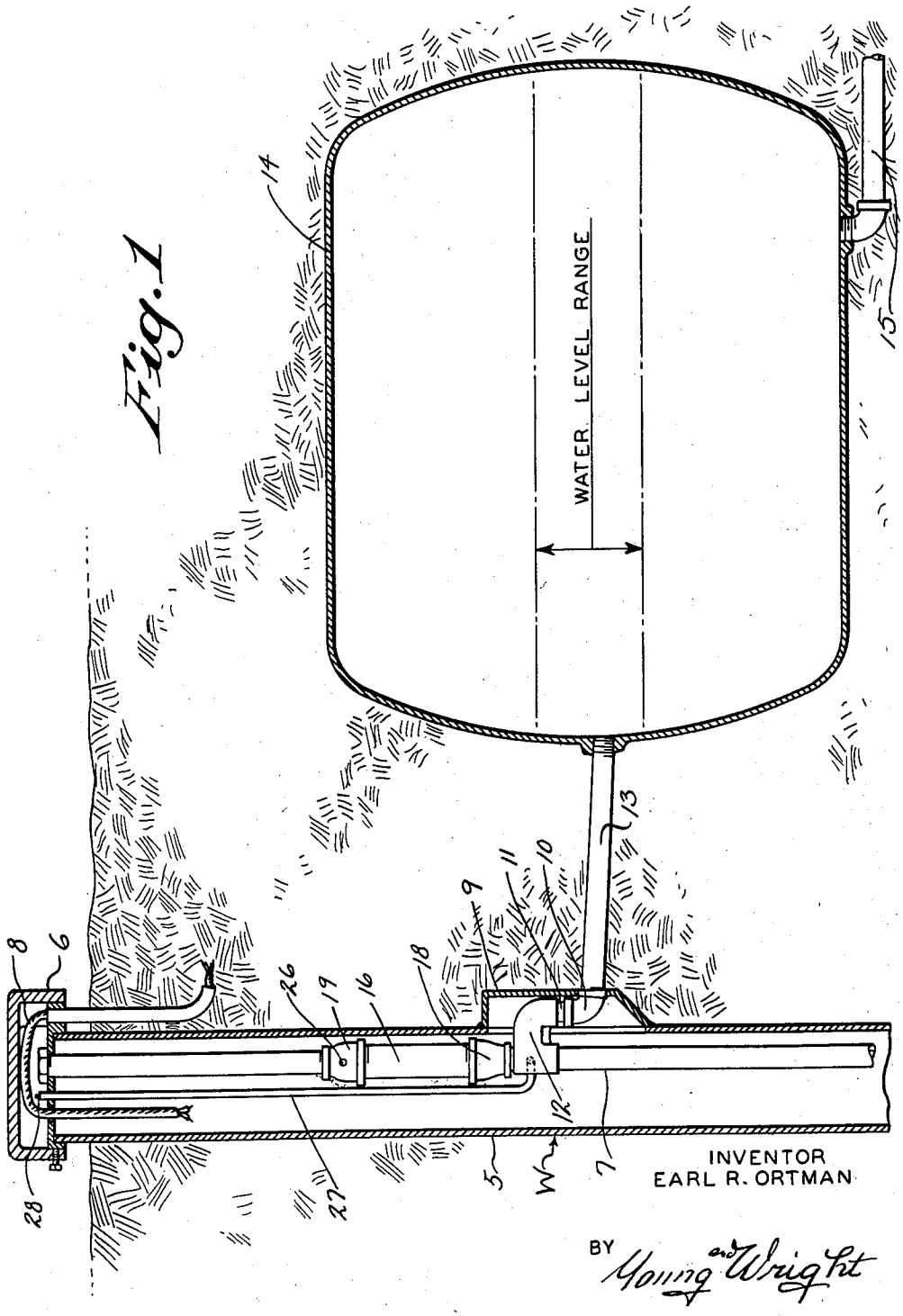
Dec. 15, 1959 E. R. ORTMAN 2,917,113

AIR UNLOADER FOR SUBMERGIBLE PUMPS

Filed March 17, 1958 2 Sheets-Sheet 1

Fig. 1



INVENTOR
EARL R. ORTMAN

BY Young and Wright

ATTORNEYS

Dec. 15, 1959 E. R. ORTMAN 2,917,113

AIR UNLOADER FOR SUBMERGIBLE PUMPS

Filed March 17, 1958 2 Sheets-Sheet 2

Fig. 2

