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J. P. LARSON

2,749,178

LIQUID SPRAY DEVICE

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FIG. 1

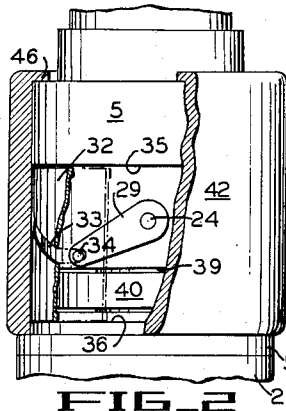
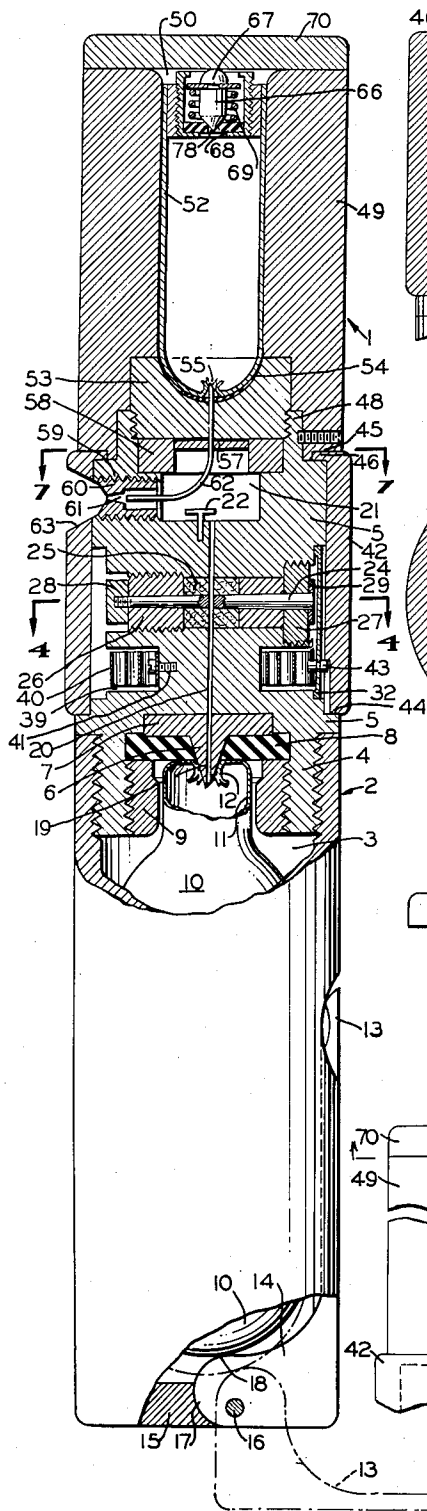


FIG. 2

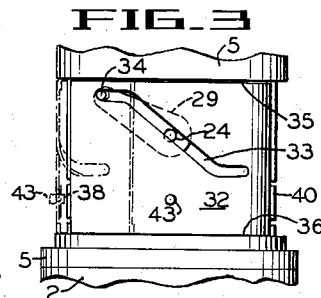


FIG. 3

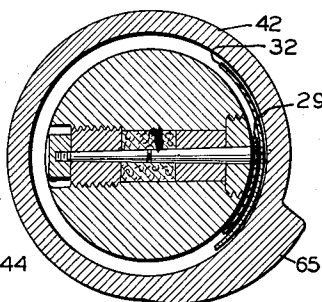


FIG. 4

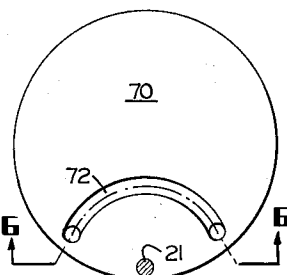


FIG. 5

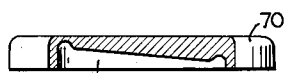


FIG. 6

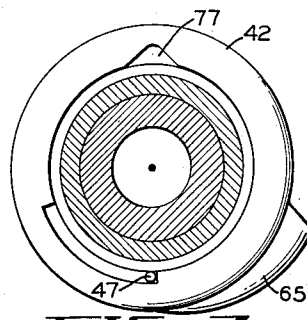


FIG. 7

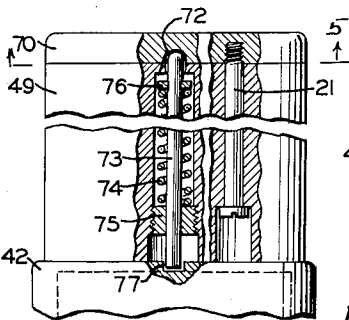


FIG. 8

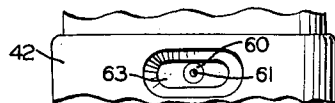


FIG. 9

INVENTOR.
JOSEPH P. LARSON

BY

Bogden Mohler & Beckley
ATTORNEYS

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2,749,178

LIQUID SPRAY DEVICE

Joseph P. Larson, Redwood City, Calif.

