Aug. 10, 1965 L. E. VIVION 3,199,957

CHEMICAL APPLICATOR

Filed April 25, 1963 2 Sheets-Sheet 1

FIG. 1.

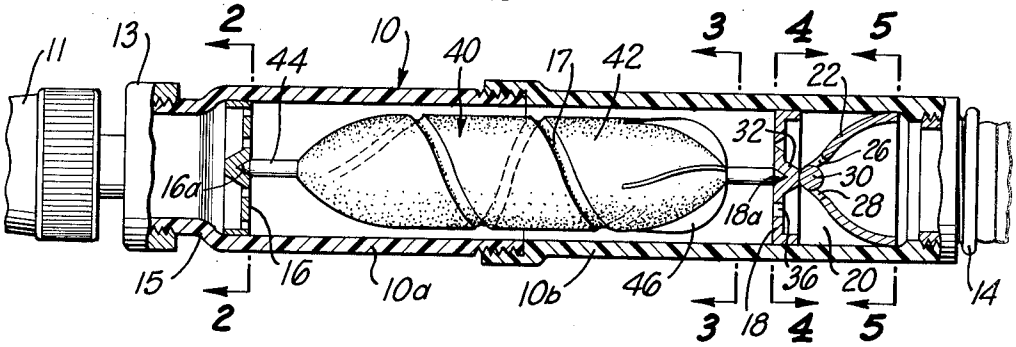


FIG. 2.

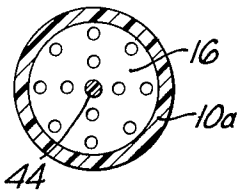


FIG. 3.

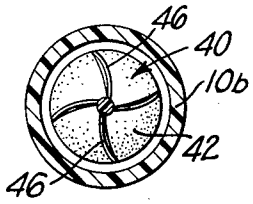


FIG. 4.

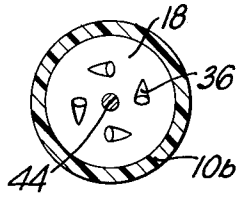


FIG. 5.

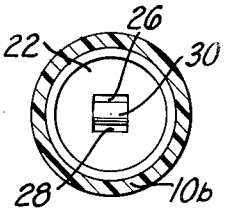


FIG. 6.

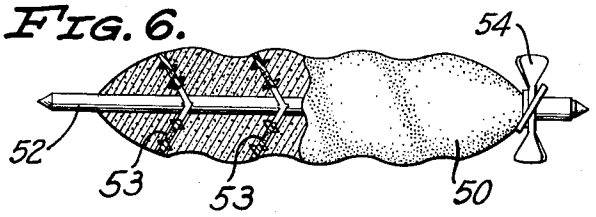


FIG. 7.

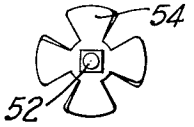


FIG. 8.

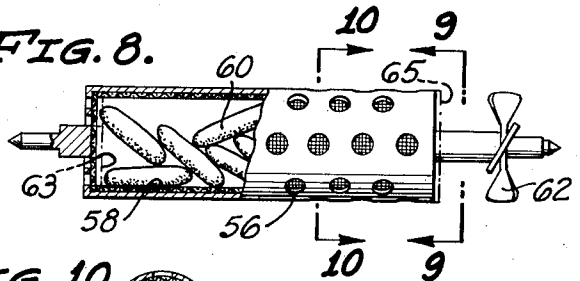


FIG. 9.

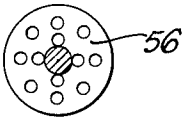
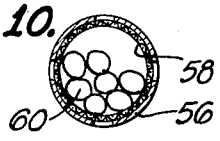


FIG. 10.



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Aug. 10, 1965 L. E. VIVION 3,199,957

CHEMICAL APPLICATOR

Filed April 25, 1963 2 Sheets-Sheet 2

FIG. 11.

