

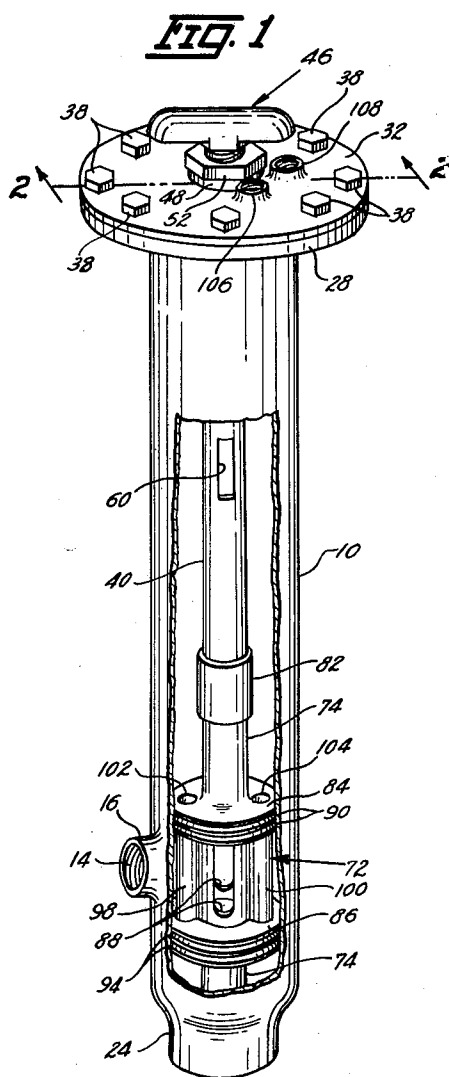
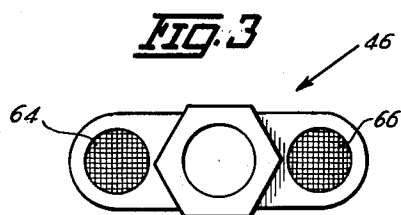
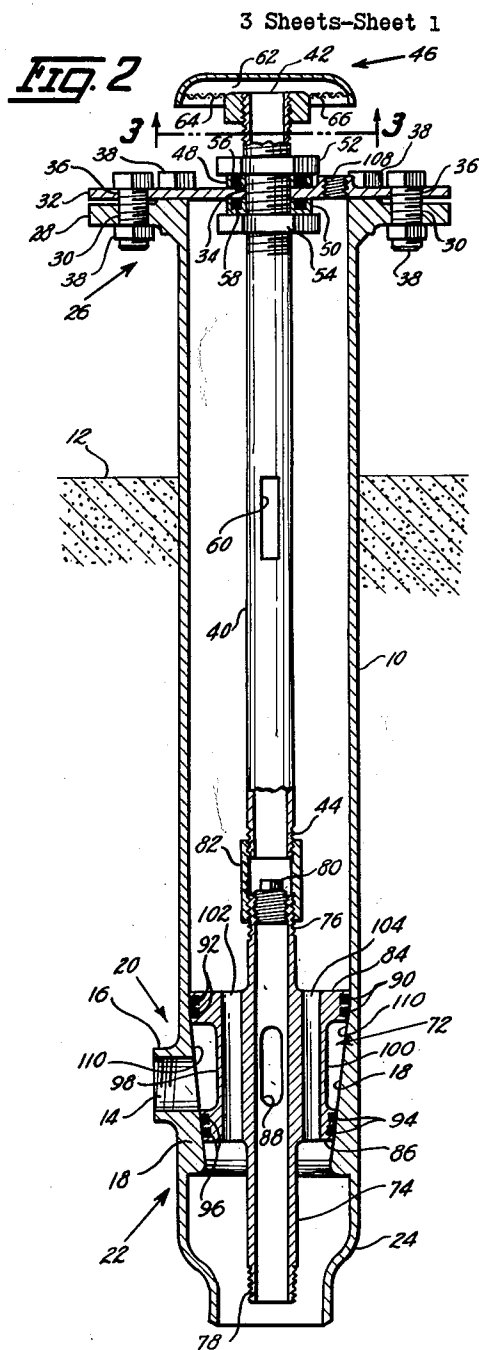
Oct. 27, 1964

A. M. PETERSON

3,154,148

PITLESS ADAPTER

Filed April 19, 1962



INVENTOR.
ANDREW M. PETERSON
BY *Malcolm S. Opler*
ATTORNEY.

