

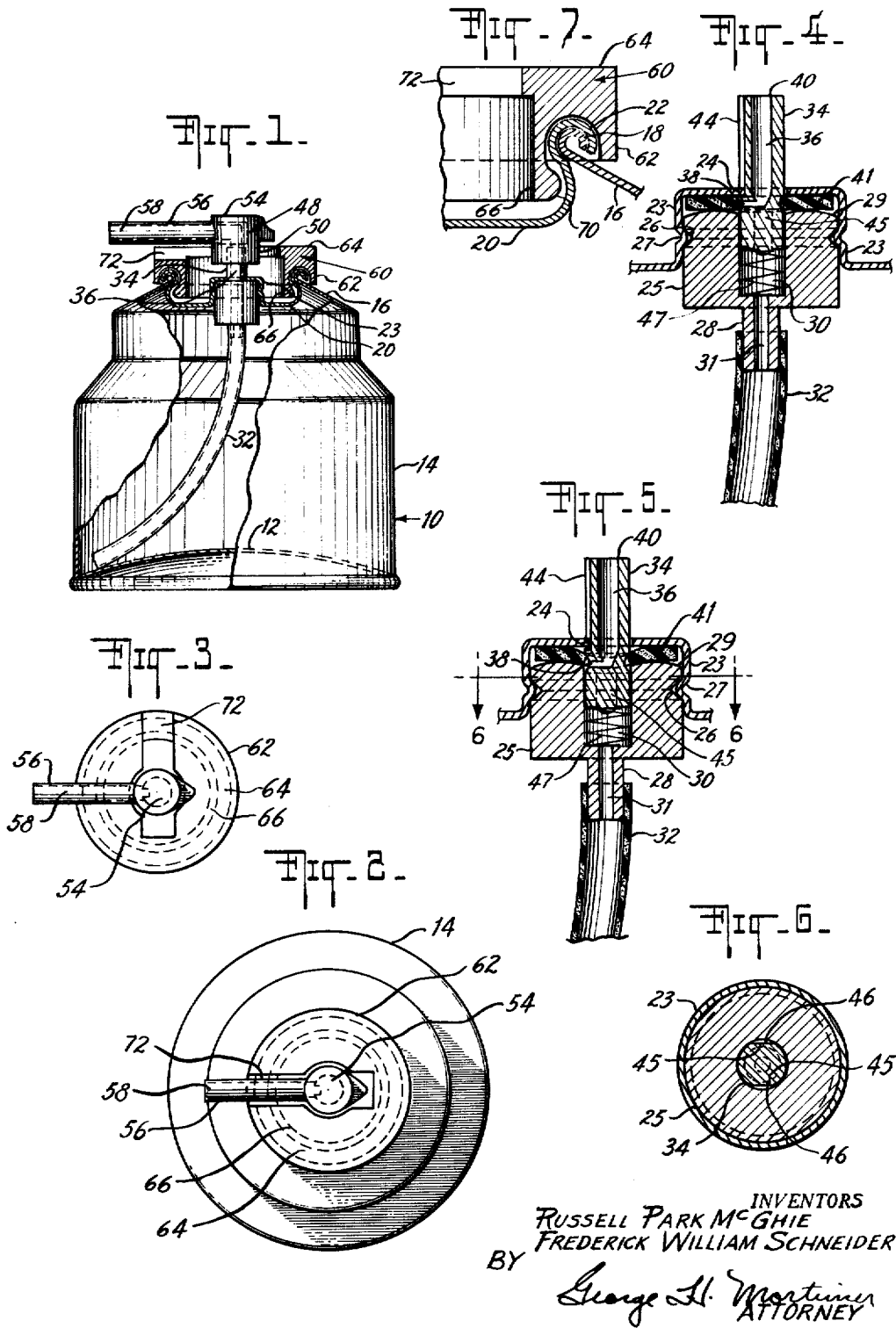
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HOLDING PRODUCTS UNDER PRESSURE

