United States Patent

[11] **3,570,770**

[72] Inventor **Ronald F. Ewald**
Rolling Meadows, Ill.

[21] Appl. No. **727,511**
[22] Filed **May 8, 1968**
[45] Patented **Mar. 16, 1971**
[73] Assignee **Seaquist Valve Company**
Cary, Ill.

[54] **VALVE BUTTON**
8 Claims, 15 Drawing Figs.

[52] **U.S. Cl.** **239/337,** 239/470, 239/573
[51] **Int. Cl.** **B05b 1/34**
[50] **Field of Search** 239/337, 468, 470, 573

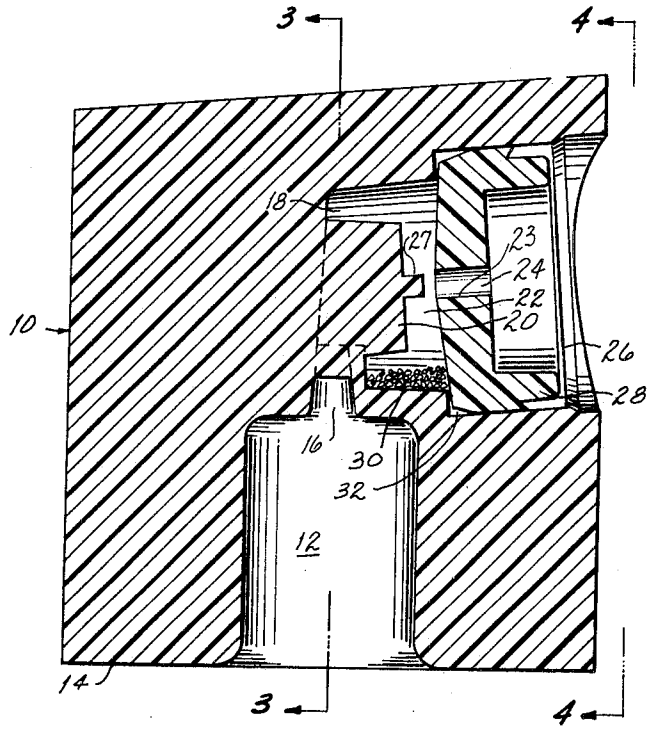
[56] **References Cited**

UNITED STATES PATENTS

3,112,074	11/1963	Green	239/573X
3,129,893	4/1964	Green	239/337X
3,174,692	3/1965	Green	239/573X
3,433,419	3/1969	Evesque	239/470

Primary Examiner—M. Henson Wood, Jr.
Assistant Examiner—Michael Y. Mar
Attorney—Stefan M. Stein