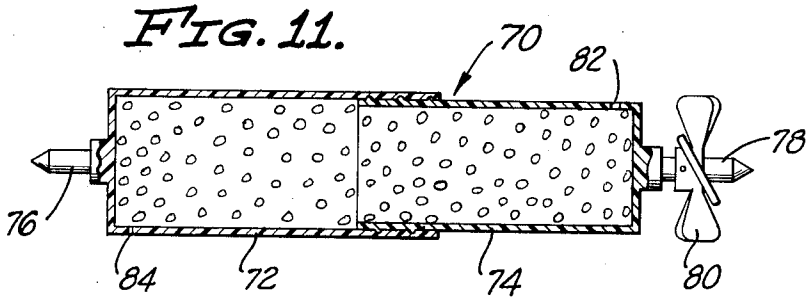


FIG. 12.

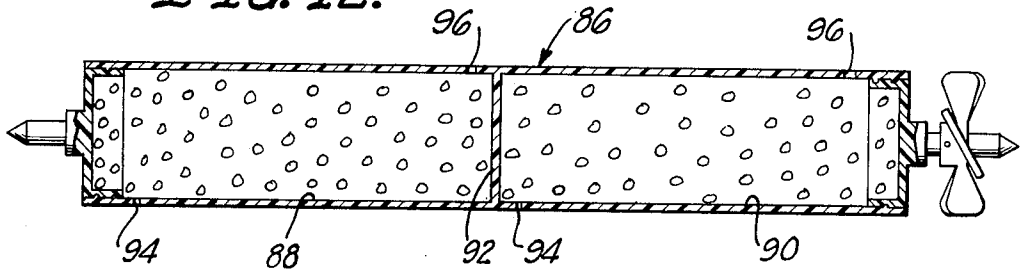


FIG. 13.

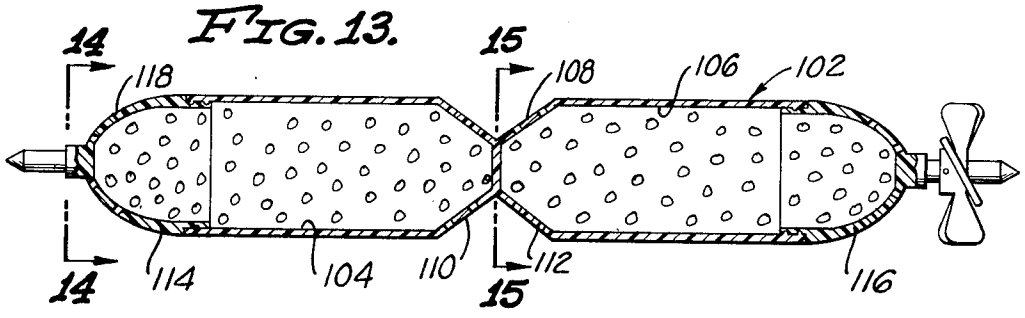


FIG. 14.

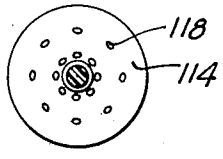
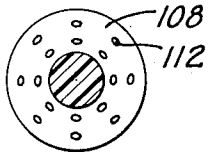


FIG. 15.



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3,199,957

CHEMICAL APPLICATOR

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Filed Apr. 25, 1963, Ser. No. 275,623
22 Claims. (Cl. 23—269)

The invention has to do with a chemical applicator and more particularly to a device that is designed to be inserted into a water or other liquid carrying conduit.

It has been proposed heretofore to provide chemical cartridges or blocks within a water or other liquid line, the chemical cartridge being dissolved by the passing water so as to provide an outlet stream having a chemical concentration within the desired range. It has been commonly experienced in devices of this sort that the cartridge will dissolve at an irregular rate or possibly not dissolve rapidly enough to give a solution of a constant and desired strength or will flush out substantially all at one moment.

It is a principal object of the invention to provide a chemical applicator which will provide a solution having a more constant and desired strength.

A still further object of the invention is to provide a chemical applicator having a simple structure and a structure which permits easy cleaning of the device.

A further object of the invention is to provide a chemical applicator wherein a capsule is rotatably mounted within the device and rotated by the water or other liquid passing therethrough.

Another object of the invention is to provide a chemical applicator having a rotatable capsule which is rugged enough to withstand hard usage.

