

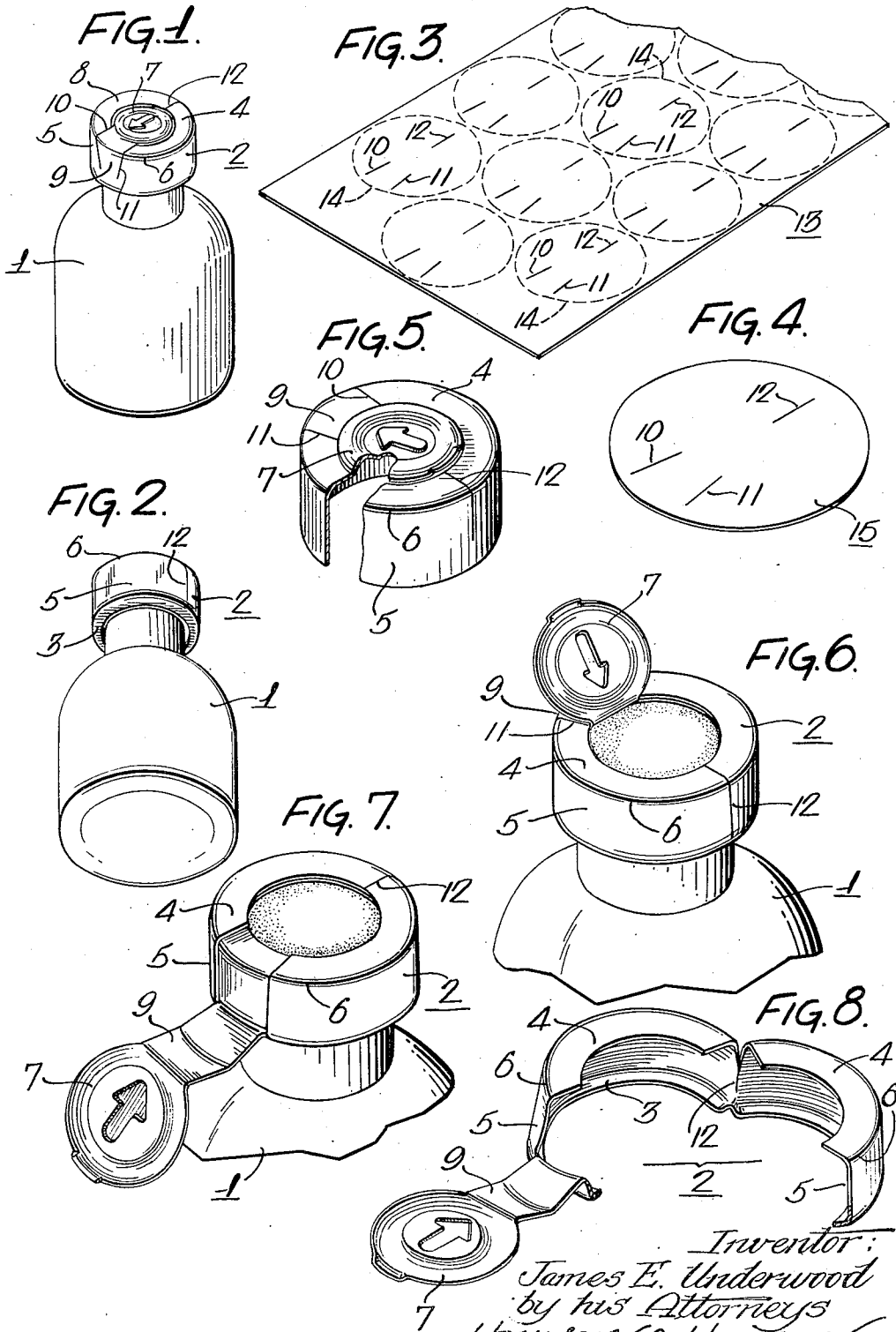
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METHOD OF MAKING TEAR-OFF CONTAINER CAPS

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METHOD OF MAKING TEAR-OFF CONTAINER CAPS

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This invention relates to tear-off container caps such as those employed as the outer cap of cap structures commonly used on pharmaceutical bottles. The common form of such a cap has a hinged tab which is raised to tear the cap off of the container. Such a cap is unusually provided with score lines to cause fracture along those lines of the soft metal of which the cap is composed. The score lines are very important as they greatly facilitate the removal of the cap and minimize the possibility of injury to the fingers during the cap removal.

