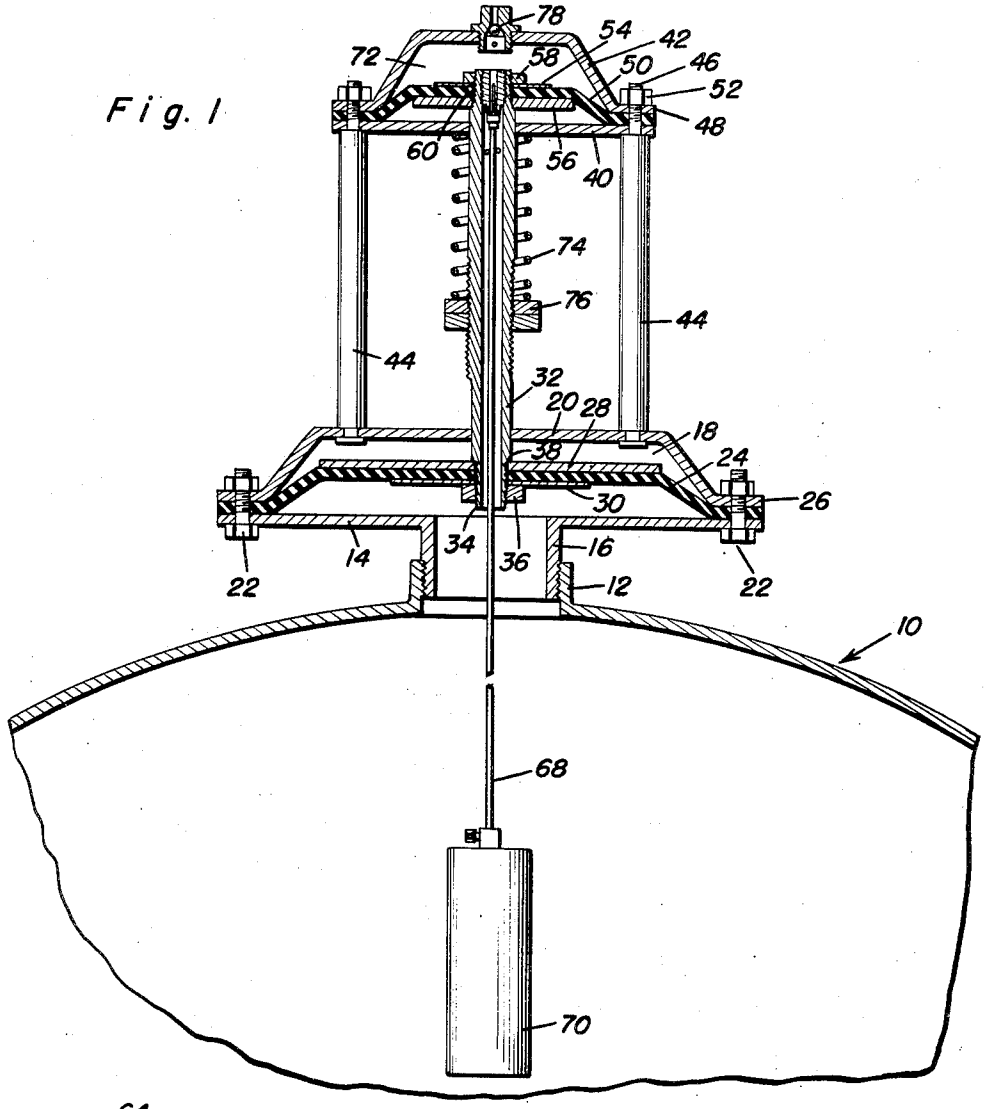
Sept. 1, 1953 E. C. AMIDON 2,650,606

LEVEL CONTROLLER

Filed Oct. 10, 1952

Fig. 1



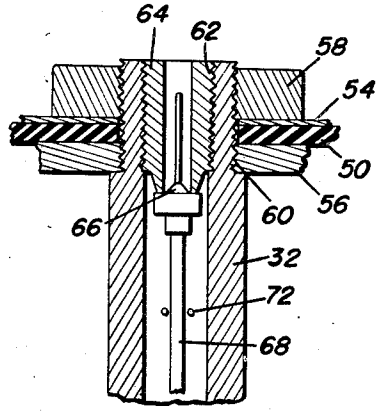


Fig. 2

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LEVEL CONTROLLER

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6 Claims. (Cl. 137—209)

