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Weatherhead, III

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[54] **CONTAINER END CLOSURE WITH METAL PLATE**

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[*] Notice: The portion of the term of this patent subsequent to Apr. 1, 1992, has been disclaimed.

[22] Filed: **June 20, 1974**

[21] Appl. No.: **481,164**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 328,876, Feb. 1, 1973, Pat. No. 3,874,580.

[52] **U.S. Cl.** **220/307**

[51] **Int. Cl.** **B65d 39/00**

[58] **Field of Search** 222/566, 563, 480, 545; 220/307; 215/362

[56] **References Cited**

UNITED STATES PATENTS

2,868,410	1/1959	Henchert	220/307
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[57] **ABSTRACT**

A dispensing container is disclosed which includes a fiber tube, a metal top plate having an opening, and a plastic self-locking end closure received within the opening.

The locking feature includes a plurality of relating narrow, peripherally spaced, axially extending radially reinforced barbs, one of which engages the rim of the opening.

10 Claims, 6 Drawing Figures

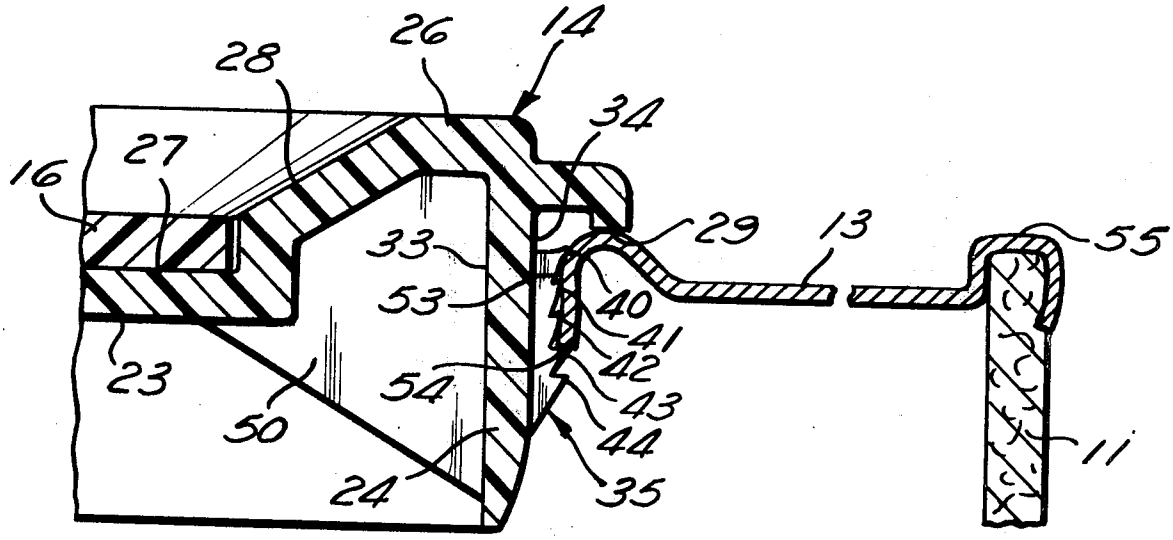


Fig. 1

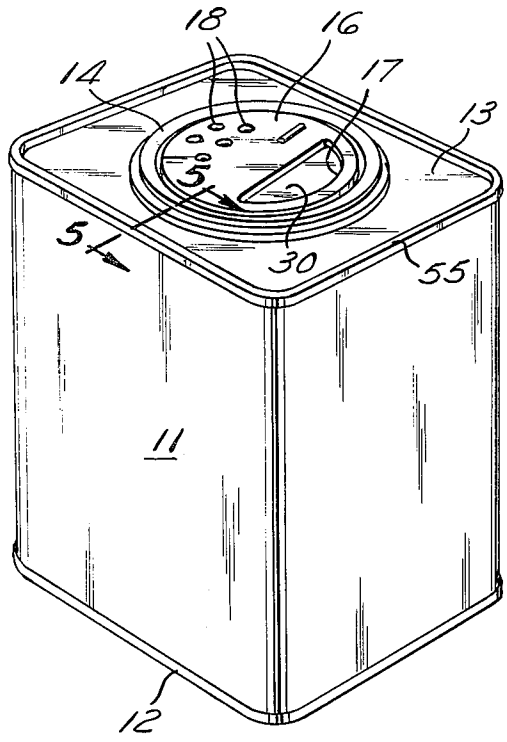
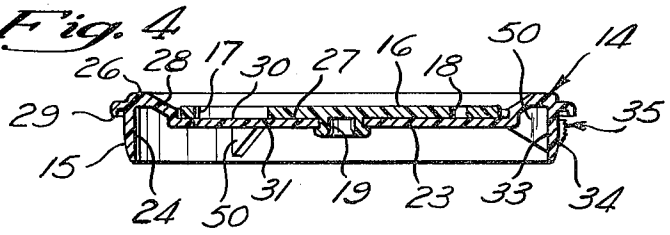


