

March 17, 1959 2,877,849 G. F. MORRISON ET AL WELL SYSTEM Filed June 17, 1957 3 Sheets-Sheet 2 ~8o ர Ó FIG. 2 <u>76</u> Ìο ó BEORGE F. MORRISON GEORGE B. BREUL HERMAN C. FRENTZE 10. RNEY

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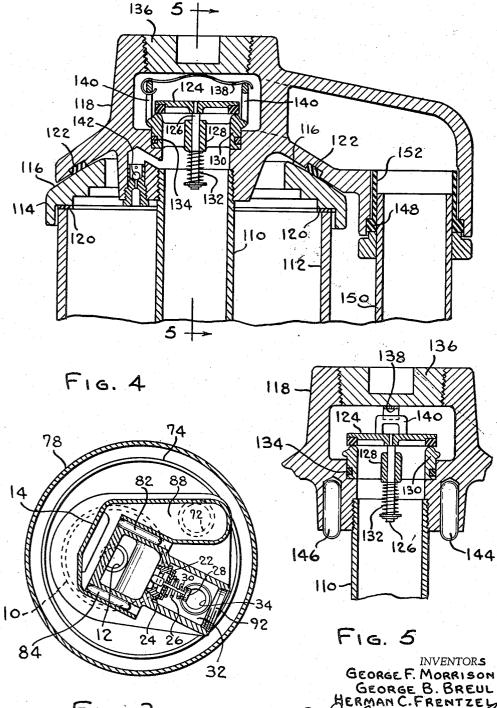


FIG. 3

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WELL SYSTEM

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22 Claims. (Cl. 166-67)

This invention relates to a pitless type water system 15 breaker hole. which is easily installed and does not complicate maintenance of the system.

In recent years the pump industry has devoted considerable attention to provision of a satisfactory pitless well system and the solutions offered to date are subject 20 to various objections. All are of such questionable nature as to be approved for residential use only. In most cases servicing the pump becomes a major problem due to the obstructions to ready access to the pump. The presently available units also call for extensive excavation, cutting 25 located below the frost line so water in the tank will and welding at the site, thus making the installation a major undertaking and precluding approval for commercial use under the sanitary codes.

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The principal object of this invention is to provide an easily installed, readily serviced pitless well system which 30 conventional float 66 connected by rod 68 to a pressure meets all sanitary code requirements.

Another object of this invention is to provide such a system at low cost.

Still another object is to provide a well cap adapter which both caps the well and connects to the pressure 35 tank.

Other objects and advantages will be pointed out in, or be apparent from, the specification and claims, as will obvious modifications of the double embodiment shown in the drawings in which:

Figure 1 is a vertical section through the well system; Figure 2 is a vertical section along line 2-2 in Figure 1;

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Figure 3 is a horizontal section along line 3-3 in Figure 1; 45

Figure 4 is a vertical section through a modified structure which has certain advantages over the first modification; and

Figure 5 is a vertical section on line 5-5 in Figure 4. Figures 1-3 show the present invention applied to a 50 submersible pump well system wherein the well casing 10 projects above grade at least 8 inches and encloses the water delivery pipe 12 connected to the outlet of the submersible pump. Cast well cap 14 is provided with a downwardly facing annular seat 16 adapted to rest on the 55 top of the well casing 10 with a suitable gasket 18 therebetween. Centrally of the cap seat 16 there is located a downwardly opening conduit 20 which is adapted to thread on the upper end of pipe 12. As may be seen in the drawing conduit 20 directs the flow past check 60 valve 22 biased to its seat 24 by spring 26 compressed between the valve and head 28 of pin 30 threaded into the valve seat member 24. Thus when the pump builds up sufficient water pressure valve 22 will be unseated to let water flow into chamber 32 in the well cap 14. Water 65 flows from chamber 32 to drain pipe 34 suitably sealed by packing 36 compressed by nut 38. Drain pipe 34 runs parallel with pump pipe 12 into fitting 40 on the top of pressure tank 42. Within the pressure tank a second drain pipe 44 is threaded in the fitting 40 and projects 70 down to a position close to the bottom of pressure tank.

The submersible pump delivering water through pipe

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12 to the well cap builds up sufficient pressure to open valve 22 and permit flow through drain pipe 34 into the pressure tank 42. When the pump is de-energized the pump delivery pipe 12 and drain pipe 34 must be drained to prevent freezing. In order to drain pipe 12 a suitable drain hole 46 is provided in the pipe below the frost line and conduit 20 is provided with snifter value 48 (which is merely a check valve permitting air to bleed from the well casing into the upper end of the pipe and into 10 conduit 20) to facilitate rapid draining of pipe 12 to a point below the frost line. Vacuum breaker hole 50 in the upper portion of pipe 44 in the air space in the pressure tank insures draining pipe 34. Thus, water can run down into the pressure tank with the air replacing it through the

The pressure tank may either be clamped on the well casing by means of top clamp 52 and bottom clamp 54 with the top clamp running around the fitting 40 and the bottom clamp holding a mounting bracket 56 on which the pressure tank may rest. Alternatively, or in addition to this mounting, the pressure tank may be welded to the well casing at 58 and 60. It will be understood, of course, that the pressure tank is largely supported by the well casing and that the bottom of the pressure tank is never freeze. The pressure tank is provided with a fitting 62 in which the pipe 64 is threaded to deliver water from the pressure tank to the house.

