An automatic water shutoff system for filling water tanks on concrete mixer trucks, including a nozzle assembly attached to a water hose. The nozzle assembly includes a first elongated tube surrounded by a second shorter tube. A flange closes the proximal end of the second tube and forms an air chamber between the first and second tubes. The end of the first tube closest to the flange forms a water inlet nipple. An air pressure sensing tap is formed by a small tube passing through the flange. One end of the tap communicates with the air chamber and a second end of the tap is attachable to an air pressure sensing tube, operatively coupled to a pressure switch. When pressure in the air chamber reaches a predetermined, water tank full level, the pressure switch causes the pump or valve to turn off the flow of water into the tank.
FIG. 4
AUTOMATIC WATER SHUTOFF SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to fluid handling apparatus and more particularly to an automatic water shut off system for use in preventing overfilling of the water tanks on concrete mixing trucks.

[0003] 2. Description of the Related Art

[0004] Concrete mixer trucks usually carry a water supply tank for washing down the truck and chute or mixing with the concrete load in the mixer. The water supply tank is manually filled. An operator places a hose in the tank and opens a valve or starts a pump to supply water to the tank. A frequent problem with this procedure is that after the water supply has been turned on, the operator for a myriad of reasons leaves the filling area to do other things while the tank is filling or otherwise gets distracted. By the time the operator returns to shut off the water, hundreds of gallons of water will have overflowed the water tank. Besides the wasted hot water, the overflowing water damages the concrete driveways where filling takes place.

[0005] Methods and systems for automatically controlling the flow of liquids into containers in the prior art have taken many forms, for example, U.S. Pat. No. 5,755,256 issued May 26, 1998 to Eldson et al. teaches an automatic shutoff fueling system for use with nozzles having an automatic shutoff valve therein. Nozzle extension and quieting tube arrangements extend into the tank so that they are in close proximity to the bottom of the tank to reduce the impact of fuel foaming which causes false shut offs of the fuel flowing into the tank. The lower end of a shutoff tube extension, mounted within a quieting tube defines a full fill level for the tank.

[0006] U.S. Pat. No. 6,154,144 issued Nov. 28, 2000 to Johnson discloses an automatic shutoff overflow controller engaged between a source of power and a water processing device (such as a washing machine). When an undesirable high liquid level is sensed by a conductive electrodes of a probe an audible warning is produced and power to the water processing device is shut off, thereby stopping the flow of liquid.

[0007] In U.S. Pat. No. 5,141,019 issued Aug. 25, 1992 to LeBlanc et al. a two stage automatic shutoff valve is disclosed. Two float controlled valves are sequentially actuated during the filling process to control the flow of liquid into an underground tank.

[0008] None of the above inventions and patents, taken either singularly or in combination, is seen to describe the instant invention as claimed. Thus a automatic water shutoff system solving the aforementioned problems is desired.

SUMMARY OF THE INVENTION

[0009] The invention is an automatic water shut off system for preventing the overfilling of water tanks on concrete mixer trucks. The system includes a nozzle assembly adapted for connection to a water supply hose, an electrically actuated water supply means (which may be a valve or pump) for controlling the supply of water to the hose, a control box means for initiating and stopping the water supply means and a pressure switch operatively coupled to the nozzle assembly and the control box means for actuating the water supply means to shut off the supply of water to the hose when the tank is full.

[0010] The nozzle assembly includes stop flange secured around a water supply tube adjacent one end thereof to form a water supply nozzle on one side of the flange and a water inlet nipple on the other side of the flange. The water supply hose is secured by a clamp to the water inlet nipple.

[0011] A second tube of larger diameter and smaller length surrounds the water supply nozzle and is secured to the stop flange so as to form an air chamber between the two tubes. A third tube is secured in an aperture passing through the flange in communication with the air chamber between the first and second tubes. This third tube forms an air pressure sensing tap. An air pressure sensing line in the form of a flexible plastic tube communicates the pressure within the air chamber of the nozzle assembly to the pressure switch. The switch controls the supply of power to the pump or electrically actuated valve. The nozzle assembly is inserted within the fill neck of the water tank so that the stop flange engages the mouth of the water tank. When the filling water reaches the level of the air chamber opening, air is trapped within the air chamber and the pressure exerted by the liquid on the trapped air inside the air chamber is communicated to the pressure switch which actuates the valve or pump to shut off water flow into the tank.

[0012] Accordingly, it is a principal object of the invention to it is another object of the invention to provide an automatic water shut off system for preventing the overfilling of water tanks on concrete mixer trucks.

[0013] It is a further object of the invention to provide an automatic water shut off system that does not rely on anyone to shut it off.

[0014] It is an object of the invention to provide improved elements and arrangements thereof for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

[0015] These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is an environmental, perspective view of a nozzle assembly for an automatic water shutoff system inserted into a water tank of a concrete truck, according to the present invention.

