

Nov. 2, 1937.

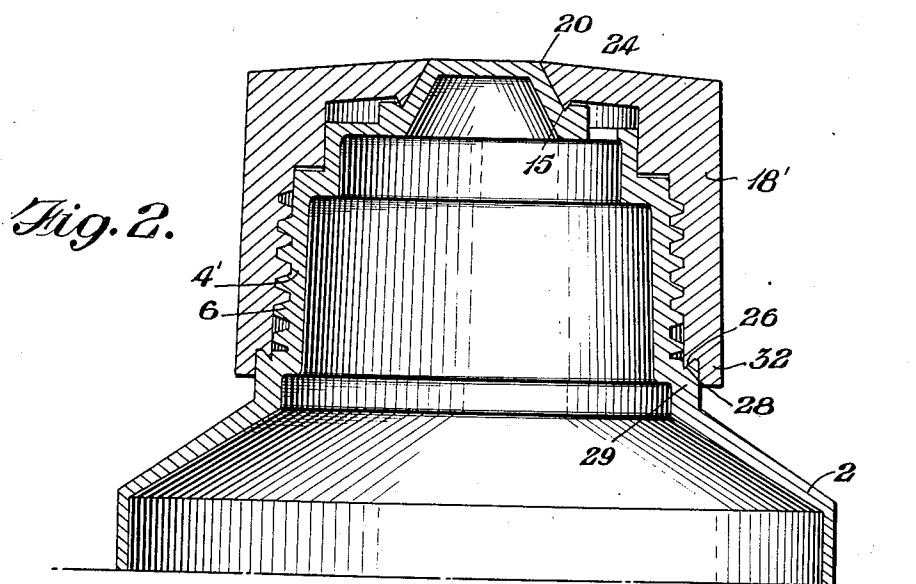
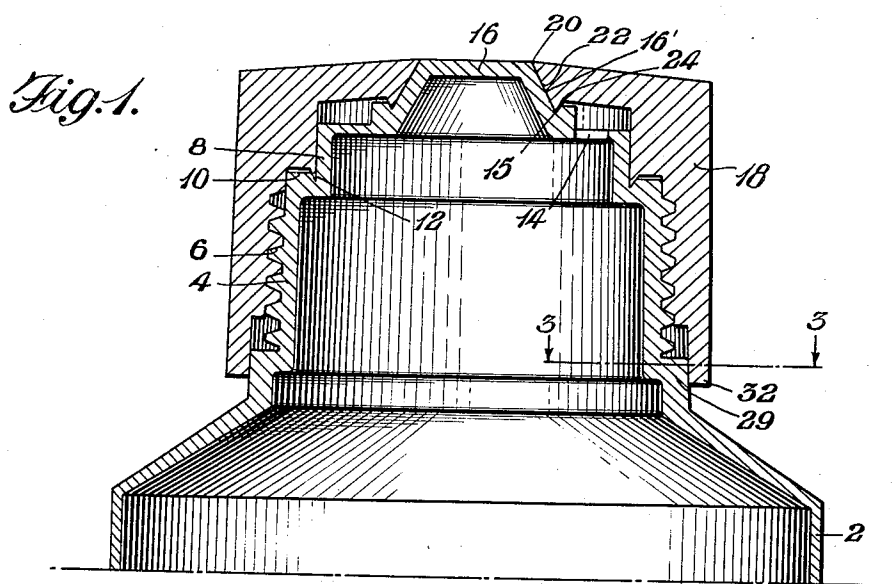
C. C. TEAS

2,098,170

CLOSURE FOR CONTAINERS

Filed March 16, 1937

3 Sheets-Sheet 1



Inventor

Charles C. Teas

By

Martin T. Fisher,

Attorney

Nov. 2, 1937.

