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N. K. STENBERG

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FLUID DISPENSER

Filed Nov. 4, 1957

2 Sheets-Sheet 1

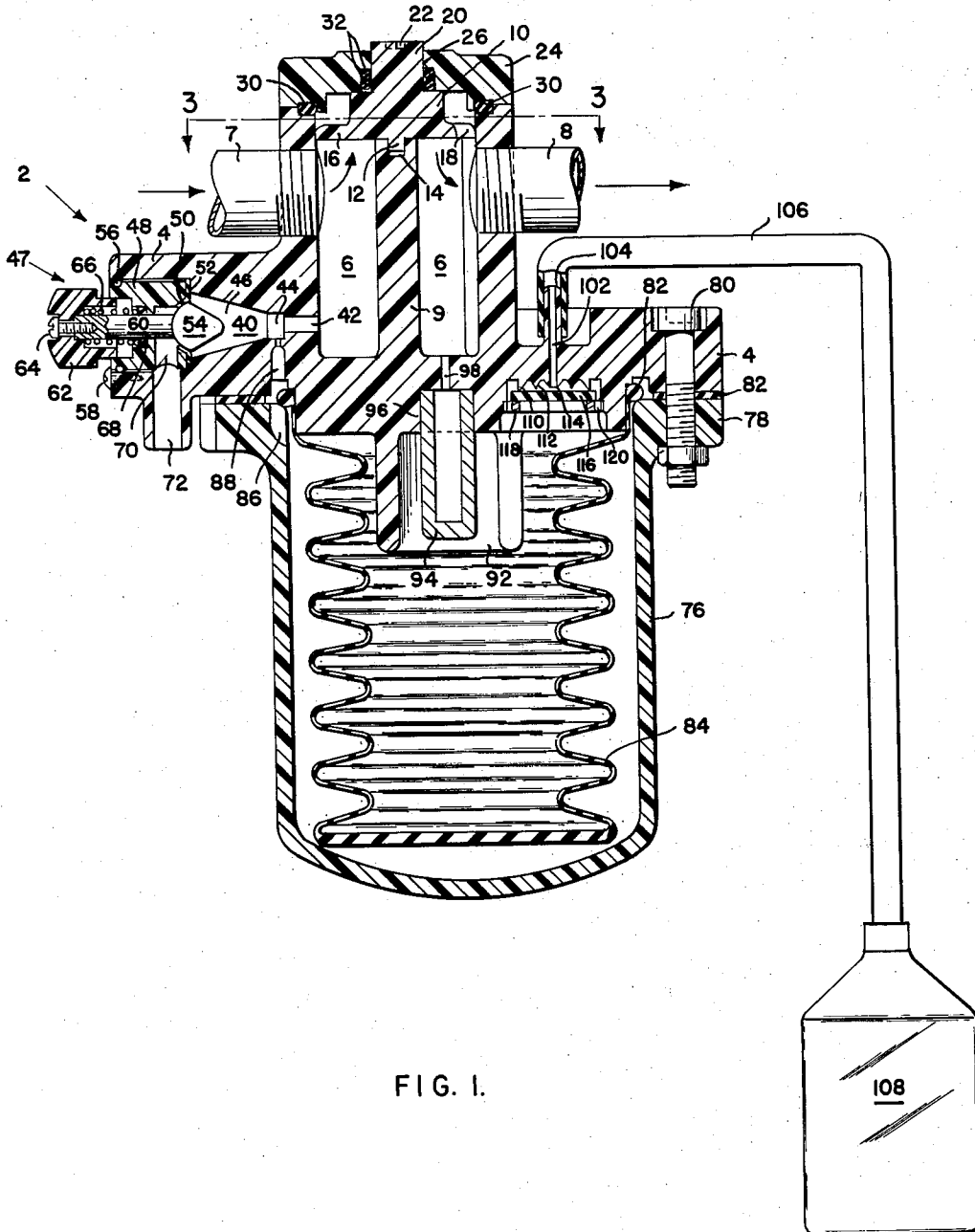


FIG. 1.

INVENTOR.

