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| [45] | Patented | Mar. 30, 1971 |
| [73] | Assignee | American Can Company
New York, N.Y. |

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- Primary Examiner*—George T. Hall
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- [54] **SCORED PERIPHERAL TEAR STRIP WITH
RECLOSURE LID**
5 Claims, 10 Drawing Figs.
- [52] **U.S. Cl.**..... **229/51,**
220/54, 150/5
- [51] **Int. Cl.**..... **B65d 17/24**
- [50] **Field of Search**..... **229/51**
(IS): 150/5; 220/54, 27; 215/46.5

ABSTRACT: A thermoplastic container and lid are heat-sealed together through clamping jaws. During the sealing operation a pair of offset scores are applied to flanges on the container and lid, which are heat-sealed. The scores facilitate severance of the sealed flanges for opening the container. Offset knives heated by the clamping jaws form the offset scores and leave a tab on the lid by which the lid may be readily removed and replaced subsequently when desired.

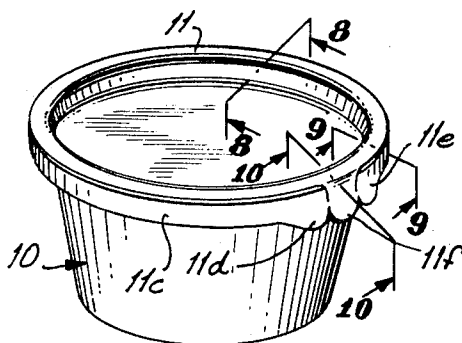


FIG. 1

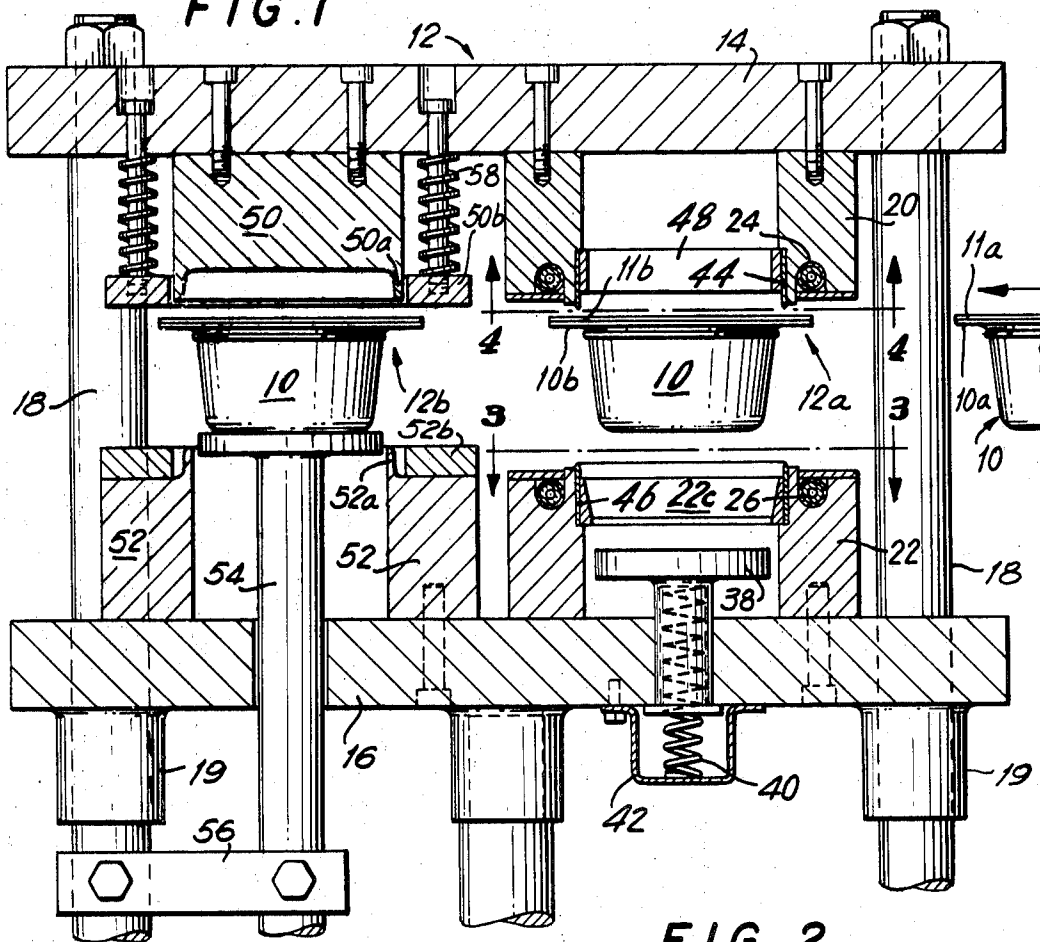
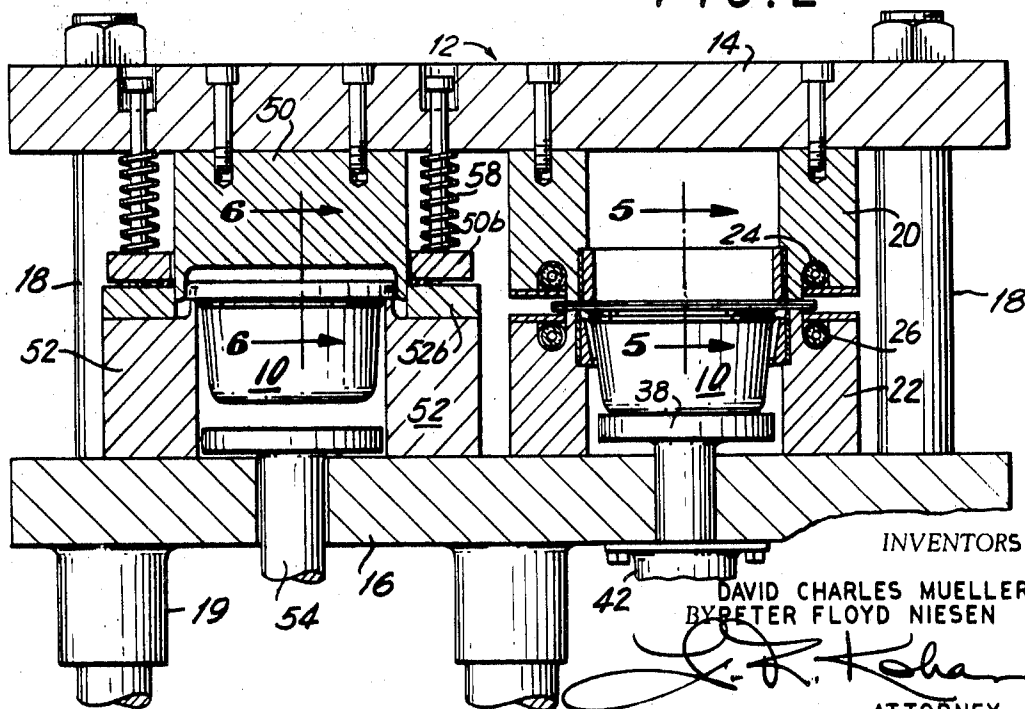


