

Jan. 17, 1961

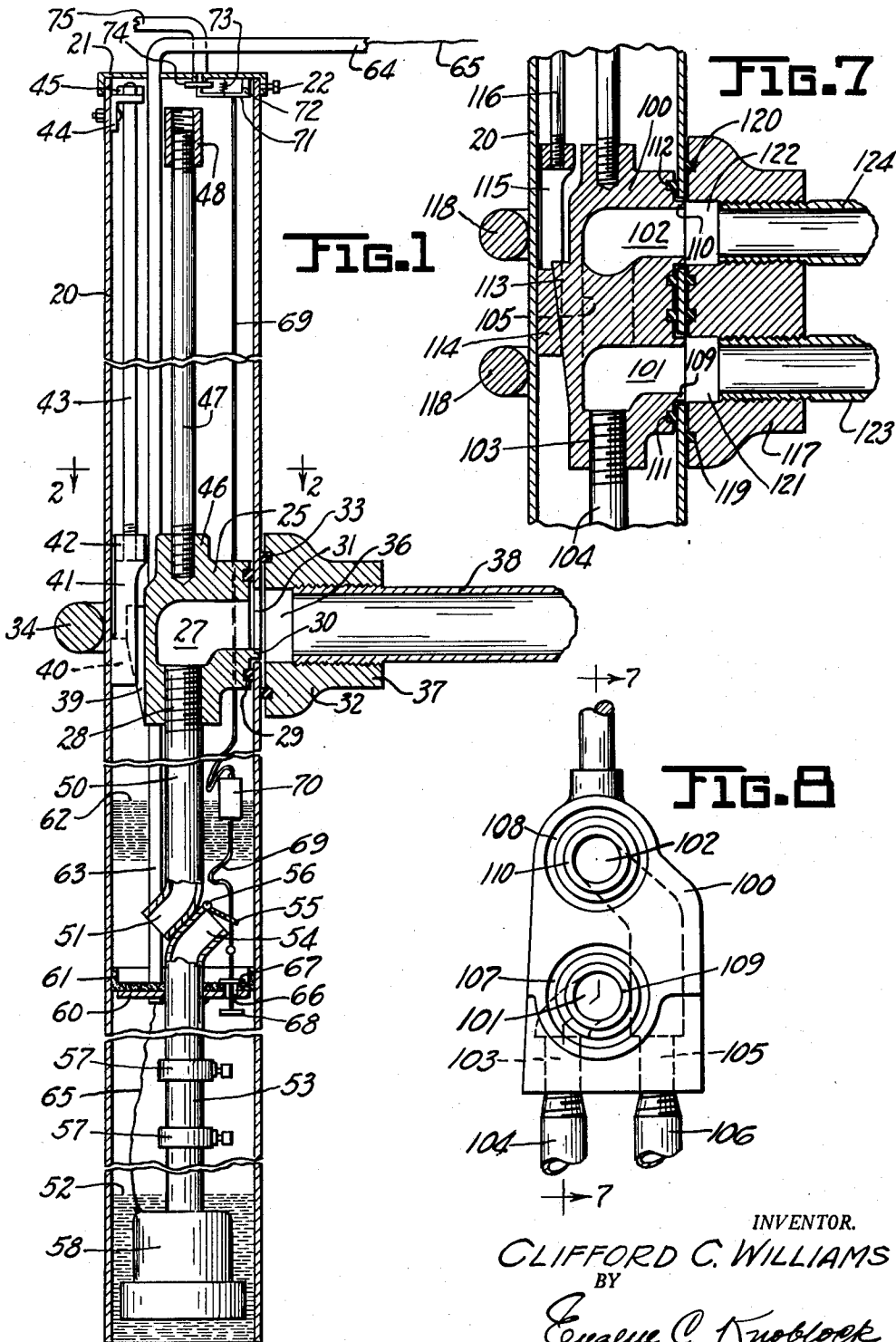
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2,968,256

