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WELL SYSTEM

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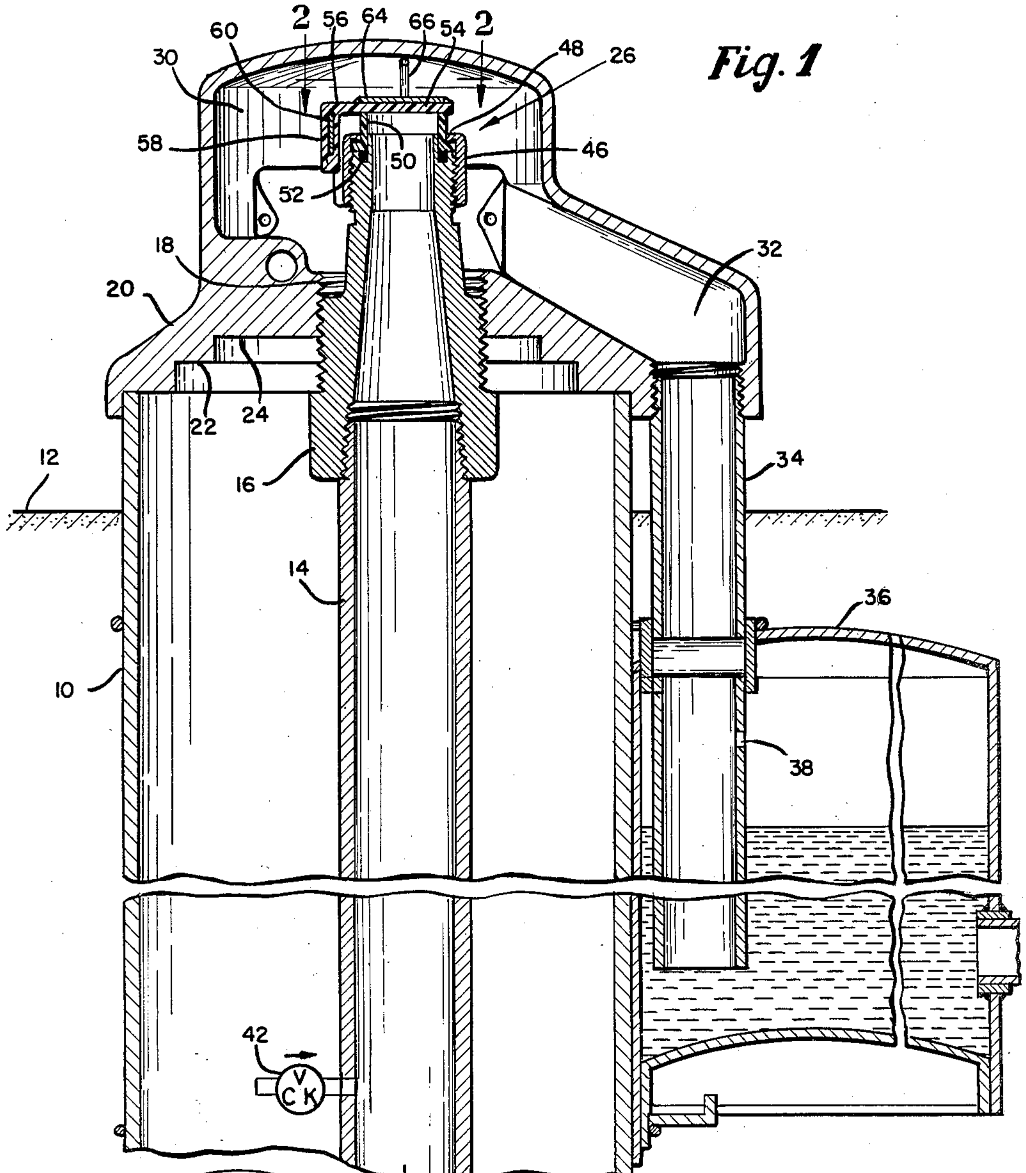

