Jan. 8, 1929. 1,698,265

C. F. KETTERING ET AL

WATER SYSTEM

Filed March 12, 1923 5 Sheets-Sheet 1

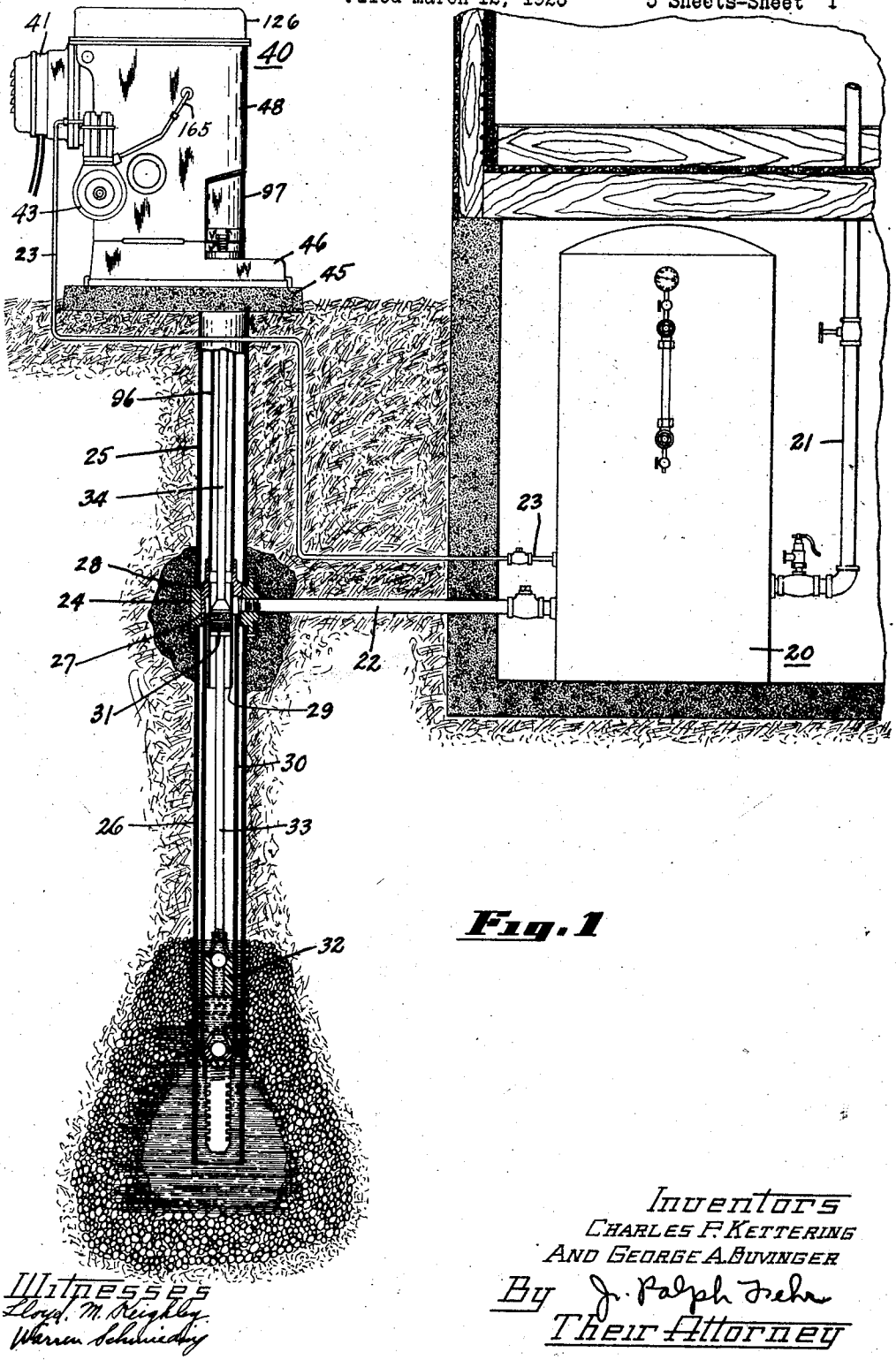

Fig. 1

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WATER SYSTEM

Filed March 12, 1923 5 Sheets-Sheet 2

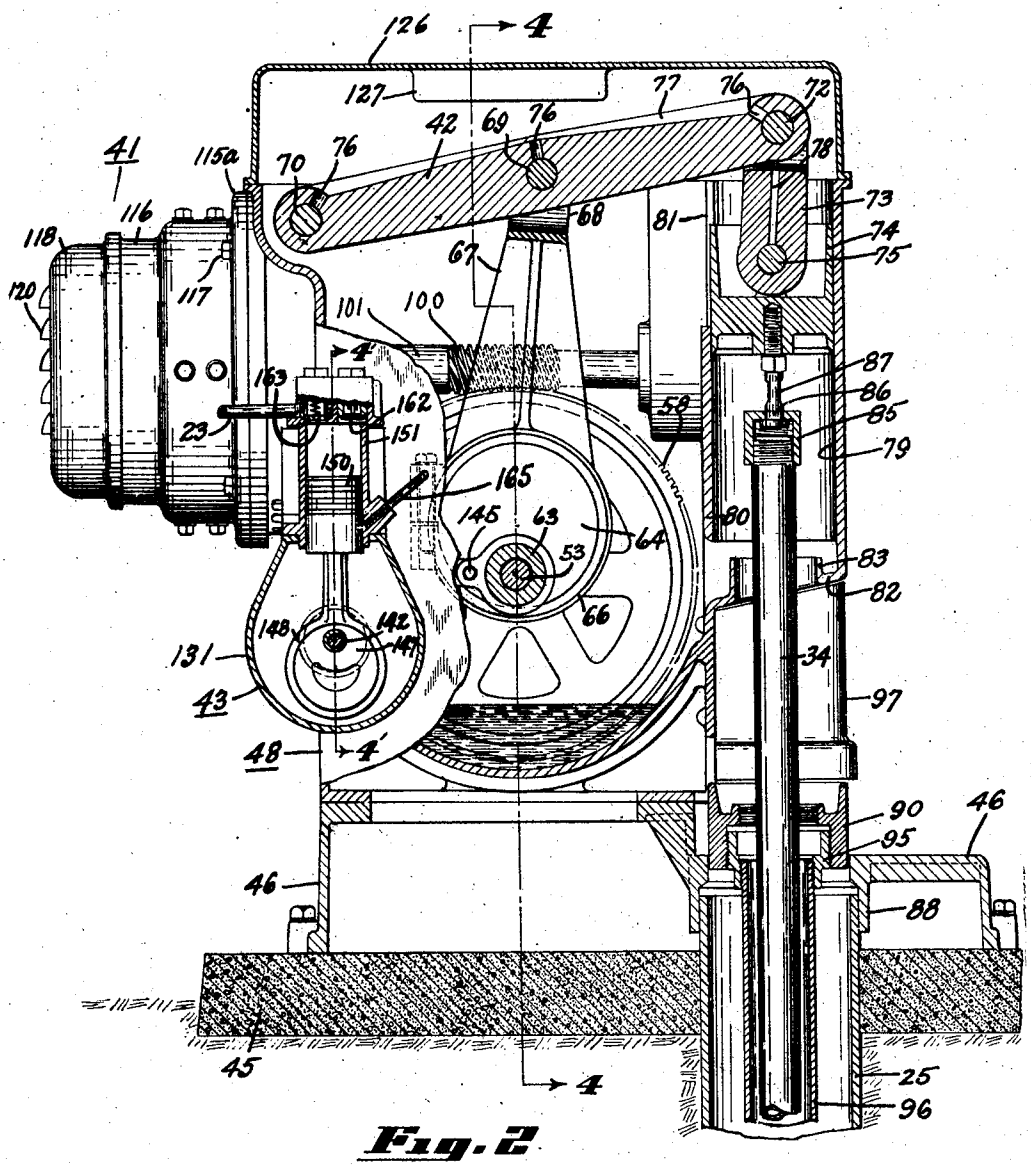

Fig. 2

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WATER SYSTEM

Filed March 12, 1923 5 Sheets-Sheet 3

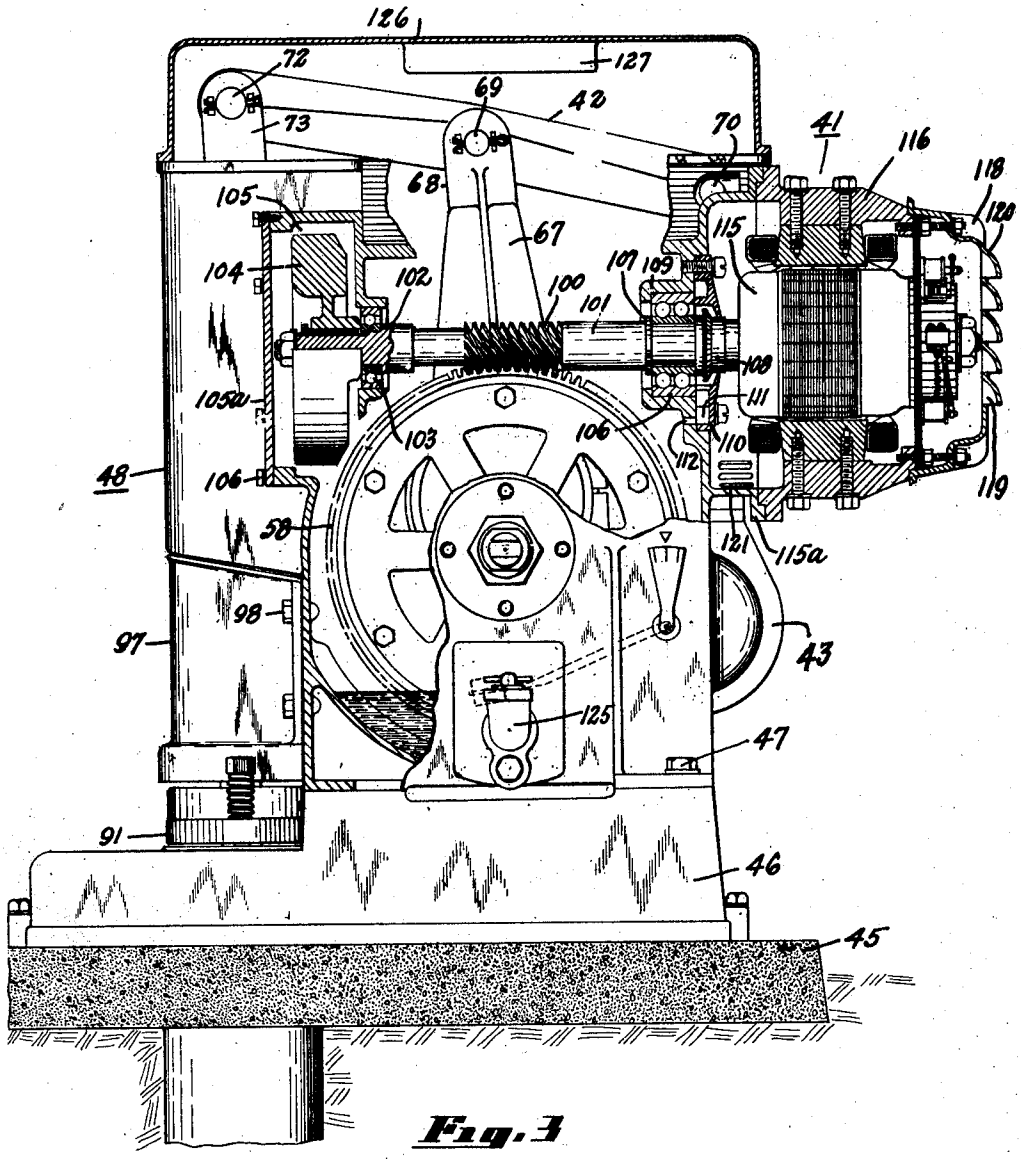

Fig. 3

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WATER SYSTEM

Filed March 12, 1923 5 Sheets-Sheet 4

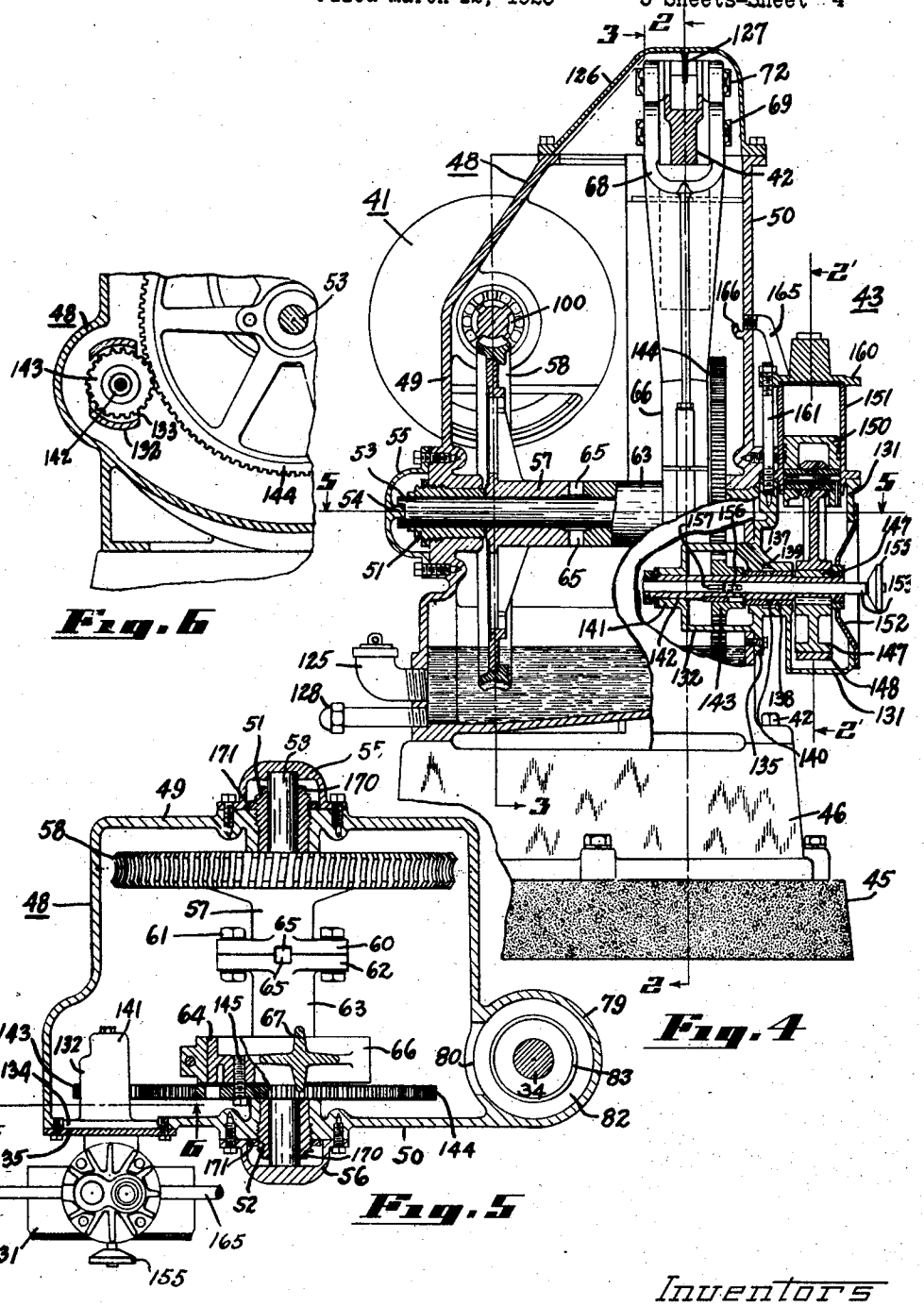

Fig. 6

Fig. 4

Fig. 5

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WATER SYSTEM

Filed March 12, 1923 5 Sheets-Sheet 5

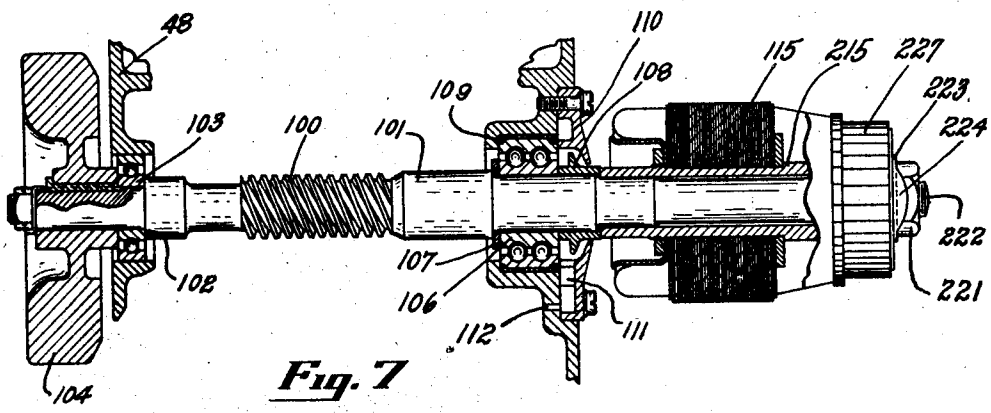

Fig. 7

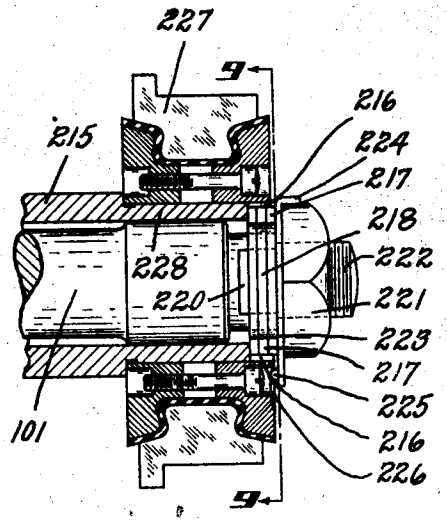

Fig. 8

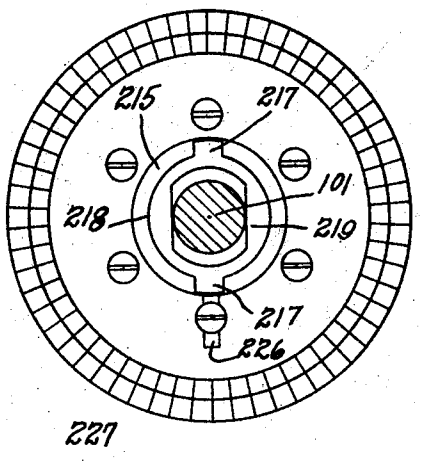

Fig. 9

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Patented Jan. 8, 1929. 1,698,265

UNITED STATES PATENT OFFICE.

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WATER SYSTEM.

Application filed March 12, 1923. Serial No. 624,323.

This invention relates to pumps and more particularly to lift pumps, a type of pump having the pump operating mechanism located at a substantial distance above the pump cylinder and piston.

It is an object of the present invention to provide pump driving mechanism which preferably is power operated and in which the pump driving mechanism is entirely enclosed in a unitary structure which is adapted to be set over a well casing and be connected with the pump rod. The structure is preferably so arranged that the pump rod is not exposed after the structure has been set in operative position.

