

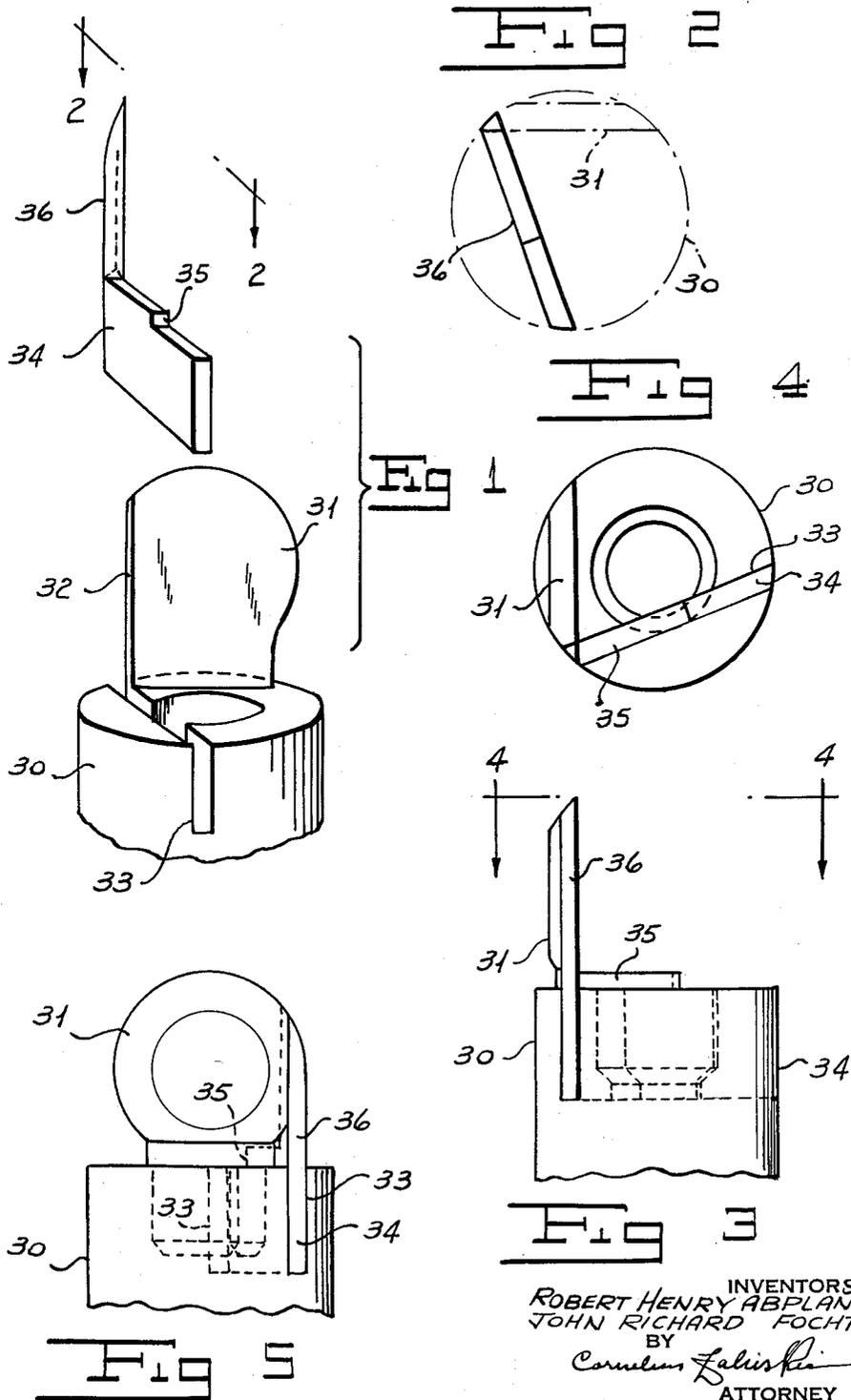
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VALVE BUTTONS FOR PRESSURIZED DISPENSERS
AND DIES FOR MAKING THE SAME