Tear-off container caps of the type mentioned are formed from flat sheets of soft metal such as aluminum, by a stamping and forming operation. As heretofore manufactured, such caps have been provided with score lines during the stamping and forming operation. In order properly to serve their purpose, the score lines should extend both along the top and down the side wall of the cap. However, the scoring of the cap during the stamping and forming operation, as heretofore practiced, results in a discontinuity of each score line at the rounded or bent portion of the cap where the side wall joins the top. This discontinuity of the score lines tends to defeat their purpose and is therefore objectionable. It makes removal of the cap difficult and sometimes results in irregular tearing of the cap and causes injury to the fingers of the user.

The principal object of the present invention is to overcome the above-mentioned objection and to provide a tear-off cap which is far superior to prior caps of this type manufactured according to the prior method above mentioned. The aforementioned object is achieved by the provision of a novel method of forming tear-off caps, which method is principally characterized in that the score lines are formed in an initial pre-scoring operation prior to the stamping and forming of the cap. By this method, it is possible to provide continuity of the score lines throughout the entire length thereof and over the rounded or bent portion of the cap. This results in a much better cap structure, particularly from the standpoint of ease of removal.

Another object of the invention therefore, is to provide a novel and improved tear-off cap having score lines which are continuous throughout their length as above-mentioned.

The invention may be more clearly understood by reference to the accompanying drawing in which:

Figs. 1 and 2 are perspective views of a bottle having the novel tear-off cap applied thereto;

Fig. 3 is a perspective view of a flat sheet to which score lines have been applied by means of a pre-scoring operation in accordance with the invention;

Fig. 4 is a perspective view of a pre-scored blank from which a cap is formed;

Fig. 5 is a perspective view of a formed cap

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prior to the application thereof to a bottle or container; and

Figs. 6 to 8 are perspective views illustrating the removal of the tear-off cap.

Referring first to Figs. 1 and 2, there is shown a bottle 1, to the head of which a tear-off cap 2 is applied. As shown in Fig. 2, the lower portion of the cap is turned inward as at 3 to secure the cap to the bottle in accordance with common practice. As may be seen in Fig. 1, a tear-off cap of the type with which the present invention is concerned comprises a top 4, a side wall 5 integrally joined to the top along the rounded or bent portion 6, and a removal tab 7 which is hingedly jointed to the outer annular portion 8 of the top along a hinge portion 9.

As hereinbefore mentioned, it is customary to provide score lines in such a tear-off cap to facilitate removal thereof. Usually there are two score lines adjacent the hinge of the removal tab, and there is a single score line opposite said hinge. In Fig. 1, two score lines 10 and 11 are shown adjacent the tab hinge 9, and a single score line 12 is shown opposite said hinge. As previously mentioned it is desirable that these score lines extend along the top and down the side of the cap. In accordance with the present invention, the cap is formed so that these score lines are continuous throughout their length.

Referring now to Figs. 3 to 5, in accordance with the present invention, the score lines are provided in a prescoring operation prior to the formation of the cap. In Fig. 3 there is shown a flat sheet 13, preferably formed of soft metal such as aluminum, in which groups of score lines have been provided in different areas or sections of the sheet from which a plurality of caps are to be stamped and formed. Each group of score lines comprises the two lines 10 and 11 and the opposite single line 12, the three lines being properly arranged in relation to one another. The areas or sections of sheet 13 from which the caps are to be stamped and formed, are indicated in Fig. 3 by the broken line circles 14. It will be understood of course, that these lines do not necessarily represent actual markings of the sheet 13. The score lines 10 and 11 diverge outwardly toward the periphery of each of the circular or disk-like portions defined by the broken line circles 14, and are disposed on opposite sides of a true radial line extending from the center of each circular portion. The score lines 10 and 11 terminate just short of the peripheral edge and short of the center of each circular portion, the inner spaced ends of these score lines 10 and 11 defining the hinge portion between the top portion and tab when the circular portion is stamped and formed with the finished cap. Preferably, the score line 12 is opposite the pair of score lines 10 and 11 and may be positioned on a radial line continued from the true radial line between the score lines 10 and 11.

