July 9, 1940. W. H. HINSCH 2,207,378

FLOATING ORIFICE FOR FLUID TREATMENT APPARATUS

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Fig. 1.

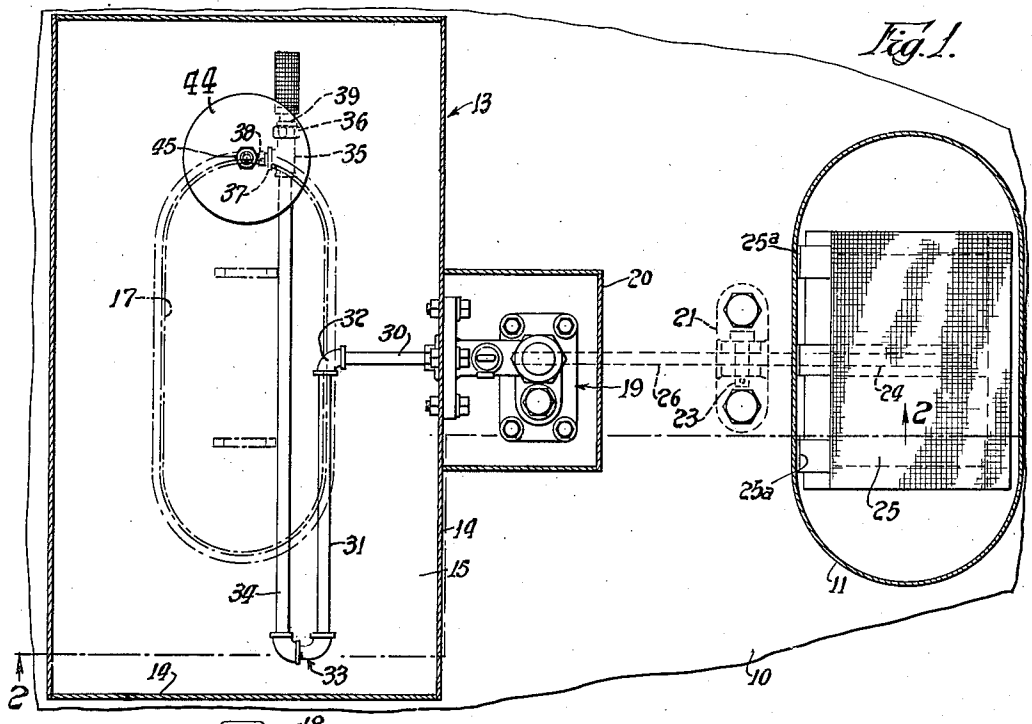



Fig. 2.

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Fig. 3.

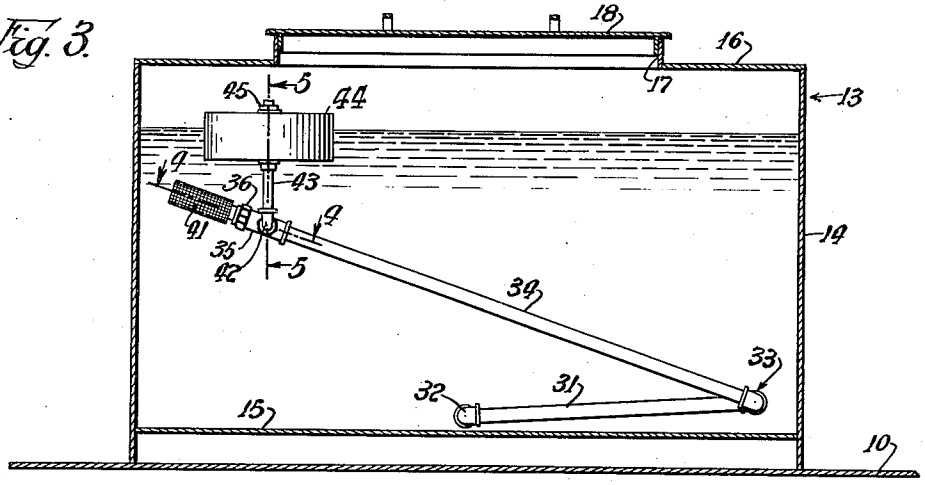



Fig. 4.

