March 20, 1973 H. A. TUBBS 3,721,296

WELL SYSTEM WITH IMPROVED PITLESS ADAPTER ASSEMBLY

Filed April 1, 1971

FIG_1

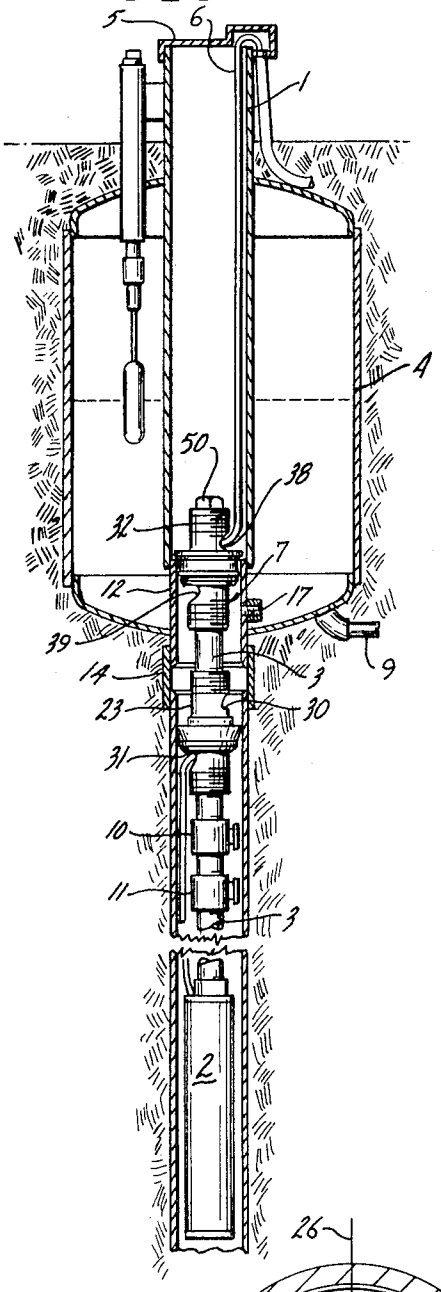
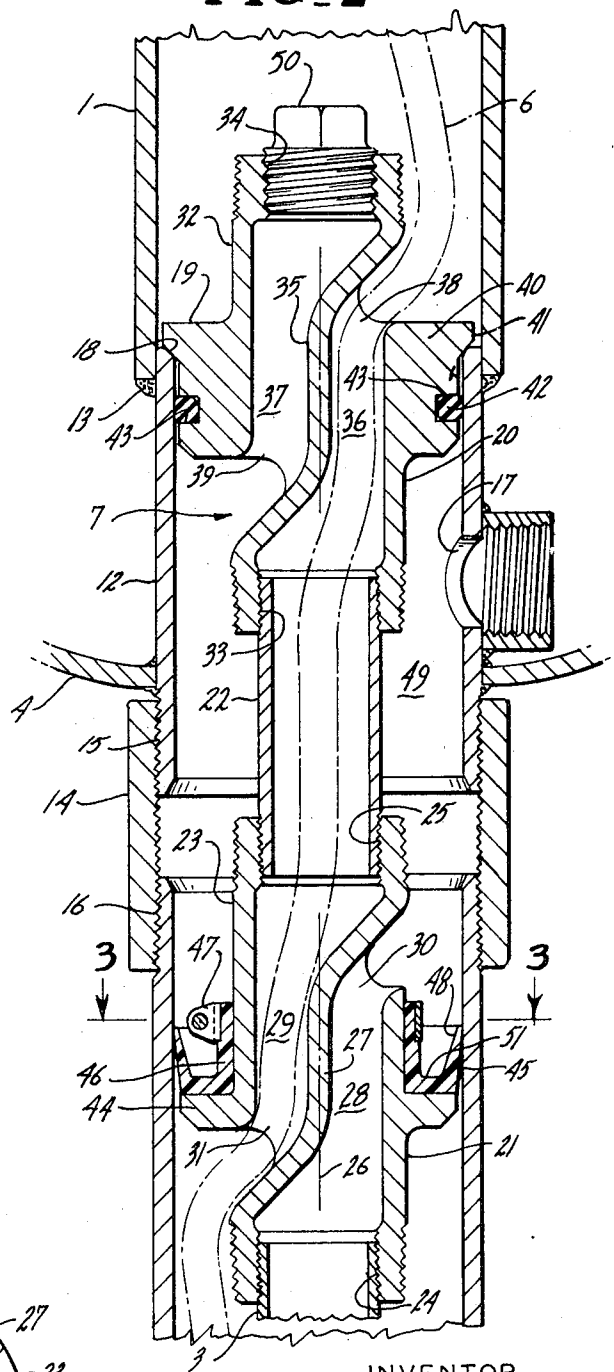


