

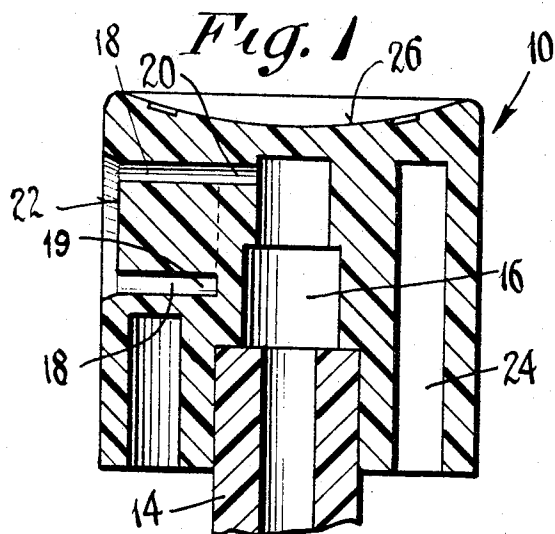
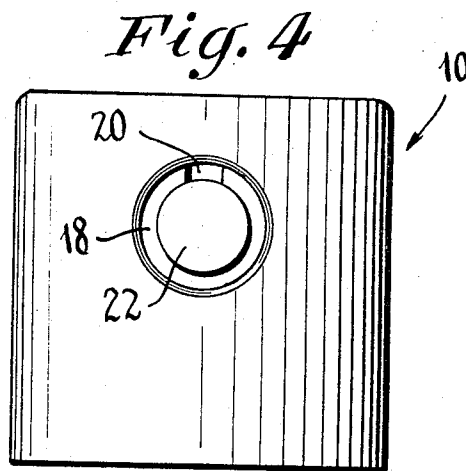
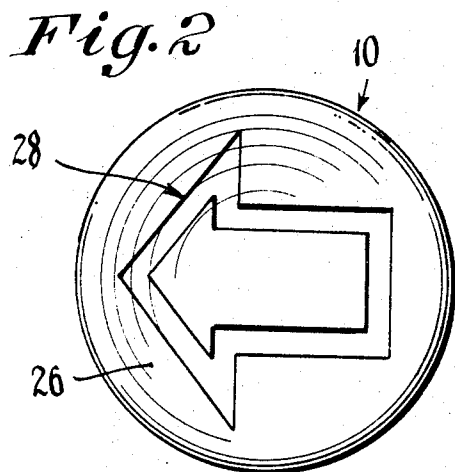
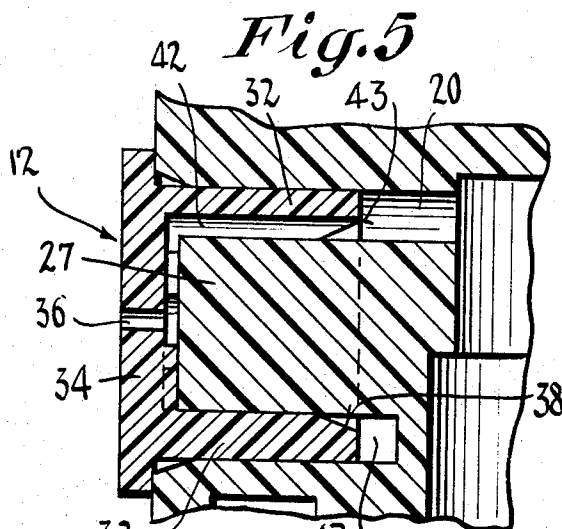
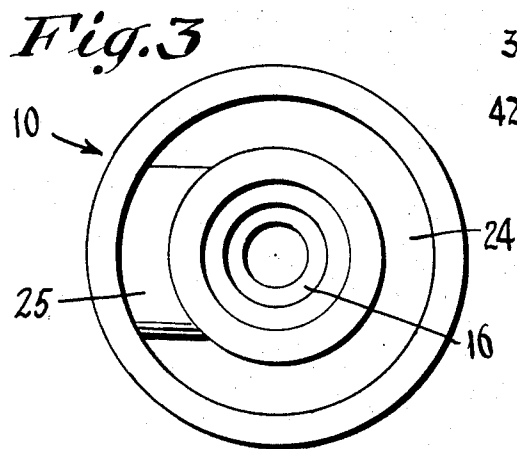
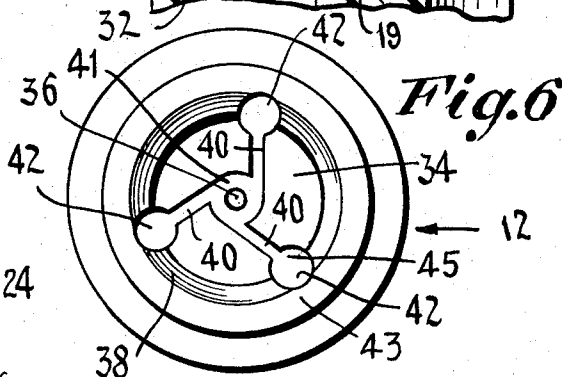
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SPRAY DISCHARGE BUTTON FOR SWIRLING SPRAY

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SPRAY DISCHARGE BUTTON FOR SWIRLING SPRAY

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ABSTRACT OF THE DISCLOSURE

A spray discharge actuator button for aerosol dispensers, comprising a button body for mounting on the depressible valve stem of the dispenser. The body has an annular side recess which communicates with the valve stem bore, and into which there is pressed a cup-like orifice piece having a central discharge opening in its transverse wall. The interior walls of the orifice piece have longitudinal and radial communicating grooves constituting discharge passages for the aerosol substance and which impart a swirl to the issuing spray.