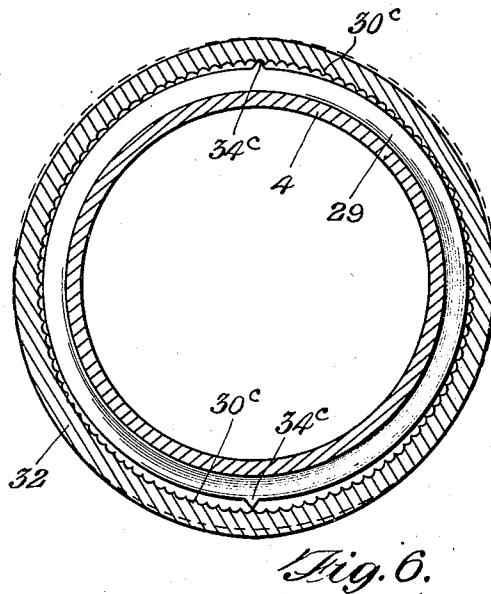
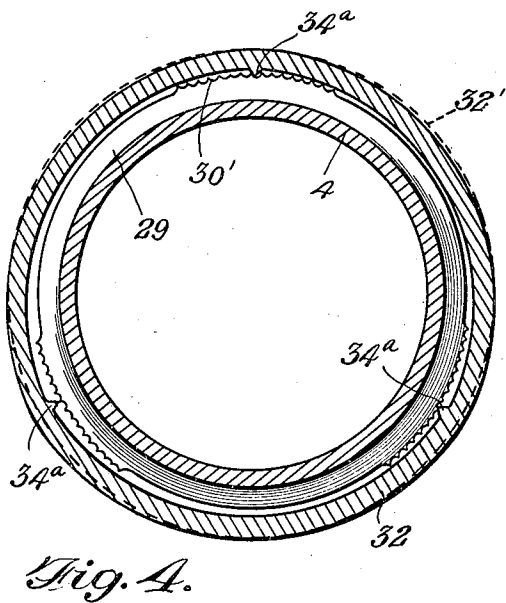
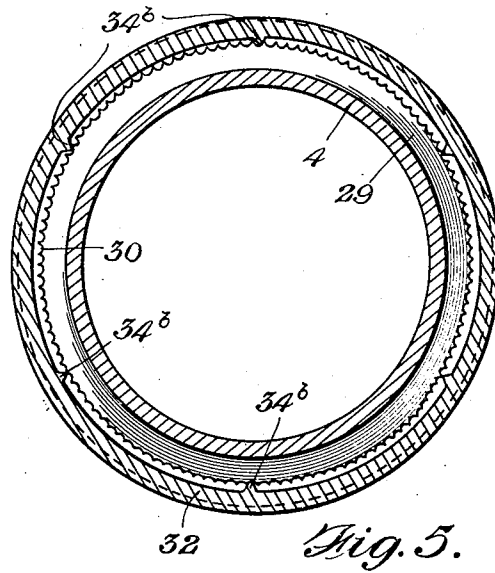
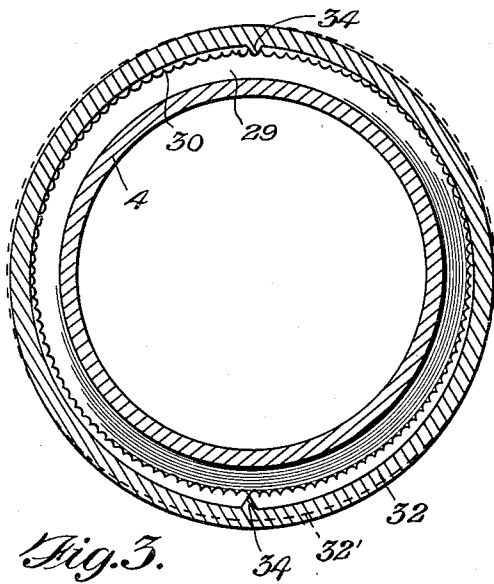
C. C. TEAS

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CLOSURE FOR CONTAINERS

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3 Sheets-Sheet 2



Inventor

Charles C. Teas

By

Martin T. Fisher,

Attorney.

Nov. 2, 1937.