PUMP ADAPTER

Filed April 29, 1957

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 2

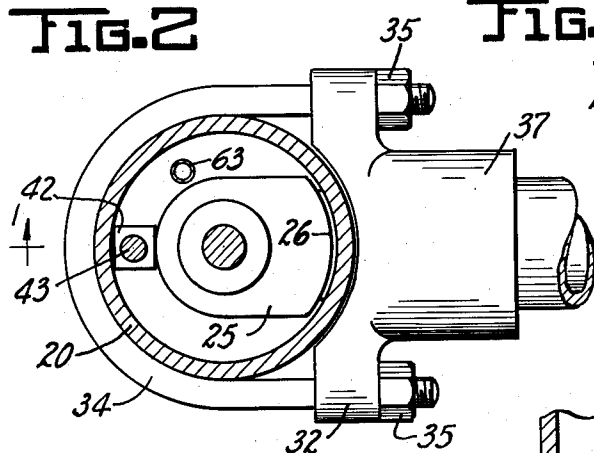


FIG. 3

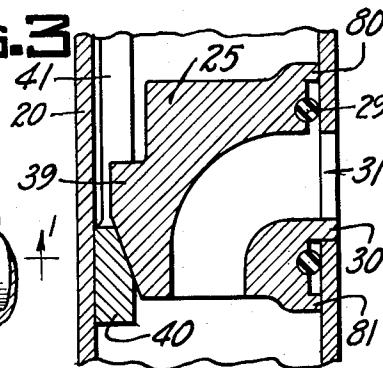
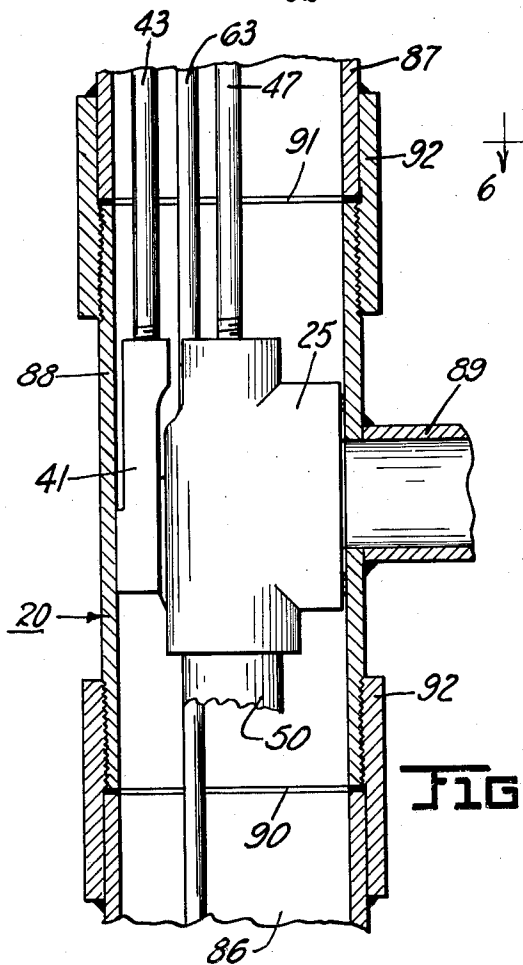
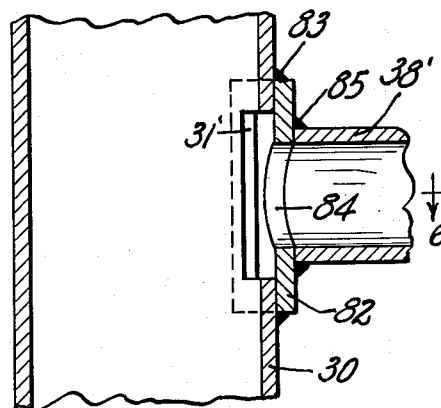