The water level in the pressure tank is regulated by a relief valve 70 in the top of standpipe 72 to bleed air from the system whenever the water level drops below a predetermined level. The air volume control standpipe 72 projects above grade within the ring shield 74. The pressure switch (also conventional) 76 is connected to the standpipe to control energization of the pump motor in the usual manner.

From the above description it will be apparent that the present system can be readily mounted on an existing or new well structure by merely placing the pressure tank adjacent the well casing and preferably attaching it thereto so as to properly locate tank fitting 40 for drain pipe 34. Protective cover 78 can be placed over the well cap and ring shield to completely enclose the well cap (not an air-tight covering, however). The cover is secured to the well cap by means of bolt 80.

It will be seen that the present structure locates the check valve 22 at the high point in the flow path and provides for draining of pipes 12 and 34 at the end of each pump operation. The valve 22 would, of course, be wet at the conclusion of the operation and there is, of course, some danger of the valve freezing in cold weather so that it could not open so as to prevent proper seating of the valve and, therefore, permitting pressure to bleed from tank 42. In order to guard against such freezing the well cap is provided with a thermostatically controlled heater 82. The heater is located in a bore immediately adjacent the check valve and so positioned that it will heat the well cap around the valve. It should be noted that the heater is of sheathed resistance type and about 250 watts are necessary to maintain the well cap sufficiently warm to prevent freezing of the valve. While the cost of 250 watts of power is not exorbitant a simple thermostatic bulb 84 can be mounted in the well cap immediately adjacent the valve. This bulb can be set to energize the heater whenever the bulb temperature drops below 40 degrees. Since the water flowing from the well is generally above this temperature, it will be appreciated that even in winter the heater will not be energized continuously since flowing water will heat up the well cap sufficiently to cause de-energization of the heater until the bulb has again cooled off some period of time

after deenergization of the pump. The precise structure of the thermostat bulb need not be illustrated as it is a commercially available product. Similarly the heater bulb is a commercially available product. Of course, the thermostatically controlled electric heater requires electricity and this is brought in through wire 86 to junction box 88 which is a part of the well cap. It will be appreciated there is no particular difficulty in having this electricity available since the submersible pump requires electricity and the wiring must, therefore, be at the well 10 anyhow.

Since the entire unit is in the form of the well cap it will be appreciated that it is a very simple matter to service the pump, for example, since it is only necessary to relieve the packing around pipe 34 by backing off nut 38 and 15 then lifting the well cap with pipe 12 still attached. Once clear of the drain pipe 34 pipe 12 may be gripped and cap 14 turned off the pipe whereupon the pipe can be pulled out to lift the pump out of the well. For servicing either snifter valve 48 or the check valve 22 the well 20 cap is provided with plugs 90, 92, respectively, for gaining access through the ports to the valves. Thus, it is simple to remove plug 90 and then remove the snifter valve 48 for replacement if this should be necessary. Similarly, removal of plug 92 affords direct access to the 25 above ground, a water delivery pipe within the casing, a check valve assembly which can be withdrawn through the port.

With this arrangement it is simple to install the system and there is no necessity for cutting or welding below grade which would give rise to conflict with sanitary 30 codes.

Referring now to Figures 4 and 5, the modified structure therein illustrated is designed to avoid unduly stressing the drop pipe 110 in the event casing 112 is not cut off square. If the casing in the first form is not square the 35pipe would have a considerable bending force applied to In the modified structure an adapter cap 114 is it. fitted over the top of the casing (it will be noted that the underside of cap 114 is stepped to accommodate various casing diameters) to present a spherical convex surface 40 116 upon which the concave underside of housing 118 may seat to position the pipe 110 on a true vertical and avoid all bending stress in the pipe. Suitable gaskets 120, 122 are employed respectively between the adapter and the casing and between the housing and the adapter. 45 Since the weight of the pump and pipe 110 is supported by the housing a good seal is effected.

The housing also incorporates a different check valve arrangement which is accessible from above and which is more readily heated by convected air currents rising from 50the well water (which is about 45° year round) and hence will require less electric heating. The check valve 124 is carried on stem 126 which passes through sleeve 128 carried by the support 130. Spring 132 biases the valve closed. The support has an O-ring seal 134 which seals 55 the support with respect to the housing. The support is not threaded into the housing but is retained therein by plug cap 136 bearing against spring 138 carried by bails 140 projecting above the support. Of course spring 138 is stronger than spring 132 so the valve is opened by the water pressure and the support does not move. It will be apparent that removal of the plug 136 affords access to the valve which can be removed bodily.

