United States Patent [19]

Reinhard et al.

[11] **3,805,891**

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[54] **WELL PIPE CONNECTOR**

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[73] Assignee: **Dicken Manufacturing Company**, Arcadia, Ohio

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[52] **U.S. Cl.** **166/88**, 285/158, 285/140

[51] **Int. Cl.** **E21b 33/03**

[58] **Field of Search** 285/158, 159, 140; 166/88, 166/89, 85, 86

[56] **References Cited**

UNITED STATES PATENTS

2,488,470	11/1949	Gerweck et al.	166/85
2,689,611	9/1954	Martinson	166/88 X
2,851,106	9/1958	Dicken	166/88
2,946,385	7/1960	Dicken	166/88
3,270,818	9/1966	Pugh	166/88
3,403,730	10/1968	Williams	166/88
3,420,303	1/1969	Stearns	285/189 X
3,430,697	3/1969	Wellstein	166/85

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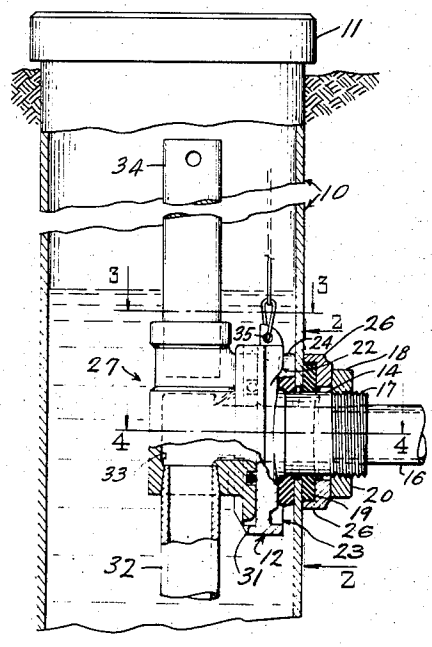
[57] **ABSTRACT**

A well pipe connector for connecting a horizontal liquid pipe outside a hollow well casing with a vertical liquid pipe extending inside the casing. The connector has a first unit attached to the casing wall and a second unit connected to the vertical pipe and removably attached within the casing to the first unit. The first unit has a plate with a sleeve extending through the casing wall to be connected to the horizontal pipe. The plate side towards the inner side of the casing wall has an annular convex surface with parallel ribs to define a gasket seat and alignment and stop surfaces. The first unit is secured to the casing with a gasket on each side of the casing wall circumjacent the sleeve to provide a fluid tight seal around the hole in the casing. A concave washer is adjacent the outer gasket to provide proper compression and spacing.

