Nov. 15, 1960 E. HAYDIN ET AL 2,960,166

WELL PUMP ADAPTER

Filed April 3, 1957

Fig. 1

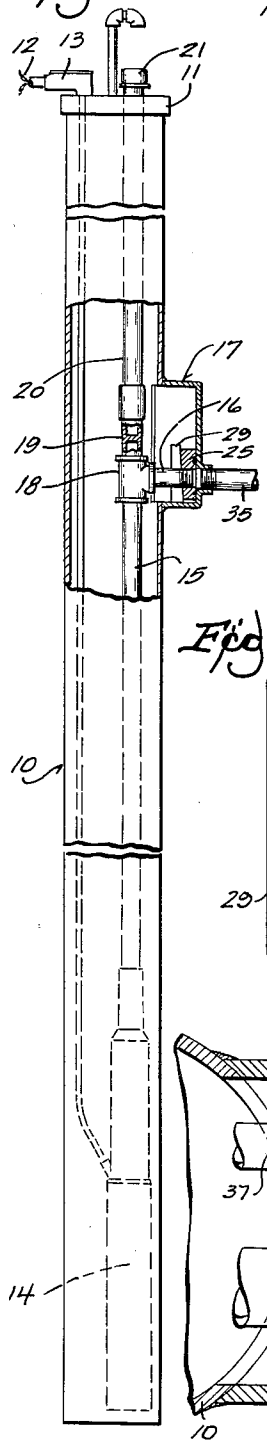
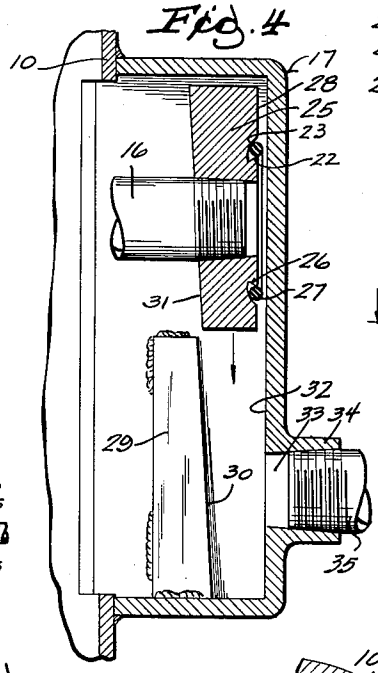


Fig. 4



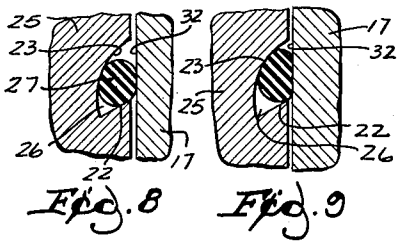


Fig. 8

Fig. 9

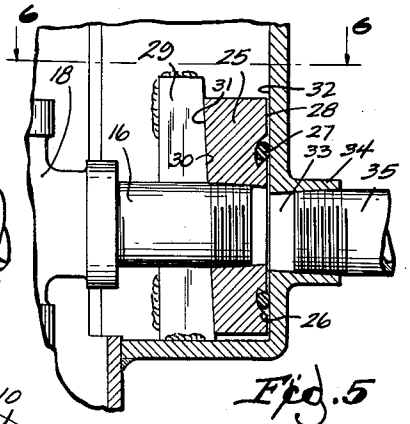
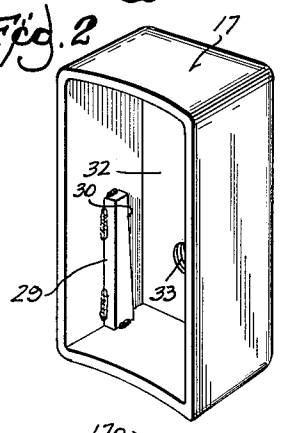