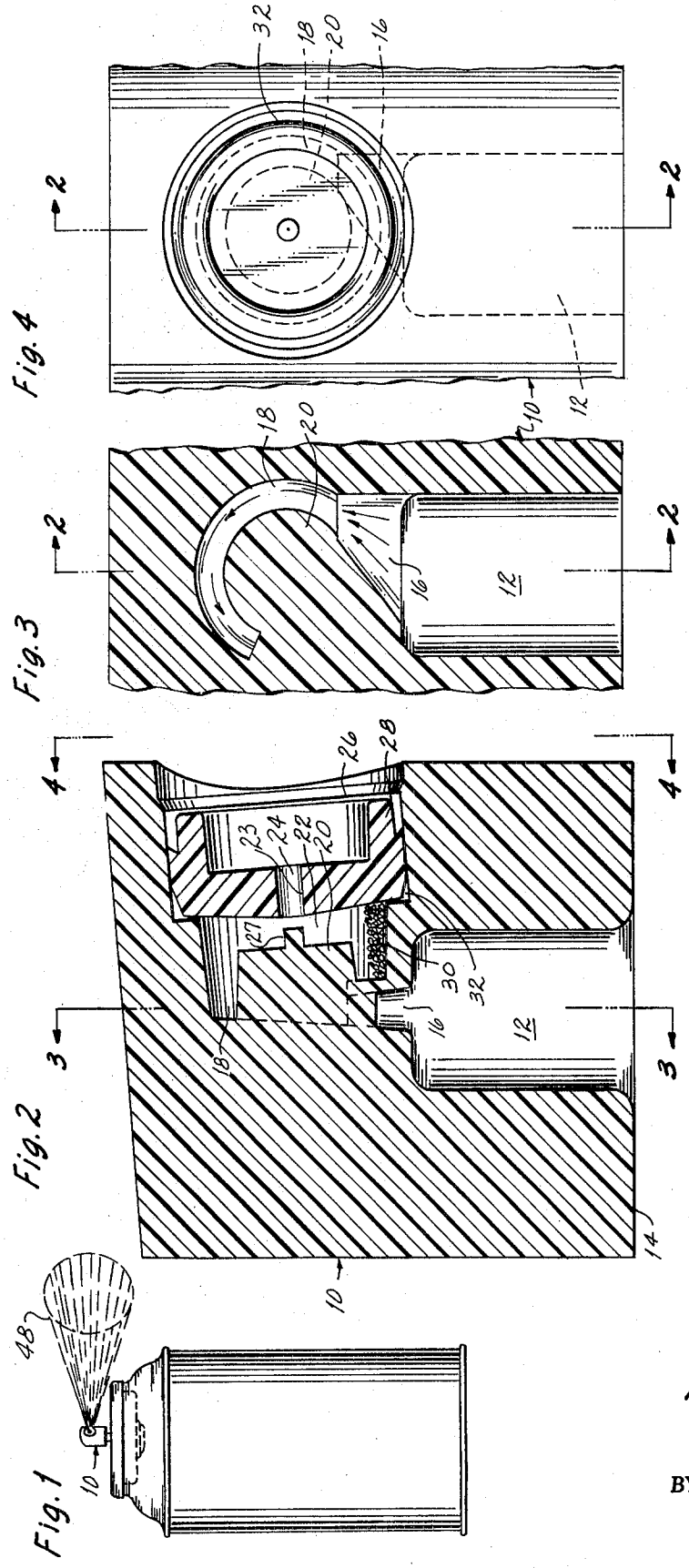
ABSTRACT: A self-cleaning spray button designed especially for use on aerosol valves for spraying starch. The discharge passageway within the button comprises inlet from the valve stem leading into an annular expansion chamber which connects with a swirl chamber just behind the discharge outlet.



PATENTED MAR 16 1971

3,570,770

SHEET 1 OF 3



Ronald F. Ewald
INVENTOR.