5 Claims, 4 Drawing Figures



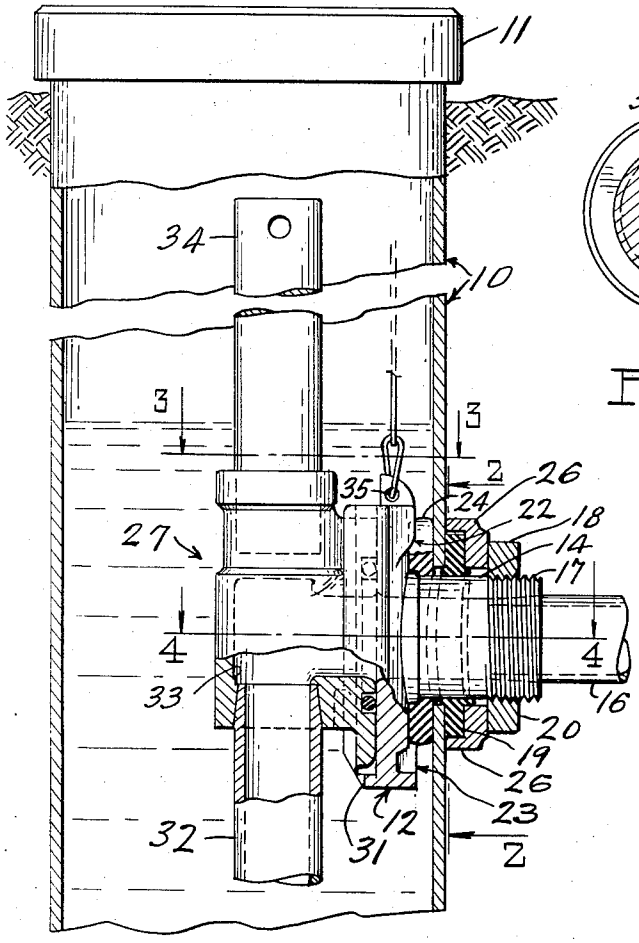


FIG-1-

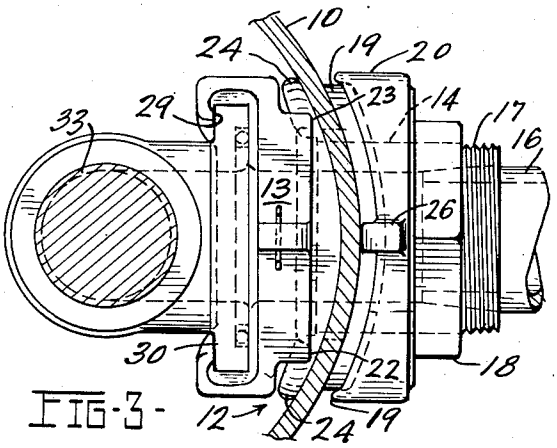


FIG-3-

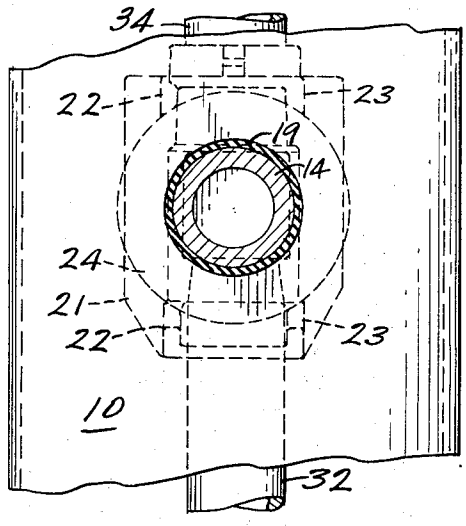


FIG-2-

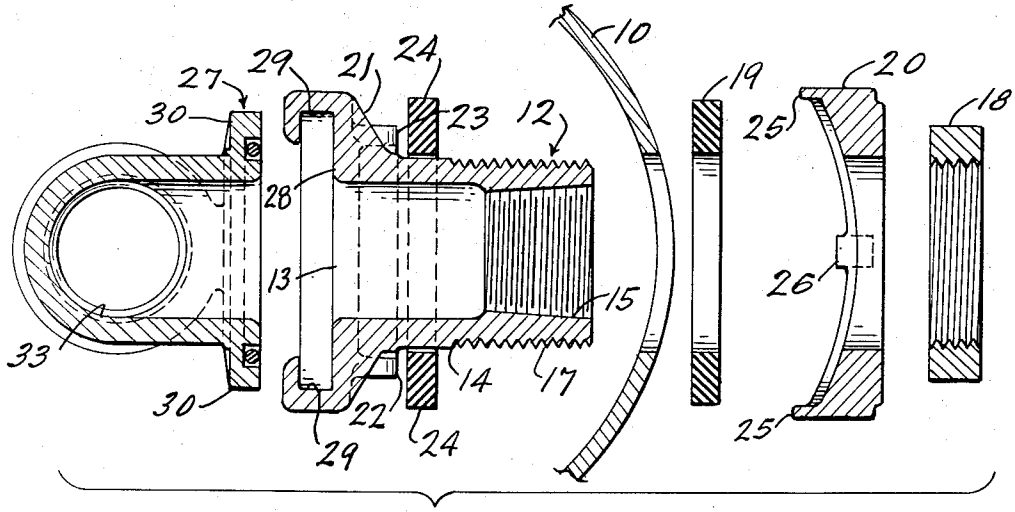


FIG-4-

WELL PIPE CONNECTOR

This application relates to well pipe connectors which are used in connecting a vertical well pipe within a well casing to a horizontal discharge pipe which extends below the ground and into the well casing. In pitless well installations, it is desirable to provide a releasable connection between the vertical well pipe and ground discharge pipe so that the well pipe can be pulled up and out from ground level for servicing, cleaning or inspection. Because the horizontal discharge pipe must necessarily be buried within the ground below the frost line, such releasable connectors must be capable of being remotely connected or disconnected by manipulating a lever or connecting pipe from the ground level.