Fig. 4



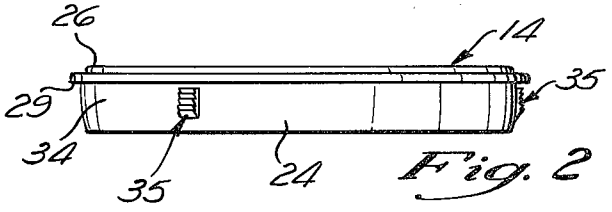


Fig. 2

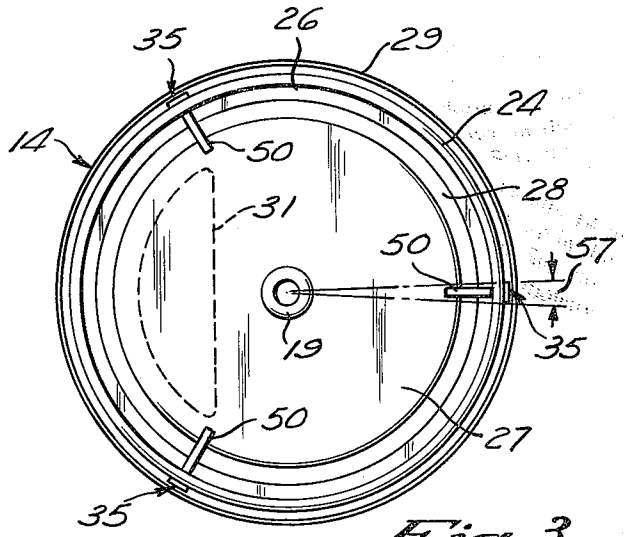


Fig. 3

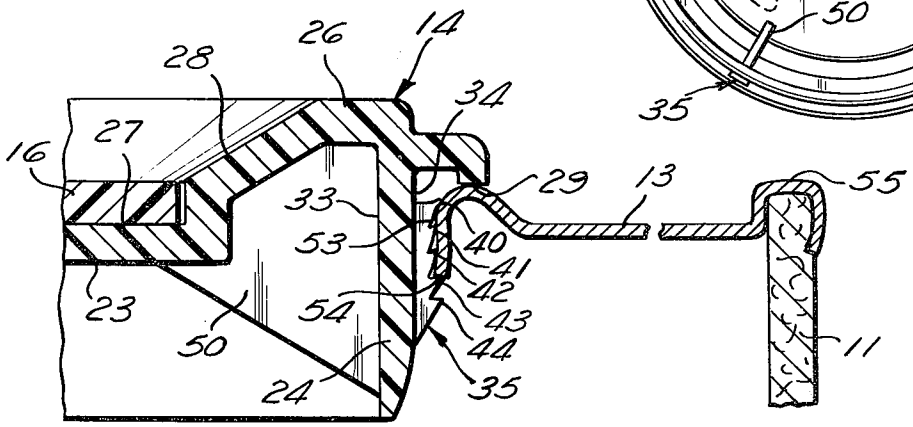


Fig. 5

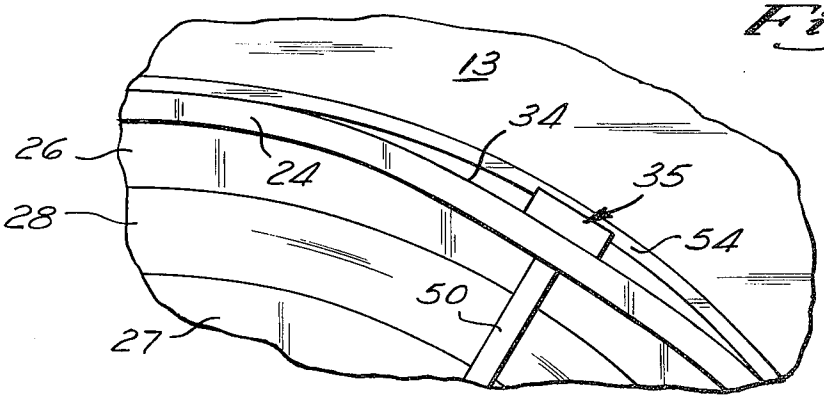


Fig. 6

CONTAINER END CLOSURE WITH METAL PLATE

This application is a continuation in part of copending application Ser. No. 328,876, filed Feb. 1, 1973, now U.S. Pat. No. 3,874,580 of Apr. 1, 1975.

BACKGROUND OF THE INVENTION

This invention relates generally to plastic end closures, and more particularly to a self-locking plastic end closure for use on a metal plate or base.

Paper fiber tubes (that is, tubes which include layers of fiber material wound such as in a helix one upon the other and secured together by an adhesive) have become widely used for dispensing containers in the food packaging industry. The paper of such tubes may be plain or it may be coated, waxed, resin impregnated, or combined with other foils or films to provide a satisfactory container for various types of food products. The tubes are cut to the desired length of the container, and each end of the tube is closed.

A variety of structures are used for closing the ends of the fiber tube. One such structure provides a plastic end closure which is received within the tube such as disclosed in U.S. Pat. No. 2,961,132. Another such structure provides a metal plate which is seamed to the fiber tube and which includes an opening which is closed by a suitable plug or by a plastic end closure of the type disclosed in U.S. Pat. No. 2,961,132.

When the end of the fiber tube is closed by a metal plate and plastic end closure, a tight interference fit between the plastic end closure and the opening in the metal plate is provided to hold the end closure on the metal plate. This arrangement is not entirely satisfactory, since the plastic end closure may crack upon assembly if the interference fit is too tight or may not be held sufficiently tight if the interference fit is too loose.

SUMMARY OF THE INVENTION

The present invention provides a self-locking end closure for use with a metal plate. The end closure is of plastic and includes a generally flat laterally extending end portion. An annular skirt portion extends axially from the end portion, and the skirt portion has a generally smooth outer surface for being received within an opening in the metal plate.

A plurality of relatively narrow locking means are arranged in peripherally spaced positions 120° apart on the end closure for securing the end closure onto the metal plate. Each of the locking means includes a plurality of axially spaced locking barbs extending radially outwardly from the outer surface of the skirt portion and terminating at an outermost barb surface. A reinforcing strut extends from the end portion to the skirt portion immediately adjacent the locking barbs and acts against radially inward movement of the locking barbs. The arcuate extent of the locking barbs of each locking means is quite small, being less than 10° and in a preferred embodiment being not greater than 3°.