[0017] FIG. 2 is a perspective view of a nozzle assembly according to the present invention.

[0018] FIG. 3 is an end view of the nozzle assembly showing the air chamber and pressure sensing tap according to the present invention.

[0019] FIG. 4 is a diagram of the automatic water shut-off system with the nozzle assembly inserted into the neck of a water tank, according to the present invention.

[0020] FIG. 5 is an electrical schematic of a water pump control circuit which includes a pressure actuated switch, according to the present invention.
[0021] FIG. 6 is a diagram of an automatic water shut-off system including a water pump, according to the present invention.

[0022] FIG. 7 is a diagram of an automatic water shut-off system including an electrically actuated valve, according to the present invention.

[0023] FIG. 8 is a electrical schematic of an electrically actuated valve control circuit including a pressure actuated switch assembly.

[0024] Similar reference characters denote corresponding features consistently throughout the attached drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] FIG. 1 shows the nozzle assembly of the automatic water shut off system of the present invention placed in the water tank of a concrete truck for preventing the overflow. The automatic water shut off system as illustrated in FIG. 4 includes a nozzle assembly 19 adapted for connection to a water supply hose 28, an electrically actuated water supply means 30 which may be a valve 43 or pump 37 for controlling the supply of water to the hose 28, a control box means 38 for initiating and stopping the water supply means 30 and a pressure switch 31 operatively coupled to the nozzle assembly 19 and the control box means 31 for actuating the water supply means 30 to shut the supply of water to the hose 28 when the tank 16 is at a full level 18.

[0026] The nozzle assembly 19 includes stop flange 26 secured around a water supply tube adjacent one end thereof to form a water supply nozzle 20 on one side of the flange 26 and a water inlet nipple 21 on the other side of the flange 26. The water supply hose 28 is secured by a clamp 41 (see FIGS. 6 and 7) to the water inlet nipple 21. A second tube 22 of larger diameter and smaller length surrounds the water supply nozzle 20 and is secured to the stop flange 26 so as to form an air chamber 24 between the two tubes which extend along the nozzle 20 to a point adjacent the nozzle opening 23. A third tube is secured in an aperture 25 passing through the flange 26 in communication with the air chamber 24 between the first and second tubes. The third tube forms an air pressure sensing tap 27.

[0027] An air pressure sensing line 35 in the form of a flexible plastic tube communicates the pressure within the air chamber 24 of the nozzle assembly 19 to the pressure switch 31. The switch 31 controls the supply of power to the pump 37 or electrically actuated valve 43.

[0028] The nozzle assembly 19 is inserted within the fill neck 17 of the water tank 16 so that the stop flange 26 engages the mouth of the water tank 16. When the filling water reaches the level of the air chamber opening 24, air is trapped within the air chamber 24a and the pressure exerted by the liquid in the tank 16 on the trapped air inside the air chamber 24a is communicated to the pressure switch 31 which actuates the valve 43 or pump 37 to shut off flow of water into the tank 16.

[0029] FIG. 5 illustrates schematically a control box for use when a pump 32 is used as the water supply means 30. Pressure switch 31 is placed in a series circuit including a normally closed stop switch SW2, a normally open start switch SW1, a motor switch 32 and motor overload contacts 33a, 33b and 33c. When switch SW1 is closed, the motor switch closes a motor switch contact MS1 which keeps power supplied to the motor switch 32 when switch SW1 is released.

[0030] The pump 37 is activated to supply water to the tank 16 until switch SW2 is opened to shut off the power to the motor switch 32. However, when the level 18 in the tank reaches full, pressure switch 31 is activated to shut off power to the pump motor switch 32.

[0031] Likewise, FIG. 8 shows the schematic of a control box when an electrically actuated valve 43 is used as the water supply means 30. In this case the valve control circuit includes a solenoid switch or relay 34 instead of the motor switch 32 of FIG. 5. Also contacts 36a and 36b of the solenoid switch or relay remain closed after the start switch SW1 is released. Power to actuate the valve 43 is supplied to the actuator coil L1 through solenoid switch or relay contact 36a.

[0032] When the pressure switch 31 is opened, power to the valve control circuit is cut off and water flow is terminated.

[0033] The nozzle assembly 19 and pressure switch 31 can be provide for use on existing water control systems. FIG. 6 shows how these elements are connected. An electric line 40 is operatively coupled into the control box 38 in the manner as shown in FIG. 5 to stop pump 37 when the tank 16 is full. FIG. 7 shows the pressure switch 31 installed within the control box 38 for shutting off valve 43 when the tank 16 is full. Also shown in FIGS. 6 and 7 are cable ties 42 securing the flexible air pressure sensing line 35 along the hose 28 in an orderly fashion.

