March 23, 1965 E. H. GREEN 3,174,692

ATOMIZER HEAD FOR USE WITH LOW-EXPANSION GASEOUS PROPELLANTS

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FIG. 1.

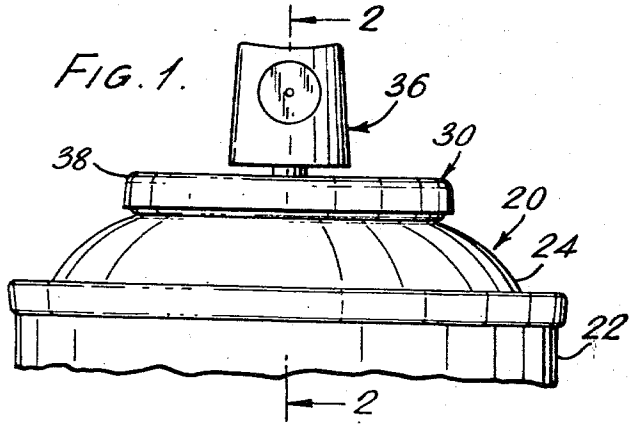

FIG. 2.

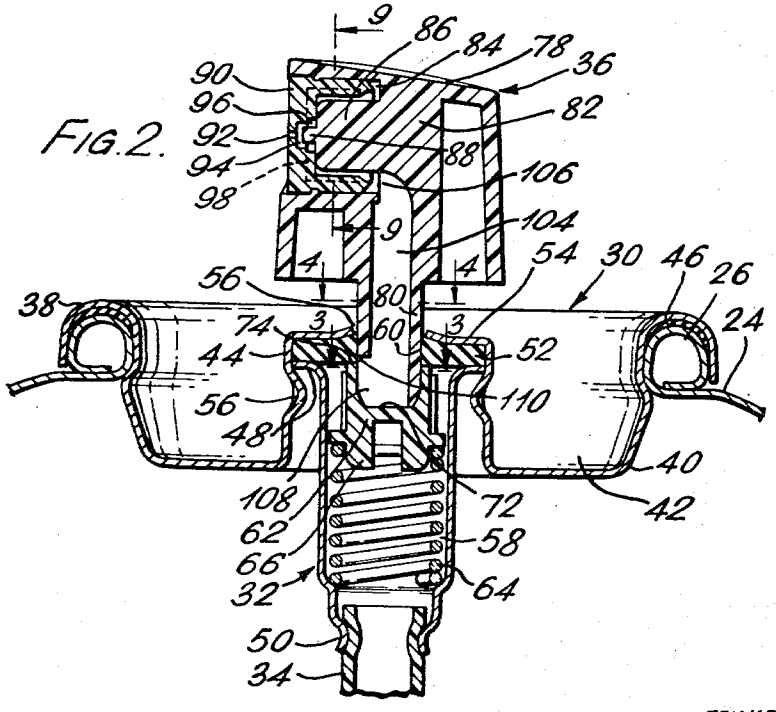

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FIG. 3.

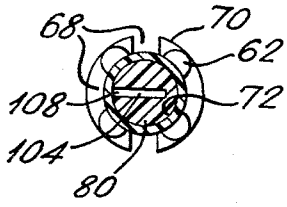


FIG. 4.

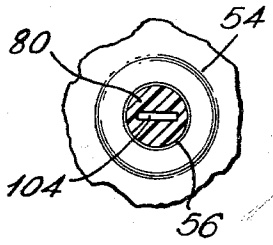


FIG. 5.

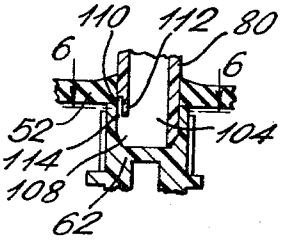


FIG. 7.

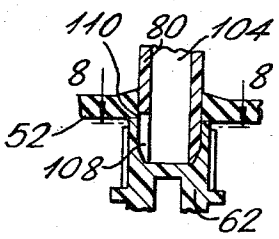


FIG. 6.

