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SPRAY DISPENSING ASSEMBLY

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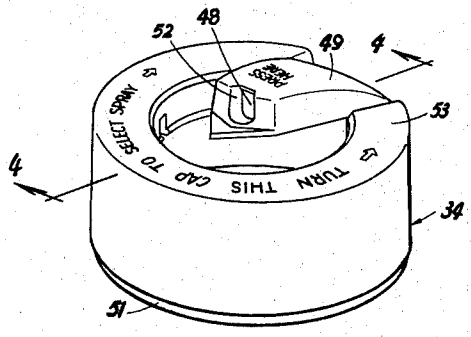

Fig. 1.

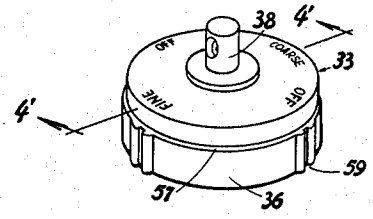

Fig. 2.

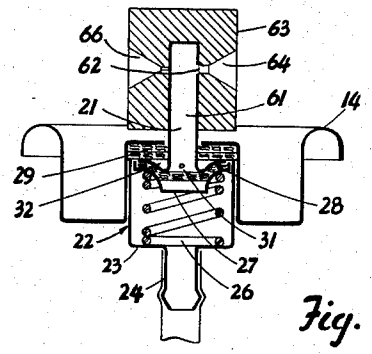

Fig. 5.

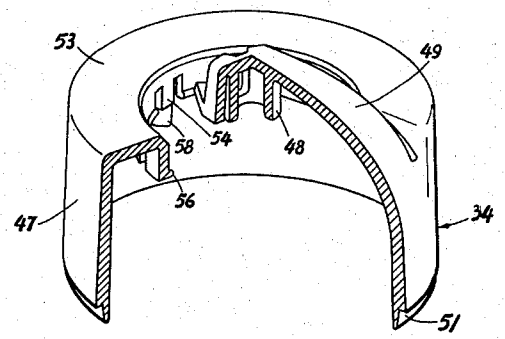

Fig. 3.

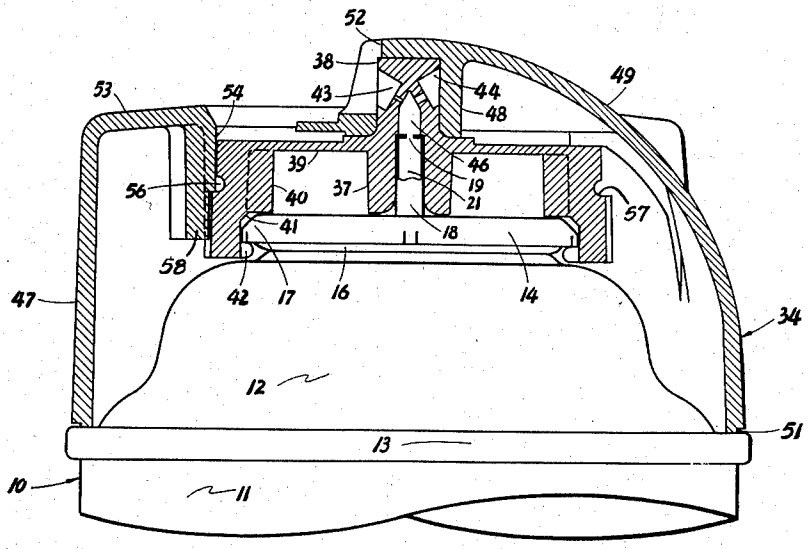

Fig. 4.

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SPRAY DISPENSING ASSEMBLY

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4 Claims. (Cl. 239—337)

This invention relates to aerosol containers, and it is concerned more particularly with an improved spray dispensing assembly for aerosol containers which will increase the versatility of the container by adapting the container to deliver a spray in a manner best suited for the operating conditions encountered.