FIG. 5

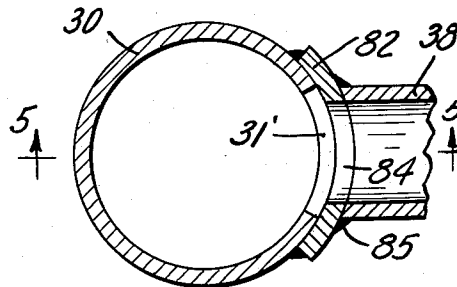


FIG. 6

FIG. 4

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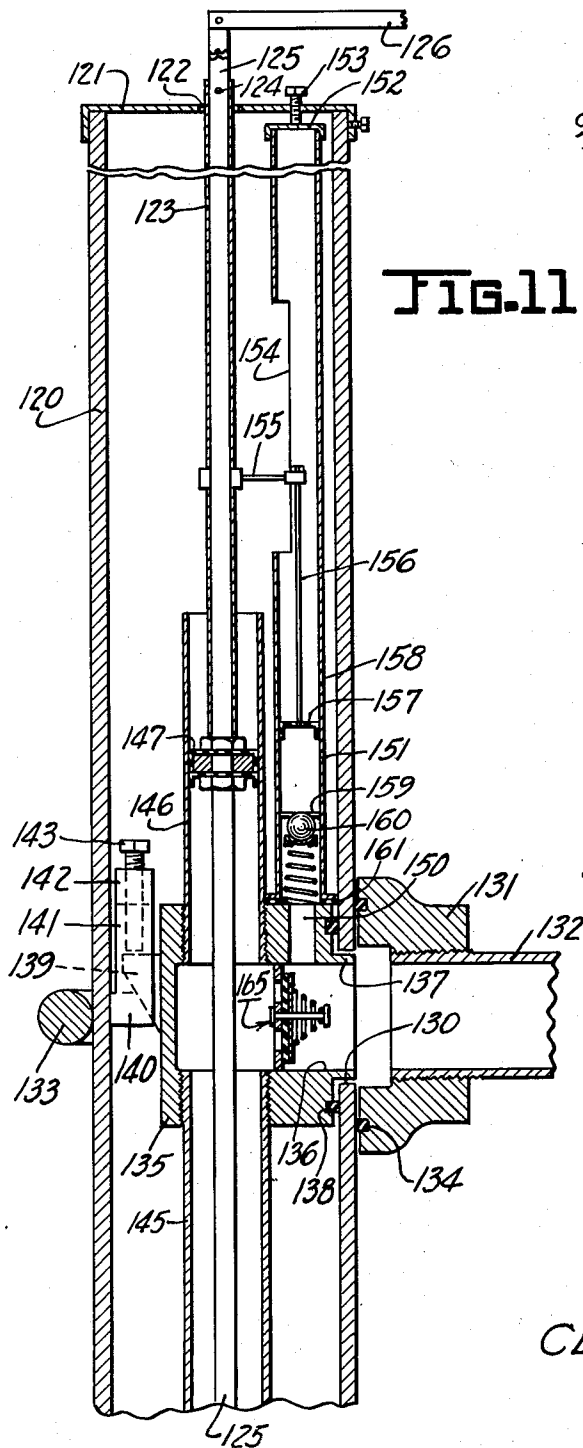
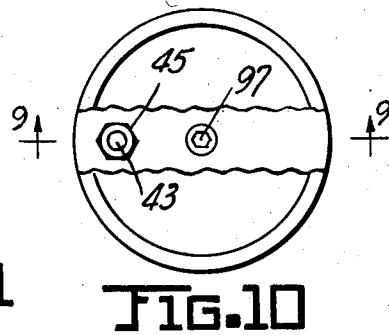
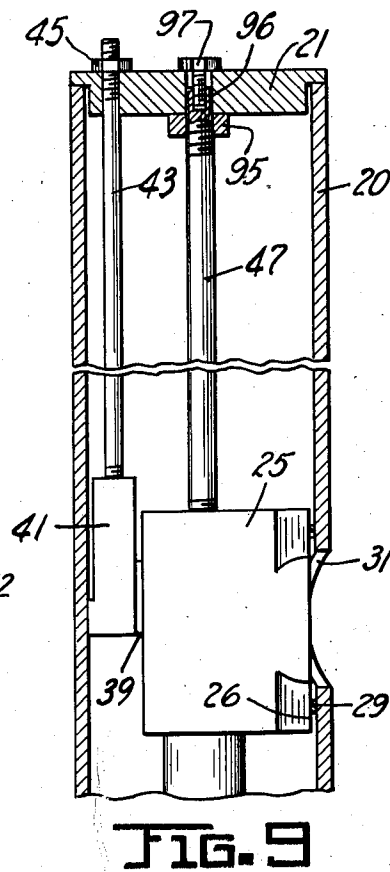
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PUMP ADAPTER

Filed April 29, 1957

3 Sheets-Sheet 3



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2,968,256

PUMP ADAPTER

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12 Claims. (Cl. 103—202)

This invention relates to improvements in pump adapters for use in water wells.

The primary object of the invention is to provide an adapter which is readily applicable in a well casing at any selected level for sealed communication with an outlet opening.

A further object is to provide a pump adapter which can be used with pumps of different types, such as jet pumps, submersible motor pumps and reciprocating pumps.

A further object is to provide a device of this character which effects connection with an outlet opening in a well casing and which does not span and close the well casing and hence permits use of the entire casing as a pressure vessel or container and permits extension past the adapter of parts which lead to sections of the pump below the level of the adapter.

A further object is to provide an adapter which is positioned in desired elevation in a well casing by a releasable wedge arrangement which is constructed to accommodate ready removal of the adapter and of the pump assembly for repair and replacement of parts.

A further object is to provide an adapter usable in well casings having different types of connections between the casing and an outlet pipe.

Other objects will be apparent from the following specification.

In the drawings:

Fig. 1 is a vertical sectional view of a well illustrating the use of my adapter therein, the pump shown being the submersible motor type, and the section line being taken on line 1—1 of Fig. 2;

Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary vertical sectional view illustrating a modified construction of the adapter;

Fig. 4 is a fragmentary vertical sectional view illustrating a modified construction of a well casing accommodating my new pump adapter;

Fig. 5 is a fragmentary vertical sectional view of still another type of well casing accommodating my pump adapter, and taken on line 5—5 of Fig. 6;

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

Fig. 7 is a vertical sectional view taken on line 7—7 of Fig. 8, and illustrating the use of an adapter for a jet type of pump;

Fig. 8 is a transverse elevational view of the adapter shown in Fig. 7, as viewed from the right in Fig. 7;

Fig. 9 is a vertical sectional view taken on line 9—9 of Fig. 10, and illustrating a modified type of adapter support;

Fig. 10 is a top view of a well casing shown in Fig. 9 with parts broken away; and

Fig. 11 is a longitudinal vertical sectional view illustrating another modified form of the adapter for use with a reciprocating pump.

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Referring to the drawings which illustrate the preferred embodiment of the invention, and particularly referring to Figs. 1 and 2, the numeral 20 designates a well casing which may carry a drive point or other reticulated member (not shown) at its lower end and which mounts a cap 21 at its upper end. The cap 21 is preferably locked on the upper end of the casing 20 as by means of set screws 22 and preferably has a substantially airtight sealed connection with the casing 20. The upper end of the casing 20 may extend to any desired elevation relative to ground level and, for convenience, will normally terminate somewhat above ground level.

