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Kramb et al.

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[54] **CONTAINER SAFETY CLOSURE**

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[52] **U.S. Cl.** ..... **215/9,** 220/39 R

[51] **Int. Cl.** **B65d 55/02**

[58] **Field of Search** ..... 215/9; 220/39 R

[56] **References Cited**

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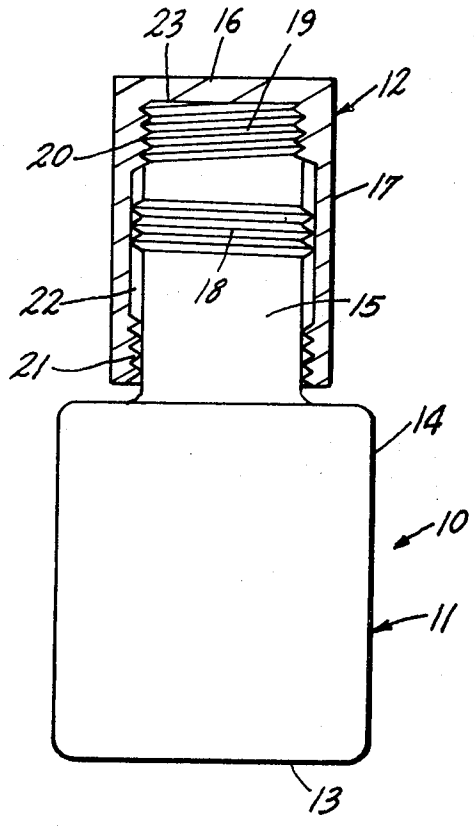
Primary Examiner—Herbert F. Ross

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[57] **ABSTRACT**

In combination, a safety container and cap assembly, the container having an elongated neck with at least two sets of threads of opposite pitch with respect to each other, one arranged proximally and one arranged distally with respect to the container, the cap having at least two sets of threads of opposite pitch with respect to each other, one arranged proximally and one arranged distally with respect to the cap complementary to and engageable with the respective sets of threads of the container, the set of threads proximal to the container having a greater diameter than that of the set of threads distal to the container, thereby permitting the distal threads of the cap to clear the distal threads of said container, the sets of threads of the container and the cap being sufficiently spaced apart so that only one set of complementary threads are engageable at one time.