Fig. 1

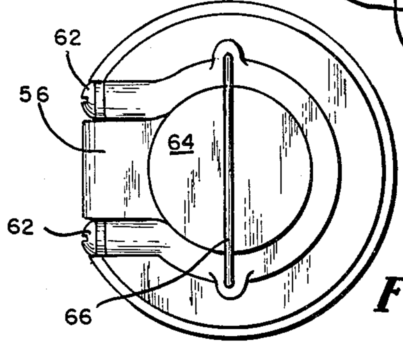

Fig. 2

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WELL SYSTEM

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This invention relates to a pitless type water system providing for above ground discharge meeting all sanitary code requirements for all well uses.

The present invention is an improvement upon Morrison et al. Patent No. 2,877,849 which provided a well system in which a housing fitting over the well casing was provided with a fitting connecting to a pump discharge pipe and providing a conduit leading outside of the housing for connection to the water delivery pipe which could run either to a buried tank or to a tank located inside the building serviced by the well. The housing was provided with a check valve which, due to its location above ground, had to be protected against freezing and for this purpose the patented structure provided a heater to keep the temperature of the check valve above freezing. If the heater was not provided the valve could freeze shut and the pump would not have sufficient pressure to open the check valve. The patented structure met with some objection by reason of the cost of running the heater and the arrangement was not fully satisfactory from the cost standpoint since the heater required additional wiring as well as the heater itself and also called for a thermostatic control for the heater.

The principal object of the present invention is to improve upon the patented well system by providing a check valve arrangement which will not freeze shut and, hence, eliminates the heater and its allied problems.

Another object of this invention is to provide a simple check valve which remains functional over an extremely wide range of temperature.

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

FIG. 1 is a vertical section through a portion of the well system with another portion of the system being shown schematically; and

FIG. 2 is a view taken as indicated by line 2—2 in FIG. 1.

Referring to the drawing in detail, the well casing **10** projects above the ground level **12** at least eight inches and encloses the pump discharge pipe **14**. The pump discharge pipe **14** is threaded into fitting **16** which, in turn, threads into the opening **18** in the well cap **20** which rests on the upper end of the well casing. As shown, the cap is resting on the largest diameter casing accommodated by the cap but it will be appreciated that smaller diameters can be accommodated at shoulders **22**, **24**. The upper end of fitting **16** is provided with a check valve **26** which permits water flowing from the pump **28** to flow into the chamber **30** and to outlet **32** in which the water delivery pipe **34** is threaded. This pipe may lead into buried tank **36** or could lead in a shallow trench to the basement of the building served by the well. As shown in FIG. 1 the discharge empties into the buried tank **36** below the level of the water in the tank. It will be appreciated the air above the water in the tank is under pressure and, hence, when the pump stops operating and check valve **26** closes the water from chamber **30** in the well cap will drain into the tank while air enters the discharge line through weep hole **38**. Thus, when the pump stops operating water is drained away from the check valve and replaced by compressed air, which of course, tends to hold the check valve on its seat.

The pump **28** has provision for the usual check valve **40** (usually a part of the pump assembly) to prevent flow down the pump discharge pipe when the pump is not operating. However, if water was allowed to stand in the pump discharge pipe above the normal frost line this water could freeze and, therefore, the pump discharge pipe is provided with a pair of vertically staggered check valves (or bleeder valves) **42**, **44** with the uppermost check valve **42** being located below the frost line. These two valves will break the vacuum in the pump discharge pipe and drain the water down to the level of the lower check or bleeder valve **44**. Thus, when the pump stops operating water is drained from both sides of the check valve.