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9 Claims. (Cl. 299—86)

This invention relates to a liquid spray device and has for one of its objects the provision of a compact, self contained spray device that is adapted for use in producing an extremely fine liquid spray by atomizing a liquid so finely that the drops or droplets are virtually invisible to the naked eye, and where the liquid is colored, the spray is adapted to produce a tint or shade that, to all appearances, is solid, and which may be of any value or an even graduation of values over the desired area.

Another object of the invention is the provision of a spray device that is adapted to use a conventional flask or container of compressed gas, such for example as CO₂ gas used for carbonating beverages, for atomizing a liquid, and which spray device is free from any objectionable projections such as a nozzle, valve or valve handle, or the like, so as to be suitable for insertion into a purse or pocket for carrying without danger of its catching therein.

A still further object of the invention is the provision of a spray device that is adapted to use a conventional flask, cartridge, or container of compressed CO₂, such as is used for carbonating beverages, for atomizing a colored liquid and for safely applying such atomized liquid to the face for tinting the cheeks, or the area around the eyes, or any desired portion of the skin, and which device is adapted to apply such color in such a manner that it is not detectable by reason of streaks or too abrupt a change in tint from its lightest value to the heaviest or darkest value, or by reason of any lack of uniformity in the graduation of the values of the color.

Other objects and advantages will appear in the description and in the drawing.

In the drawing, Fig. 1 is an enlarged vertical cross sectional view through the spray device.

Fig. 2 is a fragmentary side elevational view of an inner part of the device of Fig. 1, showing the valve actuating means.

Fig. 3 is a fragmentary side elevational view of a portion of the part shown in Fig. 2, but with the valve actuating part shown in position.

Fig. 4 is a sectional view taken along line 4—4 of Fig. 1 except showing valve in closed position.

Fig. 5 is a bottom view of the closure at the upper end of the device of Fig. 1 taken along line 5—5 of Fig. 8.

Fig. 6 is a sectional view along line 6—6 of Fig. 5.

Fig. 7 is a sectional plan view of the device taken along line 7—7 of Fig. 1.

Fig. 8 is an enlarged fragmentary, part sectional view of the upper part of the device.

Fig. 9 is a fragmentary side elevational view showing the discharge opening and closure therefor, with the closure open.

In detail, the spray device as illustrated, comprises an elongated body generally designated 1, which body is shown as being cylindrical. The lower end portion 2 of said body is tubular and hollow thereby forming a compartment 3, which, for purpose of distinguishing it from

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other somewhat similar parts, may be called the lower compartment.

The side walls of said lower portion 2 may be internally threaded at the upper end of said portion for threadedly engaging the outside threads on a depending flange 4 formed on an intermediate member 5 that also functions as the upper end wall of said lower compartment 3.

The flange 4 forms the side walls of a downwardly directed recess in the lower side of said intermediate member 5, and within said recess against the bottom thereof is downwardly directed pointed element 6 having an enlarged base portion 7 at the end opposite its point. This base is held flat against the bottom of the recess in the lower side of member 5, and a rubber or plastic washer 8 surrounds element 6 at the base and below the latter, which washer is held tightly against said base, and tightly secures the base against the bottom of said recess, by means of an annular nut 9 that threadedly engages threads formed on the inner sides of flange 4.

A flask or conventional container 10 of compressed CO₂ or other suitable fluid, is adapted to be held in the compartment 3. These flasks or "cartridges" are commonly used at the present time for holding a supply of CO₂ for use in carbonating beverages.

The upper end 11 of the flask 10 may constitute a neck or mouth portion of restricted diameter, which mouth or neck is closed by a perforatable head or closure 12.