FIG. 2



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FIG. 3

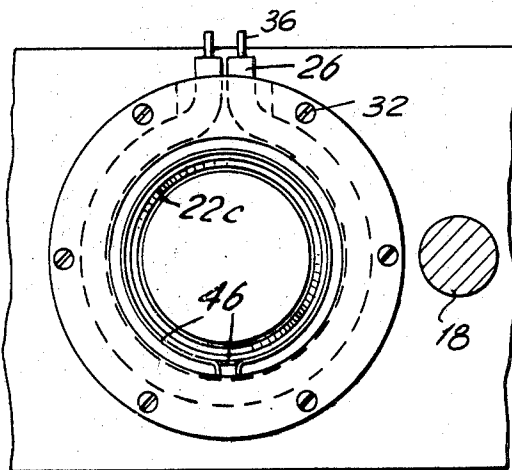


FIG. 4

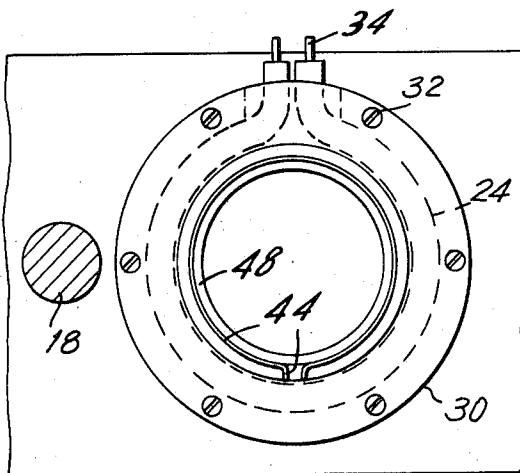


FIG. 5

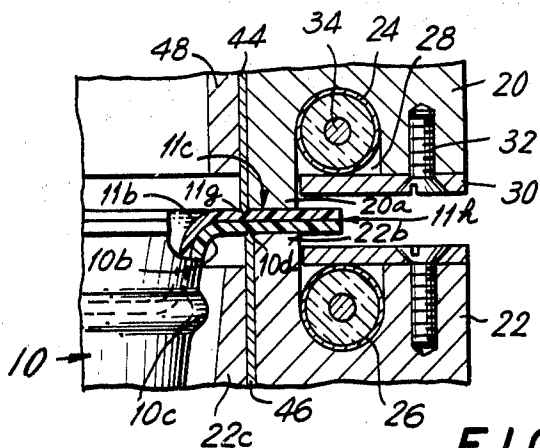


FIG. 6

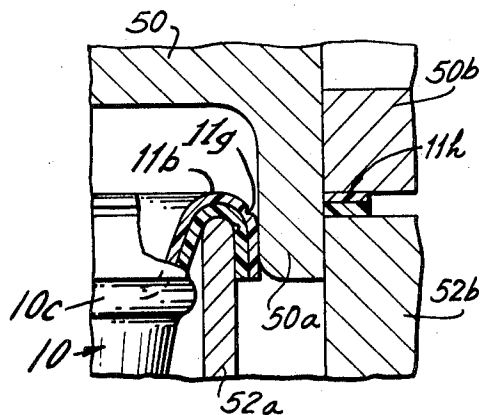


FIG. 8

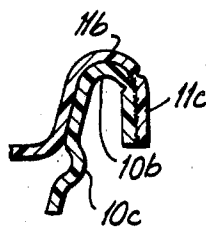


FIG. 7

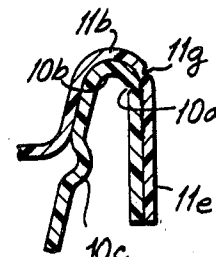
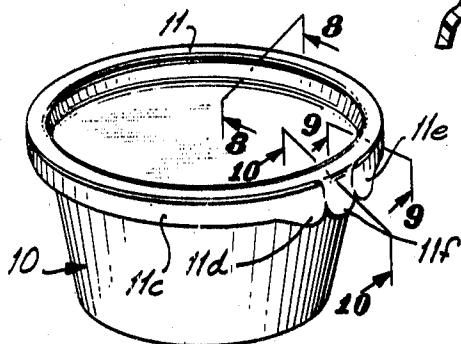


FIG. 9

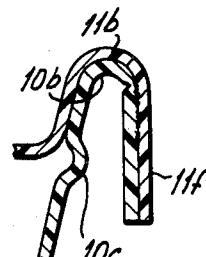
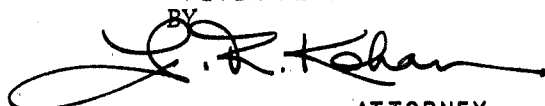


FIG. 10

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SCORED PERIPHERAL TEAR STRIP WITH RECLOSURE LID

BACKGROUND OF THE INVENTION

In the manufacture of containers for the storage and transportation of foods or liquids, it is often required that these containers be fully sealed against the outer atmosphere after being filled with the selected contents. When such a container, after having been sealed, reaches the consumer, it is advantageous for the consumer to be able to open the container without having to apply any specific tools such as knives or can openers. At the same time, it is helpful to the consumer if he is not required to read elaborate instructions prior to opening the container, or to exercise skill to remove the cover or lid from the container without destroying the package or spilling its contents. It is further useful if such a container enclosing consumer products is of the disposable type so that it may be economically discarded after use. It is also essential that the container not react with the contents or contaminate the latter by dissolving impurities therein. Thus, a container of the preceding species should be a low-cost item which is disposable and which is chemically inert in relation to the contents to be stored within the container. Accordingly, the manufacturing process by which the container and lid or closure are fabricated should be simple, low in cost, and adaptable to large volume production at high speed.