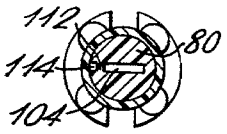


FIG. 8.

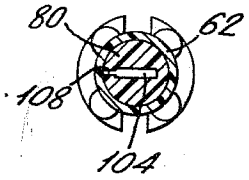
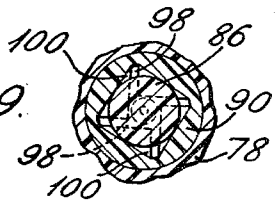


FIG. 9.



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ATOMIZER HEAD FOR USE WITH LOW-EXPANSION GASEOUS PROPELLANTS

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FIG. 10.

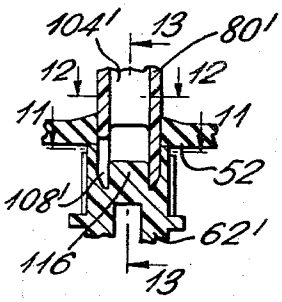


FIG. 13.

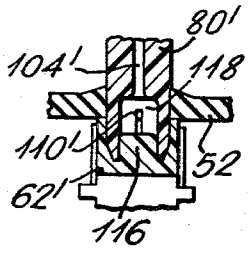


FIG. 11.

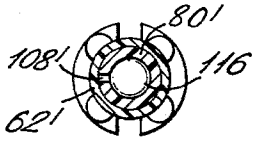


FIG. 12.

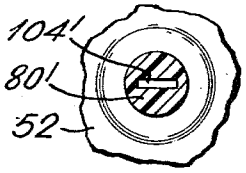


FIG. 14.

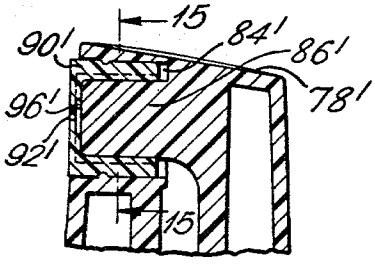


FIG. 15.

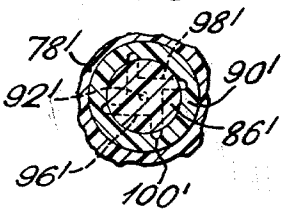
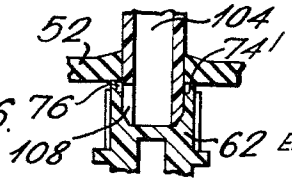


FIG. 16.



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3,174,692

ATOMIZER HEAD FOR USE WITH LOW-EXPANSION GASEOUS PROPELLANTS

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Filed June 10, 1963, Ser. No. 286,778
9 Claims. (Cl. 239—337)

This invention relates generally to the field of dispensing liquid products from pressurized containers and more particularly is concerned with an atomizer head for use with pressurized containers for effecting the discharge of the contents of the container in atomized form.

The pressurized package is well-known. It consists of a sheet metal canister which contains the product which it is desired to dispense and a propellant. The canister is sealed from the atmosphere and the propellant is normally a liquid which has a low boiling point, and one which is miscible with the product. Some form of valve and discharge device is installed on the top of the container and is arranged so that when the user operates the valve the propellant and product together will emerge from the discharge device and the propellant will immediately become gaseous thereby producing a fine spray or mist which is formed of dispersed particles of the product.

The propellants which have been used principally are hydrocarbons and fluorocarbons. Examples of hydrocarbons that are common are butane, propane and combinations thereof. Examples of fluorocarbons are the seveal compositions now marketed under the trademark "Freon." These chemicals are liquid under pressure at room temperature and are miscible with insecticides carried in other hydrocarbons such as petroleum distillates, paints in ordinary vehicles, a large range of cosmetics and hair sprays, and even with liquid waxes. Hydrocarbons are less costly than fluorocarbons but are highly flammable and require great care in the process of filling the containers because of their explosive nature. Hyrocarbons and fluorocarbons when used as propellants in canisters develop high pressures when exposed to abnormally high temperatures and even though fluorocarbons are not flammable they react in the same manner. Canisters using such propellants have been known to explode.