The chemical applicator of the invention is designed for use in a water or other liquid conducting line. The device of the invention comprises a cylindrical housing with means at its opposite ends for removably connecting the housing between sections of the liquid conducting line. An elongated chemical dispersing member is rotatably supported at its opposite ends within the cylindrical housing. In a preferred form of the chemical applicator of the invention, the chemical dispersing member is provided with a propeller. This arrangement assures rotation of the chemical dispersing member at a sufficient speed to normally provide a solution of sufficient strength. In another embodiment of the applicator of the invention, the elongated chemical dispersing member is provided with a fluted outer surface which serves to increase the speed with which the dispersing member rotates with the flow of water through the device. The fluted surface and the propeller are particularly desirable features of the device of the invention. It sometimes develops that if the nature of the chemical dispersing member or capsule is altered to make the capsule more soluble, the capsule then become unmanageable, being objectionably soft and otherwise impractical. It is desirable that the chemical capsule present a relatively firm structure. In order to employ a chemical dispersing member or cartridge of relative firmness, and still obtain sufficient dissolution of the chemical, it has developed that in most instances the chemical dispersing member or capsule should be provided with a means for increasing the speed with which it rotates, and stays intact until fully dissolved.

These and other objects of the invention will become more apparent from the reading of the following description taken in conjunction with the drawings, wherein:

FIG. 1 is a longitudinal sectional view, partly in elevation, illustrating a preferred form of the chemical applicator of the invention;

FIG. 2 is a cross-sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is a cross-sectional view taken along line 3—3 of FIG. 1;

FIG. 4 is another cross-sectional view taken along line 4—4 of FIG. 1;

FIG. 5 is still another cross-sectional view taken along line 5—5 of FIG. 1;

FIG. 6 is a side elevation, partially in section, of an elongated chemical dispersing member of another form that may be used in the device of the invention;

FIG. 7 is an end view of the chemical dispersing member of FIG. 6;

FIG. 8 is an elevational view, partly in section, of a cage-type chemical dispersing member that may be used in the chemical applicator of the invention;

FIG. 9 is a cross-sectional view taken along line 9—9 of FIG. 8;

FIG. 10 is another cross-sectional view taken along line 10—10 of FIG. 8;

FIG. 11 is a longitudinal, sectional view, partly in elevation, illustrating still another form of the chemical dispersing member of the invention which may be opened centrally of its length for refilling;

FIG. 12 is a longitudinal, sectional view, partly in elevation, of still another form of the chemical dispersing member of the invention having two compartments designed for holding different materials;

FIG. 13 is a longitudinal, sectional view, again partly in elevation, of a compartmented chemical dispersing member which may be used for the application of two different materials;

FIG. 14 is a sectional view taken along line 14—14 of FIG. 13; and

FIG. 15 is another sectional view of the device of FIG. 13 taken along line 15—15.

The device of the invention illustrated in FIG. 1 comprises a plastic, hollow, cylindrical housing **10** breakable centrally of its length into two sections **10***a* and **10***b* which are threadedly interconnected at their adjoining ends. Means are provided at the opposite ends of the cylindrical housing **10** for removably connecting the housing between sections of a liquid conducting line **11**. In the embodiment illustrated in FIG. 1, the left-hand end of the housing is necked down somewhat and externally threaded to receive a familiar type of hose coupling **13**. The other end of the plastic housing is internally threaded and held to a conventional type of coupling **14**. Section **10***b* is internally threaded at its inner end to receive the externally threaded inner end of its complementary housing section **10***a*.

Section **10***a* of the plastic housing **10** immediately adjacent its necked down outer end **15** is provided with a foraminous bulkhead **16** on its cross section. The other section **10***b* of the plastic housing **10** has a similarly located bulkhead **18**, again located on the cross section of the housing **10**, which serves to provide sections **10***b* with a vestibule compartment **20** in which there is disposed a flexible diaphragm-like channelling member **22**. The channelling member **22** has a generally funnel-like shape and at its confined end has two outlet passages **26** and **28** which are separated by a short, solid, tubular spacer **30**. The tubular spacer **30** rests on a centrally located protrusion **32** of the bulkhead **18**. As best seen in FIG. 4, the bulkhead **18** of the housing section **10***b* is provided with four radially-spaced jet passages **36** which are set at an angle to the axis of the device to impart a swirling motion to the water passing from the vestibule compartment **20** into the inner compartment of the housing **10**.