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Following the pre-scoring step, the caps are formed in a stamping and forming operation, each cap being of the form shown in Fig. 5. Fig. 4 shows a single blank 15 from which a cap is formed, such blank corresponding to one of the circular areas or sections represented by the broken line circles 14 in Fig. 3.

The pre-scoring operation may be performed in any suitable manner as long as the score lines are properly located. In practice, it has been found convenient to perform the pre-scoring operation by means of two die blocks, one above the other, the upper die block having scoring knives and being made of very hard steel, and the lower die block being plain and made of softer metal. The depth of the score is controlled by the height of the scoring knives. In the apparatus employed, the indexing of the score lines is accomplished by means of roll feed mechanism on the stamping press.

It should be noted that the pre-scored lines 10 and 11, as shown in Figs. 3 and 4, are disposed at a small angle relative to one another, and that such lines diverge outwardly toward the periphery of each of said circular portions on opposite sides of a true radial line extending from the center of each circular portion. Such divergence, which is clearly shown in Figs. 3, 4 and 5 of the accompanying drawings, is an important feature of the present invention as the stamping and forming operation performed on the pre-scored blank and which results in the formation of the depending flange of the cap, causes a flow of metal which results in the convergence of the score lines from the top of the depending flange toward the bottom thereof as shown in Fig. 1. In other words the diverging score lines 10 and 11 which terminate just short of the periphery of the circular portion from which the cap is formed, become downwardly converging score lines in the depending flange of the cap due to the flow of metal caused by the stamping and forming operation. The purpose of this is to produce a desired truncated V arrangement of the score lines in the depending flange of the finished cap as may be seen in Fig. 1 it being noted that such truncated V portion defined by the downwardly-converging score lines terminates just short of the lower edges of the depending flange. When such a cap is torn off the container to which it is applied, the metal has a natural tendency to tear along a V and the arrangement of the score lines as shown utilizes such tendency to advantage. In other words, the score lines guide the fracture of the metal along natural paths.

By virtue of the construction of a tear-off cap in accordance with the above-described method, the score lines are caused to be continuous throughout their entire length. Thus, as may be seen in Figs. 1 and 2, the score lines 10, 11 and 12 extend around the bent portion 6 of the cap and do not have any discontinuity at said portion which has been an objection in prior caps of this type, as hereinbefore mentioned.

In tearing such a cap off of a container, as illustrated in Figs. 6 to 8, the removal tab 7 is first raised about its hinge 9 and is then pulled over the side of the container head and then pulled circumferentially. During this removal operation, the metal of the cap fractures along the score lines 10 and 11 and bends readily at the score line 12 so that the cap comes off of the container substantially in the form shown in Fig. 8. It will be apparent that the continuity of the

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score lines provided by the present invention greatly facilitates the removal of the cap, there being no points of increased resistance to tearing along the score lines.

It will be apparent that the invention is susceptible to modifications and is not limited to details either of the method of forming the cap or of the cap structure itself.

I claim:

1. In the manufacture of a tear-off container cap of the type comprising a top portion, a removable tab forming a central part of said top portion and joined thereto by a hinged portion, and an integral annular flange depending from said top portion, and in which removal of the cap involves the raising of the tab and the pulling of the same from the hinge portion across the top of the cap and down the depending flange thereof, the method which comprises forming in a flat sheet of soft metal groups of score lines within circular portions of the sheet from which the caps are to be formed, each group comprising a pair of spaced score lines which diverge outwardly toward the periphery of each of said circular portions on opposite sides of a true radial line extending from the center of each circular portion, each of said spaced score lines terminating just short of said periphery and short of the center of each circular portion, and stamping and forming from each prescored circular portion a cap structure of the type defined and including a central tab portion and a depending flange with the hinge portion of the tab defined by the inner ends of the pair of score lines, the stamping and forming operation resulting in a flow of metal in the depending flange portion of the cap which causes the previously diverging score lines on that portion of the circular portion from which said depending flange is formed, to converge downwardly from the top toward the bottom of said flange to form a truncated V-shaped tear off portion on said flange which terminates just short of the lower edge of said flange.

2. In the manufacture of a tear-off container cap by the method defined in claim 1, the additional step of forming on each circular portion from which a cap is made, a third score line on that portion of the circular portion opposite said pair of diverging score lines, said third score line terminating just short of the periphery and short of the center of said circular portion and being located on a true radial line continued from the true radial line between the pair of score lines opposite said third line.

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