

July 6, 1965

J. RAVN

3,193,128

CONTAINER CLOSURE

Filed June 12, 1962

4 Sheets-Sheet 1

FIG. 1.

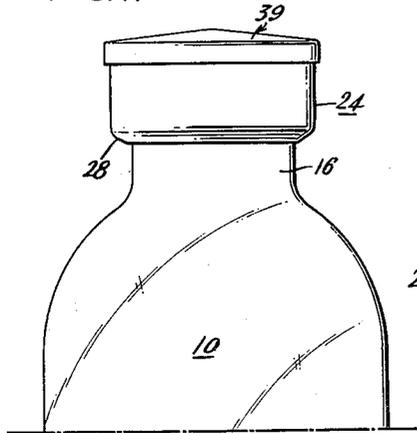


FIG. 2.

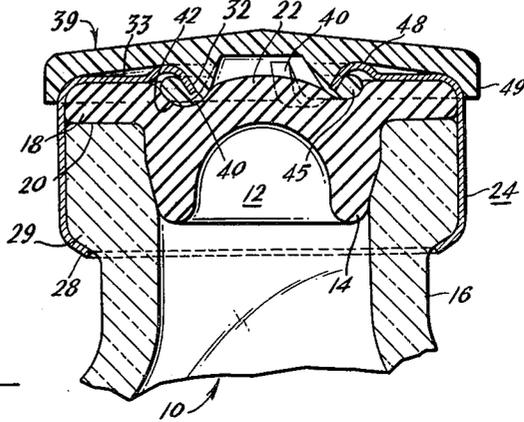


FIG. 5.

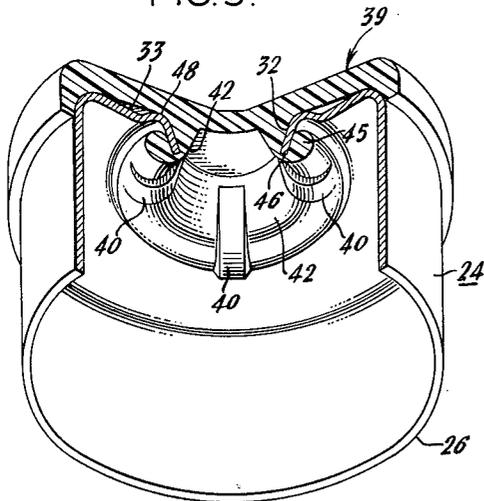


FIG. 3.

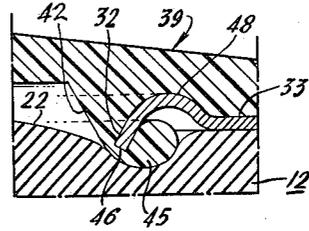


FIG. 4.

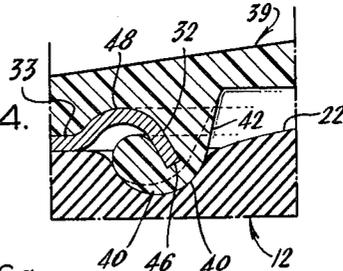


FIG. 6a

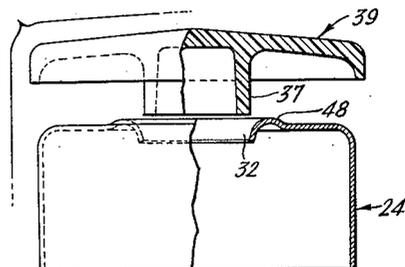
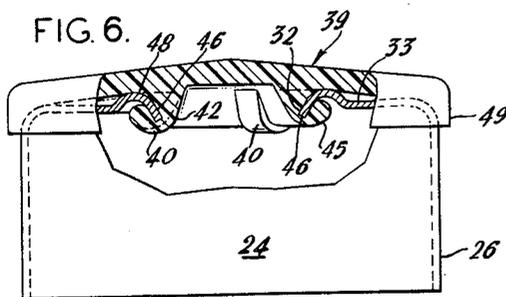


FIG. 6.



INVENTOR.
JACOB RAVN

BY *Howson & Howson*
ATTYS.