My adapter comprises a body portion, such as a casting 25, of a size to fit with clearance within the casing 20 and, as here shown, is provided with a curved or arcuate side face 26 having a radius substantially the same as the radius of the inner surface of the casing 20. The width of the body 25 is substantially less than the inner diameter of the casing 20, as best seen in Fig. 2. The body has a passage 27 therein opening substantially centrally relative to the face 26 and being substantially L-shaped and characterized by a downwardly projecting screw-threaded portion 28. The face 26 of the body has an annular groove formed therein around and spaced from the mouth of passage 27 which seats a resilient packing ring 29, such as an O-ring, whose thickness is substantially greater than the depth of the groove so that a substantial portion of said ring 29 projects from the face 26 and is adapted for continuous sealing engagement with the inner surface of the casing 20 when pressed laterally thereagainst. The body 25 of the adapter is also provided with a projecting lip 30 extending from the surface 26. The lip 30 is adapted to project into an outlet opening 31 formed in the casing 20 spaced below the upper end thereof and with which registers and communicates the passage 27 in the adapter body 25.

A fitting 32, such as a saddle member, has an annular groove in its inner or concave pipe-confronting surface within which seats a sealing ring 33 formed of rubber or other resilient material of a thickness greater than the depth of the groove so as to permit continuous sealing engagement thereof with the outer surface of the casing around the opening 31 when the saddle 32 is drawn tight against the casing. The saddle may be mounted on casing 20 by any suitable means, as by means of U-bolt 34 having threaded ends passing through openings in the fitting and nuts 35 on the ends of the U-bolt and pressing against the fitting 32. The fitting 32 has a passage 36 therethrough and preferably includes a neck or sleeve portion 37 having a screw-threaded bore forming a part of the passage 36 which communicates with the casing opening 31. An outlet conduit 38 is screw-threaded in the fitting sleeve 37.

The portion of the body 25 opposite the surface 26 thereof has a wedge 39 intermediate the height thereof, said wedge having a progressively decreasing projection relative to the body 25 from its upper toward its lower end. The wedge 39 is preferably narrow and is engageable by a wedge or cam portion 40 at the lower end of a camming member 41 which has a central opening and whose upper or head portion 42 has a screw-threaded bore to mount a vertically upwardly extending rod or bar 43. The well casing preferably mounts a bracket 44 therein adjacent its upper end, which bracket is either notched or apertured to receive the rod 43 whose upper end is preferably screw-threaded to mount a tightening nut 45.

The adapter body 25 is preferably provided with an upper neck portion 46 having a bore in which is screw-threaded or otherwise anchored the lower end portion of a rod 47 which extends upwardly to a point adjacent

the cap 21. The upper end of rod 47 may be screw-threaded to mount the sleeve 48.

The screw-threaded passage 28 in the adapter body 25 mounts the upper end of a depending conduit 50 having a laterally deflected lower open end portion 51 located above the level 52 to which water rises in the casing 20 by ground pressure. A second conduit 53 is positioned substantially coaxially with the conduit 50 and has an upper laterally deflected end portion 54 opening at approximately the same level as the end 51 of the conduit 50 but in different direction so that water discharged therefrom will not directly enter the conduit end 51. The end portions 51 and 54 are welded or otherwise fixedly connected together. A check valve is mounted on and controls the outlet 54 of the conduit 53 and, as shown in Fig. 1, may constitute a flap valve 55 pivoted at 56 to the uppermost part of the conduit end 54 and adapted to drop by gravity into a closed or sealing position and to be opened only by pressure of water passing upwardly therethrough. The conduit 53 will preferably mount one or more air charger mechanisms 57 thereon spaced below the end 54 thereof and above the water level 52. The members 57 may constitute any of the mechanisms well known in the art which serve as air chargers or bleeder orifices to charge air into the upper part of the casing by entrainment in water pumped through conduit 53. The lower end of the conduit 43 mounts a submerged electric pump 58 of any conventional or well known type located below the water level 52 and capable of operation to force or propel water upwardly through the conduit 53 for discharge through the outlet 54 thereof.

The conduit 53 mounts a disk or plate 60 spaced below the angular end portion 54 thereof and, in turn, mounting a gasket member 61, here shown as of the cup-shaped type, with its peripheral flange projecting upwardly so as to be spread and held in sealing engagement with the inner surface of the casing 20 by the weight of water thereabove and here shown as extending to a level 62 spaced above the level of the conduit openings 51 and 54. The disk 60 is preferably welded or otherwise fixed upon the conduit 53.

A conduit 63 is disposed eccentrically in the well casing 20 to extend alongside the conduit 50, the adapter body 25, and the rods 43 and 47. The lower end portion of the conduit 63 passes through the disk 60 and the washer 61 with a sealed fit and the conduit opens into communication with the casing chamber below seal 61. The upper end portion of the conduit 63 extends with a sealed fit through the cap 21 and communicates with a conventional electrical conduit 64. An electrical lead, shown schematically at 65, passes through the conduits 64 and 63 from a suitable source and into and through the portion of the casing 20 below the disk 60 for electrical connection with the motor of the submerged pump 58.