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Filed Jan. 18, 1951

2 Sheets-Sheet 1



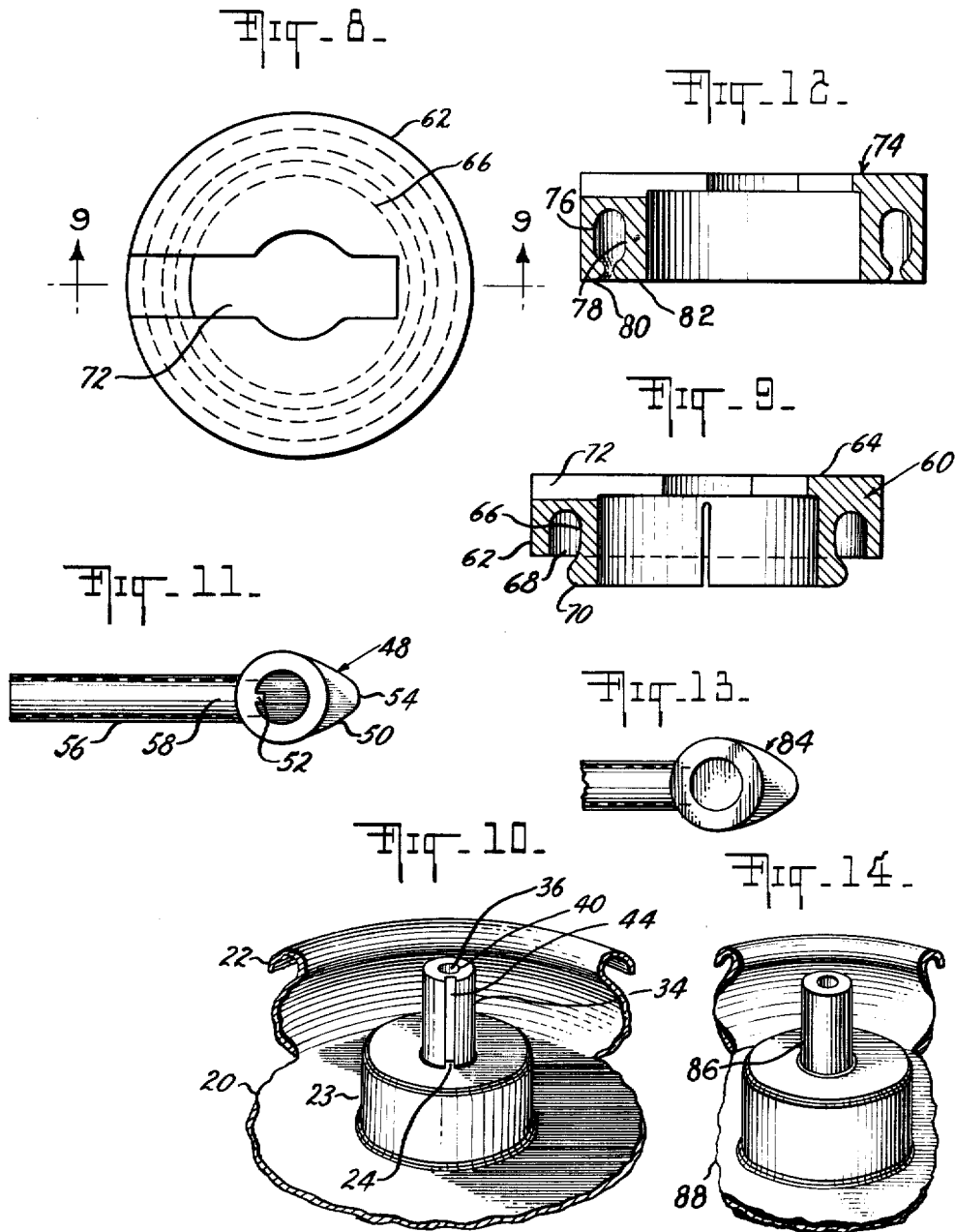
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DISPENSING DEVICE FOR CONTAINERS HOLDING PRODUCTS UNDER PRESSURE

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The present invention relates to containers and has particular reference to a new and useful dispensing device wherein a product is packaged under pressure and the discharging or dispensing of said product is governed by a manually releasable valve.

In recent years dispensing containers of the aerosol type have been widely used in the packaging and commercial distribution of hair shampoos, shaving creams, glues, food stuffs and the like. Furthermore, it has been found that the use of such containers facilitates the convenient handling of liquids such as insecticides, perfumes, deodorants, oils, waxes, paints and similar materials.

In general, such products are either packaged under pressure or are placed in containers having some means for creating a gaseous pressure within the walls thereof whereby, upon release of a suitable valve positioned in a passage through an outer wall of said container, the contained product and gas may be dispensed through said passage and ejected from the container. Adequate pressures have been obtained in various ways, e. g., some containers have been partially filled with nitrous oxide or some other inert gas; in some cases the pressure has resulted from the evaporation of a portion of the contents of the containers, or by the discharge of a compressed gas cartridge, or from the reaction of chemically produced gas; etc.