It is therefore an object of the present invention to provide a container and closure equipped with flanges heat-sealed together and scored so as to facilitate removal of the sealed flanges without required special tools or skills.

It is also an object of the present invention to form a tab on the closure or lid by which the latter may be readily removed from the container and subsequently replaced, if desired.

A specific object of the present invention is to form a tear strip from the sealed flanges of the container and lid by applying offset scores to the container and lid.

A further object of the present invention is to provide a process by which a thermoplastic container and lid are heat-sealed together through flanges provided on the container and lid, and applying simultaneously hot scoring knives to form a line of weakness and thereby facilitate severance of the sealed flanges for opening the container.

Another object of the present invention is to apply a trimming and curling operation through essentially one method step after the flanges of the container and lid have been sealed and scored.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

SUMMARY OF THE INVENTION

An easy-opening thermoplastic container package in which an open-ended container is provided with a flange portion adjoining the rim of the open end of the container. This flange portion is severable from the container rim along a score surrounding the open end of the container. A lid for closing the open end of the container is also provided with a lid flange juxtaposed on the flange of the container. A tab portion extends from the rim of the lid and is integral with the lid. The tab facilitates removal of the lid from the container and replacement of the lid on the container for its reclosure.

The lid flange portion surrounds the lid and is severable from the latter along a score. This score on the lid, however, does not pass through the tab, so that the tab is not readily severed from the lid. The scores in the lid flange and the container flange are slightly offset in relation to each other and designed so that the heat-sealed flanges form a tear strip which may be readily severed from the container package for the purpose of opening the container.

In the manufacture of the container package, thermoplastic containers and lids preformed from a flat sheet are transferred to a die station which clamps together the flanges of the lid

and container and applies heat so that the lid and container become permanently sealed together in the flange area. At the same time that this sealing process takes place, hot scoring knives are forced into the flanges to impress offset scores into both the lid flange and the container flange. After the sealing and scoring process, the sealed flanges are trimmed and curled so as to form a compact container package.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional elevational view of the die stations in which the container and lid are sealed together, scored, trimmed and curled, and shows the die stations in the inoperative or open positions for receiving the container and lid prior to processing, in accordance with the present invention;

FIG. 2 is a sectional elevational view of the die stations of FIG. 1 when in the operative or closed positions for carrying out the method steps of the present invention;

FIG. 3 is a partial plan view taken along line 3-3 in FIG. 1 and shows the method by which heat is applied to the sealing portions of the die stations and the scoring knives;

FIG. 4 is a partial view taken along line 4-4 in FIG. 1 and shows the cooperating heating and scoring arrangement lying cooperatively opposite the arrangement of FIG. 3;

FIG. 5 is an enlarged fragmentary view taken along line 5-5 in FIG. 2, and shows the method by which the flanges of the container and lid are heat-sealed together and scored in one operation;

FIG. 6 is an enlarged fragmentary view taken along line 6-6 in FIG. 2, and shows the trimming and curling operation for forming the container and lid into a compact package;

FIG. 7 is an isometric view of the combined container and lid when heat-sealed together;

FIG. 8 is a sectional view taken along line 8-8 in FIG. 7, and shows the relationship of the heat-sealed flanges with their offset scores;

FIG. 9 is a sectional view taken along line 9-9 in FIG. 7, and shows the relationship of tab portions on the lid flange and container flange heat-sealed together and forming a tear strip; and

FIG. 10 is a sectional view taken along line 10-10 in FIG. 7, and shows the relationship between the tab on the lid and the corresponding tab portion on the container, as well as the offset scores thereon.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

Referring to the drawing, a plurality of preformed containers 10 which have been formed from a thermoplastic sheet of material, are fed into a set of processing dies 12. The containers 10 project from a sheet or web 10a of assembled units. Thus, the containers 10 may be preformed from a single sheet which may contain, for example, an aggregate of eight container units. The covers 11 for these containers are similarly preformed from a sheet 11a of thermoplastic material so that a corresponding number of covers are made available and superimposed over the containers preparatory to sealing the covers onto the containers. Thus, the containers 10 are formed from the sheet 10a, whereas the covers are formed from the overlying thermoplastic sheet 11a.

