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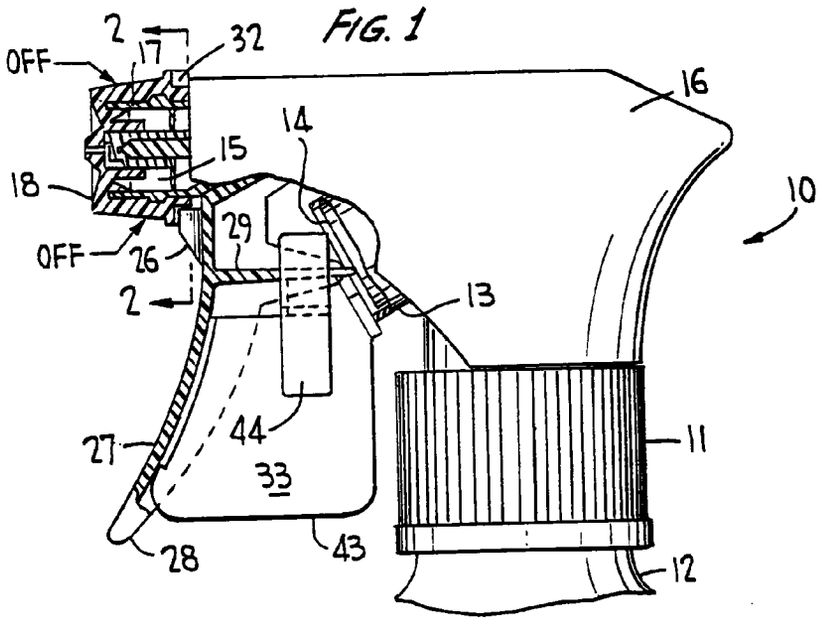
(54) Child-resistant trigger actuated pump sprayer

(57) A child-resistant trigger actuator pump sprayer includes a detent (26) on a forward wall of the trigger lever (28) for engagement with either an outer flat wall of the nozzle cap (18) or a notch in the rearward edge of the cap for locking the cap in its discharge closed position. Rotation of the cap (18) to one of its on positions is facilitated by unlocking the cap as the operator applies a slight pull force to the trigger lever to disengage the detent (26) from the notch (31) or from the external flat wall of the cap.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

This invention relates generally to a child-resistant trigger sprayer, and more particularly to such a sprayer in which the nozzle cap is prevented from being rotated from its off position without first squeezing the trigger lever to disengage a detent on the lever from an abutment means on the cap.

A further child-resistant feature of the invention includes latch means removably secured to the sprayer and extending between the trigger lever and a confronting portion of the pump body for preventing trigger actuation, such that the trigger lever cannot be first squeezed to permit nozzle cap rotation until the latch means is removed.

A number of child-resistant trigger sprayers are known which serve to block the outlet orifice to resist accidental use by especially a child. At least two separate motions are required by the user to disable a lock to permit a cap to be moved into an outlet open position.

U.S. patent 4,346,821 discloses a child-resistant safety closure for closing the outlet of a trigger sprayer and includes an actuating tab having a tooth-like detent member formed at its lower end. The member engages a slot in the trigger lever, thereby preventing cap rotation. To rotate the cap to an outlet open position, the trigger is partially depressed to disengage the detent from the slot.

U.S. patent 4,516,695 discloses a child-resistant nozzle for a trigger sprayer in which a flexible lever arm depends from a nose bushing and has a forwardly projecting tab which normally engages a notch located in the nozzle cap to prevent nozzle rotation to a discharge open position unless the tab is disengaged by depressing the lever.

U.S. patent 5,564,604 discloses a child-resistant trigger sprayer in which the trigger lever has a projection on its front wall which abuts against a lower surface of a cantilever such that downward bending thereof is prevented. When the operator pulls the trigger to move the projection downward to create a space behind the cantilever such that it can be bent downward, a hook of the cantilever can thereby be disengaged permitting a nozzle cover to be shifted to its open position.

