United States Patent [19]

Stroud

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[54] **CONTAINER AND SAFETY LID THEREFOR**

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[52] **U.S. Cl.** **215/9,** 215/45
[51] **Int. Cl.** **B65d 55/02,** A61j 1/00
[58] **Field of Search** 215/9, 45, 95

[56] **References Cited**

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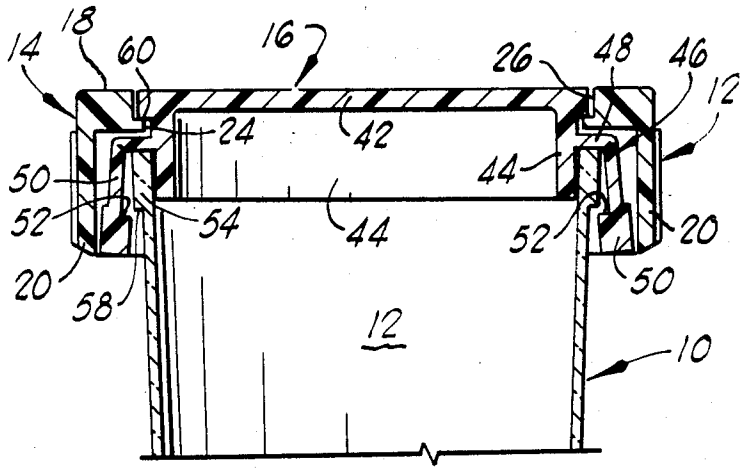
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Primary Examiner—George T. Hall
Attorney—Jerry J. Dunlap et al.

[57] **ABSTRACT**

A container and safety lid combination comprising a cylindrical container having a compound safety lid detachably mounted thereon, the safety lid including a centrally apertured outer portion, and an inner portion rotatably mounted in the outer portion for rotation about a vertical axis coincident with the axis of the container. The inner portion of the lid includes a plurality of downwardly extending legs which extend parallel to the axis of the container and along the cylindrical side wall thereof. The legs carry shoulders adapted to engage a rib or bead formed around the upper portion of the container. The outer portion of the lid includes a peripheral, downwardly extending flange positioned outside the legs of the inner portion of the lid, with such flange carrying recesses or relieved portions dimensioned to accomodate the legs of the inner portion in one relative position of the inner and outer portions of the lid. The flange of the outer portion also carries cam surfaces for biasing the legs into engagement with the rib or bead on the container when the inner portion of the lid is rotated relative to the outer portion thereof.

