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2,760,671 CAPSEALS FOR CONTAINER CLOSURES

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2 Sheets—Sheet 1

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

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CAPSEALS FOR CONTAINER CLOSURES
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This invention relates to caps/seals for container closures and particularly to such caps/seals as are customarily used for the sealing of closures employed on barrels and drums. In the art of cap/sealing barrels and drums it is desirable to employ caps/seals which are not only tamper-proof, i.e., cannot be removed without being sufficiently destroyed to make that removal obvious, as well as being leak-proof. A high degree of perfection has heretofore been achieved in this art by means of caps/seals which are internally scored and have effective gaskets secured therein. To achieve this perfection economically, however, it was necessary, employing the available gasket materials, to have the gaskets preformed prior to application to the caps/seals and to interrupt the scores at the position where the scores would otherwise cross in back of or underneath the gaskets. Otherwise, particularly where caps/seals were used without plugs as the sole closures for openings, leakage could take place along the scores in back of the gasket.

By interrupting the scores, where the gasket crossed them, this likelihood of leakage was precluded but did introduce difficulties into the removal of the seals. Such seals would normally be removed by puncturing the tops thereof and tearing along the score lines. Considering that these caps/seals are made of relatively strong and thick material as against the sort of light weight material used on bottle caps, it is obvious that there would be occasions when one would find it difficult, in tearing the metal, to jump from the scored part of the top of the cap/seal across the un-scored gasket zone thereof, so that the tearing could be continued down the skirt. Alternatively it was proposed to provide tearing tabs extending from the free edge of the skirt so that the tearing could be commenced from there rather than making it necessary to puncture the top and tear by grasping the material between the score lines. This did no better while the score was interrupted at the position beneath the gasket.

Various ideas were advanced for eliminating this problem but none of them can become successful until the advent of the instant invention. The instant invention not only facilitates the removal of caps/seals but also does so in a manner which, at the same time, includes any likelihood of leakage due to the score line. It enables the score lines to be continuous and enables a variety of score patterns to be employed which were heretofore unusable. It nevertheless does this in a manner which is simple and economical and, in addition, assures that the gasket will stay in place in the cap/seal and will not fall out in shipment, as is likely to happen with prior art caps/seals having pre-formed gaskets.

The caps/seals of the invention are formed with continuous score lines and those score lines, and the cap scored, are provided with internal gaskets by flowing the gasket material into the caps. This is done with the gasket material in sufficiently fluid state to enable it to flow into and fill the score lines where the gasket crosses them. Thus continuous score lines are used, leakage in back of the gaskets is precluded, since the score lines are filled up at that position. The filling is merely by means of gasket material, so, while leakage is prevented, the ease of removal provided by continuous scores is in no way interfered with.

It is accordingly a principal object of this invention to facilitate the removal of applied caps/seals from container closures.

Another object is to facilitate that removal while, at the same time, precluding the likelihood of leakage while those caps/seals remain applied.

Another object is to increase the number and types of possible scorings which may be applied to caps/seals for removal purposes.

Another object is to provide for the gasketing of caps/seals over wider range than was heretofore thought possible.

A more detailed object is to enable gasketed caps/seals to be continuously scored without allowing leakage behind the gaskets thereof.

Further and more detailed objects will in part be obvious and in part be pointed out as the description of the invention, taken in conjunction with the accompanying drawings, proceeds.

