This invention relates to closures for bottles and other receptacles, particularly to closures of the "crown" type employing an interior facing or "spot" for protective purposes, and the object is to improve the application of such facings or spots to all such closures.

Another object of the invention is to provide a simple and inexpensive metal cap or crown for bottles, dispensing tubes and the like, having an interior facing or spot secured to the cushion liner by mechanical means, without the aid of thermoplastic or other adhesive materials.

Still another object of the invention is to facilitate the application of center spot to caps or crowns of the above type with greater precision and uniformity than hitherto, with increased economy of manufacture, and with a degree of permanency which enables the assembled units to be handled or stored indefinitely without the spots adhering or weakening in any way.

In the manufacture of crown caps for bottles, etc., it is a common practice to fasten a center spot or facing disk of aluminum foil, tin foil, varnished paper or the like to the cushion liner which is usually made of composition cork, for the purpose of preventing the contents of the container from the deleterious effects of chemicals in the cork binder as well as to prevent the liquid from penetrating cracks in the liner after capping and thus reaching the metal of the cap.

In practice these spots are always fastened to the liners by means of the thermoplastic gum or other adhesive material, and numerous methods have been issued for various kinds of adhesives as well as for methods and means for applying them to the spot and the liner.

The aluminum spot material for standard crown cap is almost universal usage is today made in continuous strips or ribbons 1 inch wide, the back of which has been coated with a thin thermoplastic film especially made to soften at slightly elevated temperatures so that it will adhere to the cork liner when applied in the presence of heat. The manufacture of this spot material is a large and specialized business. However, thermoplastic gums are costly, as in the process of properly applying them to the metal ribbon and many problems had to be solved before spots of this type could be used on a commercially practical scale. Intricate machines, known as "spot machines" were designed to place the spots on the cork liners after the liners were inserted in the metal caps. These machines are expensive to operate because of the quantity of electric or gas heat they use, and they require constant care, attention and repairs in order to maintain the spot to the cork lining with even a reasonable degree of security and accuracy.

Lack of uniformity of product in the foregoing standard method of applying spots results from many causes which are difficult to correct. For example, in the morning when a thermoplastic machine is started up, it is usually cold and the spots are not tightly stuck to the cork; whereas in the afternoon, the machines tend to become overheated after prolonged usage and the adhesive material may be burned or "overcooked" and thus lose its adhesiveness. Again, the coated spots sometimes slide into an eccentric position on the linings unless precautions are taken to prevent this. Another disadvantage of using thermoplastic coated metal foil for the manufacture of spots is that scrap foil coated with adhesive material brings only about one-third the price of uncoated metal foil in the scrap metal market. Still another very serious objection to the use of adhesives in the application of spots as described above, is that after the manufacture of the caps is completed the adhesive material loses its adhesion with age, causing the spots to drop off, thereby making it impossible to store the finished caps for any prolonged period. This is a serious disadvantage to all can manufacturer's who would greatly prefer to apply the spots to the caps during their dull seasons and store the finished caps until required by the bottling plants.

My invention avoids the foregoing disadvantages of the prior art by entirely eliminating the use of adhesives in the application of facings or spots to closures of the above type, and by using plain uncoated metal foil, paper or the like, which I cut into disks of the proper size and secure to the cushion liner of composition cork or the like within the metal cap by a suitable pin, tack or rivet of special shape and construction. In the preferred embodiment of the invention, as hereinafter described, the attaching pin has metal shank which is strong enough to readily pierce the spot and the liner in the cap, yet is of sufficiently soft temper to turn over when forced against the cap to lock the spot in place, and it is provided with a head which is shaped to engage and hold the spot tightly against the liner to seal the hole pierced therein by the shank.

In my preferred construction the pin employed to secure the spot to the liner has a smooth, round metal shank tapering to a point, enabling the pin to pierce the spot and the liner without tearing same, and causing it to fit into snug sealing engagement with the liner when inserted therein as described above. The pin preferably has a tapered head which readily sinks into the liner in firm engagement with the adjacent area of the spot to further seal the hole formed by the pin. In another embodiment of the invention the pin is provided with a concave dome-shaped head, and in such case the rim of the dome will engage and press tightly into the spot material.
and thus insure against any liquid reaching the hole made by the shank of the pin. The pin, like the spot, may be made of any suitable material compatible with the contents of the receptacle to be capped. In the case of many beverages, such as beer, aluminum is considered the only practical material safe enough to be used in contact with the liquid, so far as well as many other purposes I prefer to use aluminum plus as well as spots in carrying out my invention.

