

- [54] **MECHANICAL BREAKUP BUTTON OR ACTUATOR**
- [75] Inventors: **James E. Greenebaum, II**, Highland Park; **Ronald F. Ewald**, Rolling Meadows, both of Ill.

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- [73] Assignee: **Seaquist Valve Company**, Cary, Ill.
- [22] Filed: **May 21, 1973**
- [21] Appl. No.: **358,581**

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Related U.S. Application Data

- [63] Continuation of Ser. No. 149,507, June 3, 1971, abandoned.
- [52] U.S. Cl. **239/492; 239/579**
- [51] Int. Cl. **B05b 1/34**
- [58] Field of Search 239/490, 491, 492, 337, 239/579

[57] ABSTRACT

A mechanical breakup aerosol valve button or actuator with an annular feed chamber which feeds chordal passageways leading into a central swirl chamber behind a recessed terminal orifice contained within an insert, whereby spray pattern and flow rate are controllable.

References Cited

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6 Claims, 5 Drawing Figures

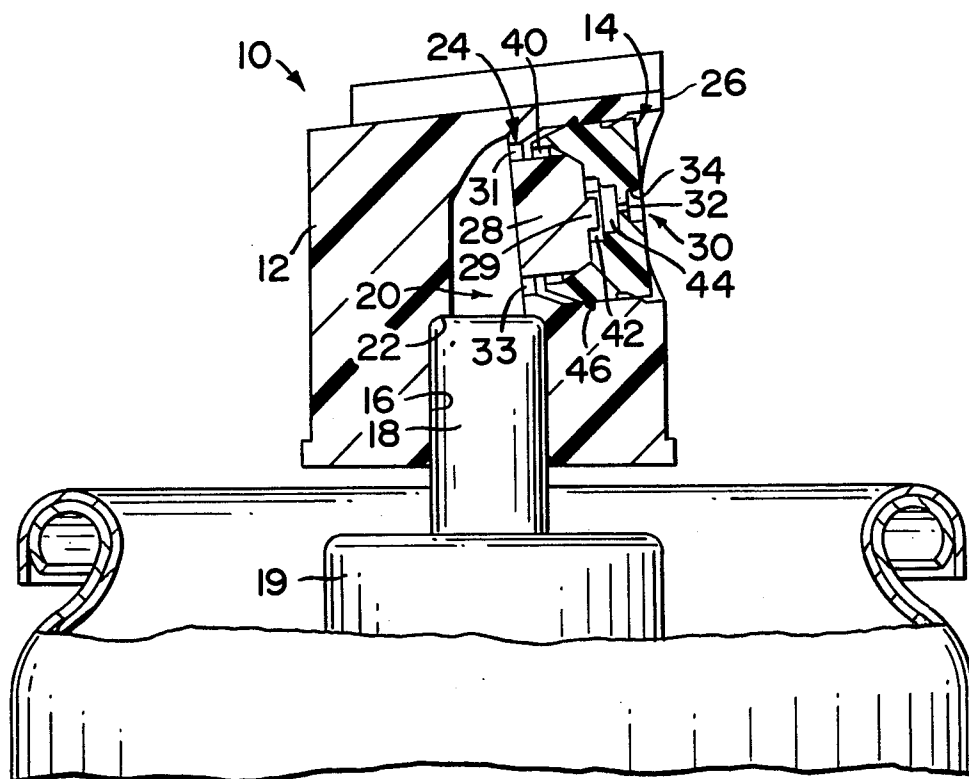


FIG. 1

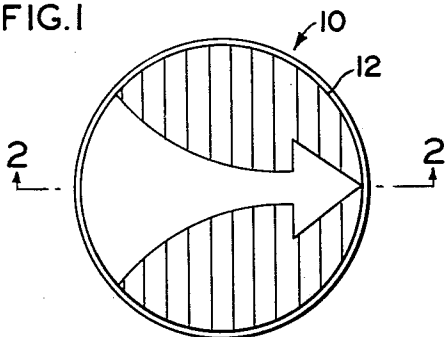


FIG. 3

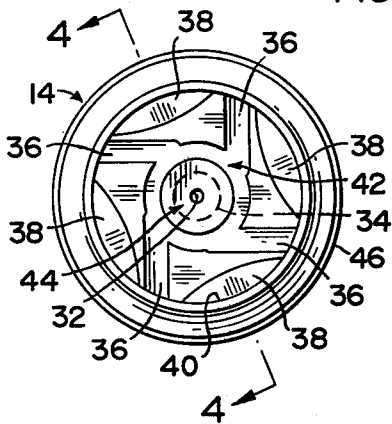


FIG. 2

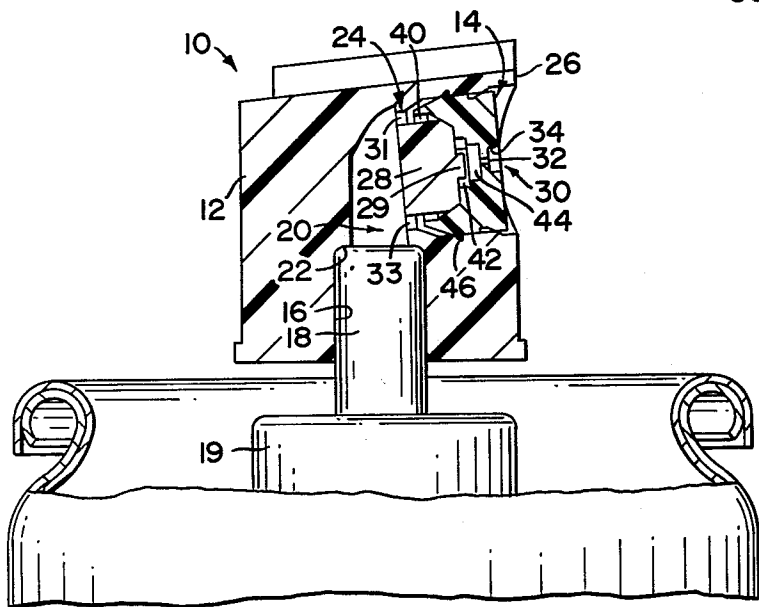


FIG. 4

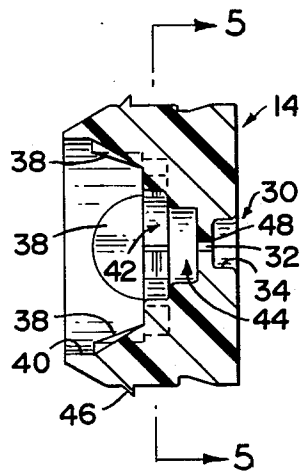
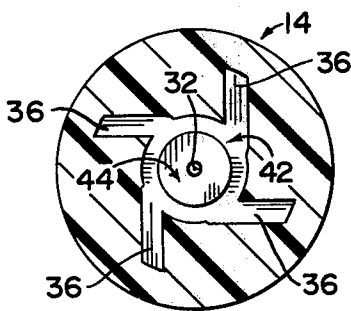


FIG. 5



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MECHANICAL BREAKUP BUTTON OR ACTUATOR

This application is a continuation of patent application serial number 149,507 filed June 3, 1971 now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a mechanical breakup button or actuator for an aerosol valve and more particularly to a mechanical breakup button or actuator which involves an annular feed chamber which feeds chordal passageways leading into a central swirl chamber behind a recessed terminal orifice. The diameter of terminal orifice coupled with the diameter of its recess provides good control over the spray rate and pattern size respectively.

2. Description of the Prior Art

There are numerous designs for mechanical breakup buttons or actuators for aerosol valves. In most of these, the liquid dispensed is given a swirling action, prior to leaving the terminal orifice whereby the emitted stream is actually mechanically-broken-up in an outward pattern into a fine mist. Such mechanical breakup buttons and actuators have been widely employed commercially in conjunction with a variety of products. A survey of these reveals, however, that considerable room for improvement remains, for example, the passageways and orifice have a tendency to become clogged with dried product deposits. In general this is attributable to complex structure that is generally utilized. A simple design would minimize the possibility of clogging. In addition, simplicity in the internal structure would facilitate high volume production necessary in this competitive market.