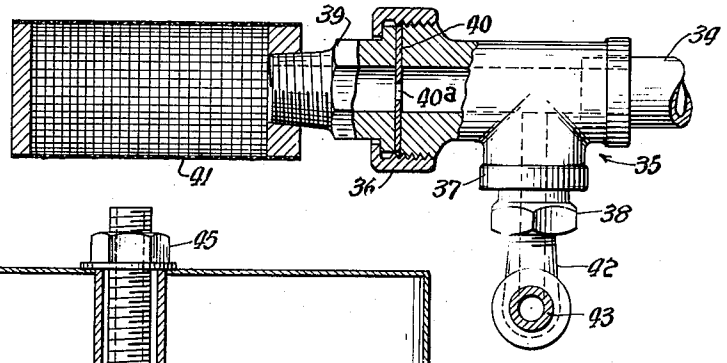
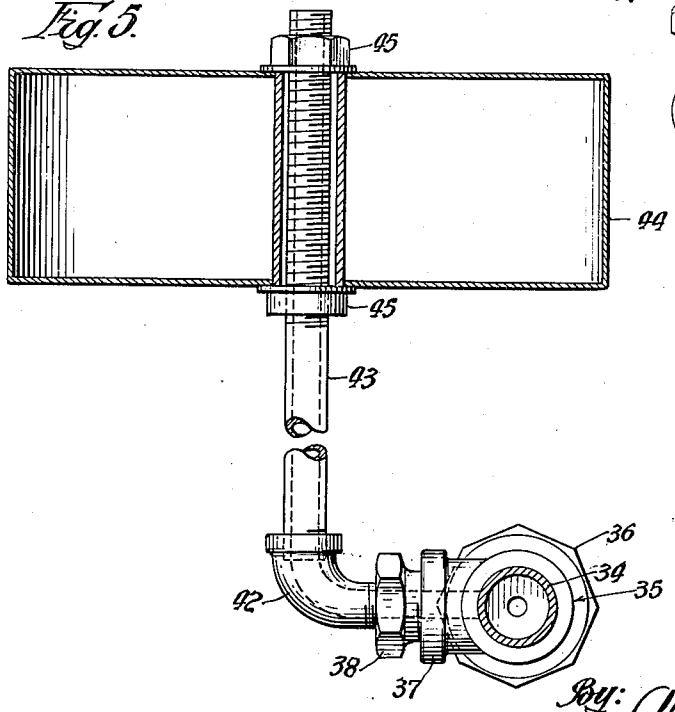



Fig. 5.




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# UNITED STATES PATENT OFFICE

2,207,378

## FLOATING ORIFICE FOR FLUID TREATMENT APPARATUS

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Application April 22, 1938, Serial No. 203,717

3 Claims. (Cl. 137—21)

This invention relates to improvements in floating orifice for fluid treatment apparatus and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

The improved floating orifice is more especially adapted for use in connection with fluid treatment apparatus including a supply tank or holder for the reagent material and a means for controlling the flow of reagent from the supply tank into the treatment tank, the flow controlling means in turn being controlled by the passage of the fluid to be treated, into the treatment tank. With apparatus of this kind as heretofore made, a drop or fall in the rate of discharge of reagent occurs and corresponds with the drop or fall in the level of the reagent in the supply tank, it being apparent that the head pressure of such reagent diminishes with the falling level of reagent due to its use. With such apparatus, it is apparent that the treatment is not uniform because when the reagent has a high level in the supply tank, a higher head pressure and a more rapid flow of reagent results than when the reagent has a low level in the tank.

One of the objects of the present invention is to provide means whereby the inlet orifice for the reagent supply is caused to remain submerged a predetermined distance beneath the surface or the level of the reagent to produce that flow pressure or head desired for the necessary rate of discharge for the reagent and to maintain that flow pressure or head substantially constant independent of the fall of the level or surface of the reagent, thereby insuring a uniform rate of discharge of reagent.