It is usual to provide such aerosol dispensing containers with a normally closed, manually opened gas-tight valve mechanism whereby after the desired amount of contained product has been dispensed from the container, the dispensing may be discontinued and the container re-sealed for subsequent use.

While aerosol containers have been found to be practical in many respects for the packaging and distribution of pressure propelled products, certain of the various types of containers and dispensing devices heretofore known have exhibited objectional operational characteristics which lessen their usefulness and desirability for adaptation to commercial operation. For example, some prior art dispensing containers have been provided with manually releasable valve operating members. Inasmuch as the operating members are generally located in exposed positions, there is constant danger of accidental discharge of the product and gas from the container as a result of inadvertent contact with said member.

Other types of aerosol dispensing containers previously used have been objectionable in that such containers have not provided satisfactory means for maintaining a delivery spout, when in use, in consistent alignment with a dip tube. Such a tube, generally attached centrally of a valve mechanism positioned within an aperture at the discharge end of the container, extends to the opposite or bottom end of said container in such a manner whereby all of the contained product may be evacuated from said container. The positioning of the delivery spout and dip tube in consistent alignment is desirable since, as the product level in the container gradually recedes through

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use, there is a normal tendency on the part of the consumer to tip the container in the direction of the spout. If the discharge end of the spout and the lower or receiving end of the tube are not maintained in consistent alignment it is possible that the receiving end of said tube will be above the surface of the product should the container be tipped. If the lower or receiving end of the dip tube becomes uncovered, the product will not be delivered smoothly, an excessive loss of propelling gas will result, and considerable quantities of the product will remain unrecoverable from the can.

The present invention provides a dispensing device which overcomes or substantially minimizes the drawbacks and disadvantages inherent in certain dispensers heretofore known in the art. Such a device has a further advantage in that it may readily and easily be produced by variations of well-known commercial manufacturing processes. Furthermore, the present invention provides a dispensing device that may be handled, packed in cartons, and distributed without danger of inadvertent operation of the valve and attendant loss of the contained product. The present invention also affords a simple means for aligning the delivery spout, when in use, with the dip tube.

In order to indicate even more fully the advantages and capabilities of the present invention, reference is made to the following description, taken in conjunction with the accompanying drawings, which by way of illustration, show a preferred embodiment of the novel dispensing device. It will be understood by those skilled in the art that other embodiments of the invention employing the same or equivalent principles may be used and that structural changes may be made as desired without departing from the present invention and the purview of the appended claims. In the drawings, similar characters are used to designate corresponding parts in each of the several figures.

In the drawings:

Fig. 1 is a side view of a dispensing device in accordance with a preferred embodiment of the present invention;

Figs. 2 and 3 are plan views of a dispensing device showing a locking cap in an open and a locked position, respectively;

Figs. 4 and 5 are side views of a dispensing valve in a closed and an open position, respectively;

Fig. 6 is a section view showing a dispensing valve as taken along line 6-6 of Fig. 5, looking in the direction of the arrows;

Fig. 7 is a fragmentary view showing a locking cap and the rolled edges of a valve mounting cap and a container on a much larger scale for purposes of clarity of description;

Fig. 8 is a plan view of the locking cap;

Fig. 9 is a sectional view of the locking cap as taken along line 9-9 of Fig. 8, looking in the direction of the arrows;

Fig. 10 is a perspective view of a valve mounting cup, with parts broken away for clarity of description, showing a reciprocating member and a keyway within said member;

Fig. 11 is a bottom view of an operating element showing a delivery spout and a key within said element;

Fig. 12 is a sectional view of a locking cap somewhat similar to that shown in Fig. 9 but modified in such manner that it may be mounted fixedly on a dispensing device;

Fig. 13 is a fragmentary bottom view of the operating element shown in Fig. 11 in a somewhat modified form; and

Fig. 14 is a view somewhat similar to Fig. 10 showing

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a reciprocating member and a valve mounting cup in modified form.