NYIRIKKI K. STENBERG

BY

Deane Smith & Hardy

ATTORNEYS

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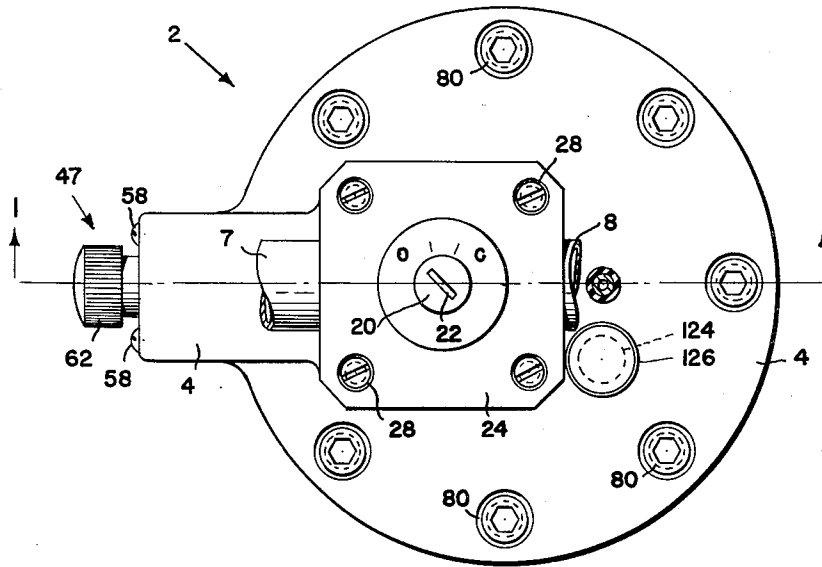


FIG. 2.

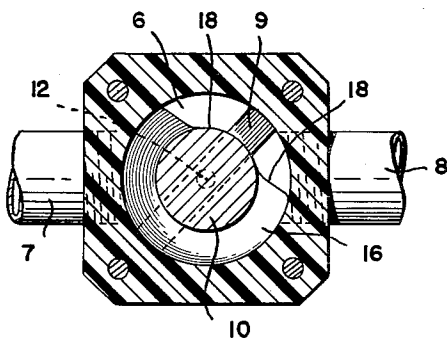


FIG. 3.

INVENTOR.

NYIRIKKI K. STENBERG

BY

Ernest S. Smith & Hardy

ATTORNEYS

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3,040,774

FLUID DISPENSER

Nyyrikki K. Stenberg, Roslyn, Pa., assignor to Fischer & Porter Company, Hatboro, Pa., a corporation of Pennsylvania

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This invention relates to a fluid dispenser. More particularly, it relates to a device for admixing an additive fluid to a main stream of fluid.

The device in accordance with this invention can be used, for example, to add relatively small quantities of a chlorine solution such as sodium hypochlorite to a water supply line. There is great need for such a device in the field of home water supply systems where there is a possibility that the source of water may be contaminated. Similarly, other additives such as fluorides can readily be introduced to a water supply line by the structure provided by this invention.

The dispenser of this invention is particularly advantageous due to the simplicity of its construction and the simplicity and effectiveness of its operation. The additive fluid can readily be introduced to the dispenser without the necessity for any disassembly. As the flow of the main stream of fluid increases, the rate of introduction of the additive fluid increases. Effective operation is achieved without the danger of the dispenser becoming plugged.

These and other advantages of the dispenser in accordance with this invention will become obvious from a reading of the following description in conjunction with the drawings in which:

FIGURE 1 is a vertical section through a dispenser in accordance with this invention;

FIGURE 2 is a top plan view of the dispenser of FIGURE 1;

FIGURE 3 is a horizontal section taken on the plane indicated by the lines 3—3 in FIGURE 1.

Referring to FIGURES 1 through 3, a dispenser 2 in accordance with this invention has a body 4 having a passage 6 adapted to carry a stream of fluid such as, for example, water. An inlet pipe 7 and a discharge pipe 8 are threadably connected to body 4 for the introduction and withdrawal of fluid, respectively, to and from passage 6.

A diagonal gate partition 9 extends upwardly from the bottom of passage 6 to a point above pipes 7 and 8. A gate 10 has a downwardly extending pin 12 which engages a corresponding opening 14 in partition 9. Base 16 of gate 10 rests on the top of partition 9 and has a cutaway portion indicated at 18 which, when spanning partition 9, permits the flow of fluid through passage 6.

Gate 10 has a head 20 with a key slot 22 to facilitate the turning of gate 10 so as to adjust the cutaway portion 18 to vary the rate of flow of fluid through passage 6.

A cap 24 has an opening 26 which embraces head 20 and is secured to body 4 by means of screws 28. The joint between cap 24 and body 4 is made fluid tight by means of a ring gasket 30. Similarly, fluid tightness between cap 24 and gate 10 is assured by ring gaskets 32 and sheet gasket 34.

It will be appreciated that the rate of flow of fluid through chamber 6 is readily controlled by means of the proper positioning of gate 10. It will further be noted

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that gate 10 causes a pressure drop which will vary as the square of the flow.