An arm 13 fits in a slot formed in one side of the lower portion 2, which arm has a right angle projection 14 at its lower end that forms a part of the bottom 15 of said portion 2. This arm and its projection 14 are pivotally secured at 16 to the bottom 15, which pivot is so positioned that the distance between the pivot 16 and the end 17 of the projection is about the same as the thickness of bottom 15. Thus when the arm 13 is swung outwardly to horizontal position said end 17 is substantially flush with the top of bottom 15. However, the distance between pivot 16 and the upper side 18 of said projection is substantially greater than the thickness of the bottom 15.

Upon unscrewing the lower portion 2 of the body 1 and inserting a flask 10 into compartment 3 when arm 13 is swung outwardly to horizontal position, the flask will practically rest on bottom 15 and surface 17 simultaneously. Upon screwing the portion 2 back onto the flange 4 while arm 13 is horizontal, the head 12 will not be punctured by the pointed element 6. When arm 13 is swung back into the slot in portion 2, the projection 14 functions like a cam for elevating the flask and to not only complete or effect the puncturing of the head 12, but to tightly seal said head against the washer 7.

The said pointed element 6 including its base is formed with a central passageway or duct 19 that is in continuation of a duct 20 extending through the member 5 to its upper end where it opens into a recess 21 in the upper side of the member 5. A baffle 22 secured in said recess extends over the upper open end of duct 20 fairly close to the latter so as to be impinged by fluid under pressure being discharged into the recess 21 from duct 20.

Between the upper and lower sides of the member 5 is a tapered valve 24 that extends horizontally across duct 20. The said member 5 is formed with a horizontally extending bore in which valve 24 is centrally positioned, and a plastic or rubber sleeve 25 is around said valve to form a seal between the valve and the wall of said bore where the duct 20 is intercepted by said bore. Said bushing or sleeve 25 and the valve 24 are apertured in alignment with the duct 20 when the valve is rotated to open position, and when valve 24 is rotated 90 degrees the passageway through the valve is out of alignment with the duct 20 and with the openings in sleeve 25 and the duct is tightly closed against passage of fluid therethrough.

A nut 26 at one end of the sleeve 25 and a nut 27 at its other end secure the said sleeve under compression in tight engagement with the valve and with the sides of the bore in member 5.

A nut 28 on one end of the valve 24 holds the valve 24 in position, said nut being rotatable with said valve.

The other end of valve 24 opposite nut 28 has one end of a relatively thin flat spring arm 29 secured rigidly thereto (Fig. 3). This arm conforms in curvature to the cylindrical contour of the outer side of body 5 and lies against said outer side and an arcuately extending arm actuating member 32. This member 32 is formed with a slot 33 (Fig. 3) that extends angularly relative to the longitudinal axis of body 1, and a pin or projection 34 on the outer end of arm 29 that is remote from its attachment to valve 24 extends into said slot 33. This arm actuating member is rotatable about the axis of the body 1 and is held to move about said axis between annular opposed shoulders 35, 36 formed in body 5 (Fig. 2).

On one end of the arm actuating member 32 is an inwardly directed pin 38 (Fig. 3) which pin is opposite an annularly outwardly directed recess 39 (Fig. 2) that is formed in the body 5.

Within recess 39 is a flat clock spring 40 (Fig. 1) that extends spirally around the body 5 within the recess 39, one end of which spring engages the pin 38, and the other end of which is secured in any suitable manner to the body 5 at the base of recess 39, such as by a pin 41 on said spring (Fig. 4) extending into an opening or recess formed in said base.

By the above designated structure it will be seen that upon rotating the member 32 as seen in Fig. 3 in one direction, the arm 29 will be swung downwardly as pin 34 is moved downwardly in slot 33 thus rotating the valve 24, and the arrangement is such that this movement will be from a closed to an open position and the spring arrangement is such that tension will be placed on the spring so that said member 32 will be automatically returned when the force that is applied on member 32 to rotate it is released.

The force for rotating the member 32 is applied to the member 32 through an outer rotatable collar 42 that surrounds the body 5 and that extends over the member 32. This collar 42 is formed with a recess that receives the outwardly projecting pin 43, which may be the opposite end of pin 38.

The collar 42 is held in a position encircling the body 5 between a lower shoulder 44 formed on said body, and the lower end of the upper portion 45 of the body 1, which upper portion is hollow to form an upper compartment 46. Along the upper edge of collar 42 is a slight, radially inwardly directed flange 46, which flange overlies an upwardly facing shoulder formed on body 5 at its upper end. An upwardly projecting pin 47 (Fig. 7) on this shoulder extends into a cut out portion of flange 46 whereby the ends of said cut out portion will engage said pin upon rotating collar 42 in either direction. Thus said ends will form stops to limit the rotary movement of said collar in opposite directions.