July 6, 1965

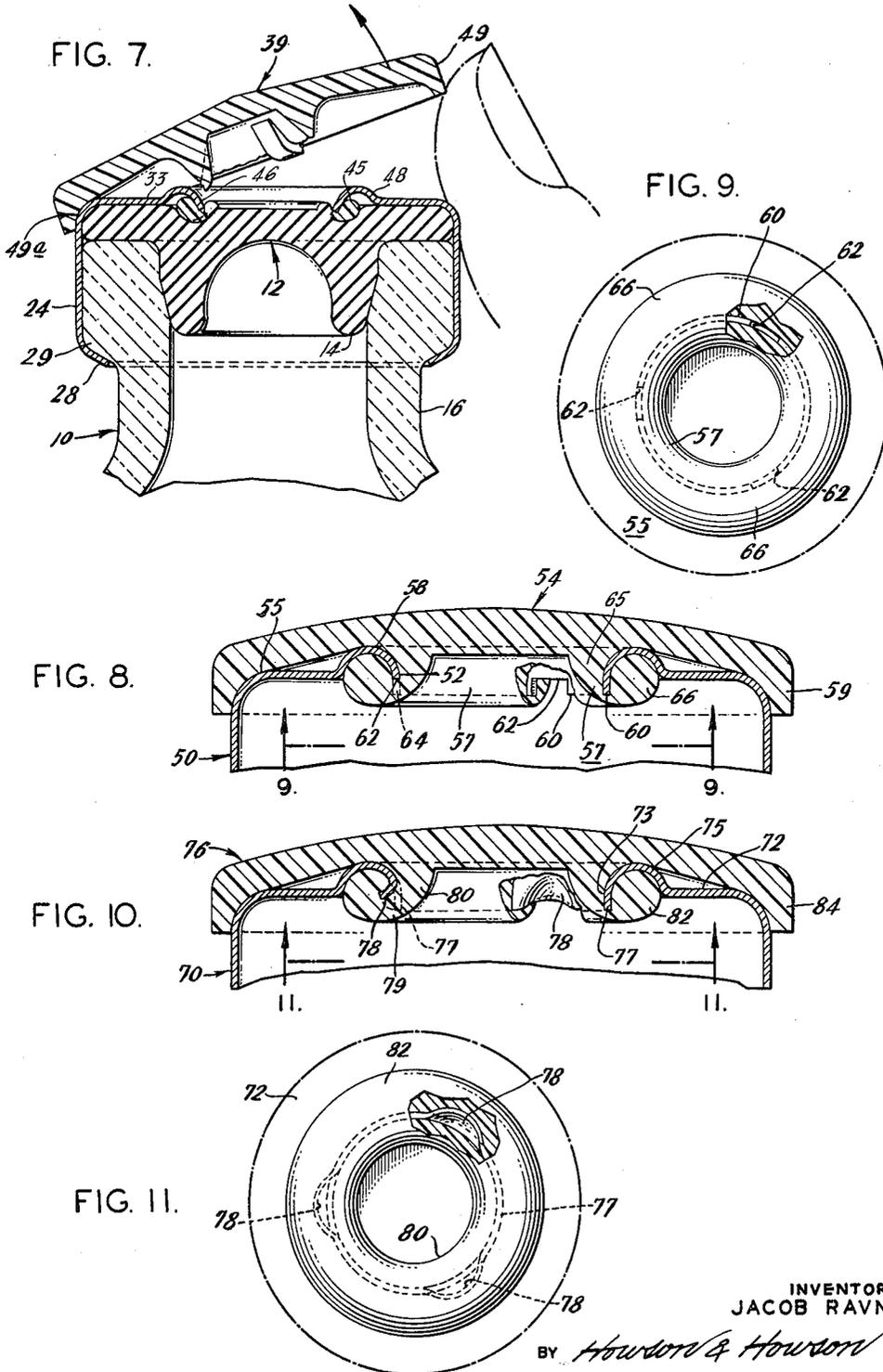
J. RAVN

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INVENTOR.
JACOB RAVN

BY *Howard & Howard*

ATTYS.

July 6, 1965

J. RAVN

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FIG. 12.

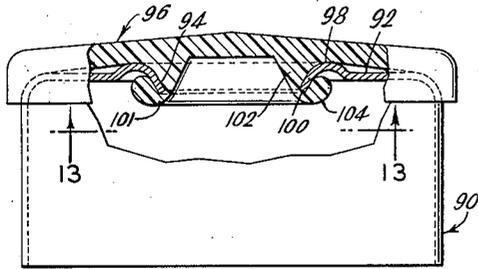


FIG. 13.

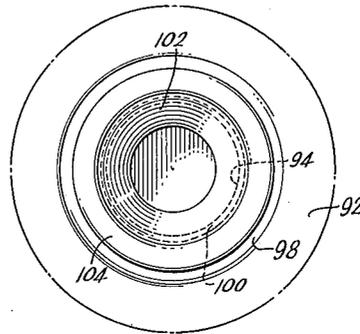


FIG. 14.

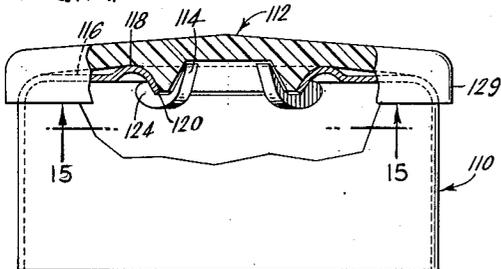


FIG. 15.