However, each of the forgoing approaches taken in providing a child-resistant trigger sprayer require additional parts and complex molding which add to the cost of production, assembly and operation of the sprayers, thereby significantly detracting from customer appeal.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a child-resistant trigger actuated pump sprayer which is easy to produce, assemble and operate and which is highly effective in resisting nozzle cap rotation from a discharge closed position without first performing a discrete step by slightly squeezing the trigger. The invention is carried out at low cost and high efficiency.

According to the invention, the trigger lever is provided with a forwardly projecting detent or catch on its forward wall, and abutment means are provided on the nozzle cap for arresting manual cap rotation from a discharge closed position as the detent engages the abutment wall means. Squeezing the trigger first to disengage the detent from the abutment wall means permits nozzle cap rotation from its discharge closed to a discharge open position.

The nozzle cap may have at least one external flat wall which comprises the abutment means preventing cap rotation in either direction about the central axis of the cap as the detent engages the flat wall in the locked, discharge closed position.

Otherwise, a rearward edge wall of the nozzle cap, whether rectangular or circular in cross-section, may be provided with an open notch having opposed side walls comprising the abutment wall means for arresting cap rotation by engagement of the detent in the locked discharge closed position.

Another feature of the invention includes the use of a removable latch means extending between the trigger lever and a confronting portion of the pump body to prevent trigger actuation, and thereby cap rotation, unless the latch means is first removed.

Other objects, advantages and novel features of the invention will become more apparent from the following detailed description of the invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side elevational view, partly in section, of a trigger sprayer incorporating the present invention;

Figure 2 is a view taken substantially along the line 2-2 of Fig. 1 showing one embodiment of the nozzle cap locked in its discharge closed position;

Figure 3 is a view similar to Fig. 2 showing the nozzle cap in the process of being rotated from a discharge closed position to a discharge open position after unlocking the cap.

Figure 4 is a view similar to Fig. 2 of another embodiment according to the invention;

Figure 5 is a view similar to Fig. 2 of a nozzle cap having an alternate configuration;

Figure 6 is a front elevational view of the trigger lever alone, at an enlarged scale, showing a detail of the detent; and

Figure 7 is a side view of the trigger lever of Fig. 6.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings wherein like reference characters refer to like and corresponding parts

throughout the several views, a trigger sprayer generally designated 10 is shown in Fig. 1 of generally known construction, the sprayer having a container closure 11 to facilitate its mounting to the neck of a container 12 of the product to be sprayed. The trigger sprayer may be structured for operation essentially the same as that disclosed in U.S. Patent No. 5,114,049, and the discharge nozzle control can be structured to operate essentially the same as that disclosed in U.S. patent 4,706,888, both commonly owned herewith.

The sprayer has a pump body which includes a pump cylinder 13 receiving a pump piston 14 for reciprocation to therewith define a variable volume pump chamber, not shown although fully understood in this art. A discharge passage 15 extends in a forward direction through the pump body, and the pump body is surrounded by a fixed shroud 16 of some suitable type. The discharge barrel of the pump terminates in a nozzle end 17 on which a nozzle cap 18 is mounted for rotation in both directions about its central axis, without axial displacement. The nozzle cap has a discharge orifice 19 through which liquid product is dispensed either as a stream or a spray in a normal manner upon trigger actuation. In the embodiment shown in Fig. 1, the nozzle cap is generally of rectangular cross-section having four flat external walls 21, 22, 23 and 24, each containing indicia OFF, STREAM, OFF, SPRAY, respectively, and a rearward facing edge wall 25.

The nozzle cap is manually rotatable about its central axis between an OFF position of Figs. 1 and 2 and an on position (SPRAY or STREAM) in which the nozzle is rotated 90° from an OFF position. In this OFF position the discharge is closed and in the on position the discharge is open, as in accordance with the nozzle structure disclosed in the aforenoted U.S. patent 4,706,888. In the open discharge position with the nozzle rotated to one of its on positions of SPRAY or STREAM, spraying is effected upon repeated pulls of the trigger such that, when the pump chamber is primed with liquid, the liquid in the chamber is compressed during each compression stroke and is expelled through the open discharge. In the OFF position of the nozzle cap, the discharge may be closed even upon actuation of the trigger.