Oct. 27, 1964

A. M. PETERSON

3,154,148

PITLESS ADAPTER

Filed April 19, 1962

3 Sheets-Sheet 2

Fig. 4

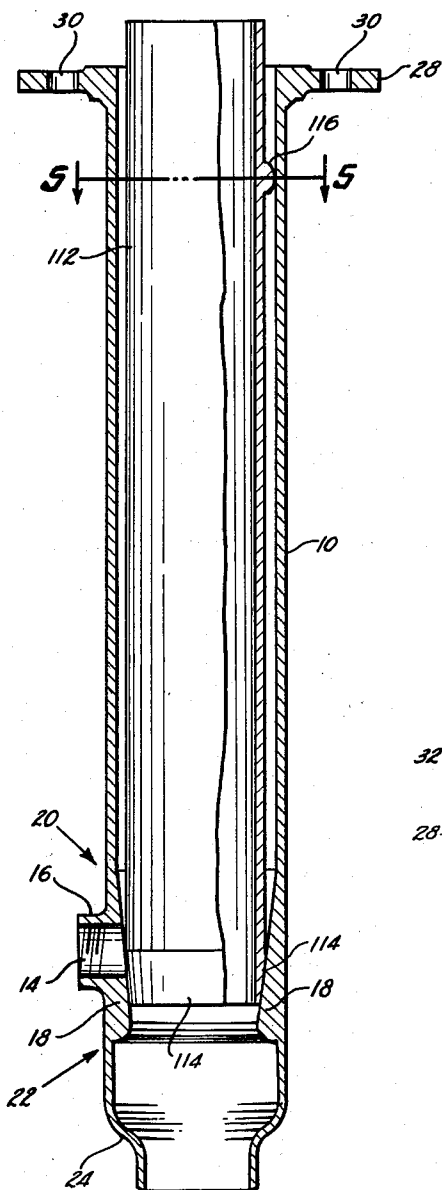


FIG. 5

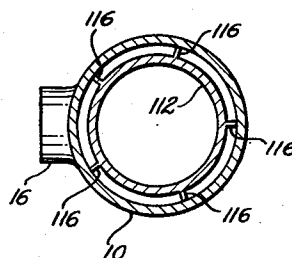
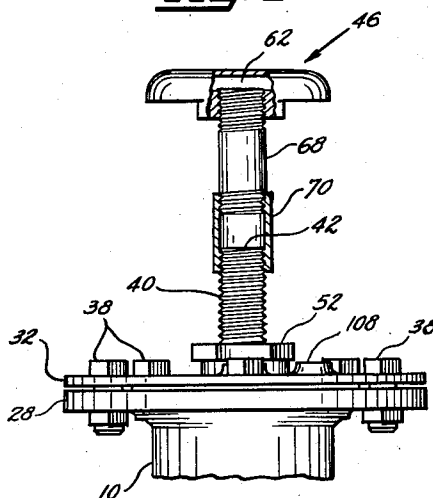


FIG. 6



INVENTOR.
ANDREW M. PETERSON

BY Morton L. Adler

ATTORNEY.

Oct. 27, 1964

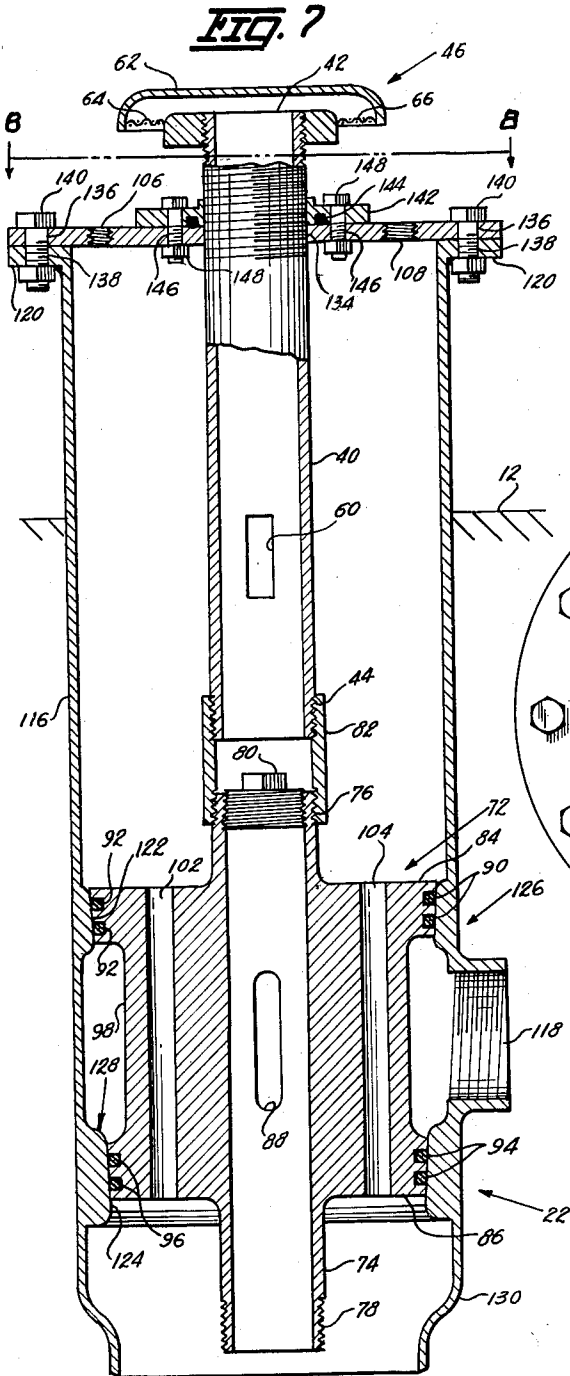
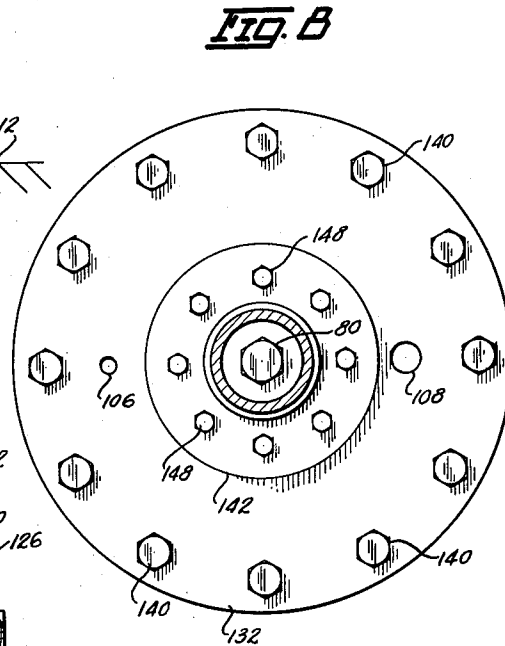
A. M. PETERSON

