Oct. 4, 1960 C. C. WILLIAMS 2,954,742

WATER PUMP UNIT

Filed April 29, 1957 2 Sheets-Sheet 1

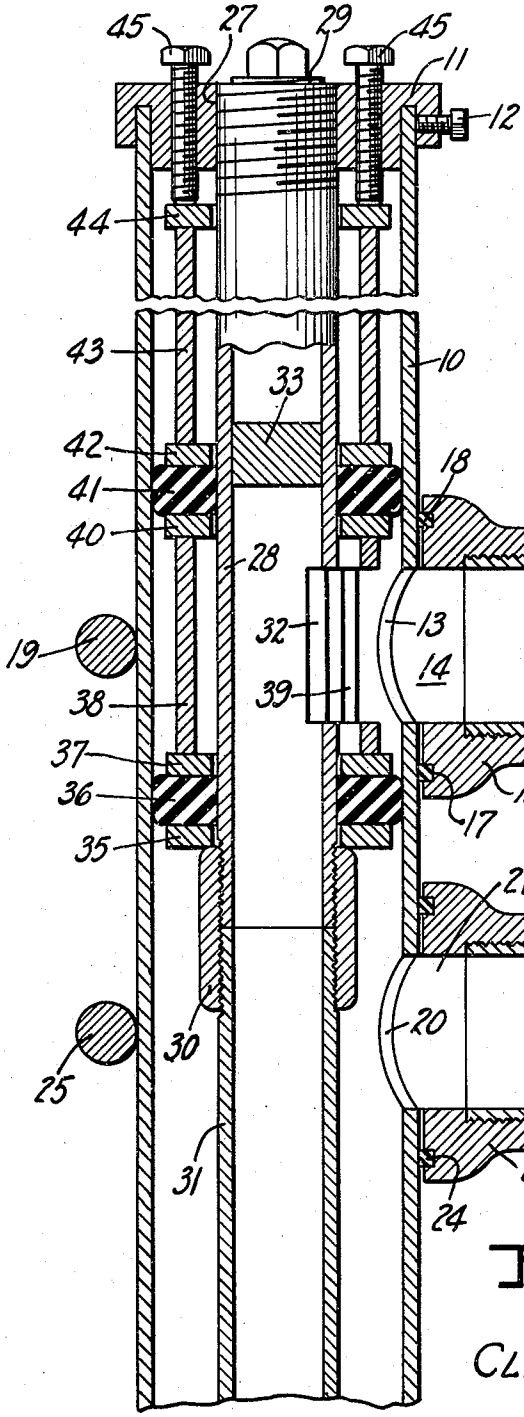



FIG. 1

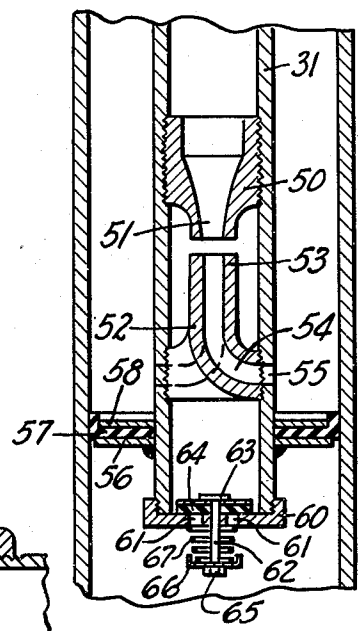



FIG. 2

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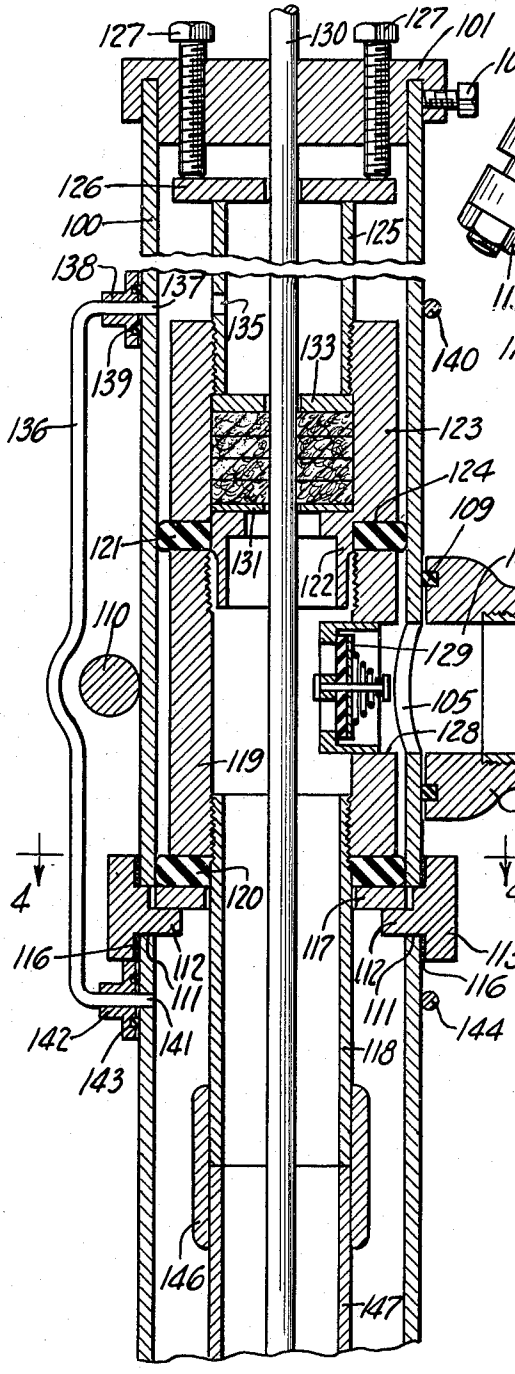



FIG. 3

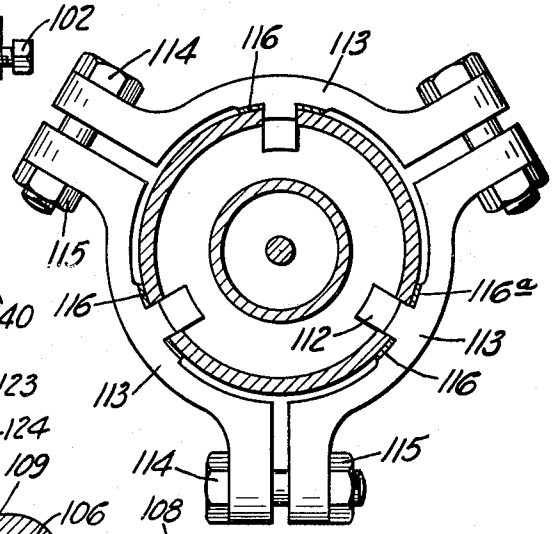



FIG. 4

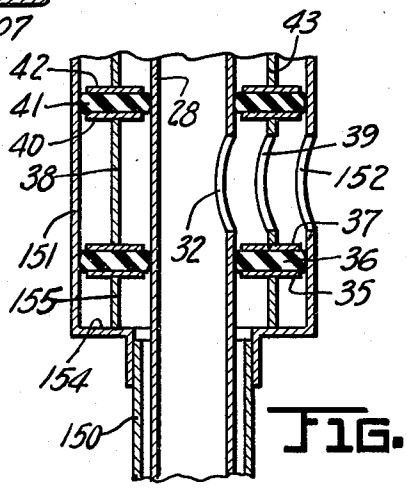



FIG. 5

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# WATER PUMP UNIT

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2 Claims. (Cl. 103—260)

This invention relates to improvements in water well units, and particularly to such units employing a well casing having a lateral discharge outlet intermediate its height.

The primary object of this invention is to provide a device of this character having a tube mounted within a well casing in a manner to provide a novel water-discharging connection thereof at a lateral outlet in the well casing.