An important requirement of all spots is that they be so securely fastened to the cushion liner of the cap that they will not come off when quantities of caps are tossed about in the hopper which feeds them to the capping machine, and that they will not come off in shipment. My improved pin or rivet fastening is even more positive and secure than can possibly be obtained with any known adhesive methods, since when adhesives are employed the gum may be softened by high temperatures and the spots may fall off before the caps reach their destination. My mechanical fastening is also simpler and more rapidly applied than adhesive methods and it saves the cost of electric or gas heat, besides avoiding the constant problems arising due to variations in the adhesive itself. My fastening pins, furthermore, will not lose their gripping properties with age, hence spot crowns made according to my invention may be made up complete during dull seasons and stored indefinitely. Another important advantage accruing from my invention is that my scrap aluminum, being pure and uncoated with adhesive, will bring about three times the price of coated aluminum in the scrap metal market.

These and other features and advantages of the invention will be described in detail in connection with the accompanying drawing, in which:

Fig. 1 is an enlarged vertical sectional view showing a crown cap embodying my invention, as applied to the mouth of a bottle;

Fig. 2 is a similar sectional view, further enlarged, showing the completed cap before being applied to the bottle;

Fig. 3 is an interior face view of the completed cap;

Fig. 4 is a fragmentary view showing a pin of the type illustrated in Figs. 1 to 3 in position to be inserted; and

Figs. 5 to 9 inclusive are fragmentary sectional views illustrating various modifications of the invention.

In Figs. 1 to 3, I show a metal crown cap 1 of standard construction, having a corrugated flange 2, which is adapted to be clamped over the mouth of a bottle in a manner well understood in the art. The cap contains a tight-fitting cushion liner 3, generally of composition cork, which is usually secured to the inner face of the cap by a suitable adhesive material.

Applied to the exposed face of the cushion liner 3 is a central spot or disk 4 preferably of thin metal such as aluminum foil or tin foil, although varnished paper or any other suitable material may be employed depending upon the contents of the container to be capped. The diameter of the spot 4 is somewhat less than the outside diameter of the mouth of the container to be capped. For example, the standard cushion liner 3 being 1 inch in diameter, the opening in the mouth of a standard bottle 5 being 5/8 inch in diameter, the spot 4 is preferably ¾ inch in diameter. Thus the spot 4 fully covers the opening in the mouth of the bottle 5 in Fig. 1 and still leaves a ¼ inch border of the cushion liner 3 exposed to contact with the rim of the bottle neck to effect a positive seal when the crown is capped on the bottle.

In the embodiment illustrated in Figs. 1 to 4, the spot 4 is firmly secured to the cushion liner 3 by a pin 6 having a smooth, round shank 7 tapering downwardly to a point, and a tapered head 8, as best shown in Fig. 4. The pin 6 may be made of any suitable material but is preferably of aluminum, and it must be strong enough to readily pierce the spot 4 and liner 3 yet of sufficiently soft temper to turn over upon said liner when forced against the inner face of the cap 1.

Fig. 4 shows the pin 6 in position to be inserted through the spot 4 and liner 3. As the sharp point of the pin first penetrates the spot, and then the liner, it makes a smooth round hole, with the result that the material of the liner closes in and hugs the shank of the pin, since the pin, in entering, does not tear the liner but rather expands it. When the pin is fully depressed, the point 7 of the shank 6 then turns over in any direction against the inner face of the cap 1 and forms a hook 9 which embeds itself in the liner as shown in Figs. 1 and 3. When the pin is thus fully inserted and the tapered head 8 is sunk into the liner, the under side of the head 6 forms a saucer 10 in the spot 4 the walls of which are in constant pressure contact with the liner 3 and pin head 8 due to the resiliency of the liner material. This pressure is maintained by the turned hook 9 of the pin which is firmly anchored in the liner 3.

Although it will be understood that the dimensions of the fastening pin 6 may vary considerably, I prefer, in the case of a standard crown cap employing a cork liner 3½ inch thick and an aluminum spot .002 inch thick, to use an aluminum pin of approximately the following dimensions: overall length from head to point ½ inch; head ½ inch in diameter; thickness of head from top to shank of pin ⅛ inch; width of tapered under face of head ⅛ inch; diameter of shank at widest part where it joins the head ⅛ inch. An important requirement is that the head 6 and the adjacent portion of the shank must be thick enough to prevent the head from being bent out of its normal position with respect to the shank, as such a bending would widen the hole in the spot material and would be detrimental.

Fig. 5 shows a modification of the invention employing a pin having a concave dome-shaped head 12 and a straight round shank 13 which is tapered to a point at the end. The concave dome 12 engages and holds the surrounded area of the spot 4 tightly against the liner 3, thus effectively sealing the hole pierced therein by the shank 13. A constant pressure contact between the parts is maintained by the resiliency of the cushion liner 3 which is compressed between the head 12 and the hooked end of the shank 13, the pointed end of the shank being turned over to form such hook when the pin is inserted as previously described.

