Sept. 5, 1967 C. SANTONI 3,339,962

CONTAINER ASSEMBLY HAVING IMPROVED CLAMPING RING

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FIG. 1

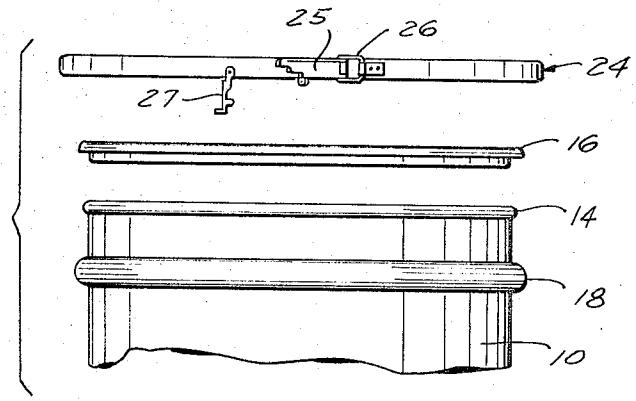
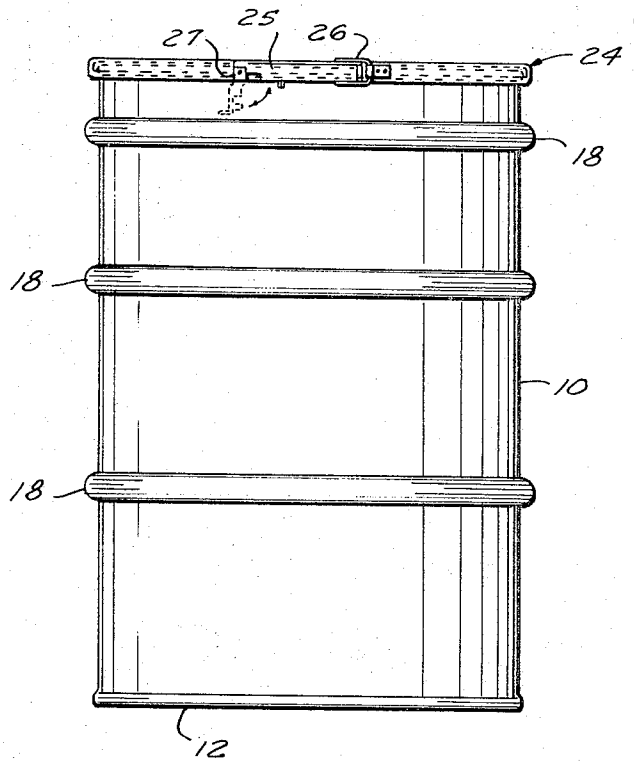


FIG. 2



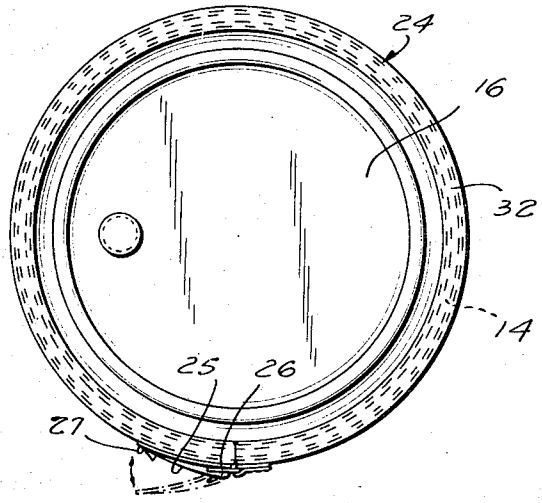
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FIG. 3