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2 Sheets-Sheet 1



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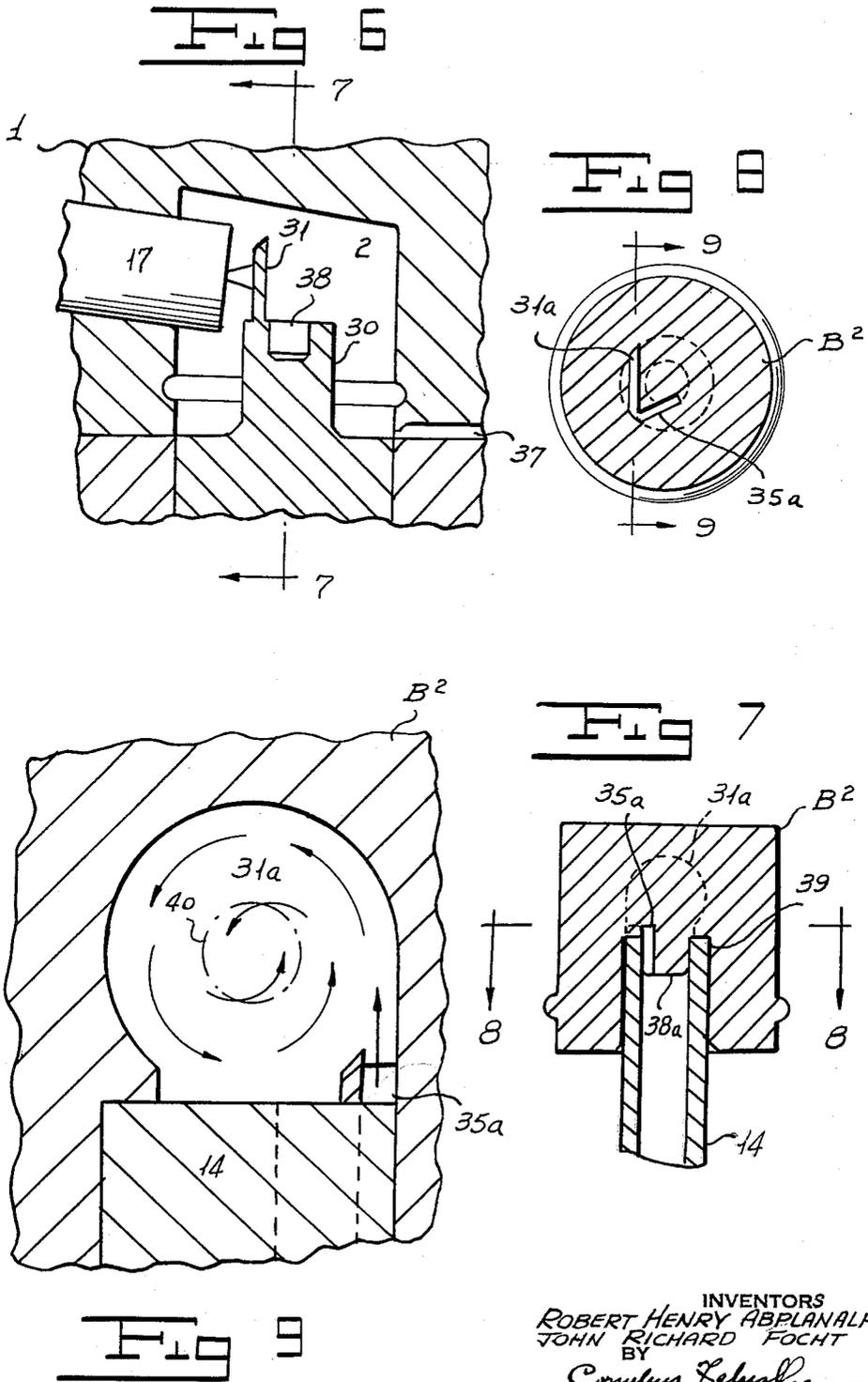
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VALVE BUTTONS FOR PRESSURIZED DISPENSERS AND DIES FOR MAKING THE SAME

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 Original application Oct. 10, 1956, Ser. No. 615,136, now Patent No. 3,008,654, dated Nov. 14, 1961. Divided and this application July 28, 1961, Ser. No. 127,678
 3 Claims. (Cl. 239-468)

This application is a division of application, Serial No. 615,136, filed October 10, 1956, now Patent No. 3,008,654.

The invention relates to valve buttons for pressurized dispensers and also includes dies in which said buttons may be pressure molded.

The buttons of this invention may be employed in connection with aerosol materials or mixtures. An aerosol material is, in the true sense, a solution of an active ingredient and a propellant, in contradistinction to a mixture which consists of a solid particle active ingredient and a propellant. In such mixtures, the solid particle active ingredient is in suspension instead of in true solution.

A number of dispensing valves known to the market are adapted to efficiently dispense aerosol solutions but are either wholly ineffective or seriously defective in the dispensing of mixtures, such as above referred to. The difficulty arises through the inability of the push buttons, with which the valves are equipped, to produce a satisfactory spray pattern throughout which the solid particles are uniformly distributed in discrete and separated form. Most prior constructions with which it has been attempted to dispense such materials either dispense the same in large droplets with excessive drip at the nozzle or squirt the material in the form of a stream, both of which conditions are wholly undesirable.