BY Stefan M. Stein
ATTORNEY

Fig. 9

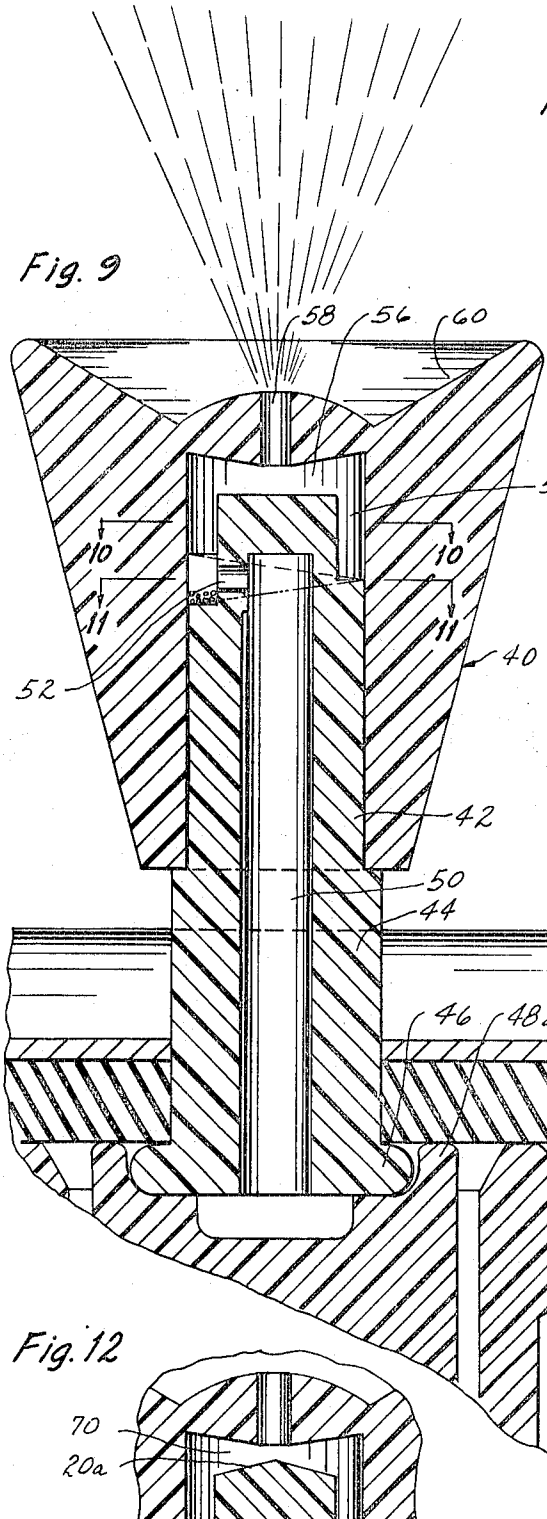


Fig. 10

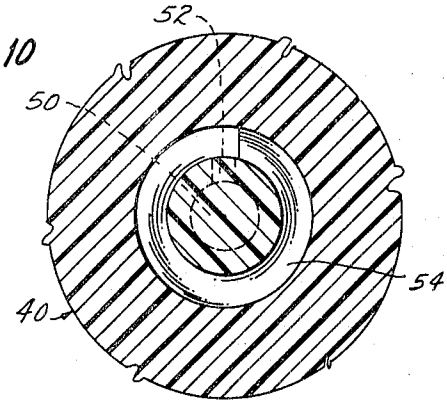


Fig. 11

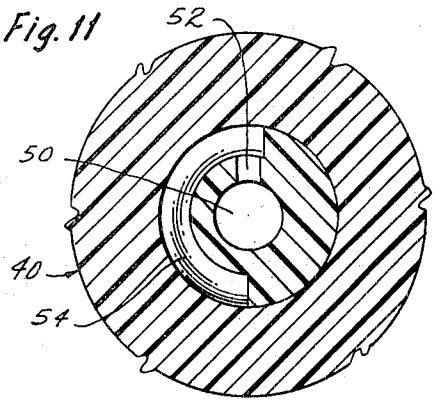


Fig. 12

Ronald F. Ewald
INVENTOR.