A further object is to provide a pump driving device which is substantially self-lubricating from a common lubricant reservoir, thereby requiring lubricant to be supplied only occasionally at one place. In this connection it is a further object to provide means for preventing the escape of lubricant from the driving mechanism into the pump.

A further object of the invention is to provide for detachment of the pump driving mechanism from the pump rod and for removal of the pump driving mechanism from a position directly over the pump well casing by permitting sliding of the pump driving mechanism upon its support, thereby reducing the labor required to disconnect the driving mechanism from the pump and to move the driving mechanism to a location such as to permit access to the pump well. A further object is to provide in the unitary structure of the pump driving mechanism for accessibility and easy removal of parts for adjustment or replacement.

A further object of the invention is to provide in a unitary structure a pump driving mechanism and an air compressor which may be used for forcing air into a storage tank into which water or other liquid is lifted by means of the pump. In this connection it is an object of the invention to provide for the lubrication of the compressor from the lubricant reservoir within the pump driving device.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of embodiment of the present invention is clearly shown.

In the drawings:

Fig. 1 is a side elevation of the invention as applied to a deep well pump system which is shown partly in section;

Fig. 2 is a view partly in elevation and partly in section, the sections being taken on the lines 2—2 and 2′—2′ of Fig. 4;

Fig. 3 is a view taken on the opposite side from Fig. 2 and is partly in section, the section being taken on the line 3—3 of Fig. 4;

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

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

Fig. 6 is a fragmentary sectional view taken on line 6—6 of Fig. 5;