In that drawing:
Fig. 1 is a top plan view of the preferred form of cap/seal in accordance with the invention.
Fig. 2 is a bottom plan view thereof.
Fig. 3 is an elevation thereof looking at Fig. 1 from the right hand side.
Fig. 4 is a fragmentary section taken on lines 4—4 of Fig. 3 and looking in the direction of the arrows.
Fig. 5 is a fragmentary section taken on lines 5—5 of Fig. 1 and looking in the direction of the arrows.
Fig. 6 is a fragmentary section taken on lines 6—6 of Fig. 1 and looking in the direction of the arrows.
Fig. 7 is a fragmentary vertical section of a closure complete with closure plug, showing the cap/seal of Fig. 1 applied thereto.
Fig. 8 is a view, similar to Fig. 5, of a cap/seal formed with a gasket continuous all over the inner surface thereof.
Fig. 9 is a view, similar to Fig. 1, of a modified form of cap/seal omitting the ears or tabs.
Fig. 10 is a vertical section taken on lines 10—10 of Fig. 9 and looking in the direction of the arrows.
Fig. 11 is a fragmentary vertical section taken on lines 11—11 of Fig. 9 and looking in the direction of the arrows.
Fig. 12 is a top plan view of a cap/seal similar to that of Fig. 1 but employing a modified form of scoring.
Fig. 13 is a bottom plan view thereof.
Fig. 14 is a view similar to Fig. 12 of a cap/seal embodying a further modification of scoring.
Fig. 15 is a bottom plan view of the cap/seal of Fig. 14.
Fig. 16 is a top plan view of a cap/seal employing a further scoring modification; and
Fig. 17 is a bottom plan view thereof.

The main parts of the preferred form of caps/seals, shown in Figs. 1 through 6, are the disc-like top generally indicated at 1 and the downwardly extending surrounding skirt generally indicated at 2. The top 1, as here shown, has a center portion 3 surrounded by a depressed portion 4. In the reverse, this may be considered as the center portion 3 being raised to encompass the head 5 of a plug 6 as seen by reference to Fig. 7. The invention is not, however, limited by this relationship of raised and depressed portions since the relationship here is solely for the purpose of encompassing the particular plug 6 and effecting a gasketing action against the head 7 of the flange 8 into which the plug 6 is threaded. Other forms of plugs might well require different cap top formations to encompass them. Thus the various formations that the top could take could include a top that is a com-
3. completely flat disc, without any depression, a top whose center section 3 was raised considerably more than that shown in order to encompass a plug with a raised head, or head with raised formations thereon or the reverse where the center section is depressed. It is to be understood then that the relationship here shown and described is more illustrative and that a well known form of plug and flange relationship have been selected to assist in that illustration.

The skirt generally indicated at 2 is cylindrical in formation, as indicated at 9. It extends laterally with respect to the head 1, departing from the depressed portion 4 thereof in a radius 10. The cylindrical portion 9, as best illustrated in Fig. 1, should preferably be of sufficient length that, when the capseal is crimped in place over the container wall opening, the bottom edge 11 of the skirt will either engage, or come so close to engagement, with the upper surface of the container wall material 12, at the position 13, as to preclude the insertion therebeneath of a tool capable of prying the capseal loose without destroying it.

The capseal here shown is provided with tabs 14 and 15 which are formed as a continuation of the skirt 2 and extend outwardly from the edge 11 thereof. Preferred scores 16 is a pair of these tabs 14 and 15, one at each end of a diameter of the cap one or the other may be omitted if desired. Furthermore one of the tabs is preferably perforated, as shown at 16, for the attachment of a suitable tag or label.

It is desired that capseals, in accordance with the invention, will give protection against unauthorized removal and, consequently, against pilferage or contamination of the contents of the container. It is also desired that they provide a liquid-tight seal against leakage of the contents of the container, as well as against breaching or sticking in of moisture vapor or other impurities from the outside should the plug gasket 17 fail in any way or should the capseal be employed without the plug. It is nevertheless desired that such capseals be readily removable in authorized manner. This authorized removal should be capable of being performed easily and quickly without too much effort on the part of the workman and without the possibility of the workman cutting or otherwise injuring himself.

Authorized removal is provided for in accordance with the invention by a pair of continuous parallel scores extending into the material of the capseal for a substantial distance from the inner surface thereof. These scores are shown in the edge 11 of the skirt 9 as best shown at 18 and 19 in Fig. 6, with that commencement being in alignment with the departure of the sides of the tab 15 from the edge 11. From there the scores extend preferably in parallel relationship up the skirt at 20 and 21, run continuously around the radius 10, across the depression 4, up under the top 3 and across that top in parallel portions 22 and 23 to the opposite side of the skirt where they continue on downwardly to terminate at the free edge 11 in alignment with the sides of the tab 14.