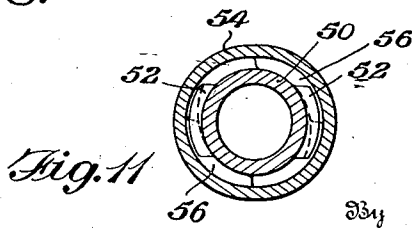
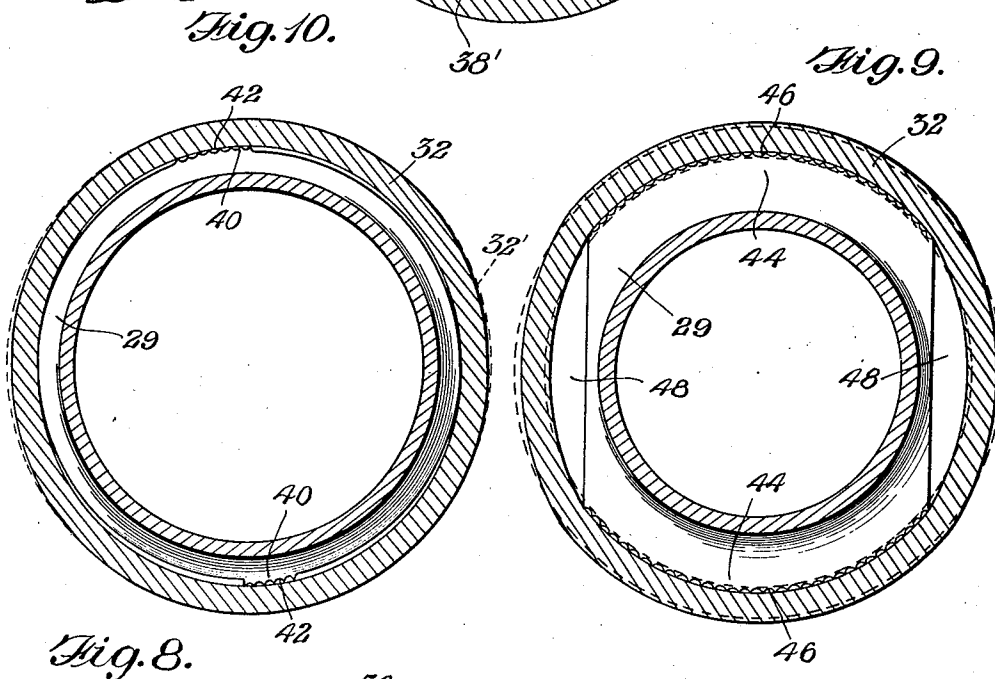
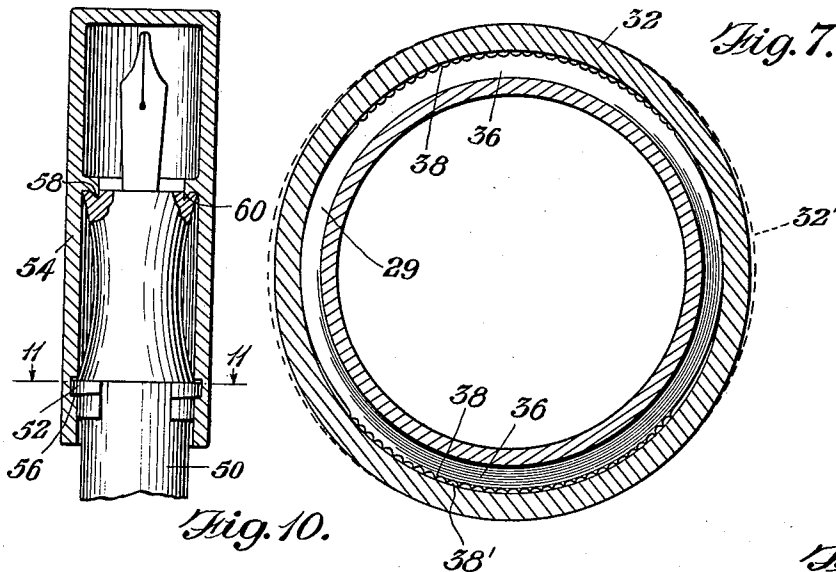
C. C. TEAS

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CLOSURE FOR CONTAINERS

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3 Sheets-Sheet 3



Inventor

Charles C. Teas

By

Martin T. Fisher,

Attorney.

