Jan. 23, 1968 L. S. TURNER 3,365,088

SAFETY LATCHING BOTTLE CAP

Filed Nov. 30, 1966 2 Sheets-Sheet 1

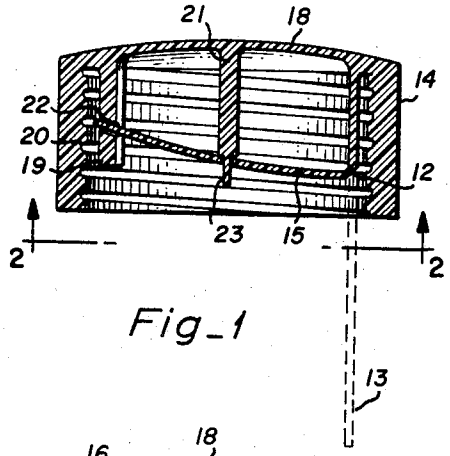


Fig_1

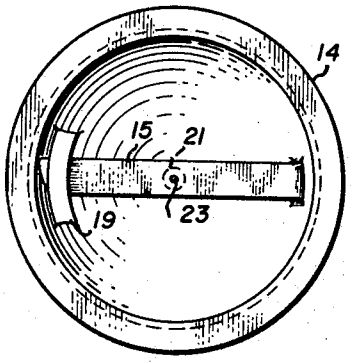


Fig_2

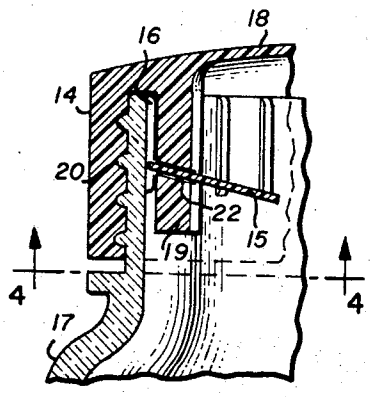


Fig_3

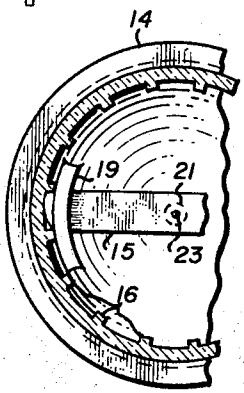


Fig_4

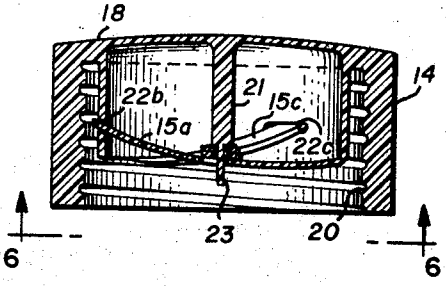


Fig_5

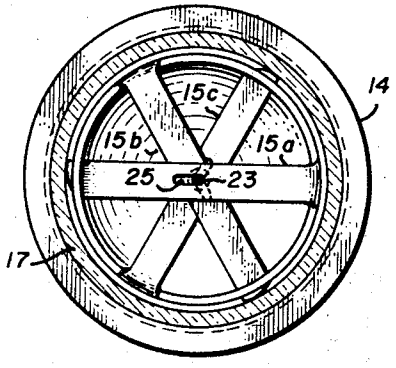


Fig_6

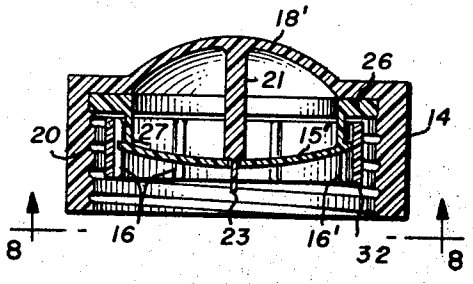


Fig_7

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SAFETY LATCHING BOTTLE CAP

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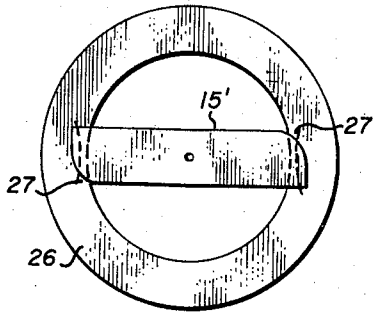