An elongated chemical dispersing member **40**, which in the embodiment of FIG. 1 takes the form of a compressed elongated capsule **42**, is rotatably supported at its opposite ends within the plastic housing **10** between the two bulkheads **16** and **18**. More exactly speaking

the chemical dispersing member 40 comprises a mass containing the chemical being dispersed formed about an elongated plastic guide rod 44 whose opposite ends are pointed to rotatably engage cavities 16*a* and 18*a* respectively of the two bulkheads 16 and 18. The pointed ends of the plastic guide rod 44 may be formed with a silicone coating to lessen friction between the cavities 16*a* and 18*a* and the guide rod.

In the particular embodiment illustrated in FIG. 1 the chemical dispersing member 40 has a helical fluting 17 for engagement with the water flowing through the inner compartment of the housing 10. The fluting 17 increases the rate at which the chemical dispersing member will rotate. The upstream end of the block 42 of the chemical dispersing member 40 is provided with four longitudinally-extending plastic fins 46. The fins 46, the fluting 17, and the jet passages 36 all contribute to increasing the speed at which the chemical dispersing member 40 rotates within the housing 10 during the passage of water therethrough. These several features, alone and in combination, have been found to be very desirable as they permit the use of a relatively hard chemical containing mass 42 (and more slowly soluble) and still obtain a satisfactory rate of dissolution which often cannot be had with a more slowly rotated chemical dispersing member 40. If the chemical capsule 40 were made more soluble, the capsule, in most instances, would be objectionably soft and would tend to block the holes of the foraminous bulkhead 16. The solubility of the capsule 42 may be controlled to some extent by the manner with which it is formed, and by the incorporation of suitable additives to vary the over-all solubility of the block. The capsule structure of the invention dissolves substantially uniformly the length of the block.

One embodiment of the capsule is prepared from one volume of plaster of Paris and two volumes of ammonium sulfate with the ammonium sulfate being dissolved in two volumes of water. The plaster of Paris is added to the water-sulfate mixture and the resulting mixture cast in a mold about the guide rod 44.

Another form of the chemical dispersing member is illustrated in FIGS. 6 and 7. The modified dispersing member comprises a fluted chemical capsule 50 which is formed about a plastic guide rod 52. The fluting of the capsule 50 is considerably wider than that of FIG. 1. One end of the guide rod 52 carries a plastic propeller 54 which propeller assists in the rotation of the chemical dispersing member. The guide rod 52 of the capsule 50 of FIG. 6 is provided with several forward-extending integrally-formed anchoring ribs 53 buried within the chemical mass which ribs promote more uniform dissolution and hold the mass to the guide rod. The use of the anchoring ribs 53 minimizes the likelihood of channelling of water above the guide rod 52 which would lead to loosening of the chemical mass from the guide rod.

A still further form of the chemical dispersing member is illustrated in FIGS. 8–10. This particular embodiment comprises a foraminous cylindrical cage 56, the inner surface of which is covered with a fine mesh screen 58. Pellets 60 are contained within the cage 56. The opposite ends of the cage 56 carry a plurality of holes, as does the side wall of the cage. To assist in the rotation of the cage 56, the embodiment illustrated in FIGS. 8–10 is provided with a propeller 62.

The cage 56 may be provided with an internal flapper valve 63 as shown in phantom lines at its downstream end and an external flapper valve 65 at its upstream end. There is some reverse flow within the housing 10 and liquid will enter the flapper valve 63 and exit through valve 65. Where it is desired to disperse a viscous liquid, the several side wall holes of the cage are blocked and the flapper valves 63 and 65 only used for admittance and exiting of the water.

The device of the invention illustrated in FIG. 11 comprises a plastic, hollow, cylindrical cage 70 breakable centrally of its length into two sections 72 and 74 which are threadedly interconnected at their adjoining ends. The cage 70 is supported at its opposite ends by axial rods 76 and 78, the ends of which are pointed and preferably coated with a silicone material, to engage the bearing cavities 16*a* and 18*a* of the respective bulkheads 16 and 18 of the cylindrical housing 10 of FIG. 1. The axial guide rod 78 centrally of its length supports a plastic propeller 80. In the particular embodiment illustrated in FIG. 11, the cage 70 is supplied with only two laterally opening holes 82 and 84 located adjacent the opposite ends of the cage. Hole 82 which is at the upstream end is desirably somewhat larger in diameter than the hole 84. In an applicator designed for use with small urea pellets, it has been found that the hole at the propeller end desirably has a diameter of .052 inch and hole 84 at the downstream end a diameter of .0280 inch. This applicator may be used with pellets of differing solubilities. The dispenser of FIG. 1 may be used for the dispensing of liquid fertilizer if the holes are made still somewhat smaller. It is generally desirable that the upstream hole 82 be somewhat larger than the downstream hole 84 in all uses.