UNITED STATES PATENT OFFICE

2,098,170

CLOSURE FOR CONTAINERS

Charles C. Teas, Dallas, Iowa, assignor to Collapsible Tube Closures Inc., Olympia, Wash., a corporation of Washington

Application March 16, 1937, Serial No. 131,241

15 Claims. (Cl. 221—60)

This invention is a closure for containers. While capable of use on bottles, cans and containers in general, it is particularly adapted for use on collapsible tubes and therefore it will be described as applied to collapsible tubes.

The invention is concerned particularly with closures of the screw-threaded type, and the primary object of the invention is to increase the frictional grip between the cap and the container, so that when the cap is turned to the closed position, it will be held there so firmly that it could be said to be locked in position, although it can be released by turning it fairly strongly in the reverse direction.

According to the present invention, either the cap or the neck of the container, preferably the cap, is made slightly resilient so that it can be distorted out of its normal shape, this distortion taking place as the cap is screwed or turned to the closed position. The reactive effect of this distortion is to create a strong frictional grip between the neck of the container and the cap. In order to create this distortion, either the cap or the neck, or both, is provided with some eccentric means which will distort the resilient cap out of its normal shape when the cap is turned to the closed position. The nature of the eccentric means employed can be varied considerably, but in the preferred form of the invention the eccentric means, which creates the distortion, also is roughened in such a way as to further increase the frictional grip or frictional lock resulting from the distortion.

The foregoing features of the invention are preferably embodied in a cap of the type having one or two knife edges for increasing the sealing effect. A knife edge seal is shown in the patent to Hickman et al., No. 1,890,441, dated December 6, 1932, and the present invention is an improvement over the closure shown in that patent, in that according to the present invention the cap, once it has been screwed into tightly closed position, will not work loose even under severe conditions of vibration and handling. While the closure shown in the Hickman et. al. Patent 1,890,441 is very satisfactory for many purposes, there is a slight tendency for the cap to work loose under severe conditions of vibrations and handling, and it is one of the important objects of this invention to provide a closure, capable of use with caps employing knife edge seals or not, which will not work loose, and which will, in effect, be locked in place, although capable of being unlocked and released by applying a fairly strong reverse turn to the cap.

Certain features of the invention may be applied to a cap for a fountain pen.

The main features of the invention having been thus indicated, the invention will be further described in connection with the accompanying drawings, illustrating the present preferred embodiments of the invention. Further advantages of construction and operation will be apparent from this more detailed description. These embodiments are illustrative, and not restrictive of the invention.

In these drawings:

Fig. 1 is a sectional view through the neck and cap of a collapsible tube embodying this invention;

Fig. 2 is a similar view, showing a modification;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Figs. 4, 5 and 6 are similar sections, showing other modifications;

Fig. 7 is a cross section showing another modification;

Figs. 8 and 9 are sections showing two other modifications;

Fig. 10 is a sectional view showing the invention applied to a fountain pen cap; and

Fig. 11 is a section on the line 11—11 of Fig. 10.

Referring now to these drawings, in which similar reference characters indicate similar parts, a collapsible tube or other container 2, is provided with a neck 4, screw threaded as at 6, the neck being narrowed at its upper part 8 to provide a shoulder 10, at the inner edge of which is an annular, substantially V-shaped groove 12 to provide a seat for a knife edge. Material in the tube passes out through a plurality of holes 14 and thence out of the tube around a central closure member 16 which is part of the neck. The portion 16 is provided with an inclined surface 16' which terminates in an annular knife edge groove 15.

Cooperating with the parts just described is a screw threaded cap 18 provided with a central discharge aperture 20 and with an inclined surface 22 terminating in a knife edge 24 which seats in the knife edge groove 15.

The neck and the cap may be made of any suitable material, preferably material having a slight resiliency, such as hard rubber, Bakelite or other synthetic resin. However, in the preferred embodiment of the invention the neck portion 4 is preferably of soft metal, while the cap 18 is of hard rubber, Bakelite, wood, fiber, or other material having some resiliency.