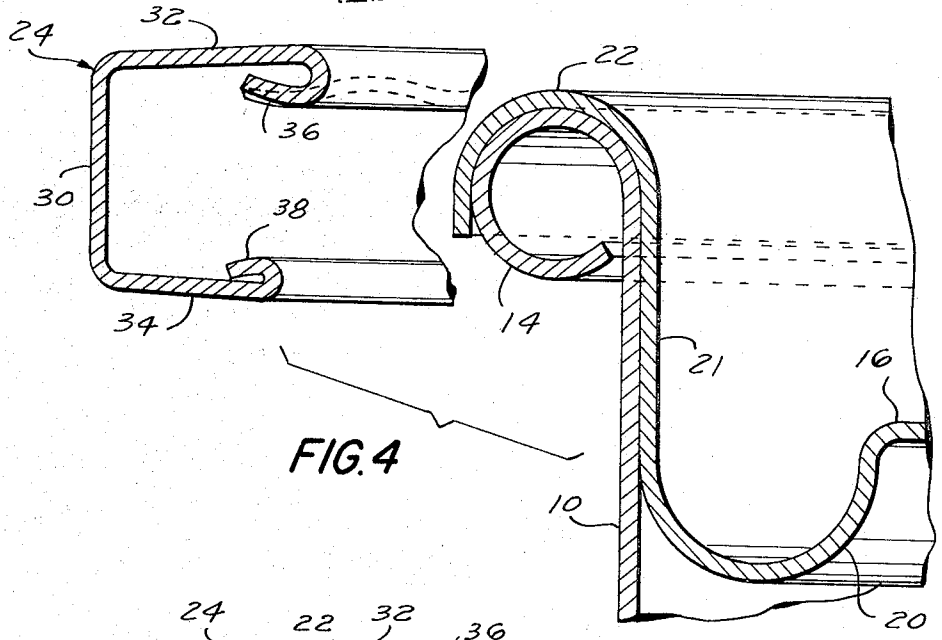
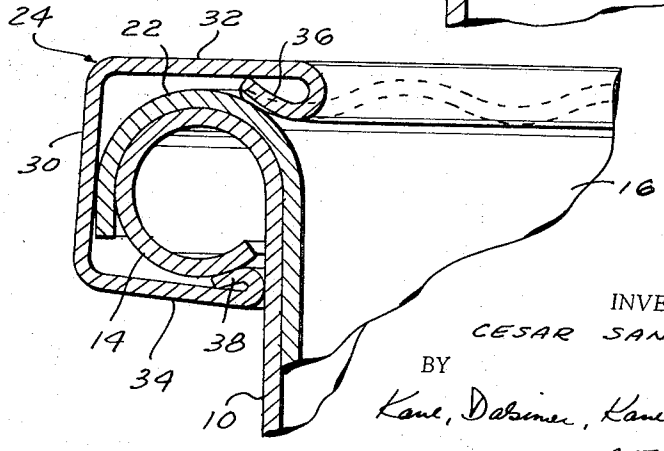


FIG. 4

FIG. 5



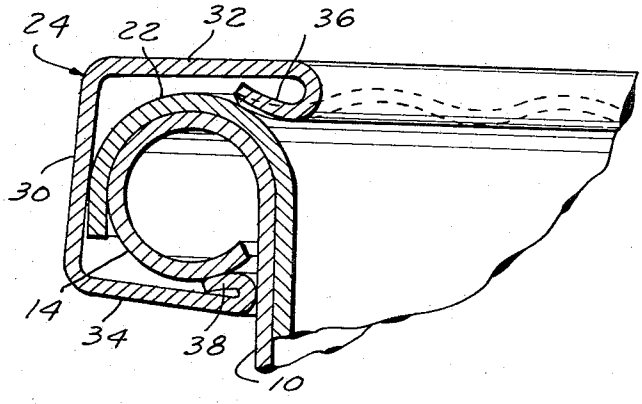
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FIG.6