The pressurized package which has a hydrocarbon or a fluorocarbon as the propellant products an aerosol in use. The valve arrangement includes an expansion chamber to give the mixture of product and propellant an opportunity of expanding before ejection from the spray head, and in many structures, especially those used to dispense paint, the expansion chamber is in a hollow tubular stem which is integral with a push-button having a discharge orifice therein. The propellant becomes a gas in the expansion chamber and literally bursts out of the discharge orifice vaporizing the material which it carries. When the user releases pressure on the spray head, such gas as may remain in the expansion chamber scavenges the chamber so that the spray head discharge orifice is quite clean. If there is any residue, it is usually that which adheres to interior surfaces, and comprises vestiges of the product.

Quite recently certain authorities responsible for public safety stated that flammable propellants constitute a hazard to public safety. Some fillers (as the pickage maker is known) do not wish to use fluorocarbons because of their high cost, or hydrocarbons because of the hazards involved. The only remaining suitable propellants are compressed air, carbon dioxide, nitrogen, and nitrous oxide. These are used in pressurized packages of food products such as whipping cream and the like. Compressed air and nitrogen have limited use because they are not as soluble in some materials as are carbon

dioxide and nitrous oxide, for example. I will refer to all of these as being low expansion gases.

There are many advantages to the use of the lattermentioned gases for propellants, but prior to my invention their several disadvantages made them unpopular. I will list hereinafter some of their advantages:

(1) They are cheap, readily available, non-toxic and non-flammable.

(2) They do not expand as rapidly as hydrocarbons or fluorocarbons and hence are not as dangerous in packages subject to excessive heat.

(3) They do not require special apparatus and locations to be loaded into containers, since they do not flash off like butane and propane.

(4) They enable more of the product to be included in the package. Where low boiling point liquids are used, the propellant has been from 40% to 80% by liquid volume of the mixture, this being required to achieve the desired aerosol effect. If the case of the propellants which are low expansion gases, only 5% to 10% of the volume need be propellant so that more of the product may be packaged in a given size container.

(5) With respect to filling, the low expansion gases may be installed by simple methods. The product may be mixed with gas and under-the-cap filled; or the gas may be driven in after the product. For example, the product is placed in the canister, the canister capped and evacuated, carbon dioxide forced in through the valve or around it, and then the canister shaken to cause absorption of the gas into the product.

Since no aerosol, that is, self-expanding atomization, is produced, there are problems peculiar to the use of propellants which have either low expansion or are absorbed in a liquid. For example, everyone is familiar with the behaviour of carbonated fluid expelled from a tap or a container. The discharge is a bubbly stream and not an aerosol. It is necessary to provide a mechanical break-up or nebulization of the emerging discharge. This can be done by so-called swirler heads.

A swirler head is a spray tip or button which has a discharge passageway arrangement forcing the discharge to be driven out in a swirling stream thereby forcing dispersion of the product by centrifugal expansion. There are many swirler heads in the prior art, the performance of which ranges through various degrees of efficiency, all of which, to the best of my knowledge are quite low. I have devised a swirler spray head which is illustrated in the drawings of this specification and which I believe to be the most effective of all spray heads of the swirler type, but its construction is the subject matter of a prior patent application. As will become obvious hereinafter, my invention is characterized by the combination of a mechanical nebulizing device such as a swirler spray head with other structures. I prefer to use my own swirler spray head construction, but I wish to point out that any good mechanical nebulizing discharge means will be suitable, even if not as effective.

The problem mentioned above is not the only problem with these low expansion propellants. Certainly it has been solved in and of itself by the use of mechanical nebulizing devices devised by myself and others, and is not set up as one which is solved by this invention. The problem solved by this invention may be described simply as a dripping or drooling which occurs after the valve of a pressurized package containing low-expansion gaseous propellant has been closed. I believe that this has greatly curtailed the use of these propellants, and the reason will become apparent from a consideration of the effect of drip or drool.