BY Stefan M. Stein
ATTORNEY

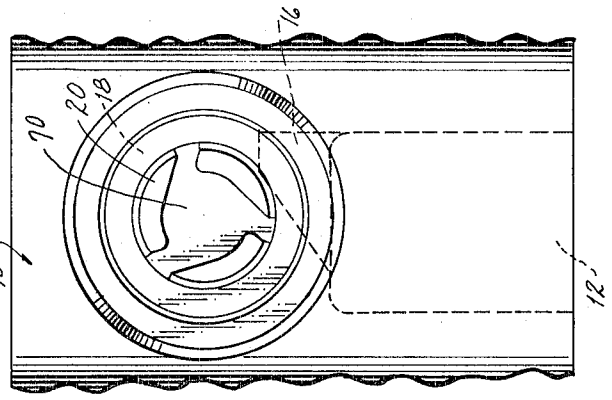


Fig. 15

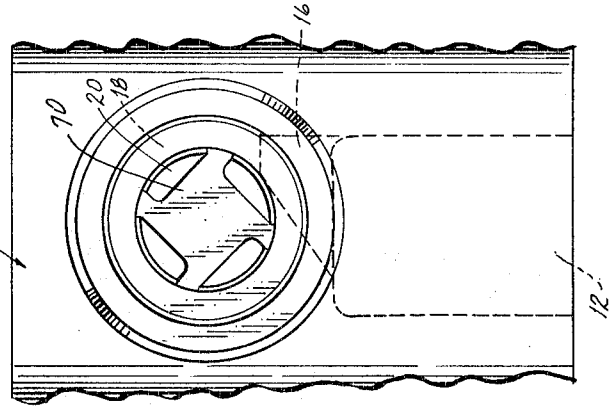


Fig. 14

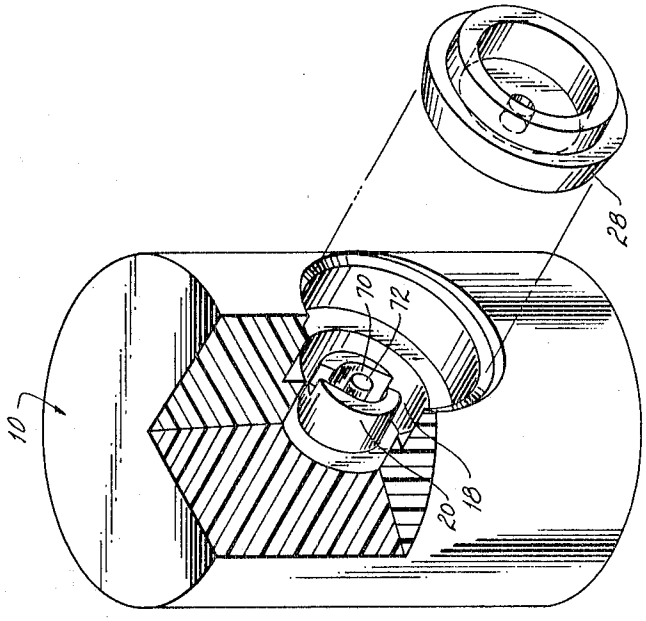


Fig. 13

Ronald F. Ewald
INVENTOR.

BY Stefan M. Stein
ATTORNEY

VALVE BUTTON

This invention relates to a self-cleaning button or actuator which is used in conjunction with an aerosol valve and is especially designed for dispensing starch, in the form of an aerosol mist.

The adaptation of aerosol-dispensing devices to spray starch has been hampered by the tendency of the liquid starch to recrystallize within the spray button. What has frequently happened is that the device, being of customary design, has functioned faultlessly on the initial use of each device. But after this use, a small quantity of liquid starch remained within the spray button where it was exposed to the atmosphere. The liquid starch, or more precisely granular starch in a volatile solvent, soon dried and recrystallized into granular form. These granules then partially, or wholly, blocked the flow passages within the button or actuator and the entire aerosol can of starch was unusable to the chagrin of the customer.

As is well known, the function of a spray button is to break up the dispensed liquid into a fine mist in a well defined pattern. However, when the button or actuator becomes clogged with granules it can no longer function properly, and the product sputters out, improperly broken up and in an erratic pattern.

With these considerations in mind, it is an object of this invention to provide a spray button or actuator which will break up a dispensed product even liquid starch, into a fine aerosol mist throughout the life of the aerosol container.

Another object is to provide a spray button or actuator of the above character which will expel such an aerosol mist in a steady well defined divergent spray pattern.

Still another object is to provide a spray button or actuator, of the above character, wherein the spray pattern may be easily varied.

A further object is to provide a spray button or actuator of the above character which will be unimpaired in its operation by the presence of a small quantity of granular matter such as starch.

A still further object is to provide a spray button or actuator of the above character which is substantially self-cleaning.

Another object is to provide a spray button or actuator of the above character which, because of its simplicity and ease of fabrication, is commercially useful on aerosol containers.

Another object is to provide a spray button or actuator of the above character, which is easily assembled.

Another object is to provide a spray button or actuator of the above character, which may be economically fabricated.

