This invention relates to improvements in a self-conforming cover for containers, and more particularly to a self-conforming cover of the type highly desirable for use on paper containers of the so-called heavy duty or semi-heavy duty type utilized for the packaging of ice cream, cottage cheese, various frozen foods, carry-out foods such as potato salads, and other foods or commodities, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

This application is a continuation-in-part of my application entitled, "Self-Conforming Cover for Containers," filed December 19, 1955, Serial No. 554,096, now abandoned.

Containers made of thin plastic, or paper containers of the heavy duty or semi-heavy duty type made of relatively heavy paper are usually provided with substantially a frusto-conical shape, with the container wall inclined outwardly toward the mouth of the container, and the container is provided with an outwardly extending or turned rim bead around the mouth thereof. Where the container is made of paper, it may be wax covered, wax impregnated, plastic lined, or otherwise treated to render the container liquidproof.

Obviously, temporary containers of such type, and especially where they are used but once, insofar as the retail dealer is concerned, must be manufactured extremely economically. In the past, considerable difficulty has been experienced in providing suitable covers for such containers, which covers were readily and easily attachable and removable, replaceable by the user in the event all of the commodity was not removed during the first use, so that the remainder might be stored in the refrigerator, and particular difficulty was experienced in providing properly fitting covers. Such difficulties were caused mainly by manufacturing variances in the containers themselves, particularly when they were made of paper, since economical production does not permit the precise and accurate sizing of a container or parts thereof to a very fine degree. Such manufacturing variances rendered the covers ill fitting, adding to the difficulty of application and removal of the covers, and in many cases there was little assurance of an adequate seal between the cover and container. The manufacture of covers and containers with companion dies so that the cover would be tailor made for a particular container is prohibitively expensive.

Container covers for carry-out containers are applied to the container after it is filled by the retail dealer, and the covers must be easily applied by hand without the aid of mechanism. Formerly known covers were not readily adaptable for adequately sealing a container slightly overfilled, or containing an unexpected air content. It is also desirable to stack the covers one upon the other in nested relationship so that the covers are not only readily available but occupy small storage space, and difficulty was experienced with previously known covers in that regard.

Further, covers of the type heretofore known were in nearly all cases made to grip the bead around the mouth of the container with positive contact on the outside of the bead and on the inside of the container in the plane of the bead. This frequently resulted in difficulty of removal of the cover and danger of spilling some of the contents when the cover was finally forced loose.

With the foregoing in mind, it is an important object of the instant invention to provide a cover for containers which is made of thin, flexible material and which is so constructed as to readily conform itself to the container so as to automatically compensate for manufacturing variances in container dimensions and yet provide an adequate seal with the container.

Another object of the invention resides in the provision of a cover highly desirable for use with paper containers, which cover is made of thin, flexible material yieldable to the container upon reasonable forceful application thereto, and which is so constructed as to automatically compensate not only for manufacturing inaccuracies in container dimensions, but which automatically compensates for an unexpected air content in the container, or an unexpected overfilling of the container, and yet produces a more than adequate seal with the container.

Another feature of the invention resides in the provision of a container cover made of thin, flexible and resilient material so designed as to establish sealing engagement with the inside of the container at a plurality of annular regions, the cover being distendable against its inherent tendency to assume its original shape when applied to the container so as to effect the adequate seal in the plurality of locations.

A further object of the invention resides in the provision of a thin, flexible conformable container cover so constructed that while it sealingly engages the container, it is extremely easy to remove and replace, without danger of spilling the contents of the container.

Still another object of this invention is the provision of a container cover that not only is self-conforming to the container when applied, but which may be made of transparent material so that the contents of the container are plainly visible to the prospective customer.

It is also an object of the instant invention to provide a container cover that may readily be molded in one piece from a suitable thermoplastic film, such as an oriented polystyrene film or equivalently moldable thermoplastic material.

Also a feature of the invention is the provision of a container cover made of thin, flexible material that is self conforming to the mouth end of the container, which cover is reinforced by an integral configuration which permits greater pressure to be applied to the cover when the cover is pressed on the container, without sacrifice of the inherent flexibility and resiliency of the cover.