Preferably these scores are actual die cuts made in the material rather than being mere distortions of the material. This preference is dictated by several factors. One is that the material is of such thickness that mere ribbing or embossing of the capseal material would not effect a weakening of it to an extent to enable the capseal or head to readily destroy. Furthermore such ribbing would project upwardly from the outer surface of the capseal and would thus interrupt or interfere with the showing of the customer's trade mark with which the tops of these capseals are usually lithographed. This is important, for the fillers of drums who capseal their tanks, all caps carrying for identification, want that identification to stand out clearly and to make as good a showing as possible. When the scoring is by means of an actual die cut into the material, such drawbacks are eliminated. In other words

4. the capseal, while making a tight closure prior to destruction, is fully effective for the purpose intended but, at the same time, may be readily destroyed by grasping one of the ears and pulling it up the skirt and across the top. Furthermore such die cutting leaves the top surface substantially smooth and uninterrupted. The cutting, as best shown at 20 and 21 in Fig. 4, and at 22 and 23 in Fig. 6, is in the form of a sharp deep V. The forming of such a cut has balanced the prior art efforts to provide economical gasketing for the prevention of leakage.

In the gasketing of prior art capseals against leakage, preformed gaskets were used which were placed in the capsceals and secured there by means of a suitably adhesive. The materials employed, to be effective for gasketing purposes, had to be resilient. Such materials as could be economically provided were relatively incapable of flowing out of their normal shape into small spaces and staying there. Thus if a score, or small depression, in the material passed by in back of the gasket, there was no assurance that the gasket material would be forced into such score or depression to sufficient extent to close it off against leakage or breathing in of moisture. Hence the only really safe course was to interrupt the skirt portion carrying said gasket material so as to prevent the inner surface of the capseal. This interruption immediately rendered the capseals difficult to remove and practically precluded the use of tabs for removal, since the skirt portion, carrying the tab, would be likely to tear off at the top of the skirt, whereas tearing across the disc-like top of the cap was necessary to enable the capseals to be removed effectively. Furthermore, such gaskets being preformed rather necessarily, from the practical and economic standpoint, had to be of rectangular shape in cross-section, to facilitate such forming. Thus they could not be contour on their outer faces to fit the recess thereupon and to fill the opposed surface.

All of these drawbacks have been eliminated by the gasketing of capseals in accordance with the instant invention and additional improvements have been introduced into the art thereby. Here, as already pointed out, the scoring of the capseal is continuous from one free edge of the skirt up over the top of the cap and down to the opposite free edge. Thus, if the scoring were not filled at the positions where the gasket crossed it, the likelihood of leakage would be present. The capseal of the invention is scored in the flat with continuous scores. Then it is formed into the cup-shape. Next it is seated on a suitable holder and spun at a substantial rate of speed while gasketing material, in fluid form, is introduced into it around the border of the top beneath the depression 4. The gasketing material is such as to be capable of flowing freely into desired position while in the fluid form but which material, after a quick curing, hardens up into a resilient, fully effective gasket. Such a gasket is shown at 24 in Figs. 2, 4, 5 and 6. From that showing it is clear that the gasket lies across the open scores. It is further seen, from the enlarged showing in Fig. 4, that V shaped sections of the gasket material have flown into and filled the score sections 20 and 21 at 25 and 26. Nevertheless there is no resulting deformation on the outer surface 27 of the gasket but, rather, that follows in a continuous smooth curve.

Not only does the gasket material flow into the portions of the score 20 and 21, which run up the skirt 9, 10 and under the depression 4 and fills the score wherever it overlaps it. This takes place even though, as best seen in Fig. 5, the exterior surface of the gasket adopts a rather smooth curve formation commencing at a thin edge at 28, thickening as it proceeds upwardly and terminating in another thin edge at 29.

The outer contour of the gasket just referred to is of importance from the standpoint of the manner in which the finished gasket flows when the capseal is secured in place on a closure. This feature is illustrated in Fig. 7
where the capseal gasket 24 starts by engaging with the rim of the plug head 5, extends between the depression 4 of the capseal and the top of the flange head 7 and follows around that bead, between it and the radius 10, and part way down the skirt, terminating adjacent the lower end of the bead. Thus, regardless of possible surface irregularities of the flange head, the gasket follows the surface of that bead around to sufficient extent, and is held against it by the cap in such a manner, that surface irregularities are filled in and effective gasketing is assured. The gasket is trapped and can flow only around this curve since its inner end comes against the plug head 5 and its outer or bottom end is trapped between the bead and the cap skirt where the cap skirt turns in to underlie the bead.