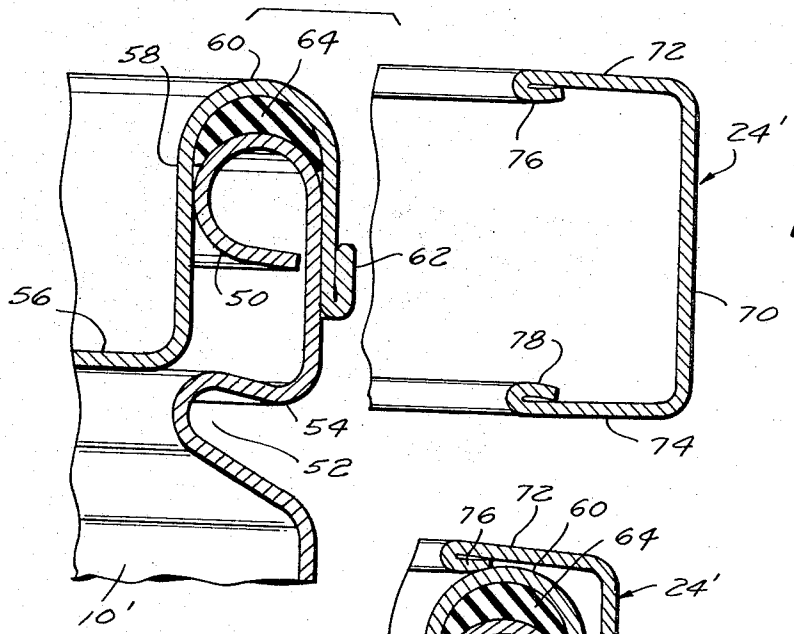


FIG.7

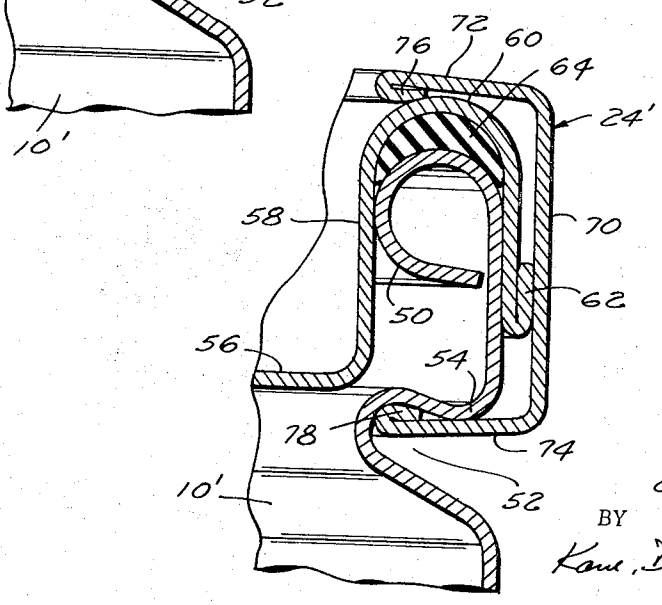


FIG.8

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CONTAINER ASSEMBLY HAVING IMPROVED CLAMPING RING

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8 Claims. (Cl. 292—256.69)

This invention relates to an improved drum type container assembly and more particularly to an improved clamping ring for releasably retaining a cover or head assembled with the container.

My invention is particularly applicable to drums made of sheet metal such as sheet steel or aluminum or to drums made of convolutely wound laminated layers of fiber or to drums having an outer shell of fiber and an inner layer of sheet metal. Drums of this type may, of course, be coated with a suitable plastic or resin coating on the inner surface thereof or they may be provided with suitable resin or plastic liners.

Drum type containers are commonly used to ship various materials, particularly raw materials and chemicals, in bulk. These materials are often in powdered or liquid form and it is important for safety, health and economical reasons to prevent loss of these materials through leakage or sifting. In this connection, the covers or heads of such containers are generally made of sheet metal and are provided with a peripheral flange which overlaps the chime around the open end of the container. A split clamping ring is applied around the assembled cover and container and is provided with a locking mechanism which constricts the clamping ring around the assembly to releasably hold the cover in place.

A number of problems have existed with the cover and clamping ring assemblies heretofore available. Thus leaking and sifting of powdered and liquid materials have frequently occurred between the cover and the chime of the container. Also, if the locking mechanism became accidentally unlatched, the clamping ring would automatically release from the assembly so that the cover would no longer be retained in place against accidental displacement. Furthermore, the filled containers are frequently subjected to impacts when dropped from trucks, trailers, trains or from loading platforms or from stacked relationship. They are also subjected to compressive forces when filled containers are stacked one upon the other. Impacts and excessive forces of this type would frequently cause distortion of the cover and clamping ring assembly creating leaking and contamination problems.

Among the objects of the present invention is the provision of an improved clamping ring for use with a drum type container and cover assembly for releasably holding the cover in place which overcomes the difficulties and disadvantages heretofore encountered so that:

(1) It substantially eliminates or minimizes the danger of leakage and sifting of powdered or liquid materials between the cover and chime;

(2) It can withstand the impacts and forces normally encountered during shipping and handling due to dropping, tipping and stacking;

(3) It is of sturdy self-reinforced construction and can be made of thinner gauge material which is lighter and less expensive;

(4) It is so constructed that in cooperation with cam surfaces formed in the cover and drum it exerts a camming action urging the cover into tight sealing relationship with the chime or with a gasket formed therearound;

(5) It has a self-retaining structure so as to remain in position assembled around the combined drum and cover thereby retaining the cover in place even when the locking mechanism is accidentally unlocked.