Fig. 6 shows a fastening pin having a concave dome-shaped head 14 similar to the head 12 in Fig. 5, but having a round tapered shank 15 similar to the shank 7 described in connection with Figs. 1 to 4. This head 14 functions in a manner similar to those described above.

In Fig. 7, I show another form of pin having
a flat round head 16, and a straight round shank 17 which is similar to the shank 13 illustrated in Fig. 5. In this, as in the other forms of the invention, the spot 4 is securely fastened in place and the hole formed by said shank 17 is effectively sealed.

Fig. 8 shows another type of pin in the form of a staple 18 which is preferably made of smooth round wire bent in the manner illustrated to provide a pair of spaced prongs or shanks 19 which are tapered toward their pointed ends in a manner similar to the shanks secured in connection with Figs. 1 to 4 and 6. The prongs 19, being tapered in the manner shown, form smooth round holes in the spot 4 and liner 3 so that the compressed material of the liner closes in and hugs the prongs and forms an effective seal against leakage.

In Fig. 9, I show still another type of pin having a round flat head 20 and a round shank 21 with a slightly enlarged pointed end 22 in the general shape of an arrow head of circular cross section. The shank 21 is shorter than in the other forms of the invention previously described, being of a dimension such that when the pin is fully sunk into the liner 3 the enlarged end 22 will not turn over against the face of the cap but will be embedded in the body of the liner which will close in and anchor it firmly against displacement. The head 20 of the pin depresses the covered area of the spot 4 into the cushion liner and effectively seals the hole formed by the shank.

In some cases, depending upon the type of spot material and cushion liner employed, the shanks of the attaching pins may be coated with a thin film of wax or gum to insure a more perfect seal against leakage at the point of entry, although such extra precaution is usually unnecessary.

The invention claimed is:

1. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a facing disk on the exposed face of said liner, and a pin extending through said disk and said liner and having its point gripping said liner to secure said disk in place.

2. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a facing disk on the exposed face of said liner, and a pin extending through said disk and said liner in sealing engagement therewith and having its point turned over between said shell and said liner to secure said disk in place.

3. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a pin having a shank extending through said spot and said liner securing same together and having a head engaging and holding the adjacent area of said spot tightly against said liner to seal the hole formed therein by said shank.

4. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a pin extending through said spot and said liner having its point turned over between said shell and said liner to secure said spot in place and having a head engaging and holding the adjacent area of said spot tightly against said liner to seal the hole formed thereby by said pin.

5. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a pin having a smooth, round metal shank tapering to a point extending through said spot and said liner in sealing engagement therewith and having said point turned over between said shell and said liner to secure said spot in place.

6. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a pin extending through said spot and said liner having its point turned over between said shell and said liner thereby securing said spot in place and having a tapered head sunk into said liner in firm engagement with the surrounding area of said spot to seal the hole formed by said pin.

7. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a smooth, round tapered pin extending through said spot and said liner in sealing engagement therewith having its point turned over between said shell and said liner thereby securing said spot in place and having a tapered head sunk into said liner in firm engagement with the surrounding area of said spot to further seal the hole formed by said pin.

8. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a pin extending through said spot and said liner having its point turned over between said shell and said liner thereby securing said spot in place and having a concave dome-shaped head engaging and holding the surrounding area of said spot tightly against said liner to seal the hole formed therewith by said pin.

9. A closure for receptacles comprising a closure shell, a cushion liner in said shell, a center spot on the exposed face of said liner, and a pin extending through said spot and said liner having its point turned over between said shell and said liner thereby securing said spot in place and having a round flat head engaging and depressing the surrounding area of said spot tightly against said liner to seal the hole formed therein by said pin.

10. A crown bottle cap comprising a metal shell, a cushion disk lining the inner face of said shell, a thin aluminum center spot on the exposed face of said disk of a diameter smaller than that of said disk but slightly larger than the inner diameter of the bottle neck to be sealed, and an aluminum pin extending through said spot and said disk having a relatively soft-tempered point turned over between said shell and said disk thereby securing said spot in place and having a tapered aluminum head sunk into said disk in firm engagement with the adjacent area of said spot to seal the hole formed by said pin.

11. A crown bottle cap comprising a metal shell, a cushion disk lining the inner face of said shell, a thin aluminum center spot on the exposed face of said disk of a diameter smaller than that of said disk but slightly larger than the inner diameter of the bottle neck to be sealed, and smooth, round tapered aluminum pin extending through said spot and said disk in firm engagement therewith having a relatively soft-tempered point turned over between said shell and said disk thereby securing said spot in place and having a tapered aluminum head sunk into said disk in firm engagement with the adjacent area of said spot to further seal the hole formed by said pin.

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