3,154,148

FITLESS ADAPTER

Filed April 19, 1962

3 Sheets-Sheet 3



INVENTOR.
ANDREW M. PETERSON

By *Morton L. Adler*
ATTORNEY.

1

3,154,148

PITLESS ADAPTER

Andrew M. Peterson, 4151 68th St., Des Moines, Iowa

Filed Apr. 19, 1962, Ser. No. 188,724

19 Claims. (Cl. 166—88)

This invention relates to improvements in water pumping apparatus of the type generally referred to as pitless adapters or pitless pumps. In such apparatus, the operating parts and discharge points are located in the ground below the frost line and a pit, which is commonly used with underground pumps but which is objectionable for sanitary reasons, is eliminated with the pitless adapter assembly which employs a well casing extending above the ground surface through which operating parts of the pump can be inserted and withdrawn in a well known manner.

In any water pumping apparatus of this type it is important that there be adequate means for a fluid seal engagement between the underground discharge port in the well casing and the water discharge line from the pump, and also that the construction of the adapter assembly permit of easy and efficient access to the pump unit for servicing and withdrawal for repairs or maintenance. Several pitless adapters or pitless pumps have been designed by others to solve these problems in various ways which I have found not entirely satisfactory. Some of the present adapters have simplified the means of withdrawing the pump head at the expense of a more complicated sealing arrangement relative to the discharge port and others have done just the reverse. In my apparatus, I have overcome these disadvantages and one of the important objects contemplated herein is the provision of a pitless adapter that includes improved and more efficient structure both as to the sealing arrangement relative to the underground discharge port and also as to the means for permitting access to and withdrawal of the pump unit.

More particularly it is one of the objects herein to provide a tapered construction within the well casing at the vicinity of the underground discharge port whereby the diameter of said well casing below the discharge port is less than the diameter thereof above the port. In situations of small casing bores of less than eight inch diameter this may be provided by a tapered bore portion in the well casing which is progressively of less diameter from a point just above the underground discharge port to a point just below such port, and in larger bore casings of eight inch diameter or greater, I provide separate tapered sections above and below the discharge port to avoid any undue reduction in diameter below the port that would result from a continuous progressive taper. In both instances, the result is the same within the concept of this invention as will appear.

Another object is to provide that the diameter at the lower extremity of the taper below the discharge port is equal to or greater than the diameter of the well casing below into which the pump unit is mounted. By this arrangement, a tool of comparable caliber as the casing bore can be easily used for pulling the pump, if necessary, and thereby avoids the problem frequently encountered of the necessity for using a smaller caliber tool to negotiate restricted areas in the passageway to the pump.

A further object includes a water discharge assembly for attachment to the pump and for registration with the discharge port wherein vertically spaced seal members, with a water outlet in between, are designed for fluid seal engagement with a tapered well casing interior respectively above and below the discharge port. Such a structure includes the advantage of being self-centering and avoids any critical tolerances in aligning the water outlet in the discharge assembly with the discharge port in the well casing.

2

Still another object includes adjustment means for effectively maintaining the sealing members in sealing contact with the tapered surface under varying pump pressures.

Other features of this invention include improved air vent means and cable passageways through the water discharge assembly as well as the fact the structure above the pump unit is preferably made of steel to assure a longer life and more resistance to corrosion over materials presently used. In addition I have provided a sleeve insert, to be used when pulling a pump unit, for the purpose of protecting the highly machined surface of the tapered bore portion from being damaged.

Further objects and the more obvious advantages of this invention will be mentioned or else appear plainly from the description which follows.

This invention consists of novel parts and combination of parts to be hereinafter described whereby the objects set forth are attained, as pointed out in the claims, and illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of this invention with portions cut away to more fully illustrate the construction thereof,

FIG. 2 is an enlarged longitudinal sectional view of the device shown in FIG. 1,

FIG. 3 is a bottom view of the air vent cap taken from the line 3—3 of FIG. 2,

FIG. 4 is a longitudinal sectional view of the well casing above the pump unit with the pull pipe and water discharge assembly removed and showing the sleeve insert in place for protecting the tapered bore portion from damage by working tools,

FIG. 5 is a cross sectional view taken on the line 5—5 of FIG. 4,

FIG. 6 is a fragmentary elevational view of the top portion of this adapter showing the vent cap mounted to a ventical extension which is a requirement in certain areas where pitless installations are used,

FIG. 7 is a longitudinal sectional view of this invention showing the adaptation of a large bore well casing for purposes of this invention, and

FIG. 8 is a top plan view taken from the line 8—8 in FIG. 7.