Fig. 5

Fig. 2



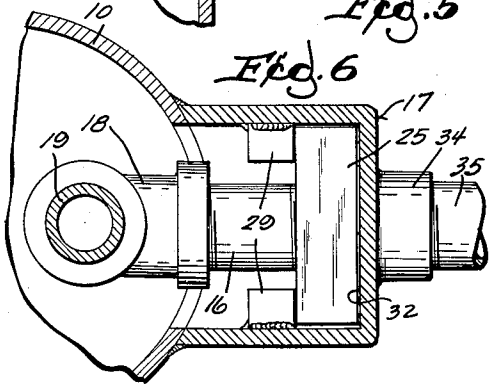


Fig. 6

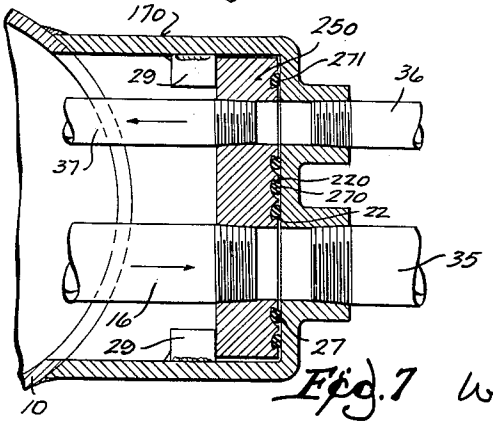


Fig. 7

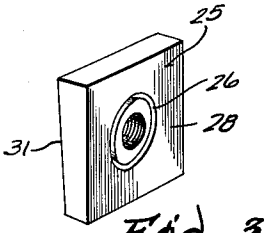


Fig. 3

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WELL PUMP ADAPTER

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16 Claims. (Cl. 166—85)

This invention relates to a well pump adapter. This is a companion to application 546,449, filed November 14, 1955.

In many instances, it is desirable that the service pipe from a well casing issue laterally rather than vertically. We have discovered that through the sealing means herein disclosed, it is possible to manipulate the well pipe and associated parts to and from sealed connection with a discharge or service pipe which extends straight outwardly therefrom. To this end, a boxlike enlargement attached to the well casing is provided with a faced bearing wall through which the discharge pipe opens. On its side walls, at opposite sides of the bearing wall, and spaced therefrom, are flanges downwardly convergent toward the bearing wall. The well pipe has a lateral branch extending toward the bearing wall and provided with a wedge-shaped fitting receivable between the flanges and the bearing wall to be cammed toward the bearing wall. An O-ring seal disposed in a groove in this wedge-shaped fitting is compressed against the bearing wall when the fitting is seated and is radially expanded hydrostatically into portions of the groove which have reduced cross section, whereby to effect a perfect seal. Thus the connection is easily made and easily disconnected as desired.

In an alternative embodiment, we use the same means to provide a dual connection into the well, each connection having its own sealing ring. This arrangement accommodates pressure and vacuum lines, as used, for example, in jet pumps.

In the drawings:

Fig. 1 is a view in side elevation of a complete well installation embodying the invention, portions of the side wall and other parts being broken away to expose the interior construction.

Fig. 2 is an enlarged detail view in perspective of the boxlike housing which is normally welded to the well casing, but which is shown separated therefrom in this figure.

Fig. 3 is a view in perspective of the wedge fitting complementary to the housing and mounted on the lateral extension of the well pipe.

Fig. 4 is an enlarged fragmentary detail view in section showing the wedge fitting as mounted in the course of manipulation into position in the housing.

Fig. 5 is a view similar to Fig. 4 showing the parts after they have reached sealing position.

Fig. 6 is a view taken in horizontal section in the plane indicated in line 6—6 of Fig. 5.

Fig. 7 is a view similar to Fig. 6 showing a modified embodiment.

Fig. 8 is a detail sectional view on an enlarged scale showing the O-ring as it appears when slightly compressed by the weight of the pump and well pipe but not completely sealed.

Fig. 9 is a view similar to Fig. 8 showing the seal seated under fluid pressure.

The well casing 10 is desirably capped at 11 against

admission of surface water. An approved electrical connection 12 is led through the fitting 13 to power the conventional submersible pump 14 disposed in the bottom of the well to deliver water through the well pipe 15.

The well pipe 15 has a lateral branch at 16 within a housing 17 welded to the side of the casing 10 in accordance with the present invention. Above the T 18 giving access to the lateral branch 16, the well pipe 15 is closed by a special closure nipple 19 which is connected to the pipe 20 that extends through the cap 11 to the surface of the ground and is capped at 21. The length of pipe at 20 serves to support the well pipe 15 and pump 14 to enable these parts to be lowered into the well casing and manipulated therein into a position in which fluid pressure will effect the seal hereinafter described.

The end of the lateral branch 16 is screwthreaded into a special wedge-shaped fitting 25 which is provided, around the end of the branch pipe 16, with an annular groove 26 of inwardly tapering cross section in which an O-ring 27 is disposed. O-ring 27 desirably consists of rubber or the like. The dimensions are such that the diameter of the ring slightly exceeds the cross section of the groove at the point at which it seats therein so that part of the ring projects beyond the face 28 of the wedge.