This invention relates to spray dispensers, and particularly to the spray orifice structures thereof.

Objects of the invention are to provide: an improved, simplified spray orifice structure which effectively causes the dispensing substance to swirl as it is being discharged, thereby to produce a uniform, improved spray pattern; an orifice structure as above, which may be economically produced from molded plastic parts; a multi-part spray structure as outlined, wherein different spray patterns and effects are obtainable by utilizing different orifice pieces with a single larger body portion without requiring any changes whatsoever in the latter; a spray structure which is non-critical of assembly, does not require special orientations of the parts, is effective and reliable in operation at all times, easily and quickly assembled, and not likely to malfunction, clog or become unoperative after extensive use.

Other features and advantages will hereinafter appear. In the drawings:

FIG. 1 is an axial sectional view of an actuator button as provided by the invention, but with the orifice piece removed, mounted on a dispensing pump stem.

FIG. 2 is a top plan view of the actuator button of FIG. 1.

FIG. 3 is a bottom plan view of the actuator button.

FIG. 4 is a front elevational view of the actuator button per se, showing details of the connecting discharge orifice and the annular cavity for receiving the orifice piece.

FIG. 5 is an axial sectional view of the orifice piece for the button, this figure also showing a portion of the actuator button in axial section.

FIG. 6 is a rear elevational view of the orifice piece of FIG. 5.

The actuator button comprises a cylindrical-shaped body member 10, said member being adapted to carry an orifice piece or member 12 (also known as a "mechanical break").

The button 10 is mounted on a hollow discharge stem 14 of the type commonly provided on small hand-held dispensers. The discharge stem 14 may, for example, be a valve stem of a pressurized dispenser, or else it may be the stem of a pump-type dispenser which utilizes a piston and cylinder action to effect the discharge.

The stem 14 is frictionally fitted in a stepped central discharge bore 16 of the button, which also serves as the initial discharge passage.

At its side, the button 10 has an annular recess 18, 19

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adapted to frictionally receive and seize the orifice piece 12, the recess 18, 19 being connected with a horizontal channel or connecting passage 20 which in turn communicates with the central bore 16 of the button. The portion 27 of the button which is surrounded by the annular recess 18 is plug-like and has a front face 22 which is set in or slightly recessed with respect to the remainder of the button body, said front face being flat and circular as shown.

The button 10 may be readily molded of plastic substance, and to facilitate such fabrication it has the usual annular coring or recess 24 which in its upper portion is interrupted by an enclosure or solid portion 25 surrounding most of the recess 18.

The button 10 has a slightly hollowed finger engageable top surface 26, on which there may appear the designation 28 of an arrow, indicating the direction of discharge of substance being sprayed from the button.

In accordance with the present invention, the orifice piece 12 is cup-shaped and constructed in a unique manner by which, in cooperation with the adjoining button formation 27 and face 22 it provides a desirable swirl and breaking up of the stream of substance which is being discharged through the button, thereby to effect a fine atomizing spray, said orifice piece being economically moldable of plastic substance and securely retained in the button against dislodgement.

The orifice piece 12 has an annular or cylindrical side wall 32 which is press-fitted in the recess 18 of the button and snugly engages both the inner and the outer walls of the recess. The piece 12 has a front or transverse wall 34 provided with a central discharge opening 36. The rear or inward edge 43 of the orifice piece 12 has a chamfer 38 to facilitate the press-fitting of the piece in the recess 18, and to constitute an addition to the annular space 19, providing a distribution channel as later described.

For imparting a swirling movement to the substance being discharged, and produce a desirable atomizing spray and pattern, the inside surface of the front wall 34 of the orifice piece 12 has a plurality of tangential feed grooves 40 connecting tangentially with a common central recess or swirl cavity 41 at their inner ends, said grooves also directly communicating with partially circular or cylindrical-walled longitudinally extending channels or grooves 42 at their outer ends, said grooves 42 being of partially circular cross-sectional area shown as greater than a half circle, and being provided in the inner portions of the annular side wall 32 of the orifice piece 12. The longitudinal passages 42 terminate at partially circular divergent formations of funnel-like enlargements 45 (of the grooves 40) at the inside of the front wall 34 of the orifice piece, which enlargements are shown in FIG. 6. Thus the grooves 42 are, as shown, of greater width than the grooves 40. The front terminations of the grooves 42 comprise partially cylindrical walls which are smooth continuations of the grooves. The central swirl cavity 41 communicates with the discharge opening 36.

As seen in FIG. 5 the orifice piece 12 is press-fitted into the recess 18 of the actuator button 10, engaging inner and outer walls thereof, thereby to be securely retained in place.