Fig. 2 shows a somewhat different placement of the knife edges. In this embodiment it is an upper

knife edge 24 is provided as before. The other knife edge, shown at 26, is provided near the lower edge of the cap 18', this knife edge being adapted to seat in an annular groove 28 formed in the lower part of the neck 4'.

The important features of the present invention, which will now be described, may be used with either of the caps shown in Fig. 1 or 2.

Referring now to Fig. 3, the portion 29 of the neck, below the screw threads, is provided with corrugations 30, which may extend part way around the neck or, as shown, all the way around the neck. The lower lip or flange 32 of the cap is provided with a plurality of inwardly directed, pointed lugs 34, which are adapted to mesh with or bite into the corrugations 30. The lugs 34 are so placed that as the cap is turned to the closed position, these lugs exert oppositely directed radial forces tending to elongate or distort the cap, which elongation or distortion is permitted by the resiliency of the cap. In Fig. 3 the dotted line 32' indicates the shape of the cap before it has been screwed into position, while the full line 32 shows the cap distorted into a somewhat elliptical shape. Due to this distortion the cap always tends to return to its original or circular shape and therefore causes the lugs 34 to bite strongly into the corrugations 30, thereby creating quite a strong frictional lock which, however, can be overcome by turning the cap in the reverse direction. As shown in Fig. 3, the lugs 34 are so arranged that when one of them is in mesh with a corrugation, the other is out of mesh. Therefore, in whatever position the rotation is stopped, one of the lugs 34 will always be in mesh with a corrugation for exerting the desired locking effect.

Referring to Fig. 4, corrugations 30' are provided as before on the neck, while three lugs 34a are provided, instead of two lugs. This arrangement of lugs works in substantially the same way, resulting in a distortion of the cap to the position shown in full lines 32. The original shape is shown in dotted lines 32'. The lugs 34a bite into the corrugations as before, these lugs being placed so as to engage differently with the corrugations whereby when one is in mesh, another one is partly out of mesh, while the third is still further out of mesh. The result of this is that one of the lugs is always in strong locking engagement with the corrugations.

In Fig. 5 the number of locking lugs is still further increased and are here shown as six in number, indicated at 34b. These lugs mesh with the corrugations as before, and are in different phase relationship with the corrugations so that one or more of the lugs is always in strong locking engagement with the corrugations, when the others are out of mesh in varying degrees with the corrugations.

Referring to Fig. 6, the corrugations and lugs are reversed, that is to say, the lower part of the neck 29, below the screw threads, is provided with lugs 34c which are adapted to mesh with and interlock with corrugations 30c on the inside of the cap. This modification operates in substantially the same way as before, resulting in a distortion of the cap, the reactive effect of which is to cause the lugs to bite into the corrugations, the lugs being out of phase in varying degrees with the corrugations so that a proper lock is had in any given position of the cap.

Referring now to Fig. 7, the neck is provided with eccentric portions 36, somewhat thicker than the rest of the neck, the effect of which eccentric portions is to distort the cap, these eccentric por-

tions exerting oppositely directed radial forces. In case the cap was circular originally, the tendency would be to distort the cap into an elliptical shape.

The outer faces of the eccentric portions 36 are preferably provided with corrugations 38, or other roughenings, for increasing the frictional grip between the cap and the neck. The inside vertical face of the lower lip 32 of the cap may be provided with cooperating corrugations 38' or with lugs like the lugs 34 in Fig. 3 for increasing the frictional lock between the cap and the corrugations 38 on the neck. The dotted line 32' in Fig. 7 shows the original or truly circular form of the cap while the full line 32 shows the distorted form.

Referring now to Fig. 8, the portion 29 of the neck is provided with cam portions 40, which have a mechanical effect similar to the eccentric portions 36 of Fig. 7, in that they exert oppositely directed radial forces tending to distort the cap out of its original shape. The original shape of the cap is shown in the dotted line 32', while the distorted shape is shown at 32. This distortion results in a strong frictional force being exerted by the cam portions 40 against the cap, tending to lock it in position. The cam portions 40 and the inside of the cap may be smooth, or one may be roughened or both be provided with cooperating corrugations 42, which intermesh with each other, or one of said portions could be provided with corrugations and the other with intermeshing lugs like the lugs 34, 34a, etc., shown in Figs. 3 and 4, as will readily be understood by one skilled in the art.