Still another object of the instant invention resides in the provision of a container cover made of thin, flexible material and comprising a diaphragm for insertion in the mouth of the container and a surrounding wall structure defining a downwardly open groove to receive the container rim bead therein, the outer marginal portion of the diaphragm being reinforced by an integral corrugated configuration to enable the cover to withstand more pressure than otherwise would be the case when the cover is applied to the container.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which...
of the heavy duty type provided with a cover embodying principles of the instant invention; Figure 2 is a greatly enlarged fragmentary vertical sectional view illustrating the cover just prior to application to the container; Figure 3 is a view similar in character to Fig. 2, but illustrating the cover applied to the container in operative position; Figure 4 is a fragmentary plan view of the cover itself; Figure 5 is a greatly enlarged fragmentary vertical sectional view similar in character to Fig. 2, but showing a cover of slightly different construction just prior to complete application to the container; Figure 6 is a view similar in character to Fig. 5 showing the cover of Fig. 5 completely applied to the container; Figure 7 is a fragmentary vertical sectional view illustrating how the covers may be stacked one within the other prior to application to the container; Figure 8 is a fragmentary plan view of a container cover of the character of that seen in Fig. 4, but embodying reinforcing configurations; Figure 9 is a fragmentary side elevational view of the cover of Fig. 8; Figure 10 is a fragmentary vertical sectional view illustrating how filled containers may be stacked one upon the other; Figure 11 is a fragmentary plan view of the character of Fig. 8 but illustrating a slightly different reinforcing configuration; and Figure 12 is a fragmentary vertical sectional view through the structure of Fig. 11. As shown on the drawings: The cover embodied in the instant invention may be made of different materials. For example, the cover might be made of a relatively heavy paper stock, discolored into the proper shape, the paper being wax covered, wax impregnated, or otherwise rendered liquid-proof. It is desirable that the cover effect a seal with the mouth region of the container at a plurality of points, and while a cover made of paper or the like will effect such plural sealing, it will not come back after removal to its exact original position, so that the engagement upon reaplication of the cover will not be as tight as upon the first application of the cover. Another and preferred material for the making of the cover is a thermosetting plastic film such as an oriented polystyrene film. Such a film may be readily molded into desired shape by the air blast process, and when molded will have an inherent tendency to always retain its original shape, so that when a cover made of such material is applied to the container, it will at once assume its original shape upon removal, and may again be applied to the container with a sealing engagement equal to that of the first application. Regardless of the material used, the cover will have substantially the same configuration, and therefore, by way of example, I have illustrated the instant invention in the form of a cover made from a transparent plastic film or membrane. Such a cover is thin, flexible, resilient, and readily conforms itself to the shape of the container mouth. Therefore, it is not necessary to precisely size the cover for any particular container, but the cover will automatically compensate for its own distortion for manufacturing inaccuracies in container dimensions. Obviously, the cover may be decorated on its external surface in any suitable or desirable manner. In the illustrated instance, the cover is shown associated with a container, made of paper, and of the flat bottom heavy container type. This container embodies a generally frusto-conical wall 1 tapering outwardly toward the mouth of the container. As seen best in Figs. 2 and 3, the container is provided with an outwardly turned rim bead 2 at the mouth end, and adjacent the mouth of the container, but below the rim bead, an inwardly open annular groove or bead 3 is provided in the wall of the container to provide a cover seat. Now, as seen best in Figs. 2, 3 and 4, the cover itself is preferably a single piece structure and embodies a diaphragm 4 which is substantially horizontal, and around that diaphragm is an upstanding wall generally indicated by numeral 5. As seen in Fig. 4, the wall 5 and the diaphragm 4 there is an inwardly open annular curve bead 6, and it will be noted that the wall 5 slopes inwardly and upwardly from the bead 6, away from the adjacent portion of the container wall, as indicated at 7. This inwardly sloping portion of the wall 5 terminates at an outwardly extending annular portion 8 which defines a shoulder for stacking purposes, as will later be apparent herein. From the shoulder 8, the wall 5 slopes upwardly and outwardly in keeping with the slope of the container wall as indicated at 9. A cross connecting portion or top wall 10 joins the wall 5 with a depending wall or skirt 11 spaced from the wall 5, and which skirt is preferably cylindrical. The skirt 11 and wall 5 together with the connection 10 conjointly define an inverted U-shaped formation defining a downwardly open annular groove for the reception of the rim bead 2 of the container. The diaphragm portion 4 of the cover is preferably provided with an annular groove 12 spaced inwardly from the aforesaid junction groove or bead 6, and this groove 12 permits added flexing of the diaphragm portion of the cover. Now with reference to Fig. 2 which shows the cover disposed over the mouth of the container, but not yet secured thereto, it will be noted that the junction between the diaphragm and wall 5, namely the curve annular portion 6, is of slightly greater diameter than the inside of the container just above the seating groove 3, so that a little pressure is required to properly seat the cover on the container and cause the bead 6 to snap into the groove 3. At the same time, it will be not that when the cover is pressed into place the outwardly sloping wall portion 9 thereof intimately seats against the inside of the container wall adjacent the mouth thereof. This, in addition to the seating of the groove portion 6 in the container groove 3 causes a slight dislocation of the cover above the groove as indicated at 13. Consequently, there is a very effective seal between the groove portion 6 of the cover and the container groove 3, and the seal is particularly effective in the annular region where the cover is deviated at 13. Another annular sealing region occurs between the wall portion 9 of the cover and the container wall as indicated at 14, caused by the resiliency of the cover. Still a further annular region which is in effect a seal occurs between the top wall portion 10 of the cover and the container rim bead 2 as indicated at 15. Thus, there is adequate and effective sealing engagement between the cover and container, and even though such sealing engagement might not be quite complete in one region, ample protection is afforded by the fact that there are two other regions of such engagement. The cover may be pressed onto the container in an easy manner by the fingers of the operator. Now it should be noted that the aforesaid U-formation in the cover defining the groove to receive the container rim bead 2 is preferably wider than the rim bead. Accordingly, when the cover is pressed on the container, the skirt portion 11 of the U-formation will depend from the cover freely around the rim bead, and there will be an annular space between this skirt 11 and the point of largest diameter of the rim bead as shown at 16 in Fig. 3. With the space 16 present, removal of the cover is greatly expedited, since it provides gripping room for the thumbs or fingers of the user, permits ease of entry and the easy application of upward pressure on the cover so that it can be forced off the container in a facile man-
ner without danger of spilling the contents of the container.