10 Claims, 5 Drawing Figures



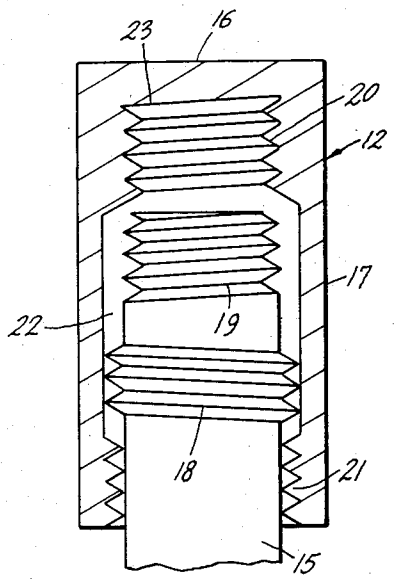


FIG. 2

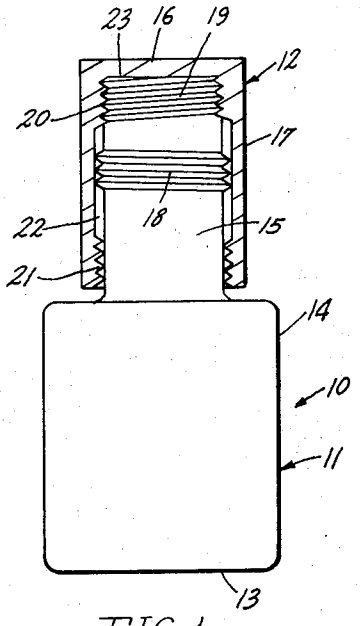


FIG. 1

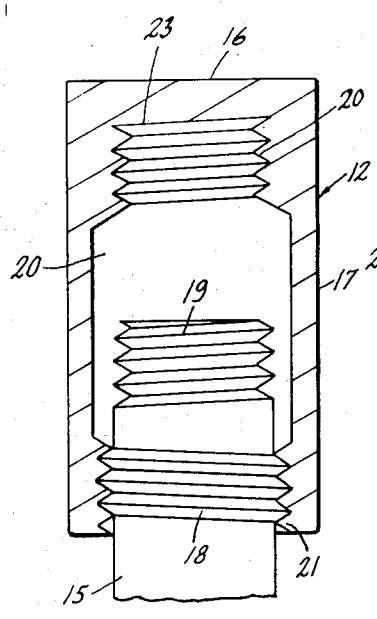


FIG. 3

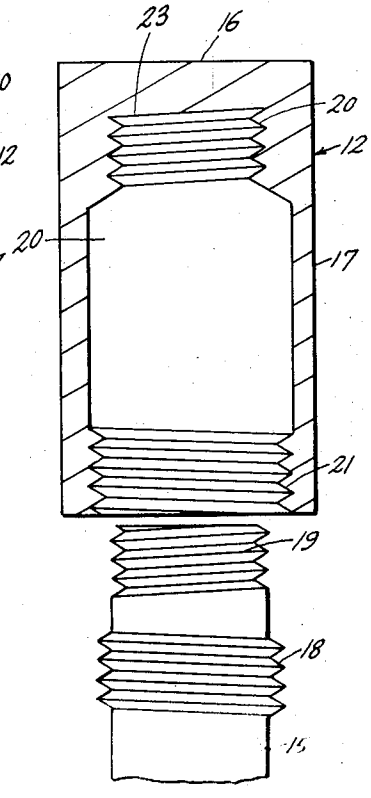


FIG. 4

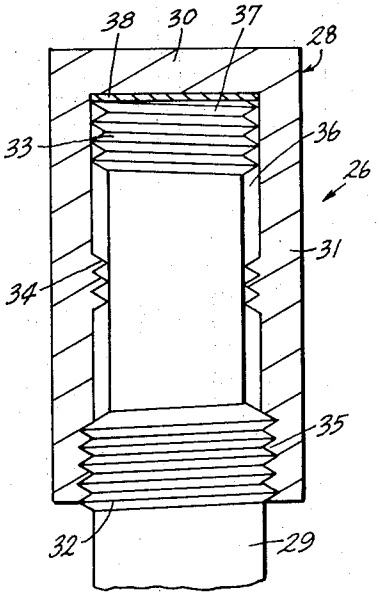


FIG. 5

CONTAINER SAFETY CLOSURE

BACKGROUND OF THE INVENTION

1. Field of the Invention.

This invention relates to containers such as bottles and closures therefor such as caps, and more particularly refers to a combination of a container and safety closure designed to contain materials which may be dangerous or hazardous to individuals, particularly to children.

Containers such as bottles utilized for medicine or hazardous chemicals are commonly provided with a screw cap or a snap-on cap. Such closures may be readily opened even by children. Some attempts to provide safety closures which may be opened only with difficulty have been provided, for example in U.S. Pat. Nos. 3,430,796, 3,630,403, and 2,960,247. However, such disclosed containers have not been entirely satisfactory either because they are too easily opened by children, or because their cost of manufacture is excessive.

SUMMARY OF THE INVENTION

It is accordingly an object of the invention to provide an improved safety container and closure which are too complicated to be manipulated and opened by small children but which can be readily opened by adults. It is an additional object to provide a safety container and closure which may be readily fabricated from inexpensive plastic materials. Still other objects will readily present themselves to one skilled in the art upon reference to the ensuing specification, the drawing, and the claims.

The present invention provides a container and safety closure each of which is provided with two sets of threads of opposite pitch, the sets of threads of the cap being complementary to the sets of threads of the container, the sets of threads being so spaced apart that only one set is engageable at a given time. Consequently, in order to remove the cap, it is necessary to turn the cap first in one direction until one set of threads are engaged and cleared, and then to turn the cap in the other direction to engage the second set of threads and to continue until the second set of threads are disengaged, permitting the cap to be removed.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing,

FIG. **1** is a side elevational view partly in section of the container and cap of the invention with the cap in closed position.