Residual sprays such as insecticides, if permitted to drool, leave a toxic material on the container and con-

taminate the hands of the user, besides making the canister slippery and dirty. Paints will also dirty the package and the user's hands. The high expansion propellants drive the passageways of the aerosol package clear, but when the valve of a package having, for example, carbon dioxide as a propellant is closed, the liquid trapped between the internal and external orifices will ooze out of the spray head at low pressure as the gas comes out of solution. This causes the drip or drool. Hereafter, I will refer only to drip, but I intend to mean any material exuding from the spray head whether it forms as drops or actually flows.

The primary object of this invention is to provide an atomizer head which will have substantially no drip when used with pressurized products having low-expansion gaseous propellants. I would define low-expansion gaseous propellants as those which have insufficient expansion to produce aerosol sprays, which are suitable for use with known pressurized products, which can be injected or included or driven into a canister along with or after the product. As of this time, I know of the four I have mentioned, namely, air, nitrogen, nitrous oxide and carbon dioxide. Some mixtures of these gases might be suitable. Carbon dioxide and nitrous oxide are best since they are absorbed by liquids used in pressurized packages.

There will be other advantages and benefits flowing from my invention, but there is no need to enumerate them. They should be apparent to those skilled in this art, as I describe my preferred embodiments. The structure which I have devised to accomplish my object is operable with pressurized mixture having high-expansion propellants as well, and this makes it very flexible and economical for a manufacturer or filler who cannot afford the time or expense of handling different kinds of spray heads and valves. The reasons for this also will be brought out hereinafter.

The several figures are intended to illustrate preferred embodiments, with modifications, using my special swirler spray head, and a different construction of swirler spray head. Both will produce the desired results. I have chosen to call the invention an atomizer head because it will give a nebulization, even with low expansion gaseous propellants.

FIG. 1 is a fragmentary front on elevational view showing the top of a canister having a pressurized mixture therein, with a spray valve and an atomizer head installed, the latter being of a construction according to my invention. Obviously this view is not detailed and hence one could not know what the exact structure is. The purpose of the view is to show the environment in which the invention is used.

FIG. 2 is a fragmentary sectional view on an enlarged scale taken through the top of the canister of FIG. 1, and along the line 2—2 of that figure, showing the details of my invention.

FIG. 3 is a fragmentary sectional view through the valve plunger of the structure illustrated in FIG. 2 along the line 3—3 and in the direction indicated.

FIG. 4 is a sectional view through the stem of the atomizer head taken along the line 4—4 of FIG. 2 and in the direction indicated.

FIG. 5 is a fragmentary sectional view generally similar to the same parts illustrated in FIG. 2, but not including as much detail, and showing a modified form of atomizer head for use with the same valve plunger as that of FIG. 2.

FIG. 6 is a fragmentary sectional view taken generally along the line 6—6 of FIG. 5 and in the direction indicated.

FIGS. 7 and 8 are views quite similar to FIGS. 5 and 6 respectively, but showing a still further modification. FIG. 8 is a fragmentary sectional view taken generally along line 8—8 of FIG. 7 and in the direction indicated. FIGS. 7 and 8 show a slot whose width is smaller than the narrower dimension of the vertical passageway.

FIG. 9 is a sectional view taken generally along the line 9—9 of FIG. 2 and in the direction indicated, to show the construction of my preferred swirler spray head, which is used in this invention.

FIGS. 10 and 11 are views similar to those of FIGS. 5 and 6 respectively, but in this case, not only is the atomizer head of a modified form, but the valve plunger likewise is of different construction than that of FIGS. 2, 5 and 7.

FIG. 12 is a sectional view through the stem of the atomizer head of FIG. 10 along the line 12—12 and in the direction indicated.

FIG. 13 is a fragmentary vertical median sectional view through the structure illustrated in FIG. 10 along the line 13—13 and in the indicated direction.

FIG. 14 is a fragmentary sectional view taken generally through a swirler spray head and being the upper portion thereof, this view being for the purpose of illustrating a different form of swirler arrangement which will function with the invention.

FIG. 15 is a sectional view through the swirler spray head of FIG. 16 along the line 15—15 and in the indicated direction.