The annular groove 12 in the diaphragm 4 of the cover, permits this diaphragm to flex or bend when applied to the container, and this additional flexibility at positions 11 in alignment with the annular groove 12 is in all likelihood an advantage for any manufacturing inaccuracies in the container dimensions. Also, this groove performs the added function of allowing a bulging or bending of the center portion of the diaphragm 4 in the event of an accidental overfill of the container, or in the event there is an unexpected or isolated point of overfilling within the entire area of application of the cover. Here-
tofore, inaccuracies in container dimensions, accidental overfill, or unexpected air content provided a hazard to the proper seating of a cover on a container, and frequently resulted in an improper application of the cover which ultimately resulted in leakage by virtue of natural pressure of the air or contents of the container, but particularly resulted in leakage due to rough handling of the filled container during transportation, stacking, and storage. The instant cover, however, is firmly affixed to the container with a resilient pressure insuring annular sealing regions at a plurality of points with the bottom or skirt of the lower container, as seen in Fig. 10. Thus, if desired, filled containers may be stacked one upon another to a considerable height with adequate stability.

As stated above, it is a simple expedient to pry up the edge portion of the cover at adjacent but spaced points with the thumb or fingers of the user, in order to facilitate the removal of the cover. If the contents are not then removed entirely from the container, the cover may be readily snapped back on the container and will have the same sealing effectiveness as it originally had. In this manner, the cover may be reused repeatedly until all of the contents of the container have been removed.

In Figs. 5 and 6 I have shown the cover of slightly different configuration. The cover has the same general shape as above described, but in this instance the diaphragm 4 has a groove configuration 17 in the form of a lazy 8. This provides immediately adjacent grooves opening in opposite directions, thus giving added flexibility to the diaphragm portion of the cover enabling it to flex, fluctuate, or distort in any direction consistent with automatically accommodating itself to the particular container, regardless of overfilling to a reasonable extent and regardless of air content. The application of the cover of Figs. 5 and 6 results in the same annular sealing regions as above mentioned, and indicated at 13, 14 and 15, but also in another annular defect 18 at the bottom of the container groove 3 that enhances the seal in the region of the groove 3. In other respects, the cover operates the same as the one previously described, and may be removed and replaced in like fashion.

In Fig. 7 I have illustrated how the covers may be stacked one upon the other prior to application to the container. It will be noted that the arcuate junction 6 between the diaphragm and the wall portion 7 of an upper cover, seats directly upon the annular shoulder 8 of the next lower cover. This elevates the groove forming U-formation of the cover above the similar construction of the next lower cover, and although the skirt 11 extends below the annular shoulder 8, as is clearly apparent from the showing in Figs. 2, 5, 5 and 6, the skirt 11 does not contact the corresponding portion of the cover next below, but is spaced thereabove, the only contact between the covers being at the annular shoulder 8. Thus while the covers are firmly stacked in position, against accidental dislodgment, they are easily and readily removable from one of the other, and jamming of the covers in the stack is effectively prevented by virtue of the fact that the skirt of an upper cover cannot become wedged over the skirt of a lower cover. It will also be noted that when a stack of covers is formed, all of the covers contact with each other, although each is separated from the cover skirts on both sides thereof so that the stack is neat, orderly, and occupies a minimum space.

