Jan. 7, 1969 R. E. STEARNS 3,420,303

WELL PIPE CONNECTOR

Filed Dec. 13, 1967 Sheet 1 of 2

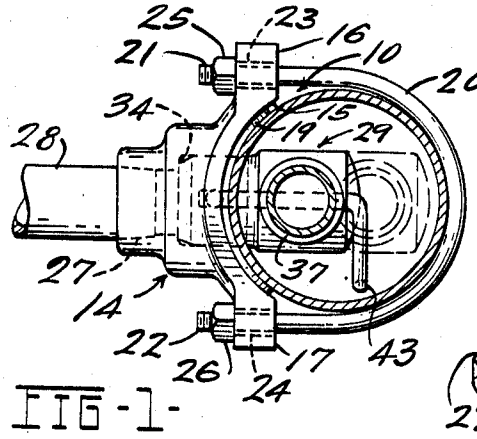


FIG-1-

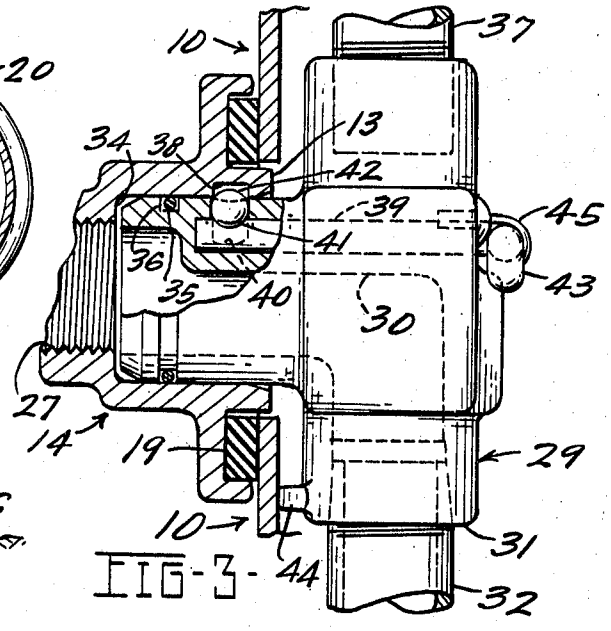


FIG-3-

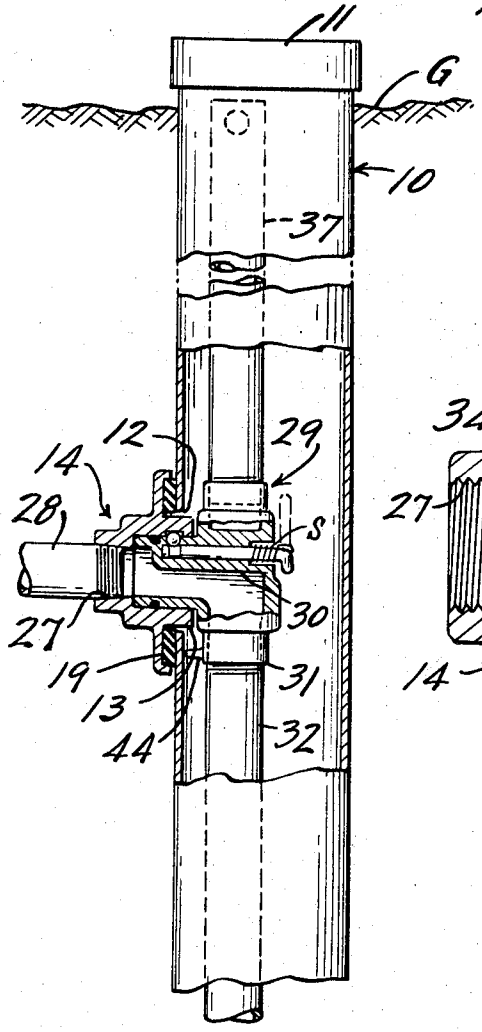


FIG-2-

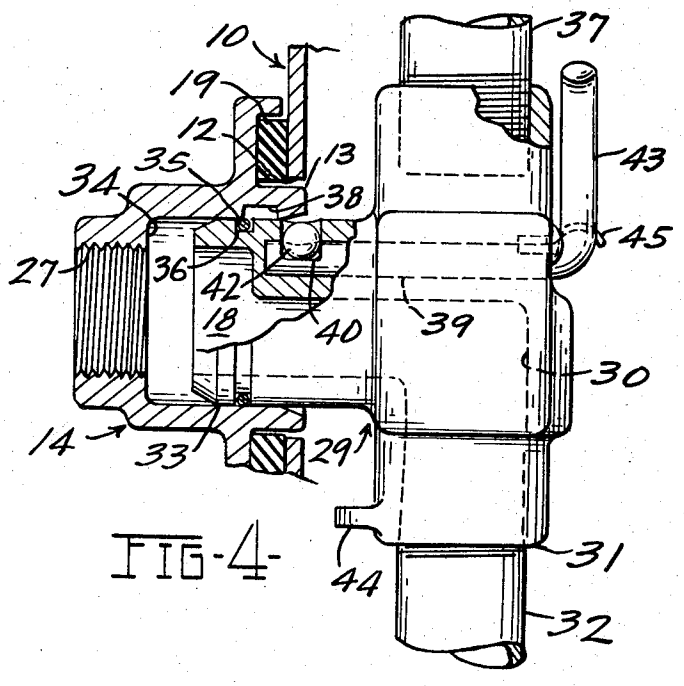


FIG-4-

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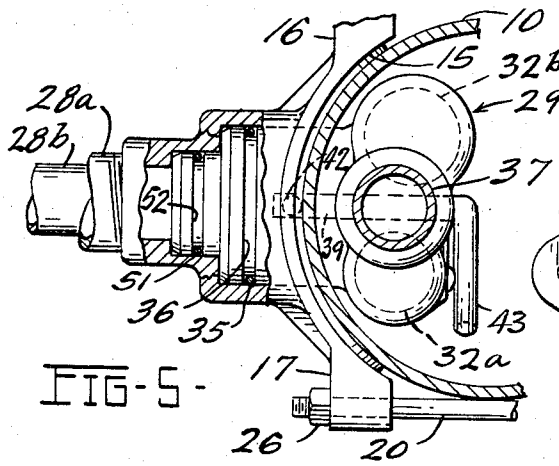