Fig. 7 is a sectional view on a larger scale showing the motor shaft which drives the pump mechanism;

Fig. 8 is a sectional view on a still larger scale of the commutator end of the motor shaft; and

Fig. 9 is an end view of the commutator, the section being taken on line 9—9 of Fig. 8.

Referring to the drawings, 20 is a storage tank having a pipe 21 leading therefrom and to the service main having water inlet pipe 22, and an air inlet pipe 23 for conducting suitable air pressure necessary for forcing water from the tank 20. Pipe 22 leads from a discharge head 24 connected at its upper end with the well casing portion 25 and at its lower end with the well casing portion 26. Discharge head 24 has a tapered seat 27 which receives a tapered plug 28 which carries cylinder 29, and drop pipe 30. Piston 31 reciprocates within the cylinder 29 and is connected by rod 33 with a plunger 32 which reciprocates within the drop pipe 30. The piston 31 is connected with a rod 34. The piston 31 and plunger 32 when operated by the rods 34 and 33 cause water to be raised from the well and forced through the plug 28 and pipe 22 into tank 20. The piston 21 is smaller in diameter than the plunger 32 to provide a differential pumping action which in turn provides a continuous flow of water into the tank.

The rods 33 and 34 are reciprocated by means of the pump driving mechanism or power head 40. This power head 40 comprises generally a motor 41 which is adapted by suitable gearing to transmit a rocking movement to a pump lever or walking beam 42 which causes the reciprocation of the rods

34 and 33. The motor 41 is also adapted to actuate a compressor 43 having a connection with the air pipe 23.