In Figs. 8 and 9 I have illustrated a cover which is substantially the same as that above described in connection with Figs. 1 to 4 inclusive, except for one distinguishing and significant difference. The cover of Figs. 8 and 9 embodies an annular series of corrugations 19 in the diaphragm outside the annular groove 12. These corrugations preferably extend to the inner portion of the wall structure generally indicated by numeral 5. As seen in Fig. 9, the corrugations are upstanding so that the bottom of the groove 12 is substantially the lowest point of the cover. The corrugations 19 disrupt the above described groove or bead 6 in the cover, but the portions of that groove or bead remaining are of increased strength, and effect a firm engagement within the cover seating groove 3 of the container.

The provision of the series of corrugations 9 materially strengthens the outer annular portion of the diaphragm as well as the junction between the diaphragm and the wall structure generally indicated by numeral 5. This additional strength permits the application of maximum pressure to the lid at the time it is pressed on to the container, without any sacrifice of the flexibility of the lid; that is, the spaced walls defining the downwardly opening groove for reception of the rim bead on the container function exactly as above described and adapt themselves to any falsity of contour of the rim bead and effect the adequate seal at the various locations above specified, and the diaphragm is free to flex in the event of unexpected air content in the container or unexpected overfilling to a slight extent. At the same time, by virtue of the corrugations, the container cover will have a firmer grip in the seating groove 3 of the container. The added strength of the reinforcing corrugations also permits the filled and capped container to be handled more carelessly than usual without fear of dislodging the cover, and further permits stacking of filled containers one upon the other to a somewhat higher extent.

It will also be noted that the added shaping of the annular series of corrugations 19 requires no additional expense in manufacture, but merely a slightly different shaping of the die structure, and the film of plastic material may be molded in the same way as above described by the air pressure method.

In Fig. 10 I have illustrated the stacking of one filled container upon another, both of the containers being capped in this instance with the cap structure shown in Figs. 8 and 9. It will be seen that the upper container has its bottom seated in the annular groove 12 in the cover of the lower container, thereby providing suitable stability for stacking purposes. It will, of course, be understood that the previously described embodiments of the instant invention are stacked in similar manner, the groove formation in the lid or cover receiving the bottom of the superposed container or engaging inside the bottom of the superposed container, in the event the groove in the cover is inverted from the showing in Figs. 1 to 4 inclusive.

In Figs. 11 and 12 I have illustrated a container cover reinforced in the manner of the cover of Figs. 8 and 9, but of slightly different arrangement. In this instance, the wall structure generally indicated by numeral 5, and including the outer wall 11 which defines the downwardly opening groove for receiving the rim bead of the container is the same as above described. However, the bottom of the inner wall merges with an annular portion of the diaphragm 4 which is provided with an annular
series of relatively widely spaced corrugations. These corrugations provide the reinforcement above described, but inside the corrugations there is a vertical annular shoulder 21 which is provided in lieu of the above described annular groove 12. This vertical shoulder is also used for stacking purposes, and will engage outside the bottom of a superposed container. It should also be noted in connection with the structure of Figs. 11 and 12, that the corrugations 20, as best seen in Fig. 12, do not fully interrupt the bead 6 which engages in the seating groove 3 of the container, but only interrupt the bead partially of its width. In other words, there is a small portion of this bead passing over every corrugation and the bead is full width in between corrugations. This provides an added locking security with the seating groove 3 of the container as well as establishing a positive seal at that location in the manner above described in connection with Figs. 1 to 4 inclusive. Otherwise, the lid of Figs. 11 and 12 functions the same and possesses the advantages of the lid of Figs. 8 and 9.