FIG-5-

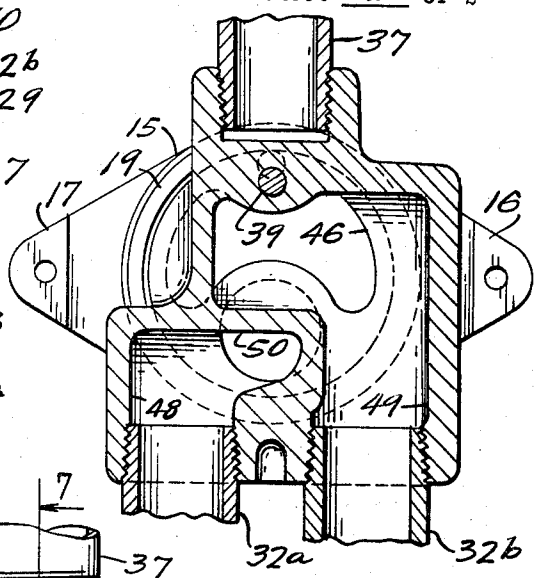


FIG-7-

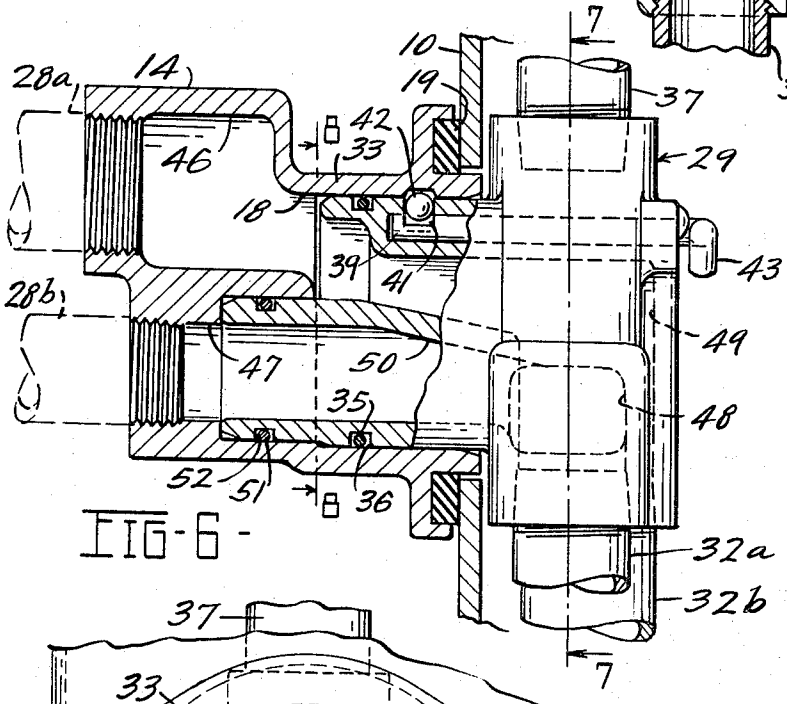


FIG-6-

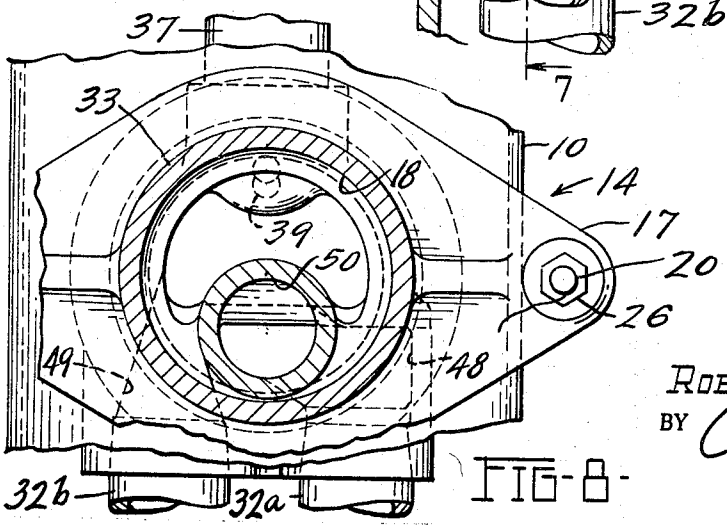


FIG-8-

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United States Patent Office

3,420,303

Patented Jan. 7, 1969

3,420,303

WELL PIPE CONNECTOR

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Filed Dec. 13, 1967, Ser. No. 690,198

U.S. Cl. 166—88 11 Claims

Int. Cl. E21b *41/00;* F16l *39/00*

ABSTRACT OF THE DISCLOSURE

A device for coupling together a vertical well pipe within a cylindrical well casing to a discharge pipe extending laterally away from the casing. The device is positioned entirely within the well casing, may be locked in position or unlocked for removal from above the casing, and does not obstruct the passage within the casing. The device includes an external flange secured to the outer surface of the casing over an aperture in the casing. The laterally extending discharge pipe is secured to this flange. An internal adapter is positioned entirely within the casing against the interior wall thereof. The adapter has a vertical passage from its bottom side connected to a horizontal passage which extends through a cylindrical sleeve which is inserted through the well casing aperture and is slidably received by the internal passage in the external flange. An O-ring positioned around the exterior of the cylindrical sleeve engages the internal passage in the external flange. The adapter is held in position by a lock detent which, in locking position, extends from the adapter sleeve into an opposed recess in the flange passage. The lock is released by manipulation of a pivot lever from within the well casing. An adapter utilizing the same principles can be provided for coupling a pair of vertical well pipes to a pair of lateral pipes, for use in a jet-type pump installation.

The present invention relates to a device for connecting a vertical well supply pipe which extends within an underground well casing to a horizontal water supply pipe extending laterally from the casing to the water outlet. More particularly, the invention is an improvement of what is known in the art as a "pitless well adapter" which is a connector which may be manipulated from above the ground at the open end of the well casing to connect and disconnect the vertical and the horizontal well pipes which are placed below the ground surface, preferably below the frost line.

A number of prior art well adapters, such as those shown in United States Patents 2,689,611 and 2,960,166, connect the vertical well pipe within the casing to the horizontal water pipe discharging from the casing by means of a connector including an elbow which is secured to a wedge-shaped member which seats within a correspondingly shaped wedge block secured to the interior of the well casing. In order to effect a liquid-tight seal, some type of gasket must be provided between the removable adapter and the interior surfaces of the well casing. Such a construction also either requires a specially designed abutment surface secured to the interior of the well casing, or requires a different adapter for well casings of different diameter.