Each of the partition 60 and the gasket 61 is provided with an aperture 66. The apertures 66 are in register and are normally sealed by a valve element 67 having a stem passing through the apertures 66 and mounting a stop 68 at its lower end. The valve 67 is carried by an elongated flexible cord or cable 69 upon which is mounted a float member 70 intermediate its length and at a selected position spaced normally below the body 25. The cord 69 passes upwardly in the casing, having free clearance with the body 25 and being connected at its upper end to a lever 71 pivoted at 72 to a bracket depending from the cap 21 and normally upwardly urged by a spring 73 to seat a valve member 74 against a valve seat depending from the cap 21 and surrounding an aperture therein. A conduit 75 communicates with the valved opening and preferably terminates in a downwardly extending portion (not shown) which is positioned alongside the upper end portion of the casing 20. The spacing between the float 70 and point of connection of cord

or cable 69 with the lever 71 is preferably such that, if the water level 62 lowers beyond a predetermined level, the weight of the float member 70 will overcome the action of the spring 73 and permit the air valve 74 to open to discharge air from the portion of the chamber or casing 20 above the liquid level 62.

In the assembly of the device the well casing 20 is first driven to the necessary depth to permit water to enter the lower end thereof to the level 52. The opening 31 in the casing is then formed at desired level and the fitting 32 is mounted upon the casing and the conduit 38 is connected to the fitting so as to insure that water passing through the outlet 31 will be confined by the seal 33 and directed into the outlet conduit 38. Thereupon the adapter body 25 with its connected conduits 50 and 53, the pump 58, the partition 60 and the conduit 63, are assembled. The valve 67 and its associated parts 69 and 70 are connected to the assembly, as is the rod 47. This assembly is then lowered into the casing 20 and, as the adapter body 25 thereof approaches the open upper end of the casing 20, the cam fitting 41 is engaged with the wedge 39 and thereafter is lowered into the casing along with the remaining parts of the assembly.

When the adapter body 25 reaches the desired level at which its passage 27 communicates with the casing passage 31, the adapter is held in that position by means of rod 47 while the rod 43 is manipulated relative to the bracket 44 and has the nut 45 threaded thereon. Thereupon, while the adapter body is held by gripping the upper end of the rod 47 or an extension member secured thereto, as by the sleeve 48, the nut 45 is manipulated to tighten the same and draw upwardly upon the wedge fitting 40, 41 while the adapter 25 is held stationary with its sealing member 29 concentric with the casing opening 31 and in position to continuously engage the inner surface of the casing as urged laterally thereagainst. The upward movement of the wedge or cam member 41 sliding against the well casing causes the cam 40 thereof to traverse the adapter wedge 39 to press the sealing ring 29 against the casing.

In cases where the adapter body is provided with the lip 30, it will be apparent that the lip may rest upon the lower edge of the opening 31 to sustain the weight of the adapter and the parts connected therewith, thus simplifying the operation of mounting the adapter. When the wedge member 40 engages the adapter wedge 39, it presses the adapter laterally in the casing to lock the lip 30 effectively within the opening 31, thus eliminating the need for the installer to hold the bar 47. The nut 45 is tightened until such time as an assured continuous seal is effected between the sealing ring 29 and the inner surface of the casing 20 around the opening 31. Thereupon the cap 21 can be installed in place after having first connected the cord 69 to the valve lever 71, and the device is ready for use.

It will be apparent that upon operation the pump unit 58 forces water upwardly through conduit 53 for discharge at 54 into the chamber above the sealed partition 60, 61. As the water level 62 rises in the upper part of the casing 20, the air pressure in the casing 20 thereabove increases and this pressure serves to force water through the open lower end 51 of the conduit 50 and upwardly in that conduit and the adapter 25 into the outlet conduit 38. The conduit 38 will be provided with a pressure switch (not shown) located in the circuit of which the lead 65 constitutes a part, so that upon the attainment of a predetermined water pressure in the line 38 the motor of the submerged pump 58 will be stopped. When water is drawn from the system with a resulting drop in the pressure in the system entailed by a lowering of the water level 62, the pressure switch in conduit 38 will be closed to again operate the submerged pump 58 to pump more water and restore the pressure in the system.

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Whenever it becomes necessary to repair the pump 58 or to replace parts thereof or of the well, the following procedure is followed. The air pressure in the upper part of the casing is first bled, as by manually opening valve 74. Then the cap 21 is removed from the upper part of the casing. The cord 69 is pulled upon to open the valve 67 and drain from the casing all water above the level of the plate 60 and gasket 61. Thereupon the bar 47 has an extension (not shown) secured thereto by means of the sleeve 48, the same being connected with a hoist or like mechanism. Then the nut 45 is loosened to loosen the wedging cam 41 and permit the adapter 25 to be swung laterally inwardly to the extent required to disengage the lip 30 from the aperture 31. Thereupon an upward pull upon the member 47 and the bar 43 will withdraw from the pump casing the entire pump sub-assembly to render it accessible for convenient repair and replacement of parts. When repair has been completed, the assembly is reinstalled in the casing in proper position and the pump is reactivated.