The housing is provided with the snifter valve 142 which is threaded into the housing from below to clarify the 65 principle of operation. To service this valve the housing would have to be raised. However, in practice this valve would be threaded in from the top side to avoid raising the housing to service the valve.

The drain valve is positioned at the top of the pipe 70 112 where convection heating of the valve may occur in winter. The thermostat bulb 144 is also positioned to be so heated in the space between the pipe and the casing. The heater 146 is similarly situated adjacent the check valve support to effectively heat the valve as needed.

Gasket 148 between the housing outlet and pipe 150 leading to the pressure tank is modified to guard against damage due to freezing. Thus the gasket has a sleeve-like extension 152 between the end of the pipe and the housing but of such thickness that it does not fill the space. If water collects in the space and then freezes it will compress the gasket rather than damage the housing.

The remainder of the structure is the same as previously described for all practical purposes. The opera-tion and theory remain the same. The two piece (Figures 4 and 5) well cap has certain advantages over the one piece cap (Figures 1-3) as does the second form of the check valve.

The simplicity of the present system resides in bringing the water above grade to a well cap containing all parts which might require service.

Although but two embodiments of the present invention have been illustrated and described, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

We claim:

1. A well system comprising a well casing projecting water pressure tank adjacent the casing and below the ground, a pipe connected to and communicating with the tank and projecting above ground, a well cap fitting over the top of the casing and the pipes, and a conduit in the cap fluidly connecting the pipes.

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2. A well system according to claim 1 including a drain hole in said delivery pipe located below the frost line, and a drain hole in the tank pipe located to drain the pipe into the tank.

3. A well system according to claim 2 in which the water flow path including the two pipes and the conduit in the cap is in the form of an inverted U, and a check valve in said flow path allowing flow from the delivery pipe to the tank pipe and preventing reversal of the flow. 4. A well system according to claim 3 in which the

check valve is located in said cap.

5. A well system according to claim 4 in which the cap is provided with a normally plugged access port for servicing the check valve.

6. A well system according to claim 5 including heating means located adjacent the check valve.

7. A well system according to claim 6 including a thermostat located in said cap and controlling energization of the heating means.

8. A well system according to claim 7 including a second check valve in the cap between the first named check valve and the delivery pipe to admit air to the delivery pipe and to close when the pressure in the delivery pipe is above atmospheric pressure.

9. A well cap comprising, a housing having a fitting adapted for connection to a well casing, a conduit within the housing and having one end terminating within said fitting and its other end communicating with the exterior of the housing exteriorly of the fitting for connection to a pipe, and a check valve in said conduit permitting flow from said one end to said other end of said conduit and preventing reversal of such flow.

10. A well cap according to claim 9 in which the conduit is provided with a port affording access to the check valve, and a closure plug for the port.

11. A well cap according to claim 9 in which the check valve is positioned so water drains away from the valve when the housing is positioned as in use with the fitting connected to the well casing.

12. A well cap according to claim 9 including another check valve located between the first named valve and said one end of said conduit to let air enter the conduit as the conduit drains.

13. A well cap according to claim 9 including an 75

electrically energized heater adjacent the valve to prevent freezing of the valve.

14. A well cap according to claim 13 including a thermostat for controlling energization of the heater.

15. A well cap according to claim 9 including seal 5 means located at said other end of said conduit.

16. A well system according to claim 1 including a check valve in said conduit for preventing flow from the tank pipe to the delivery pipe.

means for draining said pipes.

18. A well cap comprising, an annular adapter adapted to rest on a well casing, a housing adapted to rest on the adapter and having a conduit therethrough, one end of said conduit being central of said adapter and fluidly 15 seats adapted to rest on well casings of various diameters. communicating with the central opening of the adapter when the housing is on the adapter, and a check valve in said conduit allowing flow through the conduit from said one end but not to said one end.

19. A well cap according to claim 18 in which the 20 adapter has a convex upper surface and the housing has

a concave lower surface adapted to rest on the convex surface.

20. A well cap according to claim 18 in which the check valve and the seat therefor are a complete subassembly in that the valve and valve seat are a selfsupporting assembled unit and the sub-assembly is retained in the housing by spring means.

21. A well cap according to claim 20 in which the spring means acts between the sub-assembly and an ac-17. A well system according to claim 16 including 10 cess plug in the housing, removal of the plug removing the spring force on the sub-assembly and affording access thereto for removal from the housing.

22. A well cap according to claim 18 in which the adapter is provided with a plurality of concentric annular

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