A further object is to provide a device of this character with a tubular assembly supported by the well casing and including compression fittings for sealing engagement with the casing adjacent a lateral outlet in the casing to direct water to said outlet.

A further object is to provide a device of this character with a tubular assembly which discharges at a lateral casing outlet and which is adaptable for use with pumps of different types, such as jet pumps and reciprocating pumps.

Other objects will be apparent from the following specification.

In the drawings:

Fig. 1 is a vertical sectional view illustrating my invention adapted to a jet pump, said view being fragmentary and illustrating the construction adjacent the outlet end of the structure;

Fig. 2 is a vertical sectional view of the jet pump illustrating the jet portion thereof;

Fig. 3 is a vertical sectional fragmentary view of the upper or outlet portion of a well embodying my invention and using a pump of the reciprocating rod type;

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 3 but illustrating a multiple section ring portion thereof in top plan view; and

Fig. 5 is a fragmentary vertical sectional view of a modified well casing construction to accommodate a pump of the reciprocating rod type.

Referring to the drawings, and particularly to Figs. 1 and 2 thereof, which illustrate the application of the invention to accommodate a jet type pump, the numeral 10 designates a well casing having a cap 11 spanning and anchored at the upper end thereof as by means of set screws 12. The casing 10 will be provided with the usual drive point or other reticulated member (not shown) at its lower end and will be driven to a point below the water table in a manner well understood in the art. The casing is provided with a lateral outlet opening 13 therein intermediate its length and at any selected elevation, with which communicates the bore 14 of a saddle type fitting 15 within which is screw-threaded an outlet conduit 16. The fitting 15 has a circular groove 17 formed in the concave face thereof which confronts the casing 10, and said groove mounts a sealing ring 18 formed of rubber, synthetic rubber or other suitable material, and of a thickness greater than the depth of the groove so that said ring is compressed when the fitting is pressed against the wall casing around the outlet 13. Any suitable means for mounting the saddle 15 on the casing may be employed, such as a U-bolt 19 fitting around the casing with its ends passing through apertures at opposite sides of the fitting and mounting nuts (not shown).



In vertically spaced relation to the opening 13, the casing is provided with a second lateral opening 20 with which communicates the bore 21 of a saddle fitting 22, providing means for connection of pipe 23 leading to a source of pressure. Fitting 22 is preferably substantially similar to the saddle 15 and is provided with a grooved concave face to receive a gasket ring 24 for effecting sealed engagement of the fitting 22 with the well casing around the opening 20 when the fitting 22 is drawn tight, as by means of U-bolt 25 and associated tightening nuts (not shown).

The apertures 13 and 20 may be located adjacent one another but should be spaced apart longitudinally sufficiently to avoid undue weakening of the well casing and to permit access to the tightening means for the respective fittings 15 and 22. The radial orientation of the openings 13 and 20 may vary and may be of any orientation found suitable or convenient. Also, if desired, the fittings 15 and 22 may be formed integrally, i.e., as a unit.

The cap 11 is provided with a screw-threaded bore 27 centrally thereof at which the upper screw-threaded end portion of conduit 28 is connected. The upper end of conduit 28 will be closed, as by a closure plug 29. The conduit 28 extends to a level spaced below the discharge opening 13 and is externally screw-threaded at its lower end for connection thereto of a union 30 providing means for coaxially connecting thereto a lower pipe section 31. The tube section 28 has a lateral opening 32 therein which is substantially aligned with the lateral casing outlet 13. The tube portion 28 has a plug 33 therein above the level of the opening 32, which plug may be a stuffing box, a differential cylinder, or any other unit found suitable in some instances, such as instances where the plug 29 is provided, it may be unnecessary to provide the plug 33.

An apertured disk 35 fits snugly around the conduit portion 28 and slidably within the well casing, being supported on the upper end of the union or other abutment on pipe 28 spaced below the discharge outlet 13. An annular resilient sealing member 36 having a snug fit about the conduit 28 bears upon the disk 35 and has a snug fit within the casing 10. An apertured follower disk 37 substantially similar to the disk 35 bears upon the upper surface of the sealing ring 36.