The upper end of intermediate body 5 is formed with an axially upwardly directed flange 48 that is spaced radially inwardly of the flange 46 on collar 42. The upper portion 49 of body 1 is tubular and coaxial with the lower portion 2 and with the intermediate wall or body 5, and is fitted at its lower end over flange 48. Within said upper portion 49 is compartment 50 which is intended to receive and hold a liquid to be sprayed, or a container for such liquid.

Threadedly held within and by flange 48 is the bottom wall 53 of the compartment 50. This bottom wall 53 may be formed with an upwardly opening fairly wide recess 54 having a crescent shaped contour the center of which has an upwardly pointed element 55 that is adapted to puncture the wall of the container 52 that is adapted to enter said recess 54 and the lower end of the container

may be formed to fit the recess in one position but the crescent or semicircular contour of the walls of the recess will not receive the lower end 56 of the container if the lower end is turned at right angles to the position shown in Fig. 1.

A sealing disc 57 is carried by the underside of the wall 53, and an annular washer 58 is disposed between the bottom wall 53 and an upwardly facing shoulder on body 5 adjacent to the flange 48, said disc 57 being encircled by said washer.

One side wall of the recess 21 in the upper side of body 5 is drilled through to provide a passageway 59 that is internally threaded to receive the body 60 of an ejector.

This ejector is provided with a central generally venturi shaped discharge opening 61 into which extends one end of a very small conduit 62 in spaced relation thereto. Said conduit extends out of recess 21 and through disc 57, and centrally through the wall 53 and pointed element 55.

The collar 42 is formed with a circumferentially extending opening 63 (Fig. 9) that has outwardly tapered sides as best seen in Fig. 1 and this opening is at the same level as the aperture 61 and wider than said aperture so as to be spaced from the sides of said opening when the collar is rotated to bring the slot or opening 63 over the aperture 61.

The arrangement is such that spring 40 will rotate the collar so that it will completely cover the aperture 61 when the valve 24 is in closed position. But when the collar is rotated to open the valve, the aperture 61 will be spaced between the ends of the opening 63 in said collar before the valve 24 will commence to open and when the valve is fully open, the aperture 61 will be about centrally between the ends of the slot, as seen in Fig. 9. A thumb or finger engageable projection 65 (Fig. 4) on the collar facilitates the rotation of the collar by the thumb or a finger of the hand that holds the spray device.

The container or flask 52 may have a special closure at its upper end that is adapted to be threaded into any replacement flask, and which closure is provided with a valve 66 having a rounded button 67 at its upper end and the lower end is adapted to seat in an opening formed in a yieldable disc 68 of plastic or rubber. A spring 69 functions to constantly tend to urge the valve to open position.

A cover 70 extends over the upper end of the compartment 50 and is pivotally secured to the upper end of the upper portion 49 of the spray device, as at 71 (Fig. 5).

The underside of said cover 70 is formed with an arcuately extending downwardly opening recess 72 that is concentric with the pivot 21. One end of said recess is deeper than the other and the bottom of the recess is progressively slanted from the deepest end to the shallow end (Fig. 6).

A spring urged rod 73 (Fig. 8) extends through one of the walls of portion 49 parallel with the longitudinal axis of the spray device and which rod is yieldably urged upwardly and into engagement with the bottom of recess 72 at all times by means of spring 74 that reacts between a member 75 threaded into the bore walls through which rod 74 extends and a disc 76 secured to the upper end of said rod 74.

The flange 46 on the upper end of the collar 42 is formed with a notch 77 (Fig. 7) into which the lower end of the rod 74 extends when the cover 70 is closed and when the collar 42 is at the end of its rotary movement in which valve 24 is closed and the aperture 61 is covered by said collar. Thus it will be seen that when the cover is closed the collar 42 is locked against movement.

The bottom of recess 72 at its ends is preferably slightly deeper than the adjoining portion so that a slightly more than ordinary degree of force is required to start the movement of the cover from closed position to open position and vice versa. This insures against accidental opening or closing of said closure.