The cage 70 is readily opened to permit refilling. Closure tapes may be placed over the holes 82 and 84 during storage of the cage 70 and prior to use. It will be appreciated that the holes 82 and 84 may vary considerably in diameter, depending upon the solubility of the material being dispensed. In the case of more slowly soluble materials, the cage of FIGS. 8–10 may be used. In some applications, a liquid absorbent synthetic sponge may be placed in the cage 70. Such a sponge will slowly release its absorbed liquid to the water working its way through the cage.

Still another form of the cage of the invention is illustrated in FIG. 12. This cage 86 comprises an elongated cylinder having two compartments 88 and 90 separated by a transverse bulkhead 92. Each of the compartments 88 and 90 at its opposite ends is provided with laterally-opening holes 94 and 96. The opposite ends of the cage are closed by removable plugs which threadedly engage the inner walls of the respective compartments 88 and 90. The cage of FIG. 12 is especially suitable for the simultaneous dispensing of two different chemicals; for example, an insecticide and a fertilizer.

The cage illustrated in FIGS. 13–15 illustrates still another form of the cage which may be used. Cage 102 of FIG. 13 has two distinctly defined compartments 104 and 106 which are joined at a necked-down portion of the cage centrally of its length. Conical inner end walls 108, 110 of the two compartments 106 and 104 are provided with a plurality of holes 112 as seen best in FIG. 15. The opposite outer ends of the compartments 104 and 106 are closed respectively by domed removable end members 114 and 116. The domed surfaces of the two end members 114 and 116 are provided with several holes 118.

The device of the invention is especially suitable for supplying fertilizer or insecticides in solution to a garden spray. The device may be incorporated in a line immediately preceding a lawn sprinkler with the provision of suitable means for removably connecting the device in place. Desirably, the housing is made of clear plastic in order to permit the operator to visually check the state of the chemical dispersing member. The chemical dispersing member may be made of many different chemicals; for example, sodium calcium borate, or other fire-fighting chemicals may be conveniently dissolved into a garden hose stream employing the device of the invention. The device of the invention may be utilized for dispersion of a fluoride material into a water stream. The device is especially suitable for installation in a vertical outlet line to a fixed sprinkler. The device may be employed with

a mist producting head for disinfecting of barns, chicken houses, etc. with toxic material that are otherwise dangerous to handle.

Although exemplary embodiments of the invention have been disclosed herein for purposes of illustration, it will be understood that various changes, modifications, and substitutions may be incorporated in such embodiments without departing from the spirit of the invention as defined by the claims which follow.

I claim:

1. A chemical applicator for use with a liquid conducting line, said applicator comprising:
a hollow cylindrical housing with means at its opposite ends for removably connecting said housing to the liquid conducting line; and
an elongated chemical dispersing member rotatably supported at its opposite ends within the cylindrical housing and cooperating therewith to define an uninterrupted annular flow passage about and co-extensive with said member.

2. A chemical applicator in accordance with claim 1 wherein the chemical dispersing member is provided with a propeller.

3. A chemical applicator in accordance with claim 1 wherein the chemical dispersing member comprises a foraminous cage member, said cage member providing a container for a chemical substance that is soluble in the liquid flowing through the line and the cylindrical housing.

4. A chemical applicator in accordance with claim 1 wherein means are provided for introducing liquid into the cylindrical housing with a swirling motion.

5. A chemical applicator for use in a liquid conducting line, said applicator comprising:
a hollow cylindrical housing with means at its opposite ends for removably connecting said housing between sections of the liquid conducting line, said housing being separable into two portions centrally of its length to provide access to its interior; and
an elongated, liquid-soluble, generally cylindrical, chemical member rotatably supported at its opposite ends within the cylindrical housing.

6. A chemical applicator in accordance with claim 5 wherein the liquid-soluble, generally cylindrical, chemical member has a fluted outer surface.