Referring more in particular to Figs. 2, 3, 4, and 5 a concrete block 45 carries the power head base 46. Suitably mounted upon the base 46 by means of screws 47 is a housing which includes gear case 48 having side walls 49 and 50. These walls are provided with screw threaded apertures in horizontal alignment which are adapted to receive adjusting sleeves 51 and 52, respectively, which in turn carry an axle 53. The end of axle 53 adjacent the sleeve 51 is provided with a groove into which a boss 54 projects, the boss 54 being a part of the sleeve cover 55. The opposite end of the axle 53 abuts a sleeve cover 56 which is similar in construction to that of sleeve 55. Covers 55 and 56 are secured to the gear case 48 and the boss 54 prevents the axle 53 from turning. A worm gear 58 having a hub 57 is rotatably mounted upon axle 53. Hub 57 has a flange 60 which is secured by means of bolts 61 to a similar flange 62, flange 62 being a portion of a hub 63 which provides a journal for an eccentric or crank 64. Suitable openings 65 are provided in the flange 62 in order that lubricant may pass therethrough and upon the axle 53 for lubricating the axle and hubs. An eccentric strap 66 coacts with eccentric 64 and merges into a connecting rod 67 which is forked at 68 and is connected at its forked end by means of pin 69 with the pumping lever 42. Pumping lever 42 is pivoted to a pin 70 which is secured to the gear case 48. The opposite end of the pumping lever 42 is connected by means of a pin 72 with a forked link 73. Link 73 is fulcrumed at its other end to a cross head 14 by a pin 75. Lubricant paths to the pins 69, 70 and 72 are made by drilling holes 76 from the top of pumping lever 42. These holes lead from a groove 77 in the lever 42. Lubricant is supplied to the pin 75 through a substantially vertical drilled hole 78. The crosshead 74 reciprocates within a sleeve 79 which is formed by an end wall of the gear casing and intervening wall 80. Wall 80 is slotted at 81 in order that the pumping lever may move downwardly into the sleeve 79.