The superimposed covers and containers are fed or transferred through a die set 12 wherein the operations of sealing and trimming the containers are carried out. The die set 12 includes two die stations, 12a and 12b, the first of these being die station 12a wherein heat is applied to the assembly for sealing the lid to the container and scoring lines are impressed in the assembly by which the plastic lid or cover may be readily removed to subsequently gain access to the contents within the container. The feeding or transfer of the webbed containers and covers or lids through the die stations 12a and 12b may be accomplished through conventional transfer and conveying means.

The die set 12 has a fixed upper plate 14 and a movable lower plate 16. The latter is guided in its motion with respect to the upper plate 14 through guide rods or shafts 18 which are fixed to the plate 14 and are inserted within bearings 19 of the lower movable die plate 16. These guide rods 18 guide the movable plate 16 so that it is maintained in proper alignment with respect to the upper plate 14. Accordingly, the bearings 19 are slidably movable along the guide rods or guide shafts 18.

When the container and associated lid are brought or transferred to the first die station 12a, a heating, scoring and sealing operation is applied to the combined container and lid. The container 10 has tapered sides terminating in a flanged rim 10b at its open end. The closed bottom of the container is integral with the sides of the container. In addition, a bead 10c surrounds the tapered sides of the container for purposes of reinforcement. The lid 11 of the container has a flanged rim 11b which extends over and lies directly above the flange 10b and in contact therewith.

The lid 11, moreover, has a tab 11f, as shown in FIG. 7, which facilitates the lifting of the lid from the container and replacing the lid to reclose the container when desired. When the container is sealed, a tear strip 11c, also shown in FIG. 7, surrounds the container along the lid. The tear strip 11c includes a portion of the lid and container which may be readily severed from the main body of the assembly through a score which has been applied during the sealing operation in which the lid is sealed onto the container. The tear strip 11c terminates in two tabs 11d and 11e which lie on opposite sides of the tab 11f. The presence of these two tabs 11d and 11e on the tear strip facilitate the tearing of this strip from either side of the tab 11f.

Accordingly, if the container is opened by gripping the tab 11d between the thumb and the forefinger, for example, the strip will tear from the assembly in a clockwise direction, when viewed from the top of the lid. When on the other hand, the tab 11e is similarly gripped, the strip will tear from the assembly in a counterclockwise direction.

Whereas the score separates the strip 11c from the assembly, no such separating score is applied to the tab 11f where it joins the flanged rim 11b of the lid. Such a score on the tab 11f is not desired since the tab is to be completely and permanently secured to and integral with the lid for removing the lid from the container after tearing the strip 11c from the assembly, and for subsequent replacement of the lid to reclose the container, if desired.

The details of the operation in which the lid is sealed to the container may be seen from the fragmentary enlarged view of FIG. 5. After the container 10 and corresponding cover 11 have been located in place at the first die station 12a, the lower movable plate 16 is moved upward until the die sections 20 and 22 are brought together as shown in detail in FIG. 5. In this position of the die sections, the flange portions 10b of the container and 11b of the lid are directly pressed together. Extensions of these two flange portions are heat-sealed to each other by the die sealing portions 20a and 22b.

Heat to these sealing portions of the die sections is provided by heating coils 24 and 26 within the die sections 20 and 22, respectively. These heating coils are held within recesses of the die sections and surround the container and lid to be sealed thereto. The heating coil 24, for example, is retained within the groove or recess 28 through a retaining plate 30 secured to the upper die section 20 by a threaded screw device 32, for example. A similar structural arrangement applies to the heating coil 26. Through the presence of these heating coils in the lower and upper die sections 22 and 20, heat is continuously supplied to the sealing portions 20a and 22b of the die sections. The heating coils may contain conventional heating elements 34 which have terminals 36 to which electrical energy may be supplied in the customary manner.

