Nov. 12, 1968 A. A. MUSHER 3,410,460

DOUBLE SAFE CONTAINER CLOSURE AND MEASURING DEVICE

Filed May 2, 1967

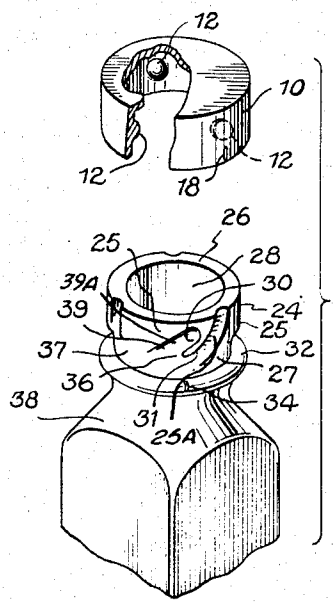


Fig. 1

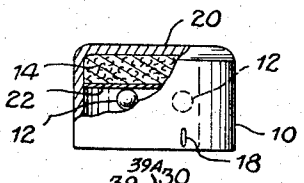


Fig. 2

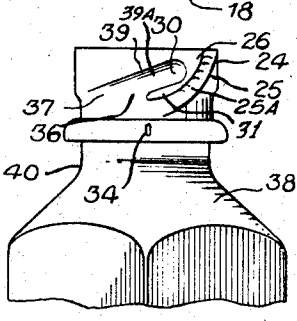


Fig. 3

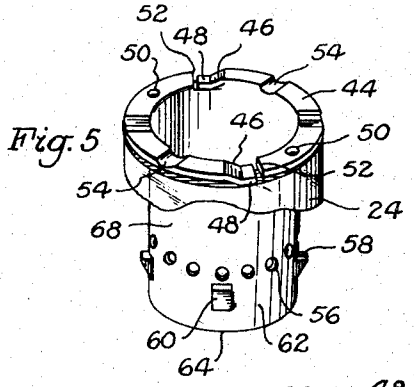


Fig. 5

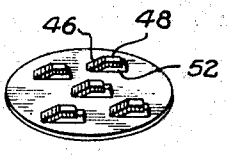


Fig. 6

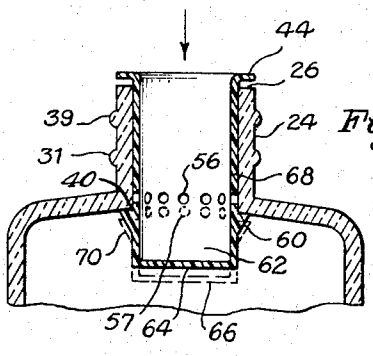


Fig. 4

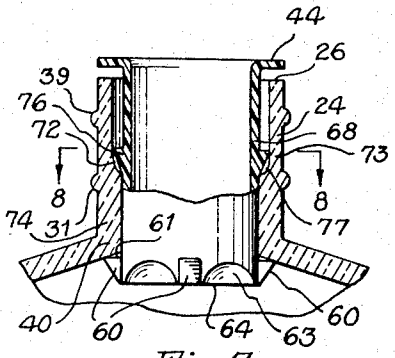


Fig. 7

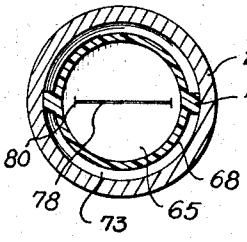


Fig. 8

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DOUBLE SAFE CONTAINER CLOSURE AND MEASURING DEVICE

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ABSTRACT OF THE DISCLOSURE

A closure and plug for a container is provided with elements inter-engaging with other elements on the mouth of the container to secure it against opening by young children. In one modification, the closure is provided with a combination safety plug and measuring device.

My invention relates to a one piece safety closure so simple in design and structure that it can be made as inexpensively as a high percentage of ordinary closures now on the market; plus a container plugging device that prevents access to most of the container's contents, while at the same time doubling as a measuring device. Further, the container can be opened as easily as any present ordinary container by a knowledgeable individual, yet should be beyond the capacity of a young child of 5 or 6 years or younger; the age group most affected by accidental poisonings. The object of this invention is to prevent accidental ingestion of toxic materials, whether medicinal or house-hold, and to do so in as simple and inexpensive a means as to possible. A further object is to provide a measuring means by simple inversion of the container. Material measured could be in liquid or powder form; also capsule or tablet etc., if medicinal. Simple design has been maintained so that manufacturing costs will not interfere with its generalized use.