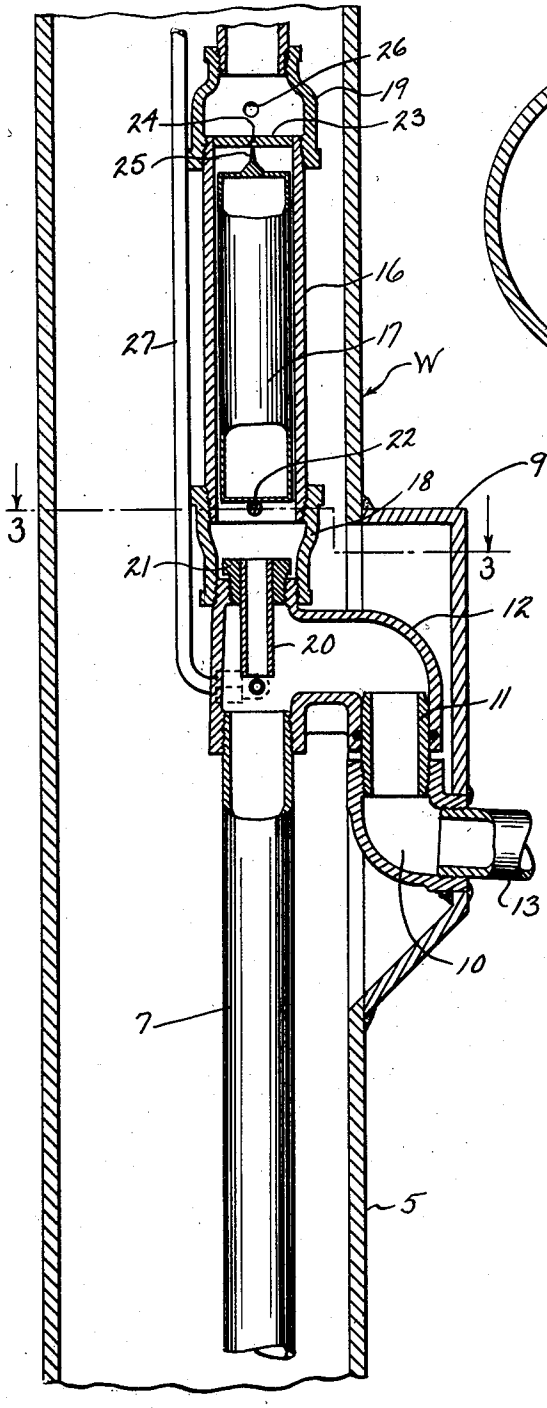


Fig. 3

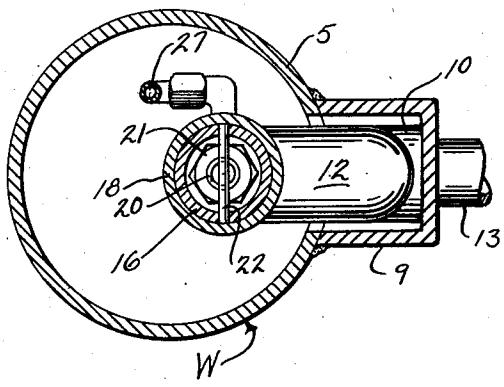
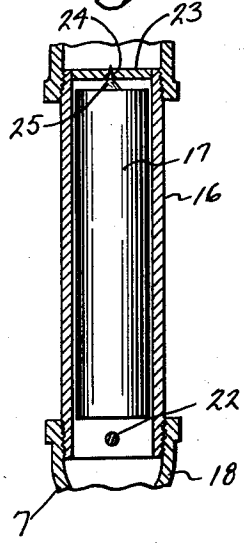


Fig. 4



INVENTOR
EARL R. ORTMAN

BY Young & Wright

ATTORNEYS

United States Patent Office 2,917,113 Patented Dec. 15, 1959

2,917,113

AIR UNLOADER FOR SUBMERGIBLE PUMPS

Earl R. Ortman, Milwaukee, Wis.