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This invention relates to the class of pressure regulators and more particularly to a novel means for maintaining the required air pressure in the water tank of a water supply system.

In a pressure tank of the type on which the device comprising the present invention is adapted to be installed, the water or other fluid contained therein is under a cushion of compressed air maintained between the usually desired limits of 20 pounds per square inch and 40 pounds per square inch pressure. As water is withdrawn from the tank the water level drops with a corresponding expansion and reduction of pressure of the air cushion. If the water supply and air pressure are thus reduced to below the lower limit of 20 pounds per square inch, the pump is automatically started and the water in the tank is replenished to a predetermined quantity to thus form an air cushion of 40 pounds per square inch pressure. As air is lost by absorption into the water, and for other reasons, the air cushion in the tank must be charged. It is therefore the primary object of the present invention to provide a pressure regulator which will recharge the tank to thus prevent such from becoming water-logged which is simple in construction, formed from very few parts, easy to manufacture and assemble, and which is highly efficient in operation.

These, together with various ancillary objects of the invention which will become apparent as the following description proceeds, are attained by this level controller, a preferred embodiment of which has been illustrated in the accompanying drawings, by way of example only, wherein:

Figure 1 is a vertical sectional view showing the level controller in operative implacement on a water tank; and

Figure 2 is an enlarged sectional detail view showing in greatest detail some of the important elements of the invention.

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, reference numeral 10 is used to generally designate a pressure tank in which water under pressure is adapted to be contained. Such tank 10 has connected to it a supply system for fluid which is pumped into the tank in a conventional manner. Discharge outlets are provided at the base of the tank for removal of the water. At the top of the tank 10 there is provided a threaded neck portion 12 to which the base plate 14 having a depending nipple 16 is secured.

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The base plate 14 forms a portion of a first chamber 18 and is secured to an upper plate 20 by means of bolts 22. The bolts 22 extend through a first diaphragm 24 which is secured within the first chamber 18 about its periphery and held in place by the depending flange 26 of the plate 20. The diaphragm 24 is provided with an upper plate 28 and a lower plate 30. A hollow tubular member 32 extends through the diaphragm 24 and upper and lower plates 28 and 30, respectively. The tubular member is threaded as at 34 and is held in locked position by means of nut 36 pressing the lower plate 30 so as to urge the upper portion of the upper plate against an annular shoulder 38 formed on the tubular member 32. The tubular member extends upwardly through the base plate 40 of a second chamber. Cooperating with the base plate 40 to form the second chamber is a cover plate 42. A plurality of supporting rods 44 which are secured at one end thereof to the plate 20 are provided with threaded portions 46 at the other end thereof which extend through the base plate 40 and the cover plate 42. Between the base plate 40 and the cover plate 42 and held in place by the depending flange 48 of the cover plate 42 is a second diaphragm 50. Nuts 52 are used to insure an air tight seal between the base plate 40 and the cover plate 42 and the diaphragm 50. The diaphragm 50 is so constructed as to leave a minimum of air space between the cover plate 42 and the diaphragm 50. The diaphragm 50 has an upper and lower plate 54 and 56, respectively, and firmly engaged with these plates and held in place by retaining nut 58 is the tube 42 which is threaded as at 60. The tubular member 32 is also internally threaded as at 62 for reception of a plug 64 forming a part of a valve assembly 66 to which a depending rod 68 is affixed. A float 70 is adjustably secured to the end of the rod 68. Guides 72 are formed in the tube 32 for insuring and guiding the travel of the rod 68 so as to insure proper seating of the valve 66.