Thus, to render the sprayer child-resistant, the nozzle cap is locked in one of its OFF positions to thereby discourage an operator especially of tender years from simply rotating the cap in either direction to an on position. The cap is locked in its discharge closed position by the provision of a detent or catch 26 provided on a forward wall 27 of a trigger lever 28 which is pivotally mounted on the pump body, and which has a conventional tup or tongue means 29 in bearing engagement with an outer end of the pump piston for reciprocating the same against the force of a return spring (not shown) in the conventional manner known in this art.

In one embodiment shown in Figs. 1 to 3 the detent extends into one of a pair of opposing open notches 31, 32 formed in edge wall 25 and respectively associated with side walls 23 and 21 each bearing the indicia OFF, as shown in the drawings. The nozzle cap is therefore locked in a discharge closed position, and is prevented from being rotated into one of its discharge open positions.

Another feature of the invention includes the provision of removable latch means generally designated 33 in Fig. 1. The details of such latch means are specifically disclosed in a companion European patent application 96117045.3, filed October 24, 1996, commonly owned herewith. The locking function of the nozzle cap according to the invention will be described assuming that latch means 33 is removed from the pump sprayer of Fig. 1, thereby permitting the trigger lever to be actuated upon manually squeezing the same in a known manner as external finger pressure is applied to forward wall 27 in a trigger pull position.

In the locked position of Figs. 1 and 2, the detent engages abutment wall means on the nozzle cap in the form of a pair of opposed side walls 34, 35 of notch 31. Any attempt to rotate the nozzle cap about its central axis in either direction causes walls 34, 35 to respectively bear tightly against flat side walls 36 and 37 of the detent.

To unlock the cap permitting its rotation from its OFF position to one of its SPRAY or STREAM positions, the operator simply exerts a slight pull against the trigger lever to rotate the lever and its detent 26 (counterclockwise when viewed in Fig. 1) downwardly and outwardly away from notch 31. The nozzle cap may therefore be rotated in either direction about its central axis as shown in Fig. 3 which illustrates the nozzle cap in the process of being so rotated in one direction.

In another embodiment of the invention shown in Fig. 4, the nozzle cap has no open notches formed in its rear edge wall, but instead the abutment wall means comprise the flat, opposing outer walls 21, 23 of the cap itself. In a discharge closed and locked position, a flat upper wall 38 of the detent (Figs. 6, 7) is positioned to closely underlie outer wall 23 of the nozzle cap such that, attempts to rotate the cap about its central axis in either direction, causes wall 23 to abut against a corner 39 or 41 of the detent for locking the nozzle cap in its OFF position without the need for a cooperating open notch as in the first embodiment. Of course, with the nozzle cap rotated to its OFF position with its outer wall 21 juxtaposed to the detent, wall 21 comprises the abutment wall means in the same manner as described with reference to wall 23.

The pump sprayer may otherwise have a nozzle cap 42 of generally circular cross-section as shown in Fig. 5 in which the discharge is closed in the manner disclosed in U.S. patent 4,204,614, commonly owned herewith. The nozzle cap is screw threaded to the pump body for rotation to an on position upon rotation of the nozzle in a predetermined direction about its central axis.

Nozzle 42 has in its rearward edge wall an open

notch 31 for locking the cap in its discharge closed position as detent 26 extends into the open notch for engaging the opposing side walls thereof, similarly as described with reference to Fig. 2. Again, with latch means 33 removed from the sprayer, a slight squeeze of the trigger moves the detent outwardly of the open notch freeing the nozzle cap for rotation from a discharge closed position to a discharge open position.

Latch means 33 has a plate 43 extending between the underside of the trigger lever and a confronting portion of the pump body, such as the pump cylinder. The latch means is removably secured to tongue means 29 by the provision of a pair lever arms 44 (only one shown in Fig. 1) having catches (not shown) engaging the tongue means and being spring biased in place as shown in Fig. 1. Movement of the free ends of the lever arms together releases them from the tongue means to permit removal of the catch, all as described in more detail in the aforementioned European patent application.