Referring to the modification shown in Fig. 9, the portion 29 of the neck is provided with oppositely arranged eccentric portions 44, the outer faces of which exert oppositely directed radial forces against the portion 32 of the cap, tending to distort it out of its original shape, the reactive effect of this distortion increasing the frictional grip between the cap and the neck. The outer vertical face or portion of the neck and the cooperating inner vertical face of the lip 32 of the cap may be smooth, but one or both are preferably provided with intermeshing corrugations or other "roughenings" 46 for increasing the frictional grip between the cap and the neck. One member or the other could be provided with lugs instead of corrugations, as described in connection with Figs. 3, 4, etc. In this embodiment of the invention, the neck may be provided with cut-out portions 48, such portions being unnecessary in view of the fact that a sufficiently strong gripping action is had by reason of the intermeshing corrugations 46 or other roughenings.

The "roughenings" provided by the lugs 34, 34a, 34b, etc., or by the corrugations 38, 42, 46, etc., may take various possible mechanical forms, the essential purpose of these "roughenings" being to increase the frictional grip between the cap and the neck. The invention is not to be limited to any particular type of "roughening". Furthermore, the "roughenings" may go all the way around the neck or only part way, as will be evident to one skilled in the art, and as illustrated in the several views.

Referring to the embodiment of the invention shown in Figs. 10 and 11, the invention is there shown as applied to a fountain pen or other analogous container. Instead of screw threads, the container barrel 50 of the pen is provided with interrupted screw threads 52, while the cap 54 is provided with shoulder portions 56 which engage under the interrupted threads 52 for holding the

cap 54 in the closed position. The cap 54 of the fountain pen may take any of the forms described in connection with the collapsible tube embodiment of the invention, and the upper end 50 of the fountain pen barrel may take any of the several forms described in connection with portion 29 of the neck, so that there is a distorting effect exerted on the cap 54 of the pen, the cap being somewhat resilient for this purpose, and suitable "roughenings" being provided for increasing the frictional grip, of the type shown in Figs. 3 to 9, inclusive. Furthermore, it should be understood that a bayonet slot or interrupted thread type of fastening shown in connection with the fountain pen cap, may be used in connection with Figs. 3 to 9 instead of the regular screw threads there illustrated.

The fountain pen cap embodiment of the invention may also include an inwardly and downwardly directed knife edge 58 which is adapted to seat in an annular knife edge groove 60, for increasing the effectiveness of the seal.

The various forms of the invention shown in Figs. 3 to 9, inclusive, may also be provided with either one or both of the two knife edges described in connection with Fig. 1 and Fig. 2.

It should be understood that one of the main features of the present invention is that the cap and neck are so shaped that a distorting effect is produced on the cap when the cap is turned to the closed position. The cap may be round to start with, or it may be out of round. In either case, it is distorted out of its original shape, and the reactive effect of this distortion creates additional friction, which, cooperating with any suitable form of "roughening" between the cap and neck, results in a strong frictional lock.

While the invention has been illustrated and described in its present preferred embodiments, it should be understood that it is not to be limited to any specific details, but may be carried out in other ways, as falling within the scope of the claims.

I claim as my invention:—

1. A closure for containers, comprising a neck member, and a cooperating cap member for rotary engagement with the neck member, one of said members being slightly resilient and normally substantially circular, one of said members being provided with means adapted to bear against the other as they are turned into engagement with each other so as to distort the resilient member out of its normal shape, such distortion serving to increase the frictional grip of the resilient member on the other member.
2. A closure for containers, comprising a neck member, and a cooperating cap member for rotary engagement with the neck member, one of said members being slightly resilient, one of said members being provided with means adapted to bear against the other as they are turned into engagement with each other so as to distort the resilient member out of its normal shape, such distortion serving to increase the frictional grip of the resilient member on the other member, and said members being further provided with interengaging roughened means for further increasing the frictional grip between the two said members.
3. A closure for containers, comprising a neck member, and a cooperating cap member for rotary engagement with the neck member, one of said members being slightly resilient and normally substantially circular, one of said members being provided with eccentric means to bear

against the other so as to distort the resilient member out of its normal shape.