FIG_2



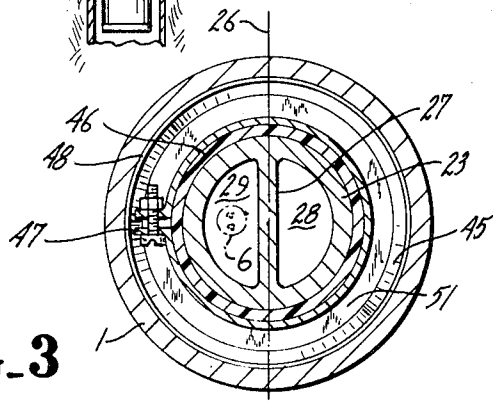


FIG_3

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WELL SYSTEM WITH IMPROVED PITLESS ADAPTER ASSEMBLY

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ABSTRACT OF THE DISCLOSURE

A well system which includes a water storage tank, a well casing extending through the tank and into the ground, a pump in the lower casing end and a water supply drop pipe between the pump and tank. The casing is divided into several parts by a coupling. A pair of packer bodies are hung within the casing with the coupling therebetween. The packer bodies include substantially identical cores with each core being divided into complementary adjacent passages by an S-shaped wall. Water and electrical conduit pass through the cores, and the conduit also passes through the tubular connector extending between the bodies. The packer bodies are sealed to the casing wall to form a central chamber so that water within the chamber pressurizes the inside of the coupling. The seal on the lower packer body is a generally cup-shaped ring.

BACKGROUND OF THE INVENTION

This invention relates to a well system with improved pitless adapter assembly, and constitutes an improved inventive concept over the system disclosed in my U.S. Pat. 2,847,939, issued Aug. 10, 1958 entitled "Well Systems."

In that patent, a unitary water distributor or pitless adapter assembly is provided which receives water pumped up through a drop pipe and permits it to flow through the well casing into a storage tank. O-rings on either end of the distributor seal it to the internal pipe wall. Electrical conduits for operating the pump pass vertically downwardly through a straight vertical passage disposed adjacent the outer edge of the distributor.

In recent years, pollution of water systems from external sources has become of increased concern. Prevention of outside-to-inside leakage has thus become more necessary, and even mandatory. Furthermore, modern water requirements make it desirable to provide the maximum possible diameter of drop pipe.

SUMMARY OF THE INVENTION

The present invention is directed to a well system having an improved pitless adapter assembly which places a coupling in the well casing under internal pressure from the water system to thus prevent outside-to-inside leakage. A pair of packer bodies are provided, one on each side of the coupling. Each packer body is sealed to the pipe wall, and the lower seal is cup-like in cross section. Power and other electrical service conduits extend through the assembly in such a manner that a larger drop pipe can be utilized.

DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

FIG. 1 is a side elevational view of a well system employing the invention;

FIG. 2 is an enlarged central vertical section of the pitless adapter assembly; and

FIG. 3 is a transverse section taken on line 3—3 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As best shown in FIG. 1 of the drawings, the well system comprises a vertically disposed tubular well casing 1 which extends from above ground level downwardly into the well. A pump 2 is disposed within and at the bottom of casing 1, and is suspended from a drop pipe 3. Casing 1 extends through a water storage tank 4 and is provided at its upper end with a cap assembly 5 of any suitable well-known design. A suitable electrical control conduit 6 passes downwardly through the casing for operating pump 2.

In operation of the well system, pump 2 pumps water upwardly through drop pipe 3, where it passes through the distributor portion of a pitless adapter assembly 7, and then into tank 4. Discharge from tank 4 is through a pipe 9.