From the foregoing it will be appreciated that water is drained from both sides of the check valve **26** which is located at the highest point in the pump delivery system. This feature is important since if water were allowed to stay on either side of this check valve the water could freeze and prevent operation of the well system. It was found in connection with the previously patented (Morrison et al. 2,877,849) well systems making similar provision for drainage from the check valve that the small amount of water remaining on the usual check valve was sufficient to freeze the valve shut without some provision for heat being applied to the valve. The present check valve **26**, however, needs no heat to prevent freezing. The present check valve eliminates the need for a heater by reason of its construction and materials. Thus, the upper end of fitting **16** and cap **20** is threaded to receive collar **46** having the inturned flange **48** which acts on the shoulder of valve seat **50** to hold the seat down against the O-ring seal **52** in the fitting. This provides a leak-proof joint between the fitting and the seat. The seat is fabricated of Teflon (tetrafluoroethylene) which is non-wettable in water and, therefore, virtually no water remains on the seat when the water is drained from both sides of the check valve **26**. The check valve assembly includes the actual valve which is a flap type fabricated of a silicon rubber disc **54** having an integral neck portion **56** which serves as a hinge and leads to the molded mounting portion **58** having a metal stiffener **60** molded therein. The mounting portion **58** is secured to the collar assembly by means of two screws **62**, **62**. The pressure side of the silicon rubber disc **54** is backed up by a metal disc **64** which merely serves to stiffen the silicon rubber disc and prevent the pressure blowing the disc downward into the fitting. The collar is also provided with a U-shaped bail **66** which limits the upward motion of the valve.

The inherent resiliency of the silicon rubber flap valve will start it towards the seat when the pump stops operating and, of course, the tank pressure will drive it home to the seat quite readily. Silicon rubber is quite difficult to wet and, hence, this, in combination with the Teflon seat, provides a valve which is practically non-wettable. The silicon rubber also has characteristics of importance in that it retains its resiliency and its good seating qualities over an extremely wide range of temperatures well beyond any that would be encountered in use. Therefore, at all operating temperatures, both high and low, the silicon rubber is sufficiently resilient to properly seat and seal the valve assembly **26**. Under freezing conditions when the pump stops operating and the lines drain from the valve there is virtually no water remaining on either the valve or the valve seat and the most that has happened in experience to date is the formation of a slight frost on the assembly which the pump pressure can readily overcome. Therefore, the present check valve assembly has eliminated the heater, the heater thermostat, and the heater wiring. In addition to all the foregoing advantages the valve itself has become a very simple, reliable construction and, due to its great simplicity, the flap valve can be fabricated for a cost quite comparable to that of the usual poppet type check valve even though relatively expensive Teflon and silicon rubber are used.

Although but one embodiment of the present invention has 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. The combination with a well system having a pump discharge pipe extending above grade and returning below grade, of a check valve located at the high point above grade, said check valve characterized by having a non-wettable valve seat of tetrafluoroethylene and a valve member of silicon rubber, and means for draining the pipe on each side of the valve.

2. A well system having a well casing rising above grade, a pump discharge pipe inside the casing, a water delivery pipe entering the ground outside the casing, a casing cap fitting over the casing and including a conduit connected to both of said pipes, a check valve in said conduit and arranged in spaced relationship from the inner walls of said casing cap, and including a valve member and a valve seat member, one of said members being non-wettable, and means for draining water from both sides of the valve.

3. A check valve assembly comprising, a valve seat of tetrafluoroethylene, and a valve having a resilient face of silicon rubber which retains its resiliency at temperatures below freezing and adapted to make sealing contact solely with the seat.

4. A check valve according to claim 3 in which the valve is a swing-type valve and is hinged by means of an integral hinge portion of rubber, and a metal plate bonded to the high pressure side of the valve.

5. The combination with a well system of the type having a pump discharge pipe rising above grade and reentering the ground, of a check valve located at the high point of the pipe, means for draining water from both sides of the check valve when the pump is not in operation, said check valve including a valve seat of non-wettable material and a valve of a resilient material which retains its resiliency at temperatures below freezing.

6. The subject matter of claim 5 in which said resilient valve is in a horizontal position when it is seated on said valve seat.

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