To this end, the safety cap or closure is designed completely separate from the one piece container plugging and measuring device. In this way, they can be used together as a combination unit, or each can be used separately according to the discretion of the manufacturer or user, and the use to which it is to be put, such as the dangers and toxicity of the contents, or its susceptibility to potentially accidental use.

In the drawings:

FIG. 1 represents an exploded view in prospective of the closure and upper portion of a container.

FIG. 2 is a view in plan of the closure.

FIG. 3 is a view in plan of the bottle.

FIG. 4 is a section in plan of a bottle and further modification of the closure plugging and measuring device.

FIG. 5 is a prospective view of the closure plug and measuring device shown in FIG. 4.

FIG. 6 is a modification of a resilient button for the closure of FIG. 2

FIG. 7 is a further modification of a closure measuring plug and bottle in section.

FIG. 8 is a cross section view of FIG. 7, taken thru the line **8** of FIG. 7.

The following detailed description referring to the accompanying drawings will better illustrate the manner in which the invention will operate. The cap **10**, FIGS. 1 and 2 is moulded or Bakelite, urea resin, polysterene, etc., or stamped from metal etc.; has inner protuberances **12**, FIGS. 1 and 2 here shown as half beads. FIG. 1 shows three on cap and bottle, FIGS. 2 and 3 show two. Instead of the usual threading arrangement of the bottle neck, that intermesh with threads, or a thread like arrangement on the cap, the threads are designed as channels so that the protuberances **12**, of the cap will slide down a first portion of the channel on the bottle entering

at points **25**, gliding along the downward path of the moulded channel **25***a* on the bottle, and closing the bottle securely, when the protuberance **12** reaches a point approximately at bight **36** on the bottle, but above the bottle sealing and cap protecting ring **32**. This securely closes the container, and it is designed so that present bottle machinery can fill and seal this bottle with this cap by exactly duplicating present precedures. In use, when the consumer uses the bottle a leftward (design reversal could of course reverse the direction) turn, will simply lock the bead or protuberance **12** at point **30**. This is accomplished by using a resilient device **14**, in the top of the cap shown in FIG. 2, such as polyurethane foam, a soft metal spring, or a moulded polyethelene or other soft plastic springy insert (shown in FIG. 6, but described later), such springy material being under the liner **22** of the cap **10**; and exerting enough downward pressure on the cap liner **22**, so that it remains in close contact with the upper rim of the bottle neck **26**. This springy material performs a dual purpose. It serves to insure that turning the bottle cap to open it will exert sufficient downward pressure to insure the bead **12** riding close to the upper guideline **39** in channel portion **39***a* overlying channel **25***a* on the bottle, and so be trapped into the safety locking feature at point **30**. It also insures that the inner liner of the cap remains evenly pressed downward against the upper rim of the bottle **26**, so that when unofficial access to the contents are attempted, nothing will leak out in this "locked on" position. The cap is marked at each bead with a mark **18**, moulded or stamped into the cap at manufacture. The bottle contains a corresponding alignment mark at **34**. When these two marks align as the turn to remove is made, it is necessary to press with a firm downward motion on the cap at bight **36** to avoid the bead or protuberance **12** entering the trap **30**. Then the bead will follow the path of the lower thread or guideline **31**, allowing the bead and the cap **10** itself to come off the bottle at point **25**. From the drawing it will be readily seen, that if the individual so desires, he or she can exert a downward pressure continually on the cap in conjunction with the turning motion, and the protuberance, **12**, FIGS. 1 and 2, will just as easily escape entrance into the trap at **30**, allowing the cap to be removed the same way at point **25**. It is readily apparent that when the protuberance **12**, is seated in the channel **39***a*, at approximately the position **30**, a mere vertical application of pressure will be ineffective to remove the closure. Removal can only be accomplished in the instance of a rotation of the closure in a one direction, and thence reversal thereto, concomitant with the application of pressure. This motion requires additional education not normally available to children.