Referring to the drawing, the invention, as therein illustrated, is embodied in a conventional dispensing container, referred to generally by reference numeral 10, which may be formed of metal, plastic, glass, etc. or any other suitable material capable of withstanding relatively high pressures. Looking first at Fig. 1, the container is shown in the form of a generally cylindrical metal can having a domed bottom wall 12 at one end thereof and a generally cylindrical side wall 14 reduced at the other end to provide a relatively small neck 16. As indicated more clearly in Fig. 7, neck 16 terminates in an opening defined by a lip or rolled end portion affording an annular bead 18 with which a dispensing valve is associated. Seated within the opening in neck 16 of the container is a valve mounting cup 20 having a peripheral edge portion 22 rolled about the bead 18 of container 10 and a body portion 23 adapted to receive a dispensing valve, Figs. 4 and 5. Body portion 23 is provided with a central aperture having an inwardly projecting lip 24 adapted to slide within a keyway in a reciprocating member hereinafter described. Mounting cup 20 may be secured or fastened to neck 16 of container 10 in any suitable manner, e. g., by expanding the inside of the cup so that the pressure of the cup pressing against the inside of the neck of the container is sufficient to seal the cup and form a tight connection thereby preventing leakage about the neck.

As indicated in Figs. 4 and 5 a representative dispensing valve suitable for use in accordance with the present invention includes a hollow cylindrically shaped valve housing 25 permanently mounted within the body portion 23 of valve mounting cup 20. The exterior surface of said housing is provided with an annular notch 26 adapted to cooperate with a plurality of inwardly directed lugs 27 of body portion 23 to maintain said housing and valve mounting cup in non-rotatable relation. Said housing is furnished with an integrally formed extension or stem 28 of greatly reduced diameter at one end thereof, a centrally apertured wall 29 at the other end, and a centrally contained, longitudinally extending passage 30. Stem 28, provided with a passage 31, is adapted for fixed attachment with one end of dip tube 32 preferably formed of a material having sufficient rigidity whereby the same may be maintained in a substantially fixed position. Such materials include hard rubber, plastic, fiber, metal, etc. A reciprocating member 34, mounted in passage 30 within said housing, is provided with a discharge passage 36 having an inlet 38 in the side wall thereof and an outlet 40 at one end of said member. A centrally apertured gasket 41 formed of a yieldable substance, e. g., rubber, plastic, etc., is positioned between the exterior surface of end wall 29 of housing 25 and the body portion of mounting cup 20 so as to surround the exterior surface of reciprocating member 34 at inlet opening 38.

In accordance with the present invention, that portion of the reciprocating member which encloses the discharge passage takes the form of a tube having a non-cylindrical exterior surface. While such a surface may be provided in any suitable manner, e. g. by furnishing said exterior surface with a linearly extending flattened portion, by providing the exterior surface with a laterally projecting protuberance, etc., it is preferred, as indicated in Fig. 10, that such a non-cylindrical exterior surface be provided by furnishing said member with a longitudinally extending groove or keyway 44. As illustrated in Figs. 4, 5 and 6 the exterior surface of the remaining portion of said reciprocating member is provided with a plurality of longitudinally extending facets 45 which cooperate with the interior surface of said housing to form passages 46 through which the contained product may pass. A coiled spring 47, adapted to apply an outwardly directed force, lies between the lower end of member 34 and the bottom of passage 30.

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As indicated in Figs. 1 and 11, an operating element 48 having an annular depending skirt 50 is detachably mounted on reciprocating member 34. The inner surface of skirt 50 is furnished with a centrally projecting, longitudinally extending ridge or key 52 adapted to cooperate with keyway 44 within reciprocating member 34 to inhibit relative rotative movement of the respective parts. Said operating element is provided with a centrally positioned operating head 54 adapted to be depressed by finger pressure, a fixed spout 56 projecting laterally therefrom, and a dispensing passage 58 extending linearly through spout 56, the inner end of said passage being in communication with the discharge passage 36 within reciprocating member 34. Fixed spout 56 is located upon operating element 48 in a position relative to key 52 whereby said key and keyway 44 may cooperate to maintain said spout in consistent alignment with dip tube 32 when said operating element and reciprocating member have been affixed in operative assemblage.

Turning now to Figures 1, 2, 3, 7, 8 and 9, a locking cap 60 having a generally cylindrical side wall 62 and a plane or flat end wall 64 is mounted for rotation about the neck of container 10 and is adapted in one position relative to reciprocating member 34 to block movement thereof and in another relative position to permit such movement. Side wall 62, together with a plurality of downwardly projecting connecting members 66 secured to the inner surface of said end wall in concentric relation with the side wall, define an annular channel 68 adapted to receive the rolled end portions of container 10 and valve mounting cup 20. The free ends of said connecting members are furnished with outwardly projecting protuberances 70 adapted for non-removable engagement with the inner annular surface of the rolled end portion of the valve mounting cup. The flat end wall of locking cap 60 is provided with a slotted aperture 72 adapted to permit reciprocal movement of operating element 48 and spout 56. Both operating element 48 and locking cap 60 are preferably made of molded plastics. However, the use of other suitable materials, e. g., metals, fiber, glass, wood, etc. is contemplated by the present invention.