The reinforcing strut pushes the locking barbs against an annular surface which defines the opening in the metal plate, so that the outermost barb surface of the locking barbs which are pushed past the annular surface upon assembly are held radially outwardly beyond such annular surface to prevent removal of the end closure. Because the arcuate extent of the locking barbs of each locking means is very small, the force required to assemble the end closure onto the metal plate is minimized to prevent breakage of the plastic end closure during assembly. In actual tests which have been conducted on the invention, it has been found that the end closure can be removed from the metal plate only upon shearing off the locking barbs, yet the plastic end closure can be assembled onto the metal plate without breaking.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of the invention will become readily apparent to those skilled in the art upon an understanding of the preferred embodiment of the invention shown in the accompanying drawings, wherein:

FIG. **1** is a perspective view of a dispensing container according to the principles of the invention;

FIG. **2** is a side elevational view of the plastic end closure for the metal top plate of the dispensing container shown in FIG. **1**;

FIG. **3** is a bottom plan view of the plastic end closure shown in FIG. **2**;

FIG. **4** is a cross-sectional side elevational view of the end closure shown in FIG. **2**;

FIG. **5** is an enlarged cross-sectional view taken along reference view line **5—5** in FIG. **1** showing one of the locking means provided by the present invention; and

FIG. **6** is an enlarged bottom view of the locking means shown in FIG. **5**.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring now to the drawings in greater detail, FIG. **1** is a perspective view of a dispensing container according to the principles of the invention. The dispensing container shown in FIG. **1** is particularly adapted for use with food products and includes a fiber tube **11**. The tube **11** is well-known in the art and includes layers of heavy craft paper disposed in a helix one upon the other and secured together by an adhesive. The dispensing container shown in FIG. **1** also includes a metal bottom plate **12** and a metal top plate **13** which are secured on the ends of the fiber tube **11** in a well-known manner by a seaming operation. A plastic end closure **14** is secured in an opening in the top plate **13** in a manner described below for opening and closing the container.

FIGS. **2, 3,** and **4** show the plastic end closure **14** in greater detail. The top end closure **14** is shown in the copending U.S. Pat. application of applicant, Ser. No. 328,876 filed Feb. 1, 1973, and includes a stationary cap **15** and a rotatable disc **16**. The cap **15** and disc **16** are each injection molded, and the cap **15** is preferably made of a medium impact styrene while the disc **16** is preferably made of flexible polyethylene. This provides a stationary cap which is rigid and a rotatable disc which is flexible so that the disc can be snapped onto the cap without breakage.

As best seen in FIGS. **1** and **4**, the rotatable disc **16** includes a large arcuate shaped opening **17** for pouring or for receiving a spoon and a plurality of smaller openings **18** for dispensing the contents of the container by shaking. The rotatable disc **16** also includes a depending axle portion **19** which is snapped into a suitable opening in the center of the stationary cap **15**, and the disc **16** is rotated to bring the openings **17** or **18** into alignment with a suitable opening formed in the stationary cap **15** and described below.

The construction of the stationary cap **15** is shown in detail in FIGS. **2, 3,** and **4.** The cap **15** includes a laterally extending end portion **23** and an annular skirt portion **24** extending axially from the end portion **23.**

The end portion **23** includes a support portion **26,** an axially recessed center portion **27,** and a conical connecting portion **28** extending between the support portion **26** and the recessed center portion **27.** An axially facing annular lip **29** is provided for axially engaging the top plate **13** to limit movement of the end closure **14** upon assembly of the end closure **14** onto the top plate **13** as described below. The axially recessed center portion **27** includes a removable tab **30** which is defined by a reduced thickness outline portion **31** so that the tab **30** can be removed in the manner disclosed in U.S. Pat. No. 2,961,132 to permit dispensing the contents of the container through the large opening **17** or the smaller openings **18.**

The skirt portion **24,** as shown in FIGS. **3** and **4,** is substantially cylindrical and extends axially from the end portion **23** for being received within the metal base **13.** The skirt portion **24** includes an inner surface **33** and a smooth outer surface **34,** and the free end of the outer surface **34** is tapered to provide an entrant surface to assist in the assembly of the end closure **14** onto the metal top plate **13.** The diameter of the outer surface **34** is approximately three inches in the embodiment shown in the drawings.