The shape of the groove is such as to provide an annular lip 22 to retain the O-ring during handling. Opposite the lip, the groove has a tapered surface 23 which co-acts with the face 32 hereafter described to provide an annular crevice of decreasing cross section in which the ring wedges to a tight seal when subjected to pressure differential.

The housing 17 is provided on its opposing side walls with flanges at 29 which are spaced to receive the wedge fitting 25 and have inclined surfaces 30 complementary to the inclined rear face 31 of wedge 25. The opposing face 32 of housing 17 is desirably finished to be planiform. The material is desirably stainless steel to assure a permanently smooth seating surface. It provides a bearing surface against which the seal ring seats as the wedge-shaped fitting 25 is lowered from the position of Fig. 4 to that of Fig. 5. In the latter position, compression of the O-ring 27 in its groove 26 limits the approach of the fitting to the surface 32. In practice, there is about 1/32 inch of clearance.

From a point within this seal leads an opening 33 communicating with a threaded sleeve 34 integral with the housing and into which the water supply pipe 35 is threaded. Accordingly, the wedge fitting 25, when seated as shown in Fig. 5, provides a substantially fluidtight connection between the lateral extension pipe 16 from the pump and the service pipe 35 leading to the point of water storage or use. When pressure is applied, the ring 27 expands and increases wedging pressure between surface 23 of fitting 25 and surface 32 to make the effectiveness of the seal proportionate to pressure differential across the seal ring.

Since the combined width of the T 18, lateral extension pipe 16 and wedge fitting 25 does not exceed the interior width of the well casing 10, the entire assembly of the wedge fitting on the well pipe 15 can be lowered with the pump into the casing and manipulated within the casing to introduce the wedge fitting 25 into the lateral housing 17. Once in the housing, the entire assembly is lowered until the O-ring seats as shown in Figs. 5 and 8. Actual compression of the seal depends upon a differential pressure which compresses the sealing ring tightly in the crevice between surfaces 23 and 32 as shown in Fig. 9.

In cases in which a jet type pump is used, the housing 170 and wedge fitting 250 may be made wide enough to accommodate two pipes, one being the lateral well pipe 16 communicating with service pipe 35 as above de-

scribed, and sometimes under pressure and sometimes subject to vacuum in this type of installation.

Pipe 36 communicates with a pipe 37 which conveys fluid under pressure to the point of use within the well. In this arrangement, the O-ring 27 co-axial with water pipe 16 is supplemented by the provision of concentric separate O-ring 270 to provide a dual seal around the connection, the ring 270 sealing under vacuum and ring 27 under pressure. For this purpose, the lip 220 is directed oppositely from the lip 22 of groove 26. The ring engaged therein is compressed slightly to engagement within lip 220 instead of being stretched slightly, as is done to retain the ring behind lip 22. Pipe 37 has an O-ring at 271 which functions like the seal ring 27 shown in Figs. 8 and 9. This pipe is always under pressure; hence but one ring is required.

We claim:

1. A well pump adapter comprising the combination with a fitting having a bearing face provided with a packing groove, of packing in said groove which projects beyond said face, an opening through said face about which said groove is continuous, means providing a complementary bearing face along which the bearing face of the fitting is adapted to be moved, said complementary bearing face being spaced from the bearing face first mentioned by the projecting packing, the bearing face last mentioned having a complementary opening therethrough, pipes communicating with the openings, said groove being provided with a lip against which the packing bears to retain the packing in the groove and camming means for urging the said faces toward each other and against said packing to provide sealed communication between said pipes through the said openings and for maintaining said faces in assembled relationship.

2. The device of claim 1 in which the camming means engages the respective bearing faces against the packing and the final seal provided by the packing is effected by pressure differential to which the packing is subject, the packing groove having a face tapering toward said complementary bearing face to provide an annular crevice of cross section decreasing in the direction in which the pressure differential is effective.

3. A well pump adapter comprising the combination with a fitting having a bearing face provided with a packing groove, of packing in said groove which projects beyond said face, an opening through said face about which said groove is continuous, means providing a complementary bearing face spaced from the bearing face first mentoined by the projecting packing, the bearing face last mentioned having a complementary opening therethrough, pipes communicating with the openings, and clamping means for urging the said faces toward each other and against said packing to provide sealed communication between said pipes through the said openings, said fitting providing retaining means at one side of the groove and behind which a portion of said groove extends, the packing being deformed in the course of assembling it with the groove to pass said means and lie in the portion of the groove behind it, whereby to be retained by said means during the handling of the fitting and packing, the said fitting further being provided with a tapering face bounding said groove in opposition to said means and cooperating with said complementary bearing face to provide a crevice progressively decreasing in cross section radially away from said means and into which said packing is adapted to wedge when subjected to pressure differential exerted in a radial direction from said means toward said crevice.