Aerosol containers are currently used for dispensing insecticides, deodorants, paints, and other materials. These containers generally have a cylindrical body portion and have at one of their ends a release valve mechanism which is adapted to be moved to an open position by the user permitting the material in the container to be discharged from the container in the form of a spray. The release valve mechanism includes a valve stem which projects outwardly from the body portion of the container and which has provided in an end portion thereof a discharge vent through which the spray is ejected. The discharge vent is connected by means of a suitable passage in the valve stem with a port at the base of the valve stem. The valve mechanism is spring biased to a closed position and is opened by depressing the valve stem inwardly toward the body portion of the container, or by canting the valve stem to one side, against the pressure of the spring biasing mechanism. When the valve stem is actuated in this manner, the port at the base of the valve stem is opened to the interior of the container, and discharge of the material in the container takes place through the discharge vent. The spring biasing mechanism serves to return the valve stem to a closed position when the pressure on the valve stem is released.

Aerosol containers of this kind have been widely accepted, however, it has been found that in certain instances better results could be achieved if a mechanism were provided for varying the type of spray discharge from the container. For instance, when the aerosol container is used with insecticides, often it is desirable that the spray pattern, spray particle size, and/or the rate of discharge be varied depending upon the conditions under which the insecticide is used. In the case of insecticides, the optimum type of spray discharge might vary depending on the movement of the air, the type of insect to be exterminated, and the sensitivity of the surrounding plant and animal life. Similarly, when the container is used with paints, the optimum type of spray discharge would vary according to the particular painting conditions encountered.

It has also been found that considerable difficulty has been encountered in handling aerosol containers of the type described. Since the release valve includes a valve stem which protrudes a considerable distance above the body portion of the container, and since this valve is

opened by depressing this valve stem, if these containers are to find maximum acceptance, means should be provided to facilitate stacking the containers and to guard against accidental discharge from the container brought about by inadvertently depressing the valve stem and consequent actuation of the release valve.

Generally, it is an object of this invention to provide an assembly for aerosol containers which will take care of the hereinbefore outlined requirements in a fully practical and satisfactory manner.

More specifically, it is an object of this invention to provide an assembly for aerosol containers which will permit the container to have a number of different types of selectively obtained spray discharge.

Still another object of this invention is to provide an assembly for aerosol containers which will facilitate the stacking and shipping of the containers; and to provide an assembly which will guard against inadvertent discharge from the release vent of the container when the assembly is incorporated with an aerosol container.

The foregoing and other objects and inventions are attained by the present invention, various novel features of which will become apparent as the following specification is read in conjunction with the accompanying drawings wherein:

Fig. 1 is a perspective view of a valve member used in the assembly;

Fig. 2 is a perspective view of another valve member used in the assembly;

Fig. 3 is another perspective view, partly in section, of the valve member shown in Fig. 1;

Fig. 4 is a sectional view of the valve members in Figs. 1 and 2 taken along the lines 4—4 and 4'—4' of Figs. 1 and 2, respectively, showing the members assembled with an aerosol container, and with the valve stem of the container shown partly in section;

Fig. 5 is a sectional view of a valve member and a release valve mechanism showing a modified form of the herein disclosed invention.

Referring to Fig. 4, a specific embodiment of this invention is shown in conjunction with a conventional aerosol container generally indicated at **10**. The container **10** may be constructed of a cylindrical body portion **11** which has its top end covered and tightly sealed by a convex lid member **12** whose peripheral edge is interfolded with the circumferential edge of body portion **11** to form an annular ridge **13**. The bottom end of body portion **11** is similarly sealed by a conventional concave bottom member (not shown) forming an annular ridge at the base of the container having the same dimensions as ridge **13**. The center of lid member **12** is provided with a valve cup **14** which is crimped in a circular opening in the center of lid member **12** and which has its peripheral edge rolled over an annular bead **16** presented by lid member **12**, forming a shoulder **17**. Projecting outwardly from the center of valve cup **14** is a tubular valve stem **18**. Valve stem **18** is provided at an outer end portion with a discharge vent **19**, which is connected by a passage **21** with a valve mechanism located within the container under valve cup **14**. This valve mechanism may be of any conventional design such as the one illustrated in Fig. 5 generally indicated at **22**. In the structure shown in Fig. 5, the center of valve cup **14** is provided with a cylindrical insert **23** which is crimped into position in valve cup **14** and which has a downwardly projecting dip tube receiver portion **24**. A com-