7. A chemical applicator in accordance with claim 5 wherein the liquid-soluble, generally cylindrical, chemical member has at least two longitudinally-extending projecting ribs radially spaced about the chemical member.

8. A chemical applicator in accordance with claim 5 wherein the cylindrical chemical member is provided with a propeller.

9. A chemical applicator in accordance with claim 5 wherein means are provided for introducing liquid into the cylindrical housing with a swirling motion.

10. A chemical dispersing member for use in a chemical applicator, said chemical dispersing member comprising:
a soluble chemical block formed about an elongated axle rod with the rod extending beyond both ends of the chemical block.

11. A chemical dispersing member in accordance with claim 10 wherein the block has a helical fluting in its outer surface.

12. A chemical dispersing member in accordance with claim 10 wherein one end of the rod supports a propeller.

13. A chemical applicator for use with a liquid conducting line, said applicator comprising:
a hollow, cylindrical housing with means at its opposite ends for removably connecting said housing to the liquid conducting line; and
an elongated chemical dispersing member rotatably supported at its opposite ends within the cylindrical housing, said dispersing member comprising a hollow, elongated, generally cylindrical cage member divided into separate compartments with holes in the walls of the respective compartments to permit ingress and egress of liquid.

14. A chemical applicator in accordance with claim 13 wherein the opposite ends of the rotatable chemical dispersing member are enclosed by removable plugs.

15. A chemical applicator for use with a liquid conducting line, said applicator comprising:
a hollow, cylindrical housing with means at its opposite ends for removably connecting said housing to the liquid conducting line; and
an elongated chemical dispersing member rotatably supported at its opposite ends within the cylindrical housing, said dispersing member comprising a cage member having an ingress hole and an egress hole to permit liquid flow therethrough, said cage member containing a sponge member filled with a chemical that is slowly released into the water flowing through the cage.

16. A chemical applicator for use with a liquid conducting line, said applicator comprising:
a hollow, cylindrical housing with means at its opposite ends for removably connecting said housing to the liquid conducting line; and
an elongated chemical dispersing member rotatably supported at its opposite ends within the cylindrical housing, said dispersing member comprising a hollow, elongated, generally cylindrical cage member having a single ingress hole at one end and a single egress hole at the other end.

17. An applicator of the character referred to including an elongate cylindrical fluid conducting housing with inlet and outlet ends, means at the said inlet and outlet ends for removably connecting said housing in a fluid conducting line, means within the inlet end portion of the housing to direct liquid circumferentially and longitudinally therethrough, axially spaced opposing bearing means arranged within the housing to occur at the opposite end portions thereof, an elongate chemical dispensing member within the housing between and in axial alignment with the bearing means and having central longitudinally outwardly projecting pins at its opposite ends rotatably supported in said bearing means, said dispenser having impellered means defining surfaces upon which the circumferentially and longitudinally flowing liquid within the housing impinges, whereby said dispenser is rotated within the housing.

18. A structure as set forth in claim 16 wherein, said dispenser including an elongate longitudinally extending axle member, the ends of which define said pins and a mass of liquid soluble chemicals formed on and about said axle member intermediate the ends thereof.

19. A structure as set forth in claim 16 wherein said impeller means includes a radially outwardly projecting, axially disposed propeller on the pin at the inlet end of construction.

20. A structure as set forth in claim 16 wherein said impeller means includes radially outwardly projecting, circumferentially and axially extending fins at the inlet end portion of the dispenser and disposed in opposition to the circumferential and longitudinal flow of liquid in the housing and about the dispenser.

21. A structure as set forth in claim 16 wherein said dispenser includes an elongate tubular container adapted to receive and carry a supply of chemical and having liquid inlet and liquid outlet openings therein.

22. A structure as set forth in claim 16 wherein said dispenser includes an elongate tubular container adapted to receive and carry a supply of chemical and has a liquid inlet opening of predetermined cross-section adjacent the inlet end of the construction to communicate with the interior of the housing and a liquid outlet opening of pre-

determined cross-section adjacent the outlet end of the construction, and communicating with the interior of the housing, said dispenser cooperating with the surrounding housing to cause a pressure drop in the liquid as it flows longitudinally toward the outlet end of the construction, whereby a predetermined flow of liquid flows into and out of the dispenser through said inlet and outlet openings.

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