10 Claims, 6 Drawing Figures



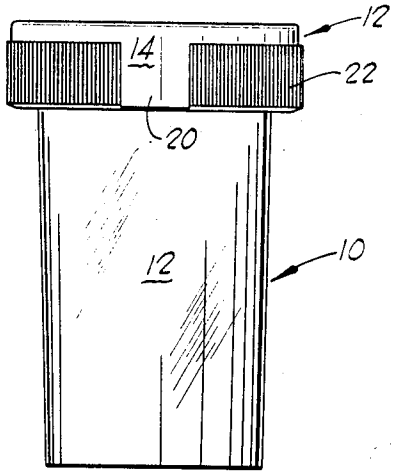


FIG. 1

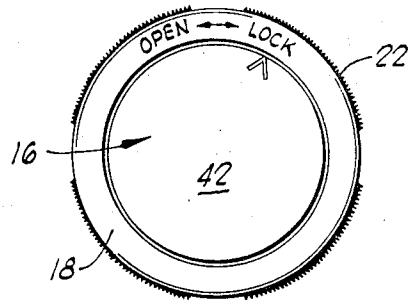


FIG. 2

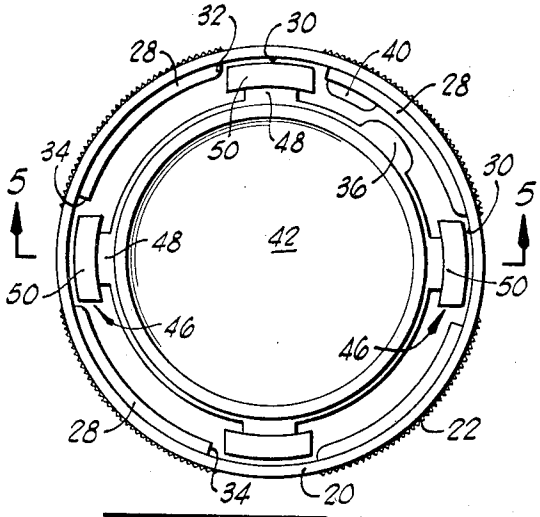


FIG. 3

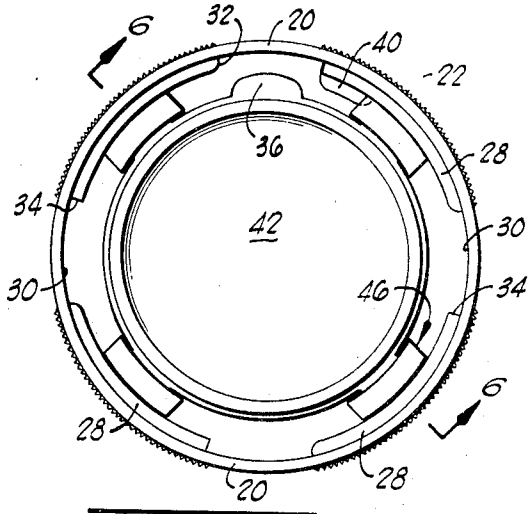


FIG. 4

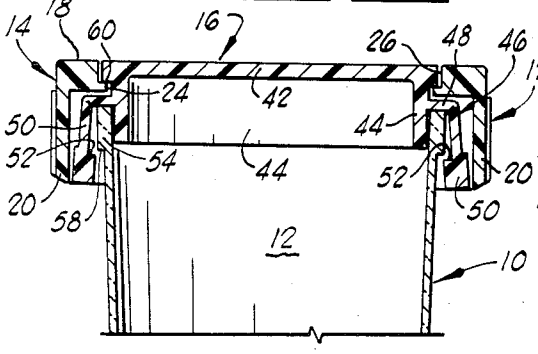


FIG. 5

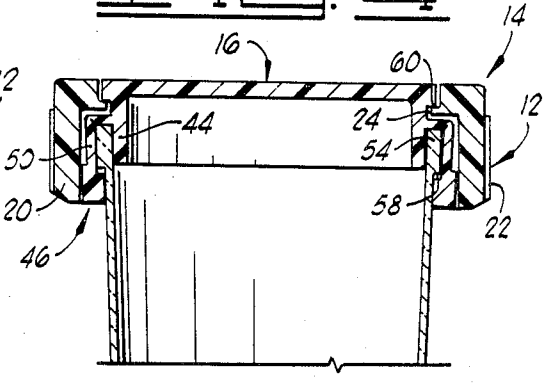


FIG. 6

CONTAINER AND SAFETY LID THEREFOR

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to safety caps or lids for use on medicine vials or similar containers to prevent access by children to the contents of the container.

BRIEF DESCRIPTION OF THE PRIOR ART

Concern has recently mounted over the frequency of poisoning accidents resulting from small children gaining access to the contents of vials and containers in which drugs, poisons and the like are located. The concern has yet more recently been reflected in the enaction of legislation which requires that under certain circumstances, containers in which poisonous or deleterious substances are stored are to be provided with lids or caps which are not readily and easily openable by children.

Various structures have been proposed to prevent or make it extremely difficult for a child of tender years to remove the lid from a vial or container. Such structures have included various types of interlocking devices which require adult perception, and digital facility and coordination beyond the capability of most small children. A difficulty which is always encountered in the design of devices of the type described is that of making such devices relatively secure with respect to tampering by precocious children, yet sufficiently understandable and easily utilized that great inconvenience and difficulty is not encountered by the average adult in the use of the device.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

The present invention may be broadly described as including a cylindrical container, and a compound safety lid detachably mounted on the container. The compound safety lid includes a centrally apertured outer portion, and an inner portion rotatably mounted in the outer portion for rotation about an axis which is substantially coincident with the axis of the cylindrical container.