Fig_8

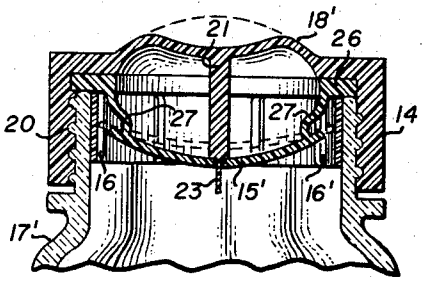


Fig_9

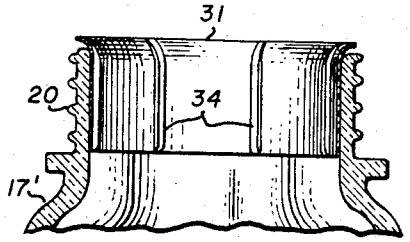


Fig_10

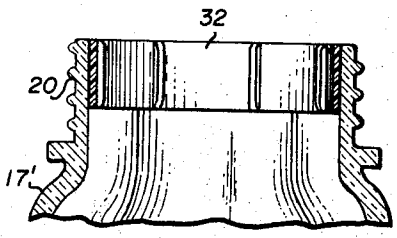


Fig_11

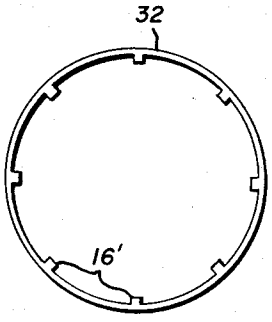


Fig_12

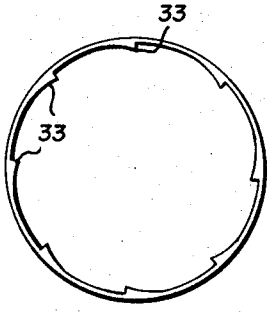


Fig_13

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United States Patent Office 3,365,088 Patented Jan. 23, 1968

3,365 088

SAFETY LATCHING BOTTLE CAP

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Filed Nov. 30, 1966, Ser. No. 597,959
11 Claims. (Cl. 215—9)

This invention relates to safety closures for containers and bottles, and more particularly this invention relates to latching arrangements for retaining a cap upon containers for drugs and other potentially dangerous substances.

A necessity for storing drugs and medicines in a household having small children creates a hazard. Children have been known to climbs and gain access to medicine cabinets and other storage places even though conscious efforts have been made to position the cabinets out of the children's reach, and to lock and securely close the storage places.

It is an object of this invention to provide a cap or closure which may latch in place over a bottle or other container to prevent the opening thereof by a small child.

A further object of this invention is to provide a latching cap for a container that may be inexpensively molded of a plastic material.

Another object is to provide a collar which may be inserted and permanently bonded to the neck of an ordinary bottle whereby a locking type of closure may be used therewith.

Other objects and advantages will become apparent throughout the progress of the specification which follows. The accompanying drawings illustrate certain selected embodiments of this invention, and the views therein are as follows:

FIGURE 1 is a sectional view of a bottle cap in accordance with a first embodiment of this invention;

FIGURE 2 is a bottom view of the bottle cap, looking along the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary sectional view of the cap in place over a bottle;

FIGURE 4 is a fragmentary sectional view along the line 4—4 of FIGURE 3;

FIGURE 5 is a sectional view of a bottle cap in accordance with second embodiment of this invention;

FIGURE 6 is a bottom view of the second bottle cap, looking along the line 6—6 of FIGURE 5;

FIGURE 7 is a sectional view of a bottle cap in accordance with a third embodiment of this invention;

FIGURE 8 is a bottom view of a leaf spring-washer forming a part of the bottle cap shown in FIGURE 7;

FIGURE 9 is a sectional view of the cap positioned over a bottle and with downward pressure being applied thereto for releasing the cap for removal from the bottle;

FIGURE 10 is a sectional view of a collar positioned on a bottle for adapting the bottle for use with a safety latching cap;

FIGURE 11 is a sectional view of a sleeve inserted and bonded in the mouth of a bottle for adapting the bottle for use with a safety latching bottle cap;

FIGURE 12 is a top view of one form of the sleeve of FIGURE 11; and

FIGURE 13 is a top view of another form of the sleeve of FIGURE 11.

Briefly stated, in accordance with this invention, the safety bottle cap **14** includes at least one leaf spring **15** of material formed as or becoming integral with the cap. The leaf spring **15** is positioned to engage protrusions or teeth **16** formed within the mouth of a bottle **17** or formed within a collar or sleeve which may be bonded within the mouth of the bottle. Normally the cap **14** is secured in a closed position by the leaf spring **15**, but the cap may

be opened by application of downward pressure which will deform and release the leaf spring from engagement with the teeth of the bottle or insert bonded thereto.