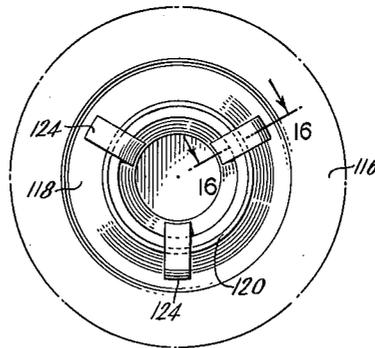


FIG. 17.

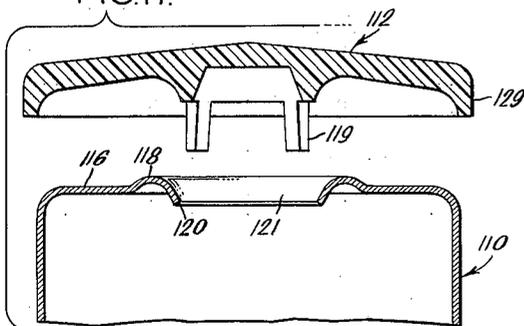
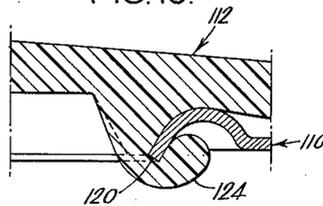


FIG. 16.



INVENTOR:
JACOB RAVN

BY *Hudson & Hudson*

ATTYS.

July 6, 1965

J. RAVN

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FIG. 20.

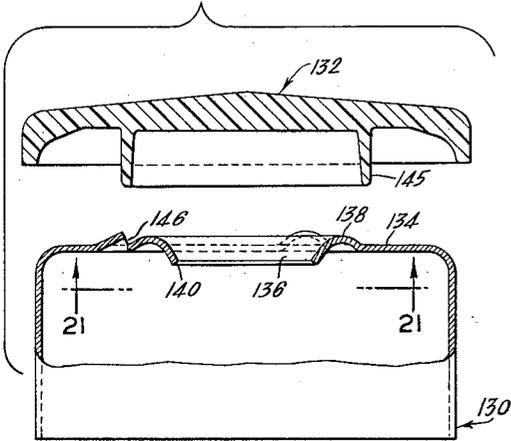


FIG. 21.

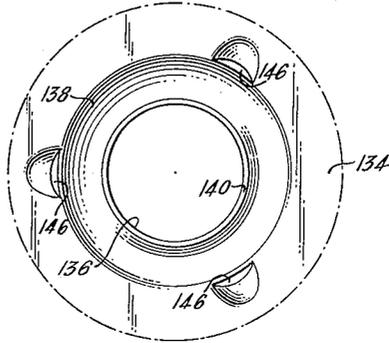


FIG. 19.

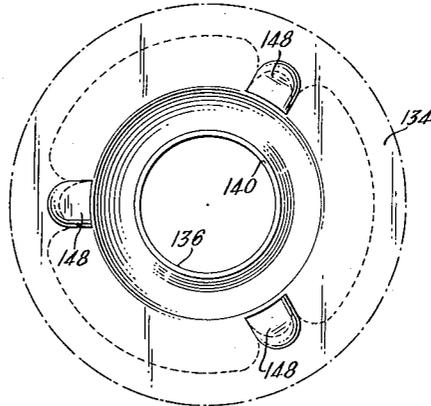
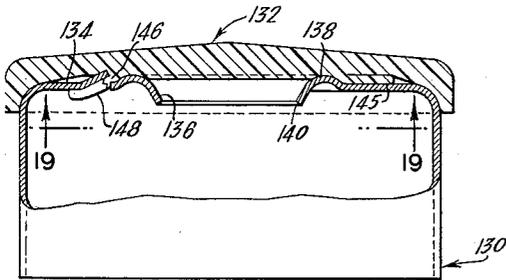


FIG. 18



INVENTOR:
JACOB RAVN

BY *Howson & Howson*

ATTYS.

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CONTAINER CLOSURE

Jacob Ravn, Phoenixville, Pa., assignor to The West Company, Phoenixville, Pa., a corporation of Pennsylvania
Filed June 12, 1962, Ser. No. 201,846
16 Claims. (Cl. 215-42)

This invention relates to an improvement in closures for pharmaceutical containers or bottles of the general type shown in my prior application entitled "Cap Structure for Bottles," Serial No. 100,636, filed on April 4, 1961 now Patent No. 3,017,274, issued January 1, 1963.

This is a continuation-in-part application of my co-pending application entitled "Container Closure," filed July 13, 1961, and bearing Serial No. 123,782 now abandoned.