FIG. 16 is a view similar to that of FIG. 7 but showing a modified form of the invention.

Basically the invention is characterized by a spray head having a mechanical break up arrangement in the form of a swirler formation, a direct passageway between internal and external metering orifices, and a valve plunger to match. The invention is built into a spray head of the removable type in which there is an integral hollow stem which is inserted into the top of a canister having the valve arrangement installed.

Reference may be had to a prior patent of mine, U.S. Patent 2,777,735 which discloses the general type of construction with which the invention is to be associated. In this earlier patent, there is provided a cover member adapted to be installed upon a canister and having a valve chamber formed therein. A valve plunger is arranged to reciprocate in the chamber which communicates with the inside of the canister. The chamber is sealed from the atmosphere by the pressure of the plunger upward against an annular ring of resilient material such as synthetic rubber. The ring opening is aligned with a socket in the valve and an externally opening hole in the cover member. The spray head has a hollow depending stem with a bottom axial slit. The length of the slit is such that the upper end will be exposed, even when the stem is bottomed in the socket, and the stem is of a cross-sectional dimension to enable it to be pushed through the annular ring and into the socket. Further downward movement of the stem breaks the seal between the upper face of the plunger and the ring, but since the stem seals the hole in the ring while having the upper end of its slit exposed, the pressurized mixture, will be driven into the opening, through the stem, and out of the tip of the spray head.

There are many advantages to this kind of construction including the adaptability of storing, transporting and filling without the spray head being in place; the fact that the spray head may be replaced by one using different metering; the fact that the head may be removed for cleaning or rotated in the socket to a new position to obviate blockage by paint or other materials in the socket; the fact that the spray head may be molded economically of plastic. All of these advantages are applicable to the invention.

The spray head and valve arrangement as known has included a pilot projection in the bottom of the valve plunger socket to lead the stem into the socket during installation; to keep the bottom end of the stem in shape, as for example when the plastic end is softened by certain chemicals used in pressurized mixtures and tends to collapse or constrict; and to afford stability during

use, whereby to prevent wobble of the spray head due to small support area. The known spray head also had an expansion chamber in the stem whose purpose was, as explained, to give the propellant an opportunity to gasify or vaporize preliminarily to its discharge from the spray head.

My new construction differs from this known arrangement in that there is no expansion chamber in the stem, but instead, there is substantially the same metering area throughout the spray head, which I call an atomizer head for obvious reasons. This means that an extremely fine passageway must be formed in the hollow stem, and I have solved the difficulty of making this passageway in a manner to be described. Since the stem is to all intents and purposes practically a solid plastic member, the socket of the valve plunger does not require a pilot projection. In order not to obsolete expensive dies which are in existence, I have devised one construction for my atomizer head which will fit into valve plunger sockets which have pitlot projections, and hence, are completely interchangeable with the spray heads previously used, upon those valve constructions designed for the latter type of spray head.

Referring now to the drawings, in FIGS. 1 and 2 there is illustrated a pressurized package which I shall designate generally by the reference character 20. There is a canister comprising metal cylinder 22 having an upper dome 24 and a bottom end (not shown) all designed to contain the pressure to which such packages are subjected. The dome 24 has an upper opening formed with a rolled edge 26 and the entire valve structure and atomizer head to be described are adapted to be secured to said opening in sealing engagement with said rolled edge 26.

Normally the filler purchases the canisters and valve mechanisms from different sources. The invention herein concerns itself in no way with the canister, which may be of any suitable construction other than shown. Reference thereto in the claims is to be understood as merely for indicating the environment in which the invention is used.

The product manufactured and sold to the filler by the valve maker consists of the parts shown in FIG. 2, exclusive of the canister dome 24. These parts are given general characters of reference and specific details will also be identified. The character 30 is the metal cover member; the character 32 is the valve housing assembled to the cover member; the character 34 is the dip tube attached to the housing 32; and the character 36 is the atomizer head mounted on the valve mechanism contained in the housing.