Other prior art well adapters use a wedging device which forces the mating surface of the connector and the face of the lateral water pipe together by exerting an opposing force against the well casing at the opposite, remote side. Such constructions, for example that disclosed in United States Patent 2,529,062, must be specifically designed for a well casing of a given diameter and necessarily block access to mechanism, such as a submersible pump, below the adapter.

It is an object of the present invention to provide a pitless well adapter or pipe connector of the type described which may be used in all commercially available sizes of well casing and which may be quickly and effectively installed or removed to connect or disconnect the vertical well pipe within the well casing to the horizontal supply pipe extending laterally from the casing.

It is a further object of the present invention to provide a pitless well adapter of the type described which may be locked in position or unlocked for removal conventily from above the ground at the upper end of the well casing and which does not require a portion of its structure to bear against the opposite surface of the well casing in order to keep it in position against the horizontal pipe inlet.

Other objects and advantages of the present invention will be apparent to those skilled in the art from the following description of a preferred embodiment thereof, with reference being made to the accompanying drawings in which:

FIG. 1 is a top view of a typical well casing with an adapter of a preferred embodiment of this invention installed therein to connect the vertical water pipe to a laterally extending water discharge pipe;

FIG. 2 is a view in elevation of a well casing with portions broken away to show the details of the well pipe connector of FIG. 1;

FIG. 3 is a view in elevation of the well pipe connector of this invention, similar to that shown in FIG. 2 but shown on an enlarged scale, and showing the method with which the connector is locked in position;

FIG. 4 is a view similar to FIG. 3 but showing the well connector in unlocked and partially removed position;

FIG. 5 is a view similar to FIG. 1 and showing a second embodiment of the invention in which the adapter connects a pair of parallel vertical pipes to a pair of lateral pipes, as would be used in a jet-type pump installation;

FIG. 6 is a view similar to FIG. 3 and showing the double pipe adapter construction in detail;

FIG. 7 is a view in cross-section, taken along line **7—7** of FIG. 6, showing the interior details of the double pipe adapter; and

FIG. 8 is a view in cross-section, taken along line **8—8** of FIG. 6, and showing the exterior of the external flange of the double pipe adapter.

Referring first to FIGS. 1 and 2, as is well known in the art, a stand pipe or well casing **10** which, in common usage, may be from four to ten inches in diameter, is vertically positioned in the ground G with its top extending slightly above the level of the ground G. A removable cap **11** is secured over the top of the casing **10**. Extending through a hole **12** in the side wall of the well casing **10**, and positioned below the frost line, is the interior edge **13** of an externally mounted flange **14**. As best seen in FIG. 1, the external flange **14** has an arcuate inner face **15** shaped to press against the exterior of the well casing **10** and has a pair of opposed ears **16** and **17** on either side of a discharge pasasge **18** which extends through the external flange **14**. Between the arcuate inner face **15** of the external flange **14** and the well casing **10** is an annular gasket **19** which surrounds the discharge passage **18** and the hole **12** in the side wall of the casing **10**. A liquid-tight seal between the external flange **14** and the wall casing **10** is created when the inner face **15** of the flange **14** is drawn against the exterior of the well casing **10** to compress the gasket **19** therebetween. The flange **14** is held in place by a U-bolt **20** which extends entirely around the wall casing **10** and has its threaded ends **21** and **22** extending through bolt holes **23** and **24** in the ears **16** and **17**, respectively, of the flange **14**. Nuts **25** and **26** on each

of the ends 21 and 22 of the U-bolt 20 are tightened to securely position the flange 14 in place. Finally, the outermost end of the flange 14 is provided with a threaded portion 27 for attachment to a laterally extending water pipe 28.

The removable connector or adapter, generally designated by reference numeral 29, includes a body portion having an L-shaped passage 30 extending from its lowermost edge 31, which is threaded to receive a vertical water pipe 32, to a horizontally extending cylindrical sleeve 33. The outside diameter of the sleeve 33 of the adapter 29 is of a size which can be slidably received by the discharge passage 18 in the external flange 14 when the sleeve 33 is inserted through the hole 12 in the pipe casing 10. As best seen in FIGS. 3 and 4, the inside diameter of the discharge passage 18 of the flange 14 is reduced at its outer or left-hand end, as viewed in FIGS. 1 through 4, so that the restricted portion forms an annular land 34 which limits the distance which the sleeve 33 of the adapter 29 will slide into the discharge passage 18 of the flange 14.