A sleeve 38 fitting freely within the casing and around the conduit 28 bears upon the follower ring 37 and is of a length to extend to an elevation above the level of the outlet 13. The tube or sleeve 38 has an outlet opening 39 therein substantially at the same level as the outlet openings 13 and 32. An annular apertured disk 40 similar to the disk 35 bears upon the upper end of the sleeve 38 and provides means for supporting an annular resilient gasket ring 41 similar to the gasket ring 36. A follower annular disk 42 bears upon the upper surface of the gasket ring 41. A sleeve or tube 43, substantially of the same diameter and transverse dimensions as the sleeve 38, bears upon the follower ring 43 and extends to a point adjacent the bottom surface of the cap 11. An annular rigid disk 44 bears upon the upper end of the sleeve 43. A plurality of set screws 45 are screw-threaded in the cap 11 and bear against the annular member 44.

It will be apparent that tightening of the set screws 45 will introduce a downward pressure upon the assembly 35–44 which will serve to squeeze or vertically compress the gasket rings 36 and 41 in a manner to effect sealing engagement thereof with the well casing 10 and the conduit 28 in a continuous circumferential manner. Consequently, water which is discharged from the conduit 28 at

its outlet 32 will be prevented from draining through the well casing around the conduit 28, 31, and, instead, will be confined for discharge at the lateral outlet 13 and the discharge conduit 16.

The lower end of the conduit 31 is internally screw-threaded to receive therein an orifice member or fitting 50 having an upwardly flaring passage 51 therethrough. A second fitting 52, in the nature of a jet member or nozzle, is screw-threaded within the tube 31 in adjacent but spaced relation to the lower end of the fitting 50. The jet member 52 preferably includes a nozzle portion 53 having a bore from which extend one or more lateral passages 54 for communication with lateral apertures 55 in the pipe 31 communicating with the space within the casing surrounding the conduit 31. The jet is constructed to permit flow of water therearound in the pipe 31 to enter the fitting 50.

The lower portion of the pipe 31 below the level of the lateral openings 55 carries a packer member of well known construction. This packer may include a lower plate 56 fixedly anchored to the tube in any suitable manner, a pump leather or cup member 57 defining a seal and an upper disk 58 fitting within the cup-shaped pump leather. The packer assembly 56, 57, 58 effectively seals the chamber thereabove from the space within the casing located therebelow.

The lower end of the pipe 31 mounts a check valve which may be of any suitable construction. The construction here shown entails the use of a cap 60 screw-threaded on the pipe 31 and provided with a plurality of apertures 61 spaced from a central aperture within which is slidable endwise the stem 62 of a member having an enlarged head 63. A sealing disk or valve member 64 is carried by the stem 62 and preferably includes a rigid backing plate and a resilient or rubber face portion adapted to bear against the apertured wall of the cap 60. The lower end of the stem 62 carries a head 65 which supports a plate or disk 66 upon which bears a coil spring 67 whose upper end bears against the lower surface of the cap 60.

The construction makes possible the provision of an effectively operating jet pump having a single pipe. Also, the construction has the advantage of accommodating preassembly of the pump sections with minimum need for parts of special dimensions or proportions, while accommodating a wide range of locations of the lateral openings 13 and 20 in the well casing. Thus it is possible to accommodate any desired location of the opening 13 relative to the upper end of the well casing by merely selecting a tube 43 of a length related to the spacing of the opening 13 from the end of the well casing.