In view of the thermoplastic characteristics of the material used for the container and lid, the extended portions of the flanges 10b and 11b between the sealing portions 20a and 22b,

become permanently sealed together through pressure applied by these heated sealing portions of the die sections. After an appropriate dwell period which assures that the lid and container flanges have been properly heat-sealed together, the movable die plate 16 is drawn downward. To assure that the container 10 does not remain adhering to the lower die section 22, an ejection plunger 38 is provided. The plunger 38 is acted upon by a spring 40 which tends to maintain the plunger 38 in an upward position, in which the container 10 is ejected from the interior of the die section 22. To enable the spring 40 to act upon the plunger 38 in this manner, a cup-shaped member 42 is mounted on the plate 16 so that one end of the spring 40 can abut the interior of this cup-shaped member. The other end of the spring 40 abuts directly the plunger 38. An ejection mechanism of this type is required since the tapered sides or walls of the container 10 will tend to adhere to the tapered portion 22c of the lower die section 22, which holds the container in place during the sealing operation. Thus, the tapered portion 22c of the die section serves to locate the container accurately during the processing operations. At the same time, however, such tapered surfaces have the inherent characteristic of clinging or adhering to each other at the interface. As a result, the tapered surface of the container wall tends to inherently cling to or stick to the tapered surface of the die section.

During the operation in which the extended portions of the flanges 10b and 11b are heat-sealed to each other, scores are also applied to these flanges through scoring knives 44 and 46. The upper and lower scoring knives are offset from each other so that scores 11g and 10d are applied to the lid and container, respectively, in an offset manner. These scores are applied for the purpose of facilitating the removal of the tear strip 11c from the container assembly. The tear strip is composed of an extended portion of the lid flange 11b and the container flange 10b. This combined structure of the tear strip results from these two extended flange portions being heat-sealed together, as previously described. Accordingly, the composite tear strip may be removed as a unit by severing along the scores 10d and 11g. The knives 44 and 46 are held in contact with the die sections retaining the heating coils 24 and 26. The upper scoring knife 44 is held in place by a retaining ring 48 which presses the scoring knife firmly against the portions 20a of the die section so as to maintain the scoring knife properly located.

The scoring knife 44 and retaining ring 48 have ring-shaped or annular cross sections. The scoring knife 46 is held in place and pressed against the die portion 22b by the tapered die portion 22c which also serves the purpose of locating the container at the first die station. Since the die portions 20a and 22b are maintained at an elevated temperature by the heating coils 24 and 26, the scoring knives 44 and 46 are also heated as a result of being in contact with the die portions 20a and 22b. The heating of these scoring knives 44 and 46 facilitates the formation of the scores 10d and 11g when the die sections are brought together. The scores 10d and 11g are offset relative to each other to increase the structural strength of the partitioning portion which partitions the tear strip 11c from the container and lid. Thus, if the two V-shaped scores were to lie directly aligned and opposite to each other, the tear strip could accidentally sever from the container assembly because of the small amount of material left between the vertices of the scores. By somewhat offsetting the two scores 10d and 11g with respect to each other, a substantially larger amount of material or thickness is left between the vertex of each score and the oppositely lying exterior surface. As a result of this added thickness of the material on the opposite side of the score, greater structural strength of the score is realized. At the same time, no substantially greater force is required to sever the tear strip from the container and lid combination. Thus, the tear strip may be nearly as readily removed with the offset scores as with the design in which the scores are aligned and directly facing each other.

The flange portion of the container beneath the tab 11f is scored because the score 10d is continuous and forms a closed

path or closed score. The score 11g, however, is discontinuous in the respect that it does not extend over the tab 11f. The discontinuity in this score is necessary to maintain the tab 11f firmly secured to and integral with the lid proper. If the score 11g, for example, were to be continuous in a manner similar to that of the score 10d, the tab 11f could readily sever from its lid when pulled upward for the purpose of opening the container. If the tab were thus severed from the lid, it would then make removal of the lid somewhat difficult, for prying might be required at the interface of the lid and container to remove the lid in the absence of the tab. Accordingly, the score 11g is continuous with the exception of the portion which extends across the tab 11f.

When the tear strip 11c is removed from the lid, the scored tab of the container beneath the lid tab 11f will tend to remain attached to the container rim because the score through this lower tab is not severed when the tear strip is removed. When the tab 11f is lifted, however, for the purpose of removing the lid from the container, the force applied to this tab by the gripping fingers, for example, will tend to be sufficient to sever the connection between the lower tab and the container rim. Since this lower tab is heat-sealed to the under side of the cover tab 11f, it will be removed with the lid and will thereafter be a portion of the lid, serving thereby to give the tab 11f a double thickness.

