

April 11, 1967

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3,313,445

SEALING DEVICE FOR CONTAINERS

Filed March 8, 1965

2 Sheets-Sheet 1

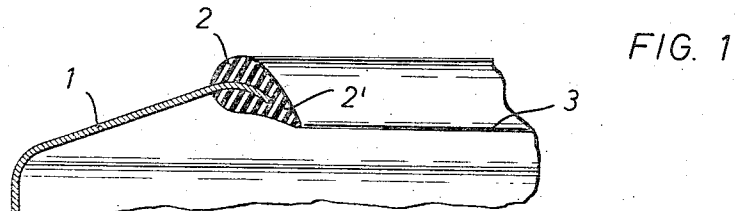


FIG. 1

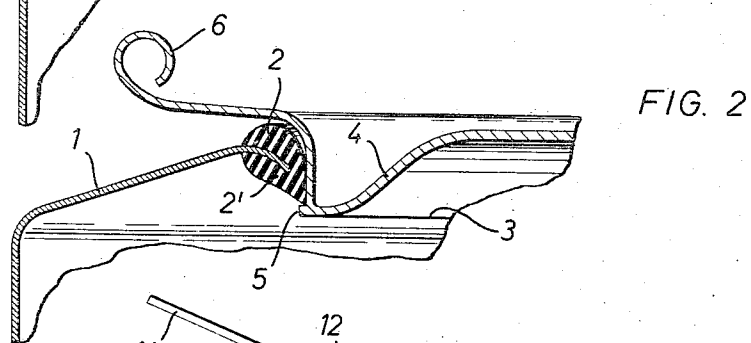


FIG. 2

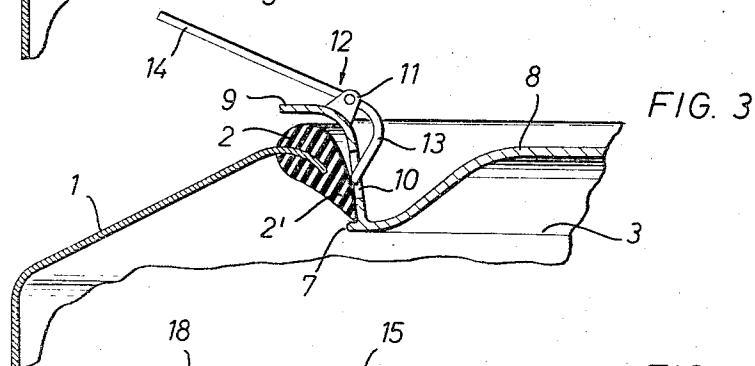


FIG. 3

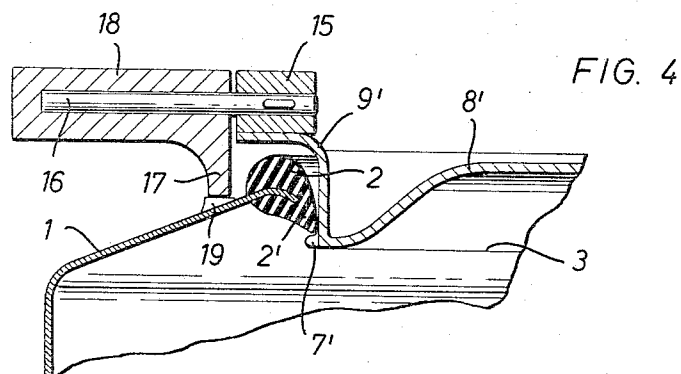


FIG. 4

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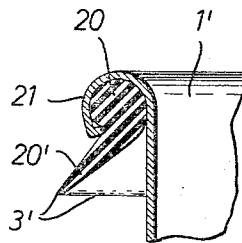


FIG. 5

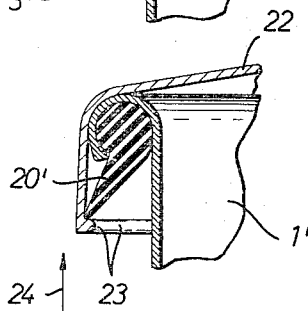


FIG. 6

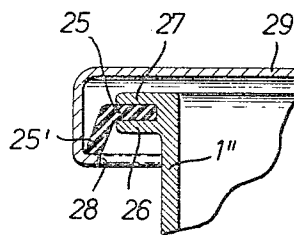


FIG. 7

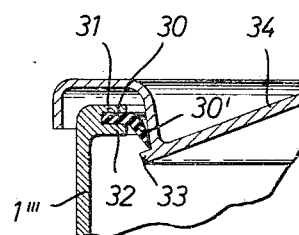


FIG. 8

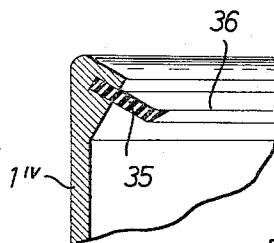


FIG. 9

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SEALING DEVICE FOR CONTAINERS

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Filed Mar. 8, 1965, Ser. No. 437,949

Claims priority, application Germany, Mar. 10, 1964,
B 75,837

5 Claims. (Cl. 220-46)

The present invention relates to a closure device for tightly sealing a container or other receptacle which may be opened and closed by a cover and be subjected, for example, to internal pressure or a vacuum, and which is provided with an elastic sealing ring of rubber, plastic, or the like between the container and the cover.