My prior container closure consists of a stopper and a tamper-proof cap member of sheet metal such as aluminum having a top including an outer annular portion and an inner removable disc portion disposed centrally of the annular portion and detachably connected to the annular portion by fractureable bridge members. A cover member overlies the top of the metal cap and is connected to the disc portion so that removal of the cover member functions to fracture the bridge members and detach the disc from the cap. Although this prior cap is useful for the purposes intended, it is not entirely satisfactory since it is somewhat expensive to manufacture and when the disc portion is removed, the portions of the severed bridge segments remaining on the annular portion have rough edges which may present a hazard to the user.

A primary object of the present invention is to provide a tamper-proof cap and cover for pharmaceutical containers or bottles which normally is secured in place against accidental displacement yet may be easily and safely removed to permit access to the contents of the container when desired and wherein no rough or sharp edges are produced by removal of the cover which may present a risk of injury to the user.

Another object of the present invention is to provide a tamper-proof cap and cover which is comprised of comparatively few parts and is of a simplified construction which is easy and economical to manufacture.

More specifically, the closure of the present invention includes a metal cap having an opening in the top thereof and a tamper-proof cover member which overlies the cap opening and is detachably secured to the cap by fractureable means on the cover which are interlocked with the metal cap so that the cover normally is secured in place yet may be readily detached when desired.

In the preferred embodiments of the invention, the cover member has at least a portion thereof disposed adjacent the outer periphery of the cap so that the user may support the bottle in one hand and disengage or detach the cover with the thumb of the hand by exerting pressure on the cover away from the cap sufficient to fracture the locking means and thereby detach the cover from the cap. By this one-piece, tamper-proof construction, the cover member may be removed by a one-hand operation and there are no rough or sharp edges produced on the cap by removal of the cover member as in my prior closure. In certain forms of the invention the cover member embraces the top peripheral portion of the cap in a manner to provide a seal against dirt and other foreign matter.

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The foregoing and other objects of the invention and the various details of the construction and arrangement thereof are hereinafter more fully described and set forth with reference to the accompanying drawings, in which:

5 FIG. 1 is a side elevation of a container closure in accordance with the present invention secured in position on a bottle;

FIG. 2 is an enlarged sectional view through the container closure and neck of the bottle;

10 FIGS. 3 and 4 are enlarged fragmentary sectional views showing details of the construction of an embodiment of container closure in accordance with the present invention;

FIG. 5 is a fragmentary perspective view of the container closure with a portion thereof broken away prior to its assembly to the bottle;

15 FIG. 6 is an enlarged side elevational view partly in section of the container closure of FIG. 5;

FIG. 6a is a side elevational view partly in section of the cover member and cap of the container closure shown in the above figures prior to assembly to one another;

20 FIG. 7 is a sectional view similar to FIG. 2 showing the removal of the cover member;

FIG. 8 is an enlarged sectional view of another embodiment of container closure in accordance with the present invention;

25 FIG. 9 is a sectional view taken on line 9-9 of FIG. 8;

FIG. 10 is an enlarged sectional view of another form of container closure in accordance with the present invention;

30 FIG. 11 is a sectional view taken on line 11-11 of FIG. 10;

FIG. 12 is an enlarged side elevational view partly in section of still another embodiment of container closure in accordance with the present invention;

35 FIG. 13 is a sectional view taken on line 13-13 of FIG. 12;

FIG. 14 is an enlarged side elevational view partly in section of a further embodiment of container closure in accordance with the present invention;

40 FIG. 15 is a sectional view taken on line 15-15 of FIG. 14;

FIG. 16 is an enlarged sectional view taken on line 16-16 of FIG. 15;

45 FIG. 17 is a transverse sectional view of the cover member and cap of the container closure of FIGS. 14-16 inclusive prior to assembly to one another;

FIG. 18 is a side elevational view partly in section of a still further embodiment of container closure in accordance with the present invention;

50 FIG. 19 is a sectional view taken on line 19-19 of FIG. 18;

FIG. 20 is a side elevational view partly in section of the cover member and cap of the container closure of FIGS. 18 and 19 prior to assembly; and

55 FIG. 21 is a sectional view taken on line 21-21 of FIG. 20.

Referring to the drawings, in the illustrated embodiments of the invention reference numeral 10 designates generally a container or bottle of conventional form, a portion of which is shown in FIG. 1.

As shown in FIG. 2, a stopper 12, which may be formed of rubber or like material, has a hollow plug portion 14 adapted to fit tightly within the neck 16 of the bottle and a top portion 18 which overlies the

end of the bottle neck and seats against the outer end 20 of the bottle neck ring. The plug 14 is recessed interiorly as shown to provide a central thin wall portion 22 which may be pierced, for example, by the needle of a hypodermic syringe to gain access to the bottle contents. The stopper 12 may be of any conventional form and the present invention is not concerned with the particular form employed.