From the foregoing, it is apparent that I have provided a lightweight, economical, durable cover for a paper container or the like, which cover is so constructed as to provide annular sealing engagement with the container at a plurality of locations yet is easily removable and replaceable, and which cover automatically conforms to the contours of the container so as to automatically compensate for manufacturing inaccuracies in container size, overfilling, unexpected air content, and similar hazards with effective sealing always resulting. It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:
1. A closure for the mouth end of a paper container having an outwardly sloping wall toward the mouth end terminating in an outwardly turned rim bead, said closure comprising a cover of flexible material including a diaphragm portion, an annular wall around said diaphragm which slants inwardly, then extends outwardly laterally to form an annular shoulder of a width exceeding the thickness of the material and then slants outwardly above said shoulder, an annular top portion extending outwardly from said wall, and an annular skirt depending from said top portion to define with said wall a downwardly opening groove to receive the container rib bead.
2. A closure for the mouth end of a paper container having an outwardly sloping wall toward the mouth end terminating in an outwardly turned rim bead, said closure comprising a cover of flexible material for snap-on engagement over the container rim bead and including a diaphragm portion, an annular wall around said diaphragm which slants inwardly, then extends outwardly laterally to form an annular shoulder and then slants outwardly above said shoulder, an annular top portion extending outwardly from said wall, and an annular skirt depending from said top portion to define with said wall a downwardly opening groove to receive the container rim bead.
3. A closure for the mouth end of a paper container having an outwardly sloping wall toward the mouth end terminating in an outwardly turned rim bead, said closure comprising a cover of flexible material for snap-on engagement over the container rim bead and including a diaphragm portion, an annular wall around said diaphragm which slants inwardly, then extends outwardly laterally to form an annular shoulder and then slants outwardly above said shoulder, an annular top portion extending outwardly from said wall, an annular skirt depending from said top portion to define with said wall a downwardly opening groove to receive the container rim bead, said cover being a molded film of plastic material, and said diaphragm having an annular groove formed by a bodily deviation of the cover material therein inside said wall to allow automatic compensation for variances in container dimensions.
4. In combination, a paper container having a wall tapering outwardly toward the mouth end thereof and terminating in an outwardly turned rim bead, said container having a cover seating annular groove in the wall thereof below said rim bead, and a thin flexible cover yieldable to the contours of the container when applied, said cover including a diaphragm, an upstanding wall surrounding said diaphragm and connected therewith by an inwardly opening annular bead of slightly greater diameter than the inner wall face of the container above said seating groove and forced into said seating groove, and an outer cylindrical wall spaced from the first said wall and connected therewith at the top to define therewith a downwardly opening groove in which the container bead is received, the first said cover wall sloping inwardly away from the container wall above said seating groove, then extending laterally to define an annular shoulder from which the wall slopes outwardly in keeping with the container wall to insure several annular regions of sealing contact with the container adjacent the mouth end.
5. A cover for a container with an outwardly turned rim bead around the mouth thereof, comprising a lid made of thin flexible material of less rigidity than the container, said lid including a diaphragm surrounded by a pair of spaced walls connected at the top to define an annular downwardly opening groove to receive the container rim bead, and said diaphragm having an annularly corrugated margin in said diaphragm at the inner of said pair of spaced walls and providing radial projections extending to a larger diameter than the contiguous portion of said inner wall so as to be engageable in holding groove in the wall of the container.
6. A cover for a container with an outwardly turned rim bead around the mouth thereof, comprising a lid made of thin flexible material of less rigidity than the container, said lid including a diaphragm surrounded by a pair of spaced walls connected at the top to define an annular downwardly opening groove to receive the container rim bead, and said diaphragm having an annular groove therein spaced inwardly of the inner of said walls permitting said lid to automatically compensate for inaccuracies in the container dimensions, the surrounding annular portion of said diaphragm from the inner of said spaced walls to said groove being corrugated vertically with the corrugations extending substantially radially.
7. A cover for use on a container having a wall tapering outwardly toward the mouth end and terminating in an outwardly turned rim bead with a cover seating groove in the wall below said rim bead, comprising a lid made of thin flexible material, said lid including a diaphragm surrounded by inner and outer walls connected at the top to define a downwardly opening groove to receive the container rim bead, an annular resiliently yieldable bead projecting radially outwardly to a slightly greater diameter than the inner wall face of the container at the junction between said inner wall and said diaphragm, and said bead being partially interrupted and stiffened by an annular series of vertical corrugations in said diaphragm.
8. A cover for a container having an outwardly sloping wall toward the mouth end terminating in an outwardly turned rim bead and a container seating annular groove in the wall below said rim bead, said cover comprising a lid of thin flexible material of less rigidity than the container including a diaphragm portion, an annular wall around said diaphragm, and an inwardly open curvate bead to snap into the groove in the con-
tainer wall, said annular wall slanting inwardly above said bead, then extending laterally outwardly to form an annular shoulder and then slanting outwardly above said shoulder to intimately contact the container wall, an annular top portion extending outwardly from the cover wall, and an annular skirt depending from said top portion to define with said wall an annular groove of greater width than the container rim bead to receive the same with said skirt spaced outwardly from the rim bead.

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