Body 4 is additionally provided with an aspirator passage 40 having a passage portion 42 leading from passage 6, a throat portion 44 and a flared portion 46. Aspirator passage 40 is controlled by a valve structure indicated at 47. Valve structure 47 has a valve seat member 48 which provides a valve seat at 50 which has overlying it a valve gasket 52 against which a valve 54 is seated. A ring gasket 56 seals valve seat member 48 to body 4 and the seat member is held in position by means of screws 58.

Valve 54 is attached to a stem 60 which, in turn, is secured to a knob 62 by means of a screw 64. A compression coil spring 66 surrounds stem 60 and has its ends abutting against knob 62 and a gasket 68 which is seated against valve seat member 48. Spring 66 acts to bias valve 54 into the closed position. When knob 62 is pushed inwardly against spring 66, fluid can discharge through aspirator passage 40 into passage 70 in valve seat member 48 and thence into passage 72 formed in body 4 and out to the atmosphere.

A casing member 76 is bolted to body 4 through flange 78 by means of bolts indicated at 80 and together with body 4 forms a chamber. A gasket 82 is employed to make the connection between member 76 and body 4 fluid tight. Flange 78, at its inner edge, engages an enlarged annular rim 82 of an expandible and contractible diaphragm 84 of, for example, resilient material such as rubber or polyethylene and which, as shown in FIGURE 1, is in the form of a bellows. The exterior of diaphragm 84 is in fluid communication with passage 6 by means of a cutout portion 86 at the inner edge of flange 78 and a passage indicated at 88 in body 4 connecting the throat 44 of aspirator passage 40 to the lower face of body 4. The diaphragm 84 separates the chamber formed by casing member 76 and body 4 into two separate portions, one of which portions, as will be evident, acts as a reservoir for the additive fluid.

Body 4 has a downwardly extending partial ring member 92 which lies within diaphragm 84 and acts to limit the upward travel of the diaphragm 84. Member 92 surrounds a thimble-shaped porous plug 94 and is secured by a pressed fit in an opening 96 in body 4. The plug 94 may be any porous material having pores capillary in nature and being suitably resistant to corrosion by the fluids employed, for example, porous ceramic ware such as of unglazed porcelain, aluminum oxide, silicon dioxide, other porous stones and carborundum. A passage 98 in body 4 connects the downstream side of passage 6 to opening 96 and the interior of plug 94.

In order to fill the interior of diaphragm 84 with the additive fluid, for example, sodium hypochlorite, body 4 is provided with a passage 102 which runs through an upper extension member 104 which is adapted to receive a hose 106. As shown, the hose 106 leads downwardly to a non-transparent open topped container 108 containing the desired fluid, the hose 106 being immersed in the fluid. As shown in FIGURE 1, container 108 has been reduced in size disproportionately in order to permit it being shown.

Adjacent the lower end of passage 102, body 4 has concentric sealing rings 110, 112 and 114. Sealing ring 112 extends downwardly beyond ring 114 and, in turn, ring 110 extends downwardly beyond ring 112. A check

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valve 116 of a resilient material such as rubber is seated on a flange 118 which is provided with openings 120 for the passage of a fluid. After filling, the fluid within diaphragm 84 forces check valve 116 upwardly first against ring 110 and then successively against rings 112 and 114 as the pressure increases.

As shown in FIGURE 2, body 4 is provided with a vent opening 124 which leads downwardly to the interior of diaphragm 84. A removable plug 126 is used to block opening 124.

As shown in FIGURE 1, the bulk of the dispenser can be formed of synthetic resins such as suitably rigid polyvinylchloride, phenolic or rubber base styrene resins. Similarly, metals such as stainless steel can be employed. The materials will, as a practical matter, be selected for convenience of manufacture and depending on the fluids to be used.

Operation

With a stream of fluid, for example water, flowing into passage 6 from pipe 7, knob 62 is forced inwardly to move valve 54 off its seat and permit fluid to flow through aspirator passage 40 and to the atmosphere through passages 70 and 72. The flow of fluid through aspirator passage 40 causes a reduction in pressure at the exterior surface of diaphragm 84 incident to the fluid connection provided by cutout portion 86 in flange 78 and passage 88. This results in the expansion of diaphragm 84 which, in turn, causes a reduction of pressure within diaphragm 84 and fluid to flow from container 108 through tube 106, passage 102, openings 120 and into the interior of diaphragm 84. During this operation porous plug 94 prevents any appreciable amount of liquid from passing from passages 6 and 98 into the interior of diaphragm 84. It is to be understood that the time required for filling diaphragm 84 is in the order of minutes, whereas, it takes several weeks for the additive to flow through plug 94 by capillary action and into passage 6. When the interior of diaphragm 84 is adequately filled, knob 62 is released permitting spring 66 to seat valve 54. The pressure of the fluid within diaphragm 84 exerted against check valve 116 causes it to be urged against one or more of rings 110, 112 and 114. After the filling operation, it is desirable to vent air from the upper portion of the interior of diaphragm 84 by loosening plug 126.