SUMMARY OF THE INVENTION

Broad Statement of the Invention

The invention here relates to a valve button or actuator for an aerosol valve with a vertical valve stem recess leading to a terminal orifice insert depression on the side wall thereof. A cup shaped terminal orifice insert is inserted into this depression and surrounds a post. The valve stem recess is preferably countersunk to provide a shoulder surface to accept the valve stem. The post is disposed at the upper portion of the valve stem recess.

The cup shaped terminal orifice insert has a unique stepped orifice for controlling flow rate and the spray pattern. The smaller diameter portion of the orifice controls the flow rate. The larger diameter portion of the orifice controls the spray pattern and since the smaller diameter portion is recessed away from the exterior face of the insert, there is very little chance of nicking the edge during assembly or shipping. This further insures a high degree of spray pattern quality.

The insert also includes four chordal passageways which comprise the swirl inducing member of the swirl inducing chamber that is formed when the insert is press fitted into the depression around the post.

The inside surface of the insert also has a plurality of fillets which cooperate with the post to automatically center the terminal orifice insert during assembly with respect to the post.

In operation upon an aerosol valve, the button or actuator is depressed to cause pressurized product to move vertically upward into and through the valve stem

recess. It is then forced forwardly about the base of the post toward and through the annular feed groove formed between the terminal orifice insert and the post into the chordal passageways and into the swirl chamber. Such motion imparts a rotational moment to the product. From there the product is forced forward through the stepped orifice and finally expelled from the button in a fine mist. The smaller diameter portion of the orifice governs the spray rate while the larger diameter portion of the orifice governs the spray pattern. Thus by merely changing the terminal orifice insert, one can customize the spray rate and pattern for any particular product.

It should be noted that the passageways leading into the swirl chamber are chordal at about a 20° angle. This provides for new product to be sprayed over any possible residue of the old product from previous spray in the swirl chamber without tearing it loose with no shearing action between the swirl chamber and the residue. Instead the residue is retained in place but is subsequently dissolved by the new liquid product. This substantially reduces clogging.

The invention accordingly comprises the features of construction, combinations 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.

BRIEF DESCRIPTION OF THE DRAWINGS

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 drawing in which:

FIG. 1 is a top view of the valve button of the present invention.

FIG. 2 is a sectional view taken along line 2-2 of FIG. 1 showing a side view of the valve button with the terminal orifice insert fitted therein.

FIG. 3 is a back view of the terminal orifice insert.

FIG. 4 is a cross sectional side view of the terminal orifice insert taken along line 4-4 of FIG. 3.

FIG. 5 is a cross sectional view of the insert taken along line 5-5 of FIG. 4 to show the chordal passageways as they lead to the swirl inducing chamber.

Similar reference characters refer to similar parts throughout the several views of the drawing.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As been seen in FIG. 2, the valve button, generally indicated at 10 comprises a button body 12 and a cup shaped terminal orifice insert 14. They are generally made of molded plastic. The button body 12 has a valve stem recess 16 to receive the stem 18 of the aerosol valve 19 (shown only in outer form detail). Immediately above and substantially concentric with valve stem recess 16 is a smaller rectangular swirl chamber feed recess 20. A circular support rim 22 is also provided whereby button body 12 may engage and seal the valve stem to itself. Additional seal means may be used on rim 22, if desired.

A circular depression 24 extends forwardly from recess 20, in the side wall of the button. It houses the terminal orifice insert 14. Affixed to the body 12 adjacent recess 20 in the aft portion of the recess 24 is a cylindrical terminal orifice feed post 28 with volume saver plug 29 extending forwardly from its base. The rectangular

recess 20 extends above and below the cylindrical post 28 to provide, in this instance, 2 product feed channels 31 and 33. Obviously, more feed channels could be provided.