Oftentimes, capable of being applied as above described and operable to flow when cured as described, is Durex compound presently marketed by Dewey and Almy Chemical Company. The invention is not so limited, however, but, rather, it embraces the various materials suitable for this purpose. Generally speaking the material should be of a nature that, when initially heated, it will be substantially fluid but, when cooled from such fluid state, it will turn into a rubber-like jelly and remain permanently that way.

As an alternative to the Fig. 1 system of removing the capsseals by grasping a tab and tearing up the skirt, an additional transverse score is provided at 30, preferably in the center of the cap top. This score is formed into the material of the cap thereof and stops just short of the parallel scores 22 and 23. The seal may be destroyed and removed, through the use of this score, by merely driving a screwdriver through the score 30, prying up the material of the seal at one side of the break and tearing along the parallel scores by using pliers or other suitable gripping instrument.

An alternative form of gasketing for the form of continuously scored capseal, of Figs. 1 and 2, is shown in fragmentary section in Fig. 8. Here the gasketing material 31 not only lies part way up the skirt 9, as shown at 32, around the radius 10, as shown at 33, and across the depressed part 4 but, also, continues up the incline, as at 33, to lie underneath the raised top portion 31 and all the way across such portion. Thus the gasketing material forms a complete covering over the inner surface of the capseal and fills the scores throughout the whole of their extent from the outer end of the bead 7, inward over the whole of the cap surface.

Heretofore, even with scores interrupted at the normal gasket seat it has been difficult to protect the contents of the container, particularly where no plugs were used, from getting in contact with the raw metal in the scores. Dies, if used, sometimes made up of layers of different materials, but little success was achieved in finding a commercial, economical arrangement. By adopting the Fig. 8 form, however, the problem is completely solved, all in one application of gasketing material.

In gasketing the cap of the Fig. 8 form, the fluid material is applied to the cap in the proper position while the cap is spinning. This causes a layer of adequate thickness to be formed over all of the surface of the cap, including the filling of the scoring. In addition the centrifugal force involved causes the gasketing material to build up to the form of a full gasket at 32, substantially the same as the gasket 24 of the previous form. Thus the contents of the container are protected from coming in contact with the metal of the cap and particularly from contacting that metal which might otherwise be in the raw unfinished state, having been scored. The gasket material here, due to its nature and manner of application, adheres to the inner surface of the cap throughout the same as does the gasket 24.

In the modification shown in Figs. 9, 10 and 11 the construction is the same as that shown in Figs. 1 through 6, except that the tabs 14 and 15 have been omitted.

The same reference characters have been accordingly used. The starting positions 18 and 19 of the score portions 20 and 21 are properly spaced on page 11 positions rather than being on either side of a tab, as in the previous figures. Again the continuous scores are filled by the extending portions of gasket 24, where that gasket overlaps them. The scores continue across the top in scored portions 22 and 23 and then run down the opposite side. Removal of this capseal must, however, be achieved by fracturing the cap along the cross-score 30 by then grasping the material on one side of the fracture and tearing along the lines 22 and 23.

A capseal with another form of highly effective scoring, which, however, could not heretofore be employed, is shown in Figs. 12 and 13. Like the capseal of Figs. 1 and 2 this cap has a disk-like top 31 recessed downward at 32, with a lateral extending skirt 33 around its periphery and with tabs 34 and 35 extending outwardly from the edge thereof. Parallel scores are formed in the skirt commencing in alignment with each side of the tabs as indicated at 36 and 37. These scores extend up the skirt and turn inwardly under the recessed portion where they communicate with scores 38 and 39. The score 39 extends continuously across the top of the cap into engagement with the side score at the opposite side of the opposed ear 34, while the scores 38 extend in parallel relationship for a substantial distance across the top but terminate at ends 40 just before they come into engagement with the diagonal score 39. Again a gasket 41 is flowed into the cap around the periphery of the interior thereof, filling the scores 38 and 39 where it crosses them.