pression coil spring **26** is positioned within the space bounded by insert **23** and has its upper end bearing against a washer **27** seated on the lower side of a base portion **28** of the valve stem. Under the pressure of spring **26**, base portion **28** is thrust in fluid tight relation against a pair of gasket members **29** seated on the upper surface of base portion **28**. A small orifice **31** connects passage **21** in the valve stem with an annular trough **32** formed in the upper surface of the base portion. When the valve stem is depressed or canted to one side against the bias of spring **26**, the pressure within the aerosol container forces material from the bottom of the container through a dip tube connected to the dip tube receiver portion into the space bounded by the insert **23**. Thence the material flows around the base portion of the valve stem to annular trough **32**, orifice **31** and passage **21**. The valve stem is held against rotation relative to the container by the friction created by coil spring **26** thrusting base portion **28** against gasket members **29**.

In the embodiment shown in Figs. 1, 2, 3, and 4, the spray assembly consists in general of an inner valve member **33** adapted to be secured to the top end of an aerosol container, and a relatively rotatable outer valve member **34**. Inner valve member **33** includes a ring portion **36**, a sleeve or coupling portion **37**, and a valve spindle **38**. Sleeve portion **37** and valve spindle **38** are supported centrally within ring portion **36** by a flexible wall portion **39**.

As shown in Fig. 4, sleeve portion **37** is adapted to fit snugly over and be received by valve stem **18** when inner valve member **33** is assembled with the aerosol container. A series of lugs **40** projecting radially inward from the inner surface of ring portion **36**, together with an annular groove **41**, are provided to seat the inner valve member on shoulder **17** of the aerosol container when the inner valve member is in this assembled position. To nonrotatably secure inner valve member **33** in a seated position on shoulder **17**, a series of flange segments **42** extending radially inward from the bottom end of ring portion **36** have been provided so as to grip the under side of shoulder **17** when inner valve member **33** is seated thereon. Flange segments **42** are flexibly secured to ring portion **36**, and will give slightly as the inner valve member **33** is snapped into position on shoulder **17**. When it is desired to actuate the release valve by depressing the valve stem **18**, flexible wall **39** permits sleeve portion **37** and valve spindle **38** to be depressed together with valve stem **18**, and independently of ring portion **36** and flange segments **42** which fasten the inner valve member to the aerosol container.

Referring again to Fig. 4, valve spindle **38** is integrally formed with sleeve portion **37** and has provided at its upper end a pair of fluid control passages **43** and **44** spaced on opposite sides of valve spindle **38**. Passages **43** and **44** communicate at their inner ends with a collection chamber **46** formed at the center of the valve spindle. When the inner valve member **33** is assembled with an aerosol container, chamber **46** will communicate with discharge vent **19** in valve stem **18** so that material discharged from vent **19** will collect in chamber **46**.

Outer valve member **34** includes an annular support collar **47** and a centrally disposed valve cap **48** connected to support collar **47** by means of a flexible arm **49**. The lower edge of support collar **47** has a groove **51** formed therein which is adapted to rest on ridge **13** when the parts are assembled with a container as shown in Fig. 4. In this condition of the parts, valve cap **48** is mounted about valve spindle **38**, and support collar **47** and valve cap **48** are free to rotate with respect to inner valve member **33** and the aerosol container **10**. Flexible arm **49** permits valve cap **48** to be depressed inwardly independently of support collar **47** when it is desired to actuate the release valve by depressing valve stem **18**.

As can best be seen in Fig. 1, a discharge passage **52** is provided in valve cap **48** which is movable by rotating the valve cap into register with either control passage **43** or control passage **44**. When passage **52** is in registry with control passage **43**, control passage **44** will be closed by the inner wall surface of valve cap **48**. Any material ejected from vent **19** is collected in chamber **46** and exhausted through the single control passage **43**. When the valve cap is rotated so that passage **52** is in registry with control passage **44**, fluid exhaust will take place through passage **44**. Valve cap **48** is rotatable to a position intermediate these two positions where both passages are closed by the inner wall surface of valve cap **48**, and in this position, no fluid discharge will take place through valve spindle **38**.

As can be seen in Fig. 4, control passages **43** and **44** are each provided with a constriction which serves to control the flow of material through each passage. Each constriction is designed to give a certain type of spray discharge, and in the embodiment shown, the discharge through passage **43** will be somewhat less than the discharge through passage **44**, since the constriction in passage **43** is greater than the constriction in passage **44**. These passages could be designed to control the type of discharge from the container in a variety of other ways, as for instance, to control the pattern of the spray and/or the particle size of the spray ejected from the aerosol container.