In operation with the automatic electric switch on the supply pump set for limits of 20 pounds per square inch to 40 pounds per square inch pressure, as water is used the water level in the tank will drop until the pressure of the air cushion above the water is reduced to 20 pounds per square inch. The pump will then be activated and pump more water into the tank until the air in the tank has reached the pressure of 40 pounds per square inch and the pump has been stopped by the automatic switch. During this

process air in the tank will pass up the nipple 16 and exert pressure on the diaphragm 24 which will lift the tubular member 32 so as to activate the diaphragm 50 decreasing the volume of the upper portion 72 of the second chamber and thus forcing air through the hollow tube 32 back into the tank 10. As water is used and the pressure falls to 20 pounds per square inch, a spring 74 extending between and resiliently engaging the plate 40 and a collar 76 formed from two lock nuts screwed on the tubular member 32 will force the tubular member 32 downwardly. When the diaphragm 50 thus moves downwardly, the volume of the portion 72 of the second chamber will increase thus opening check valve 78 which is actuated by the atmospheric pressure thus filling the portion 72 of the chamber. When the supply pump is again started the process would be repeated and put more air into the tank.

In the event too much air was forced into the tank the water level would lower and the float 70 would be suspended thus causing the valve 66 to open filling the space 72 with air from the tank under pressure preventing air from the outside from entering. After the tank was used for a period the water would gradually rise until the float was again submerged and the valve 66 closed.

Accordingly, it can be readily seen that this simple device will prevent a tank for fluids under pressure from becoming water-logged, an unsatisfactory condition caused by lack of the proper quantity of air in the tank. Since from the foregoing the construction and advantages of this level controller are readily apparent, further description is believed to be unnecesary. However, since numerous modifications will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not intended to limit the invention to the precise embodiment shown and described, but various modifications and equivalents may be restorted to within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A fluid level controller for use in pressure storage tanks comprising a first chamber adapted to be secured to a tank and open to gaseous pressure in said tank, a first diaphragm in said chamber, a hollow tubular member extending through said first diaphragm and open to the gaseous pressure in said tank, a second chamber, a plurality of support members extending between said chambers, said support members being terminally secured to said chambers, a second diaphragm in said second chamber dividing said second chamber into a first and a second pressure portion, a check valve on said second chamber adapted to open said first pressure portion to atmospheric pressure, said tubular member extending through said second diaphragm and adapted to communicate with said first pressure portion, a relief valve, the valve seat of said relief valve being carried by said tubular member, a rod having a float attached at one end thereof, said rod being secured to said valve, said relief valve being activated to open said tubular member to said first pressure portion upon downward movement of said float upon removal of a predetermined quantity of liquid from said tank.

2. A fluid level controller for use in pressure storage tanks comprising a first chamber adapted to be secured to a tank and open to gaseous pressure in said tank, a first diaphragm in said chamber, a hollow tubular member extending through said first diaphragm and open to the gaseous pressure in said tank, a second chamber, a plurality of support members extending between said chambers, said support members being terminally secured to said chambers, a second diaphragm in said second chamber dividing said second chamber into a first and a second pressure portion, a check valve on said second chamber adapted to open said first pressure portion to atmospheric pressure, said tubular member extending through said second diaphragm and adapted to communicate with said first pressure portion, a relief valve, the valve seat of said relief valve being carried by said tubular member, a rod having a float attached at one end thereof, said rod being secured to said valve, said relief valve being activated to open said tubular member to said first pressure portion upon downward movement of said float upon removal of a predetermined quantity of liquid from said tank, and spring means continuously biasing said tubular member to close said relief valve.