Air control valves 10 and 11, similar to those shown in my aforementioned U.S. Pat. 2,847,939, may also be used.

For purposes of utilizing assembly 7, a sleeve-like casing insert 12 is telescopingly received within casing 1, and is secured at its upper end to the casing, as by welds 13. The lower end of insert 12 may be removably secured to the lower portion of the casing in any of several ways. As shown in FIG. 2, an annular outer imperforate coupling 14 is provided proximate tank 4, and the insert and casing are threaded into each respective circumferential end thereof, as at 15 and 16. Alternately, one of the threaded connections may be replaced by a weld.

The wall of insert 12 is provided with one or more openings 17 separate from coupling 14 for discharge of water into tank 4. Furthermore, the upper telescoped end of the insert forms a shoulder 18 from which a water distributor assembly 19 hangs.

In accordance with the invention, assembly 19 is constructed and disposed so that the exposed joints at 15, 16 of coupling 14 are pressurized internally by the water supply system. This will prevent any outside-to-inside leakage through the coupling, which is shown as being below tank 4 in the ground.

For the above-mentioned purpose, distributor assembly 19 comprises a pair of vertically spaced packer bodies 20, 21, which are adjustably joined by a tubular connector 22 of reduced diameter. Packer bodies 20 and 21 are preferably made of suitable cast metal, and are provided with longitudinally extending cylindrical cores which are substantially identical.

The core of lower packer body 21 comprises an outer cylindrical core wall 23 forming threaded lower and upper end openings 24, 25. Openings 24 and 25 are aligned on the central casing axis 26, and lower opening 24 threadably receives drop pipe 3. A generally S-shaped planular divider wall 27 extends diagonally between the inner opening portions, crossing axis 26, and forms a pair of complementary adpacent passages 28, 29. As shown, right passage 28 is disposed between longitudinal core wall 23 and divider wall 27, and extends from central opening 24 upwardly to a narrow upwardly facing side port 30 which is remote from opening 24 and is offset from axis 26. Likewise, left passage 29 extends from central opening 25 downwardly to a narrow downwardly facing side port 31 which is remote from opening 25 and is offset on the other side of axis 26. As can be seen, passages 28 and 29 are substantially identical, but are reversed in position and inner wall curvature on opposite sides of axis 26.

As previously mentioned, the packer body cores are substantially identical. Thus, the core of upper body 20 comprises an outer core wall 32 having threaded lower

and upper end openings 33, 34; S-shaped divider wall 35, right and left passages 36, 37 and ports 38, 39.

Connector 22 joins packer bodies 20 and 21, as by threading into the inner facing end openings 25 and 33. The length of connector 22 may be varied as desired. If increased lifting and a larger connector are desired, the connector could be threaded to the outside walls of openings 25 and 33.

Upper packer body 20 is provided with means for securing distributor assembly 19 within the well casing. For this purpose, a land 40 surrounds upper core wall 32 and has a radially outwardly extending top flange 41 thereon which hangs from shoulder 18.

In addition, bodies 20 and 21 are provided with means for sealing the casing wall on either side of coupling 14. As shown, an O-ring 42 is disposed in a groove 43 in land 40 to form the upper seal at a point between ports 38 and 39. The lower seal is formed by providing an annular ring or platform 44 on lower core wall 23, just above port 31. A flexible sealing ring 45 of soft rubber or the like is seated on the platform. Ring 45 is generally cup-shaped in cross section, and has an inner longitudinal wall 46 engaging core wall 23 and which is secured thereto as by a conventional hose clamp 47. The outer wall 48 of sealing ring 45 tapers outwardly into engagement with the inner casing wall below port 30.

In operation of the well system, water passes up through drop pipe 3, through lower opening 24, passage 28 and hence through port 30 into the chamber 49 formed between O-ring 42 and sealing ring 45. Since upper opening 34 is closed off, as by a plug 50, water can only escape through opening 17 into tank 4. Also, since the entire system including the tank is pressurized, the threaded connection between coupling 14 and the adjacent casing, which are inwardly encompassed by chamber 49, is under system pressure from the inside.