The new art is represented by the presence of two distinct, overlying, interconnecting but reversing channels. These two channels are arranged in relation one to the other, that closure rotation, either right or left directionally will always result in the closure remaining locked or closed on the container. This assurance that the protuberance **12**, will automatically always select the upper blind end or locking channel during accidental or unauthorized rotation of the closure is accomplished by placing a resilient packing or spring member **14**, FIG. 2, between closure top **20** and closure liner **22**, with sufficient resilience to exert a constant downward torque on liner **22**. This downward force, exerted on the terminal end of the container neck **26** creates a reverse pressure on the closure, forcing it upward, and thereby assuring that the protuberance **12** will follow the guideline **39**, FIGURES 1 and 3, into the upper closed or locked channel. The only way in which closure can be removed, is for sufficient downward pressure on cap to be exerted to force the protuberance **12** to enter the lower or opening channel

FIGURE 1, **27**. To effect this, alignment marks are provided on bottle cap **18**, FIGS. 1 and 2, and bottle collar **34**, FIGS. 1 and 3. The vertical alignment of these two marks indicate the presence of the protuberance **12** at the bight of the two channels, the only position where sufficient pressure concomitant with the correct rotation will cause the protuberance **12** to pass into the lower, free, or open ended channel, and so allow for the closure's removal.

Because young children are incapable of exerting two coordinated efforts involving and creating two forces at approximately 90 degrees of each other consistently and at sufficient pressures, the closure is child safe, and in consequence a safety closure.

To provide an added or double safety feature, the invention includes a plug like device that is designed to function as a measuring device also, increasing its utilitarian advantages, and capable of being moulded in one operation from a soft plastic such as polyethylene. In this way only the one does or one measure would be available if an unauthorized individual should accidentally succeed in removing the cap. Yet when used by authorized personnel, it would satisfactorily measure one does or application. This could best be accomplished by having the measuring plug open to the container's contents when the closure is secured to the bottle, and closed to the container's contents when the cap or closure is removed from the container. This is accomplished by proper placement of holes **56**, FIGS. 4 and 5. FIG. 4 illustrates the plug designed for liquids in the bottle with the cap removed. The dotted lines **66** indicating its position with the cap secured to the bottle. Again referring to FIG. 4, when the cap is secured on the bottle the filling holes are in the dotted position **57**, and below the bottle shoulder **49** and thus open to receive the contents when inverted.

Since the inserted plug is designed as a measuring device also, it follows that it should be available in a variety of sizes, such as ½ teaspoonful, 1 teaspoon, 2 teaspoonsful, 3 teaspoonsful, one-half ounce, 1 ounce, 2 ounces, 3 ounces, etc., depending on its use and if medicine etc., for whom prescribed. In the liquid measurer, the space beneath the holes **56** and bottom **64** in FIGS. 4 and 5 constitute the measurement. Thus to reduce unnecessary inventory and confusion, it is recommended that all containers from one or 2 ounces on up to even a quart or gallon size (for use with household bleaches, floor polishes etc.) should be made with the same size neck. Thus after filling the bottle, the plug with the correct measuring capacity can be stamped or lightly hammered into the neck. In manufacturing, this would be a simple machine procedure between the filling and caping motions of the machines.

In FIGURES 4 and 5, the measuring insert **68**, has an upper lip **44**, that when capped is compressed downward by the closing motion of the cap against the upper rim of the bottle **26**. When this is so closed, the holes **56** FIG. 5, that allow the contents to enter are compressed to the dotted position **57** in FIG. 4, which carry it below the inner shoulder of the bottle **40** (shoulder). If the contained liquid contains a sediment material, the bottle should be shaken first, then tilted or inverted to allow an aliquot portion of the contents to enter the insert plug. When the bottle is returned to the upright position, there are sufficient holes around the circumference to allow any liquid over the amount measured by the measurement area **62** to flow back into the container quickly. To gain access to this measured portion it is simply necessary to remove the cap and the insert will rise in the container neck **24**, causing the inner shoulder **40**, of the bottle to close the holes, preventing any additional contents of the bottle from leaving, and assuring accurate measurement. Appropriately placed wedges **60**, FIGS. 4 and 5, are provided with a broad catch surface **58**, that stop the insert plug from leaving the container, thru contact with the container shoulder **40**, thereby preventing accidental removal of the combination safety and measuring plug. This rise in the bottle neck is accomplished by one or two possible methods, or by both together. The insert from the wedge **60** to its top **44** slopes outward from ½ to 1½ degrees or so, depending on the material used and it's thickness, etc. This will provide an upward torque on the insert since it will cause the insert to rise seeking the position of less pressure. It is of course stopped by the wedges **60** moulded to the sides of the insert against the inner shoulder **40** of the bottle, also closing the openings **56**. It is this locking of the insert in the container with the holes closed, that provides the additional safety factor as well as its measuring function. The rise is also accomplished by bent fingerlike projections **46** and **48** of FIG. 5 moulded in a number of positions around the outer rim **44** of the insert **68**. The moulded finger has a leg **46**, that carries the flat finger **48**, that rests against the upper rim of the bottle (rim **26**) leaving a space **52**, so that when the lip **44** of the insert is compressed against the upper rim **26** of the bottle, by tightening the cap, it will have sufficient room to stretch out and remain flat while the cap is secured. Yet, being of resilient material, when the cap is removed it will return to its moulded original shape forcing up into the neck the insert **68**, until it is caught against the shoulder **40** of the bottle by the wedges **60** moulded into the measuring insert.