The cover member 30 is preferably formed of sheet metal and has an annular curled over lip 38 formed on the edge of the body 40 which, as seen, provides an annular well 42 by reason of the formation of an upwardly extending boss 44 in the center thereof. The lip 38 has an inlay of gasket material 46 when furnished to the filler by means of which the filler may seal the cover member 30 in place when he crimps same to the rolled edge 26 of the canister. The valve housing 32 is a separate cylindrical structure having a flared upper end 48 and a constricted bottom end 50 into which the dip tube 34 is frictionally engaged. Both plastic and metal housings have been used, but it may be assumed that the structure illustrated is metal. The dip tube 34 is plastic and extends down to the bottom of the cylinder 22.

The housing is secured to the boss 44 by having its flared end 48 engaged against an annular perforated gasket 52 which is disposed in the top of the boss against the bottom of the end wall 54 of the boss, and the assembly being tightly held in place by suitable crimps or pinches 56 upsetting the metal of the boss 44 inwardly in places around its circumference, under the flared end 48. The center of the end wall 54 is perforated at 56 and the resulting opening has the edges slightly turned up. This is common technique in the manufacture of these articles, and is only mentioned to explain the apparent thickening of the gasket at the hole 56. The gasket 52 is originally flat and is slightly relieved at the hole 56 to provide resilience and compressibility when the stem of the head is inserted. This will enable a sliding and sealing fit with the stem.

The housing 32 provides an enclosed valve chamber 58 which will permit the pressurized mixture to pass up the dip tube 34 and escape to the atmosphere out of the opening 56 unless prevented from doing so by some means blocking the opening 56 as well as the center perforation 60 in the gasket 52. This means is a valve plunger 62 which is reciprocable in the chamber 58, but which normally is pressed upward by a helical spring 64, the bottom end of which engages the inside of bottom end 50 of the housing 32 and the upper end of which engages upon the reduced diameter bottom end 66 of the plunger 62. The plunger 62 has a configuration which provides grooves and passageways such as shown at 68 in FIG. 3 past which the pressurized mixture may readily flow, while providing formations 70 to cooperate with the inner walls of the housing 32 to assure easy but guided reciprocation. Many suitable other arrangements can be used.

The upper end of the plunger 62 is provided with an axial socket 72 aligned with the openings 56 and 60 and this provides an annular valve seat 74 on the end of the plunger 62. The seat 74 is preferably disposed immediately surrounding the entrance to the socket 72 to form a ring coaxial therewith, but in certain cases it may be desirable to have an axially inwardly extending chamber 76 about the entrance to the socket, as shown in FIG. 16. In this case the seating ring 74' will be spaced radially outward of the major bore of the socket, and spaced likewise radially outward of the stem, as will be described.

Looking now at the construction of the atomizer head 36, as viewed in FIG. 2, there is a top enlarged generally hollow push-button part 78 having an integral depending stem 80 connected therewith. The stem 80 extends from an enlarged body portion 82 that has a cylindrical cavity 84 opening to one side of the head 36, the cavity having a central coaxial post 86 with a small tip 88. A cup shaped insert 90 is engaged in the cavity 84 over the post 86 and it has a central orifice 92 opening to the atmosphere. The interior of the cup provides a circular swirl-smoothing chamber 94 into which the tip 88 protrudes, a square swirl-forming chamber 96 communicating with the circular chamber 94 and having tangentially located entrance passageways 98 feeding same as best shown in FIG. 9. The opening in the cup-shaped insert being square with rounded corners, when it is engaged upon the post 86 and pushed into cavity 84, it will provide axially extending generally triangular cross-section passageways 100 which provide communication between the innermost end of cavity 84 and the swirl-forming chamber 96. This is a description of my preferred swirler construction, and in operation it will mechanically nebulize pressurized products with great efficiency.

An alternate form of swirler is shown in FIGS. 14 and 15. The head 78' of FIGS. 14 and 15 has a center post 86' and cylindrical cavity 84' upon which a cup-shaped insert 90' is engaged. Molded into the insert are the axial grooves 100', a mixing chamber 96' and spirally or tangentially extending passageways 98'. The mixing chamber 96' communicates with the atmosphere through a central orifice 92'. This latter construction is not as desirable as my preferred arrangement, but I believe it will operate satisfactorily.