Referring again to Fig. 4, the wall of collar **47** slopes inwardly toward the top of the collar so that the outer edge of a support shoulder **53** formed at the top of the collar has a diameter slightly less than the inside diameter of ridge **13**. This facilitates stacking a number of the containers since the ridge at the base of each container, which is the same size as ridge **13** as previously explained, will fit about the outer edge of support shoulder **53**. Also, since the bottom member of each container is concave, the top surface of the outer valve member **34** will clear the bottom surface of each container when the containers are stacked.

Extending downwardly from the inner edge of support shoulder **53** is a flexible, serrated wall **54**. With the parts assembled as in Fig. 4, serrated wall **54** substantially surrounds the outer surface of ring portion **36** of the inner valve member save for a portion under flexible arm **49** which has been omitted to permit flexure of arm **49**. A series of radially inwardly projecting ridge segments **56** are provided at the lower edge of serrated wall **54**. When the valve members are assembled as in Fig. 4, ridge segments **56** will snap into an annular groove **57** formed in the outer surface of ring portion **36**, fixing outer valve member **34** against axial displacement away from inner valve member **33**.

As an aid to positioning the two valve members in different adjusted positions, i.e., positions where either control passage **43** or control passage **44** is in registry with discharge passage **52**, or where both passages are closed by the inner wall surface of valve cap **48**, cooperating protruding means are provided between the inner and outer valve members. Referring to Figs. 2 and 3, projecting downwardly from support shoulder **53** of the outer valve member is a finger portion **58**. In each of the adjusted positions of the inner and outer valve members, finger portion **58** will snap between a corresponding pair of lugs **59** projecting radially outwardly from the outer surface of ring portion **36**. An arrow together with suitable markings are provided on the visible portions of the inner and outer valve members to assist the user in selecting the type of spray desired.

Fig. 5 shows a modified form of the herein described invention. In the embodiment shown in Fig. 5, a valve stem **61** has a discharge vent **62** which extends radially outwardly to one side of the valve stem, and the top of

the valve stem is sealed shut. Rotatably mounted about valve stem **61** is an outer valve member **63**. Two fluid control passages **64** and **66** are provided in valve member **63** on opposite sides of the valve member. These control passages are designed to control the type of discharge from container **11** in the same manner as passages **43** and **44** in inner valve member **33**. Outer valve member **63** may be adjusted so that either control passage **64** or control passage **66** is in registry with discharge vent **62**, or to an intermediate position where both passages are closed by the inner wall surface of valve member **63**.

From the foregoing, it is apparent that a very simple but practical means has been provided which will increase the utility of aerosol containers and which will facilitate the handling of these containers. When valve members **33** and **34** are mounted on a container as described hereinbefore, the fluid discharge mechanism, comprising the inner valve member **33** and valve stem **18**, together with the associated release valve mechanism, presents a nozzle member, comprising a valve spindle **38**, having a plurality of fluid control passages adapted to be opened to the interior of the aerosol container when the nozzle member is depressed. A selector member, comprising the outer valve member **34**, may be rotated so that discharge passage **52** is in registry selectively with either control passage **43** or control passage **44** in the nozzle member of the fluid discharge mechanism, or so that both passages are closed. Another mode of applying the principle of the invention is illustrated in the modified form of this invention shown in Fig. 5. In this instance, the nozzle member comprising valve stem **61**, is provided with a single discharge passage, and the selector member, comprising outer valve member **63**, has a plurality of control passages which are movable selectively into registry with the discharge passage. In both forms of the invention when the release valve mechanism is actuated by depressing the valve nozzle, the manner in which the material is ejected from the container will depend upon the adjusted position of the selector member. When the selector member is positioned so that both control passages are closed, accidental discharge is effectively guarded against since no material discharge can take place through the valve nozzle member.

While we have described only two particular embodiments of this invention, it should be understood that we do not wish to be restricted thereto, and that we intend to cover all modifications of the invention which would be apparent to one skilled in the art and which come within the scope of the appended claims.