[0034] It is to be understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

We claim:
1. A automatic water shutoff system for preventing the overflow of containers comprising:
a nozzle assembly adapted for connection to a liquid supply hose, said nozzle assembly including chamber means for forming a column of air which is pressurized by liquid in the container above a predetermined level;
an electrically actuated liquid supply means for controlling the supply of liquid to the liquid supply hose;
control box means for electrically actuating the liquid supply means;
and
means responsive to the pressure of the air within the chamber means, the pressure responsive means being operatively coupled to the nozzle assembly and the control box means for actuating the liquid supply means to shut off the supply of liquid to the hose when liquid within the container is at a full level
2. The automatic water shutoff system according to claim 1, wherein said nozzle assembly comprises:
a stop flange secured around a first water supply tube adjacent one end thereof to form a water supply nozzle on one side of said flange and a water inlet nipple on the other side of said flange;
said chamber means includes a second tube of larger diameter and smaller length surrounding said nozzle and secured to said stop flange so as to form an air chamber containing said column of air; and

3. The automatic water shut-off system according to claim 1, wherein said electrically actuated liquid supply means comprises a water pump assembly.

4. The automatic water shut-off system according to claim 1, wherein said electrically actuated liquid supply means comprises an electrically actuated valve assembly.

5. The automatic water shut-off system according to claim 1, wherein said pressure responsive means is in the form of a pressure responsive switch assembly.

6. The automatic water shut-off system according to claim 2, wherein said pressure responsive means is in the form of a pressure responsive switch assembly.

7. The automatic water shut-off system according to claim 3, wherein said pressure responsive means includes a pressure responsive switch assembly operatively connected to a circuit in said control box means for turning said water pump assembly on and off.

8. The automatic water shut-off system according to claim 4, wherein said pressure responsive means includes a pressure responsive switch assembly operatively connected to a circuit in the control box means for opening and closing said valve assembly.

9. The automatic water shut-off system according to claim 2, wherein said electrically actuated liquid supply means comprises a water pump assembly.

10. The automatic water shut-off system according to claim 2, wherein said electrically actuated liquid supply means comprises an electrically actuated valve assembly.

11. The automatic water shut-off system according to claim 9, wherein said pressure responsive means includes a pressure responsive switch assembly operatively connected to a circuit in said control box means for turning said water pump assembly on and off.

12. The automatic water shut-off system according to claim 10, wherein said pressure responsive means includes a pressure responsive switch assembly operatively connected to a circuit in the control box means for opening and closing said valve assembly.

13. An automatic water shut-off system for preventing the overfilling of containers comprising:

a nozzle assembly adapted for connection to a liquid supply hose, said nozzle assembly including chamber means for forming a column of air which is pressurized by liquid in the container above a predetermined level; and

means responsive to the pressure of the air within the chamber means, the pressure responsive means being operatively coupled to the nozzle assembly.

14. The automatic water shut-off system according to claim 13, wherein said nozzle assembly comprises:

a stop flange secured around a first water supply tube adjacent one end thereof to form a water supply nozzle on one side of said flange and a water inlet nipple on the other side of said flange;

said chamber means includes a second tube of larger diameter and smaller length surrounding said nozzle and secured to said stop flange so as to form an air chamber containing said column of air; and

a third tube is secured within an aperture passing through said stop flange for communicating with said column of air within said chamber, wherein said third tube forms an air pressure sensing tap.

15. The automatic water shut-off system according to claim 13, wherein said pressure responsive means is in the form of a pressure responsive switch assembly.

16. The automatic water shut-off system according to claim 14, wherein said pressure responsive means is in the form of a pressure responsive switch assembly.

17. The automatic water shut-off system according to claim 16, including a flexible tube operatively connected to said pressure sensing tap and said pressure responsive switch assembly.

18. The automatic water shut-off system according to claim 16, including a flexible tube operatively connected to said pressure sensing tap and said pressure responsive switch assembly.

19. A nozzle assembly adapted for connection to a liquid supply hose, said nozzle assembly including chamber means for forming a column of air which may be pressurized by a rising liquid level in a container into which the nozzle assembly is placed, wherein said chamber means includes a pressure sensing tap.

20. A nozzle assembly according to claim 19, wherein said nozzle assembly comprises:

a stop flange secured around a first water supply tube adjacent one end thereof to form a water supply nozzle on one side of said flange and a water inlet nipple on the other side of said flange;

said chamber means includes a second tube of larger diameter and smaller length surrounding said water supply nozzle and secured to said stop flange so as to form an air chamber containing said column of air; and

a third tube is secured within an aperture passing through said stop flange for communicating with said column of air within said chamber, wherein said third tube forms said air pressure sensing tap.

* * * * *