The inner portion of the compound lid carries a plurality of legs which extend substantially parallel to the axis of rotation of the inner portion, and project along the cylindrical side wall of the container. The container carries a rib or bead formed around the upper portion of the container, and the legs on the inner portion of the compound lid carry shoulders adapted to engage the rib or bead on the container.

The outer portion of the lid includes a peripheral, downwardly extending flange which extends outside the legs of the inner portion of the lid. The downwardly extending flange of the outer portion of the lid carries alternating recesses and protuberant cam surfaces to respectively accommodate the legs of the inner portion of the compound lid in such recesses, and alternately, bias the legs inwardly into engagement with said rib at different times during the rotation of the inner portion of the lid with respect to the outer portion thereof.

In a preferred embodiment of the invention, the lid further includes friction lugs carried by the outer portion of the lid in a position for engagement with a portion of each of the legs carried by the inner portion of the lid to frictionally resist relative rotative movement between the inner and outer portions of the lid at a time when the inner and outer portions of the lid are positioned in a locking orientation in relation to each other. A preferred embodiment of the compound safety lid further includes a stop provided on the outer portion of the lid which limits the extent to which the inner portion of the lid may be rotated relative to the outer portion thereof.

An important object of the present invention is to provide a safety lid for a cylindrical container, which lid can be easily locked on the container by an adult in such a way that unlocking by digital manipulation is extremely difficult for children to accomplish.

Another object of the invention is to provide a safety lid for use on a cylindrical container, which safety lid may be easily and relatively economically molded of synthetic resin.

An additional object of the invention is to provide a compound safety lid of two interlocking part construction, which lid is mechanically strong and durable, and is characterized in having a long and trouble-free operating life.

Additional objects and advantages of the invention will become apparent as the following detailed description of the invention is read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation view of a cylindrical container and safety lid constructed in accordance with the present invention.

FIG. 2 is a plan view of the assembly depicted in FIG. 1.

FIG. 3 is a bottom plan view of the compound safety lid of the invention showing the relationship of the inner and outer lid portions when the lid is in an unlocked or released status.

FIG. 4 is a view similar to FIG. 3, but showing the relationship of the inner and outer lid portions at a time when these portions of the compound safety lid are in a locking relationship.

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3 at a time when the safety lid is in a released or unlocked status in relation to the cylindrical container.

FIG. 6 is a sectional view similar to FIG. 5, but showing the relationship of the inner and outer portions of the compound safety lid to each other and to the container at a time when the safety lid is locked in position on the container, such sectional view being taken along line 6—6 of FIG. 4.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring initially to FIG. 1 of the drawing, the present invention includes a container **10** which includes a bottom (not visible) and a circularly cross-sectioned side wall **12**. In the illustrated embodiment of the invention, the container **10** is generally cylindrical in configuration and is open at its upper end.

Secured to the open upper end of the container **10** is a compound safety lid **12**. The compound safety lid includes an outer portion **14** and an inner portion **16** which is rotatably mounted within the outer portion in the manner illustrated in FIGS. **5** and **6**. The outer portion **14** of the compound safety lid **12** includes a centrally apertured, horizontally extending top portion **18** and a peripheral, downwardly extending flange **20** which extends along the side wall **12** of the container

10, and carries a plurality of knurled sectors 22 to facilitate digital manipulation of the safety lid in a manner hereinafter described. A top wall 18 is provided with a large circular central aperture 24 (see FIG. 5), and a counterbore 26 is formed adjacent the opening 24 to permit snap engagement of the inner portion 16 of the lid 12 with the outer portion 14 thereof.