Thus, when the nozzle cap is locked in its discharge closed position as described above, catch means 33 prevents the operator from unlocking the nozzle cap without first removing the catch means from the trigger sprayer followed by a slight squeeze of the trigger lever. Only then can the nozzle cap be rotated into one of its on positions.

Detent 26 may be molded with the trigger lever so as to form an integral part thereof, or may be in the form of a separate pins or the like.

Obviously, many modifications and variations of the present invention are made possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

Claims

1. A child-resistant trigger actuated pump sprayer, comprising a pump body including a pump cylinder (13), a pump piston (14) reciprocable within said cylinder (13) to therewith define a variable volume pump chamber, a discharge passage (15) extending in a forward direction through said body, a trigger lever (28) pivotally mounted on said body and engaging said piston (14) for reciprocation thereof upon manual trigger actuation, a nozzle cap (18, 42) having a discharge orifice in communication with said discharge passage, said nozzle cap (18, 42) being mounted on a nozzle end of said pump body for rotation about a central axis thereof between discharge open and closed positions, wherein a forwardly projecting detent (26) is provided on a forward wall (27) of said trigger lever (28) and abutment wall means on said nozzle cap (18, 42), said detent (26) engaging said abutment wall means in said discharge closed position and in a relaxed condition of said trigger lever (28) for resisting rotation of said nozzle cap (18, 42) from said closed position, and said detent (26) disengaging said abutment wall means upon manual actuation of said trigger lever (28) for permitting rotation of said nozzle cap (18, 42) from said closed position to said open position.

2. The pump sprayer according to claim 1, wherein said nozzle cap (18) has at least one flat outer wall (21, 23) which comprises said abutment wall means.

3. The pump sprayer according to claim 1, wherein said nozzle cap (18, 42) has a rearwardly facing edge wall (25) containing an open notch (31) having opposed side walls (34, 35) comprising said abutment wall means.

4. The pump sprayer according to anyone of claims 1 to 3, further comprising removable latch means (33) extending between said trigger lever (28) and a confronting portion of said pump body in abutting engagement therewith for preventing trigger actuation, said latch means (33) including a spring biased clamp engaging tongue means (29) of said trigger lever (28) for removably securing the latch means (33) to the sprayer.