Exhaustive experimentation has shown that a very high degree of turbulence of the material before and as it leaves the nozzle is essential to satisfactory dispensing of mixtures and it has been found that the most satisfactory way to accomplish this is to dispense the same through a nozzle which imparts to them a rapid rotary motion, so that the mixtures leaves the nozzle and form a spray pattern in which the material swirls at high velocity.

Numerous attempts have been made to construct valve operating buttons which would bring about this result, but this has involved many difficult problems because satisfactory spraying requires that the nozzle opening be extremely small and many times minute.

Although the need has been acute and some of the best minds in this art have been applied to these problems, the best and only solution heretofore obtained has been to construct the button of a plurality of parts which must be separately fabricated and subsequently assembled. The resulting buttons are expensive to produce and materially add to the cost of the dispensing mechanism as a whole.

With the foregoing considerations in mind, the primary object of the present invention is to provide a valve button which will accomplish highly effective results in the dispensing of a discrete solid particle-propellant mixture and which may be made complete in a single pressure molding "shot," with all parts thereof integral with one another, so that no prefabrication is required and no subsequent assembly operation necessary.

The accomplishment of this object is made possible by the use of dies of unique construction which, as hereinafter pointed out, may be readily made by any experienced die maker. They are such that the use of these dies in a conventional pressure molding machine, utilizing any

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appropriate kind of thermoplastic, will result in the production of the button of this invention.

Generally speaking, this button is provided with the usual nozzle perforation, but immediately adjacent the inner end of the nozzle perforation is formed a circular chamber, preferably coaxial with the nozzle. Leading off-center into said circular chamber and preferably substantially tangent thereto is a passage through which the mixture is fed from the interior of a hollow valve stem. Since this material is under considerable pressure, it traverses said passage, enters the circular chamber off-center, swirls about therein at high velocity and exits therefrom through the nozzle perforation with high velocity circular motion, to be discharged therefrom in the form of a swirling spray of substantially conical form, having a smaller or larger angle at its apex according to the size and shape of the nozzle perforation.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and appended claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

FIG. 1 is a perspective view of the parts of a male die member, the parts being illustrated in this figure as separated so that their individual structures may be clearly understood.

FIG. 2 is a plan view of one of the parts shown in FIG. 1, looking downwardly from the plane of the line 2-2 of FIG. 1.

FIG. 3 is a side elevation of the assembled parts shown in FIG. 1.

FIG. 4 is a plan view looking downwardly from the plane of the line 4-4 of FIG. 3.

FIG. 5 is a view of the structure of FIG. 3 when viewed from the left of the latter figure.

FIG. 6 shows an assembled die couple including the male die shown in FIGS. 1-5.

FIG. 7 is a central section of a button molded in the die of FIG. 6, as taken in the plane of the line 7-7 of the latter figure.

FIG. 8 is a plan section taken on the line 8-8 of FIG. 7.

FIG. 9 is a fragmental section taken in the plane of the line 9-9 of FIG. 8.

In FIGS. 1-9 there is shown a mold and button construction. In FIG. 6, the complete die assembly for making this button is shown as comprising a female die 1 with a mold cavity 2, while the male die is indicated at 30. 17 designates the retractable core member. The fundamental feature of this particular embodiment of the invention is that the material to be dispensed is fed to the circular chamber back of the nozzle in a truly tangential relation thereto, so as to produce an active swirling movement of the material in this chamber, before it is dispensed through the nozzle.

The manner in which said male member is constructed is shown in FIG. 1. In this view the upper portion of the male member is provided with an upstanding flange 31 of substantially circular form but with one side thereof cut away to leave an upright edge 32. Across the top of the male member 30 is formed a slot 33, one upright edge of which occupies the same plane as the edge 32 of the flange 31. In this slot is firmly affixed an insert forming a second flange 34 shown in the upper portion of FIG. 1. The right hand portion of this flange is substantially the same height as the depth of the slot 33 and comes flush with the upper face of the male member. Said flange is, however, provided with a stepped portion 35 and at the

left hand end of this stepped portion is an integral up-standing part 36 which is so shaped, proportioned and located that, when the flange 34 is in the slot 33, the part 36 will supplement and supply the remainder of the circular contour of the flange 31, as clearly appears in FIG. 5. When these parts are assembled as stated, they appear as shown in FIGS. 3-5.

From FIGS. 1 and 4 it will be seen that the slot 33 is off-center and consequently the flange 34 is off-center, so that the stepped portion 35 overlaps the cavity in the button which will be cast in the resulting mold. FIG. 3 shows very clearly the stepped portion 35 as rising above the upper surface of the main portion of the male die and this stepped portion will form in the button a laterally extending passage.

When the male and female members of the die couple are assembled as shown in FIG. 6, with the retractable core member 17 in place as therein illustrated, plastic is introduced through the gated runner 37 to effect the molding operation. After the plastic has solidified sufficiently to permit it, the retractable core member 17 is withdrawn, followed by with withdrawal of the male member 30 and the ejection of the cast from the cavity 2.