Continuing with the description of the structure of FIG. 2, it will be recalled that the stem 80 of prior structures had an expansion chamber therein. In the present invention, this chamber has been eliminated and

in its place I have provided an extremely small area passageway 104 which opens to cavity 84 at 106, extends to the bottom of the stem 80 and opens to the side along a slot 108. The slot 108 extends above the ring seat 74 of valve plunger 62 and up into the hole of the gasket 52 and hence, when the plunger is up against the gasket there is no communication between the passageway 104 and the valve chamber 58. When the push button 78 is depressed, there will be a very small portion of the slot 108 exposed above the ring 74 and disposed below the gasket 52, so that pressurized mixture will be forced into the passageway 104.

I have discovered that if the passageways and chambers between the internal metering orifice and external metering orifice are reduced to the barest minimum the drip may be substantially reduced if not fully eliminated. The internal metering orifice is the exposed entrance 110 to the slot 108 at the top of the slot. The external metering orifice is the orifice 92. As a rule, the one of these two which has the smaller cross section area will control the rate of discharge.

While it is desired that the passageway 104 be as small as the internal metering orifice this is most difficult to accomplish. I have found that I can build a core pin in the form of a thin blade to be used in the molding process to achieve the desired dimensions. One successful structure had a thickness of .015 inch with a width of about .1 inch.

The internal metering orifice may be adjusted by making slot 108 narrower than the passageway 104. In FIGS. 7 and 8, for example, passageway 104 had a width of .015 inch, but the slot 108 was only .010 in width. Thus the internal metering orifice at 110 was decreased substantially. Assuming a vertical exposed length of slot of about .010 inch, the decrease in metering area was from .00015 square inch to .00010 square inch. Proper core pin design can accomplish this.

It is pointed out that in order to assure that there will be as little volume included between the internal and external orifices as possible, the head 36 should be designed so that the cup-shaped insert 90 practically bottoms in cavity 84 leaving little, if any, volume not occupied by the insert. The volume shown unoccupied in FIG. 2 is merely for clarity of illustration and may be much less.

In FIGS. 5 and 6 I have shown a construction in which that portion of the slot 108 which enters into the hole of the gasket 52 is prevented from being squeezed together by gasket 52 if the platsic should soften, by means of a strengthening gusset or strut 112 which supports same. The slot 108 will then have a smaller cross section extension 114 connecting with the internal metering orifice 110.

In the structures described thus far, the passageway 104 extends down to the very bottom end of the stem 80 so that the stem is quite solid. The socket 72 of the valve plunger is therefore open to its floor with no pilot projection, as used with previous removable stems. This gives good support for the atomizer head 36 in the socket and prevents wobbling. As I pointed out, however, many molds are already built with the pilot projection designed to be formed in the valve plunger. FIGS. 10, 11, 12 and 13 illustrate such a valve plunger 62'. In all respects, but for the pilot extension 116 the valve plunger 62' is like the valve plunger 62 of other figures. The stem 80' has the narrow passageway 104' and this extends throughout the length of the stem, except at the bottom, where the passageway widens out to a cylindrical formation 118 to accommodate the pilot projection 116. I have exaggerated the size of this hollow to best illustrate same, but it should be understood that it need only barely clear the projection 116. The slot 108' is formed in the stem wall at the bottom end, and in this case, since FIG. 13 is a sectional view looking out of the slot, the internal metering orifice 110' is clearly visible. Such a construction provides a device in which the atomizer head of the invention is fully interchangeable with spray heads of the type shown in my above-mentioned patent.

It should be obvious that wherever similar elements are used in the various forms of the invention, I have used identical numbers either with or without primes.

It may be desirable to have the slot 108 below the gasket 52 at all times, even when the plunger 62 is up against the gasket. In such case, FIG. 16 illustrates a plunger 62 with an annular chamber into which the internal metering orifice opens.