Sleeve 79 is open at the top and at the bottom to provide direct communication with the interior of the gear casing. The gear casing 48 is provided with an inclined wall 82 directly below the sleeve 79 and an annular, upwardly extending boss 83 surrounding rod 34. The end of rod 34 has screw threaded engagement with a shank nut 85 having swivel connection with a cross head shank 86 which in turn is screw threaded into the cross head 74 and is provided with the flats 87 to receive a wrench. The wall 82 also forms a bottom for a portion of the gear casing 48. However, this wall is arranged in spaced relation with the pump base 46 so that when the pumping lever 42 is in its lower position the cross head shank flats 87 will be located below the wall 82 whereby an adjustment can be made for a purpose to be described later.

The upper well casing portion 25 is adapted to fit within a downwardly extending boss 88 formed in the pump base 46. A flange 90 is slidably mounted within an opening in the base support 46 and is provided with laterally extending ears 91. Flange 90 is connected by means of a reducing coupling 95 with an extension pipe 96 which encircles the piston rod 34 and is connected to the upper part of the tapered drop pipe plug 28. A piston rod cover 97 forming part of the housing of the pump driving mechanism is interposed between the wall 82 of the gear casing 48 and the flange 90 and is removably secured to the gear casing 48 by means of screws 98.

Worm wheel 58 is driven by a worm 100 forming a part of a driving shaft 101. Driving shaft 101 has a reduced portion which forms a shoulder 102 and the inner race of the ball bearing 103 is clamped between this shoulder 102 and a flywheel 104 which is also keyed upon the driving shaft 101. The outer race of bearing 103 is located within an opening of one of the end walls of the gear casing 48. The gear casing 48 merges into a housing 105 for flywheel 104 having a removable cover 105^a secured by screws 106. The opposite end wall of the gear casing is provided with an opening through which the driving shaft 101 extends. The driving shaft 101 is also journalled in a bearing 106 located in this opening. The inner race of the bearing is clamped between a collar 107 and an oil deflector 108 and the outer race is clamped between a shoulder 109 and a ball thrust cover 110, the ball thrust cover being secured to the end wall of the gear casing 48. It will be noted that the opening adjacent the shoulder 109 is of slightly larger diameter than the opening in which the bearing 103 is located the purpose of which will be described later. The ball thrust cover 110 is adapted to house the oil deflector 108. This cover 110 provides an oil receptacle 111 adjacent the bottom thereof which is connected by means of opening 112 with the interior of the gear case 48.

The drive shaft 101 extends through the cover 110 and at its extended end carries motor rotor member 115. A motor stator member 116 forming part of the housing for the pump driving mechanism is secured by bolts 117 to gear casing 48 and is provided with the motor cover 118 having openings 119 which openings are protected by louvers 120. The gear casing 48 extends outwardly to partly enclose the motor stator member 115, and openings 121 are located in this extended portion or flange 115^a to provide for the ventilation of the motor.

The gear casing 48 is adapted to contain

the quantity of lubricant which is poured into said casing through a filler L 125. The level of the lubricant within the gear casing is determined by the L 125. The attendant pours the lubricant into the gear casing until the lubricant within the L 125 is substantially near the top thereof at which level the correct amount of lubricant is provided within casing 48. The worm wheel 58 splashes the lubricant within the gear casing 48 to lubricate the worm 100 and the bearings 103 and 106. A pump cover 126 is provided with an oil deflector 127 and some of the lubricant splashed within the gear casing will strike the cover 126 and the deflector 127 will direct the lubricant so that it will drop into the groove 77 on the pumping lever 42, the oil deflector 127 being located directly above the groove 77. Lubricant which is carried to the groove 77 will flow downwardly through the hole 76 on to the pin 70 when the pumping lever is in the position shown in the drawing. Some lubricant will also pass through the opening 76 leading to the pin 69 for lubricating the same. Now when the pumping lever is lowered the lubricant in the groove 77 will pass through the opening 76 and to the pin 72 while some of the lubricant will flow through hole 78 and to pin 75. Some of the lubricant which is splashed within the gear casing 48 will also pass through the upper part of the open end of sleeve 79 and through the slot 81 to lubricate the sleeve and the cross head 74.

It is noted that the well casing 25 is located directly below the sleeve 79, and, in order that lubricant will not pass through the sleeve 79 and into the well casing 25 the upwardly extended annular flange 83 on the wall 82 is provided. This flange has an outside diameter which is less than the inside diameter of the sleeve 79. The lubricant which flows down the walls of the sleeve 79 will fall upon the wall 82 and due to the slant of the wall 82 this lubricant will again return to the bottom of the gear casing 48, the flange 83 forming an upwardly extending wall so that the lubricant can not pass into the well casing.

Lubricant also passes to the axle 53 through the opening 65 located in the flanges 60 and 62 whereby hubs 57 and 63 and axle 53 are lubricated. Adjacent the bottom of the gear casing 48 there is provided a drain pipe 128 for the purpose of draining the lubricant from the gear casing 48, the bottom of casing 48 being inclined upwardly away from the drain plug 128 so that the lowest part of the gear casing is adjacent the drain pipe 128.