To operate the dispensing device above described, it is only necessary to rotate locking cap 60 until the slotted aperture 72 therein is in alignment with the operating element 48 and spout 56, Fig. 2. Subsequent manual depression of the operating element will cause said element and spout to pass downwardly into said aperture. Inasmuch as said operating element is mounted on reciprocating member 34, depression of the operating element will also result in the downward passage of member 34, and will cause the dispensing valve to open. A portion of the contained product is then forced upwardly through dip tube 32, passages 31, 30, 46, and discharge passage 36 from whence it is dispensed through passage 58 of delivery spout 56. It will be observed that since key 52 and keyway 44 cooperate to maintain spout 56 in consistent alignment with dip tube 32, complete evacuation of the product from the container is assured inasmuch as the receiving end of said tube necessarily will be below the surface of the contained product even when the container is tipped in the direction of the spout. When sufficient product has been obtained from the container and it is desired to discontinue the dispensing, the operator need only release the operating element 48 whereupon the spring 47 returns the valve to the closed position, Fig. 4, and the container is re-sealed for subsequent use.

When not in use, cap 60 may be rotated to a position where slotted aperture 72 is in non-aligning position with respect to the operating element 48 and spout 56. Since neither the operating element nor the spout can be depressed when cap 60 has been rotated to such a locked position, Fig. 3, it is evident that the present invention affords a dispensing device which may be handled, packed in cartons, and distributed without danger of inadvertent operation of the valve and attendant loss of the contained product.

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Although in the dispensing device described above the locking cap is mounted for rotation relative to the fixed reciprocating member and operating element, it will be understood that the principle of the present invention, in the broadest aspect thereof, can also be applied in a dispensing device having a locking cap permanently mounted on the container and an operating element and reciprocating member which are movable relative thereto. Such modifications are illustrated in Figs. 12-14. Fig. 12 shows a locking cap 74 adapted for mounting fixedly on the container. Such a cap has a double side wall, the members of which are indicated by numerals 76 and 78. Protuberances 80 and 82, located on the free edges of members 76 and 78, are adapted to grip the rolled end portion 22 of valve mounting cup 20 whereby the cap may be mounted fixedly on the container. Figs. 13 and 14, illustrate modifications of the parts shown in Figs. 11 and 10, respectively. Thus, Fig. 13 illustrates an operating element 84 which does not have a key 52 as is shown in Fig. 11 and Fig. 14 shows a reciprocating member 86 which does not have a keyway 44 and a valve mounting cup 88 which does not have a lip 24 such as are shown in Fig. 10. In the modifications shown in Figs. 12-14 the invention is embodied in a dispensing device having a locking cap mounted fixedly on the container and an operating element and a reciprocating member movable relative thereto.

Furthermore, it will be appreciated by those skilled in the art that the particular dispensing valve and delivery spout hereinbefore described were selected only for purposes of clarity of description and are merely representative of some of the many varied types of dispensing valves and product delivering means well known in the art. Accordingly, any dispensing valve provided with an operating element having a shoulder thereon and reciprocable means for opening and closing the valve may be suitably incorporated in a dispensing device in accordance with the present invention. Similarly, the invention contemplates the use of any one of the numerous product delivering means which may be employed in place of a delivery spout, e. g., a discharging lip, an orifice, a spray nozzle, etc.

It will be evident from the foregoing specification that the dispensing device of the present invention satisfactorily overcomes many of the inherent drawbacks and disadvantages of certain prior art dispensers. The present device is extremely simple in character and is adapted for rapid and economical production and assembly by machines and methods that are commercially available and highly efficient in operation. The incorporation of a locking cap of the type described simplifies the problem of distribution and storage of pressure propelled products inasmuch as the danger of accidental discharge of said product from the container is substantially overcome. Furthermore, the cost of such a cap is such that it may be used on containers that are adapted to be thrown away after a single use.

While there has been shown and described what is at present considered to be the preferred embodiment of the invention, it will, of course, be understood by those skilled in the art that many modifications and changes and substitutions may be made therein without departing from the true scope of the invention as defined in the appended claims.