In the assembly of the pump, assuming that the well casing has been sunk so that its drive point is below the water table, the first operation will be to form the openings 13 and 20 in the well casing at the desired locations for the particular installation. The fittings 15 and 22 are then connected to the well casing, and the conduits 16 and 23 are connected to the fittings. Thereupon the internal structure of the device having been preassembled with the sleeve 43 of desired length, and having been connected to the cap 11, is lowered into the well casing until the cap 11 seats upon the upper end of the well casing. The cap 11 is then anchored upon the well casing by tightening the set screw 12, and the set screws 45 are operated to effect vertical compression and horizontal expansion of the gaskets 36 and 41 until each of these gaskets effects a firm, continuous, inner and outer peripheral sealing engagement with the inner conduit 28 and the casing 10, respectively. Thereupon, the well is in condition for operation.

When the pump requires repair or replacement of parts, all that is required to be done is to release the set screws 45 and 12 and pull upwardly on the cap 11 which carries with it all of the internal operating parts of the pump and thus exposes them to the workman for repair and attention.

While this construction is shown in connection with a pump of the jet type, it may also be used with a reciprocating type pump, if desired, by replacing plug 33 with a pump rod packing and applying a drain between the upper part of casing 10 and the lower part as shown in Fig. 3.

The construction illustrated in Figs. 3 and 4 is designed particularly for a pump of the reciprocating type and entails the use of a conventional well casing 100 having a drive point (not shown) at its lower end and mounting a cap 101 at its upper end to be anchored as by means of set screws 102. The well casing 100 has an outlet opening 105 spaced below its upper end and communicating with the passage 106 in a fitting 107, such as a saddle, to which a discharge conduit 108 is connected. The concave face of the saddle has a groove adapted to receive a gasket ring 109 thicker than the depth of the groove and extending around the mouth of the passage 106 for engagement with the casing 100 around the outlet 105 when the saddle is drawn tight against the casing, as by means of a U-bolt 110 and means (not shown) such as nuts for drawing the U-bolt and the fitting into tight gripping relation to the casing 100.

The well casing is provided with a plurality of apertures 111 in a circular series spaced below the level of the outlet 105 to receive inwardly projecting lugs 112 formed on individual sections 113 of a multiple section ring encircling the well casing and secured together by suitable means, as by bolts 114 and nuts 115. Gaskets 116 bear upon lands 116*a* at the inner surface of each ring section surrounding the lugs 112 to engage the casing and effect a seal around each casing opening. The lugs 112 provide means to support an annular rigid disk 117 fitting freely within the well casing and around a lower pipe portion 118 whose upper end is threaded in the bore of a tube or sleeve 119. An annular gasket 120 is interposed between the annular plate 117 and the tubular member 119 and is adapted to have a snug sealing fit within the well casing 100 and around the pipe 118.

The upper end of the sleeve 119 supports a second gasket ring 121 substantially similar to the ring 120 and adapted for sealing peripheral engagement with the casing 100 above the discharge opening 105 and around a depending tubular projection 122 of reduced dimension to fit freely in sleeve 119. Projection 122 forms a part of a sleeve or cup-shaped member 123 having a shoulder 124 bearing upon the upper surface of the gasket 121. A tube or spacer 125 is screw-threaded in the upper end of the member 123 to extend adjacent to the cap 101 and to be pressed upon by a rigid annular disk 126. Set screws 127 are screw-threaded in the cap 101 to bear upon the disk 126 and press downwardly on the structure consisting of parts 125, 123, 121, 119 and 120 to compress the two gaskets 120 and 121 into firm continuous peripheral sealing engagement with the well casing and with the inner members 122 and 118 which the respective gaskets 121 and 120 encircle. This provides a firm sealing engagement with the well casing above and below the opening 105. An opening 128 is provided in the member 119 at substantially the level of the outlet 105 to establish communication between the interior of the parts 118 and 119 with the outlet 105, and a check valve 129 is preferably mounted in said opening 128.

The pump rod 130 is reciprocable in a central opening in the cap 100 and passes through apertures in the parts 126 and 122 and downwardly in the pump tube to carry the usual pump leather (not shown) in the lower end of the well below water level therein in a manner understood in the art. A suitable packing extends around the rod 130 in the member 123, the same preferably being supported upon a plate 131 bearing upon a shoulder at the lower end of cup-shaped member 123 and serving in turn to support packing rings 132 which are pressed upon at

their upper ends by an annular plate **133** which is depressed by threaded adjustment of the lower end of the screw-threaded tubular part **125** within the member **123** to compress the packing **132**.