Referring to the drawings a well casing 10 is shown in relation to the ground level 12, with the underground discharge port 14 in communication with the internally threaded stub pipe or fitting 16 on the outer side of casing 10 for attachment to a discharge line (not shown) in a well known manner. The bore of the casing 10, at the area of the discharge port 14, includes a tapered portion 18 extending downwardly and inwardly beginning at an approximate point 20 relatively close to but above port 14 and extending to approximately point 22 relatively close to but below port 14. The exact location of points 20 and 22 are not critical, it being sufficient if they are suitably placed respectively above and below port 14 for the proper operation of parts to be later described. The lower extremity of the tapered portion 18 actually defines the lower end of casing 10 and a suitable adapter or reducer member 24 may be either integral with or otherwise attached to casing 10 below portion 18 and is designed to be attached as by welding to the underground casing (not shown) in which the pump (not shown) is mounted, as is well known. Casing 10 is preferably made of steel as I have found it is considerably more durable than cast iron which is generally used in pitless units of this type, and also because the steel more readily lends itself to the use of my tapered portion 18 which is an important part of this invention.

The top 26 of casing 10 terminates in a circumferential projecting flange or shoulder 28 which is provided with a plurality of spaced bolt holes 30 near its perimeter.

3

A disc shaped top plate or cover 32 has a central opening 34 and spaced bolt holes 36 near its perimeter similarly arranged as holes 30. Plate 32 is designed to lie in juxtaposition with shoulder 28 and with holes 30 and 36 in register to receive the respective bolts and nuts 38 for securing member 28 and 32 together.

A pull pipe 40 is removably attached at its upper end to plate 32 so as to depend therefrom in axial alignment into casing 10. Pipe 40 is externally threaded at both the top end 42 and bottom end 44, and end 42 extends upwardly through plate 32 to support a vent cap 46 which will be referred to later in more detail. Seal means in the form of washers 48 and 50 are mounted on pipe 40 respectively above and below plate 32 and are tightened against such plate and opening 34 in securing pipe 40 by the respective nuts 52 and 54. Preferably washers 48 and 50 have the respective O-rings 56 and 58 set in grooves as shown in FIG. 2 for more effective sealing action. The relative adjustment of nuts 52 and 54 makes possible the depth of penetration of pipe 40 into casing 10 for certain adjustments that will become apparent and will be pointed out as the description proceeds.

A slot or aperture 60 is formed in pipe 40 intermediate ends 42 and 44 to provide a vent means from the interior of casing 10 into pipe 40 and out of the top thereof through cap 46. Such cap is threadably attached to the top of pipe 40, is elongated in form and includes a hollow chamber 62 communicating at respective opposite ends with the downwardly directed screened outlet ports 64 and 66. Cap 46, as shown in FIG. 2, is attached directly to pipe 40 in relatively close proximity to plate 32 but may be mounted to a vertical extension pipe 68 (FIG. 6) which is attached to pipe 40 by a collar or sleeve 70. This may be necessary where specific heights are required for vent caps in certain localities.

The lower end 44 of pipe 40 carries the water discharge assembly designated generally by the numeral 72 which includes an elongated pipe member 74 of like diameter as pipe 40 and is externally threaded at the upper end 76 and at the lower end 78. Pipe 74 is plugged 80 at the top and the upper end 76 is secured to end 44 of pipe 40 in axial alignment therewith by a sleeve or collar 82. Intermediate ends 76 and 78 on pipe 74 there is secured the longitudinally spaced disc shape seal members 84 and 86, with member 84 being the uppermost of the two and being of a larger diameter than member 86. In this respect, the perimeters of members 84 and 86 are tapered and such members have diameters designed for nesting and sealing contact with the tapered portion 18, respectively above and below the port 14. Intermediate members 84 and 86, pipe 74 is provided with a transverse opening or water outlet 88 in communication with the lower end 78 of pipe 74 which will be secured to an underground pump unit (not shown) in a well known manner.

The water discharge assembly 72, when lowered into casing 10, will seat in the tapered portion 18 as shown in FIG. 2. It should be mentioned here that the walls of portion 18 and the periphery of members 84 and 86 are smoothly machined to provide a valve seat type sealing contact, and for additional sealing assurance, though not necessarily required, I have preferably placed a pair of parallel O-rings 90 in grooves 92 in the periphery of seal 84 and a similar set of O-rings 94 in peripheral grooves 96 on seal 86. The taper of the casing wall at 18 provides a means for the self-centering and support of assembly 72 and eliminates the possibility of an improper seal above or below port 14 which has often occurred in other type adapters when any lateral force or twist is created or encountered that tends to move the pull pipe out of accurate axial alignment with the casing.