Having thus described the invention, what is claimed is:

1. A dispensing device comprising a container, a dispensing valve having a reciprocating member for controlling the opening and closing of the valve, said member having a discharge passage therethrough, an operating element mounted on said member, said operating element being provided with a shoulder and a dispensing passage communicating with said discharge passage in said reciprocating member, and locking means comprising a cap mounted on said device, said operating element and said cap being relatively movable and said cap being

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adapted in one position relative to said operating element to prevent movement thereof and in another relative position to permit such movement, said cap being furnished with a side wall and an end wall provided with a slotted aperture of sufficient size to permit passage of said operating element.

2. A dispensing device as set forth in claim 1 in which said locking means is mounted fixedly on said device and said operating element and reciprocating member are mounted for rotation on said device, said locking means being adapted to prevent reciprocable movement of said operating element when the element is in one position relative to said locking means and being adapted to permit such movement when the operating element is in another relative position.

3. A dispensing device as set forth in claim 1 in which said dispensing valve and said operating element are secured to said device in fixed relative assemblage and said locking means is mounted for rotation on said device, said locking means being adapted in one position relative to said assemblage to prevent reciprocable movement thereof and in another relative position to permit such movement.

4. In a dispensing device, a dispensing valve having a reciprocating member for controlling the opening and closing of the valve, said member being formed with a longitudinally extending keyway in the outer wall thereof and a centrally disposed discharge passage therethrough, an operating element mounted on said member, said operating element being provided with a dispensing passage communicating with said discharge passage in said reciprocating member and a key adapted for cooperative engagement with said keyway in the reciprocating member to maintain said operating element and said reciprocating member in fixed relative position, a cup secured to the dispensing device in which said dispensing valve is mounted, said cup having a lip adapted to slide within the keyway on said reciprocating member whereby rotational movement of the reciprocating member within the cup is prevented and a dip tube attached to said dispensing valve in alignment with said dispensing passage.

5. A dispensing device comprising a container, a dispensing valve having a reciprocating member for controlling the opening and closing of the valve, said member having a discharge passage therethrough, an operating element mounted on said member, said operating element being provided with a shoulder and a dispensing passage communicating with said discharge passage in said reciprocating member, and locking means mounted on said device adapted in one position relative to said operating element to prevent movement thereof and in another relative position to permit such movement, said locking means comprising a cap mounted for rotation on said device, said cap being furnished with a cylindrical side wall and a flat end wall provided with a slotted aperture of sufficient size to permit reciprocable passage of said operating element and said discharge passage.

6. A dispensing device comprising a container, a dispensing valve having a reciprocating member for controlling the opening and closing of the valve, said member having a discharge passage therethrough, an operating element mounted on said member, said operating element being provided with a shoulder and a dispensing passage communicating with said discharge passage in said reciprocating member, and locking means mounted on said device adapted in one position relative to said operating element to prevent movement thereof and in another relative position to permit such movement, said locking means comprising a cap mounted for rotation on said device, said cap being furnished with a cylindrical side wall, a flat end wall provided with a slotted aperture of sufficient size to permit reciprocable passage of said operating element and said discharge passage, and a plurality of downwardly projecting connecting members secured to the inner surface of said end wall in concentric relation with said side wall.

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7. A dispensing device comprising a container, a dispensing valve having a reciprocating member for controlling the opening and closing of the valve, said member having a discharge passage therethrough, an operating element mounted on said member, said operating element being provided with a shoulder and a dispensing passage communicating with said discharge passage in said reciprocating member, and locking means mounted on said device adapted in one position relative to said operating element to prevent movement thereof and in another relative position to permit such movement, said locking means comprising a cap mounted for rotation on said device, said cap being furnished with a cylindrical side wall, a flat end wall provided with a slotted aperture of sufficient size to permit reciprocable passage of said operating element and said discharge passage, and a plurality of downwardly projecting connecting members secured to the inner surface of said end wall in concentric relation with said side wall, the free end of each of said connecting members having an outwardly projecting protuberance for mounting said cap on said dispensing device.

8. A dispensing device comprising a container, a dispensing valve having a reciprocating member for controlling the opening and closing of the valve, said mem-

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ber being formed with a longitudinally extending keyway in the outer wall thereof and a centrally disposed discharge passage therethrough, an operating element mounted on said member, said operating element being provided with a dispensing passage communicating with said discharge passage in said reciprocating member and a key for permanent engagement with said keyway to maintain said operating element and said reciprocating member in fixed relative position, a dip tube attached to said dispensing valve in alignment with said dispensing passage, and locking means comprising a cap mounted on said device adapted in one position relative to said operating element to prevent movement thereof and in another relative position to permit such movement, said cap being furnished with a side wall and an end wall provided with a slotted aperture of sufficient size to permit passage of said operating element.

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