Extending around the outer surface of the sleeve 33 is an O-ring type gasket 35 positioned in a groove 36 on the exterior of the sleeve 33. As best seen in FIGS. 3 and 4, when the sleeve 33 of the adapter 29 is fully inserted within the discharge passage 18 of the external flange 14, the O-ring 35 is compressed to effectively seal these surfaces against the passage of any liquid. It will thus be seen that when the adapter is inserted in position, as seen in FIGS. 2 and 3, a continuous liquid passage from the water pipe 32 through the adapter 29, the external flange 14 and to the supply pipe 28 is provided. The adapter 29 and flange 14, as thus far described, may be readily disconnected by sliding the adapter 29 out from the flange 14, to the right as shown in the drawings, by means of a handle or pipe 37 which is secured to an upper surface of the adapter 29 and extends to the top of the well casing 10. Because the liquid passage through the adapter 29, the flange 14 and the pipes 28 and 32 is under the pump pressure from the well, it is, of course, necessary to provide a mechanism for locking the adapter 29 in position.

A novel feature of this invention resides in the locking mechanism which can be quickly and easily manipulated from a position on the ground above the top of the well casing 10. As best seen in FIGS. 3 and 4, a locking recess 38 extends radially outwardly in the interior wall of the discharge passage 18 of the external flange 14 in a position near the interior edge 13 of the flange. Extending through the adapter 29 is a generally horizontal passage through which a locking shaft 39 extends from the rear of the adapter to a position below the recess 38 when the adapter 29 is fully inserted in the external flange 14. The locking shaft 39 has a flattened or cam portion 40 positioned below a socket 41 in the wall of the cylindrical sleeve 33. Within the socket 41 is a locking detent 42, shown in this embodiment as a steel ball, which is movable up and down in the socket 41.

Operation of the locking mechanism thus described is clear from a comparison of FIGS. 3 and 4. On the outer end of the locking shaft 39 is an arm or lever 43 which may be pivoted to rotate the shaft 39. When the shaft 39 is rotated, the flattened or cam portion 40 will cause the detent or ball 42 to move radially outwardly to extend beyond the outer surface of the sleeve 33. Thus, with the adapter 29 fully inserted within the discharge passage 18 of the external flange 43, so that the detent 42 lies below the recess 38, when the shaft 39 is rotated, the locking detent 42 will move radially outwardly to enter the recess 38 and thus prevent the removal of the adapter 29 from the discharge passage 18 of the external flange 14. As seen in FIG. 4, when the shaft 39 is turned by pivotal movement of the lever 43 so that the flat area or cam 40 assumes the position shown in FIG. 4, the locking detent or ball 42 will drop downwardly or move radially inwardly to lie entirely below the outer surface of the sleev 33 to permit removal of the adapter 29 from the discharge passage 18 of the external flange 14. A spring S, shown in FIG. 2 circumjacent the shaft 39, may be included to bias the shaft in its locked position.

The advantages of the well adapter thus described are several. Firstly, because the locking mechanism requires only a relatively short movement of the lever 43 in order to rotate the shaft 39, this lever 43 may be conveniently operated from above the ground by means of a latch chain (not shown) or by means of a removable adjusting lever or stick (also not shown). Secondly, engagement and disengagement of the adapter does not depend in any way upon the use of the opposite side of the well casing to force a liquid-tight seal between the parts. Thus, as seen in FIG. 2, a large portion of the well casing remains unobstructed for inspection and manipulation of the parts below the union. Thirdly, because no seal is effected between the inner face of the well casing 10 and the adapter 29, this single adapter 29 may be used with any size well casing, as long as a properly dimensioned external flange 14 is provided. Other advantages of the present invention over those known in the prior art will be apparent to those skilled in the art.

Finally, a laterally extending boss 44 on the lower portion of the adapter 29 may be provided to further stabilize the adapter 29 and its suspended water pipe 32 when installed. The purpose of the boss 44 is to bear against the adjacent usrface of the well casing 10 to prevent possible binding or cocking of the sleeve 33 within the discharge passage 18, due to the heavy weight of the water pipe 32 and the pump attached at the lower end thereof. If desired, a stop member 45 may be secured to the outer surface of the adapter 29 to limit the pivotal movement of the lever 43 between its lock and unlock positions.