Another object of the invention is to provide a floating orifice arrangement wherein it is possible to prevent the formation of a vacuous condition in the reagent conduit so that so soon as the conduit is opened the reagent instantly flows therethrough without a lag or a holding back of the reagent, thus assisting in providing for more uniformity in treatment.

A further object of the invention is to provide a floating orifice arrangement which is more practical for use in connection with the tender tank of steam locomotives and is unaffected by the surging of the reagent due to lateral motion when the tender and locomotive are under way.

The above-mentioned objects of the invention as well as other, together with the advantages thereof will more fully appear as the specification proceeds.

Fig. 1 is a fragmentary top plan view of a part of the tender tank of a locomotive equipped with a water treating apparatus in which the improved floating orifice arrangement is embodied.

Fig. 2 is a vertical sectional view through parts appearing in Fig. 1 as taken on the line 2—2 thereof.

Fig. 3 is a transverse vertical sectional view through parts appearing in Fig. 2 as taken on the line 3—3 thereof.

Fig. 4 is a substantially horizontal detail sectional view, on an enlarged scale, as taken on the line 4—4 of Fig. 3.

Fig. 5 is a vertical detail sectional view through parts shown in Fig. 3 as taken on the line 5—5 of Fig. 3.

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawings, 10 indicates the top wall of the tender tank of a steam locomotive in a part of which is provided an upright tubular member 11. This member forms the manhole through which untreated water, as from a wayside column or the like, is discharged into the tank in the usual manner. Parts of the tubular member 11 extend above and below the top wall 10. A cover 12 is hinged to that part of the member extending above the wall 10 whereby the manhole may be closed.

13 indicates a reagent supply tank supported upon the wall 10 forwardly of the manhole. This tank is of a greater dimension transversely of the wall 10 than longitudinally of the same. It includes upright side and end walls 14, a bottom wall 15 and a top wall 16 in which is a filler opening 17 closed by a cover 18. As shown in Fig. 1 the filler opening 17 is elongated transversely of the wall 10.

A valve 19 is secured to the central bottom portion of the tank 13 and to the adjacent portion of the tank wall 10 and which valve controls the discharge or flow of reagent from the tank 13 into the tender tank. To protect this valve against damage and tampering, it may be enclosed in a box-like housing 20 as appears in Figs. 1 and 2.

A fulcrum bracket 21 depends from the top wall 10 at a point between the member 11 and tank 13. A lever 22 is pivoted at a point 23 between its ends to the bracket. An arm 24 of said lever extends rearwardly to engage a foraminous panel 25 pivoted at 25a to the bottom edge of the front wall of the member 11. The other arm 26 of said lever carries a spring seat member 27 for engagement with the depending stem 28 of the valve mechanism in the casing of the valve 19.

A spring 29 is arranged between the seat 27 and the bottom of the valve to prevent such a rocking movement of lever as will actuate the valve mechanism in the valve 19 due to rough road bed conditions. In taking on untreated water for the tank, when such water is discharged into the manhole 11, it engages the member 25 which will depress said member and rock the lever 22 to open the valve 19.

In the tank 13 is located the improved floating orifice construction made as follows: 30 indicates a pipe extending longitudinally of the tank wall 10 in the median line thereof which is coincident with the like line of the tank 13. One end of the pipe is connected to the inlet side of the valve 19. A second pipe 31 which extends transversely of the tank 13 is connected at one end by an elbow 32 to the other end of the pipe 30. The other end of the pipe 31 has a loose swing joint connection 33 with one end of a third pipe 34 arranged parallel with the pipe 31. The other end of the pipe 34 carries a T fitting 35 having one end adapted to receive a union nut 36 and also having a lateral boss 37 for receiving a reducing pipe bushing 38.

A fitting 39 is associated with the fitting 35 and is secured to the same by the nut 36 before mentioned and a disk 40 is clamped in place between the associated ends of the fittings 35 and 39 respectively.