4. A closure for containers, comprising a neck member, and a cooperating cap member, for rotary engagement with the neck member, one of said members being slightly resilient, one of said members being provided with eccentric means to bear against the other so as to distort the resilient member out of its normal shape, said eccentric means being roughened for increasing the frictional grip between the two members.

5. A closure for containers, comprising a neck member and a cooperating cap member for screw-threaded engagement therewith, the cap member being slightly resilient and normally substantially circular, one of said members being provided with eccentric means to bear against the other, so as to distort the resilient cap to thereby increase the frictional grip between said members.

6. A closure for containers, comprising a neck member and a cooperating cap member for screw-threaded engagement therewith, the cap member being slightly resilient, one of said members being provided with roughened eccentric means to bear against the other, so as to distort the resilient cap to thereby increase the frictional grip between said members.

7. A closure for containers, comprising a neck member, and a cooperating cap member for rotary engagement with the neck member, one of said members being slightly resilient and normally substantially circular, one of said members being provided with means adapted to bear against the other as they are turned into engagement with each other so as to distort the resilient member out of its normal shape, such distortion serving to increase the frictional grip of the resilient member on the other member, and one of said members being provided with knife-edge means for increasing the sealing effect of the cap member.

8. A closure for containers, comprising a neck member, and a cooperating cap member for rotary engagement with the neck member, one of said members being slightly resilient, one of said members being provided with means adapted to bear against the other as they are turned into engagement with each other so as to distort the resilient member out of its normal shape, such distortion serving to increase the frictional grip of the resilient member on the other member, and said members being further provided with interengaging roughened means for further increasing the frictional grip between the two said members, the cap member being provided with knife-edge means for increasing the sealing effect of the cap member.

9. A closure for containers, comprising a neck member, and a cooperating cap member for rotary engagement with the neck member, one of said members being slightly resilient, and the other of said members being provided with eccentric means to bear against the resilient member so as to distort the same out of its normal shape.

10. A closure for containers, comprising a neck member and a cooperating cap member for screw-threaded engagement therewith, the cap member being slightly resilient, the neck member being provided with eccentric means to bear against the cap, so as to distort the resilient cap to thereby increase the frictional grip between said members.

11. A closure for containers, comprising a neck

member and a cooperating cap member for screw-threaded engagement therewith, the cap member being slightly resilient, one of said members being provided with roughened eccentric means to bear against the other, so as to distort the resilient cap to thereby increase the frictional grip between said members, the cap member being centrally apertured and provided with at least one annular knife edge for increasing the sealing effect of the cap member.

12. A closure for a container, comprising screw-threaded neck and cap members, one of which is provided, below its screw threads, with corrugations, and the other of which is provided, below its screw threads, with lugs adapted to interlock with said corrugations, for holding the cap locked in closed position.

13. A closure for a container, comprising screw-threaded neck and cap members, one of which is provided, below its screw threads, with corrugations, and the other of which is provided, below its screw threads, with lugs adapted to interlock into said corrugations, for holding the cap locked in closed position, one of said members

being provided with at least one knife edge adapted to bite into the other member, for increasing the sealing effect between said members.

14. A closure for a container, comprising screw-threaded neck and cap members, the cap member being resilient, said members being provided with cooperating lugs and corrugations, adapted to interlock when the cap is turned to closed position, the interaction between the lugs and corrugations serving to distort the resilient cap for increasing said interlocking effect.

15. A closure for a container, comprising screw-threaded neck and cap members, the cap member being resilient, said members being provided with cooperating lugs and corrugations, adapted to interlock when the cap is turned to closed position, the interaction between the lugs and corrugations serving to distort the resilient cap for increasing said interlocking effect, one of said members being provided with at least one knife edge adapted to bite into the other member, for increasing the sealing effect between said members.

CHARLES C. TEAS.