FIGS. 5 through 8 illustrate an embodiment of the present invention which is designed for use with a jet-type pump installation in which a pair of vertical pipes are connected by the adapter to a pair of laterally extending horizontal pipes outside of the casing. As is well known to those skilled in the art, one pipe is to supply fluid (air) under pressure to the well while the other pipe acts as the water pipe. In FIGS. 5 through 8, the same reference numerals are used to designate like parts as were used in FIGS. 1 through 4.

Referring to FIG. 5, the external flange 14 has an arcuate inner face 15 which is held against the outside of the well casing 10 by the U-bolt 20 which extends around the well casing 10 and is secured to the external flange 14 through the ears 16 and 17 thereof by means of a fastener or nut 26. As best seen in FIG. 6, the annular gasket 19 perfects a liquid-tight seal between the external flange 14 and the well casing 10.

Referring to FIGS. 6 and 8, the external flange 14 has a pair of passages 46 and 47 which connect to the main passage 18 adjacent the inner side of the external flange 14. A pair of lateral pipes 28*a* and 28*b* are connected to the outer ends of the passages 46 and 47, respectively, as best seen in FIG. 6.

Referring to FIG. 7, the adapter 29 has a pair of passages 48 and 49 whose lower ends are connected to a pair of vertical pipes 32*a* and 32*b*, respectively. As best seen in FIG. 6, the passage 48 continues at right angles through the cylindrical passage 18 and is formed by a separate tubular wall 50 which extends outwardly from the main sleeve 33. The tubular wall 50 has an outside diameter which is adapted to be received by an enlarged portion of the passage 47 in the external flange 14. An O-ring 51 in a groove 52 on the outer side of the tubular wall 50 is provided to seal the union between the tubular wall 50 and the enlarged area of the passage 47.

A continuous passage from the vertical pipe 32*b* through the passage 49 in the adapter 29 and through the sleeve 33 circumjacent the tubular wall 50 extends into the upper passage 46 and thence the pipe 28*a*, as best seen

in FIGS. 6 and 7. With an O-ring **35** extending around the outer surface of the sleeve **33** in its groove **36**, a seal is completed between the outer surface of the sleeve **33** and the interior of the external flange **14**.

With the embodiment of FIGS. 5 through 8 thus described, the remaining details are essentially identical to those in the embodiment of FIGS. 1 through 4, with the operation of the locking mechanism the same. The advantages are enumerated with reference to the embodiment of FIGS. 1 through 4 are present in the two-pipe adapter as described and various modifications may be made by those skilled in the art without departing from the scope of the appended claims.

I claim:

1. A device for coupling a vertical well pipe within a well casing to a discharge pipe extending laterally from said casing comprising, in combination,

an external flange adapted to be secured to the outer surface of a hollow well casing, said flange including a discharge passage extending therethrough substantially normal to the axis of said well casing whereby, when said flange is secured to the outer surface of said casing over an aperture in the sidewall thereof, said lateral discharge passage is in communication with the interior of said casing,

an internal well adapter for placement within said hollow casing, said adapter having a vertical intake passage extending generally parallel to the axis of said well casing from the bottom of said adapter and a lateral passage communicating with said vertical pasage and extending generally normally thereto, said lateral passage extending through a laterally extending cylindrical sleeve, said cylindrical sleeve having an outer surface dimensioned to be slidably received by said discharge passage in said external flange whereby said internal well adapter may be positioned within said well casing by inserting said cylindrical sleeve through said aperture in the sidewall of said casing and sliding said cylindrical sleeve laterally into said discharge passage of said external flange, and

means for removably locking said cylindrical sleeve within said discharge passage, said locking means including a movable lock member and a complementarily shaped recess positioned opposite one another in opposed portions of said cylindrical sleeve and said discharge passage, and means for selectively moving said lock member from a first position where said cylindrical sleeve and said discharge passage may be moved axially relative to one another to a second position where said locking means extends into said opposed complementary recess to prevent relative axial movement of said cyclindrical sleeve and said discharge passage.

2. The device of claim **1** which further includes an annular resilient gasket positioned circumjacent the discharge passage in said external flange and adapted to engage the outer surface of said well casing circumjacent said casing aperture and means for securing said external flange in position upon said casing with said annular gasket in position between said flange and said casing.

