

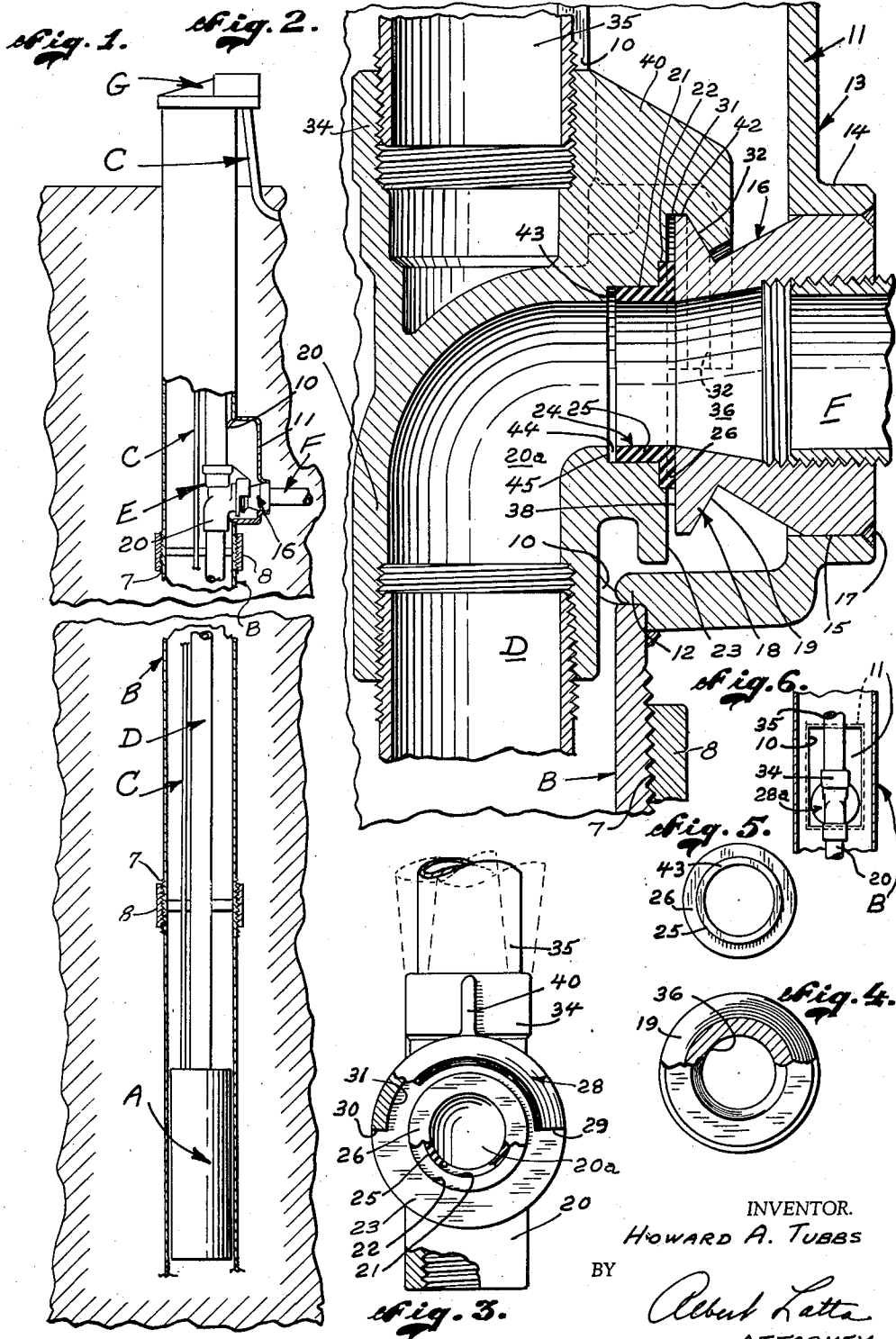
Dec. 29, 1959

H. A. TUBBS

2,918,972

COUPLING APPARATUS FOR A WELL SYSTEM

Filed Aug. 12, 1957



INVENTOR.
HOWARD A. TUBBS

BY

Albert Latta
ATTORNEY

1

2,918,972

COUPLING APPARATUS FOR A WELL SYSTEM

Howard A. Tubbs, Whitewater, Wis.