As shown in FIGS. **2** through **5,** the plastic end closure **14** also includes a plurality of locking means **35.** The locking means **35** are arranged in peripherally spaced positions on the end closure **14,** and the structure of each of the three locking means is identical. Each locking means includes a plurality of axially spaced locking barbs, **40, 41, 42, 43** and **44** (FIG. **5**), each of which extend radially outwardly approximately 0.015 inches from the outer surface **34** of the skirt portion **24** and each of which terminate at a radially outward most barb surface which is a sharp edge in the preferred embodiment. Each locking means **35** also includes a reinforcing strut **50,** and each reinforcing strut **50** extends from the portion of the inner surface **33** adjacent the locking barbs **40** through **44** radially inwardly to the support portion **26** and the recessed center portion **27** and the connecting portion **28.**

The construction of the metal top plate **13** is best shown in FIG. **5.** The metal top plate **13** in the preferred embodiment is a thin steel stamping. A round opening is provided in the top plate **13** which is defined by a generally tubular axially extending annular marginal wall **53** which terminates at an annular marginal edge **54.** The outer periphery of the metal plate **13** includes a reversely bent seamed portion **55** which clamps the metal top plate **13** onto the top end of the tube **11.**

When the end closure **14** is to be assembled onto the metal top plate **13,** it is properly aligned vertically above the opening in the top plate **13** as viewed in the drawings and is displaced axially onto the plate **13.** This is commonly done with automatic machinery which positions the end closure **14** and applies a force to the support portion **26** to push the end closure onto the top plate **13.**

The inside diameter of the marginal wall **53** and the outside diameter of the outer surface **34** (that is, the diameter of the cylindrical portion of the outer surface **34** from which the locking barbs project) are dimensioned to provide an interference fit. As may be best seen by reference to FIGS. **5** and **6,** each locking means **35** and a portion of the outer surface **34** immediately adjacent thereto is deformed radially inwardly from its free or normal configuration illustrated in FIG. **3** when the end closure **14** is assembled onto the top plate **13.** This is because the cylindrical marginal wall **53** is sufficiently inelastic as to undergo little or no deformation upon such assembly, and the relatively more elastic end closure **14** deforms radially inwardly to accomodate the interference between the locking means **35** and the marginal wall **53.**

As the individual locking barbs **40** through **44** are pushed into the marginal wall **53** during assembly, the outermost barb surface (which is a sharp edge in the preferred embodiment) is deflected radially inwardly relative to the outer surface **34** (FIG. **5**). After the individual barbs **43** and **44** are pushed through and past the marginal wall **53,** the resilience of the individual barbs **43** and **44** permits the radially outermost surfaces of the barbs **43** and **44** to snap radially outwardly back to their free or normal position as shown in FIG. **5,** so that the radially outermost surface of the barbs **43** and **44** is disposed radially outwardly from the marginal wall **53** and the marginal edge **54** engages the locking barb **43** to lock the end closure **14** on the top plate **13.** The reinforcing strut **50** acts against radially inward movement of the locking means **35** to insure that the radially outermost surfaces of the barbs **40, 41,** and **42** are pushed radially outwardly against the marginal wall **53** and to hold the barbs **43** and **44** in a position radially outwardly from the marginal wall **53.** In actual tests on the invention, it has been found that the engagement between the marginal edge **54** and the barbs **43** and **44** is such that the end closure **14** can be removed only by exerting a force of sufficient magnitude on the end closure **14** as to break off the locking barbs **43** and **44.**

Because of the multiplicity of barbs provided on each locking means **35** (five barbs in the preferred embodiment), the marginal edge **54** will engage one of the barbs **40** through **44** even if the axial length of the marginal wall **53** varies significantly. Thus, if the marginal wall **53** is longer than shown in FIG. **5,** the marginal edge **54** may engage the barb **44** rather than the barb **43,** while the marginal edge **54** may engage the barb **42** rather than the barb **43** if the marginal wall **53** is shorter than shown in FIG. **5.**