We claim:

1. In a combination with a container for confining fluids under pressure, said container having a cylindrical body portion and two end portions, a depressably actuable valve stem axially projecting from and attached to one end of said body portion, said valve stem having a discharge vent therein for releasing said fluids from said container; a variable spray assembly comprising an inner valve member and a rotatable outer valve member, said inner valve member including a coupling sleeve portion received by said valve stem in a fluid tight relationship, a valve spindle having internal surface portions defining with said valve stem an expansion chamber communicating with said discharge vent, skirt fastening means securing said inner valve member to said one end of said body portion, and flexible webbing extending from said skirt fastening means to said sleeve portion and valve spindle permitting said sleeve and spindle to be depressed with said valve stem independently of said skirt fastening means; said outer valve member having a valve cap rotatably mounted on said valve spindle; exhaust conduit means for selectively establishing a fluid exhaust connection with said expansion chamber and closing the same, said exhaust conduit means including a plurality of fluid control passages, each having a distinctive configuration, formed in one of said valve members and a discharge passage formed in the other of said valve members, said discharge passage being selectively registrable with each of said fluid control passages on rotation of said outer valve member, whereby fluid emitted from said container may egress from said expansion chamber, upon depression of said valve stem and spindle.

2. In combination with a container for confining fluids under pressure, said container having a cylindrical body portion and two end portions, a depressably actuable valve stem axially projecting from and attached to one end of said body portion, said valve stem having a discharge vent therein for releasing said fluids from said container; a variable spray assembly comprising a pair of interfitted relatively rotatable inner and outer valve members, one of said valve members having a coupling portion received by said valve stem in a fluid tight relationship; skirt fastening means securing said inner valve member to said one end of said body portion, said inner and outer valve members having internal surface portions defining exhaust conduit means for selectively closing said discharge vent or establishing a fluid exhaust connection with said discharge vent, said exhaust conduit means including a closure wall and a plurality of fluid control passages each of a different configuration formed in one of said valve members and a discharge passage formed in the other of said valve members, said discharge passage being selectively registrable with said closure wall and with each of said fluid control passages on relative rotation of said inner and outer valve members to selectively close said discharge vent or establish said fluid exhaust connection through one of said fluid control passages.

3. In combination with a container for confining fluids under pressure, said container having a cylindrical body portion and two end portions, a depressably actuable valve stem axially projecting from and attached to one end of said body portion, and valve stem having a discharge vent therein for releasing said fluids from said container; a variable spray assembly comprising an inner valve member having a coupling portion received by said valve stem in a fluid tight relationship; skirt fastening means securing said inner valve member to said one end of said body portion, an outer valve member mounted on said inner valve member for relative rotation thereto, said inner and outer valve members having internal surface portions defining exhaust conduit means for selectively closing said discharge vent or establishing a fluid exhaust connection with said discharge vent, said exhaust conduit means including a closure wall and a plurality of fluid control passages each of different configuration formed in one of said valve members and a discharge passage formed in the other of said valve members; said discharge passage being movable selectively into registering position with said closure wall and with each of said fluid control passages by relative rotation of said valve members to selectively close said discharge vent or establish said fluid exhaust connection, said inner and outer valve members including protruding means operatively interposed between said members for positioning said members in said registering positions.

4. In combination with a container for confining fluids under pressure, said container having a cylindrical body portion and two end portions, a depressably actuable valve stem axially projecting from and attached to one end of said body portion, said valve stem having a discharge vent therein for releasing said fluids from said container; a variable spray assembly comprising a pair of interfitted relatively rotatable inner and outer valve members, said inner valve member including a coupling portion received by said valve stem in a fluid tight relationship, fastening means securing said inner valve member to said one end of said body portion, and means flexibly connecting said coupling portion and fastening means permitting said coupling portion to be depressed with said valve stem independently of said fastening means, said inner and outer valve members having in-

ternal surface portions defining exhaust conduit means for selectively establishing a fluid exhaust connection with said discharge vent, said exhaust conduit means including a plurality of fluid control passages each of different configuration formed in one of said valve members and a discharge passage formed in the other of said valve members; said discharge passage being selectively registrable with each of said fluid control passages on relative rotation of said inner and outer valve members to selectively establish said fluid exhaust connection through one of said fluid control passages.

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