As shown in FIGURES 1 and 2, the bottle cap comprises a cylindrical peripheral part with interior threads **20** for engaging the threaded part of a bottle top, and a flexible diaphragm or closure **18** over the top of the cylindrical part. This cap may be molded as a single plastic unit with three downwardly extending protrusions: the leaf spring, which may be molded in a position **13**; a guide part **19**, positioned diametrically opposite from the leaf spring **15**; and a central guide and pressure column **21**. The leaf spring **15** is formed with a reduced and weakened section at a point **12** (FIGURE 1) whereby the leaf spring may be bent or folded across the cap. As shown in FIGURES 1 and 3, an opening or guideway **22** is formed in the guide part **19** to receive and hold the leaf spring **15**. The central pressure column **21** is positioned to bear against the center of the leaf spring **15**. A downwardly extending finger **23** may pass through an opening in the leaf spring **15** to prevent the pressure column from slipping to one side of the leaf spring and failing to make a proper engagement therewith.

It is contemplated that the safety cap structure will be molded as a unit of a plastic material such as polypropylene. The structures formed of a material such as this will be somewhat pliable and flexible, and a hinge may be formed by a reduced or weaknened section **12**, such that the leaf spring may be molded as a downwardly extending part **13** and may be subsequently folded or bent across the cap to be held in the guideway **22**.

As shown in FIGURES 3 and 4, the bottle may be molded with inwardly extending teeth or protrusions **16** positioned for engagement with the leaf spring **15**, and the teeth **16** will lock the cap from rotation and will prevent it from being unscrewed, thereby securing the cap to the bottle **17**. However, if downward pressure is exerted against the top closure or diaphragm **18**, the downward pressure will be transmitted to the leaf spring **15** by means of the pressure column **21**. The leaf spring **15** is thereby deformed downwardly, effectively foreshortening the longitudinal dimension thereof to release the leaf spring **15** from engagement with the teeth **16**. This permits the cap to be unscrewed by an adult who may put pressure from a thumb or finger against the center of the top thereof, thereby unlatching and releasing the leaf spring in removing the cap.

Another embodiment of this invention is illustrated by FIGURES 5 and 6, using a structure which is similar to that described above. Thus the bottle cap includes the cylindrical peripheral part **14** with internal threads **17** and the flexible-diaphragm top closure **18**. In this case the bottle cap is molded with three downwardly extending leaf springs **15***a*, **15***b*, and **15***c*. Each of the leaf springs **15***a*, **15***b*, and **15***c* is folded or bent across a central pressure column **21** with the extremity thereof being held in a respective guideway **22***a*, **22***b*, and **22***c*. The guideways may be formed in openings of three downwardly projecting guide parts similar to the guide part **19** as shown in FIGURES 1, 2, 3, and 4; or, alternatively a single cylindrical part may project downwardly within the peripheral cylinder **14** to provide a single structure with three guideway openings, as shown in FIGURES 5 and 6. The cylindrical structure of FIGURES 5 and 6 may provide the base for the leaf springs which may be molded to extend downwardly therefrom.

Each of the leaf springs **15***a*, **15***b*, and **15***c* forming the structure shown in FIGURES 5 and 6, may contain a slotted opening **25** through which the downwardly extending finger **23** may protrude. The slotted openings **25** are dimensioned to permit deformation of the leaf springs **15***a*, **15***b*, and **15***c* to an extent necessary for disengage-

ment with the teeth or protrusions **16** of the bottle; but the movement is restricted such that an extreme pressure applied to the top diaphragm **18** will not unduly deform the leaf springs to cause the leaf springs to drop out of guideways **22***a*, **22***b*, and **22***c*. Therefore, the slotted openings in each leaf spring constitute a means for permitting the leaf spring to be deformed by a predetermined amount and for providing a stop to prevent undue deformation thereof.

Another embodiment of this invention is illustrated by FIGURES 7, 8, and 9 which show a bottle cap having a cylindrical peripheral part **14** with internal threads **20** and with a top closure diaphragm **18'**. In this case, the diaphragm **18'** is formed in a dome shape which may be depressed by downward pressure, as shown in FIGURE 9. A centrally disposed pressure column **21** protrudes downwardly from the diaphragm **18'** with a downwardly extending guide finger **23** at the extremity thereof. As in the embodiments described above, downward pressure against the diaphragm **18'** will be transmitted by the pressure column **21** to a leaf spring **15'**. In this case, the leaf spring **15'** is molded with a washer member **26**, which is formed separately, and then inserted into the cap, as shown in FIGURES 7 and 9.