The downwardly extending flange 20 carries on the inner side thereof at circumferentially spaced intervals around the flange, a plurality of cam segments 28. In the illustrated embodiment of the invention, four of the cam segments 28 are illustrated, with adjacent pairs of the four cam segments separated by relieved zones 30. Each cam segment 28 has an inclined or tapered cam surface 32 at one end thereof, and is abruptly terminated at its other end by a surface 34 lying in a plane extending normal to a tangent to the annular downwardly depending flange 20. In a preferred embodiment of the invention, the cam sectors 28 are formed integrally with the downwardly extending flange 20 as best illustrated in FIG. 6 of the drawings.

Formed on the under side of the top wall 18 at circumferentially spaced intervals around the inner portion 16 of the lid 12, and spaced inwardly from the cam sectors 28 is a small fraction cam or protuberance 36. This friction cam 36 functions in a manner and for a purpose hereinafter described in greater detail. Formed on the underside of the top wall 18 of the outer portion 14 of the lid 12 is a stop member 40. It will be noted that the stop member 40 is located adjacent one end of one of the cam sectors 28. Its function will be hereinafter described.

The inner portion 16 of the compound safety lid 12 includes a top wall 42, which extends across and fills the counterbore 26 in the outer portion 14 of the lid, and a downwardly depending annular flange 44 which extends peripherally around the outer edge of the top wall 42. The annular flange 42 has projecting therefrom, a plurality of downwardly depending locking legs designated generally by reference numeral 46. In the illustrated embodiment of the invention, four of the locking legs 46 are illustrated, and each is of generally L-shaped configuration so as to include a web portion 48 and a locking portion 50. The locking portion 50 of each of the L-shaped legs 46 extends generally parallel to the axis of the cylindrical container 10, and carries near its lower, free end, a locking shoulder 52. The locking shoulder 52 of each leg 46 is positioned adjacent a protuberant bead or rib 54 formed near the upper end of the container 10 so that the locking shoulder 52 may engage a downwardly facing shoulder 58 formed on the rib 54 when the compound safety lid 12 is oriented to a locking status.

A downwardly facing shoulder 60 is formed around the outer periphery of the top wall 42 of the inner portion 16 of the compound safety lid 12, and functions to define with the web portion 48 of each of the legs 46, a groove or channel for receiving a radially inwardly projecting portion of the top wall 18 of the outer portion 14 of the lid 12. This arrangement functions to engage the inner and outer portions, 14 and 16, respectively, of the compound safety lid with each other. It may be mentioned at this point that the legs 46 carried by the inner portion 16 of the compound lid 12 are formed integrally with the remainder of this portion of the lid, and are of relatively thin transverse cross sectional dimension so that the legs may be flexed relatively easily. The material of which each leg 46 is constructed is, moreover, a relatively resilient material so that the legs, after being bent into the position depicted in FIG. 6 of the drawing from a position in which they are located in a plane extending substantially parallel to the plane of the upper wall 42, are loaded in resilient deformation and tend to spring outwardly against the flange 20 of the outer lid portion 14 in the manner depicted in FIG. 5.

OPERATION

In the operation of the container and safety lid combination of the present invention, the container 10, of course, is used to contain pills or capsules of drugs or medicaments, the pharmacological character of which is such that it is desirable to prevent them from falling into the hands of children. For this purpose, the compound safety lid 12 is secured across the open upper end of the container 10. In FIGS. 4 and 6 of the drawings, the compound safety lid is shown in its locked position. In FIGS. 3 and 5 of the drawings, the compound safety lid is shown in its released position.