Well connectors of this general type are disclosed in U.S. Pat. Nos. 2,689,611, 2,946,385 and 3,420,303. In general, one of the difficulties incurred with such well pipe connectors of the prior art has been in the attachment of one of the units of the well connector to the well casing. The well casing, which may vary in diameter from 4 to 12 inches and sometimes larger, typically has a hole provided below the frost line through which a sleeve of a unit of the well connector is inserted and means such as a clamping nut are provided externally of the well casing for drawing the first unit tightly against the inner wall of the well casing. It is, of course, most desirable to provide an absolutely liquid tight seal between the well casing and first unit of the connector to keep ground water or other contaminants out of the well. This problem is particularly aggravated since the unit is buried below the frost line and, should a leak or other malfunction develop, a costly repair job involving the unearthing of the well casing down to that level is required.

Accordingly, it is an object of this invention to provide an improved well pipe connector which includes a novel and improved means for assuring a watertight and lasting seal between a unit of the well connector and the wall of the well casing.

It is another object of this invention to provide an improved well pipe connector in which initial installation is facilitated by its design in that it provides means on a unit of the connector which prevents misalignment of the unit during installation and which also, through the provision of a shaped gasket seat opposite the interior wall of the well casing, assures a liquid tight and lasting seal.

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

FIG. 1 is a cross-sectional view in elevation, of a well pipe connector of this invention installed in a typical well casing;

FIG. 2 is another view in elevation of the invention, taken along line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view looking into the well casing, taken along line 3—3 of FIG. 1; and

FIG. 4 is an expanded view of various components of the well connector of this invention prior to their installation on a casing wall.

Referring first to FIG. 1, a typical vertical hollow well casing 10 is shown which extends into the ground and has its upper end closed by a removable cap 11. Below the end of the casing 10, at a line below the frost line, is a lateral aperture through the wall of the casing into

which the first unit 12 of the connector of this invention is inserted. Referring to FIG. 4, the first unit 12 comprises a generally flat plate 13 which has a hollow sleeve 14 extending from one side in alignment with an aperture extending through the plate to provide a liquid passage extending through the unit 12 as shown. The external diameter of the sleeve 14 is generally slightly smaller than the hole cut into the wall of the well casing 10 and the sleeve has internal threads 15 into which is secured the threaded end of a horizontal water or liquid discharge pipe 16, as seen in FIG. 1. The outer end on the sleeve, 14 has external threads 17 upon which are turned a clamping member or nut 18 shown in FIG. 4. To conform an external gasket 19 to the outer surface of the well casing 10, a concave washer or shim 20 is provided to be slipped over the sleeve 14 before the nut 18 is applied. The radius of curvature of the concave washer 20 is described below.

One side of the generally flat plate 13 is provided with an annular, generally convex bearing surface 21, best seen in FIGS. 2 and 3 which is bracketed by a pair of vertically extending ribs 22 and 23, best seen in FIG. 2. The radius of curvature of the convex surface 21 is selected to be intermediate that of the casing 10, that is, between the radius for a 4 to 12 inch diameter casing. This intermediate radius, where combined with the internal gasket 24 of sufficient thickness, will be effective to seal the unit to the wall of all casings 10 of this size range, as explained below. In a like manner, the radius of curvature of the concave shim 20 is also intermediate the casing radii range to provide an effective external seal in cooperation with the gasket 19.

The ribs 22 and 23 extend along the lateral edges of the plate 13 and terminate short of the annular convex surface 21 to provide a recessed gasket seat formed by the annular convex surface 21 and the adjacent terminal ends of the ribs 22 and 23. When the internal gasket 24 is placed over the sleeve 14 and the sleeve 14 is inserted through the wall of the well casing 10, the gasket 24 is caused to conform between the inside wall of the well casing 10 and the annular convex surface 21 to provide a sealing surface of substantial width, as best seen in FIG. 3. When the clamping member or nut 18 is turned tightly upon the threads 17 of the sleeve 14, both of the gaskets 19 and 24 are caused to assume the shape shown in FIG. 3 to provide a double sealed construction which positively prevents leakage through the joint and also serves to dampen the transmission of any unwanted vibrations from the parts attached to each end of the connector. The ribs 22 and 23, whose lateral height is less than that of the gasket 24, prevent the unit from twisting during installation so that its vertical positioning, as shown in FIGS. 1 and 3, can be assured during installation. The surfaces of the ribs 22 and 23 provide a stop member against the inside wall of the casing 10 in the event that the installer places excessive force on the clamping member 18.