It is desirable that the washer-leaf spring member **26** become integral with the remainder of the bottle cap such that the cap may not be twisted separately from the washer **26**. This may be accomplished by use of adhesives or heat treating of the plastic materials or by providing interlocking serrations or the like between the two members.

The normal position of this form of bottle cap is shown in FIGURE 7, wherein the leaf spring **15'** engages teeth of the bottle top or of a collar insert thereto at both ends to lock the cap in place. When downward pressure is applied to the diaphragm **18'**, as shown in FIGURE 9, the leaf spring **15'** is deformed downwardly, thereby disengaging the ends thereof from the teeth **16'**. This embodiment provides an advantage that no restraining guideway need be provided to hold the extremities of the leaf spring in a position to engage the teeth **16'**. The leaf spring **15'** may be molded integrally with the washer **26** and with two downwardly extending support members **27**. Each of the support members **27** has a relatively great dimension transversely to the spring member **15'** and a narrow dimension longitudinally thereof. The support members may be easily deformed as shown in FIGURE 9 but will not readily deform in the circumferential direction with respect to the bottle top. Therefore, no further guideways or supporting structures are necessary for holding the leaf spring **15'** properly engaged with the teeth **16**.

Obviously, the teeth or protrusions **16** may be formed within the mouth of the bottle **17** during the manufacture of the bottle. This structure is shown in FIGURES 3, 4, and 6. An alternative possibility is shown in FIGURES 10, 11, 12, and 13 wherein an ordinary bottle **17'** is formed with no inwardly extending teeth but is provided with a plastic insert **31**, **32**, or **33**. The insert **31** of FIGURE 10 may be formed with internal ribs **34** thereon and with a flared opening which will constitute a nondrip pouring edge for liquids. The collar may be preformed and secured onto the bottle with an adhesive or with interlocking serrations, or the like, on the bottle neck. The collar inserts **32** and **33** of FIGURES 11, 12, and 13 are somewhat more abbreviated than that shown in FIGURE 10. In this case, the collar **32** comprises a simple cylindrical structure or sleeve having internal teeth or cam surfaces which may be inserted into the mouth of the bottle with an appropriate adhesive binding the members together.

It is contemplated that a collar as shown in FIGURES 10 or 11 may be formed slightly oversized and may thence be pressed or otherwise forced into the neck of a bottle. In this case a pressure-sensitive adhesive may be used for bonding the collar to the bottle. A collar of this type may

be employed with the security caps of FIGURES 1, 5, or 7; or may be employed with more sophisticated bottle closures which may employ key-type locks or the like in combination with a screw-type cap.

FIGURE 12 has a collar **32** with protuberances or teeth **16'** extending inwardly therefrom for engagement with the leaf-spring structures heretofore discussed. In this case, the leaf springs may be formed with cam- or wedge-shaped extremities which are diagonals with abrupt shoulders as shown in FIGURE 8. Thus the cap may be secured onto a bottle with the cam surfaces of the leaf springs engaging the teeth or protrusions **16** and passing thereover. On the other hand, if an attempt is made to unscrew the cap without depressing the top diaphragm **18**, the abrupt edge of the cam surface of the leaf spring **22** or **22'** will unengage the teeth **16'** to prevent the cap from being removed. Obviously, the cam surfaces may be applied to the collar **33** as shown in FIGURE 13. In this case, the teeth or inward protuberances are themselves cams, and the extremity of the leaf spring may be square-ended. The cam surfaces of the collar permit the cap to be turned in one direction but not in the other and perform the same function as a cam end of the leaf spring would perform against the teeth **16'** of the collar **32**.

As shown in FIGURE 7, a collar **32** may be inserted into the cap during the manufacture thereof, and before the cap is screwed upon a bottle top. The collar **32** may contain an application of adhesive which will bind itself to a bottle neck into which it may be inserted. Thus the cap and collar assembly, as shown in FIGURE 7, may be used by a pharmaceutical house in packaging drugs or medicines such that the cap may be screwed upon any bottle to make it a security container. Once the cap has been placed upon the bottle, the adhesive will bond the collar **32** to the bottle top, and removal of the cap therefrom will be possible only by properly depressing the diaphragm **18'**, as shown in FIGURE 9. Thus, if the pharmaceutical house is packaging pills or the like in bottles, ordinary caps may be used for those pill bottles which are inteded for doctors' offices, hospitals, and the like; and security caps may be used for those pill bottles which are intended to be sold to the general public as household items. Obviously, the collar insert may be used in conjunction with the embodiment of FIGURES 1, 2, 3, and 4 or with the embodiment of FIGURES 5 and 6.