Application March 17, 1958, Serial No. 722,623

6 Claims. (Cl. 166—67)

This invention appertains to wells for the supplying of water to buildings and more particularly to well installations of the so-called pitless type, embodying a submerged pump and a buried water reservoir pressure tank, and the present invention is an improvement over my prior Patent No. 2,707,030, issued April 26, 1955.

I have found that the use of a buried pressure tank is highly desirable particularly with the use of submerged pump systems, in that the space for a storage tank in the home is saved; condensation in the home is eliminated and the water is kept at a desirable low temperature. However, much difficulty has been experienced with the maintenance of the tank with a desired volume of air for pressure purposes and the relief of an undesirable volume of air in the tank so that the tank will not become air bound.

It is, therefore, one of the primary objects of this invention to provide a simple and inexpensive means incorporated directly with the pump pipe and affected by flow of water in the pipe, incident to the operation of the pump, for relieving undue pressure in the tank.

Another salient object of my invention is to provide a float chamber or housing forming a part of the pump pipe and disposed directly above the water supply pipe leading to the tank having a valve seat for the passage of air therethrough and a float in said housing having a valve to close said seat upon the flow of water in the pump pipe to prevent the escape of water and air into the well, the float falling to the bottom of the chamber or housing when the water in the tank falls to a certain level to open said seat, and thus permit unloading of excess air from the tank.

A further important object of my invention is to provide means for permitting the forcing of air under pressure from the exterior of the well to the tank, should the tank become water logged from anything, such as lack of use of the water system for a long period of time.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described and claimed, and illustrated in the accompanying drawings, in which drawings,

Figure 1 is a vertical sectional view through the upper part of a well installation of the pitless submerged pump type with a buried pressure tank, showing my invention incorporated therewith;

Figure 2 is an enlarged fragmentary detail vertical sectional view through the well casing and pump pipe showing my air unloader incorporated with the well pipe;

Figure 3 is a horizontal sectional view through the well casing and pump pipe taken on the line 3—3 of Figure 2, looking in the direction of the arrows, and

Figure 4 is a detail vertical sectional view through the pump pipe showing the float chamber or housing incorporated therewith, the float in said chamber being shown in its raised position to close the valve seat.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the latter W indicates a well installation embodying one of the preferred forms of my invention.

As illustrated, the well installation W includes a casing 5 preferably formed from a plurality of casing sections. The casing 5 protrudes above the ground a predetermined distance according to a particular State Code for wells, and the upper end of the casing 5 is closed and sealed by a removable cap 6. The cap 6 has attached thereto a depending pump pipe 7 leading from the submerged pump (not shown). The pump and its motor are of a type now commonly found on the open market. Also connected with the cap 6 is a conduit for the electric cable 8 leading to the pump motor.

As set forth in my mentioned patent, the casing 5 below the frost level is provided with a laterally extending box or casing 9. This box or casing has welded thereto an angle pipe joint 10, and this joint carries a nipple 11. The pump pipe 7 intermediate its ends is provided with a T-coupling 12 and one arm of the T-coupling receives the nipple 11 and forms in conjunction therewith a slip joint. In accordance with this invention, a water supply pipe 13 for the building leads to a water reservoir tank 14. This tank is buried in the ground below the frost level and the bottom of the tank has communicating therewith a pipe 15 which leads to a residence or other building, not shown.