The adapter body may be altered, if desired, to prevent rocking thereof in a manner to compress the gasket ring 29 unequally throughout its circumference. Thus, as illustrated in Fig. 3, the adapter body 25 may have a projection 80 at its upper end and a projection 81 at its lower end, which projections form interruptions of the surface 26 of the adapter body and are spaced from the groove seating the sealing member 29. The projections 80 and 81 terminate short of the projection 30 so as to avoid interference with the supporting or suspending function of the lip 30 as it seats in the lower part of the casing opening 31. The extent of the projection of the lugs 80 and 81 is substantially less than the normal extent of projection of the uncompressed gasket ring 29 from the face 28, so as to insure that the gasket ring 29 will have been pressed into full sealing engagement with the well casing 20 by the time the lugs 80 and 81 engage the well casing as a result of the operation of the wedging cam 40 acting against the wedge 39 on the adapter body.

In cases where the use of a saddle fitting at the casing outlet is not desired, the well casing may have an outlet of the character illustrated in Figs. 5 and 6. Thus an aperture 31' is formed in the well casing and an outlet assembly is welded to the casing around aperture 31'. The assembly consists of a curved plate 82 adapted to be peripherally welded at 83 to the outer surface of the casing 30 continuously around and in spaced relation to the aperture 31'. The curved plate 82 has an aperture 84 formed therein to communicate with the aperture 31' and against this plate 82 around the opening 84 is abutted the end of an outlet pipe 38' which is peripherally welded thereto at 85. In this construction the opening 31' will preferably be of such size in relation to the inner diameter of the sealing ring 29 that the sealing ring may continuously and sealingly engage the plate 82.

In cases where it is desired to avoid the operation of welding to the casing after it has been lowered in the ground, and in which it is also desired to avoid the use of saddles, as illustrated in Figs. 1 and 2, the construction illustrated in Fig. 4 may be employed. In this instance the casing 20 is formed of a plurality of parts including a lower casing part 86, an upper casing part 87, and an intermediate casing part 88 which may be in the nature of a T, in that it has welded or otherwise fixedly secured thereto a laterally projecting part 89 intermediate its ends. If desired, gasket members 90 and 91 may be interposed between the adjacent ends of the sections 86, 87 and 88, and screw-threaded means may be provided to join the conduit parts 86, 87 and 88. One form of such means may include sleeve members 92 welded to the upper end of the lower section 86 and to the lower end of the upper section 87, respectively, to project therefrom. The sleeves 92 may be internally screw-threaded and the opposite end portions of the con-

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duit section 88 may be externally screw-threaded so that the threads may interengage, as illustrated in Fig. 4, to interlock the parts and form a composite casing unit 20 of desired length and desired rigidity. The adapter 25 is locked in this casing by the wedging unit 41 in the same manner described above. This construction eliminates the necessity of applying the outlet pipe 89 after the well casing has been driven, as will be obvious.

In some instances it may not be desirable to provide the adapter body 25 with a projection such as the lip 30 engaging within the aperture 31 of the casing, and it may be also desirable to provide means different from those described above for support of the adapter after it has been lowered into the pipe casing and before the adapter has been wedged into sealing engagement with the pipe casing. Such a construction is illustrated in Figs. 9 and 10, wherein the body of the adapter 25 at the surface 26 thereof is smooth and uninterrupted except for the groove receiving the gasket ring 29. It will be understood, however, that projections may be provided on the adapter body as shown at 80, 81 in Fig. 3, if desired. The bar 47 is connected to the upper end of the adapter and has a nut 95 threaded on its upper end. Bar 47 is preferably provided with an axial screw-threaded socket in its upper end. The cap 21 has a bore 96 adapted to receive the upper end portion of the rod 47. The shank of a set screw 97 passes through the bore 96 and has a large head bearing against the top surface of the cap 21 around the opening 96. The set screw is screw-threaded in the socket in the member 47 so that it locks the member 47 relative to the cap 21. The cap 21 is also provided with a bore within which fits snugly and slidably the rod 43 upon whose upper end is screw-threaded the nut 45 to bear against the top of cap 21. In this construction it will be apparent that the adapter body 25 is supported or suspended from the cap 21 and the casing 20 when lowered within the casing. For this purpose it will be apparent that the length of the member 47 must be calculated with relation to the location of the outlet passage 31 in the well casing. Consequently, all that is necessary to assemble the pump in the Fig. 9 construction is to preassemble the cap 21 and adapter in proper spaced relation by means of the member 47 and to provide a slack adjustment of the wedging member 41 relative to the wedge 39 of the adapter. The pump arts and associated elements are then connected to the adapter, and the assembly is lowered into the casing 20 to be suspended from the cap 21. The register of the bore 27 of the adapter with the casing opening 31 can be observed through the opening 31 or by observation of the radial location of the nut 45 with relation to the radial location of outlet 31. The nut 45 can then be tightened to wedge the adapter against the casing for sealing engagement of the sealing ring 29 with the casing 20.