An air compressor 43 is mounted upon wall 50 of the gear casing 48. This air compressor comprises a crank case 131 having a portion 132 which is open at one side as at 133 (see Fig. 6) and is adapted to extend through an opening 134 in the wall 50 of the crank case. The crank case 131 is provided with a flange 135 by means of which the case 131 is secured to the gear case 48. A wall 137 which is provided by the casting 131 carries a bearing 138 and has a passage 139 which may conduct lubricant from the interior of the gear casing 48 to the passage 140 in the bearing 138. The skirt portion 132 also merges into a bearing 141. Shaft 142 is journaled within bearings 138 and 141. A pinion 143 is slidably mounted on and adapted to drive the shaft. Pinion 143 is driven by a gear 144 rotatably mounted upon the axle 53 and secured to the eccentric 64 by means of screw 145. An eccentric 147 is keyed to the shaft 142 and coacts with an eccentric strap 148 connected with a piston 150 which is adapted to reciprocate within a cylinder 151 attached to crank case 131. Crank case 131 is provided with cover 152 having an opening of sufficient diameter to provide clearance for the shaft 142. Shaft 142 is hollow and carries a gear shifting rod 154 having an actuating knob 155 at one end and at its other end carries a pin 156 slidably mounted in a slot 157 in the shaft 142 and connected with the pinion 143 in order to slide the pinion horizontally upon the shaft 142 to control the engagement of said pinion 143 and spur gear 144. The pinion 143 drives the shaft 142 through a key as shown in Fig. 4.

The cylinder 151 of the compressor 130 is clamped between a cylinder head 160 and the crank case 131 as shown by means of bolts 161. The cylinder head 160 is provided with an intake valve 162 and a discharge valve 163. Discharge valve 163 is located within a discharge chamber which is connected to air pipe 23. During the operation of the compressor air is drawn into intake 162 and compressed within the cylinder 151 and expelled through the discharge valve 163 through the pipe 23 and into the storage tank 20.

A conduit 165 connects the interior of the cylinder 151 with the interior of gear casing 48. A ledge 166 located directly below the connection of the pipe 165 to the gear casing 48 is adapted to collect lubricant and direct same into this conduit 165 whence it flows against the piston 151 for lubricating the piston and cylinder walls. Some of the lubricant splashing within the gear casing 48, passes through the hole 139 in the wall 137 of crank case 131 and through the passage 140 for lubricating the shaft 142. Sufficient lubricant passes through the conduit 165 and through the opening 139 for lubricating the cylinder and piston wall, the bearing 138, eccentric 147 and eccentric strap 148. Pinion 143 is lubricated by the direct contact with the spur gear 144 which dips into the lubricant in casing 48, and bearing 141 is lubricated by lubricant thrown out by gear 144.

The hubs 57 and 63 and likewise the wheel

58 carried by the hub 57 can be shifted horizontally upon the axle 53 by moving the adjusting sleeves 51 and 52 and in this manner the wheel 58 can be brought into alignment with the driving shaft 101 also the spur gear 154 can be aligned with the pinion 143. The outwardly extending portions 170 of the sleeves 51 and 52 are provided with flat sides whereby a wrench may be used for adjusting same. The sleeves are locked in position by means of nuts 171.

It will be noted that when the pumping lever is in the position shown in the drawing, the pin 69 connecting the pump lever with the connecting arm 67, and the pin 72 connecting link 73 and pumping lever 42, are located above the top of the gear casing 48 whereby access may be had to these pins by merely removing the cover 126. By removing the pins 69 and 72 the pumping lever 42 can be swung about pin 70, when it is desirable to disassemble the mechanism. With the pumping lever removed the attendant may reach through the top of the gear case 48 and remove the nuts 61 whereby flanges 60 and 62 and likewise the hubs 57 and 63 are separated. Either one or the other of the sleeve covers 55 and 56 is then removed and the axle 53 can then be withdrawn from the gear case. The opening in the top of the gear case 48 is of sufficient width and length that the worm wheel 58 or the eccentric 64, eccentric strap 65, driving arm 66, and spur gear 144 can be removed therethrough. With this type of construction the disassembling or assembling of the mechanism is facilitated.

It is not necessary that the pin 72 be removed for accomplishing the foregoing disassembling of the device. The pumping lever 42 can be lowered to its down position and when in this position the shank 86, which, as was previously described projects beyond the wall 82, can be disconnected by removing the piston rod cover 97. The attendant may then apply a wrench to the flats 87 and disconnect the piston rod 34 from the cross head 74, and then the cross head 74 and link 73 can be swung around with the arm 42.

In case it is desired to remove the rod 34 or parts of the well casing, the cover 97 is removed, and, when the cross head 74 is down, the shank nut 85 is uncoupled from the rod 34. The gear casing 48 can then be slid sideways on the base 46 without raising same since the piston rod 34 clears the wall 82. If it is desirable a platform can be built having a height substantially equal to that of the base plate 46 so that the gear casing can be slid over without lowering same and in this manner when the gear casing is again placed in position it is not necessary to lift it. After the gear casing is moved a sufficient distance; ready access may be had to the well casing for removing the desired parts. It will be noted that the gear case 48 and the pump rod cover 97 provide a complete enclosure for the part of the pump rod 34 located between the well and the operating mechanism.

Referring more particularly to Fig. 3 it is shown that the driving shaft 101 can be disassembled. The flywheel cover 105ª is removed and the flywheel 104 is then removed and when the stator member 116 is removed the ball thrust cover 110 can be disconnected from gear casing 48 and then the driving shaft 101 carrying the motor rotor 115 and deflector 108, bearing 106, collar 107, bearing 102, can be removed from the structure as a unit, the opening in the wall adjacent the shoulder 109 being of sufficient diameter to permit the bearing 102 to be withdrawn therethrough.