The phrase "pressurized product" as used herein is intended to mean that part of a pressurized mixture, exclusive of the propellant, whether or not it includes solvents, carriers or any other materials.

Various modifications may be made without departing from the spirit or scope of the invention as defined in the claims.

What I claim is:

1. An atomizer head primarily for use in creating a nebulized spray of a pressurized product emerging from a pressurized container having a mixture of said product and a low expansion gaseous propellant therein, said package being of the type in which there is a valve mechanism including an internal valve plunger having a socket with an upwardly extending valve seat, said valve seat being pressed against an annular gasket having a perforation to seal the interior of the package which comprises: a push button having an integral depending stem adapted to be inserted through said perforation into said socket and adapted further to be pushed to unseat said plunger to release the contents of said package past the seal, formed by said valve seat and said gasket, a swirler structure in the push button having an externally opening orifice, a vertical passageway of uniform cross-sectional area throughout substantially all of its length, said passageway being situated in the interior of said stem, said stem having an axially extending slot in its side wall connected with said vertical passageway, said vertical passageway extending downward to communicate with the upper end of said slot and upward to communicate with said swirler structure, said slot being exposed at its upper end for communication with said passageway when said stem is depressed and said valve seat is unseated to permit the pressurized product to pass into said passageway through said opening formed at said upper end of said slot, and said passageway being of blade-like configuration along most of its length and having a quadrilateral cross-sectional configuration whose narrower dimension is of the same order as the width of said slot, measured horizontally at its exterior entrance.

2. An atomizer head as claimed in claim 1 in which the horizontal width of the entrance to the slot is the same as the narrower dimension of said passageway.

3. An atomizer head as claimed in claim 1 in which the horizontal width of the entrance to the slot is less than the narrower dimension of said passageway.

4. An atomizer head as claimed in claim 1 in which said slot is of such axial length that if so inserted into said socket and before said plunger would be unseated, said exposed upper end of the slot is located in the gasket perforation, and in which there is a strengthening gusset in said upper end to prevent collapse of the slot thereat, said gusset being spaced from the entrance to enable pressurized products to pass down the slot past the gusset and into the passageway.

5. An atomizer head as claimed in claim 1 in which the said vertical passageway is of uniform cross section throughout substantially all of its length except for the bottom end, the same being of enlarged cross section at said bottom end whereby said stem may be inserted into a plunger socket which has a pilot projection in the bottom thereof.

6. An atomizer head primarily for use in creating a nebulized spray of a pressurized product emerging from a pressurized container having a mixture of said product and

a low expansion gaseous propellant therein, the container having a cover member mounting an internal valve structure which includes a valve plunger with an upwardly extending valve seat biased upwardly to seat against an annular gasket, a single central perforation in the gasket opening to the outside of the cover member but the gasket being held in the cover member, a blind ended socket in the plunger aligned with the perforation, the plunger adapted to be pushed downwardly to unseat said valve seat from said gasket and release pressurized mixture from the interior of said canister past said plunger; said head comprising: a push button having a depending stem adapted to be inserted through the gasket perforation into the socket in sealed engagement with the perforation and in mating engagement with the socket, a vertical central passageway situated in the interior of said stem, said stem having an axially extending slot in the side wall of said stem, said slot extending to the bottom of said stem and being blocked along the majority of its length by said socket, and being exposed only at its upper end through the side wall of said stem to communicate with said central passageway when the plunger is in unseated condition and the stem is fully engaged in the socket, a swirler formation in the button having an externally opening orifice and communicating internally with the top of said central passageway, the major extent of said passageway having a cross sectional configuration at least whose narrower dimension is of the same order as the horizontal width of said slot at its upper end in said stem.

7. An atomizer head as claimed in claim 6 in which the passageway is generally rectangular in cross section, but with the narrower dimension less than one fifth the longer dimension.

8. A structure as claimed in claim 6 in which said stem is solid on its bottom end but for the bottom end of said passageway and slot, and the socket bottom is in engagement with said bottom end.

9. A structure as claimed in claim 6 in which said passageway flares to a generally circular cross section at its bottom end, and said socket has a central projection entering said bottom end.

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