An orifice 40*a* is provided in this disk and the size thereof determines the amount or volume of the reagent which is permitted to enter the pipe 34. A strainer 41 is carried by the fitting 39 to prevent the entrance of enlarged particles into the pipes 34—31 and 30 which might damage the mechanism in the valve 19.

An elbow 42 has a loose swing joint connection at one end with the bushing 38 and a relatively long pipe nipple or tube 43 is connected to the other end of the elbow 42. This nipple extends axially through a float 44 and nuts 45 are threaded on said nipple to engage against opposite sides or ends of the float whereby the float is secured to the nipple.

When the desired amount of liquid reagent is provided in the tank 13, the float 44 will float on the surface thereof and will hold or support the fitting 35 at that distance below said surface as determined by the length of the nipple 43 and thereby fixes the pressure or head of the liquid reagent on the orifice 40*a*.

When the mechanism in the valve 19 is actuated to open the same, reagent will pass through the strainer 41 and orifice 40*a* into the pipes 34—31—30 into and through the valve 19 and into the water contained in the tender tank. As the level of the liquid reagent falls, the float 44 falls therewith, the pipe 34 swinging about the swing joint connection 33, the float always maintaining the fitting 35 with orifice 40*a* the same distance below the surface or level of the reagent supply so that the "head" of the reagent remains constant, regardless of the height of the level of the reagent in the tank.

When the valve 19 is closed, the pipes 30—31—34 and fittings 35 and 39 remain filled with liquid reagent. The next time the valve 19 is opened, air may enter the pipe 34 through the nipple 43 to provide atmospheric pressure in the column of liquid in said pipes and fittings so that no vacuous condition can develop in the pipe that would hold back the flow of reagent.

With the structure described there is a constant head provided against the orifice thereby assuring a uniform rate of flow of reagent from the tank at any level of the reagent therein. By the provision of the nipple 43 which constitutes an air bleeder, no vacuous condition arises in the pipes and fittings mentioned so that there is no lag in the flow of reagent once the valve 19 is opened.

The improved orifice arrangement is simple in construction and positive in its operation for its intended purpose.

While in describing the invention I have referred in detail to the form, arrangement and construction of the parts thereof, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically pointed out in the appended claims.

I claim as my invention:

1. In combination with means for holding a supply of liquid and having an outlet, a conduit having one end connected to said outlet for a relative movement, means providing an inlet associated with the free end of the conduit and which end is adapted to be submerged in said liquid to a depth providing a predetermined flow pressure head at said inlet, a T fitting attached to the free end of the conduit, said T fitting having a lateral boss, a pipe bushing in the boss, an upstanding tubular nipple having a swing joint connection with the bushing, a float having an opening therein through which the upper end of the nipple projects, means for securing the nipple in the float with its upper end terminating above the float and in communication with the atmosphere, a member at the end of the T fitting and communicating axially therewith, a perforated disk providing an orifice located between the member and the end of the T fitting, and clamping means for the member and the fitting to hold the disk in position therebetween.

2. In combination with means for holding a supply of liquid and having an outlet, a conduit having one end connected to said outlet for a relative movement, means providing an inlet orifice associated with the other end of the conduit and which inlet orifice is adapted to be submerged in said liquid to a depth providing a predetermined flow pressure head at said inlet orifice, a single float member in said liquid and arranged to rise and fall with the level thereof, and means connecting said float to said conduit for moving the same in a manner maintaining the flow pressure head at said inlet orifice substantially constant, said connecting means comprising a tubular member passing upwardly through the float and secured therein with its free end projecting through the float member in communication with the atmosphere and having a swing joint connection with the conduit whereby during the rise and fall of the float the conduit will be at all times supplied with air.

3. In combination with means for holding a supply of liquid and having an outlet, a conduit having a swing joint connection at one end with said outlet, a fitting secured to the other end of said conduit, means carried by said fitting and providing an inlet orifice for said end of the conduit, a unitary float member having a vertical opening therethrough and tubular means secured in said opening of the float and having a swing joint connection with said fitting and providing for the entrance of atmospheric air therethrough.

WALTER H. HINSCH.