The motor rotor 115 is assembled on a sleeve 215 which is detachably mounted upon the shaft 101 in the following manner: Sleeve 215 is provided at its outer end with diametrically opposite notches 216 (see Fig. 8). These notches 216 receive ears 217 projecting from a plurality of washers 218, each having central holes with flat sides 219 adapted to fit over diametrically opposite flats 220 provided on the shaft 101. These washers 218 provide the driving engagement between the sleeve 215 and the shaft 101, and are held in position by means of nut 221 cooperating with threaded end 222 of the shaft 101. A lock washer 223 carries a lip 224 engaged by one of the flat side surfaces of the nut 221 and a lug 225 adapted to engage a groove 226 provided in the outer face of a commutator 227 secured upon the reduced end 228 of the sleeve 215. It is obvious, after the rotor 116 has been removed that the parts 106, 107, and 108 may be removed from the shaft 101, this shaft having been first removed from the pump mechanisms as described.

Referring more particularly to Figs. 4 and 5 it will be noted that the air compressor can be assembled as a unit before being attached to the gear case wall 50. Further, by manipulating the knob 155 the pinion 143 can be brought into or out of engagement with the spur gear 144 to render the compressor operative or inoperative as desired. The compressor 150 may be considered as an attachment to the pump power head and if it should happen that other air pumping means are provided for supplying tank 20 with air the compressor unit may be omitted and cover part substituted for the flange 135.

While the form of mechanism herein shown and described constitutes a preferred embodiment of one form of 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. Pump operating mechanism comprising

in combination a motor, transmission mechanism connected with the shaft of said motor, a housing adapted to be set over a well to provide a cover therefor and having an opening for receiving a pump rod, means for connecting the mechanism with said pump rod, said housing supporting said motor and enclosing said transmission mechanism and said means, said housing having a removable portion providing access to said means.

2. Pump driving mechanism comprising, in combination, a housing; a prime mover and power transmitting mechanism driven by the prime mover and adapted to be connected with a pump rod all enclosed and supported by the housing, said housing being adapted to be located over a well to provide a cover therefor and having an opening located in alignment with the well for receiving a pump rod extending from the well.

3. Pump driving mechanism comprising, in combination, a housing; a prime mover including a rotatable drive shaft enclosed by the housing; a vertically movable crosshead within the housing; means for transmitting power from the drive shaft to the cross head, said housing being adapted to be located over a well and having an opening located in alignment with the well for receiving a pump rod extending from the well; and connections for attaching the crosshead to the pump rod.

4. Pump driving mechanism comprising, in combination, a prime mover including a rotatable drive shaft; a vertically movable crosshead; means for transmitting power from the drive shaft to the crosshead; a housing for said means and crosshead; said housing being adapted to be located over a well and having an opening in alignment with the well for receiving a plunger rod extending from the well; and connections for attaching the crosshead to the plunger rod, said housing having a removable portion providing access to said connections.

5. Pump driving mechanism comprising, in combination, a housing adapted to be located over a well, a tube or casing for surrounding a plunger rod, said housing forming a substantial continuation of the tube to enclose a part of the rod extending from the well; and mechanism enclosed by the housing for reciprocating the pump rod, said tube being removable to provide access to said part of the pump rod.

6. Pump driving mechanism comprising, in combination, a housing; a base for supporting the housing and for sliding the housing horizontally upon the base, said housing adapted to be located over a well to provide a cover therefor and to receive a pump plunger extending from the well; mechanism for reciprocating a plunger enclosed within the housing; and means for attaching a plunger to said mechanism; the detaching of the plunger and sliding of the housing upon the base providing access to the well without bodily lifting the housing.

7. Pump operating mechanism, comprising in combination, a housing and power transmitting mechanism enclosed and supported by the housing, said housing being adapted to be set over a well to provide a cover therefor and having an opening for receiving a pump rod, means for connecting the pump rod with the mechanism, said housing having a removable portion providing access to said means, the construction and arrangement of the housing with respect to the rod being such that said housing may be moved sideways without bodily lifting same after the mechanism is detached from the rod.

8. Pump driving mechanism, comprising in combination, a housing including a gear case adapted to contain lubricant, transmission mechanism including a walking beam pivoted to said housing, a crosshead attached to the free end of the walking beam, means for attaching the crosshead to a pump plunger, a crosshead guide provided in the housing, said mechanism being disposed in said housing and adapted to be lubricated by the lubricant therein, and mechanism supported by and within the housing for oscillating the walking beam.

9. Pump driving mechanism, comprising in combination, a housing adapted to contain a quantity of lubricant, a walking beam pivoted to the housing, a vertically disposed guide within the housing, a reciprocating member slidably cooperating with the guide and operatively connected with the walking beam, said member being adapted to be operatively connected with a pump rod, and transmission mechanism operatively connected with the walking beam and arranged to cause lubricant to be conveyed to lubricate the guide and the connections between the operating elements.

10. Pump driving mechanism, comprising in combination, a housing providing a gear case adapted to contain a quantity of lubricant, a vertical guide within the housing, a reciprocating member slidably cooperating with the guide, transmission mechanism within the gear case, connecting means between the transmission mechanism and the reciprocating member, said transmission mechanism being adapted to cause lubricant to be conveyed to the connecting means at the reciprocating member, said housing having an opening adjacent the reciprocating member for providing access to the connecting means at the member, and a cover for said opening for preventing the escape of lubricant from the housing.

11. Pump driving mechanism, comprising in combination, a housing including a gear case open at the top and a cover therefor; a walking beam enclosed by the housing and pivoted at one end adjacent one end wall and

the top of the gear case; a crosshead attached to the other end of the walking beam; a crosshead guide provided on the opposite wall of the gear case; and mechanism supported by and within the housing for oscillating the walking beam.

12. Pump driving mechanism, comprising in combination, a housing including a gear case open at the top and a cover therefor; a walking beam enclosed by the housing and pivoted at one end adjacent one end wall and the top of the gear case; a crosshead attached to the other end of the walking beam; a crosshead guide provided on the opposite wall of the gear case; a crank rotatably mounted below the walking beam and supported by the gear case; means for transmitting motion from the crank to the walking beam; and means enclosed by said housing for driving said crank.