At opposite sides of pipe 74 between seal members 84 and 86 I have secured cable conduits 98 and 100 which include the respective passageways 102 and 104

4

extending vertically through members 84 and 86. While such conduits 98 and 100 may be made in any suitable form, it can be pointed out that a simple but effective method is to weld pipe lengths to pipe 74 intermediate the seal members 84 and 86 and in registration with suitable passageways therethrough. For carrying the cable (not shown) outside of casing 10, there are suitable apertured fittings 106 and 108 provided in the top plate 32.

With this invention constructed and arranged as described, it will be appreciated that the novel tapered portion 18 of casing 10 provides many advantages. These include the self-centering and alignment of assembly 72 and also the fact that as long as seal members 84 and 86 are in effective sealing engagement with the casing wall at points above and below port 14, the discharge of water through openings 88 will effectively register with such port. This differs from some other pitless units where critical tolerances are necessary to provide direct sealing engagement between the discharge line in the adapter and the discharge port in the casing. In addition it is pointed out that the water assembly 72 can be inserted into place in casing 10 in any position of rotation without in any way affecting the proper flow of water from outlets 88 to part 14. This is true since all structure between the seal members 84 and 86 is spaced from the casing wall so as to be encircled by the water passageway or chamber 110. By this arrangement, assembly 72 cannot be installed in the wrong position and no point of reference nor means for orientation are required for registering outlets 88 with port 14 as is required in other type pitless installations.

Should any adjustment of seals 84 and 86 relative to sealing engagement with the walls or portion 18 be necessary due to high pump pressures or wear on the O-rings 90 and 94, if used, or for any other reason, this is accomplished by suitable adjustment of nuts 52 and 54 whereby assembly 72 can be wedged into tight sealing contact with portion 18. Although any such adjustment would obviously be of minute proportions, it would nevertheless change the relative position of assembly 72 to a limited degree but, as pointed out above, this would in no way interfere with the flow of water from outlet 88 to port 14 since the sealing arrangement here is not directly between these parts.

There will be occasions when access to the underground pump structure must be had for servicing, repairs and including complete removal. For such purposes certain tools must of necessity be passed through casing 10 to the underground units. In such cases it is highly desirable that a tool designed for the full size bore of the submerged casing be used, if possible, and this is frequently impossible in many other pitless units because of various obstructions in structure or other causes that create restricted areas in the upper casing. This disadvantage is overcome in my invention since the bottom end 22 of casing 10 has a diameter equal to or greater than that of the submerged casing in which the pumping unit will be housed. Consequently, with my adapter assembly withdrawn from casing 10, the bore of such case is completely free of any obstruction and will receive a tool of a proper caliber comparable to the bore of the submerged casing. However, since portion 18 of this invention is a smoothly machined surface that should be kept free of marks or scratches for efficient functioning, I have provided an elongated pipe insert sleeve 112 to be inserted into casing 10 as shown in FIG. 4 when servicing tools are to be used. The lower end of sleeve 112 is tapered as at 114 to conform to the taper of portion 18 and the outer surface of taper 114 is smoothly machined for a seal-like contact with taper 18. The bottom edge of taper 114 terminates below port 14 and slightly above the bottom of the tapered portion 18 so as not to decrease the diameter of the passageway into the lower structure. In this way, port 14 is fully closed to any contact from any tool and all of that part of the

5

tapered portion 18 that is susceptible of engagement by seals 84 and 86 is also fully protected. At the upper end of sleeve 112, I have placed a transverse row of a plurality of spaced lugs or nipples 116 around the outer surface thereof to abut the inner wall of casing 10 in keeping the sleeve 114 in proper axial alignment relative to casing 10.

In the specific embodiment of this invention to which the foregoing description has been directed, namely, the construction shown in FIGS. 1 and 2, it is pointed out that the continuous and progressive tapered construction shown at 18 is preferably used only on well casings of less than eight inches in diameter since within such limits, the diameter at the bottom of portion 18 is still equal to or greater than the diameter of the underground casing (not shown) to which it will be attached. However, when the casing 10 has a diameter of eight inches, or greater, for use with a corresponding larger diameter underground casing, a progressive tapered construction of casing 10 at the vicinity of port 14 would result in a diameter at the lower end of such taper that would be too small to permit use of a full size tool relative to the diameter of the underground casing. Accordingly, for such larger casings, I have modified the casing structure at the vicinity of port 14 to accomplish the objects of this invention and without in any way departing from the principle thereof. Such modification is illustrated in FIGS. 7 and 8 where like numerals are given to like parts previously described.

With reference now to FIGS. 7 and 8, the larger bore well casing 116 includes the underground discharge port 118 and the circumferentially projecting mounting flange 120 at the top substantially the same as for casing 10 except for size. The bore of casing 116 is provided with vertically spaced tapered portions 122 and 124, each of which extend downwardly and inwardly. Portion 122 begins slightly above the upper plane level 126 of port 118 and extends to a point substantially on plane 126. Portion 124 begins at approximately the lower plane level 128 of port 118 and extends to a point below such port comparable to the lower extremity of taper 18 in FIG. 2. Thus, there is a tapered bore portion both above and below port 118 and the smallest diameter of taper 124 is less than the smallest diameter of taper 122 but equal to or greater than the diameter of any underground casing to which it will be attached as by the adapter 130.