The resulting button B² will appear as shown in FIGS. 7-9. The portion 30 of the male member will have formed a cavity to receive the tubular valve stem 14 and a depression 38 in the top of the portion 30 will have formed the plug 38a which, together with the remainder of the cast, provides the channel 39 into which the upper end of the valve stem will seat, as shown in FIG. 7.

The stepped portion 35 of the flange 34 will have formed the passage 35a through which material may pass from the valve stem to the circular chamber 31a formed conjointly by the flange 31 and its supplementary part 36. As shown in FIGS. 8 and 9, the passage 35a merges into the circular chamber 36a in a truly tangential relation thereto, to impart to materials fed into said chamber maximum swirling motion, so that they exit from the nozzle 40 (FIG. 9) to produce a spray pattern in which this swirling motion persists to produce the results hereinbefore stated.

In molding buttons in a mold such as described, we find it convenient and desirable to use a thermoplastic which is more or less resilient. Polyethylene is the preferred plastic. It is introduced into the mold when the parts are as shown in FIG. 3 through the runner and gate 22, or in any other suitable manner and fills the entire mold cavity which is unoccupied by the male dies and core projections. Immediately following injection of the plastic it solidifies, but it remains sufficiently warm and elastic, to permit of a separation of the core parts and withdrawal of the cast from the female mold.

In the foregoing detailed description, we have shown one way of accomplishing the object of this invention. The parts of the die are so constituted that they cast a one-piece integral button with a passage leading off-center into a circular discharge chamber to produce a swirling discharge of said material from said chamber so that it persists in the spray pattern. By this arrangement the material is broken up into an extremely fine spray or mist in which the solids are uniformly dispersed.

This invention possesses many advantages over prior practice. It permits the accomplishments of the results to which we have referred through simple and conventional pressure molding practice and it entirely eliminates the necessity of subsequent assembly of separately fabricated parts heretofore required to produce the swirling discharge. By the use of this invention swirling discharge valve buttons may be produced at the same cost as the ordinary straight trajectory discharge buttons and at the same time and without any additional operations.

The foregoing detailed description sets forth the invention in one of its preferred practical forms, but the invention is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, what we claim as new and desire to secure by Letters Patent is:

1. In an assembly of the character described, a valve button, the same being an integral one-piece molding provided at its bottom with a valve stem socket, said button having interiorly formed therein the greater portion of a substantially circular chamber arranged with its axis substantially normal to the axis of the socket and all parts of which chamber are enclosed within and closed by the molded interior of the button except that the bottom of said chamber is circumferentially open to the interior of the socket, there being a discharge outlet leading from said chamber through the wall of the button to the exterior thereof, in combination with a tubular valve stem snugly fitted into said socket and closing the circumferential opening in the bottom of said chamber except for a passage leading from the interior of the valve stem into said chamber substantially tangentially of the latter, whereby material under pressure flowing through said passage into the chamber is caused to spirally swirl therein and exit through the discharge outlet to form a whirling spray pattern.

2. In an assembly of the character described, a valve button, the same being an integral one-piece molding provided at its bottom with a valve stem socket, said button having interiorly formed therein the greater portion of a substantially circular chamber arranged with its axis substantially normal to the axis of the socket and all parts of which chamber are enclosed within and closed by the molded interior of the button except that the entire circumferential portion of the bottom of said chamber directly above the socket is open to the interior of the socket, there being a discharge outlet leading from said chamber through the wall of the button to the exterior thereof, in combination with a tubular valve stem snugly fitted into said socket and closing the circumferential opening in the bottom of said chamber except for a passage leading from the interior of the valve stem into said chamber substantially tangentially of the latter, whereby material under pressure flowing through said passage into the chamber is caused to spirally swirl therein and exit through the discharge outlet to form a whirling spray pattern.

3. In an assembly of the character described, a valve button, the same being an integral one-piece molding provided at its bottom with a valve stem socket, said button having interiorly formed therein a substantially circular chamber arranged with its axis substantially normal to the axis of the socket, all parts of which chamber are enclosed within and closed by the molded interior of the button except for an opening in the circumferential wall of said chamber leading to the interior of the socket, there being a discharge outlet leading from said chamber through the wall of the button to the exterior thereof, in combination with a tubular valve stem snugly fitted into said socket and closing a part of the opening in the circumference of said chamber but leaving another part of the circumferential opening unsealed to form a passage leading from the interior of the valve stem into the chamber substantially tangentially of the latter, whereby material under pressure flowing through said passage into the chamber is caused to spirally swirl therein and exit through the discharge outlet to form a whirling spray pattern.

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