The design of the fingers are better illustrated in FIG. 6, where they are reversed, for this represents an alternate means (instead of the spring or the polyurethane foam) of exerting a downward pressure on the liner of the cap assuring that sufficient pressure is exerted on the liner **22**, to prevent any leakage of the liquid contained (or powder, etc.) and at the same time insuring that the beads **12** will lock into the traps **30**, unless access is being performed by an authorized individual, in which instance sufficient downward pressure will be exerted at the correct moment (or thru out the turn) so that the bead **12**, will be guided past the trap at position **36**, so that the cap can be properly removed.

The cap of this invention is simple enough to use by normal adults, teenagers, etc., so that if it was provided on all containers of medicine, household products (except food), insecticides, or what have you, there could be no serious objection to its use. Mass produced, it would be equally economical with present closures. It is equally true that any adult or teenager capable of exerting the effort necessary with most present closures would experience no difficulty with this one. It merely requires downward pressure continually, or at the correctly indicated moment in addition to the turning motion.

In the case of the insert being supplied routinely, at the dispensing or manufacturing level, it is conceivable that a family having no children or senile individuals that could be accidentally harmed by the contents, and not desiring the use of the measuring feature of the product, particularly if it is a household item, would prefer to have access to the contents without the inserts present. For such cases, there is provided on the upper rim **44** of the insert a small group of holes **50**, into which an ice pick, the tines of a fork or any other readily available pointed household object can be inserted, and then using the opposite side of the bottle as a fulcrum, the insert can easily be pried out and discarded. For easiest removal, partial lifting from one side should be completed, and the procedure repeated on a hole **50**, nearly opposite the original one.

Also moulded into the top surface of the rim **44** of the insert are at least two pouring ridges **54**, so that access to the measured contents of the insert will flow easily. It will be obvious to one skilled in the art, that by inverting the container partially as required, and pressing on one portion of rim **44**, the contents of the container will be dispensed continually until pressure is replaced, when the insert will return to its cap off position closing the insert

to any additional container contents. This dispensing feature also pertains to the solid material variation described in the next paragraph. This feature does not materially lessen the safety feature since a young child is incapable of the coordinated inversion of container and pressure necessary.

As previously stated, the use of an insert for solid material such as powders, granules, and in the case of medicine tablets or capsules also; will require a variation of the insert plug, and the bottle or container will require an enlarged collar inside **74** in FIG. 7.

FIG. 7 illustrates this modification, and FIG. 8 is a cross-section thru the bottle and insert at point **8** on FIG. 7. As in the liquid insert **68**, FIG. 4, there are a group of two or more wedges **60**, which will catch at their upper larger surface **61** against the shoulder of the bottle **40**, preventing accidental access to the entire contents of the container.

In the powder container there is an inner collar **74**, that narrows the neck of the container below that point **77**. When a pair of similar wedges **76** opposite each other are pressed against this collar **74** by the cap **10** forcing the insert down when screwed on, it will compress the side walls of the insert inward, forcing open a slit in the bottom. This slit **78**, follows a direct path between the two upper wedges **76** FIGS. 7 and 8. In this opened position, this slit will allow material to enter the insert and "fill" the area between the insert and the liner **22** of the container cap. Thus in this variation, the upper area becomes the measuring area. The slit is reinforced by moulding in a thicker area of plastic at its end points **80**, so that it will not split further than designed. To vary the measuring capacity of this insert, it will be necessary to leave the bottom **64** open, and curved inward **65** to a point even with the container shoulder, between the wedges **60** so that the bottle can be completely emptied into the insert in its last use. To vary the measuring capacity it is also necessary to vary the position of the bottom **65**, FIG. 8, so placing it that the distance from it **65**, to the top of the rim **44** will represent the volumetric quanity is designed to hold. Again it would be best to make the bottle neck and inserts the same size, varying the inventory only by supplying inserts with different measuring capacities thru changing the position of bottom **65** in the inserts.