The tube **125** preferably has a lateral opening **135** therein above the level of the member **123** and adjacent the upper end of a drainage conduit **136** which communicates with a lateral passage **137** in the well casing **100** above the upper seal **121**. A saddle fitting **138** carrying an annular sealing ring **139** in its inner face and drawn taut around the well casing by a U-bolt **140** and associated nuts (not shown) provides a sealed connection between the upper end of the conduit **136** and the aperture **137**. The lower end of the conduit **136** communicates with the lateral aperture **141** in the well casing below the level of the lower gasket **120** and a sealed connection is effected by means of a lower saddle **142** having an annular sealing gasket ring **143** in its inner surface and drawn taut by U-bolt **144** and associated nuts similarly to the matter in which the upper saddle **138** is tightened.

It will be understood that the pipe **118** may either extend to the lower end of the well casing or, as here shown, may be connected by a union **146** with a lower axially aligned conduit **147** extending to the lower end of the well and providing the cylinder within which the pump leather reciprocates.

Substantially the same advantages are possessed by this construction to accommodate a reciprocating pump as are possessed by the jet type of pump previously described. Thus the location or elevation of the outlet **105** is readily accommodated in each installation by the simple expedient of controlling the length of the sleeve **125**, and the seals are readily manipulated by operating set screws **127**. The provision of openings **111** in preselected relation to and below the opening **105** is, of course, essential in order to receive the projecting abutments **112** of the sectional ring **113**. Likewise, it is necessary to provide the apertures **137** and **141** and their associated saddle fittings **138** and **142** to mount the leakage by-pass conduit. This leakage by-pass conduit is not essential but is preferred by reason of the fact that some clearance between the cap **101** and the pump rod **130** is necessary to permit free reciprocation of the pump rod, and this clearance may be adequate to result in leakage into the interior of the casing which can be drained by the by-pass **136**. It will also be apparent that the same accessibility for repair and replacement of parts by the unitary handling of all of the structure associated with the cap **101** and consisting of the entire internal structure of the pump is made possible by this construction.

The construction shown in Figs. 3 and 4 requires the well casing to be of a diameter of five inches or more.



Such casings are costly for deep wells. In order to accommodate the application of the principle to a small diameter well casing, an arrangement may be employed of the type shown in Fig. 5. In this construction, a small diameter well casing **150** may mount an enlarged upper casing section **151** within which the lateral outlet **152** is formed. The shoulder **154** of the enlargement provides an abutment for a sleeve **155** upon which bears the lower compression seal of the same construction described above and herein identified by the same reference numerals used in Figs. 1 and 2.

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 water well, a well casing having a lateral outlet intermediate its length, a water tube unit mounted within said casing with clearance and having a lateral aperture adjacent said outlet, a water pump unit operative to elevate water in said water tube unit, a pair of compressible seals located above and below said outlet and sealing the space between said casing and said water tube unit, a cap spanning the upper end of said casing, means for compressing said seals axially and expanding them radially into sealing engagement with said casing including a part carried by said cap, said water tube unit being suspended by said cap, and an abutment carried by said water tube unit and supporting the lowermost compressible seal.

2. In a water well, a well casing having a lateral outlet intermediate its length, a water tube unit mounted within said casing with clearance and having a lateral aperture adjacent said outlet, a water pump unit operative to elevate water in said water tube unit, a pair of compressible seals located above and below said outlet and sealing the space between said casing and said water tube unit, a cap spanning the upper end of said casing and carrying said water tube unit, an abutment on said tube supporting the lowermost seal, and selectively operable means for compressing said seals axially to expand them radially into sealing engagement with said casing including a spacer between said seals and means accessible exteriorly of said cap for applying downward pressure on the upper seal.

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