The stopper 12, whether in the form just described or otherwise, is secured in place in closing relation with respect to the neck opening in the bottle by means of a novel construction and arrangement of a cap and cover member which is the subject matter of the present invention. The cap as shown at 24 in the drawings is preferably of sheet metal, such as aluminum and comprises an annular top portion 33 having a central opening 32 therein, and a depending peripheral flange or skirt 26, the edge portion of which is adapted to be crimped or spun inwardly as indicated at 28 to engage below an extreme shoulder 29, on the bottle neck. The tamper-proof cover member 39 overlies the central opening in the cap, and is detachably secured thereto by fracturable means which interlock the cover member and cap together. According to the present invention, the fracturable interlocking means is formed as an integral part of the cover member and depends from the underside of the cover member and interlockingly engages with the cap as hereinafter described with respect to the several embodiments of the invention shown in the drawings.

In accordance with the embodiment of the invention illustrated in FIGS. 1-7, the fracturable interlocking means is formed by a continuous circular skirt consisting of a generally cylindrical tubular body portion 42 which depends from the underside of the cover member 39 concentrically thereof and extends through the central opening 32. The body portion 42 of the skirt terminates in an out turned continuous flange portion or bead 45 which interlockingly engages with the edge portion of the cap surrounding the central opening 32. The wall of the skirt is of a greater thickness at circumferentially spaced points to define locking members 40 which in the present instance, project from the interior surface of the skirt lengthwise thereof and are equispaced from one another at three circumferentially spaced points whereby the body portion 42 of the skirt and the bead 45 are thicker at the locking members 40 than the wall of the skirt intermediate the locking members 40. As shown, the wall of the skirt adjacent the terminal edge 46 of the cap intermediate the locking members 40 is comparatively thin, permitting easy tearing thereof while effectively sealing the opening 32. The thicker locking members 40 retain the cover member in engagement with the cap, insuring against inadvertent separation of the skirt and accidental displacement of the cover member from the cap. In the present instance, the annular top portion 33 of the cap is provided with an integral raised rib portion 48 which terminates in a downwardly extending inner peripheral terminal edge 46 which grips the bead 45 and presses it firmly against the stopper 12.

The cover member 39 also provides a further seal to preclude infiltration of dirt and foreign matter in the area between the cap and stopper and lip of the bottle. To this end a lip 49 depends from the outer peripheral edge of the cover member which embraces the cap in the manner shown in FIG. 2 so that the top portion of the cap is snugly nested in the under surface of the cover member 39.

Prior to assembly of the cover member 39 to the cap 24, the cover member is of the form illustrated in FIG. 6a and includes as illustrated, a generally cylindrical tubular skirt 37 of an external diameter slightly smaller than the diameter of the central opening 32 in the cap 24. The cover member 39 which is preferably of a plastic material is assembled to the cap 24 by positioning the

skirt through the central opening 32 with the underside of the cover member 39 engaging the top of the cap and thereafter engaging the free end of the skirt with a suitable die to form the out turned bead 45 and locking members 40. The assembled cover member 39 and cap 24 may then be applied to the bottle 10 by positioning it over the stopper 12 in the top of the bottle and crimping the flange 26 of the cap over the shoulder 29 below the lip 20.

With reference to FIG. 7, the user may easily detach the cover member 39 from the cap 24 to expose the stopper 12 when it is desired to withdraw the contents of the bottle 10 by supporting the bottle in the palm of the hand and engaging the lip 49 of the cover with the tip of the thumb. Upon exerting an upward force on the cover member 39, it is pried upwardly with the portion thereof at 49a diametrically opposed from the point engaged by the user serving as the fulcrum of a lever and supporting the cover member 39 as the peripheral edge 46 of the stationary cap portion 33 causes separation of the body portion of the skirt from the bead. It is noted that the rib 48 serves to rigidify the top of the cap to facilitate separation of the skirt and insure retention of the bead 45 between the cap and stopper. The cover member 39 may then be disposed of and the central portion of the stopper 12 may be pierced by a syringe or the like to withdraw the contents of the bottle.

By this construction, the cover member 39 cannot be replaced once it has been removed thereby providing a tamper-proof assembly. Further, it is noted that there are no sharp edges produced during removal of the cover member 39 which may present a hazard to the user. Moreover, the bead 45 which is retained between the cap and stopper serves as a seal to prevent dirt and foreign matter from entering and contaminating the interior of the bottle between the plug 14 and the neck of the bottle. Additionally since the fingers of the user are remote from the exposed portion of the stopper 12 during removal of the cover member, there is no likelihood of contaminating the sterile stopper of the bottle.

