FLUID TREATING METHOD AND APPARATUS


Application March 2, 1954, Serial No. 413,525
8 Claims. (Cl. 137—101.11)

This invention relates to an improved method and apparatus for introducing treating chemicals or the like into a closed flow line and at predetermined rate proportionate to the fluid flow in such line it being understood that the expression “fluid” as herein used means “liquid” and not gas.

Although the invention, as hereinabove characterized, is applicable to fluid for lines generally, it is especially suitable for use in the treatment of water for various purposes, whether in open or closed flow systems, and particularly the latter.

For instance, the invention finds a field of especial utility in effecting the introduction of scale and corrosion control chemicals into the water supply of such as cooling tower-incorporating air-conditioning systems to thus prolong the life of the equipment unincorporated therein. This of course, is just by way of example as will be appreciated by those versed in the water treatment art.

Briefly and generally stated the invention has for its primary object to provide a novel method and apparatus for fluid treatment in general and water treatment in particular, which involves the principle of treating material feed to a fluid line proportionate to the rate of flow therein, and which treating material feed is controlled by gravity-like displacement of the treating material effected by fluid taken from said line.

Additionally the invention contemplates a novel method and apparatus for this purpose which is automatic in operation and wherein the apparatus is simple, inexpensive and long lived.

Various other objects and advantages of the invention will be readily apparent to those versed in the art as the now preferred example is explained, reference being had to the accompanying drawing. It is to be understood, however, that the disclosures contained in this specification and in the drawing are to be taken as illustrative rather thanlimitative, since various changes and modifications may be made within the spirit and scope of the subject matter claimed hereinafter.

In the drawings, wherein the same reference characters have been used to designate the same parts, wherever they appear in the several views—

Figure 1 is an elevational view, largely diagrammatic and partly broken and partly in section, showing application of the invention to a cooling tower-incorporating air conditioning system;

Figure 2 is a view in broken longitudinal section showing the treating fluid container and its supporting means, and also the flow-fluid-receiving vessel which is supported by the treatment fluid and controls the supply of the latter to a flow fluid line;

Figure 3 is a cross-sectional view taken on the line 3—3 of Figure 2; and

Figure 4 is another cross-sectional view taken on the line 4—4 of Figure 2.

Referring to the drawing by reference characters, the cooling tower of a conventional air-conditioning system is fragmentarily shown and indicated by numeral 8, said tower providing the bottom 12, the front wall 13 and the customary downwardly directed spray nozzles 9. Through these spray nozzles 9, water from the system is discharged and collected, as at 11, in the supply basin 10 which is provided in or defined by, the bottom of said cooling tower 8.

As illustrated, the water 11 which is employed in the air-conditioning system is initially taken from the supply basin 10 of tower 8 by pipe 14 leading through the front tower wall 13, said pipe 14 being connected to the suction side of the pump 15. Pump 15 discharges, as usual, into the pipe or riser 16 which supplies water to the spray nozzles 9.

As indicated earlier herein, the object of the present invention as applied to air-conditioning apparatus is to supply acid or other appropriate rust and corrosion-controlling chemical to the water supply line of the apparatus and in proportion to the rate of flow of water therethrough. Thus it is possible to effectively guard against the occurrence of rust or corrosion in the equipment, while at the same time avoiding waste of the treating chemical or damage to the apparatus as the result of an oversupply of such chemical.

In carrying out the invention, the T-coupling 17 which is located in the water supply line or riser 16 has the reduced laterally extending outlet branch 18 from which leads the pipe 19 which discharges into the bottom inlet portion 20 of what may be a conventional filter of the “upflow” type having the top outlet 22. Filter 21 has the valve-controlled sediment outlet 21a in its bottom as indicated.

The filtered water taken from the supply line or riser 16 passes from the filter 21 through the top outlet 22, pipe 23, elbow 24, pipe 25 and through the conventional check valve 26 which prevents back flow of fluid toward the filter 21.

From the check valve 26 the water from the supply line or riser 16 passes to the water-carrying bottle 38 by way of a pipe 27, elbow 28, pipe 29, valve casing 30 and connections 31, 32, 33 and 35.

Valve casing 30 has a conventional needle valve (not shown) but controlled as at 30a to regulate the flow of water into the bottle 38. Regulation of the water flow to bottle 38 is important as will be presently understood.