Application August 12, 1957, Serial No. 677,485

5 Claims. (Cl. 166—88)

The invention relates to well systems and has particular reference to a single pipe system wherein installation problems are simplified.

An object of the invention is to provide improved apparatus for making rapid connection of the supply pipe to the underground water delivery pipe.

A specific object is to provide a novel coupling device for connecting the supply pipe to the delivery pipe.

Another object is to provide such a coupling device which may be readily disconnected from the delivery pipe for servicing purposes.

A further object is to provide coupling apparatus which does not obstruct the interior of the well casing.

A further object is to provide means for assuring unerring guidance of one part of the coupling onto the second part whereby installation time is kept at a minimum.

Other objects and advantages of the invention will be apparent from the ensuing specification and appended drawing in which:

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

Fig. 2 is a sectional view of the coupling device;

Fig. 3 is a detail view of one part of the coupling device, partly in section;

Fig. 4 is a detail view of the second portion of the coupling device shown partly in section;

Fig. 5 is a detail view of the sealing washer; and

Fig. 6 is a rear view of the coupling device and surrounding housing, such view being on a greatly reduced scale.

Referring to Fig. 1, the well system shown is of the submersible type wherein the pumping apparatus (which includes a pump and motor unit for driving same) is lowered into the well casing B near the lower end thereof and beneath the water level within the casing. The well casing is made up of successive sections of pipe having their adjacent ends externally threaded at 7 so as to be secured together by means of the internally threaded coupling sleeves 8.

Electrical wiring C extends down through the interior of the casing to the motor for driving the pump. The water is pumped up through the supply pipe D, then through the coupling unit E and on through the delivery pipe F to the point of usage.

The upper end of the well casing B may be closed off by means of a sealing cover G through which the electrical wiring passes.

It will be noted that the interior of the well casing must remain unobstructed to permit the lowering of the pumping apparatus down into the well casing and subsequent removal therefrom for servicing purposes. Consequently, the connecting of the pipe D to the delivery pipe F (through the medium of the coupling device E) is made outside of the circumferential wall of the well casing.

2

To accommodate such connection, a large opening 10 is cut in the wall of the well casing and a box like housing 11 is secured to the casing, surrounding the opening so as to maintain the interior of the well casing water tight. Referring to Fig. 2 it will be noted that a locating lug 12 is formed in the lower portion of the housing 11 to locate the housing relative to the well casing opening prior to welding same thereto. The front wall 13 of the housing has an outwardly projecting hub 14 with a bore 15 therethrough into which the male portion of the coupling, referred to generally as 16, is mounted. This part of the coupling device is welded securely to the housing as by means of the welding material 17. The male portion of the coupling device is in the general form of a spool having a circular flange 18 formed at the inner end with the inwardly directed conical surface 19.

The female portion of the coupling device is preferably in the form of a casting having a downwardly depending internally threaded connecting portion 20 into which the supply pipe D is threaded. The internal bore 20a opens into a counter bore 21 which in turn opens into the counterbore 22 which opens through the flat outer face 23 of the casting. The sealing washer 24 has a cylindrical hub portion 25 which is received in the counterbore 21 and a circumferential flange portion 26 which is received within the counterbore 22.

An overhanging portion, identified generally as 28, is formed on the casting, terminating on either side thereof at 29 and 30 so as to define a substantially semi-circular lip. The circular extent of the lip is preferably slightly less than 180 degrees for reasons to be explained hereinafter. The lip includes a circular shaped base 31 and the circularly arranged inclined wall 32 for engagement with the conical surface 19 of the male portion of the coupling device. It will be understood that the inclined wall extends throughout the entire circular length of the lip 28. It will be noted that the flange portion of the sealing washer projects outwardly beyond the end face 23 of the casting for reasons to be explained hereinafter.