13. Pump driving mechanism, comprising in combination, a housing including a gear case open at the top and a cover therefor; a walking beam enclosed by the housing and pivoted at one end adjacent one end wall and the top of the gear case; a crosshead attached to the other end of the walking beam; a crosshead guide provided on the opposite wall of the gear case; a crank rotatably mounted below the walking beam and supported by the gear case; means for transmitting motion from the crank to the walking beam; a motor shaft supported by the gear case; gearing between the motor shaft and the crank; a motor rotor mounted on the motor shaft outside the gear case; and a motor field frame included as part of the housing mounted upon the gear case.

14. Pump driving mechanism, comprising in combination, a reciprocating crosshead and means for attaching the same to a pump plunger; a gear case provided with a guide for the crosshead; and mechanism in the gear case for reciprocating the crosshead, said mechanism including a shaft extending through the gear case and projecting beyond opposite walls thereof; a flywheel mounted on one projecting end of the shaft; a motor rotor mounted on the other end of the shaft; and a motor field frame mounted on the gear case.

15. Pump driving mechanism, comprising in combination, a reciprocating crosshead and means for attaching the same to a pump plunger; a gear case provided with a guide for the crosshead; and mechanism in the gear case for reciprocating the crosshead, said mechanism including a shaft extending through the gear case and projecting beyond opposite walls thereof; a flywheel mounted on one projecting end of the shaft; a motor rotor mounted on the other end of the shaft; a housing for the flywheel including a removable cover to permit removal of the flywheel; a removable housing for the motor rotor including the motor field; and means for detachably securing the shaft to the gear case, the removal of said means permitting removal of the shaft from the gear case with the motor rotor assembled thereon after the flywheel has been removed.

16. Pump operating mechanism, comprising in combination, a housing and power transmitting mechanism enclosed and supported by the housing, said housing adapted to be set over a well and having an opening for receiving a pump rod, said housing providing a lubricant reservoir; means for causing the mechanism to be lubricated by lubricant in the reservoir; and means for preventing the escape of lubricant through said opening.

17. Pump operating mechanism comprising, in combination, a housing and power transmitting mechanism enclosed and supported by the housing, said housing adapted to be set over a well and having an opening for receiving a pump rod, said housing providing a lubricant reservoir; means for causing the mechanism to be lubricated by lubricant in the reservoir; and means for preventing lubricant conducted to said mechanism from escaping through said opening.

18. Pump operating mechanism, comprising in combination, a housing and power transmitting mechanism enclosed and supported by the housing, said housing being adapted to be set over a well and having an opening in a horizontally extending wall thereof for receiving a pump actuating rod, said housing also providing a lubricant reservoir for lubricating said mechanism, and means for preventing lubricant conducted to said mechanism from escaping through said opening, said means including a flange extending upwardly from said horizontally extending wall.

19. Pump operating mechanism, comprising in combination, a housing and power transmitting mechanism enclosed and supported by the housing, said housing adapted to be set over a well and having an opening for receiving a pump rod, said housing providing a lubricant reservoir; means for causing the mechanism to be lubricated by lubricant in the reservoir; and an annular flange surrounding said opening and extending vertically from a wall of the housing to prevent the escape of lubricant through said opening.

20. Pump operating mechanism comprising in combination, a housing and power transmitting mechanism enclosed and supported by the housing, said housing adapted to be set over a well and having an opening for receiving a pump rod, said housing providing a lubricant reservoir; means for causing the mechanism to be lubricated by lubricant in the reservoir; means for preventing lubricant conducted to said mechanism from es-

caping through said opening, said means including an annular flange surrounding said opening.

21. Pump driving mechanism, comprising in combination, a housing adapted to contain a quantity of lubricant and having an opening for receiving a vertically extending pump rod, a crosshead guide disposed directly above the opening, a crosshead cooperating with the guide and adapted to be connected with the pump rod, transmission mechanism within the housing and connected with the crosshead, said transmission mechanism being adapted to cause lubricant to be conveyed to the crosshead and guide, and means for preventing the lubricant, passing the guide, from escaping through said opening.

22. Pump operating mechanism, comprising in combination, a housing adapted to be set over a well and having an opening for receiving a pump rod extending vertically from the well; power transmitting mechanism located within and supported by the housing, said mechanism including a vertically reciprocating crosshead guided by the housing; means for connecting the crosshead with a pump rod; means within the housing for lubricating the crosshead; and an annular flange surrounding said opening and extending vertically from a wall of the housing to prevent the escape of lubricant through said opening.

23. Pump operating mechanism comprising, in combination, a housing adapted to be set over a well and having an opening for receiving a pump rod extending vertically from the well; power transmitting mechanism located within and supported by the housing, said mechanism including a vertically reciprocating crosshead guided by the housing; means for connecting the crosshead with a pump rod; means within the housing for lubricating the crosshead; and means for preventing lubricant conducted to said mechanism from escaping through said opening, said means including an annular flange surrounding said opening and extending vertically from a wall of the housing.

24. Pump driving mechanism, comprising in combination, a gear case adapted to contain a quantity of lubricant; mechanism within the case for reciprocating a pump plunger, said mechanism including a walking beam providing a plurality of bearing surfaces and having a groove for directing lubricant to the bearing surfaces; and means in the case for causing lubricant to be delivered to the groove.

25. Pump driving mechanism, comprising in combination, a gear case adapted to contain a quantity of lubricant; mechanism within the case for reciprocating a pump plunger, said mechanism including a walking beam providing a plurality of bearing surfaces and having a groove for directing lubricant to the bearing surfaces; means within the case for splashing lubricant; and means supported by the case for directing lubricant into said groove.

In testimony whereof we hereto affix our signatures.

CHARLES F. KETTERING.
GEORGE A. BUVINGER.