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C. A. MEYER

2,674,390

JOINT OR CLOSURE

Filed Sept. 11, 1950

FIG. 1

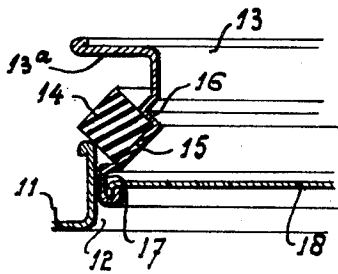


FIG. 2

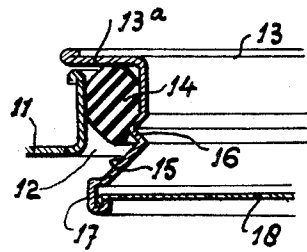


FIG. 3

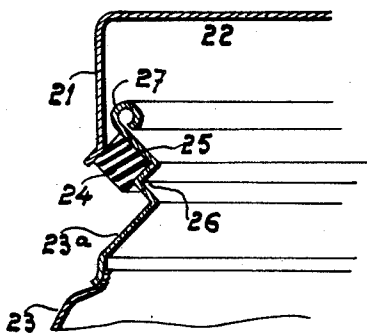
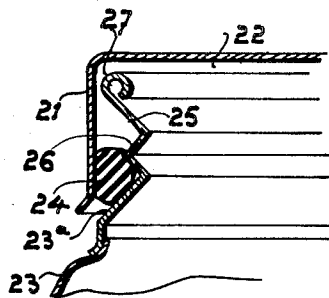


FIG. 4



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JOINT OR CLOSURE

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Claims priority, application Netherlands
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3 Claims. (Cl. 220—46)

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The present invention relates to joints or closures of the type comprising one part adapted to be introduced into and secured in an orifice of another part. The first mentioned part may, for instance, be a stopper, a cover or the like adapted to seal the opening of a bottle, a jar, a drum, a tin, a can or a similar container. Alternatively the first mentioned part may be formed by the spout or the mouth of a bottle, a can or the like being adapted to be secured in the orifice constituted by the projecting flange or rim of a cover, a cap or the like, and thereby to be sealed. The principles of the invention are equally applicable to the coupling and sealing of sections of pipe or conduits.

More particularly, my invention relates to joints of the kind in which the part to be secured in an opening in the other part is provided with an elastic ring, and with a shoulder or other protruding means over which the ring may roll when the part is introduced into the corresponding orifice; the two parts being secured to one another by the elastic ring being clamped between the shoulder and the inner surface of the orifice.

Joints of the type set forth have been proposed heretofore, but actually they are rarely employed mainly because they have to be handled with utmost skill and care in order to ensure a reliable seal since even the slightest carelessness in the application leads to unsatisfactory results.

In my co-pending application for Letters Patent, Serial No. 143,935, filed February 13, 1950, I have proposed a joint of this type ensuring a reliable connection or seal even when being handled inexpertly or carelessly, or when the dimensions of the one part and the orifice in the other part are not carefully adjusted to one another. In the device referred to, the elastic ring is seated on the cylindrical mantle of the one part, that is, between the shoulder over which the ring is adapted to roll, and a shoulder for guiding the part into the orifice. Additional features render this closure or other connection practically invulnerable to inexpert use.

The present invention presents certain added advantages over my prior arrangements since it makes especial provisions for embodying the invention in container and other joints, the interfitting members of which are made of relatively thin sheet metal, as in the canning industry, which industry affords a vast outlet for devices constructed in accordance with my invention.

One object of my present invention, therefore, is to improve this type of joint without, on the

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other hand, sacrificing any of the many advantages of the earlier construction. With this object in view, in the joints made according to the present invention, the elastic ring is located on the mantle surface of a truncated cone inclined with respect to the shoulder over which the ring is to roll. In this way the shape of the cover, for instance, is simplified to such an extent that the device can easily be executed in sheet-metal such as tin. Moreover, such a device is rendered much less sensitive to inexactness in dimensions.

Other objects and features of novelty will be apparent from the following specification when read in connection with the accompanying drawings in which certain embodiments of the invention are illustrated by way of example.

In the drawings:

Figure 1 is a longitudinal section of a drum closure according to my present invention, the parts being in open position;

Figure 2 is a section of the same closure in closed position;

Figure 3 is a cross-section of another embodiment of my present invention applied to a drum closure of the cap type, in open position; and

Figure 4 shows the same closure in closed position.

In the embodiment of the invention shown in Figures 1 and 2 of the drawings the ring 14, serving to secure the stopper 13 in the opening 12 of the vessel 11, is seated on the mantle 15 of a truncated cone, the apex of which embraces an angle of about 90°. The shoulder 16, the operative face of which also consists of a truncated cone, is constituted by a simple bead formed in the wall of the cover. The cover is completed by the bottom 18 seamed or rolled into the profiled mantle of the cover.

This stopper, too, has a flange 13a located at such a distance from the shoulder 16 that the ring 14 is caught before having completed half a revolution when the closure is pressed home.

Very evidently, in the device shown, the width of the supporting face 15 is far less important than in the closure illustrated in my copending application to which reference has been made; the seat 15 being conical the ring 14 always tends to abut against the shoulder 16, particularly so when the stopper is placed on the rim of the opening. Hence, the width of this seat 15 may be chosen somewhat larger than the height of the ring 14, thereby eliminating the risk of the ring rolling back into an incorrect position when the stopper is removed.

Moreover, it appears that even when the height

of the guiding rim 17 is less than that of the lower shoulder of the closure element in the embodiment shown in Figures 1 and 2 of my aforesaid application, the distance along which the stopper is guided in the orifice is larger, thereby offering a greater security against an oblique or eccentric location of the stopper with respect to the orifice.