FIG. 1

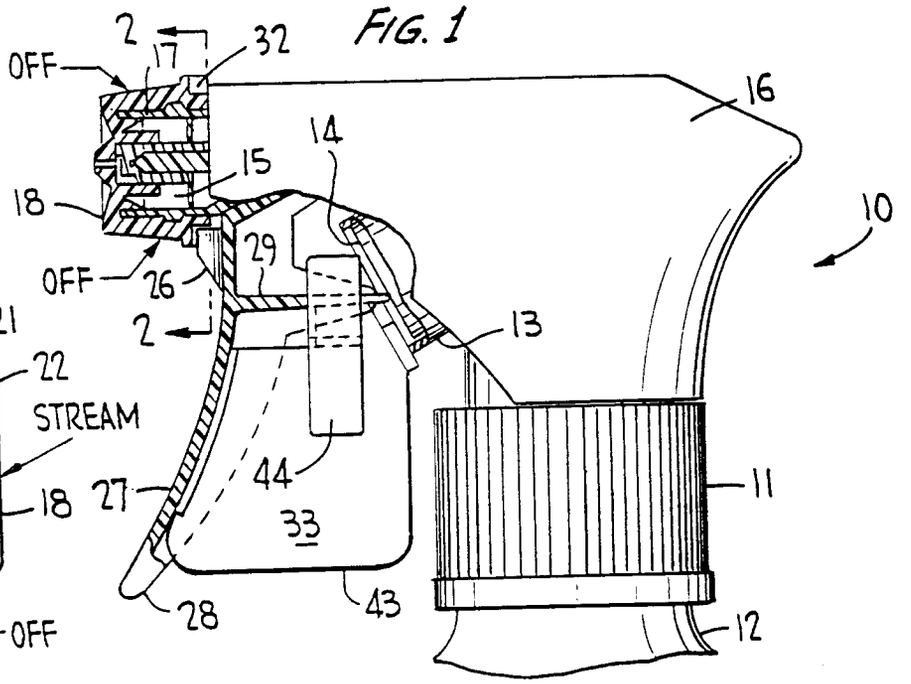


FIG. 2

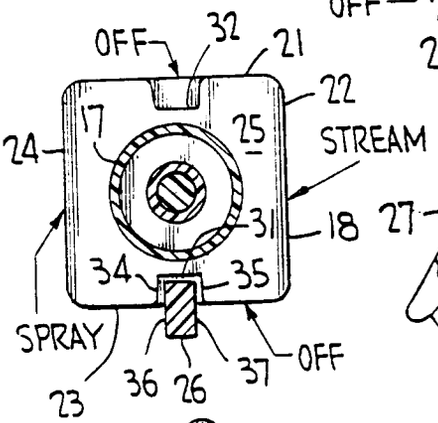


FIG. 3

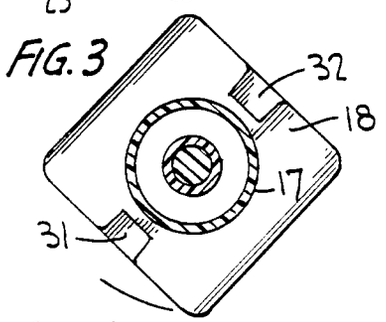


FIG. 4

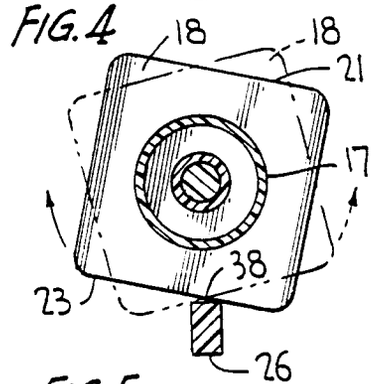


FIG. 5

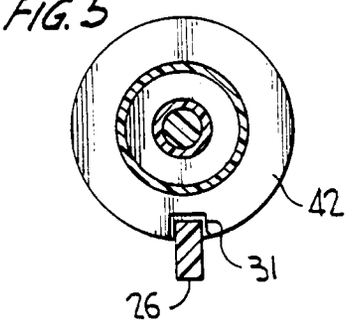


FIG. 6

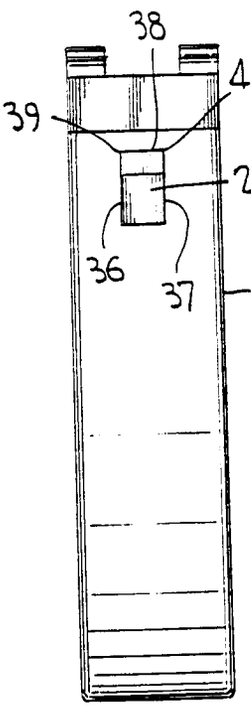
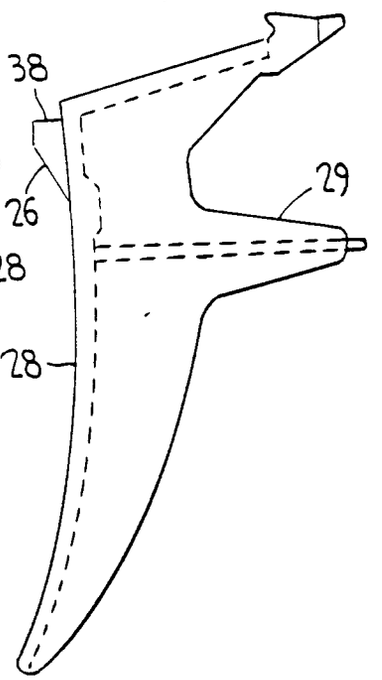


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 97 10 6208

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,X	US 4 516 695 A (AFA CONSOLIDATED CORP) * column 6, line 16 - column 7, line 14; figures 1,2 *	1-3	B05B11/00
A	US 4 946 074 A (GROGAN) * abstract; figure 1 *	4	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 September 1997	Guastavino, L

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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