4. The device of claim 3 in which the means comprises a lip projecting radially outwardly and the packing is under tension behind the lip.

5. The device of claim 3 in which the means comprises a lip overhanging the groove in a radially outward direction and the packing is under compression behind the lip.

6. The device of claim 1 in which said camming means comprises a bearing surface spaced from said complementary surface downwardly and convergent thereto, the fitting being receivable between said complementary surface and the last mentioned bearing surface to be clamped by wedge action upon relative movement in a direction toward alignment of said openings.

7. In a device of the character described in which a well casing has a box opening laterally therefrom and provided with a service pipe outlet, a bearing surface through which said outlet opens and side walls transverse to said bearing surface, the combination with said box, of a wedgeshaped fitting having a bearing surface, an opening complementary to that of the box and slidable toward and from a position of registration of said openings, one of said surfaces being provided with a packing groove continuous about its opening, packing in said groove, and means within the box projecting inwardly from said side walls and spaced from the first mentioned surface to receive said wedge-shaped fitting and adapted to hold the fitting in clamping engagement with the bearing surface of the box to engage said packing between said surfaces upon relative movement of the casing toward said position of registration.

8. In a device of the character described a well casing provided with a box opening laterally therefrom and provided opposite said casing with an interior bearing surface and a service pipe opening therethrough, box side walls and flange means within the box projecting inwardly toward each other from said side walls in spaced relation to said surface, and a wedge-shaped fitting receivable with clamping pressure between said surface and said flange means and provided with a bearing surface complementary to that of the box and having a well pipe connected to it and opening therethrough in a position for registration with the service pipe opening through the surface first mentioned when the fitting is wedged between the flange means and said first mentioned surface.

9. The device of claim 8 in which at least one of said surfaces is provided with a packing groove continuous about the opening therein provided and with packing in said groove and normally projecting therefrom to engage the first mentioned surface.

10. The device of claim 8 in which at least one of the surfaces is provided with a packing groove continuous about the opening therein provided and with packing in the groove and means sufficiently overhanging the groove for retaining the packing therein during manipulation of said fitting.

11. The device of claim 8 in which at least one of the surfaces is provided with an annular groove and an annular lip partially overhanging the groove and with a generally tapered surface opposed to said lip, together with resilient O-ring packing engaged under elastic pressure behind the lip within the groove and projecting from the groove and adapted to be deformed elastically along the tapered surface when subjected to differential pressure in a direction away from the lip.

12. A well pump adapter for use with a well casing having a lateral opening and containing a pump and a pump pipe having a lateral extension projecting through said opening, the adapter comprising a boxlike housing in closed communication with one side of the casing and having directly opposite the casing an interior bearing surface provided with a service pipe connection opening therethrough, said housing having side walls with flange means projecting toward each other at opposite sides of said pipe extension and spaced from said surface, said pipe extension having a wedge fitting connected thereto and through which said pipe extension opens, said fitting being provided with a bearing surface complementary to that of the housing and being engaged between the housing surface and said flange means with said pump pipe extension communicating through said

surfaces with said service pipe and substantially aligned therewith.

13. The device of claim 12 in which one of said surfaces is provided with a packing groove continuous about the opening therein and with packing in said groove under compression between said surfaces maintained by the wedging of said fitting between the flanges and the surface first mentioned.

14. The device of claim 13 in which the wedge fitting is provided with a generally circular groove and the packing comprises an O-ring in the groove, the groove having inwardly convergent side surfaces between which the O-ring is compressed.

15. As a new article of manufacture, a lateral extension box for application to a well casing, said box having an open side to face the well casing and having an interior bearing surface opposite said side and provided with a service pipe opening through said surface and flange means spaced from said bearing surface and disposed at opposite sides of the box.

16. As a new article of manufacture, a wedge fitting for use with the box of claim 15 comprising a wedge having opposed and convergent bearing surfaces, one of which comprises a substantially planiform face having an opening therethrough and provided about said opening with a groove and with an overhanging lip, the other said surface being adapted to be received behind the flange means of the box of claim 15 and packing seated in the groove partially behind the lip and normally projecting beyond said face and adapted for sealing engagement with the bearing surface of the box of claim 15 when the wedge is advanced along the flange means.

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