At the upper end of the casting an internally threaded boss 34 is provided to receive a length of pipe 35 which is used for installation and removal of the pumping apparatus as desired. The water, of course, travels up throughout the pipe D then through the internal bore 20a and on through the hollow sealing washer and the internal bore 36 of the coupling member 16 and then on into the delivery pipe F.

During installation of the pumping apparatus into the well casing, the cover G is of course removed and the pump and motor unit is lowered down into the well casing from the open upper end. The coupling member 16 which terminates within the interior of the housing 11 does not interfere with the pump-motor unit as it is lowered down into the well casing past the opening 10. It will be understood that the water supply pipe D may be well in excess of 100 ft. in length, consequently made up of several sections joined together in a conventional manner to form a continuous pipe of the desired length.

The coupling member 20 is threaded onto the upper end of such pipe and when the coupling member has been lowered into the well casing to the depth of the housing 11, then the connecting flange 28 is guided into the interior of the housing 11, above the flange 18. Further lowering of the coupling member causes the inclined wall 32 to slide down the conical surface 19 causing a wedging action which forces the flat end face 38 of the male coupling into tight engagement with the end face of the sealing washer, thereby establishing a water tight connection between the two coupling members. The cir-

3

cular shaped base portion 31 of the lip "bottoms" on the circumferential wall portion 42 of the male coupling flange 18 so as to line up, on a common axis, the coupling bores 20a and 36—the thickness of the sealing washer flange 26 and the resiliency of same being such that an adequate water tight seal is effected at the moment of "bottoming."

It will be noted that the entire weight of the pumping unit and supply pipe D is suspended from the coupling 20 thereby setting up the wedging action between the lip 28 and flange 18 so as to effect a very tight seal between the two parts of the coupling. Due to the heavy weight which must be borne by the lip 28, a reinforcing rib 40 is formed on the casting and extends between the boss 34 and the lip 28.

As previously mentioned the lip 28 extends throughout an arc of slightly less than 180 degrees, the ends 29 and 30 terminating slightly above a horizontal plane drawn through the axis of the counterbore 22 as best viewed in Fig. 3. Thus no difficulty is encountered in guiding the lip onto the conical surface 19 to "bottoming" position. It will be noted that the coupling member 20 can be rotated slightly relative to coupling member 16 (within the limits permitted by the internal diameter of the well casing through which the pipes D and 35 extend) as indicated by dotted lines in Fig. 3. The extent of rotation, however, is considerably exaggerated in Fig. 3. This rotative movement is useful in breaking the seal between the resilient sealing washer and the end face 38 of the male coupling member for servicing purposes and in working the female coupling member to full "bottoming" position, as shown best in Fig. 2, thereby obtaining maximum sealing conditions.

It will be noted in viewing Fig. 6 that the width of the housing 11 is just sufficient to accommodate the diameter of the circular boss 23a, consequently, assuring that the lip 28 can be guided onto the conical surface 19 with a very minimum of effort. In other words once the boss portion of the female coupling is guided into the interior of housing 11 above the male coupling, then the coupling connection is unerringly made by simply lowering the pumping apparatus and supply pipe further into the well casing. It will also be noted that the length of the box is such that adequate area is provided above the coupling member 16 for moving the coupling member 20 into the interior of the box above the coupling member 16 before lowering same thereonto. Thus it can be understood that the coupling connection is accomplished within a matter of seconds. I have also found that my coupling apparatus can be used satisfactorily in a shallow well type of installation wherein the pumping apparatus is located at or near the point of water usage remote from the well casing. The supply pipe extending down into the casing is heavy enough to effect sealing of the coupling members with the added aid of water pressure behind the sealing washer on the annular end wall 43, a slight annular chamber 44 being provided between the end wall of the washer and the bottom 45 of the counterbore 21.