The valve 67 on container 52 is so arranged that the

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button 67 on the valve will automatically be moved downwardly by the cover when the latter is closed so as to seal off the air inlet vent 78 in disc 68, thus further insuring against leakage of liquid from the container. However, when the cover is swung to open position the spring 69 will cause valve 66 to open to admit air into the upper end of the container 52.

In operation, assuming the device is to be used to spray color around the eyes of a person, or to spray color onto the cheeks, the cover 70 is first swung to open position and the device is held upright in the hand so that the thumb will be in a position to press against the projection 65 on collar 42. In this position, the opening 63 will be where it would normally be directed toward the face of the person. Upon rotating said collar, the valve 24 will be opened to permit any desired amount of gas from flask 3 to pass into recess 21 and out of aperture 63 past the discharge end of conduit 62. The liquid in the compartment 50 or flask 52 will be drawn through conduit 62 and into the gas discharged through the opening 63, and it will be so finely atomized that the spray deposited on the skin will not be visible as droplets, but will appear as a very even or evenly graduated tint or shade or both.

Whether a light or heavy spray is desired can be accurately controlled by the rotation of collar 42, since a considerable movement of the collar will effect a relatively slight movement of the arm that is connected with the valve.

As soon as the operation is completed, and the pressure on the projection 65 is released, the valve 24 will be automatically closed and the collar 42 will cover the discharge aperture. By swinging cover 70 to closed position the collar 42 will be locked closed, thus obviating the likelihood of the valve 24 being opened accidentally while the spray device is in a pocket or purse.

Obviously, liquid could be poured directly into compartment 50 instead of using a flask or container 52, but the latter is usually preferred since it can be more easily secured against possible leakage.

In referring to sleeve 25 as being of plastic, it should be mentioned that the word "plastic" is intended to include the tetrafluoro resin or synthetic material commonly known under the trade name of "Teflow," since this is the preferred material for said sleeve.

Also mention should be made of the importance, in certain uses, of the contour of the bottom of the container 52 and of the wall 53. For example, under certain conditions where different devices may be available for use, it may be extremely important that no mistake be made in the container 52. Hence, if a container having a certain product therein will be the only container that can fit a particular device, it will be seen that no mistake can be made in selecting the right product for the device and for use.

Of course, different contours in the bottom of the container and in wall 53, than the one described, can be provided.

I claim:

1. A liquid spray device comprising; an elongated body having a first compartment in one end thereof for gas under pressure and a second compartment in the other end for liquid, a pair of ducts communicating at one of their ends with said first and said second compartments respectively, means for atomizing said liquid and for discharging the liquid so atomized from said body comprising a fluid actuated ejector in said body at a point between said first compartment and said second compartment, and the other ends of said ducts communicating with said ejector for actuating the latter to induce a flow of said liquid through said ejector for discharge therefrom with said fluid upon passage of fluid under pressure through said ejector, a partition between said first compartment and said second compartment sealing one

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from the other against passage of gas and liquid from one to the other.

2. A liquid spray device comprising; an elongated body having a first compartment in one end thereof for gas under pressure and a second compartment in the other end for liquid, a pair of ducts communicating at one of their ends with said first and said second compartments respectively, means for atomizing said liquid and for discharging the liquid so atomized from said body comprising a fluid actuated ejector in said body at a point between said first compartment and said second compartment, and the other ends of said ducts communicating with said ejector for actuating the latter to induce a flow of said liquid through said ejector for discharge therefrom with said fluid upon passage of fluid under pressure through said ejector, valve means in the duct that communicates with said first compartment for controlling the flow of gas to said ejector, and a rotatable member extending around said body connected with said valve means for actuating the latter upon rotation of said member.

3. A liquid spray device comprising; an elongated tubular body having a compartment in each of its opposite ends for a fluid under pressure and for a liquid to be sprayed respectively, a wall intermediate said opposite ends closing said compartments to passage of fluid and liquid from one to the other, a fluid actuated ejector in said wall opening laterally outwardly thereof relative to the longitudinal axis of said body, a first passageway communicating between the compartment for said liquid and said ejector for supplying liquid to the latter to be ejected therefrom with said fluid and a passageway communicating between the compartment for said fluid and said ejector for actuating the same and for inducing a flow of said liquid through the ejector for discharge therefrom, and a valve in said last mentioned passageway and in said wall for controlling the flow of said fluid to said ejector.