It is to be noted that the water supply pipe 13 inclines downwardly from the elbow joint 10 to the tank 14. Also in accordance with my invention, the pump pipe 7 has incorporated therewith directly above the coupling 12 a cylindrical housing 16 for a hollow float 17. The hollow float is preferably formed from a non-rusting metal, such as brass, copper or the like. The housing 16 is preferably of a greater diameter than the diameter of the pump pipe 7 and consequently, the housing 16 is connected with the upper arm of the T-coupling 12 by a reducing coupling 18. The upper end of the housing 16 is connected by a similar reducing coupling 19 with the adjacent section of the pump pipe. As the pump pipe is connected with the cap 6, the entire pump pipe and the pump can be pulled from the top of the well casing by first pulling up on the pump pipe to disengage the T-coupling from the nipple 11 and then by moving the pump pipe laterally and then upwardly. Below the housing 16 I preferably utilize a short section of pipe or tube 20, which in effect functions as a water baffle and this tube 20 is carried by a threaded sleeve 21 which is threaded into the upper arm of the T-coupling 12.

In normal operation of the system, when the pump is functioning, water flows from the well up the well pipe through the T-coupling 12 into the supply pipe 13 and then into the tank. A certain amount of water will flow through the tube 20 and into the housing 16 and this flow of water will effect the float 17.

The float 17 is of an elongated cylindrical shape and its downward movement is limited by a cross pin 22 which extends through the lower end of the housing 16. The upper end of the housing 16 is closed by a plate 23 and the axial center of this plate is provided with a tapered opening 24 constituting a valve seat. The upper end of the float 17 has formed thereon or secured thereto a needle valve 24 which is adapted to enter and close this seat at certain times, as will later appear. The needle valve is tapered to facilitate its entrance into the seat and the needle valve increases in diameter to form a substantially conical base to also help in shutting off the valve seat. It is to be noted that the upper reducing nipple 19 is provided with a vent opening 26.

By referring to Figure 1 of the drawings, it is to be noted that the water level range in the tank 14 is slightly above and below the water supply pipe 13, and air trapped in the tank is placed under pressure when the water level rises in the tank. It can be seen that when the water level falls below the pipe 13 that air can escape from the tank.

The float 17 is in its raised position when the water level in the tank 14 is above the supply pipe 13. This maintains water in the cylinder 16. When the water pump starts, water and trapped air in the pump pipe 7 are forced into the tank 14. As air accumulates in the tank 14 water level lowers to a point slightly lower than pipe 13, allowing the water to flow downward through pipe 13 into the tank 14. This lowers the float 17 and the valve seat 24 is uncovered. This permits the escape of excess air from the tank back into the well. When the tank pressure has lowered sufficiently and the water pump starts, water rises into the cylinder 16 raising the float and closing the valve seat. Water with trapped air will again be forced into the tank 14.

Should the tank 14 become water logged from any reason, I have made provision for positively charging the tank with air under pressure. This means includes a tube 27, which is carried by and extends through the plate or cap 6. The lower end of the tube communicates with the T-coupling 12 just below the baffle tube 20. The upper end of the tube 27 carries a normally closed valve 28 of the type utilized on automobile tires and referred to as the "Schroeder" type valve. Thus, an air conducting hose leading from an air pressure tank can be connected to the tube 27 and air under pressure can be forced into the tank.

Various changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

1. In a well of the pitless submerged pump type, a well casing, a pump pipe extending longitudinally of the casing, a water reservoir pressure tank disposed adjacent to the well casing and buried in the ground, a water supply pipe communicating with the pump pipe and with the tank intermediate the bottom and top of said tank, a housing connected with said pump pipe directly above the connection of the water supply pipe with the pump pipe, a float in said housing affected by the height of the water in the tank and flow of water through the pump and supply pipes, said housing having at its upper end a closure member provided with a valve seat for the flow of air therethrough and said float having at its upper end a valve for closing said seat when the float is raised by the level of water in the tank and flow of water through the pump pipe.