The opposite side corner portions of the grooves 42 have a snug fit with the inner wall surfaces of the annular recess of the body member, and said longitudinally extending grooves have a combined width constituting a relatively small fractional part of the circumference of the inner cylindrical wall of said annular side recess whereby the flow of aerosol substance through said longitudinally extending grooves is in the nature of concentrated jets of small girth.

Upon the button 10 being depressed, the substance which is discharged upward through the stem 14 and central bore 16 will be lead through the connecting channel 20, from which it will pass into the inner portion 19 of the recess 18 which now acts as a distribution manifold, together with the chamfer 38. From such manifold the substance passes forwardly through the three grooves 42 and thence to the feed grooves 40 in the inner surface of the front wall 34 of the orifice piece 12. The substance now swirls in the swirling cavity 41, from which it passes through the discharge opening 36 to emerge as a fine swirling spray. The tangential relation between the grooves 40 and the swirling cavity 41 impart a powerful swirling action to the substance being discharged, as will be understood.

The advantageous action as effected by the invention may now be readily understood. The inner end 19 of the annular recess 18 serves as a distribution channel or passage, by which the discharging substance is brought to the three longitudinal grooves 42. From such grooves, the discharging substance passes inwardly through the grooves 40 into the chamber 41 where a powerful swirl is effected. The swirling substance is then discharged from the orifice opening 36, resulting in a fine, equally distributed spray. The circular plug-like formation or portion 27 of the button, in cooperation with the orifice piece 12, effects the formation of the annular distribution channel 19, as well as the longitudinal channels 42 and the tangential channels 40 together with the swirling cavity 41. All such passages are obtained by the shape of the orifice piece 12, whereas the button portion 27 is of a simple circular plug-like shape devoid of grooves, depressions or the like. Thus, the advantageous swirling spray pattern is the result of the various groove-like configurations given to the orifice piece 12, and by varying such groove-like configurations, different types of substance may be accommodated or best handled, and different spray patterns may be effected by the use of different orifice pieces without requiring alteration of the plug-like formation 27 of the button.

The enlargements 45 of the grooves 40, and the chamfer 38 minimize impeding of the substance where its direction of travel is changed, and this is an important feature of the invention.

Variations and modifications may be made within the scope of the claims, and portions of the improvement may be used without others.

I claim:

1. An aerosol spray discharge device adapted for a hand-held dispenser, comprising, in combination:

- (a) a body member having a central discharge bore adapted to receive and frictionally fit the discharge stem of the dispenser, having an annular side recess, and having a connecting passage communicating with said bore and recess,
- (b) said body member having a cylindrical plug-like portion provided with a flat circular front face, said plug-like portion being encircled by the annular side recess,
- (c) said connecting passage extending from the bottom of said recess inward to said central bore,
- (d) a cup-shaped orifice member having a transverse front wall provided with a central discharge opening, and having a cylindrical side wall which is snugly frictionally fitted into the annular side recess of the said body member,
- (e) the inner and outer cylindrical surfaces of said

cylindrical side wall snugly engaging the inner and outer side wall surfaces of the annular side recess,

(f) the inside surface of the front wall of said orifice member having a central swirl cavity communicating with the central discharge opening, and having a plurality of feed grooves extending outward from the swirl cavity in substantially tangential relationship thereto and communicating therewith,

(g) the interior portions of the cylindrical side wall of the orifice member having a plurality of longitudinally extending grooves constituted of partially-cylindrical walls and having partially-circular cross-sectional areas, said longitudinally-extending grooves being of greater width than said tangential feed grooves and communicating respectively with said feed grooves and extending to the edge of the cylindrical side wall, the opposite side corner portions of said longitudinally extending grooves having a snug fit with the inner wall surfaces of the annular recess of the body member, and said longitudinally extending grooves having combined widths constituting a relatively small fractional part of the circumference of the inner cylindrical wall of said annular side recess whereby the flow of aerosol substance through said longitudinally extending grooves is in the nature of concentrated jets of small girth,

(h) the inner end of the annular side recess being unimpeded and free of said cylindrical side wall and constituting a distribution channel by which the dispensing substance is fed from the connecting passage to the longitudinal grooves,

(i) the edge of the said cylindrical side wall of the orifice member having a bevel at the ends of the longitudinal grooves, providing an enlargement of the distribution channel at said grooves,

(j) said bevel being annular and constituting a uniform enlargement of said distribution channel,

(k) said tangential feed grooves in the inside surface of the front wall of the orifice member leading directly toward partially-cylindrical wall surfaces which are of the same configuration as the cross-sectional shape of said longitudinally extending grooves and which constitute smooth continuations of the walls of said longitudinally extending grooves so as to aid the flow of aerosol substance at the junction points of the longitudinal grooves and the tangential feed grooves,

(l) end portions of said tangential feed grooves being divergent where they meet the said longitudinal grooves and thereby constituting funnel formations to further aid in the flow of the aerosol substance.

2. A spray discharge device as in claim 1, wherein:
(a) the cross-sectional areas of the longitudinal grooves are at least as large as a half circle.

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