Another embodiment of container closure in accordance with the present invention is illustrated in FIGS. 8 and 9. The container closure as shown comprises a cap 50 of cup-like form including an annular top portion 55 and a raised rib 58 formed integrally therewith which terminates in a downwardly extending inner peripheral edge 60 to define a central opening 52.

A tamper-proof cover member 54 overlies the central opening 52 in the cap 50 and is detachably secured thereto by fracturable means which interlock the cover member and cap together. To this end the cover member 54 has a depending skirt 57 consisting of a generally cylindrical body portion 65 terminating in an out turned flange or bead 66 adapted to interlockingly engage with the terminal edge portion 60 and the terminal edge 60 of the cap is provided, in the present instance with three circumferentially spaced cut out portions 62. By this arrangement, the wall of the skirt adjacent the terminal edge 60 of the cap intermediate the cut out portions 62 is very thin and the wall of the skirt at the cut out portions 62 is thicker, providing locking members 64 which hold the cover to the cap. The cover member prior to assembly to the cap is of the form shown in FIG. 6a and may be assembled to the cap in a manner similar to that described above, wherein by means of a suitable die the free end of the skirt is upset or crimped over the terminal edge portion of the cap thereby providing the thicker locking members 64 at the cut out portions 62.

The cover member has a depending outer peripheral lip 59 so that it may be removed from the cap in a manner similar to that described above. As in the previously described embodiment, the cover member 54 closely embraces the cap to provide a seal and the bead 66 which engages under the edge 60 of the cap provides a supple-

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mental seal preventing dirt and foreign matter from infiltrating the interior of the bottle. Further the removal of the cover member does not leave jagged edges on the cap and once removed, the cover member is not replaceable thereby providing a tamper-proof construction.

Another form of container closure in accordance with the present invention is shown in FIGS. 10 and 11. As shown, the container closure comprises a cap 70 and a cover member 76 detachably secured thereto. The cap and cover member are of generally the same configuration and arrangement as the cover member and cap of the previously described embodiment of FIGS. 8 and 9. The cap includes an outer annular top portion 72 having an integral raised rib 75 which terminates in a downwardly extending inner terminal edge 77 defining a central opening 73 and the cover member 76 includes a depending skirt 80 consisting of a body portion 81 and an out turned flange or bead 82 engageable under the inner terminal edge 77 of the cap. In the present instance, the inner peripheral edge 77 of the cap is crimped or bent back to provide indentations 78 at three circumferentially spaced points so that when the skirt 80 of the cover member 76 which is of the form shown in FIG. 6a prior to assembly, is assembled to the cap in the same manner described above, the skirt 80 is thicker at the indentations 78 than at the intermediate portions thereby providing locking members 79 which serve to hold the cover member to the cap and which are fracturable upon actuation of the cover member relative to the cap to permit removal of the cover member.

As in the previously described embodiments the cover member serves as a seal and has an outer depending lip 84 to facilitate removal of the cover member from the cap in the manner described above. The bead 82 similarly is retained between the cap and stopper after removal of the cover member to act as a supplemental seal and the assembly is tamper proof since the cover member is not replaceable once removed.

A further embodiment of container closure in accordance with the present invention is illustrated in FIGS. 12 and 13. The container closure as shown includes a cap 90 of cup-like form including an annular top 92 having a central opening 94 and a cover member 96 adapted to be detachably secured to the cap over the opening 94. The annular portion 92 has a raised rib 98 formed integrally therewith which terminates in a downwardly extending inner peripheral terminal edge 100 defining the central opening 94.

The cover member 96 is detachably secured to the cap by means of fracturable locking means. In accordance with this embodiment of the invention, the locking means comprises a continuous skirt including a generally cylindrical tubular body portion 102 depending centrally of the cover member terminating in an out turned flange or bead 104 which engages under the terminal edge 100 of the cap. The wall of the skirt adjacent the peripheral edge 100 of the cap is of a predetermined uniform thickness at the junction of the body portion 102 and bead 104 as at 101 to retain the cover member against accidental displacement with respect to the cap during shipping and handling and is adapted to be fractured along said juncture 101 by actuating the cover member with respect to the cap in a manner similar to that described above.

As in the previously described embodiments, the cover member closely embraces the cap to provide a seal against infiltration of dirt and foreign matter between the cover member and cap and the bead 104 is adapted to press against the stopper to provide a supplemental seal preventing dirt and foreign matter from infiltrating to the stopper. Further, removal of the cover member does not leave jagged edges on the cap and the cover member once removed is not replaceable thereby providing a tamper-proof construction.