It is an object of the present invention to provide a closure device which is adapted to seal a container tightly and reliably, regardless of whether it contains a pressure or vacuum, merely by applying the cover upon the container and without requiring any additional means for securing the cover to the container.

A feature of the invention for attaining this object consists in providing a sealing ring of a cross-sectional shape differing from that of a flat ring and secured to one of the elements to be sealed relative to each other, that is, to the container or the cover, so that a deformable part of the ring projects from one element toward the other and is adapted to engage upon a projection or the like on the other element when the two elements are pressed against each other. Insofar as the invention is concerned, it is immaterial whether the cover is designed so as to engage partly into the container or whether it surrounds the open end of the container, although for sealing a container which is acted upon by internal pressure it is more advisable to employ a cover of the type which is pressed into the container opening, while for sealing an evacuated container, it is more advisable to employ a cover which engages over the outer side of the cover opening.

Another feature of the invention provides that for permitting the container elements which are connected to each other by the sealing ring to be easily disconnected from each other, the projecting edge portion on one of these elements which forms the mentioned projection is interrupted at one point so that, if a lifting force is exerted upon this element at this point, it may be easily severed from the other element. If the projection extends continuously around one container element or is interrupted at least at one point, it is advisable to provide this container element carrying the projection with an aperture at a point above the projection, and in the case of an interruption in the projection at a point above the interruption, and to mount on this container element a lever, one end of which is adapted to pass through this aperture. If this lever is then pivoted at one end so that its other end passes through the aperture, it will press upon the unclamped part of the sealing ring and thereby disengage the same from the projection so that the two container elements may then be easily separated from each other.

One of the container elements, for example, the cover, which is provided with a projecting edge portion may, however, also form the support of a rotatable handle which is provided with an eccentric cam which, when the handle is turned, acts upon the other container element so as to lift the first element from the latter. Particularly in this case it is advisable to provide the projecting edge portion with an interruption.

The features and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which—

FIGURE 1 shows a cross section of the part of a container adjacent to its opening, the edge portion of which

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is provided with a sealing ring according to the invention;

FIGURE 2 shows a similar view of the container according to FIGURE 1, but with a cover closing and sealing the opening and a handle integral with the cover;

FIGURE 3 shows a similar cross section of a part of a container with a cover thereon which is provided with a pivotable lever which is adapted to act upon the sealing ring on the container for lifting the cover off the container;

FIGURE 4 shows a similar cross section of a part of a container with a cover fitted therein which is provided with a rotatable handle with an eccentric cam thereon;

FIGURE 5 shows a similar cross section of a part of a container on which an outwardly projecting sealing ring according to the invention is secured;

FIGURE 6 shows a similar view of the container part and sealing ring according to FIGURE 5 with an overlapping cover thereon;

FIGURE 7 shows a similar cross section of a part of another container with a sealing ring of a substantially rectangular cross section secured thereto and closed by an overlapping cover;

FIGURE 8 shows a similar cross section of a part of another container which is closed by a cover which is partly inserted into the container opening, and in which the sealing ring has a substantially triangular cross section; while

FIGURE 9 shows a similar cross section of a part of still another container which is provided with a sealing ring with a sharp inner edge.

As illustrated in FIGURES 1 and 2 of the drawings, the container 1 is provided with a sealing ring 2 of an elastic material, such as rubber, plastic, or the like, which is secured to the edge portion of the container which surrounds the opening thereof. This sealing ring 2 has a substantially drop-shaped cross section with a sharp inner edge portion 3 of a diameter smaller than the diameter of the opening of the container itself without the sealing ring. If a cover 4 for this container which is provided with a continuous projection 5 along its lower edge is pressed downwardly into the area which is surrounded by the sealing ring 2, the elastically deformable part 2' of the sealing ring will be compressed in the outward directions until the projection 5 of the cover 4 snaps over the edge portion 3 of the sealing ring. The compressed part 2' then tends to reassume its former position and therefore effects a secure sealing action between the cover and the container. If the inside of the container is acted upon by a pressure, the cover 4 will tend to separate from the container and the deformable part 2' of the sealing ring 2 will also be deformed in the same direction and thereby press more strongly against the part of the cover above the projection 5 so that the cover which is centrally acted upon by the internal pressure will be secured to the container at a still greater strength than previously. The smaller the difference is made between the diameter of the edge of the upper part of the container and the diameter of the edge of the cover, the greater may be the forces which act upon the inside of the container without danger that the cover might open of its own accord. If, however, a force is exerted upon one side of the cover, for example, by means of a handle 6, the cover may be disengaged from the sealing ring 2 and be opened. Of course, the thickness and solidity of the elastic material of the sealing ring are also important factors which determine the security of the sealing action of the cover and the facility at which it may be opened.