FIG. **2** is an enlarged fragmentary sectional view showing one set of threads disengaged and the other set about to be engaged.

FIG. **3** is an enlarged fragmentary sectional view showing the second set of threads engaged.

FIG. **4** is an enlarged fragmentary sectional view showing the cap entirely disengaged.

FIG. **5** is an enlarged fragmentary view showing another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. **1**, a safety container and closure assembly **10** is shown comprising a container **11** and a cap **12**. The container has a bottom **13**, a cylindrical side wall **14**, and a neck **15**. The container may be formed of any suitable material such as glass, plastic

materials such as polyethylene, polypropylene, styrene, nylon, or other plastic materials commonly used. Additionally, metals such as steel, zinc, copper, etc. may be used where appropriate. The cap **12** has a top wall **16** and a cylindrical side wall **17.**

The neck **15** of the bottle is provided with two sets of threads of opposite pitch, a proximal thread set **18** which is preferably a left-handed thread, and a distal thread set **19** which is preferably a right-handed thread. The cap **12** is also provided with two sets of threads, a proximal thread set **20** which is preferably a right-handed thread and complementary to and adapted to engage the distal thread set **19** of the container neck **15,** and a distal thread set **21** which is preferably a left-handed thread and is complementary to and adapted to engage the proximal thread set **18** of the container neck. The cap is also provided with a recess **22** adapted to permit the side wall **17** of the cap to clear the thread set **18** of the container neck. Additionally, the distal thread set **21** of the cap is spaced sufficiently from the proximal thread set **20** in order to permit the thread sets **18** and **21** to clear and become disengaged before the thread sets **19** and **20** are engaged when closing the container, and upon opening the container, to permit the thread sets **19** and **20** to become disengaged before the thread sets **18** and **21** become engaged. This results from the fact that the two sets of threads are of opposite pitch, and cannot be engaged at the same time as this would render the structure inoperable.

The completely closed position of the container **11** and cap **12** is shown in FIG. **1.** In order to remove the cap, the cap is rotated counterclockwise until the thread sets **19** and **20** are completely disengaged, as shown in FIG. **2.** The cap is then lifted a further distance until the thread set **21** encounters the thread set **18.** While still applying an upward force, the cap is now rotated clockwise, causing the thread set **21** to engage the thread set **18,** as shown in FIG. **3.** Clockwise rotation of the cap is continued until the thread set **21** completely clears the thread set **18** and becomes disengaged, permitting the cap to be removed, as shown in FIG. **4.** In order to replace the cap, the cap is again placed over the neck of the bottle until the thread set **21** engages the thread set **18.** The cap is then rotated counterclockwise until the thread sets **18** and **21** become disengaged. The cap is then pushed downward until the thread set **19** engages the thread set **20.** The cap is then rotated clockwise until the end **23** of the bottle neck engages the top wall **16** of the cap, or a gasket which may be inserted therebetween. In the embodiment shown, the initially encountered thread set is designed to have left-handed threads and the finally engaged thread sets are designed to be right-handed threads. Alternatively, this could be reversed, with the final thread set being left-handed and the initial thread set being right-handed.

FIG. **5** illustrates another embodiment of the invention comprising an assembly **26** of a container **27** and a cap **28.** The container **27** has a neck **29** at one end, and the cap **28** is comprised of a top wall **30** and a cylindrical side wall **31.** The neck **29** is provided with a pair of thread sets, a proximal thread set **32** and a distal thread set **33.** The cap is provided with a pair of thread sets including a proximal thread set **34** and a distal thread set **35.** The distal thread set **33** of the neck **29** and the proximal thread set **34** of the cap are complementary and engageable with each other, preferably

being left-hand threads. The proximal thread set **32** of the neck and the distal thread set **35** of the cap are complementary and engageable with each other and are preferably right-hand threads. A recess **36** is provided in the wall of the neck **29** to permit the thread set **34** to clear the wall as it moves up and down. Additionally, the diameters of the thread sets **33** and **34** are smaller than those of the thread sets **32** and **35** to permit the thread set **35** to clear the thread set **33** when the cap is removed. A conventional gasket **38** of a material such as cork, paper, or metal may be interposed between the end of the container **37** and the cap.