The concave washer 20 has a peripheral ridge 25 surrounding the concave surface next to the gasket 19 which aids in seating the gasket 19 on the outer surface of the well casing 10 and helps to confine it against lateral movement during tightening or when stress is placed upon the unit. A pair of diametrically opposed lugs 26 extend from the deepest portion of the face of the gasket to provide a positive stop member to prevent over tightening of the outside gasket 19. The length of these lugs 26 is such that they will not contact the well

casing **10** until the gasket **19** is properly compressed; further tightening of the nut **18** will then serve to compress the inner gasket **24** as described above. In addition, contact of the lugs **26** with the well casing **10** will prevent any tendency of the inner gasket **24** to pull away if excessive pump or pipe weight is hung on the interior of the unit as described below.

The second unit of the well connector consists of a generally flat plate **27** having a planar surface which is adopted to mate with a machined planar surface **28** of the first unit **12**, as best seen in FIG. **4.** The first unit **12** can be provided with a recessed channel including a pair of internal slots **29** which slidingly receive, from the top, the lateral edges **30** of the second unit as best seen in FIG. **1.** The bottom edge of the plate **21** of the first unit **12** has a rim **31** which acts as a stop member to position the second unit as it slides into the slots **29** on the first unit **12.** The flat face **27** of the second unit is provided with a groove for receiving an O-ring which is slightly compressed when the units are joined together to provide a fluid tight seal between the two connecting units. The second unit has an L-shaped fluid passage extending upwardly from a vertical well pipe **32** and thence laterally towards the first unit **12** to provide a complete liquid passage from the vertical pipe **32** through the connector unit to the lateral discharge pipe **16.**

At the top of the second unit **25** is a blind hole **33** which has internal threads to receive an extension pipe **34** which extends towards the top of the well casing **10.** The extension pipe **34** is used only as a handle or tool for manipulating the second unit **27** into the receiving slots **29** of the first unit **12** to couple or uncouple the connector unit. Finally, the first unit can be provided with an eye **35** which enables it to be lowered into position in the well casing **10** by means of a suspension member or hanger during initial installation.

It will be seen from the above described preferred embodiment that the well pipe coupling of this invention has the advantage of providing a permanent liquid tight seal between it and the wall of the well casing and that it has the advantages of adapters of this type in that it can be coupled or uncoupled from above the ground without the necessity of entering the well casing or digging down to the level of the horizontal discharge pipe. It will also be seen that the invention can be conveniently used to couple many types of fluid pipes, in addition to the use described in connection with a pitless type well coupling. Other advantages and variations will be apparent to those skilled in the art and may be made without departing from the spirit and scope of the attached claims.

I claim:

1. A well pipe connector for joining a horizontal discharge pipe extending into a hollow well casing with a vertical well pipe extending within said casing comprising, in combination, a first unit having a plate with a central aperture and an annular sleeve extending outwardly from said aperture on one side to define a liquid passage through said plate, said sleeve having means on its outer end for securing it to said horizontal discharge pipe with the opposite side of said plate having a generally planar surface, said one side of said plate having an annular, generally convex surface surrounding said sleeve with a pair of ribs on opposed lateral edges extending parallel to said well casing and terminating short of said annular surface to define a gasket surface circumjacent said sleeve, means on the outer portion of said sleeve for engaging a clamping member whereby said first unit can be attached to said well casing with a first gasket between said annular gasket surface and the inner wall of said well casing and a second gasket between the outer wall of said well casing and said clamping member, and a second unit having a generally planar surface for releasable engagement with said opposite side of said first unit with a liquid passage extending into said planar surface of said second unit and thence downwardly into said well casing to provide a liquid passage from said vertical well pipe through said connector to said horizontal discharge pipe.

2. The pipe connector of claim **1** which further includes means for slidingly engaging said general planar surfaces of said first and second units together whereby said units are held in registry with each other.

3. The pipe connector of claim **1** wherein said ribs on said opposite side of said first unit extend outwardly beyond said annular gasket surface towards the outer end of said sleeve to provide alignment and stop surfaces adjacent said inner wall of said well casing to align said first unit vertically within said casing.

4. The pipe connector of claim **1** which further includes a rigid concave washer between said clamping member and said second gasket, said concave washer having a pair of opposed stop lugs extending from its concave surface towards said well casing to provide means for positioning said washer at a fixed minimum distance from said well casing when said clamping member is tightened to assure compression of said first inner gasket.

5. The pipe connector of claim **1** wherein the radius of curvature of said annular convex surface and of said concave washer are equal and are intermediate the radius of said well casing.

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