The open central portion 51 of sealing ring 45 provides the floor or base of chamber 49, and thus will receive and contain any sediment which may tend to deposit out of the water. At the same time, portion 51 is spaced sufficiently below port 30 to prevent the water flow therethrough from disturbing the deposited sediment.

The device of the invention also provides for passage of electrical conduit 6 therethrough. As shown, conduit 6 passes downwardly from the casing top through passage 36, central connector 22, passage 29 and hence into the lower casing portion. Conduit 6 is thus completely protected and separated from water at all times. The construction makes it possible to use larger drop pipes, if desired.

In some instances it may be desirable to connect opening 17 to the house or other water use area through a direct discharge pipe connection, not shown. In such instance, tank 4 would be eliminated so that chamber 49 feeds directly to the water use area.

In addition, some installations may provide for a connector 22 of extended length so that chamber 49 would encompass more than one coupling and adjacent casing portion.

Various mode of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In a well system having a vertical well casing, with the casing being divided into at least two parts by a coupling, a pump disposed at the lower end of the casing, and a water supply drop pipe extending upwardly within the casing from said pump, the improvement comprising:
(a) a pair of vertically spaced upper and lower packer bodies disposed within said casing,
(b) said packer bodies having substantially identical longitudinally extending cores aligned on the central casing axis and with said cores having cylindrical outer walls forming lower and upper end openings,
(c) each said core also including a diagonal divider wall extending through the core between said end openings and crossing said axis to form a pair of complementary adjacent generally longitudinal passages, each said passage terminating in a port remote from the respective opening and offset from said axis,
(d) the inner facing end openings in said cores being joined by an adjustable connector,
(e) means to seal each said packer body to the inner wall of said casing to form a chamber therebetween which is in communication with the innermost port of each said core and which encompasses the inner portion of said coupling and the adjacent casing,
(f) said chamber having an outlet for discharging water for storage or use,
(g) means closing the upper opening in said upper packer body,
(h) and means connecting the upper end of said drop pipe to the lower opening in said lower packer body so that water pumped under pressure through said last-named opening will flow through the respective passage and port into said chamber and hence through said outlet so that the inner portion of said coupling adjacent said casing is pressurized.

2. The well system of claim 1:
(a) in which said lower core is surrounded by an annular platform,
(b) and in which the sealing means for said lower body comprises a flexible sealing ring of generally cup-shaped cross section seated on said platform,
(c) said ring having an inner longitudinal wall engaging the outer wall of said lower core and an outer tapered wall engaging the inner wall of said casing, and forming an open central portion therebetween,
(d) said open central portion providing a floor for said chamber to receive and contain sediment deposited out of the water disposed within said chamber,
(e) and means for securing said ring to said packer body.

3. The well system of claim 1 in which said adjustable connector is tubular, and which includes:
(a) an electrical conduit passing downwardly within said casing from the upper casing portion to said pump,
(b) said conduit passing through the uppermost port in said upper core, through said tubular connector and said inner facing end openings, and through the lowermost port in said lower core.

4. The well system of claim 3:
(a) which includes a water storage tank through which said casing extends,
(b) wherein said drop pipe extends upwardly to proximate said tank,
(c) and wherein said outlet discharges water from said chamber into said tank.

5. In a well system:
(a) a vertical well casing,
(b) an imperforate coupling dividing said casing into at least two parts, with said coupling being disposed underground and circumferentially surrounding said casing and at least partially threadably connected to the latter,
(c) a pump disposed at the lower end of said casing,
(d) a water supply drop pipe extending upwardly within the casing from said pump,
(e) a pair of vertically spaced upper and lower packer bodies disposed within said casing,
(f) means adjustably connecting said packer bodies,
(g) and means to seal each said packer body to the inner wall of said casing to form a chamber therebetween which encompasses the inner portion of said coupling and the adjacent casing,
(h) said chamber having an outlet separate from said circumferential coupling for discharging water for storage or use.

(i) the lower packer body having an opening connected to the upper end of said drop pipe and which communicates through a water passage to said chamber so that water pumped under pressure through said drop pipe and lower packer body into said chamber will pressurize the inner portion of said coupling and said adjacent casing to prevent outside-to-inside leakage through the threaded connection therebetween.

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