My invention contemplates the provision of an improved split clamping ring of a size and configuration to fit around the assembled cover and chime portion of a drum type container and having a locking mechanism connected between the two ends of the ring for contracting the ring and causing it to tightly embrace the assembly and hold the cover in place.

The clamping ring comprises a peripheral band portion made of a resilient metal and having integral flanges along its upper and lower edges projecting radially inwardly toward the central axis of the ring in slightly diverging relationship to each other and with the marginal edges of the flanges being turned or folded inwardly toward the inner surfaces of the flanges so to form marginal beads. The flanges of the ring engage over an upwardly facing cam surface on the peripheral portion of the cover and over a downwardly facing cam surface formed around the outer surface of the drum with the marginal beads projecting beyond the apex portion of the cam surfaces in engagement therewith and exerting a resilient wedging or camming action, wedging the cover into sealing engagement with the chime portion of the container or with a gasket formed therearound.

In one form of my invention, the marginal bead formed around the upper flange portion of the clamping ring is in the form of a tubular curl providing additional resiliency and the inner edge of the material of this bead is of wavy, corrugated configuration in a longitudinal direction with spaced sections being in close proximity to the inner surface of the flange and alternate sections being spaced outwardly therefrom, to reinforce the structure when a force is applied to the upper surface of the ring and cover when the drums are stacked one on top of the other.

In the accompanying drawings:

FIG. 1 is an exploded view showing the upper portion of a container and also the cover and clamping ring in spaced superimposed relationship ready to be assembled with each other;

FIG. 2 is an elevational view of the assembled cover and clamping ring;

FIG. 3 is a top plan view showing the assembly in full lines and indicating in dotted lines the position of the locking lever, when in open position;

FIG. 4 is an enlarged detailed sectional view of the upper chime portion of the container with the cover assembled thereon and showing a fragmentary portion of the clamping ring prior to application to the assembly;

FIG. 5 is an enlarged detailed sectional view similar to FIG. 4, but showing the clamping ring applied to the assembly and also showing the position of the marginal bead when a pressure or force is applied to the upper surface of the clamping ring;

FIG. 6 is a detailed sectional view similar to FIG. 5, but showing the arrangement of the marginal bead of the upper flange when no force is applied to the upper surface thereof;

FIG. 7 is a detailed sectional view similar to FIG. 4, showing a modified form of drum and cover assembled with each other and showing in fragmentary form a modified type of clamping ring prior to application to the assembly; and

FIG. 8 is a detailed sectional view similar to FIG. 7 and showing the modified form of structure with the clamping ring assembled therearound.

In the accompanying drawings my invention is illustrated as applied to a drum type container made of sheet metal such as sheet steel or aluminum. However, it should be understood that my invention is equally applicable to drums made of fiber or of combined fiber and metal and also to such drums having coatings and linings therein.

In the form of my invention, illustrated in FIGS. 1 to 6, the drum or container has a cylindrical or tubular body

portion **10** having a bottom closure **12** also made of metal and permanently sealed and secured to the lower peripheral edge of the body portion. The body portion is open at its upper end as shown and has a chime portion extending around the opening.

In the form of my invention, illustrated in FIGS. 1 to 6, the chime portion includes an outwardly turned substantially cylindrical tubular bead **14** frequently designated as a "false wire." As shown in the drawings, the false wire or tubular bead serves to support the peripheral portion of the cover **16**.

Suitable outwardly projecting reinforcing and rolling hoops or beads are preferably formed circumferentially around the body portion. These rolling hoops have a larger diameter than the chime portion of the drum and the assembled chime cover and clamping ring, so that the assembled drum can be turned on its side and rolled on the hoops. The specific configuration and spacing of the hoops may be varied. Thus they may have a relatively broad and flat band-like outer surface or they may be convexly rounded as shown. In the illustrated embodiment, the two lower hoops are spaced a distance approximately one-third of the height of the drum from the respective ends and from each other and this is a commonly used spacing. An additional rolling hoop is illustrated as being positioned a short distance beneath the chime at the open upper end of the drum and a rolling hoop is frequently provided at this location.