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A further embodiment of container closure in accordance with the present invention is illustrated in FIGS 14-16 inclusive. The closure comprises a cap 110 and a cover member 112 detachably secured to the cap by fracturable locking means. The cap is of generally the same configuration and arrangement as the cap of the embodiment of closure shown in FIGS. 1-7 and includes an outer annular portion 116 having an integral raised rib 118 which terminates in a downwardly extending inner peripheral terminal edge 120 defining a central opening 121.

In accordance with this embodiment of the invention, the fracturable locking means detachably securing the cover member to the cap comprises, in the present instance, three locking fingers 119 depending from the underside of the cover member 112, each finger 119 having an out turned terminal portion 124 which engages around the peripheral edge 120 and lies under the top. The locking fingers 119 serve to retain the cover member in place on the cap and upon actuation of the cover member with respect to the cap are fracturable to permit removal therefrom. It is noted that removal of the cover member does not leave jagged edges and as in the previously described embodiments, the cover member is not replaceable thereby providing a tamperproof construction. The cover member has a depending outer peripheral lip 129 to provide a seal between the cover member and cap and also provide means for removing the cover member from the cap in a manner similar to that described above.

The cover member 112 is of the form illustrated in FIG. 17 prior to assembly wherein as shown, the locking fingers 119 project in a straight line direction from the underside of the cover member to engage through the central opening 121 of the cap. By this construction the locking fingers 119 may be bent back on assembly of the cover member and cap.

A still further embodiment of container closure in accordance with the present invention is shown in FIGS. 18-21 inclusive. The container closure comprises a cap 130 and a cover member 132 detachably secured to the cap by means of fracturable locking means. The cap 130 includes an annular top portion 134 having a central opening 136 therein and a raised rib 138 which terminates in a downwardly extending inner peripheral edge 140 to define a central opening 136. In accordance with this embodiment of the invention, a plurality of circumferentially spaced radially inwardly directed slotted openings 146 is provided in the annular top portion 134 of the cap adjacent to and radially outwardly of the raised rib 138. The cover member 132 has a plurality of locking fingers 148 depending from the underside thereof, each locking finger engaging through one of the slotted openings 146 and being disposed under the annular top of the cap. The locking fingers 148 serve to retain the cover member over the cap as illustrated in FIG. 18 and are fracturable to permit removal of the cover member from the cap upon actuation of the cover member with respect to the cap. The configuration of the cover member prior to assembly is illustrated in FIG. 20 and as shown, includes a generally cylindrical depending flexible skirt 145 which, when pressed against the top of the cap upon assembly of the cover member to the cap, causes portions of the skirt to engage through the slotted openings 146 to provide the locking fingers 148 and causes the sections of the skirt intermediate the locking fingers to be displaced outwardly to lie flush with the outer surface of the annular portion of the top as illustrated for example in FIG. 18.

From the foregoing it will be apparent that the present invention provides an improved container closure for pharmaceutical bottles which is of one-piece, tamper-proof construction and wherein the cover member may be readily and easily removed when it is desired to gain access to the contents of the bottle by a one-hand operation with-

out creating any harmful rough edges during removal thereof. Moreover the container closure of the present invention provides an effective seal for the container to safeguard the contents thereof from contamination. Further, the container closure is composed of relatively few parts which are of simplified construction and can be manufactured easily and economically.

While particular embodiments of the invention have been illustrated and described herein, it is to be understood that changes and modifications may be incorporated therein within the scope of the following claims.

I claim:

1. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top having an annular portion and a skirt depending from the outer periphery of the annular portion, said annular portion terminating in an inner edge defining an opening in said top, a cover member overlying said opening, locking means depending from the cover member through said opening and engaging under the inner edge of said annular portion to secure said cover member over said opening, said locking means being fracturable upon actuation of said cover member with respect to the top to permit removal of the cover member from the cap and prevent replacement of said cover member.

2. A container closure as claimed in claim 1, wherein said annular portion includes an integral raised rib surrounding said opening, said rib terminating in a downwardly extending inner terminal edge defining said opening.

3. A container closure as claimed in claim 2 wherein said locking means includes a flange providing an enlarged bead connected to the outer end of said locking means and engaging under said raised rib.

4. A container closure as claimed in claim 1 wherein at least a portion of said cover member extends radially outwardly beyond the peripheral edge of said annular portion.

5. A container closure as claimed in claim 4 wherein said cover member is generally disc-like having a continuous lip depending from its outer peripheral edge and wherein the cap is snugly nested in the under surface of the cover member to preclude infiltration of foreign matter between the cap and cover member.

6. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top, means defining at least one opening in said top, a cover member overlying said opening, a skirt depending from the underside of said cover member projecting through said opening and including an out turned flange engaging under the top, said skirt being relatively thin and having thicker portions at circumferentially spaced points to define locking members to secure said cover member to the cap, said locking members and skirt being fracturable upon actuation of said member with respect to the top to permit removal of the cover member from the cap and prevent replacement of said cover member.