Referring back to the piping from valve 30 to the water-receiving bottle 38, the pipe 33 may and preferably does take the form of a length of rubber tubing as at 34 to the reduction 32 of the valve-carried pipe 31. The other end of the rubber tubing length 33 is frictioned over the outer end of the glass tube 35 which is tightly fitted in one of the two passages which extend through the rubber cork 36 which is located in the neck 37 of said bottle 38.

The second passage through the stopper 36 has tightly fitted therein another length of glass tubing 39, the outer end of which has frictioned thereon the length of what may be rubber tubing 40 whose lower end discharges into the basin 10. The thus provided line 39, 40 from water bottle 38 serves as an air vent and also as an overflow line when bottle 38 is full.

In carrying out the invention it will be noted from an inspection of Figures 1, 2 and 4, that the water-receiving bottle 38 is received in the open top of a cross-sectionally larger tank 41 so as to leave the surrounding space 43. The tank 41 is initially charged with a predetermined quantity of acid or other chemical 42 for injection into the water circuit of the air-conditioner or other apparatus. The acid tank 41 will necessarily be of lead or other material which is immeasurable to acid attack, that is when the injection chemical is an acid.

The acid tank 41, as shown in Figures 1 and 2 is carried by the front wall 13 of the cooling tower 8, being
supported by the socket-form bracket 44 having a short front wall 44a and the higher rear wall 44b, which latter is secured by screws or the like 45 to the front wall of the cooling tower 8 or other support.

Figures 1 and 2 show the acid tank 41 as having the rearwardly projecting discharge nipple 46 which provides the outlet 47, such nipple 46 being located adjacent the open top of the acid jar or container 41.

The base 47 of the nipple 46 of the acid tank or jar 41 is connected by pipe 48 with the pipe 49 which latter, as indicated in Figure 1, discharges downwardly into the open topped wooden box 50 which has the upstanding side walls 50a. This box is supported by legs 51 rising from the basin 10 in the bottom 12 of the cooling tower 8.

When acid is used the pipes 48, 49 will be of plastic or other material which is impervious to acid.

Clips or the like 52, 52a may be secured to the inner surface of the front wall 13 of the cooling tower 8 and to the side 56 of the wooden box 50 so as to dispose the pipes 49 in proper position for discharge into said box.

The reason for the use of the wooden box 50 is that undiluted acid must not be discharged to direct contact with metal, here the basin 10 provided at the bottom 12 of cooling tower 8. Water from the spray nozzles 9 dilutes the acid in wooden box 50 and results in the overflow of the diluted acid into the tower-provided water supply basin 10.

The operation of the apparatus will now be described.

First a sufficient quantity of acid 42 or other treatment fluid is put in the tank or jar 41 so that the weight of the empty water bottle 38 will elevate the level of said acid 42 in tank 41 to a point just below the plane of the acid outlet passage 47 in tank nipple 46.

Then the pump 15 is started and water from the cooling tower-provided supply basin 10 of Figure 1 is drawn by said pump 15 through pipe 16 and is forced as usual, up the riser 10 to ultimately pass to spray nozzles 9. A quantity of the flow of water from riser 10, depending upon the rate of flow therethrough and the setting of needle valve 30, 31, is forced by pump 15 into the water-receiving bottle 38 by way of line 19, filter 23, check valve 26 and the line 31, 33 and 35.

As water flows into the bottle 38 it sinks in the acid tank or jar 41 causing the level of acid 42 to rise therein so that a quantity of acid proportionate to the amount of water collected in the bottle 38 will pass through the nipple passage 47 and pipe 48, 47 down into the wooden box 50 and thence in diluted form by the spray nozzles 9 induced overflow into the water supply basin 10 in the bottom 12 of the cooling tower 8.

Experience will tell the supervisor of the cooling system when the supply of acid must be renewed in the jar 41, and the relative sizes of the water bottle 38 and acid tank 41 will ordinarily be such that when the water bottle 38 is full the acid supply will be exhausted. But in any event no further discharge of acid through the nipple 47 into pipe 45 will take place until the water bottle 38 has been filled; and of course will be replenished when that time has been reached an overflow of water from the bottle will pass into the basin 10 in the bottom of the cooling tower by way of the tube 39 and pipe 49 as mentioned hereinafore.