The versatility of the insert could be greatly increased if the user could adjust measurement to his own requirements. This is readily possible by molding the insert in two pieces instead of the aforesaid one. Thus the inside of the insert would have molded into the area beneath the holes (explanation is on liquid insert, but dry material variation would be similar), threads that would mesh with a movable, separate bottom having threads on it's outer surface; and a thickened area with a slot making adjustment of the position of the bottom possible by knife blade, screwdriver, etc., inserted thru the container neck while the insert remained in place in the container. It could also have attached (molded) to this movable bottom, an indicator stick whose position at varying points along the side, etc., of the insert, would indicate thru graduations or other markings the amount of material being measured at any one position of the movable bottom of the insert. The bottom of the insert has molded into it as part of it's structure a stop to prevent the movable insert bottom from being accidentally screwed out of the insert. Since the indicator stick is attached to the movable bottom, the indicating graduations would be on the side of the insert.

For simplicity in the description, I have limited mention to a bottle and a cap; but this is not to be construed as limiting the invention in any way. The design and principles are applicable to any container, whether bottle, vial, can, or plastic or other material; and the same variability applies to the closure and insert. Many variations in design, shape, or material would all work satisfactorily, and the design in the drawings is merely illustrative, and is not intended in any way to limit the principles of the invention to the existing drawings, or to the description.

I claim:

1. A safety closure in combination with a container, the said closure having an internal cylindrical face provided with protuberances, the container having a neck and being provided with at least one engaging surface on the outer periphery intermeshing with a corresponding number of protuberances to prevent removal thereof except with pressure force, a resilient button inserted in the closure, the said engaging surfaces comprised of a first and second channel, the first channel opening into the top of the neck of the container at one end running at least partially around the neck of the container and connecting at its other end at a bight into a second channel overlying the first channel, the said second channel extending upwardly in a direction reversing that of the first channel and terminating at an end opposite the end of connection to the first channel below the top of the neck, whereby the said protuberance enters the first end of the first channel and upon rotation of the closure, rides in the first channel circumferentially around the neck to the said second end and upon reversal of closure rotation, the said protuberance rides in the second channel thus securing the closure to the said neck in a manner requiring reverse directional rotation and downward pressure at the bight of the first and second channel to disengage the closure from the neck.

2. A safety closure in combination with a container, the said closure having an internal cylindrical face provided with at least one protuberance, and a resilient button inserted in the closure, the container having a neck and being provided with an engaging surface on the outer periphery intermeshing with the protuberance to prevent removal thereof except with pressure force, the engaging surface on the neck of the container provided with a channel around the said outer periphery of said neck, said channel comprising two portions, a first portion opening at the top of the neck and following in a first direction generally downwardly and circumferentially partly around the neck, a second portion overlying the first portion and connected at a bight to the first portion and following a direction opposite to the first portion, the said second portion terminating at a point below the top of the neck, the said protuberance being inserted into the first portion and riding therein and thence into the second portion of the channel for engagement therewith, whereby the said protuberance enters the first portion opening at the top of the neck and upon rotation of the closure circumferentially around the neck and reversal of closure rotation, the protuberance rides in the second portion of the channel, thus securing the closure to the said neck in a manner requiring for removal reverse directional rotation and downward pressure at the bight of the first and second portions to disengage the closure from the neck.

3. The combination of claim **1** further having a circumferential channel around the neck in the plane of the said bight.

4. The combination of claim **1**, in which the resilient button is made of polyurethane foam.

5. The combination of claim **2**, in which the button has an integral resilient extension from the face thereof, and the said button is further provided with a recession into which the extension is received on compression of the extension.

6. The combination of claim **1**, further provided with a hollow cylindrical plug, closed at one end. The outer walls of the hollow cylinder having at least one resilient protuberance adapted to engage the inner shoulder of the container mouth.

7. The combination of claim **6** in which the upper end of the hollow cylindrical plug is provided with an annular flange, the said flange having resilient projections which normally rest on a terminal end of the container mouth.

8. The combination of claim **6**, plus plural openings distributed around the cylinder which permit communication

of material from the container to the inside of the hollow cylinder.

9. The combination of claim **6**, in which the closed end of the cylinder is provided with an elongated slot, capable of opening upon application of pressure to the cylinder walls.

10. The combination of claim **9** in which is applied to the cylinder wall a further protuberance on the cylinder face, extending beyond the wall a nominal distance greater than the circumference of the cylinder at that point.

11. The combination of claim **10**, in which recesses are provided on the inside surface of the mouth of the container, and in which the further protuberances are permitted to ride without any pressure being applied thereto.

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