4. A liquid spray device comprising; an elongated tubular body having a compartment in each of its opposite ends for a fluid under pressure and a liquid to be sprayed respectively, a wall intermediate said opposite ends, a fluid actuated ejector in said wall opening laterally outwardly thereof relative to the longitudinal axis of said body, a first passageway communicating between the compartment for said liquid and said ejector for supplying liquid to the latter to be ejected therefrom with said fluid and a passageway communicating between the compartment for said fluid and said ejector for actuating the same and for inducing a flow of said liquid through the ejector for discharge therefrom, and a valve in said last mentioned passageway for controlling the flow of said fluid to said ejector, a member on said body rotatable about its said axis, and means for actuating said valve connected with said member.

5. A liquid spray device comprising; an elongated tubular body having a compartment in each of its opposite ends for a fluid under pressure and for a liquid to be sprayed respectively, a wall intermediate said opposite ends, a fluid actuated ejector in said wall opening laterally outwardly thereof relative to the longitudinal axis of said body, a first passageway communicating between the compartment for said liquid and said ejector for supplying liquid to the latter to be ejected therefrom with said fluid and a passageway communicating between the compartment for said fluid and said ejector for actuating the same and for inducing a flow of said liquid through the ejector for discharge therefrom, and a valve in said last mentioned passageway for controlling the flow of said fluid to said ejector, a closure on said body for said ejector movable relative to said body from a closed position closing said ejector to an open position uncovering said ejector for discharge of said fluid and liquid therefrom.

6. A liquid spray device comprising; an elongated tubular body having a compartment in each of its opposite

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ends for a fluid under pressure and for a liquid to be sprayed respectively, a wall intermediate said opposite ends, a fluid actuated ejector in said wall opening laterally outwardly thereof relative to the longitudinal axis of said body, a first passageway communicating between the compartment for said liquid and said ejector for supplying liquid to the latter to be ejected therefrom with said fluid and a passageway communicating between the compartment for said fluid and said ejector for actuating the same and for inducing a flow of said liquid through the ejector for discharge therefrom, and a valve in said last mentioned passageway for controlling the flow of said fluid to said ejector, a closure on said body for said ejector movable relative to said body from a closed position closing said ejector to an open position uncovering said ejector for discharge of said fluid and liquid therefrom, means for actuating said valve connected with said closure for opening said valve upon movement of said closure to said open position and for closing said valve upon movement of said closure to said closed position.

7. A liquid spray device comprising; an elongated hollow body adapted to receive therein a container filled with a compressed fluid under pressure vaporizable upon release from said container, a wall at one end of said body provided with a pointed element projecting into said compartment for puncturing a portion of said container a duct extending through said element opening at one end of said duct outwardly of the latter substantially at its pointed end, a fluid actuated ejector carried by said wall opening outwardly of said body, the opposite end of said duct opening into said ejector for actuation of the latter to induce a flow of liquid therethrough for vaporization and ejection from said body, a passageway in said body communicating with said ejector for conducting a liquid thereto, a valve in said duct for controlling the flow of said fluid to said ejector, means for actuating said valve and manually actuatable means on said body at the side of said compartment opposite said pointed element for supporting such container and for moving it against said element for puncturing said portion.

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8. A liquid spray device comprising; a body having a pair of separate compartments therein sealed one from the other, a container for liquid adapted to fit within one compartment of said pair, a flask for fluid under pressure adapted to fit within the other compartment of said pair, an ejector carried by said body and opening outwardly therefrom, a duct communicating between the interior of said flask and said ejector, a rotary valve element of plastic material extending across said duct and closing the duct to flow of said fluid through when in said closed position and said element being ported to register with said duct upon rotation of said element to open position, means for so rotating said element and a conduit for liquid communicating between the interior of said container and said ejector.

9. A liquid spray device comprising; a body having a pair of separate compartments therein sealed one from the other, a container for liquid adapted to fit within one compartment of said pair, a flask for fluid under pressure adapted to fit within the other compartment of said pair, an ejector carried by said body and opening outwardly therefrom, a duct communicating between the interior of said flask and said ejector, a rotary valve element of plastic material extending across said duct and closing the duct to flow of said fluid through when in said closed position and, said conduit including a hollow puncturing element projecting into said one compartment for engaging and for puncturing a wall of said container to admit liquid in said container into said conduit, said element being engageable with said one wall of said containers in one position only of said container relative to the walls of said one compartment, and means respectively on said container and within said one compartment obstructing movement of said container into said engagement with said element except when said container is in said one position only.

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