This form of scoring takes advantage of the natural inclination to tear the material along somewhat of a diagonal, thus makes the job of tearing a little easier for the workmen. Furthermore the cap is somewhat stronger since only one score line extends all the way across it. A further modification of scoring is illustrated in Figs. 14 and 15. Here the top 42 is depressed at 43 and has a laterly extending skirt 44 projecting downwardly the same as the previous forms. Tabs 45 and 46 extend outwardly from the bottom edge of the skirt 44 and score lines commence at either side of the tabs 45 and 46, as shown at 47 and 48, extending up the skirt and around on top of the same. These scores may be parallel as they extend up the skirt but may also converge somewhat in that extent. From the top of the skirt, however, the continuing scores converge sharply as seen at 49 and 50, and end up in a single score portion 51 that latter extends across the center of the cap to the opposite pair of converging, or, in this instance, diverging scores. Again a flowed-in gasket 52 borders the interior of the cap and fills the diagonal scores 49 and 50 where it crosses them as well, of course, as filling the portions of the skirt scores 47 and 48 where it overlies them.

Normally the tearing of one tab to where the scores 50 and 49 converge into the line 51 should be sufficient to enable this cap to be lifted off. If not, however, a rap on the line 51 would cause it to fracture and the cap to pop off.

An extension of the idea of a single score line is illustrated at Figs. 16 and 17. Here the cap, like that of Fig. 9, is devoid of tabs, has a top 53 with a depressed portion 54 therearound and has a laterly extending skirt 55 extending downward from the portion 54. Here a single internal score runs up inside of the skirt, at one end of a diameter, runs across around the top and down the skirt at the opposite end of the diameter. A flare in gasket 56 fills the portion of this scoring, extending across the top where the gasket overlies it and, also, fills the portion extending down the skirt on each end of the diameter where the gasket extends down alongside that skirt.

This capseal is highly effective when applied, and it may be removed with remarkable ease. A sharp rap on
the score portion 57 running across the top of the cap, not only fractures that portion but is also likely to fracture one or both of the portions 58 running down the skirt. This results in the cap popping off without any more needing to be done.

From the foregoing description of the structure it will be appreciated that substantial improvement is introduced into the art of capsule for container closures, particularly those used for the sealing of steel barrels and drums. It will be apparent, however, that though several embodiments of the invention have been shown and described the invention is not necessarily limited thereby but encompasses also such other embodiments as might suggest themselves to one skilled in the art. It is accordingly to be understood that the foregoing description of the invention, taken in conjunction with the accompanying drawing, is to be construed in an illustrative and not a limiting sense.

Having described my invention what I claim as new and seek to obtain letters patent for is:

1. A capsule for container closures comprising a disc-like top with a laterally extending skirt therearound, a tearing ear forming part of said skirt and extending away from the free edge of the same, a pair of internal score lines formed into the material of said skirt and extending continuously from said skirt across the position where said skirt and top are joined and part way across said top, said score lines commencing at the free edge of said skirt, one on either side of said ear, a gasket of resilient gasket material formed in situ in the peripheral trough shaped channel formed by the juncture of said top and skirt and secured to the surface of said channel, said gasket crossing said score lines and having portions extending integrally therewith and outwardly from the outer surface of said gasket, said portions being formed for mating and filling engagement with said scores where said scores and gasket cross, said portions extending into said scores and filling the same.

2. A capsule for container closures comprising a disc-like top with a laterally extending skirt therearound, a pair of tearing ears forming part of said skirt and extending outwardly from and away from the free edge of the same at diametrically opposed positions with respect to said top, a pair of parallel internal score lines formed into the material of said skirt and top and extending continuously from the edge of said skirt, across the position where said skirt and top are joined, across said top and down the opposed side of said skirt, said score lines commencing and terminating at the free edge of said skirt, one on either side of said ears, a gasket of resilient gasket material formed in situ in the peripheral trough shaped channel formed by the juncture of said top and skirt and secured to the surface of said channel, said gasket crossing said score lines and being formed with transversely extending raised portions mated to the opposed portions of said scores, said raised portions extending into said scores and filling the same.

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