The construction of the water discharge assembly 72 and its operation is the same as previously described, except for size as required, with seal members 84 and 86 engaged respectively with the tapered portions 122 and 124, which, it will be appreciated, provides the same results and effects as with portion 18.

When the pull pipe 40 is of an appropriately larger diameter for larger installations, the mounting of such pipe is slightly varied as shown in FIGS. 7 and 8. This includes a top flange or cover 132 with center opening 134 and spaced bolt holes 136 near its perimeter similar to plate 32 and similarly mounted on flange 120 with holes 136 registering with holes 138 in the flange to receive the respective bolts and nuts 140.

A threaded washer like adjusting flange 142 having a recessed O-ring 144 is mounted on pipe 40 above plate 132 and screwed tightly against the plate 32. Flange 142 is also provided with spaced bolt holes 146 near its perimeter to register with holes 146 in plate 132 for receiving the respective nuts and bolts 148.

From the above description of FIGS. 7 and 8 it will be appreciated that the modification of the tapered construction and the modification of the mounting means for the pull pipe at the top of casing 116 create no changes in principle of this invention but rather provides for its application to well casings of different sizes. It should also be mentioned that with the device shown in FIGS. 7 and 8, an appropriately sized sleeve 112 (FIG. 4) can also be used for the purposes described therefor.

6

From the above description it is submitted that the invention shown and described is aptly suited to achieve the purposes intended and is characterized by a combination of highly useful and mutually cooperating elements that combine their respective and proportionate functions in accomplishing the objects sought to be obtained.

It will be understood that the phrasology employed herein is for the purpose of description and not for limitation and that modifications and changes in the construction and arrangement of this invention can be made within the scope of what is claimed, without departing from the spirit and purpose thereof. It is thus intended to cover by the claims, any modified forms of structure or mechanical equivalents which may be reasonably included within their scope.

I claim:

1. A pitless adapter assembly comprising:

- (a) a well casing having a lateral discharge port,
- (b) the bore of said casing having a smoothly machined tapered wall portion extending downwardly and inwardly from a point in close proximity above said port to a point in close proximity above said port,
- (c) an adapter member carried by the lower end of said casing and designed for attachment to a submerged well casing,
- (d) the diameter of the lower end of said tapered portion being at least equal to the diameter of the submerged well casing with which it will be associated,
- (e) a pull pipe for insertion into said well casing,
- (f) means at the top of said well casing for supporting said pull pipe,
- (g) a water discharge assembly carried by the lower end of said pull pipe,
- (h) said water discharge assembly including vertically spaced, smoothly machined tapered exterior wall portions defining seal members adapted respectively for nesting and sealing engagement with the tapered bore portion of said well casing above and below said port respectively,
- (i) the area in said well casing intermediate said seal members defining a water chamber in communication with said port,
- (j) said water discharge assembly being designed for flow communication with a submerged pump unit, and being provided with a water outlet intermediate said seal members and in flow communication with said water chamber, and
- (k) means in said water discharge assembly sealing off fluid flow into said pull pipe.

2. A pitless adapter assembly comprising:

- (a) a well casing having a lateral discharge port,
- (b) the bore of said casing having a tapered portion extending downwardly and inwardly from a point in close proximity above said port to a point in close proximity below said port,
- (c) the diameter of the lower end of said tapered portion being at least equal to the diameter of the submerged well casing with which it will be associated,
- (d) a circumferentially projecting shoulder at the top of said casing,
- (e) a top plate removably attached to said shoulder for providing a closure at the top of said well casing,
- (f) a pull pipe extending axially through said plate both upwardly and downwardly into said well casing,
- (g) means for securing said pull pipe to said plate and in selective positions of penetration into said well casing,
- (h) a pipe member secured at its upper end to the lower end of said pull pipe so as to axially depend therefrom,
- (i) the lower end of said pipe member designed for fluid flow communication with a pump unit,

- (j) means sealing the upper end of said pipe member against fluid flow,
 - (k) vertically spaced disc members on said pipe member each having tapered perimeters adapted respectively for nesting and sealing engagement with the tapered portion of said well casing above and below said port respectively,
 - (l) the area in said well casing intermediate said seal members defining a water chamber in communication with said port, and
 - (m) said pipe member being provided with a fluid outlet opening intermediate said seal members and in communication with said water chamber.
3. A device as defined in claim 2 including:
- (a) an enclosed cable passageway adjacent said pipe member intermediate said seal members but extending through said respective seal members and also being closed from communication with said water chamber, and
 - (b) cable outlet means in said top plate.
4. A device as defined in claim 2 wherein:
- (a) said pull pipe is provided with a lateral opening to create a vent passageway from the interior of said well casing through said pull pipe to the exterior of said well casing, and
 - (b) a vent cap on the top end of said pull pipe exteriorly of said well casing.
5. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
 - (b) the bore of said casing having a tapered portion extending downwardly and inwardly from a point in close proximity above said port to a point in close proximity below said port,
 - (c) the diameter of the lower end of said tapered portion being at least equal to the diameter of the submerged well casing with which it will be associated,
 - (d) a top plate removably attached to the upper end of said well casing,
 - (e) a water discharge assembly including vertically spaced tapered surfaces defining seal members adapted respectively for nesting sealing engagement with the tapered bore portion of said well casing above and below said port respectively,
 - (f) said nesting engagement providing means for supporting said water discharge assembly within said well casing,
 - (g) means connected to said top plate and said water discharge assembly for adjustably urging said seal members into sealing engagement with said tapered portion,
 - (h) said water discharge assembly being designed for flow communication with a submerged pump unit, and being provided with a water outlet intermediate said seal members and with means for flow communication with said port, and
 - (i) means preventing fluid flow upwardly from said water discharge assembly.
6. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
 - (b) the bore of said well casing being progressively concentrically reduced beginning at a point closely adjacent the upper extremity of said port and extending downwardly therefrom,
 - (c) the smallest diameter of said reduced bore portion being at least equal to the diameter of the submerged well casing to which it is designed to be connected,
 - (d) a water discharge assembly of progressively reduced diameter from top to bottom disposed within said well casing so as to effect a sealing engagement with the reduced bore portion above and below said port,
 - (e) means on said water discharge assembly for flow communication with a submerged pump unit,