7. A container closure according to claim 6 wherein said locking members are formed by protrusions projecting from the inner peripheral surface of the skirt.

8. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top portion terminating in an inner edge defining an opening in said top, means defining a plurality of circumferentially spaced cut out portions in the inner terminal edge of said top, a cover member overlying said opening, a skirt depending from said cover member through said opening including an out turned flange engaging under said inner terminal edge, the wall of said skirt adjacent said terminal edge being thin intermediate said cutout portions and thicker at the cutout portions to provide locking members seating in said cut-out portions securing said cover member to said cap, said locking members and skirt being fracturable upon actuation of said cover member with respect to the top to

permit removal of said cover member from the cap and prevent replacement of said cover member.

9. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top consisting of an outer portion terminating in an inner edge defining an opening in said top, means defining a plurality of circumferentially spaced indentations in the inner terminal edge of said outer portion, a cover member overlying said opening, a skirt depending from said cover member including a body portion extending through said opening and an out turned flange engaging under said inner terminal edge, the wall of said skirt adjacent said terminal edge between said indentations being thin and the wall of said skirt at said indentations being thicker to provide locking members to secure said cover member to the cap, said locking members and skirt being fracturable upon actuation of said cover member with respect to the top to permit removal of the cover member from the cap and prevent replacement of said cover member.

10. In combination with a bottle and a stopper adapted to fit within the neck of the bottle, a tamper-proof closure comprising a cap adapted to hold said stopper in place in the bottle, said cap including a top having an annular portion overlying said stopper and a skirt depending from the outer periphery of said annular portion, said annular portion terminating in an inner edge defining at least one opening in said top, a cover member overlying said opening, locking means depending from the cover through said opening and engaging between said stopper and said top to secure said cover member over the opening, said locking means being fracturable upon actuation of said cover member with respect to the top to permit removal of said cover member from the cap and expose said stopper through said opening in the cap and prevent replacement of said cover member.

11. The combination as claimed in claim 10 wherein said cover member is of generally disc-like form and extends radially outwardly beyond the outer edge of said top, said cover member having a lip depending from the outer peripheral edge thereof surrounding the cap whereby the cap is nested in the underside of said cover member to provide a seal.

12. In combination with a bottle and a stopper adapted to fit within the neck of the bottle, a tamper-proof closure comprising a cap adapted to hold said stopper in place in the bottle, said cap including a top consisting of an annular portion terminating in an inner edge defining an opening in said top, a flange depending from the outer peripheral edge of said annular portion adapted to secure said cap to said bottle, a cover member overlying said opening, a skirt depending from the cover including a body portion extending through said opening and an out turned flange providing an enlarged bead engaging under the inner peripheral edge of said annular portion, said inner peripheral edge extending downwardly and adapted to seat said skirt against said stopper to provide an effective seal, a plurality of circumferentially spaced locking members on said skirt, said locking members and skirt being fracturable upon actuation of said cover member with respect to the top to permit removal of the cover member from the cap and prevent replacement of said cover member, removal of said cover member operable to separate the body portion of said skirt from said bead and said bead being retained between said cap and said stopper to provide a seal therebetween.

13. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top portion terminating in an inner terminal edge defining an opening in said top, a cover member overlying said opening, a skirt depending from the underside of said cover member including a body portion projecting through said opening and an out turned flange engaging under the top, the wall of said skirt at the junction of said body portion and flange being adjacent said terminal edge and being of a predetermined uniform thickness and being fracturable at

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said junction upon actuation of said cover member with respect to the top to permit removal of the cover member from the cap and prevent replacement of the cover member.

14. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top, means defining an opening in said top, a cover member overlying said opening, a plurality of locking fingers depending from said cover member, each of said locking fingers projecting through said opening and including an out turned terminal portion engaging under said top, said locking fingers being fracturable upon actuation of said cover member with respect to the top to permit removal of the cover member from the cap and prevent replacement of the cover member.

15. In a tamper-proof closure for pharmaceutical bottles or the like, a cap including a top, means defining a plurality of slotted openings in said top, a cover member overlying said top, a plurality of locking fingers de-

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pending from the underside of said cover member, each of said locking fingers engaging through one of said openings in said top and including an out turned terminal tip portion engaging under the top to secure said cover member to said cap, said locking fingers being fracturable upon actuation of said cover member with respect to the top to permit removal of the cover member from the cap and prevent replacement of said cover member.

16. A container closure as claimed in claim 1 wherein said locking means is formed integrally with said cover member and wherein said locking means and cover member are made from a plastic material.

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FRANKLIN T. GARRETT, *Primary Examiner.*

FRANK L. ABBOTT, CLAUDE A. LE ROY, *Examiners.*