In order to remove the cap **38,** it is rotated counterclockwise until the thread sets **32** and **35** are disengaged. The cap is then lifted further until the thread set **34** encounters the thread set **33.** While maintaining upward force, the cap is then rotated clockwise, the thread set **34** engaging the thread set **33** and traveling over the thread set until it disengages on the other side. The cap may then be removed. To reapply the cap, it is placed over the neck **29** until the thread set **34** encounters the thread set **33.** The cap is rotated counterclockwise until the thread set **34** passes below the thread set **33.** The cap is pushed downward until the thread set **35** encounters the thread set **32.** The cap is then rotated clockwise until the two thread sets completely mesh and the end of the neck **37** engages the top wall **30** of the cap or the gasket **38** placed therebetween.

As may be seen in FIGS. **1–5,** the thread sets of both embodiments shown must be so arranged that both of the thread sets on the container neck are male threads and both of the thread sets on the cap are female threads.

Since one pair of thread sets are right-handed and the other left-handed, sufficient space must be provided between the proximal thread set **32** and the distal thread set **33** of the container so that one thread set is disengaged when the other is engaged, thereby insuring that only one pair of complementary thread sets can be engaged at any given time. This is required for operability because the thread sets are of opposite pitch.

The safety container and closure assembly of the present invention has a number of advantages over those disclosed in the prior art. First, it requires a somewhat complicated procedure for removing the cap from the container, thereby preventing young children from readily removing the cap. The requirement of using two separate counter-directed motions for removing the cap also provides a warning to an adult that contents may be hazardous. The structures may be readily formed by conventional means such as molding, and may be made of any of a large number of materials. Additionally, both the cost of the materials and the cost of fabrication are relatively small. It is to be understood that the invention is not to be limited to the exact details of structure, materials, or procedures shown and described, as obvious modifications and equivalents will be apparent to one skilled in the art.

We claim:

1. In combination, a safety container and cap assembly comprising:

1. a container having an open-ended neck, said neck having provided on the outer surface thereon:

a. a proximally arranged male thread set, and

b. an axially spaced distally arranged male thread set of opposite pitch and smaller diameter with respect to said proximally arranged thread set,

2. a cap having a top wall and a cylindrical side wall, said cap having provided on the inner surface of said side wall:

a. a proximally arranged female thread set complementary to and adapted to engage the distally arranged thread set of said neck, and

b. an axially spaced distally arranged female thread set of opposite pitch with respect to said proximally arranged thread set (*2a*) and complementary to and engageable with the proximally arranged thread set of said neck,

the axial spacing of the respective threads on said cap being greater than the axial spacing of the respective threads on said neck, the thread sets of said neck and said cap being so arranged that only one complementary pair of thread sets of said neck and said cap can be engaged at any given time, whereby removal of said cap requires rotation first in one direction and then in the other.

2. A safety container and cap assembly according to claim **1,** wherein the distal thread set on said neck and the proximal thread set on said cap are both right-handed, and the proximal thread set of said neck and the distal thread set of said cap are both left-handed, and whereby final closure is accomplished by engagement of the distal thread set of said neck and the proximal thread set of said cap.

3. A safety container and cap assembly according to claim **2,** wherein a recess is provided in the side wall of said cap intermediate the proximal and distal thread sets thereof to permit the proximal thread set of said neck to travel therein.

4. An assembly according to claim **1,** wherein the distal thread set of said neck and the proximal thread set of said cap are left-handed and the proximal thread set of said neck and the distal thread set of said cap are right-handed, and whereby final closure is accomplished by engagement of the proximal thread set of said neck and the distal thread set of said cap.

5. An assembly according to claim **1,** wherein said container is formed of glass.

6. An assembly according to claim **1,** wherein said container is formed of a plastic material.

7. An assembly according to claim **1,** wherein said cap is formed of a plastic material.

8. An assembly according to claim **1,** wherein said container is formed of metal.

9. An assembly according to claim **1,** wherein a gasket is provided in said cap for sealing the open end of said container.

10. An assembly according to claim **4,** wherein the portion of said neck intermediate the thread sets provided thereon is recessed to permit the proximal thread set of said cap to travel therein.

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