2. In a well of the pitless submerged pump type, a well casing, a pump pipe extending longitudinally of the casing, a water reservoir pressure tank disposed adjacent to the well casing and buried in the ground, a water supply pipe communicating with the pump pipe and with the tank intermediate the bottom and top of said tank, a housing connected with said pump pipe directly above the connection of the water supply pipe with the pump pipe, a float in said housing affected by the height of the water in the tank and flow of water through the pump and supply pipes, said housing having at its upper end a closure member provided with a valve seat for the flow of air therethrough, said float having at its upper end a valve for closing said seat when the float is raised by the level of the water in the tank and flow of water through the pump pipe, and means for positively charging the tank with air under pressure.

3. In a well of the pitless submerged pump type, a well casing. a pump pipe extending longitudinally of the casing, a water reservoir pressure tank disposed adjacent to the well casing and buried in the ground, a water supply pipe communicating with the pump pipe and with the tank intermediate the bottom and top of said tank, a housing connected with said pump pipe directly above the connection of the water supply pipe with the pump pipe, a float in said housing affected by the height of the water in the tank and the flow of water through the pump and supply pipes, said housing having at its upper end a closure member provided with a valve seat for the flow of air therethrough, said float having at its upper end

a valve for closing said seat, when the float is raised by the level of the water in the tank and flow of water through the pump pipe, and means for positively charging the tank with air under pressure from the top of the well casing.

4. In a well of the pitless submerged pump type, a well casing, a pump pipe extending longitudinally of the casing, a water reservoir pressure tank disposed adjacent to the well casing and buried in the ground, a water supply pipe communicating with the pump pipe and with the tank intermediate the bottom and top of said tank, a housing connected with said pump pipe directly above the connection of the water supply pipe with the pump pipe, a float in said housing affected by the height of the water in the tank and the flow of water through the pump and supply pipes, said housing having at its upper end a closure member provided with a valve seat for the flow of air therethrough, said float having at its upper end a valve for closing said seat when the float is raised by the flow of water through the pump pipe, and means for positively charging the tank with air under pressure from the top of the well casing, including a tube communicating with the pump pipe below the housing, said tube extending above the upper end of the well casing and a normally closed valve carried by the upper end of said tube.

5. In a well of the pitless submerged pump type, a well casing, a pump pipe in said casing and extending longitudinally thereof, a buried water reservoir pressure tank disposed adjacent to the well casing, a water supply pipe communicating with the tank at a point intermediate the upper and lower portions of said tank, means connecting the water supply pipe with the pump pipe including a T-coupling having vertically aligned arms and a lateral arm, the lowermost of the vertically aligned arms communicating with the pump pipe, a housing communicating with the uppermost of the vertically aligned arms, a float affected by the level of the water in the tank and the flow of water in the pump pipe in said housing, a closure plate for the upper end of said housing having a valve seat for the passage of air therethrough and a valve carried by said float adapted to close said seat when the float is affected by the flow of water in said pump pipe, said float lowering to unseat the valve when the water level in the tank reaches a point below the supply pipe whereby to permit the escape of excess air from the tank.

6. In a well of the pitless submerged pump type, a well casing, a pump pipe in said casing and extending longitudinally thereof, a buried water reservoir pressure tank disposed adjacent to the well casing, a water supply pipe communicating with the tank at a point intermediate the upper and lower portions of said tank, means connecting the water supply pipe with the pump pipe including a T-coupling having vertically aligned arms and a lateral arm, the lowermost of the vertically aligned arms communicating with the pump pipe, a housing communicating with the uppermost of the vertically aligned arms, a float affected by the height of water in the tank and the flow of water in the pump pipe in said housing, a closure plate for the upper end of said housing having a valve seat for the passage of air therethrough, a valve carried by said float adapted to close said seat when the float is affected by the level of the water in the tank and the flow of water in said pump pipe, and a baffle tube of smaller diameter than the pump pipe connected with the pump pipe and extending downwardly from said housing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,657,637	Baker	Nov. 3, 1953
2,787,220	Patterson et al.	Apr. 2, 1957
2,807,214	Patterson	Sept. 24, 1957