Another object is to provide a spray button or actuator of the above character, which may be disassembled for more thorough cleaning, should the need arise.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

In its most basic embodiment, the invention comprises a mechanical breakup spray button or actuator especially useful for starch wherein the starch product passes from the valve stem of the aerosol valve into and through an inlet passageway to an annular tapered ring-shaped expansion channel around an axial knob. The channel imparts a forwardly acting centrifugal motion and directs the starch product into a circular swirl chamber just behind the terminal orifice. The swirl chamber may possess an axial tit or a cone which aids in maintaining and even increasing the force of the centrifugal motion previously imparted to the starch product. A swirl chamber tangentially fed from the expansion channel may also be utilized within the knob with or without an axial tit to provide a more positive centrifugal motion to the starch product. With such centrifugal motion, the product is then dispensed through the terminal orifice to effect a well defined funnel-shaped spray pattern. The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a perspective view of a typical aerosol container with one embodiment of the button of this invention thereon showing the funnel-shaped spray pattern that it emits, in a horizontal fashion.

FIG. 2 is a side cross-sectional view of the button of this invention taken along lines 2–2 of FIG. 3.

FIG. 3 is a partial cross-sectional view of the button taken along line 3–3 of FIG. 2.

FIG. 4 is a front view of the button taken along line 4–4 of FIG. 2.

FIGS. 5 through 8 are cross-sectional side views of different embodiments of orifice inserts.

FIG. 9 is a side view, partly in section, of a second embodiment of the button and the spray pattern it emits in a vertical fashion.

FIG. 10 is a cross-sectional view taken along line 10–10 of FIG. 9.

FIG. 11 is a cross-sectional view taken along line 11–11 of FIG. 9.

FIG. 12 is a detailed side cross-sectional view of the swirl chamber of the bottom of FIG. 9, showing another variation of swirl chamber configuration.

FIG. 13 is a broken perspective view showing the tangentially fed swirl chamber in the knob version of the valve button.

FIGS. 14 and 15 show variations in the swirl chamber of FIG. 13.

Similar reference characters refer to similar parts throughout the several view of the drawings.

With special reference to FIG. 2, it can be seen that spray button 10 is provided with a substantially vertical and cylindrical valve stem receiving recess 12 extending upwardly from its base 14. Recess 12 is of a size to fit snugly about the valve stem, (not shown) and may even be provided with an anchoring groove, (not shown) to grasp the anchoring ring frequently found on valve stems.

When the aerosol valve is actuated by pressing downward on button 10, the product for which the button 10 has particular application, such as liquid starch, is forcibly ejected, under pressure, through the valve stem and out its orifice into a wedge-shaped inlet passage 16 (see FIG. 3). Inlet passage 16 channels the flow to one side to cause it to enter into a tapered ring shaped expansion channel 18. As the starch enters the channel, it is partially vaporized and is directed via the walls of channel 18 around horizontal knob 20. And since channel 18 is tapered; i.e. in the shape of a helix, the starch is driven forwardly into circular swirl chamber 22. A forwardly acting centrifugal motion is thereby imparted to the product. As more product enters chamber 22, the earlier entering product "swirls" into a whirlpool thereby greatly increasing angular velocity, and then out through terminal orifice 24 and flare 26 of orifice insert 28. To aid in creating the "swirl" flow pattern, a tit 27 may be formed on protrusion 20.

As the product leaves flare 26, the starch encounters a rapid drop in pressure. With the high angular velocity imparted to the product, the product rapidly spirals outwardly under its own centrifugal force into a well defined funnel-shaped spray pattern as seen in FIG. 1.

When actuation of the aerosol valve is terminated, flow stops. This may leave a small quantity of product, such as starch within channel 18 and chamber 22. Such starch will remain liquid long enough to drain into the lower portion of the channel, where (as seen in FIG. 2) it is generally below inlet 16 and does not block either channel 18 nor chamber 22. The starch may recrystallize into granules 30 or remain as a liquid.

Then when the valve is again activated the new starch swirl passes over granules 30 and, since it is not completely saturated, any granules 30 left from prior use, will be quickly redissolved therein. Spray button 10 is therefore self-cleaning and the possibility of granular or liquid starch adversely affecting the normal functioning of the button is avoided.