3. A fluid level controller for use in pressure storage tanks comprising a first chamber adapted to be secured to a tank and open to gaseous pressure in said tank, a first diaphragm in said chamber, a hollow tubular member extending through said first diaphragm and open to the gaseous pressure in said tank, a second chamber, a plurality of support members extending between said chambers, said support members being terminally secured to said chambers, a second diaphragm in said second chamber dividing said second chamber into a first and a second pressure portion, a check valve on said second chamber adapted to open said first pressure portion to atmospheric pressure, said tubular member extending through said second diaphragm and adapted to communicate with said first pressure portion, a relief valve, the valve seat of said relief valve being carried by said tubular member, a rod having a float attached at one end thereof, said rod being secured to said valve, said relief valve being activated to open said tubular member to said first pressure portion upon downward movement of said float upon removal of a predetermined quantity of liquid from said tank, an annular collar secured about said tubular member, and a spring coaxial with said tubular member biasing said collar and said second chamber.

4. A fluid level controller for use in pressure storage tanks comprising a first chamber adapted to be secured to a tank and open to gaseous pressure in said tank, a first diaphragm in said chamber, a hollow tubular member extending through said first diaphragm and open to the gaseous pressure in said tank, a second chamber, a plurality of support members extending between said chambers, said support members being terminally secured to said chambers, a second diaphragm in said second chamber dividing said second chamber into a first and a second pressure portion, a check valve on said second chamber adapted to open said first pressure portion to atmospheric pressure, said tubular member extending through said second diaphragm and adapted to communicate with said first pressure portion, a relief valve, the valve seat of said relief valve being carried by said tubular member, a rod having a float attached at one end thereof, said rod being secured to said valve, said relief valve being activated to open said

tubular member to said first pressure portion upon downward movement of said float upon removal of a predetermined quantity of liquid from said tank, said support members extending through said second diaphragm, and means engaging said support members securing said second chamber and said second diaphragm to said support members.

5. A fluid level controller for use in pressure storage tanks comprising a first chamber adapted to be secured to a tank and open to gaseous pressure in said tank, a first diaphragm in said chamber, a hollow tubular member extending through said first diaphragm and open to the gaseous pressure in said tank, a second chamber, a plurality of support members extending between said chambers, said support members being terminally secured to said chambers, a second diaphragm in said second chamber dividing said second chamber into a first and a second pressure portion, a check valve on said second chamber adapted to open said first pressure portion to atmospheric pressure, said tubular member extending through said second diaphragm and adapted to communicate with said first pressure portion, a relief valve, the valve seat of said relief valve being carried by said tubular member, a rod having a float attached at one end thereof, said rod being secured to said valve, said relief valve being activated to open said tubular member to said first pressure portion upon downward movement of said float upon removal of a predetermined quantity of liquid from said tank, said support members extending through said second diaphragm, and means engaging said support members securing said second chamber and said second diaphragm to said support members, an annular collar secured about said tubular member, and a spring coaxial with said tubular member biasing said collar and said second chamber.

6. A fluid level controller for use in pressure storage tanks comprising a first chamber adapted to be secured to a tank and open to gaseous pressure in said tank, a first diaphragm in said chamber, a hollow tubular member extending through said first diaphragm and open to the gaseous pressure in said tank, a second chamber, a plurality of support members extending between said chambers, said support members being terminally secured to said chamber, a second diaphragm in said second chamber dividing said second chamber into a first and a second pressure portion, a check valve on said second chamber adapted to open said first pressure portion to atmospheric pressure, said tubular member extending through said second diaphragm and adapted to communicate with said first pressure portion, a relief valve, the valve seat of said relief valve being carried by said tubular member, a rod having a float attached at one end thereof, said rod being secured to said valve, said relief valve being activated to open said tubular member to said first pressure portion upon downward movement of said float upon removal of a predetermined quantity of liquid from said tank, and guides in said tubular member, said rod extending between said guides.

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