The cover **16** is also made of sheet metal and is of one conventional design having a central disc shaped portion with one or more circular reinforcing beads or ribs **20** formed therein. A vertically disposed cylindrical portion **21** is formed around the outer portion of the cover and is of a size and configuration as to abut against the inner wall of the chime portion of the container when the cover is assembled thereon. A concavo-convex peripheral flange **22** is formed around the outer edge of the cover. The size and configuration of the cover flange should be such that it rests upon the tubular bead **14** of the chime of the container in snugly fitting engagement thereof as shown in FIGS. 4 to 6.

The container and cover assembly heretofore described forms one type of container to which my improved clamping ring may be applied. It may also be applied to other forms of drum type containers as, for instance, the container illustrated in FIGS. 7 and 8 or to fiber drums or drums made of combined fiber and metal.

In FIGS. 1 to 6 is illustrated, a split clamping ring **24** made of a suitable resilient metal such as steel and provided with suitable locking mechanism connected between the two ends thereof whereby the ring may be expanded to permit its assembly around the combined cover and container or contracted so as to tightly engage the assembled cover and container to hold the cover in place. In this connection, the clamping ring should be of a size and configuration so that it can be extended around the combined cover and container as shown in tightly engaging relationship.

Many suitable locking mechanisms may be employed, as for instance the illustrated mechanism. Thus, I have shown a locking lever **25** pivoted at one end to one end of the split clamping ring and pivotally connected at an intermediate point to link **26** which in turn is pivotally connected to the opposite end of the clamping ring. All of the pivotal connections have vertical axes so that the locking lever and link can pivot outwardly, horizontally. When pivoted outwardly, as shown in FIG. 1, the ring is expanded to permit its assembly over the combined cover and container. When the locking lever is pivoted inwardly, against the surface of the clamping ring, the ring is contracted as shown in FIG. 2, to exert a compressive force on the assembled parts. A small latch **27** may be pivotally connected to the locking ring adjacent the free end of the locking lever. The latch may be pivoted downwardly to free the locking lever for opening movement as shown in FIG. 1, or it may be pivoted upwardly as shown in FIG. 2 to overlap an end portion of the locking lever and may retain it in locked position. Locking mechanisms of this type are known in the art and it should be understood that other suitable locking mechanisms may also be employed.

The structure and configuration of my improved locking ring are most clearly illustrated in FIGS. 4 to 6. Thus the ring comprises a peripheral band portion **30** having integral upper and lower flange portions **32** and **34** extending for substantially the entire length of the ring and projecting radially inwardly toward the axis of the band in slightly diverging relationship. The marginal edges of the flanges are bent or folded back upon themselves toward the interior surfaces of the flanges to form marginal upper and lower beads **36** and **38**.

In the first form of my invention, the lower bead **38** is more tightly compressed as shown, whereas the upper bead **36** is in the form of a tubular curl spaced outwardly from the flange for a greater distance than the lower bead. In addition, the inner edge of the metal forming the upper bead **36** has a longitudinally wavy and corrugated configuration as shown most clearly in dotted lines in FIGS. 4, 5 and 6 with spaced portions of the inner edge being spaced outwardly from the inner surface of the flange and alternate sections being in closely spaced relationship to the inner surface of the flange.

When the cover is assembled on the container as shown, the upper surface of the peripheral flange **22** of the cover provides an upwardly facing cam surface. In addition, the lower surface of the tubular bead or false wire formed around the chime of the container provides a downwardly facing cam surface spaced below the upwardly facing cam surface.

The distances between the upper and lower flanges **32** and **34** of the clamping ring should be such that the space between the beads **36** and **38** is less than the distance between the apex portions of the upwardly and downwardly facing cam surfaces. In addition, the length of the flanges **32** and **34** should be such that the beads **36** and **38** extend inwardly beyond the apex portions of the cam surfaces when the ring is assembled around the combined cover and container as shown in FIGS. 5 and 6.

Thus it will be seen that when the cover is placed on the container and the ring is assembled therearound and the locking mechanism is closed, the ring will be contracted around the combined cover and chime portions. When thus contracted, the beads **36** and **38** engage the upper and lower cam surfaces causing the flanges to expand sufficiently to permit the beads to project inwardly beyond the apex portion or the crowns of the cam surfaces. Thus the beads snap past dead center and hold the ring in place. The spacing between the flanges **32** and **34** of the clamping ring is such that when the ring is assembled in closed position the flanges are slightly expanded in tension, thus exerting a resilient compressive force upon the upper surface of the cover flange and the lower surface of the false wire or tubular bead forming the chime of the container. The tubular curled configuration of the upper bead **36** causes it to exert an additional resilient force against the upper surface of the cover.

The upper flange **32** of the clamping ring is preferably slightly longer than the lower flange causing the beads to engage the cam surfaces in the manner indicated in FIGS. 5 and 6.

The corrugated configuration of the inner edge of the metal, forming the upper bead **36** of the clamping ring, serves to reinforce the structure when a downward force or impact is exerted against the upper surface of the clamping ring, as when filled containers are stacked one upon the other. In FIG. 6 the section through the upper bead **36** is taken at the point of the closely spaced section of the inner edge of the bead. It is shown in its normal assembled position when no force is exerted against the upper surface of the flange **32**, and the spacing between

the edge of the bead and the inner surface of the flange is apparent. FIG. 5 is a similar view but illustrating the relative position of the inner edge of the upper bead when a force has been applied to the upper surface of the clamping ring. It will be seen that the inner edge of the bead engages the inner surface of flange **32** thereby giving additional support and reinforcement to the structure.

In FIGS. 7 and 8 I have shown a modified type of locking ring **24'** which is particularly suitable for application to a container of the type shown at **10'** or to fiber drums or containers having a metal reinforced chime with an external groove extending around the upper portion thereof.

In the illustrated embodiment the container **10'** is made of sheet metal and has an inturned tubular bead **50** extending around the open end thereof. An exterior groove **52** is formed circumferentially around the upper portion of the drum a short distance beneath the bead **50**. The upper surface of the groove is defined by a rounded shoulder **54** presenting a downwardly facing cam surface to be engaged by a lower flange of the locking ring. A cover **56** is seated over the open end of the container and this likewise is preferably made of sheet metal. The cover has a central well-like disc portion and a circular wall **58** formed a short distance from the outer edge thereof and adapted to engage the inner surface of bead **52** when the cover is applied to the container. A concavo-convex peripheral flange portion extends around the outer edge of the cover and is adapted to overlap the inturned bead **50** of the container chime. The outer edge of the cover flange extends downwardly over the outer surface of the chime and preferably terminates in a seamed edge **62**. The upper surface of the peripheral flange portion **60** forms an upwardly facing cam surface which is engaged by the upper flange of the clamping ring. In this form of container, I preferably provide a circular gasket **64** made of natural or synthetic rubber or a suitable elastomeric synthetic resin which serves to provide an additional seal between the cover flange and the chime of the container.

The modified form of locking ring **24'** is of the split ring type as in the first form of my invention and has a similar type of locking mechanism connected between the ends thereof.

Locking ring **24'** preferably comprises a peripheral band portion **70** similar to the band portion **30** and having upper and lower integral flanges **72** and **74** extending for substantially the entire length thereof and projecting radially inwardly toward the axis of the ring in slightly diverging relationship. The marginal edges of the flanges are bent or folded back upon themselves toward the interior surfaces of the flanges to form marginal beads **76** and **78**. The beads **76** and **78** are preferably formed into rather closely spaced relationship wtih the inner surfaces of the flanges **72** and **74**.

The spacing between the upper and lower flanges **72** and **74** of the clamping ring are such that the beads **76** and **78** when the flanges are in a position of rest are spaced apart a distance slightly less than the distance between the apex portions of the downwardly facing and upwardly facing cam surfaces **54** and **60**. Also, the length of the flanges is such that the beads **76** and **78** extend beyond the apex portions of the cam surfaces when the clamping ring is assembly therearound in locked relationship as shown in FIG. 8. Thus the beads snap past dead center and are releasably retained in place.

In both of the illustrated forms of my invention, the cover is first applied to the open end of the container, the clamping ring is assembled around the chime and cover portion while the locking mechanism is in open position. Thereafter, the locking mechanism is locked to contract the locking ring causing the flanges of the locking ring to engage against the upper and lower cam surfaces and be expanded thereby until the marginal beads are locked beyond the apex portions of the cam surfaces.

It will be seen that the locking ring exerts a resilient compressive force to hold the cover in sealing engagement with the chime or with a gasket formed therearound, thus leaking or sifting between the cover and chime is minimized or eliminated. It will also be seen that the locking ring provided an improved reinforced structure that can withstand the forces and impacts normally encountered during shipping or storage. Should the locking mechanism be accidentally opened, the clamping ring will nevertheless remain in place due to the engagement of the beads beyond the apex portions of the cam surfaces.

Modifications may be made in the illustrated and described embodiment of the invention without departing from the invention as set forth in the accompanying claims.

I claim:

1. An improved clamping ring for use in releasably holding a cover in assembled relationship with a drum type container of the type in which the upper surface of the container chime is overlapped by a peripheral flange of the cover which presents an upwardly facing rounded shoulder forming an upwardly facing first cam surface and the container also has a rounded shoulder in its outer surface spaced downwardly a short distance beneath the top of the chime and forming a downwardly facing second cam surface, said clamping ring comprising: a split ring made of a resilient metal and having a contour and length so that it can tightly encompass the container chime with the cover assembled thereon and a locking assembly connected between the adjacent ends of the ring and shiftable from an open position with the ring in expanded relation to a locked position with the ring in contracted relation, said ring being formed with a peripheral band portion having integral flange portions extending for substantially the entire length of the band and projecting radially inwardly toward the axial center of the band in slightly diverging relationship with the marginal edges of the flanges being bent back upon themselves toward the interior surfaces of the flanges to form marginal beads, the length of the respective flanges being such that the beads extend slightly beyond the apex portions of the upper and lower cam surfaces when the clamping ring is assembled around the combined chime and cover and the spacing between the flanges is such that when they are in a normal position of rest, the distance between the beads is slightly less than the distance between the apex portions of the cam surfaces whereby when the clamping ring is assembled around the combined chime and cover and is contracted by the locking assembly, the flanges are expanded over the cam surfaces until the marginal beads are retained beyond the apex portions in compressive engagement with the cam surfaces.

2. A clamping ring as set forth in claim **1** in which the bead formed along the marginal edge of the upper flange is of relatively rounded, tubular construction.

3. A clamping ring as set forth in claim **2** in which the end portion of the metal forming said upper bead is of wavy, corrugated configuration with spaced portions spaced outwardly from the inner surface of the flange and alternate sections in closely spaced relationship to the inner surface of the flange so that upon the application of a force against the upper surface of the ring, the alternate sections engage the inner surface of the flange to reinforce the structure.

4. A clamping ring as set forth in claim **1** in which the beads formed along the marginal edges of the flanges are relatively flattened and in closely spaced relationship with the inner surfaces of the flanges.

5. An improved drum type container assembly comprising: a container body having an open end with a chime formed therearound and also having a downwardly facing rounded shoulder formed around its exterior a short distance beneath the top of the chime to provide a downwardly facing cam surface; a cover removably applied to the open end of the container and having a peripheral flange with an upwardly rounded shoulder overlapping

the top of the chime and forming an upwardly facing cam surface; and a split clamping ring made of a resilient metal assembled around said combined container chime and cover and having a locking assembly connected between the adjacent ends of the ring and shiftable from an open position with the ring in expanded relation so as to be removable from the chime and cover to a locked position with the ring in contracted relation tightly engaging the chime and cover, said ring being formed with a peripheral band portion and having integral flange portions extending for substantially the entire length of the band and projecting radially inwardly toward the axial center of the band in slightly diverging relationship with the marginal edges of the flanges being bent back upon themselves toward the interior surfaces of the flanges to form marginal beads, the length of the respective flanges being such that the beads extend slightly beyond the apex portions of the upper and lower cam surfaces and the spacing between the flanges is such that when the flanges are in a position of rest the distance between the beads is slightly less than the distance between the apex portions of the cam surfaces whereby when the clamping ring is assembled around the combined chime and cover and is contracted by the locking assembly the flanges are expanded over the cam surfaces with the marginal beads retained beyond the apex portions in compressive engagement with the cam surfaces.

6. An improved drum type container assembly as set forth in claim 5 in which the beads formed along the marginal edges of the flanges are relatively flattened and in closely spaced relationship with the inner surfaces of the flanges.

7. An improved drum type container assembly as set forth in claim 5 in which the bead formed along the marginal edge of the upper flange is of relatively rounded, tubular construction.

8. An improved drum type container assembly as set forth in claim 7 in which the end portion of the metal forming said upper bead is of wavy, corrugated configuration with spaced portions spaced outwardly from the inner surface of the flange and alternate sections in closely spaced relationship to the inner surface of the flange so that upon application of a force against the upper surface of the ring, the alternate sections engage the inner surface of the flange to reinforce the structure.

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