The terminal orifice 24 and flare 26 are contained within a separate dish-shaped orifice insert 28. The length of the wall 23 of orifice 24 will affect the depth of the cone-shaped spray pattern (see FIG. 1). The insert is anchored within a cylindrical cavity 32, within the button 10 in such fashion that it is concentric with chamber 22. Cavity 32 has a diameter approximately equal to that of insert 28 whereby a press fit between the two can be utilized. A lip or circular barb on the wall of cavity 32 may be used to insure retention although such is not necessary.

Several different embodiments of orifice inserts are shown in FIGS. 5 to 8 although a mere disc-shaped insert can be used. Basically, the orifice inserts shown differ only in their terminal orifice area. In FIG. 5, the inner wall 36 is completely conical. In FIG. 6, a step 40 is provided about the terminal orifice 24. In FIG. 7, the insert has a completely flat rear wall 42. In fig. 8, rear wall 44 has a tangentially fed swirl chamber 46, much like chamber 70 of FIG. 13 described hereinafter, in its back surface axial with the terminal orifice 24. In each instance, the length of the terminal orifice or the character of the stream which enters the orifice is altered and this affects the spray pattern 48, (see FIG. 1). Also affecting the spray pattern 48, is the diameter of the terminal orifice 24.

A second embodiment of the invention is shown in FIGS. 9 through 11. This second embodiment comprises a one-piece, vertical discharge button 40. The button is mounted on closed end hollow valve stem 42 of a toggle action tilt valve 44. In such a valve when button 40 is pressed sideways, valve stem 42 tilts about its rim 46 to depress valve sealer 48*a* and open the seal to allow dispensing of product. The product then travels upwardly through the hollow 50 of valve stem 42. It then passes out valve stem orifice 52 in the side of the closed upper end of the valve stem much like wedge shaped inlet passage 16 of the embodiment of FIG. 2. An annular tapered expansion channel 54 leads from orifice 52 into swirl chamber 56. The taper of channel 54 imparts a rising spiral motion to the product. Upon reaching swirl chamber 56, the product swirls in whirlpool fashion until it issues from terminal orifice 58. As in the first embodiment, when the product leaves orifice 58 and subsequently flare 60, a well defined hollow funnel-shaped spray pattern, as in FIG. 1, is again produced.

Any undischarged liquid starch remaining in channel 54 of swirl chamber 56 drains downwardly before recrystallizing. Upon first reuse, the crystals so formed are swept up and out of orifice 58 to cause reliable operation.

A third embodiment of the invention is shown in FIGS. 12 to 15. Here a tangentially fed (from expansion channel 18) swirl chamber 70 is formed in knob 20 and the inside wall of terminal orifice insert 28 abuts against the face of knob 20. By such structure, and with a central tit 72, which may also be utilized in the structure of FIGS. 2 to 4 and FIGS. 9 to 12, a more positive control over the centrifugal motion is effected. If desired, a cone-shaped knob 20*a*, as seen in FIG. 12, may be employed instead of tit 72 on knob 20.

While the invention has been illustrated and described with particular reference to a valve button, it should be understood that the invention may also be incorporated into a valve actuator.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Now that the invention has been described,

I claim:

1. An aerosol spray device for attachment to the exposed stem of an aerosol valve comprising a device body, a cylindrical recess in the base of said body, an inlet passage, said passage leading to an annular helical, expansion channel around a knob, said channel opening and leading into a swirl chamber, said chamber being just behind and communicating with the terminal orifice.

2. The aerosol spray device of claim 1 wherein said device comprises a valve button.

3. The aerosol spray device of claim 1 wherein said device comprises an actuator.

4. The aerosol spray device of claim 1 wherein said swirl chamber is forwardly of said knob and is circular in shape.

5. The aerosol spray device of claim 1 wherein said swirl chamber is a tangentially fed chamber within said knob.

6. The aerosol spray device of claim 1 wherein said terminal orifice is an insert and said insert is of inverted cup shape.

7. The aerosol spray device of claim 6 wherein said swirl chamber is a tangentially fed chamber on the back of said insert axial to said terminal orifice.

8. The aerosol spray device of claim 1 wherein said device is capable of being attached to a vertical valve stem with a side emitting orifice therein, said orifice acting as said inlet passage.