The adapter is well suited for use with jet type pumps by construction thereof in the manner illustrated in Figs. 7 and 8. Jet pump installations require a pressure line and a water discharge line, and the adapter illustrated in Figs. 7 and 8 provides the same. In this construction the adapter body 100 is elongated and of slightly different shape than the adapter 25. The body 100 has passages 101 and 102. The passage 101 communicates with a bore 103 in which is screw-threaded the upper end of a depending conduit 104. Passage 102 has a bore 105 offset therefrom with which a depending conduit 106 has a screw-threaded connection. Passages 103 and 105 are spaced apart laterally but the passages 101 and 102 are preferably vertically aligned. A groove 107 is formed in the surface of body 100 in spaced concentric relation to passage 101 and a groove 108 is formed in said surface in spaced concentric relation with opening 102. A projection 109 projects from the face of body 100 near opening 101, and a projection 110 projects from the body 100 near the opening 102.

These projections seat in openings within the pipe casing 20 and may be tubular as shown. Annular seal 111 seats in groove 107 and annular seal 112 seats in the groove 108. Said seals constitute flexible and resilient rubber or synthetic rubber rings whose thickness is greater than the depth of the respective grooves. The seals are adapted to bear continuously against the inner surface of the casing 20 around the openings into which the projections 109 and 110 extend. The body 100 has the wedge 113 formed therein in diametrically opposed relation to the outlets of the passages 101 and 102 and adapted to be engaged by a wedging cam 114 on a fitting 115 adapted to be drawn upon by a draw rod 116 for the purpose of pressing the gasket rings 111 and 112 in sealing engagement with the casing wall as will be apparent.

One or a pair of saddle fittings 117 are carried by the casing as by means of U-bolts 118 and have concave casing-confronting surfaces interrupted by grooves within which sealing rings 119 and 120 are seated. The seal ring grooves are concentric with passages 121 and 122, respectively, in said fitting which communicate with the passages 101 and 102 in the adapter. Conduits 123 and 124 are screw-threaded in the fitting or saddle 117.

The use of the adapter in connection with a reciprocating type of pump is illustrated in Fig. 11. The well casing 120 has a cap 121 provided with an opening 122 to slidably receive a spacer tube 123. A reciprocating pump rod 125 extends within and is fixed at 124 to the spacer tube 123. Rod 125 is pivotally connected at its upper end to an operating lever or rod 126. Rod 125 extends substantially centrally in the casing 120 to a pump head or piston (not shown) adjacent the lower end of the casing. The pump casing is provided with an outlet opening 130 at desired height thereof. A saddle 131 having a screw-threaded passage therethrough within which is connected the end of outlet conduit 132 is secured to the casing 120 in register with the passage 130, as by means of a U-bolt 133. A gasket ring 134 is carried by the casing-confronting surface of the saddle to provide continuous sealed engagement with the casing around the opening 130 as the securing means for saddle 131 is drawn taut.

The adapter body 135 has a transverse passage 136 therein adapted to register with the bore of the fitting 131 here shown as being outlined in part by a tubular projection 137 adapted to fit in the opening 130, although it will be understood that a lip to seat against the bottom portion of the opening 130 may suffice. The body 135 has a groove receiving a resilient sealing ring 138 continuously engageable with the inner wall of the casing around the opening 130. A wedge rib 139 is formed in diametrically opposed relation to the gasket ring-mounted surface of the adapter body 135 and is engageable by the cam portion 140 of a cam fitting 141. Fitting 141 is characterized by a central aperture and an upper part 142 having a screw-threaded bore in which is screw-threaded a set screw 143. The set screw 143 is adapted to bear against the upper edge of the wedge 139 to press thereagainst and draw the fitting 141 upwardly relative to the adapter body and thereby force the adapter body laterally for the purpose of effecting a continuous sealed engagement between the sealing ring 138 and the casing.

The adapter body 135 has a vertical bore therethrough communicating with passage 136, said bore being screw-threaded to mount the upper end of a depending tube 145 through which the pump rod 125 extends. A second tube 146 is screw-threaded in the upper part of the passage to project above the adapter and define a cylinder within which a piston 147 is mounted.

The adapter body also has a passage 150 extending upwardly from the passage 136. A conduit 151 communicates with passage 150 and preferably is provided

with a hold-down cap 152 at its top which is secured to the cap 121 by means of a screw 153. The conduit 151 is preferably cut away at 154 and a bracket 155 carried by the spacer tube 123 projects through the opening 154 and mounts a rod 156 carrying an air pump piston 157 which reciprocates in the tube 151. The tube 151 is provided with an air port 158 intermediate the stroke of air pump piston 157. The tube 151 is also provided with a valve seat 159 below piston 157 against which a spring-pressed valve 160 seats to normally close the same but to be unseated by pressure of air pumped by the piston 157.