After the extended flange portions of the container and lid have been heat-sealed together and scored, the die sections are parted through the downward motion of the plate 16, and the combined container and lid are transferred from the first die station 12a to the second die station 12b. In this second die station a curling operation is applied to the sealed flanges of the container and lid, after trimming or severing from the webs from which the container and lid were preformed. The trimming and curling operation is shown in detail in FIG. 6. For the purpose of performing the trimming operation, the upper die section 50 at the second die station has a trimming or cutoff portion 50a. When the lower die portion 52 is brought upward to mate with the upper die section 50, the trimming or cutoff portion 50a will sever the portion 11h from the tear strip 11c. This trimming or cutoff operation may also serve to sever the sealed lid and container from the respective webs 10a and 11a. As the die section 52 proceeds in its upward stroke or movement, the remaining portion of the sealed flanges are curled over the die portion 52a, as a result of the relative action between the trimming and curling die portion 50a and the curling portion 52a. Thus, during the upward stroke of the die section 52 the sealed flange portions are forced to curl over the die portion 52a, and thereby result in a curled-over portion of the tear strip which is substantially parallel to the axis of the container perpendicular to the bottom plane thereof. When the container stands on a horizontal surface after being thus sealed, the edge of the tear strip faces directly the horizontal surface upon which the container stands.

When the die sections of the second station are separated by the downward stroke or motion of the plate 16, at the end of the curling operation, the sealed container is prevented from moving downward with the die section 52 due to the presence of the fixed ejector 54. The latter is secured to the fixed guide rod 18 through a clamping bracket 56. This clamping bracket 56 secures the ejector 54 to the guide rod 18. Thus, when brought to the second die station 12b, the container will rest upon the ejector 54, or be in close proximity with the upper surface of this ejector. When the die section 52 is moved upward, the container remains essentially unaffected in its posi-

tion because the ejector is fixed in its location. When, subsequently, the die section 52 is moved downward at the end of the curling operation, the container is prevented from adhering or sticking to the lower die section 52, through the presence of the stationary ejector 54. The die portion 50b, which cooperates with the cutoff portion 50a to trim or sever the portion 11h from the sealed flanges of container and lid, is under spring pressure when the die section 50 and 52 are in closed position. Thus, the spring 58 abutting the fixed plate 14 and the die portion 50a applies a downwardly directed force to the portion 50a. When the two die sections 50 and 52 are brought together, the severed portion 11h is firmly squeezed between the upper cutoff portion 50b and the lower cutoff portion 52b. The spring force acting on the portion 50b due to the spring 58 assures neat and sharp severance of the tear strip 11c from the severed portion 11h. Firm gripping of the cutoff section 11h by the die portions 50b and 52b is necessary to obtain a clean severance of portion 11h and avoid a ragged cut edge of the finished container assembly.

It is thought that the invention and many of its attending advantages will be understood from the foregoing description and it will be apparent that changes may be made in the steps of the method described and their order of accomplishment without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

We claim:

1. A thermoplastic container package comprising, in combination:

- an open-ended container having a closed base and sides integral with said base;
- a container flange portion adjoining the rim of the open end of said container and severable from said rim along a score surrounding the open end of said container;
- a lid for closing the open end of said container;
- a lid tab portion extending from the rim of said lid and integral with said lid, said lid tab portion being sealed to said container flange portion adjacent and below said score surrounding the open end of said container, said lid tab portion being for removing said lid from said container by severing said score surrounding the open end of said container and for replacing said lid onto said container; and
- a lid flange portion adjoining the rim of said lid and said lid tab portion, said lid flange portion being sealed to said container flange portion and severable from the rim of said lid and said tab along a score in said lid flange portion, said score surrounding the open end of said container being offset from said score on said lid flange portion.

2. The thermoplastic container package as defined in claim 1 including a lid flange tab portion integral with said lid flange portion and adjoining one side of said lid tab portion, said lid flange tab portion being severable with said lid flange portion along said score.

3. The thermoplastic container package as defined in claim 2 including a further lid flange tab portion integral with said lid flange portion and adjoining the other side of said lid tab portion, said further lid flange tab portion being severable with said lid flange portion along said score.

4. The thermoplastic container package as defined in claim 1 wherein said sides of said container are tapered.

5. The thermoplastic container package as defined in claim 1 wherein said lid has a recess within said rim of said lid.