The invention having been described, what I claim is:

1. Apparatus for supplying a second or treating liquid to a first, or flow line liquid in proportion to the rate of flow of the latter and comprising in combination, a first liquid source, a conduit line communicating with said first liquid source, and through which said first liquid flows under pressure, a bleed line communicating with said first liquid conduit line, a closed first liquid-receiving vessel and into the upper portion of which said bleed line discharges, an open topped second liquid-containing tank and cross-sectionally oversized with respect to said first liquid-receiving vessel, the first liquid-receiving vessel supported by the second liquid in said tank and freely movable up and down in the latter, said tank having a second liquid outlet in one upstanding wall short of its upper end, the weight of the first liquid-receiving vessel when empty adapted to bring the second liquid level up to a point just below the plane of the second liquid outlet of said tank, a second liquid conduit leading from said tank outlet to said first liquid source, and a combined venting and overflow pipe leading from the upper portion of said first liquid-receiving vessel and communicating with said first liquid source.

2. Apparatus for supplying a second or acid type treating liquid to a first, or flow line liquid in proportion to the rate of flow of the latter and comprising in combination, a first liquid source, a conduit line communicating with said first liquid source and through which said first fluid flows under pressure, a bleed line communicating with said first liquid conduit line, a closed first liquid-receiving vessel and into the upper portion of which said bleed line discharges, an open topped second liquid-containing tank and cross-sectionally oversized with respect to said first liquid-receiving vessel, the first liquid-receiving vessel supported by the second liquid in said tank and freely movable up and down in the latter, said tank having a second liquid outlet in one upstanding wall short of its upper end, the weight of the first liquid-receiving vessel when empty adapted to bring the second liquid level up to a point just below the plane of the second liquid outlet of said tank, a tray-like container formed of material which is impervious to acid and disposed in said first liquid source above the level of first fluid in the latter, means controlled by first liquid flow in said conduit line for supplying first liquid to said tray-like container to overflow therefrom to said first liquid source, and a second liquid conduit leading from said tank outlet and also discharging into said tray-like container whereby diluted second liquid overflowes from the latter to said first liquid source.

3. The combination set forth in claim 2, and a flow-regulating valve in said first liquid bleed line.

4. The combination set forth in claim 3, and a flow-regulating valve in said first liquid bleed line.

5. Apparatus for supplying a second or acid type treating liquid to a first, or flow line liquid in proportion to the rate of flow of the latter and comprising in combination, a first liquid source, a conduit line communicating with said first liquid source and through which said first liquid flows under pressure, a bleed line communicating with said first liquid conduit line, a closed first liquid-receiving vessel and into the upper portion of which said bleed line discharges, an open topped second liquid-containing tank and cross-sectionally oversized with respect to said first liquid-receiving vessel, the first liquid-receiving vessel supported by the second liquid in said tank and freely movable up and down in the latter, said tank having a second liquid outlet in one upstanding wall short of its upper end, the weight of the first liquid-receiving vessel when empty adapted to bring the second liquid level up to a point just below the plane of the second liquid outlet of said tank, a tray-like container formed of material which is impervious to acid and disposed in said first liquid source above the level of first fluid in the latter, means controlled by first liquid flow in said conduit line for supplying first liquid to said tray-like container to overflow therefrom to said first liquid source, and a combined venting and overflow pipe leading from the upper portion of said first liquid-receiving vessel and communicating with said first liquid source.

6. The combination set forth in claim 1, and wherein the first liquid is water and the first liquid conduit line is the water-supply line of a cooling tower-incorporating air-conditioning apparatus, the first liquid source being a
basin provided in the lower portion of the cooling tower into which first liquid is supplied from said conduit line by spray means from above, and a bracket carried by said cooling tower and removably supporting said second liquid tank.

7. The combination set forth in claim 2, and wherein the first liquid is water and the first liquid conduit line is the water-supply line of a cooling tower-incorporating air-conditioning apparatus, the first liquid source being a basin provided in the lower portion of the cooling tower into which first liquid is supplied from said conduit line by spray means from above, and the spray means of said cooling tower being the means controlled by the first liquid flow in said conduit line for supplying the first liquid to said tray-like container.

8. The combination set forth in claim 5, and wherein the first liquid is water and the first liquid conduit line is the water-supply line of a cooling tower-incorporating air-conditioning apparatus, the first liquid source being a basin provided in the lower portion of the cooling tower into which first liquid is supplied from said conduit line by spray means from above, the spray means of said cooling tower being the means controlled by the first liquid flow in said conduit line for supplying first liquid to said tray-like container, and a bracket carried by said cooling tower and removably supporting said second liquid tank.

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