A check valve 165 is mounted in passage 136 of the adapter between passage 150 and tube 145 to permit water to flow from the tube 145 to outlet tube 132.

The piston 147 is a differential piston, and the tube 146 is a differential cylinder, and the piston reciprocates in that cylinder coincident with the reciprocation of pump rod 125 to pump water upwardly in the tube 145 for discharge through valve 165 into outlet conduit 132. An air charge is pumped in the air tube 151 incident to each operation of the pump rod 156 with pump rod 125, thus introducing an air charge into the water being pumped to the conduit 132. Air cylinder 151 is held down against a gasket 161 at the top surface of the adapter body 135 by means of the set screw 153.

By means of this construction, it is possible to remove pump rod 125 and its associated parts, including the air pump 151, 157 without removing the adapter 135. Furthermore, it is possible, by releasing the tension on the set screw 143, to release the adapter and thereby remove the entire pump mechanism, in which case a length of pipe will preferably be coupled onto the upper end of the differential cylinder 146 for the lifting operation.

While the preferred embodiments of the invention have been illustrated and described, it will be understood that changes in the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. In a well, a casing having a discharge outlet intermediate its length, an adapter having a passage, a conduit depending from said adapter and communicating with said passage and with a pumping unit, and wedge means in said casing alongside said adapter for anchoring said adapter in engagement with said casing with the discharge mouth of its passage communicating with said outlet, said adapter having a vertical tapered rib diametrically opposite the discharge mouth of said adapter passage and having its greatest width at its upper end, said wedging means engaging said rib and said casing and including means for urging it upwardly against said rib to urge said adapter laterally.

2. In a well, a casing having a discharge outlet intermediate its length, an adapter having a passage, a conduit depending from said adapter and communicating with said passage and with a pumping unit, wedge means in said casing alongside and engaging said adapter for laterally pressing said adapter in engagement with said casing with the discharge mouth of the passage communicating with said outlet, said adapter having a vertical tapered rib diametrically opposite the discharge mouth of said adapter passage and having its greatest width at its upper end, said wedge means including a fitting embracing said rib and having a tapered lower part engaging said casing and said rib, and means urging said fitting upwardly relative to said adapter.

3. A well comprising a casing having a discharge outlet intermediate its length, a cap sealing the top of said casing, an adapter having a passage, means for wedging said adapter laterally into engagement with said casing with its passage communicating with said discharge outlet, a depending conduit communicating with said adapter passage, a second conduit carried by said depending conduit, a submersible motor pump carried by said second

conduit, a partition carried by said second conduit above the normal level of water in said casing, air charging means on said second conduit below said partition, said first conduit having an inlet opening therein adjacent and above said partition, said second conduit having an outlet adjacent to and above said partition, a check valve in the outlet of said second conduit, a conduit extending through said casing with sealed connections with said cap and partition, and an electrical conductor extending through said last named conduit for connection with the pump motor.

4. A well as defined in claim 3, wherein said cap has an air passage, and a normally closed valve for sealing said air passage.

5. A well as defined in claim 3, wherein said partition has an opening, a valve normally closing said partition opening, and a float connected to said valve.

6. A well as defined in claim 3, wherein said cap has an air outlet, a normally closed valve for sealing said outlet, said partition having an opening, a valve normally closing said partition opening, and manually operable means for opening said valves.

7. In a well, a casing having a discharge outlet intermediate its length, an adapter having a passage, a conduit depending from said adapter and communicating with said passage and with a pumping unit, wedge means bearing against said casing substantially diametrically opposite said outlet and having an inclined surface, said adapter having an inclined surface portion engaged by and coacting with the inclined surface of said wedge means, and means for moving said wedge means in said casing relative to said adapter for pressing said adapter laterally into engagement with said casing with its passage communicating with said outlet.

8. The combination defined in claim 7 wherein said adapter has an annular groove in one side face surround-

ing said passage, and a sealing ring seating in said groove and of a thickness greater than the depth of said groove for continuously engaging said casing around said outlet.

9. The combination defined in claim 7, wherein a lug projects from said adapter adjacent said passage and seats in said casing outlet.

10. The combination defined in claim 7, wherein a tubular projection on said adapter at the mouth of said passage seats in said casing outlet.

11. The combination defined in claim 7, wherein a sealing ring is carried by said adapter and surrounds said outlet for sealing engagement with said casing and abutments project from said adapter above and below said passage and engage said casing when said ring is in sealing engagement with said casing.

12. In a well, a casing having a discharge outlet intermediate its length, an adapter having a passage, a conduit depending from said adapter and communicating with said passage and with a pumping unit, wedge means movably mounted for longitudinal movement in said casing substantially diametrically opposite said outlet and having an inclined surface, means carried by said adapter having an inclined surface portion for co-acting with the inclined surface of said wedge means for pressing said adapter laterally into engagement with said casing with its passage communicating with said outlet upon movement of said wedge means, and means for moving said wedge means.

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