The height of the guiding rim 17 being less, and the seat 15 for the ring 14 being conical, the total height of the stopper may be made less than in the device shown in the copending application, thereby decreasing its manufacturing costs and its weight. Furthermore, the closing travel, that is, the distance covered by the stopper from the moment of abutment on the rim of the opening to the position in which the seal is completed, is shorter, the result being that the compression caused by closing the vessel is lower, so that in many cases the provision of the conventional air-outlets will be superfluous.

When the ring moves over dead-center or passes its "snap position" it is, moreover, compressed to a smaller extent than the ring in the earlier device, thus permitting the use of a harder ring, increasing the height of the shoulder 16, and/or decreasing the resistance against closure of the vessel, while maintaining the same resistance against involuntary opening thereof.

Finally, it has been found that a smaller cross-section of the ring may be chosen and, furthermore, may be made identical for closures of widely varying dimensions, and the joint can be used for considerably smaller orifices than before.

Although the primary object of my present invention consists in removing the difficulties encountered in the manufacture of a sheet metal closure, it will be apparent from the foregoing that my present invention is by no means limited to application to sheet metal joints, but, on the contrary, may be applied advantageously to the interconnection of parts made of any other material.

In the embodiment illustrated in Figures 3 and 4 of the accompanying drawings, the part to be secured in the orifice of the other part consists of the spout of a vessel or can 23, whereas the orifice 22 is formed by the mouth of a cap 21 to be placed on said spout.

The spout is provided with an elastic ring 24 which, in the closure's open position (Fig. 3), is seated on the conical face 25 and abutting against the shoulder 26. The bead 27 serves as an initial guide to the cap. When the latter is placed on the spout and pressed home, the ring 24 rolls over the shoulder 26 until it abuts on the conical surface 23a situated beneath the shoulder 26. This abutment occurs in a position where the ring 24 still has the tendency to continue to roll and, therefore, to press the cap further down on the spout, and thus opposing removal of the cap.

It will readily be understood that the invention is not limited to the embodiments illustrated and described; for instance, the two co-acting parts may be tube ends so that the joint serves as a pipe connection; the joint may also be executed as a shaft-coupling; the one part may be the cover of a man-hole, an inspection-hole, a drainage aperture or the like. Briefly, the invention is applicable in all those cases where a connection is required which is easy to make and to remove, particularly when the connection must be a hermetic seal.

Having thus described the invention, what is

claimed as new and desired to be secured by Letters Patent is:

1. A joint structure comprising two members, one of which is provided with an annular wall defining an orifice, the other of said members adapted to be introduced into said orifice to establish sealing contact with the wall of the orifice, said second named member having an outer peripheral surface of a maximum diameter less than the diameter of the orifice, a resiliently deformable ring of elastic but substantially incompressible material and of polygonal cross-section surrounding and seated upon said peripheral surface, a clamping shoulder projecting radially outwardly from said surface and defining one side of the seat for said ring on which seat said ring is disposed when at rest in a substantially undistorted state of equilibrium in the unapplied position of the second named member, said seat having the shape of the mantle of a truncated cone diverging outwardly and rearwardly substantially from the base of said shoulder, said ring having an outside diameter greater than the inside dimension of said orifice and said shoulder being of considerably less outside dimension than said orifice, whereby upon introduction of said second named member into said orifice the ring abuts the peripheral edge of the orifice and is tilted over said clamping shoulder and commences a distorting everting rolling movement along said surface, and a second radially outwardly projecting shoulder on said surface spaced from said first named shoulder in the direction of movement of said ring and adapted to be abutted by said deformable ring during such movement to limit the extent thereof, the axial distance between said clamping shoulder and said second named shoulder being such with respect to the circumference of cross-section of the deformable ring that the ring abuts against said second named shoulder before it rolls completely over said clamping shoulder and before it can reach a new position of equilibrium, said ring in its operative position at said limit of movement being clamped between the apex of the first named shoulder and the wall of the orifice and resting in contact with the second named shoulder whereby the joint is sealed.

2. The joint structure as set forth in claim 1 in which said first named shoulder is also conical but diverging in the opposite direction and the ring is of a general wedge shape in cross-section, the apex of the wedge directed radially inwardly and the cross-section of the ring being substantially symmetrically disposed about a transverse plane passing through the apex thereof.

3. A joint structure comprising two members, one of which is provided with an annular wall defining an orifice, the other of said members adapted to be introduced into said orifice to establish sealing contact with the wall of the orifice, said second named member having an outer peripheral surface of a maximum outside dimension less than the inside dimension of the orifice, a resiliently deformable ring of elastic but substantially incompressible material and of polygonal cross-section surrounding and seated upon said peripheral surface, a clamping shoulder projecting radially outwardly from said surface and defining one side of the seat for said ring on which seat said ring is disposed when at rest in a substantially undistorted state of equilibrium in the unapplied position of the second named member, said seat having the shape of

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the mantle of a truncated cone diverging outwardly and rearwardly substantially from the base of said shoulder, said ring having an outside dimension greater than the inside dimension of said orifice and said shoulder being of considerably less outside dimension than said orifice, whereby upon introduction of said second named member into said orifice the ring abuts the peripheral edge of the orifice and is tilted over said clamping shoulder and commences a 10
distorting everting rolling movement along said surface, means for limiting the introduction movement of said members before said ring has rolled completely over said shoulder, and before

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it has reached a new position of equilibrium; said ring at such limit of movement being clamped between the apex of said shoulder and the wall of the orifice.

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