I claim:

1. In a well system a subterranean hollow well casing; a pumping apparatus; a water feed pipe within the well casing; a water delivery pipe leading from the well casing; means for connecting the delivery pipe in a substantially water tight manner to the feed pipe, said means including: a coupling member secure with the well casing and having a passage therethrough in communication with the interior of the delivery pipe, said coupling member having an end wall, a second coupling member having a passage therethrough in communication with the interior of the feed pipe and having an end wall exposed toward the end wall of the first coupling member, the passage in each coupling member opening through its respective end wall, a sealing member in one of the end walls of one of the coupling members, an arcuately con-

4

toured inclined ramp on one coupling member and an arcuately contoured flange on the other coupling member having an inclined surface for coaction with the ramp, whereby the weight of the feed pipe causes one coupling member to move toward the other to establish a water tight connection between said coupling members and whereby as a result of the arcuate contours of the ramp and flange, the coupling members are capable of rotation relative to each other about a substantially common and generally horizontal axis.

2. A well system as set forth in claim 1 wherein the well casing has an opening in the side wall thereof and a housing surrounds the opening and is secured to the well casing, said housing projecting radially outwardly from the well casing to provide a chamber exposed toward the interior of the well casing, the coupling member which is secure with the well casing being anchored to the housing.

3. In a well system having a generally vertically directed subterranean hollow well casing, a generally vertically directed feed pipe within the casing and extending generally lengthwise thereof and a delivery pipe leading from the casing exteriorly thereof, apparatus for removably connecting the feed pipe to the delivery pipe comprising: a first hollow coupling member secured to the feed pipe and having its interior in communication with the interior of said feed pipe, said first coupling member including an end wall and a semi-circular flange overhanging the end wall, said semi-circular flange being generated about a generally horizontally directed axis; a second hollow coupling member secure with the well casing and having its interior in communication with the interior of the delivery pipe, said second coupling member including an end wall exposed toward the end wall of the first coupling member and a circular flange on the end wall, said circular flange being generated about a generally horizontally directed axis, the semi-circular flange of the first coupling member overhanging and removably engaging the circular flange on the second coupling member; a resilient hollow sealing washer received in one of the coupling members, whereby sealing connection is established between the coupling members when the flange of the first coupling member is brought into engagement with the flange of the second coupling member.

4. A well system as set forth in claim 3 wherein the respective flanges on the coupling members have complementary inclined surfaces, whereby the weight of the feed pipe causes the first coupling member to move toward the second coupling member to establish the sealing engagement therebetween.

5. In a well system a subterranean hollow well casing; a pumping apparatus; a water feed pipe within the well casing; a water delivery pipe leading from the well casing; means for connecting the delivery pipe in a substantially water tight manner to the feed pipe, said means including: a coupling member secure with the well casing and having a bore therethrough in communication with the interior of the delivery pipe, said coupling member having an end wall, a second coupling member having a bore therethrough in communication with the interior of the feed pipe and having an end wall exposed towards the end wall of the first coupling member, one of the coupling members having a counterbore opening through the end wall thereof; a resilient hollow sealing washer mounted in the counterbore and having an end wall spaced from the base portion of the counterbore, whereby a chamber is formed between the end wall of the sealing washer and the base portion of the counterbore, the other end wall of the washer being adapted to engage the end wall of the other coupling member; coacting inclined surfaces formed on the coupling members for removably interconnecting said coupling members, whereby the weight of the feed pipe causes one coupling member to move in a direction lat-

erally of the line of force imposed on such coupling member by the weight of the feed pipe, thereby bringing the end walls of such coupling members into sealing engagement with the sealing member and whereby water pressure is exerted on the end wall of the sealing washer to assist in effectuating sealing engagement between the other end wall of the sealing washer and the end wall of the other coupling member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,689,611	Martinson	Sept. 21, 1954
2,707,030	Ortman	Apr. 26, 1955
2,771,955	Carter	Nov. 27, 1956
2,841,223	Maass et al.	July 1, 1958