FIGURE 3 illustrates a modification of the cover which is provided with special means for acting upon the sealing ring 2 at one point so as to deform the latter sufficiently to disengage from the projection 7 of the cover 8

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so that the cover may then be opened. The edge portion 9 of the cover 8 is for this purpose provided with an aperture 10 and also with a bearing bracket 11 on which a two-armed lever 12 is pivotally mounted. One end 13 of this lever 12 is bent downwardly in a manner so that its end is adapted to pass through the aperture 10 and, when the outer end 14 of the lever is lifted, to act upon the deformable part 2' of the sealing ring 2 so as to disengage this part at this point from the cover 8. If the cover is then lifted, for example, by the lever 12, it may be easily opened and removed from the container 1. Since the other arm 14 of lever 12 by its own weight tends to pivot downwardly, there is practically no danger that the other arm 13 will act upon the sealing ring 2 when this is not desired.

FIGURE 4 illustrates another modification of the means for removing the cover 8' from a container 1 which is provided with a sealing ring 2 similar to that as shown in FIGURES 1 to 3. The edge portion 9' of the cover 8' is provided with a supporting member 15 for a pin 16 on which a handle 18 is rotatably mounted which has an eccentric cam projection 17 thereon and may consist, for example, of a single piece of material. When the handle 18 is turned, the eccentric cam 17 engages with a projection 19 on the container 1 and thereby lifts the edge portion 9 and thus the cover 1 at this point. In order to reduce the force which is required to lift the cover, the projection 7 is interrupted at the point 7'.

It is, of course, also possible to open a cover without any additional means, such as a lever 12 or an eccentric cam 17, if any suitable available element is inserted between the upper surface of the sealing ring 2 and the edge portion 9 or 9' of the cover and the deformable part 2' of the sealing ring is thereby disengaged at one point from the projection 5 or 7 of the cover.

FIGURE 5 shows a further modification of the invention in which a sealing ring 20 is secured to the outer edge portion 21 of a container 1'. The deformable part 20' of this sealing ring 20 extends downwardly toward the outside so that the edge portion 3' thereof has a larger diameter than the edge portion 21 of the container 1'. If a cover 22 which is provided with an inward projection 23 is applied upon the container 1', the deformable part 20' of the sealing ring 20 is depressed in the direction toward the container 1' until its edge portion 3' snaps over the projection 23 so that the container 1' and the cover 22 are then tightly connected to each other. Such a construction is especially suitable if the container 1' is evacuated. However, even if there is an interior pressure in the container 1', the cover cannot be lifted by this pressure from the container unless it exceeds a certain strength. If the cover 22 is to be removed from the container 1', it is necessary to bend the deformable part 20' of the sealing ring 20 at one point in the direction toward the container or to exert a force upon the cover at one point of the projection 23 so as to loosen the two parts from each other. If the individual parts are made of the proper dimensions in relation to each other, the cover 22 may also be loosened from the container 1' if a force is exerted upon the cover only at one point in the direction of the arrow 24, as shown in FIGURE 6. The sealing ring 20 will then be deformed at this point until it finally snaps over the projection 23 at this point.

FIGURES 7 to 9 illustrate that the sealing ring may also be of a substantially flat cross-sectional shape. According to FIGURE 7, the inner part of the sealing ring

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25 is clamped between two outer flanges 26 and 27 on the upper end of the container 1'', while the outer deformable part 25' engages behind a projection 28 on the cover 29 which is radially spaced from and extends around the container 1''.

The sealing ring according to FIGURE 8 has a substantially triangular cross section. Its outer part is clamped between two flanges 31 and 32 which project inwardly from the upper edge of the container 1''', while the sharp edge of its deformable part 30' engages behind a projection 33 on the cover 34. The covers of the containers according to FIGURES 7 and 8 may be applied thereon and removed therefrom in the same manner as previously described.

FIGURE 9 finally shows a modification of the manner of mounting a flat sealing ring 35 which has a sharp inner edge 36. The cover which may be applied on the container 1'''' may be of different constructions, such as shown in FIGURES 2, 3, 4 and 8, respectively.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A closure device for tightly sealing a container element having an opening and a cover element for opening and closing said opening, comprising an elastic sealing ring of a rubberlike material and of a cross-sectional shape differing from that of a flat ring and secured to one of said elements so that a deformable part of said ring projects from said element toward the other element, said other element having a projection thereon, said deformable part adapted to engage upon said projection and to secure said elements to each other when pressed against each other.

2. A closure device as defined in claim 1, in which said projection on one of said elements forms a peripheral projecting edge portion.

3. A closure device as defined in claim 1, in which said projection on one of said elements forms a peripheral projecting edge portion having an interruption at one point into which a tool may be inserted to act upon the sealing ring when said container is to be opened.

4. A closure device as defined in claim 1, in which the peripheral edge of said element carrying said projection has an aperture above said projection, and further comprising a lever pivotally mounted on said element and having one end adapted to pass through said aperture to act upon said sealing ring when a force is exerted upon the other end of said lever so as to open said container.

5. A closure device as defined in claim 1, further comprising a rotatable handle rotatably mounted on said element carrying said projection and having an eccentric cam thereon adapted, when said handle is turned, to act upon the other element to separate the two elements from each other.

No references cited.

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