The safety bottle cap of this invention is particularly advantageous because there are no cavities formed therein which are capable of holding or retaining powders, fragments of pills or drops of medicine, or the like. Thus the bottle cap of this invention is liquid- and gas-tight, contains no cavities to cause contamination if reused for food or the like, which may spoil after period of time. This cap may easily be cleaned, if desired, for reuse or for continued, prolonged use in a household.

This invention further enjoys the advantage of being integrally formed with comparatively simple plastic molding operations. Manufacture of this bottle cap may be accomplished with no need for an assembly of many small parts. Since the bottle cap is of unitary construction, having but a single plastic part, economies are effected in the manufacture and assembly of the caps and insert collars, which may be used as safety containers for the sale and storage of potentially harmful substances.

This security bottle cap is further advantageous in that there are no moving parts to be assembled. Although certain parts of this unitary construction may slide across each other, there are no separately formed parts which must move with respect to one another.

Changes may be made in the form, construction, and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fall fairly within the scope of the following claims.

The invention is claimed as follows:

1. A container and safety cap therefor, said container comprising a neck having threads external thereof, and

latching means including protrusions positioned inside the neck and extending longitudinally thereof, said cap comprising a cylindrical peripheral portion having internal threads adapted to engage the threads of the container neck, a flexible diaphragm closure formed integrally with the peripheral portion, a leaf spring disposed across the cap for engaging the protrusions inside the container neck, and a pressure column formed integrally with the diaphragm closure and extending into engagement with the leaf spring for transmitting pressure from the diaphragm closure to deform and foreshorten the leaf spring, whereby the leaf spring may be disengaged from the protrusions within the container neck.

2. A container and safety cap therefor in accordance with claim 1 wherein the leaf spring is formed as a downward extension at one side of the cap and is folded across the cap, said cap further including a downwardly extending guide part positioned to receive and hold the leaf spring for engagement with the protrusions inside the container neck.

3. A container and safety cap therefor in accordance with claim 1 comprising cooperating means on the leaf spring and on the pressure column for maintaining the leaf spring positioned across the pressure column.

4. A container and safety cap therefor in accordance with claim 3 wherein the cooperating means comprises a finger extending from the pressure column and an opening in the leaf spring for receiving the finger to maintain the leaf spring in position with respect to the pressure column.

5. A container and safety cap therefor in accordance with claim 1 wherein the cap includes a plurality of leaf springs, each formed as a downward extension and folded across the cap to engage the container-neck protrusions at the opposite side.

6. A container and safety cap therefor in accordance with claim 5 comprising means for limiting downward movement of the diaphragm, including a finger extending from the pressure column and an elongated opening in each of the leaf springs for receiving the finger and positioning each leaf spring across the pressure column, the elongated opening of each leaf spring being dimensioned to permit a predetermined degree of movement in response to the downward pressure against the diaphragm.

7. A container and safety cap therefor in accordance with claim 1 where the leaf spring is formed with a washer including a support member near each end of the leaf spring and connecting between the leaf spring and the washer.

8. A container and safety cap therefor in accordance with claim 7 wherein the support members are dimensioned to be deformable in a direction longitudinal of the leaf spring and are further dimensioned to resist deformation in directions transverse to the leaf spring, whereby the leaf spring may be foreshortened by pressure against the diaphragm and whereby the leaf spring will lock against the protrusions in the bottle neck.

9. A container and safety cap therefor in accordance with claim 1 wherein the protrusions positioned inside the nack of the container are molded integrally with the container.

10. A container and safety cap therefor in accordance with claim 1 comprising a collar inserted into the neck of the container, said collar including inward protrusions for engagement with the leaf spring of the cap.

11. A container and safety cap therefor, said container comprising a neck having threads external thereof, a collar insert fixed in position inside of the neck of the container, said collar insert having protrusions extending inwardly therefrom, said safety cap comprising a cylindrical peripheral portion having internal threads adapted to engage the threads of the container neck, said cap including locking means for engaging the protrusions of the collar insert for securing the cap to the container, said insert being formed with inwardly protruding cam surfaces having abrupt shoulders for engaging the locking means of the cap.

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