When the compound safety lid 12 is to be placed on the container 10 after it has been removed and the container has been filled, or a portion of the contents removed therefrom, the lid is placed down over the open upper end of the container with the peripheral, downwardly extending flange 20 extending concentrically around the container 10, and with the upper edge of the container bearing against the web portions 48 of the several locking legs 46. At this time, the inner portion 16 of the compound safety lid occupies a position with respect to the outer portion 14 such that the locking legs 46 have the locking portions 50 thereof disposed in the recesses or relieved zones 30 formed at circumferentially spaced intervals around the flange 20 of the outer portion 14. Due to the resiliency of the locking legs 46, when they are in this position opposite the relieved zones 30, the legs tend to bend outwardly into these zones, and this permits the protuberant bead or rib 54 carried on the upper portion of the container 10 to pass by the locking portions 50 of the legs 46 so that the upper edge of the container 10 comes to bear against the web portions 48 of the locking legs.

When the compound safety lid 12 has been placed on the container 10 in this manner, with the outer portion 14 oriented to the unlocking position with respect to the inner portion 16, the next manipulation which is carried out is that of locking the compound safety lid in place on the container. To accomplish this, the index finger is placed against the bottom of the container 10. Compressional force is then exerted with the index finger and the thumb, and this tends to cause enhanced or greater frictional contact between the web portions 48 of the legs 46 and the upper edge of the container 10.

While continuing to press with the index finger and thumb in the manner described, the other hand is then used to grip between the fingers, the knurled sectors 22 carried on the peripheral, downwardly extending flange 20 of the outer portion 14. When such grip is established, the outer portion 14 of the compound safety lid 12 is rotated relative to the inner portion 16 thereof in a direction such that the locking legs 46 come into contact with the tapered cam surfaces 32 formed on the flange 20 adjacent the relieved zones 30. In the FIG. 3 illustration of the drawings, this rotative movement contemplates rotation of the outer portion 14 in a

clockwise direction about the inner portion **16.** A camming action now comes into play which results in the locking legs **46** being biased inwardly as they pass over the tapered cam surfaces **32.** The locking legs then ride onto the inner surfaces of the cam segments **28.** In this position, the locking legs **46** are, of course, biased inwardly toward the wall of the container **10.** This results in the locking shoulders **52** carried by the locking portions **50** of the several locking legs **46** being moved in to the position shown in FIG. **6** so that they are opposite, and directly beneath, the downwardly facing shoulder **58** formed on the protuberant bead or rib **54** carried around the upper portion of the container **10.** With the locking legs **46** in this position, it will now be impossible to pull the compound safety lid **12** from the container **10.**

By continued rotative movement of the outer portion **14** of the compound safety lid **12** with respect to the stationarily held inner portion **16,** the friction cam **36** encounters and bears against the stop member **40** which projects downwardly from the under side of the top wall **18** of the outer portion **14** of the compound lid **12.** At this point, it then becomes more difficult to rotate the outer portion **14** relative to the inner portion **16** of the compound safety lid. A stronger grip is required in forcing the inner portion **16** against the top edge of the container **10** in order to continue to permit the outer portion to be rotated without concurrent rotation of the inner portion of the lid. Thus, it is much more difficult, once the friction cams **36** encounter the stop member **40,** for a small child to manipulate the outer portion **14** of the safety lid in proper relation with respect to the inner portion thereof.

Continued rotation of the outer portion **14** of the compound safety lid **12** with respect to the inner portion **16** thereof ultimately brings one side of one of the locking legs **46** into contact with the stop member **40.** This status is shown clearly in FIG. **4** of the drawings, where the stop member **40** has been encountered by one of the locking legs **46.**

In order to remove the compound safety lid from the container **10,** the procedure is reversed — that is, the outer portion **14** of the safety lid **12** is merely rotated in relation to the inner portion **16** thereof so that ultimately the locking legs **46** are free to snap outwardly into the relieved zones **30** formed in the peripheral, downwardly extending flange **20.** The compound safety lid **12** can then be easily removed from the container. It will be perceived that several individually identifiable and clearly independent digital movements of a certain type are required for locking and unlocking the compound safety lid of the present invention. Moreover, it has been explained that adult strength is required in order to accomplish the locking and unlocking movements effectively. For these reasons, it is extremely difficult for any child, particularly one of tender years, to gain access to the inside of the container and its contents.