- (f) in said water discharge assembly having a chamber in flow communication with said port,
 - (g) a pull pipe operatively attached at one end to the upper end of said well casing so as to project exteriorly thereof and attached at the opposite end to said water discharge assembly, and
 - (h) closure means at the top of said well casing,
 - (i) said pull pipe having a lateral opening at a point within said well casing to provide a vent passageway from the interior to the exterior of said well casing, and
 - (j) means in said water discharge assembly sealing off fluid flow into said pull pipe.
7. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
 - (b) the bore of said well casing being progressively concentrically reduced beginning at a point closely adjacent the upper extremity of said port and extending downwardly therefrom,
 - (c) the smallest diameter of said reduced bore portion being at least equal to the diameter of the submerged well casing to which it is designed to be connected,
 - (d) a water discharge assembly of progressively reduced diameter from top to bottom disposed within said well casing so as to effect a sealing engagement with the reduced bore portion above and below said port,
 - (e) means on said water discharge assembly for flow communication with a submerged pump unit,
 - (f) in said water discharge assembly having a chamber in flow communication with said port,
 - (g) a top plate on said casing,
 - (h) a pull pipe attached at one end to said top plate and at the other end to said water discharge assembly, and
 - (i) means associated with said pull pipe for adjustably urging said water discharge assembly downwardly into sealing engagement with said reduced bore portion of said well casing, and
 - (j) means in said water discharge assembly sealing off fluid flow into said pull pipe.
8. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
 - (b) the bore of said casing having vertically spaced, first and second tapered portions,
 - (c) said first tapered portion beginning at a point in close proximity above said port and extending downwardly and inwardly approximately to the upper level of said port,
 - (d) said second tapered portion beginning at approximately the lower level of said port and extending downwardly and inwardly therefrom,
 - (e) the diameter at the narrowest point of said first tapered portion being less than the diameter of said casing,
 - (f) the diameter at the narrowest point of said second tapered portion being less than that of the corresponding point on said first tapered portion but being at least equal to the diameter of the submerged well casing with which it is designed to be associated,
 - (g) a top plate removably attached to the upper end of said well casing,
 - (h) a water discharge assembly including vertically spaced tapered portions defining seal members adapted respectively for sealing engagement with said respective first and second tapered portions,
 - (i) the engagement between said water discharge assembly and said casing providing means for supporting said water discharge assembly within said well casing,
 - (j) means connected to said water discharge assembly and supported by said top plate for removing said water discharge assembly from said casing,
 - (k) said water discharge assembly being designed for

9

10

- flow communication with a submerged pump unit, and being provided with a water outlet intermediate said seal members and with means for flow communication with said port, and
- (l) means preventing fluid flow upwardly from said water discharge assembly.
9. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
- (b) the bore of said casing being tapered downwardly and inwardly both above and below said port,
- (c) the smallest diameter within said casing being at least equal to the diameter of the submerged well casing to which it is designed to be connected,
- (d) a water discharge assembly of progressively reduced diameter from top to bottom disposed within said well casing so as to effect a nesting and sealing engagement with the reduced bore portion above and below said port,
- (e) means on said water discharge assembly for flow communication with a submerged pump unit,
- (f) in said water discharge assembly having a chamber in flow communication with said port, and
- (g) means attached at one end to the upper end of said casing and at the other end to said water discharge assembly to facilitate insertion and removal of said water discharge assembly into and out of said well casing, and
- (h) means preventing fluid flow upwardly from said water discharge assembly.
10. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
- (b) the bore of said casing being tapered downwardly and inwardly both above and below said port,
- (c) the smallest diameter of said reduced bore portion being at least equal to the diameter of the submerged well casing to which it is designed to be connected,
- (d) a water discharge assembly of progressively reduced diameter from top to bottom disposed within said well casing so as to effect a sealing engagement with the reduced bore portion above and below said port,
- (e) means on said water discharge assembly for flow communication with a submerged pump unit,
- (f) in said water discharge assembly having a chamber in flow communication with said port,
- (g) a top plate on said casing,
- (h) a pull pipe operatively attached at one end to said top plate so as to project exteriorly thereof and attached at the opposite end to said water discharge assembly, and
- (i) closure means at the top of said well casing,
- (j) said pull pipe having a lateral opening at a point within said well casing to provide a vent passageway from the interior to the exterior of said well casing, and
- (k) means in said water discharge assembly sealing off fluid flow into said pull pipe.
11. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
- (b) the bore of said casing having a tapered portion extending downwardly and inwardly from a point in close proximity above said port to a point in close proximity below said port,
- (c) an adapter member carried by the lower end of said casing and designed for attachment to a submerged well casing,
- (d) the diameter of the lower end of said tapered portion being at least equal to the diameter of the submerged well casing with which it will be associated,
- (e) a pull pipe for insertion into said well casing,
- (f) closure means at the top of said well casing for supporting said pull pipe,
- (g) a water discharge assembly removably attached to the lower end of said pull pipe,