As further shown in the drawings, the locking means **35** are remotely spaced about the circumference of the skirt portion **24,** and the locking barbs of each locking means extend only through a small arc. The locking means **35** are spaced circumferentially apart by an arc of at least 90°, and in the preferred embodiment the locking means are 120° apart. The locking barbs of the locking means each extend circumferentially through an arc **57** (FIG. **3**) of less than 10°, and in the preferred embodiment the locking barbs each extend through an arc of not greater than 3°. This feature of the invention concentrates the resilient force created by the interference between the locking means **35** and the marginal wall **53** to provide a self-locking end closure in which the locking barbs tightly lock against the marginal edge **54** in the manner illustrated in FIG. **5.** Furthermore, this feature of the invention minimizes the axial force required to assemble the end closure **14** onto the top plate **13** to prevent breakage of the end closure **14** during assembly.

Although a preferred embodiment of this invention is illustrated it is to be understood that various modifications and rearrangements of parts may be resorted to without departing from the scope of the invention disclosed and claimed herein.

What is claimed is:

1. In combination, an end closure and a metal plate, said metal plate including an axially extending marginal wall terminating at a marginal edge and defining an opening, and said end closure being plastic and including a laterally extending end portion, an annular skirt portion extending axially from said end portion, said skirt portion having an inner surface and a generally smooth outer surface being received within said marginal wall, and a plurality of relatively narrow locking means disposed in peripherally spaced positions holding said skirt portion in said marginal wall, each of said locking means including a plurality of axially spaced locking barbs extending radially outwardly from said outer surface and terminating at an outermost barb surface, reinforcing strut means extending from said end portion to said inner surface immediately adjacent said locking barbs and acting against radially inward movement of said locking barbs, said marginal wall radially engaging and radially inwardly deforming said outermost barb surface of at least one of said barbs disposed nearer to said end portion, and said marginal edge axially engaging at least one of said barbs disposed farther from said end portion to lock said end closure onto said metal plate.

2. The combination in accordance with claim 1 wherein said locking barbs each extend through an arc of less than ten degrees.

3. The combination in accordance with claim 2 wherein said locking barbs each extend through an arc of not greater than three degrees.

4. The combination in accordance with claim 2 wherein said locking means are one-hundred twenty degrees apart.

5. The combination in accordance with claim 1 wherein said end portion includes a generally flat axially recessed center portion, and each of said reinforcing struts extend between said inner surface adjacent said locking barbs and said recessed center portion.

6. The combination in accordance with claim 1 wherein said locking means provide the sole means for holding said end closure on said metal plate.

7. The combination in accordance with claim 1 wherein said outer surface of said skirt portion from which said locking barbs project and said marginal wall of said metal plate are dimensioned to provide an interference fit therebetween.

8. In combination, an end closure and a metal plate, said metal plate including a marginal surface defining an opening, and said end closure being plastic and including a laterally extending end portion, an annular skirt portion extending axially from said end portion, said skirt portion having an inner surface and a generally smooth outer surface being received within said marginal edge, and a plurality of relatively narrow locking means disposed in peripherally spaced positions holding said skirt portion in said marginal edge, each of said locking means including a plurality of axially spaced locking barbs extending radially outwardly from said outer surface and terminating at an outermost barb surface, reinforcing strut means extending from said end portion to said inner surface immediately adjacent said locking barbs and acting against radially inward movement of said locking barbs, and said marginal surface engaging at least one of said barbs to lock said end closure onto said metal plate.

9. The combination in accordance with claim 8 wherein said locking barbs each extend through an arc of less than ten degrees.

10. The combination in accordance with claim 9 wherein said locking barbs each extend through an arc of not greater than three degrees.

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