A cup shaped terminal orifice insert 14 is press fitted into depression 24, to completely cover the opening of said depression. However, an annular feed chamber 40 between insert 14 and post 28 remains. As best seen in FIG. 3, fillets 38 (usually four although more or less may be used) center the terminal orifice 30 of the insert 14 with respect to the post 28. These fillets provide for automatic centering which is needed with current high speed assembly apparatus. The terminal orifice insert 14 includes a stepped orifice 30 comprising a smaller diameter rate controlling portion 32 and a larger diameter spray pattern controlling portion 34. As seen from FIGS. 3 and 5, the inside base of the insert 14 has four (although more or less may be used) chordal swirl producing passageways 36. When in position, terminal orifice insert 14 surrounds post 28 to form annular feed groove 40, as well as a swirl inducing chamber 42 because of passageways 36 and a swirl boasting chamber 44 just behind the stepped terminal orifice 30.

Orifice insert 14 may also include an anchoring ring 46 on its outer surface a corresponding annular slot in depression 24 to firmly lock the insert in place.

In use, pressurized product passes upwardly through valve stem recess 16, then through swirl chamber feed recess 20, via passageways 29 and 31 into annular feed groove 40. Then the product is forced, by its own pressure, through chordal passageways 36 into swirl inducing chamber 42. Since these passageways are not tangential but are positioned as chordal with respect to the circular swirl inducing chamber 42, the new product is sprayed over the residue remaining from previous spraying thereby minimizing potential clogging of the valve.

The driving pressure then forces the product which now has achieved a centrifugal action from swirl inducing chamber 42 through a swirl boasting chamber 44 into the rate controlling position of orifice 32. This portion of orifice 42 acts to meter the emitted product. The product is then forced through the spray pattern portion of orifice 34 into the atmosphere. The sudden drop in pressure and centrifugal acceleration produces a well defined hollow funnel-like spray pattern in accord with the diameter of this portion of the orifice 30. The edge 48 appears to be a dominant factor in producing a uniform spray pattern. Since the edge 48 is recessed from the face of insert 14, it can be more easily molded in a uniform manner and will retain its edge during use because it is protected.

It should be noted that the four concave fillets 38 formed in the terminal insert orifice 14 functions as a centering means to facilitate high speed automated assembly.

The structural design just described can easily be incorporated into an actuator as well as the button to which the above description was directed.

It will thus be seen that the objects of this invention, among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above constructions 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,

What is claimed is:

1. A mechanical breakup button or actuator comprising a body with a valve stem recess therein, said recess leading to a depression on the side of said body, a post disposed in said depression, a cup shaped terminal orifice insert including a terminal orifice comprising a plurality of stepped recesses disposed in said depression such that said terminal orifice insert and said post cooperate to form an annular feed groove, said annular feed groove leading to a plurality of passageways, said passageways communicating with the inner most stepped recess of said terminal orifice which forms a swirl inducing chamber between the forward end of said post and the interior of said terminal orifice insert, said chamber communicating with said orifice, said passageways being inclined relative to the outer circumference of said swirl inducing chamber to form chordal passageways such that product is sprayed over product residue in said swirl inducing chamber to minimize potential clogging of said terminal orifice.

2. The button of claim 1 wherein the outermost stepped recess and the next adjacent stepped recess cooperatively form a spray control means, said outermost stepped recess being larger than said next adjacent stepped recess such that said outermost stepped recess controls the spray pattern and said next adjacent stepped recess control spray rate.

3. The button of claim 1 wherein the interior base of said terminal orifice insert is provided with fillets to provide automatic centering of the terminal orifice with respect to said swirl inducing chamber.

4. The button of claim 1 wherein a swirl boasting chamber communicating with both said swirl inducing chamber and said terminal orifice is provided between said post and the interior of said terminal orifice insert.

5. The button in claim 1 wherein said post has a volume saver plug on its forward end extending into said swirl inducing chamber.

6. The button of claim 1 wherein said valve stem recess leads to a smaller substantially rectangular swirl chamber feed recess and said post is affixed to the wall of said rectangular recess and said rectangular recess extends below and above said post to provide feed chambers to said swirl chamber.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,881,658 Dated May 6, 1975

Inventor(s) James E. Greenebaum II Ronald F. Ewald

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Abstract, line 1, delete "aeroso" and insert therefor
-- aerosol --.

Column 4, line 23, delete "innter" and insert therefor
-- inner --.

Column 4, line 39, after "control" insert therefor
-- the --.

Signed and Sealed this

fourth Day of November 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks