March 9, 1948. A. R. BINK 2,437,589

TELESCOPING DISPENSING NOZZLE WITH FLUID PRESSURE-OPERATED SAFETY VALVE

Filed April 23, 1945

FIG. 1.

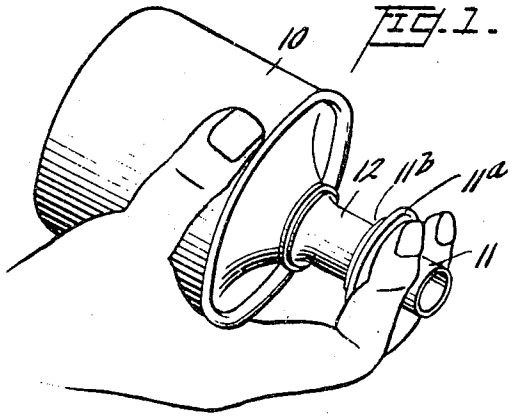


FIG. 2.

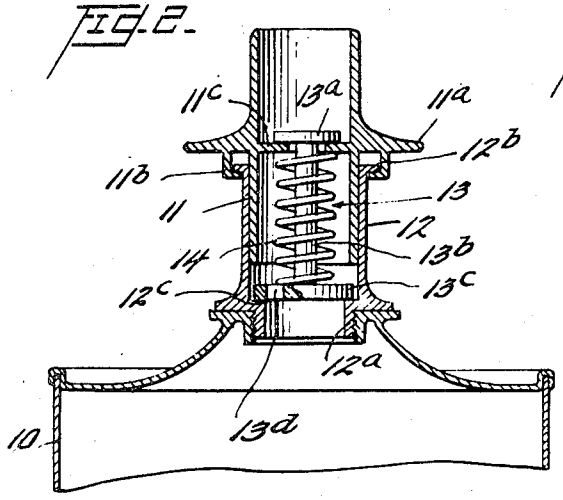


FIG. 3.

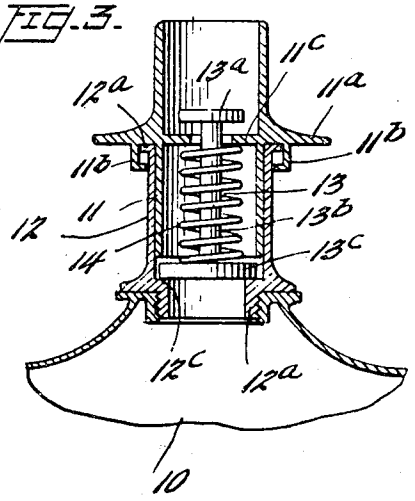
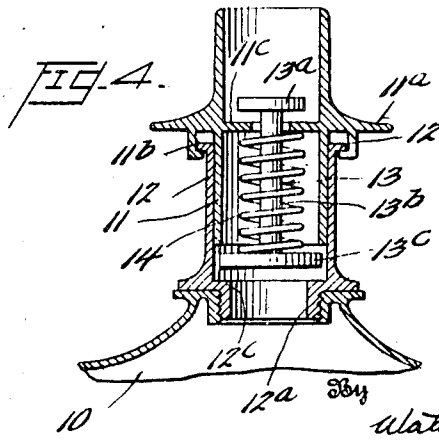


FIG. 4.



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TELESCOPING DISPENSING NOZZLE WITH FLUID PRESSURE-OPERATED SAFETY VALVE

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7 Claims. (Cl. 222—493)

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The present invention relates to fluid dispensing nozzles and particularly to nozzles of the type primarily intended to be used in association with small dispensing cans such as may be held in the hand and conveniently moved about for the purpose of applying one or more drops of fluid at any selected point.

Dispensing nozzles of this general type have heretofore been widely employed and, where the fluid to be dispensed is oil or the like the design of a satisfactory nozzle presents no difficulty. In certain instances, however, it is necessary to package liquids of volatile or explosive nature in the conventional small dispensing can adapted for hand manipulation and it is highly desirable to provide in association with a can which is designed and intended for use in dispensing liquids of explosive nature a dispensing nozzle which may not only be manipulated manually so as to permit the discharge of measured quantities of liquid from time to time as needed, but will also serve as a safety device having the capacity to automatically act when the internal pressure exceeds a predetermined minimum, to vent the can by permitting the discharge into the atmosphere of vapors which, if confined, would cause the building up of excessive pressures, sufficient to cause disruption of the container wall unless relieved. The ability to readily permit escape of vapor from the can with which it is associated, when the vapor pressure exceeds a predetermined minimum, is a characteristic of the present dispensing nozzle and when it is used the danger of explosion due to excessive internal pressure is wholly eliminated, it being impossible for the improved nozzle to fail to function in this respect.

The nozzle which comprises the subject matter of the present application is one of great simplicity, comprising four operating parts only and these being of simple nature, readily fabricated and readily assembled. It is also constructed so as to be operable manually with the greatest ease. The liquid discharge port of the nozzle is at its extreme end so that the user may precisely direct the outflowing liquid onto a chosen area. The nozzle may be operated by pressure applied manually at any one of a number of different places, the control valve being unseated when the nozzle end is pressed against a part to which liquid is to be applied or unseated when finger pressure is applied at any point along the circumference of an annular flange which forms part of the movable member of the nozzle and which is particularly designed to be engaged and manipulated by the fingers of the operator.

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One embodiment of the invention will be disclosed by way of example but it will be understood that such embodiment, which is illustrated in the accompanying drawings, may be considerably modified without departure from the invention in adapting the nozzle to containers of different types and for the handling of fluids having different characteristics.

In the drawings:

Figure 1 is an illustration, in perspective, of a container to which the nozzle has been applied, the container being tilted to liquid discharging position and a finger of the operator being shown to be in contact with the movable or control portion of the nozzle; and

Figures 2, 3 and 4 are axial sections through the improved nozzle showing the operating parts in the positions which they occupy when the nozzle is in normal or closed position; after it has been opened in the normal manner by externally applied pressure; and after it has been opened as a result of excessive internal pressure, respectively.

The wall of a container, which may be a small metal can, is indicated at 10 and it will be understood that the container with which the improved nozzle is associated may be of any size or shape. The nozzle includes four principal elements, the forwardly and rearwardly disposed telescoping tubular members 11 and 12, respectively, comprising the nozzle proper the valve and valve stem assembly generally indicated at 13, and the helical compression spring indicated at 14. The tubular member comprising the forwardly positioned orificed discharge member 11 and the rearward socket member 12 are coaxial and the cylindrical outer surface of the member 11, at one end of such member, makes a close sliding fit with the cylindrical inner surface of the member 12. The member 12 is in effect a nipple and is adapted to be attached to the can 10. In the drawings it will be observed that a reduced annular end portion 12*a* of the member 12 is exteriorly threaded so as to have threaded engagement with the internally threaded neck of the can 10. The member 11 is provided with an annular flange 11*a*, that surface of the flange which faces away from the container 10 being adapted to be engaged by the fingertips when the nozzle is to be operated to permit the discharge of fluid from the can. The telescoping tubular members have mutually cooperating portions which limit to a predetermined distance the possible relative axial movements of these members. Thus the member 12 is provided at its outer end

with a radially extending peripheral flange 12b and the member 11 is provided with a cylindrical flange 11b the lower cylindrical edge of which is inwardly turned or upset so as to underlie the flange 12b. The peripheral flange 12b of the member 12 thus acts as a stop preventing movement of the member 11 relatively to the member in excess of a predetermined distance.

The valve and valve stem assembly 13 includes the disc valve 13a and the stem portion rigid therewith, the stem portion including the relatively lengthy stem proper 13b and the terminal flange 13c, the terminal flange being apertured at several points, as for instance at 13d, to permit the passage of liquid at all times from the interior of the can outwardly into the nozzle as far as the valve member 13a. The inner end of the helical spring 14 rests against the outer face of the terminal flange 13c of the valve and stem assembly and its outer end contacts with the inner face of the annular internal flange 11c of the movable member 11 of the nozzle.

Normally the various parts of the nozzle occupy the positions in which they are illustrated in Figure 2, the spring 14 acting to force the valve stem assembly flange 13c inwardly upon the outwardly facing surface of the internal shoulder 12c of the tubular member 12, and also urging the member 11 outwardly so that the members 11c thereof contact with the peripheral flange 12b of the outer member. The dimensions of the several parts are such that, when the member 11 has been projected axially to the limit of its movement away from the can 10 the outer surface of its internal annular flange 11c is in liquid-tight engagement with the inner or undersurface of valve disc 13a, the outer surface of the annular part 11c thus comprising a valve seat for the valve 13a. When the valve is thus seated the valve assembly disc 13c may be spaced very slightly away from shoulder 12c.

With the parts so positioned there can be no escape of liquid due to inversion of the can. Valve opening may be brought about in either of two ways, i. e., by manually pressing the member 11 axially toward the can to the position in which it is shown in Figure 3 of the drawings, the valve 13a being thereby unseated and an annular passage for the flow of fluid around the valve stem 13b established. The valve will remain open so long as pressure is applied to the member 11. When the pressure is relieved the spring immediately acts to thrust the member 11 outwardly and to interrupt the flow of liquid.

Excessive pressure within the container may likewise open the valve since an annular area of the undersurface of the valve part 13a, closely encircling the stem part 13b, will always be exposed to the action of fluid pressure within the container. When the pressure becomes sufficiently great to overcome the action of the spring 14 the valve will open, moving to or toward the position in which it is shown in Figure 4, enabling a portion of the volatilized liquid to escape. The strength of the spring 14 will be such as to permit opening of the valve automatically in this manner long before the container wall becomes overstressed and hence the improved dispensing nozzle acts as a safety valve which under no circumstances can fail in its explosion preventing functions. Naturally the various elements of the invention may be designed so as to have different shapes in order to meet different conditions and the invention is not limited to that precise form which has been selected for disclosure by way of example.

The terms "forward" and "rearward" and their derivatives, as applied to the members 11 and 12, when used in the specification and claims, have reference to the relative positions of the members axially of the device in the direction of discharge of the fluid.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A fluid dispensing nozzle comprising, in combination, telescoping forward and rearward tubular members relatively movable axially and having mutually cooperating portions which limit to a predetermined distance the relative axial movements of said members, the forward member having a valve seat facing the discharge end of that member and the rearward member having a stop surface facing in the same direction, a valve and stem assembly disposed axially of the said members and movable independently of said telescoping members, and a spring acting on the forward member and valve stem assembly to seat the valve on the valve seat and the stem on the stop surface of the rearward member, the forward member being at the forward limit of its travel when the valve and stem are seated, the parts being so constructed and arranged that unseating of the valve results when the forward tubular member is thrust rearwardly or the pressure of fluid behind the valve overcomes the action of the spring.

2. A fluid dispensing nozzle comprising, in combination, telescoping forward and rearward tubular members together comprising an open-ended duct for liquid, said members having mutually cooperating portions which limit to a predetermined distance their relative axial movements, the forward member having a valve seating surface and the rearward member a valve stem seating surface, both such surfaces facing toward the same end of the duct, a valve and stem assembly disposed axially of the said members, a spring having its ends engaging the forward member and valve stem assembly, said spring normally urging the valve and seat into liquid-tight engagement upon said seating surface and the valve stem against the valve stem seating surface, the forward member being at the forward limit of its travel when the valve and stem are seated, the parts being so constructed and arranged that unseating of the valve results when the forward tubular member is thrust axially of the rearward member or when the pressure of fluid behind the valve overcomes the action of the spring.

3. The combination set forth in claim 2 in which the valve and stem assembly includes a terminal disc mounted on the stem remote from the valve, said disc being perforated to permit the passage of gas and liquid at all times.

4. A fluid dispensing nozzle comprising telescoping tubular members together comprising an axially extensible and contractible duct, and means associated with the duct for normally maintaining the duct closed, said means being movable to open the duct at all times both by axial contraction of the duct and also by the pressure of fluid at the inlet end of the duct whenever it exceeds a predetermined minimum whether the duct is contracted or not.

5. A dispensing container for volatile liquids or the like, having walls, one of which has an opening provided with a tubular nipple member, a forwardly disposed tubular discharge member disposed for limited telescoping movement with

respect to said nipple member and retractable rearwardly towards said container, a valve element movable at all times independently of said nipple member and said discharge member and openable forwardly from a seat on said discharge member, retractive movement of said discharge member serving to move said seat rearwardly relatively to said valve and unseat the same for dispensing, and movement of said valve itself forwardly with respect to said seat on the discharge member, under pressure of the fluid contents of the container, serving to vent the container whatever the position of the telescoping members as a safety measure.

6. A dispensing container for volatile liquids or the like, having relatively rigid non-collapsible walls, one of which has an opening provided with a tubular nipple member, a forwardly disposed tubular discharge member disposed for limited telescoping movement with respect to said nipple member and retractable rearwardly toward said container against spring pressure, a valve element movable at all times independently of said nipple member and said discharge member and openable forwardly from a seat on said discharge member also against spring pressure, means bracing said valve element against said nipple member whereby rearwardly retractive movement of said discharge member serves to move said seat rearwardly relatively to said valve and unseat the same for dispensing, and the movement of said valve itself forwardly with respect to said seat under pressure of the volatile contents of the container, serves to vent the container whatever the position of the telescoping members as a safety measure.

7. A dispensing container for volatile liquids, or the like, having relatively rigid non-collapsible walls, one of which has an opening provided with a tubular nipple member, a forwardly disposed

tubular discharge member disposed for limited telescoping movement with respect to said nipple member and retractable rearwardly toward said container against spring pressure, a valve element movable at all times independently of said nipple member and said discharge member and openable forwardly from a seat on said discharge member also against spring pressure, means bracing said valve element against said nipple member whereby rearward retractive movement of said discharge member serves to move said seat rearwardly relatively to said valve and unseat the same for dispensing, and the movement of said valve itself forwardly with respect to said seat under pressure of the volatile contents of the container, serves to vent the container whatever the position of the telescoping members as a safety measure, a single spring compressed between a portion of said forward tubular discharge member and a portion of said valve bracing means, whereby said spring performs the dual function of resiliently resisting the retraction of the discharge member to unseat the valve for dispensing purposes, and resiliently resisting the forward unseating of the valve element itself under internal fluid pressure.

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