Although a preferred embodiment of the invention has been herein illustrated and described, it will be understood that various changes and innovations can be effected in the described and illustrated structure without departure from the basic principles which underlie the invention. Changes and innovations of this type are therefore deemed to be circumscribed by the spirit and scope of the invention, except as they may be necessarily limited by the appended claims or reasonable equivalents thereof.

What is claimed is:

1. A container and safety lid combination comprising:

a container having a bottom and an open top, and being substantially circularly cross-sectioned from bottom to top;

a rib extending around the upper portion of the container;

a safety lid removably engaging and closing the upper end of said container and comprising:

a centrally apertured outer portion having a peripheral, downwardly extending flange formed thereon, said flange having circumferentially spaced, leg accommodating recesses formed therein and facing said container;

cam segments carried on the inner side of said flange adjacent said recesses and facing said container;

an inner portion rotatably mounted in said outer portion and having a portion positioned in the central aperture in said outer portion, and a downwardly extending flange projecting inside the open top of said container; and

a plurality of resilient locking legs connected to said inner portion flange and projecting across the top edge of said container and downwardly between the container and the flange of said outer portion, said legs each being dimensioned to be received in said leg-accommodating recesses, and each having a locking shoulder formed thereon for engaging said rib when said legs ride over said cam segments between said cam segments and said container.

2. A container and safety lid combination as defined in claim **1** wherein each of said cam segments is characterized in having a tapered cam surface at one side thereof adjacent one of said recesses.

3. A container and safety lid combination as defined in claim **1** wherein said outer portion is further characterized in having:

a top wall with said central aperture formed therein; and

a stop member projecting downwardly from said top wall radially inwardly of one of said cam segments.

4. A container and safety lid combination as defined in claim **1** wherein said outer portion is further characterized in having:

a top wall with said central aperture formed therein; and

a stop member formed on said top wall in a position to engage one of said locking legs to limit movement of said outer portion relative to said inner portion.

5. A container and safety lid combination as defined in claim **1** wherein each of said locking legs is of generally L-shaped configuration, and includes:

a web portion projecting radially outwardly from said flange carried by said inner portion and engaging the upper edge of said container; and

a locking portion extending downwardly between said container and the flange carried by said outer portion and having said locking shoulder formed on the lower end thereof.

6. A container and safety lid combination as defined in claim 1 wherein said inner portion is further characterized in including:

a top wall positioned in the central aperture in said outer portion; and

means engaging a portion of said outer portion to prevent said top wall of said inner portion from being displaced from the central aperture in said outer portion.

7. A container and safety lid combination as defined in claim 3 and further characterized in including a friction cam secured to said inner portion in a position to frictionally engage said stop member during a portion of the rotation of said inner portion relative to said outer portion.

8. A container and safety lid combination as defined in claim 2 wherein each of said locking legs is of generally L-shaped configuration, and includes:

a web portion projecting radially outwardly from said flange carried by said inner portion and engaging the upper edge of said container; and

a locking portion extending downwardly between said container and the flange carried by said outer portion and having said locking shoulder formed on the lower end thereof.

9. A container and safety lid combination as defined in claim 8 wherein said combination is further characterized in having:

a top wall in said outer portion having a central aperture formed therein;

a stop member on said top wall; and

a friction cam formed on said inner portion in a position to frictionally engage said stop member when said outer portion is rotated to one position relative to said inner portion.

10. A lid for a container having an annular locking element adjacent an open upper end thereof, said lid comprising:

a first portion having a top wall and an annular flange extending normal to said top wall around the outer periphery thereof;

cam means carried on said flange on the inner side thereof; and

a second portion rotatably mounted on said first portion and having a plurality of downwardly extending legs extending substantially parallel to said flange and cooperating with said cam means for positioning of the legs radially inwardly with respect to said flange in one position of said second portion relative to said first portion whereby said locking element may be engaged by said legs when said first and second portions are in said one position.

* * * * *