As fluid flows through passage 6 at a rate controlled by gate 10, there is, as previously pointed out, a pressure drop across gate 10. The higher pressure of the upstream side of gate 10 is exerted through passage 40, passage 88 and cutout portion 86 against the outer surface of diaphragm 84. This causes diaphragm 84 to force fluid through plug 94 and into the downstream side of passage 6 against the lower pressure of the downstream side of passage 6. Since the pressure drop across gate 10 varies as the square of the flow while the flow through plug 94 is more nearly linear with the pressure drop, the additive fluid will be supplied at a slightly higher dosage for large rates of flow than for small rates of flow. This is advantageous since a higher rate of flow of the main stream of fluid results in the fluid remaining in the system for a shorter period of time.

It is not desired to be limited except as set forth in the following claims.

What is claimed is:

1. A dispenser for supplying an additive fluid to a main stream of fluid which comprises: a body having a passage for carrying a main stream of fluid and means in said passage for providing a pressure drop, a chamber adjacent said body, a diaphragm separating said chamber into a reservoir portion for containing an additive fluid and a second portion, said reservoir portion being in fluid communication with said passage on the downstream side of said means, and a porous plug having pores capillary in nature separating said reservoir portion and said passage, said second portion being in fluid communication with the passage on the upstream side of said means.

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2. A dispenser in accordance with claim 1 in which the plug is a porcelain plug.

3. A dispenser for supplying an additive fluid to a main stream of fluid which comprises: a body having a passage for carrying a main stream of fluid and gate means in said passage for providing a pressure drop, a diaphragm having an interior side and an exterior side, the interior side forming with the body a reservoir for an additive fluid which is in fluid communication with said passage on the downstream side of the gate means, a porous plug having pores capillary in nature positioned between the said reservoir and the passage and a casing surrounding the diaphragm, the exterior side of the diaphragm being in fluid communication with said passage on the upstream side of the gate.

4. A dispenser in accordance with claim 3 in which the plug is a porcelain plug.

5. A dispenser for supplying an additive fluid to a main stream of fluid which comprises: a body having a passage for carrying a main stream of fluid and a gate in said passage for providing a pressure drop, means forming a chamber adjacent said body, a diaphragm separating said chamber into a reservoir portion for containing an additive fluid and a second portion, said reservoir portion being in fluid communication with said passage on the downstream side of the gate, and a porous plug having pores capillary in nature separating said reservoir portion and said passage, said body having an aspirator passage having a throat and having its inlet end connected to the first mentioned passage upstream of said gate, a valve in said aspirator passage downstream of said throat, a third passage leading from said throat to the second portion of said chamber, a fourth passage for the admission of said additive fluid into the reservoir portion of said chamber responsive to a reduction in pressure produced by the flow of fluid in said aspirator passage and a valve controlling said fourth passage to prevent the discharge of fluid therethrough.

6. A dispenser in accordance with claim 5 in which the plug is a porcelain plug.

7. A dispenser in accordance with claim 5 in which the plug is thimble-shaped having its open end in communication with the passage adapted to carry a main stream of fluid.

8. A dispenser in accordance with claim 7 in which the plug is a porcelain plug.

9. A dispenser for supplying an additive fluid to a main stream of fluid which comprises: a body having a passage for carrying a main stream of fluid and a gate in said passage for providing a pressure drop, a diaphragm having an interior side and an exterior side, said interior side forming with the body a reservoir for an additive fluid which is in fluid communication with said passage on the downstream side of the gate, a porous plug having pores capillary in nature between the interior of the diaphragm and the passage and a casing surrounding the diaphragm, said body having an aspirator passage having a throat and having its inlet end connected to the first mentioned passage upstream of said gate, a valve in said aspirator passage downstream of said throat and a third passage leading from said throat to the exterior side of said diaphragm, a fourth passage for the admission of said additive fluid into said reservoir responsive to a reduction in pressure produced by the flow of fluid in said aspirator passage and a valve controlling said fourth passage to prevent the discharge of fluid therethrough.

10. A dispenser in accordance with claim 9 in which the plug is a porcelain plug.

11. A dispenser in accordance with claim 9 in which the plug is thimble-shaped having its open end in communication with the passage adapted to carry a main stream of fluid.

12. A dispenser in accordance with claim 11 in which the plug is a porcelain plug.

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