- (h) said water discharge assembly including vertically spaced tapered wall portions defining seal members adapted respectively for sealing engagement with the tapered bore portion of said well casing above and below said port respectively,
- (i) said water discharge assembly being designed for flow communication with a submerged pump unit, and being provided with a water outlet intermediate said seal members and constructed for directing flow communication to said port, and
- (j) means in said water discharge assembly sealing off fluid flow into said pull pipe.
12. A device as defined in claim 11 wherein said pull pipe is provided with a lateral opening to create a vent passageway from the interior of said well casing through said pull pipe to the exterior of said well casing.
13. A device as defined in claim 11 wherein:
- (a) said water discharge assembly includes an enclosed passageway for the running of cable from a pump unit, and
- (b) outlet means for said cable are provided in said closure means at the upper end of said well casing.
14. A device as defined in claim 11 wherein: an O-ring is inset in the tapered wall portion defining each seal member.
15. A device as defined in claim 11 wherein: a pair of parallel spaced O-rings are inset in the tapered wall portion defining each seal member.
16. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
- (b) the bore of said casing having a tapered portion extending downwardly and inwardly from a point in close proximity above said port to a point in close proximity below said port,
- (c) the diameter of the lower end of said tapered portion being at least equal to the diameter of the submerged well casing with which it will be associated,
- (d) a circumferentially projecting shoulder at the top of said casing,
- (e) a top plate removably attached to said shoulder,
- (f) a pull pipe extending axially through said plate both upwardly and downwardly into said well casing,
- (g) means for securing said pull pipe to said plate and in selective positions of penetration into said well casing,
- (h) a water discharge assembly attached to the lower end of said pull pipe,
- (i) said water discharge assembly including vertically spaced tapered exterior wall portions defining seal members adapted respectively for sealing engagement with the tapered bore portion of said well casing above and below said port respectively,
- (j) the area in said well casing intermediate said seal members defining a water chamber in communication with said port,
- (k) said water discharge assembly being designed for flow communication with a submerged pump unit, and being provided with a water outlet intermediate said seal members and in flow communication with said water chamber, and
- (l) means in said water discharge assembly sealing off fluid flow into said pull pipe.
17. A device as defined in claim 16 wherein:
- (a) said pull pipe is provided with a lateral opening to create a vent passageway from the interior of said well casing through said pull pipe to the exterior of said well casing,
- (b) a vent cap on the top end of said pull pipe exteriorly of said well casing, and
- (c) said vent cap being provided with a downwardly directed screened outlet opening.
18. A pitless adapter assembly comprising:
- (a) a well casing having a lateral discharge port,
- (b) the bore of said well casing being progressively

11

concentrically reduced beginning at a point closely adjacent the upper extremity of said port and extending downwardly therefrom,

(c) the smallest diameter of said reduced bore portion being at least equal to the diameter of the submerged well casing to which it is designed to be connected,

(d) a water discharge assembly of progressively reduced diameter from top to bottom disposed within said well casing so as to effect a nesting and sealing engagement with the reduced bore portion above and below said port and to be supported thereby,

(e) means on said water discharge assembly for flow communication with a submerged pump unit,

(f) in said water discharge assembly having a chamber in flow communication with said port,

(g) means attached at one end to the upper end of said casing and at the other end to said water discharge assembly to facilitate removal of said water discharge means at times, and

(h) means preventing fluid flow upwardly from said water discharge assembly.

19. A device as defined in claim 18 wherein said water discharge assembly is provided with an enclosed through passageway for the running of cable from a pump unit.

12

References Cited in the file of this patent

UNITED STATES PATENTS

1,838,401	Howard	Dec. 29, 1931
2,010,992	Howard	Aug. 13, 1935
2,689,611	Martinson	Sept. 21, 1954
2,859,823	Bauer	Nov. 11, 1958
2,918,972	Tubbs	Dec. 29, 1959
2,931,379	Haydin	Apr. 5, 1960
2,949,961	Anderson	Aug. 23, 1960
2,960,166	Haydin et al.	Nov. 15, 1960
3,065,792	Andrew	Nov. 27, 1962

FOREIGN PATENTS

581,421	Canada	Aug. 18, 1959
---------	--------	---------------