemblies, therefore the present invention provides for lowering the cost of manufacture with the resulting benefit to the public.

While the form of mechanism herein shown and described constitutes preferred embodiment of one form of the invention, it is to be understood that other forms might be adopted and various changes and alterations made in the shape, size, and proportion of the elements therein without departing from the spirit and scope of the invention.

What is claimed is as follows:

1. Pumping apparatus comprising, in combination, a transmission housing including a frame having vertically aligned bearings in its upper and lower walls; a motor mounted on said frame and including a shaft journalled in said bearings; a pump mounted on said frame, and mechanism in said housing for connecting the pump with the motor shaft.

2. Pumping apparatus comprising, in combination, a transmission housing including a frame having a bearing for receiving a vertical shaft; a motor mounted on said frame and including a vertical shaft journalled in said bearing and maintained in operating position by gravity; a pump mounted on said frame; and mechanism in said housing for connecting the pump and motor shaft.

3. Pumping apparatus comprising, in combination, a transmission housing including a frame having a vertically extending bearing and a flange extending horizontal from said bearing; a motor field frame supported by said flange; an armature shaft journalled in said bearing and extending within said housing; an armature on said shaft above said flange; a pump supported by the frame; and mechanism in the housing for connecting the shaft and pump.

4. Pumping apparatus comprising, in combination, a housing and transmission mechanism therein; a pump supported by the housing, said pump being removable horizontally from the housing without disturbing said mechanism; and a motor having a vertical shaft extending into the housing and connected with said mechanism; said shaft being vertically removable from the housing without disturbing said mechanism.

5. Pumping apparatus comprising, in combination, a housing including a frame and cover and transmission mechanism located in said housing; a pump supported by said housing and removable horizontally in one direction from the housing without dis-

turbing said mechanism; said transmission mechanism being removable horizontally in the opposite direction from the housing after said cover has been removed; and a motor for driving said mechanism.

6. Pumping apparatus comprising, in combination, a housing including a frame and cover, and transmission mechanism including a gear located in said housing; a pump supported by said housing and removable horizontally in one direction from the housing without disturbing the mechanism; a motor having a shaft removably mounted on said housing, said shaft having a gear meshing with the first gear, said gears being demeshed by removal of said shaft from the housing after removal of the motor shaft and said cover.

7. Pumping apparatus comprising, in combination, a frame provided with a vertically extending bearing, and a horizontally extending cross head guide; mechanism supported by said frame including a crosshead mounted on said guide and a worm gear connected with said cross head, and a worm gear shaft detachably secured to said frame; a pump having a rod detachably secured to the cross head; and a motor supported by said frame and having a shaft carrying an armature above the frame and a worm below the armature meshing with the worm gear.

8. Pumping apparatus comprising, in combination, a housing and transmission mechanism therein; a pump supported by the housing and including a piston driven by said mechanism, said pump being removable axially of the piston from the housing without disturbing said mechanism; and a motor having a vertical shaft extending into the housing and connected with said mechanism; said shaft being vertically removable from the housing without disturbing said mechanism.

In testimony whereof we hereto affix our signatures.

GEORGE A. BUVINGER.
CLARENCE WARNER.