3. The device of claim **2** wherein said means securing said external flange includes a pair of laterally extending ears positioned on opposite sides of said discharge passage, an aperture extending through each of said ears with the distance between said ear apertures being slightly larger than the outer diameter of said well casing, a U-shaped threaded fastener extending around said well casing with one leg received by each ear aperture and means for securing said threaded fastener to said ears.

4. The device of claim **1** which includes a means for effecting a liquid seal between the adjacent surfaces of said cylindrical sleeve and said discharge passage of said external flange.

5. The device of claim **4** in which said means for effecting a liquid seal in an O-ring positioned within a circumferential groove on the outer surface of said cylindrical sleeve.

6. The device of claim **1** wherein said means for removably locking said cylindrical sleeve within said discharge passage of said external flange includes a recess in said discharge passage and a lock member positioned in said cylindrical sleeve opposite said recess when said sleeve is positioned within said passage, said lock member comprising a detent positioned within the wall of said cylindrical sleeve and movable from a first position wherein said detent lies below the outer surface of said sleeve to a second position wherein said detent extends beyond the outer surface of said sleeve and into said opposed recess, and control means operable from within said well casing effective to move said detent from said first to said second position.

7. The device of claim **6** wherein said control means includes a rotatable shaft extending through said internal well adapter generally parallel to the axis of said cylindrical sleeve from said locking detent to a position within said well casing, said shaft including a cam surface positioned below said detent whereby rotation of said shaft will cause said cam surface to move said detent from said first to said second position.

8. The device of claim **7** which further includes a lever secured at an angle to the outer end of said rotatable shaft whereby pivotal movement of said lever will rotate said shaft.

9. The combination of a hollow cylindrical well casing having a lateral aperture in the wall thereof,

an external flange secured to the outer surface of said well casing and including a cylindrical discharge passage extending normal to the axis of said well casing in alignment with said lateral aperture in said well casing wall, and

an internal adapter positioned within said well casing, said adapter including a laterally extending tubular sleeve extending through said well casing wall aperture and into said discharge passage of said external flange, a vertical intake passage extending from the lowermost portion of said adapter and communicating with the interior of said tubular sleeve to provide a continuous passage into the discharge passage of said external flange,

means for effecting a fluid seal between the outer surfaces of said adapter sleeve and the adjacent inner surfaces of said discharge passage in said external flange, and

locking means for preventing relative movement between said adapter and said external flange, said locking means including a recess and a shaped detent positioned opposite one another in opposed portions of said adapter sleeve and said flange discharge passage, and means for moving said shaped detent into said recess to prevent removal of said adapter from said well casing.

10. A device for coupling a pair of well pipes within a well casing to a pair of pipes extending laterally away from said well casing comprising, in combination,

an external flange adapted to be secured to the outer surface of said casing, said flange including a main cylindrical passage adapted to be received by an aperture in the wall of said casing, a second separate passage within said main cylindrical passage and means for securing said flange to said casing,

an internal well adapter for placement within said well casing, said adapter having a pair of separate passages extending generally parallel to the axis of said casing, one of said pair of passages communicating with a cylindrical sleeve extending at right angles thereto and the other of said pair communicating with a smaller tubular pipe within said sleeve, said cylindrical sleeve having an outer surface dimensioned to be slidably received by said main cylindrical

passage in said external flange and said smaller tubular pipe having an outer surfae dimensioned to be received by said second separate passage within said cylindrical passage in said external flange, whereby said internal well adapter may be positioned within said well casing by inserting said cylindrical sleeve and said tubular pipe through said casing aperture and into said main cylindrical passage and said second separate passage respectively, and

means for removably locking said adapter in inserted position including a movable lock member and a complementarily shaped recess positioned opposite one another in opposed portions of said cylindrical sleeve and said main cylindrical passage and means for selectively moving said lock member from a first position where said cylindrical sleeve and said main cylindrical passage may be moved axially relative to one another to a second position where said locking means extends into said opposed complementary recess to prevent relative axial movement of said cylindrical sleeve and said main cylindrical passage.

11. The device of claim **10** which includes a first sealing member interadjacent the opposed surfaces of said cylindrical sleeve and said main cylindrical passage to effect a fluid seal therebetween and a second sealing member interadjacent the opposed surfaces of said tubular pipe and said second separate passage to effect a fluid seal therebetween.

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JAMES A. LEPPINK, *Primary Examiner.*

U.S. Cl. X.R.

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