May 25, 1937. C. E. McMANUS 2,081,246

CONTAINER CLOSURE AND METHOD OF MAKING SAME

Filed March 29, 1933

Fig. 1.

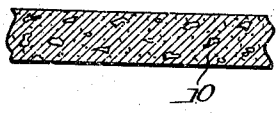


Fig. 2.

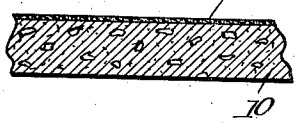


Fig. 3.

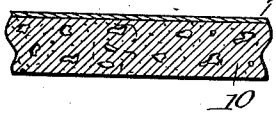


Fig. 4.

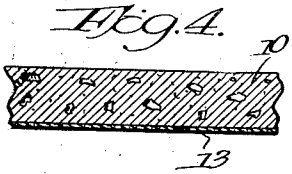


Fig. 5.

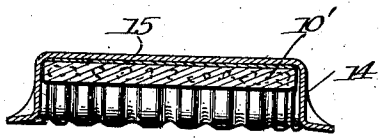


Fig. 6.

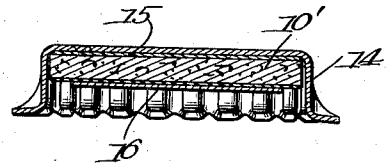


Fig. 7.

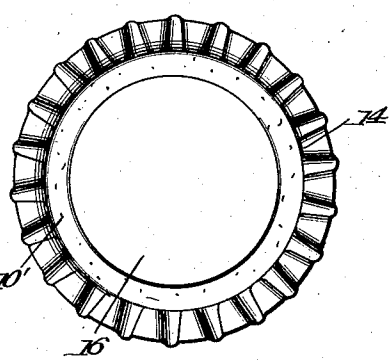


Fig. 8.

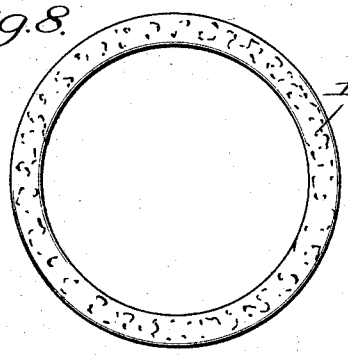
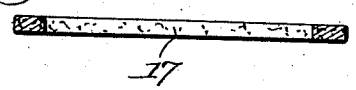


Fig. 9.



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2,081,246

CONTAINER CLOSURE AND METHOD OF MAKING SAME

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Application March 29, 1933, Serial No. 663,424

2 Claims. (Cl. 215—37)

This invention relates to closures, and particularly caps for containers having cushion liners associated therewith.

A particular object of the invention is to provide a cap having a cushion or disc which will be (1) impervious to liquids and gases, (2) substantially unaffected by acids, alkalies and oils incident to its use with food and other products, and (3) which will be pressure resistant in that it will withstand the high sealing pressures frequently employed.

A further object of the invention is to provide a cap or closure having a cushion liner associated therewith which liner is relatively thin or of a gauge of less thickness than the cushion discs and liners now in use. This results in a substantial saving in material and a better seal is obtained because of the exceptional resilience and pressure resistance of the cushion material.

A further object of the invention is to provide a cap with a cushion disc having a suitable protective facing, which may be in the form of a film, an overall liner, or a center spot liner.

The cushion liner material of the present invention is described in the co-pending application of William M. West, filed March 24, 1933, Serial No. 662,633, and I have found the same highly acceptable as a sealing means between the closure and the container to which it is applied. This material is in the form of a close network of expanded structure and vulcanized, having as its main body ingredients comminuted cork and cellular rubber with suitable plasticizers and softening agents. The close network provided is impervious to gases and liquids and will withstand pressures of one hundred and fifty to two hundred pounds or above the normal range necessary to be considered in connection with high pressure sealing operations.

The material comprises a retiform structure having as its principal body materials comminuted cork and rubber. That is, a close network of expanded and vulcanized material in block, rod or strip form having each of the major components substantially cellular. The cushion discs or liners are sliced or punched from the expanded material. The product is characterized by having the optimum inherent properties of the body members available and in fact the rubber and cork cooperate to produce an effect which is the maximum resultant of the combination of their several qualities.

The cork particles are of a size to retain their cellular nature, and the mass is expanded and the rubber rendered cellular in situ and immediately vulcanized.

The rubber substantially encases the cork particles, and is adherent to the faces thereof. The cork particles constitute a body material as distinguished from a filler, and the rubber, the cellular walls of which are united to the cork particle faces, acts to (1) bond the cork particles forming a cork and rubber network, and (2) resiliently and permanently fix or position the particles in spaced relation preventing compacting thereof.

The product is flexible and resistant to creasing and bending strains without cracking, elastic, tough, pressure resistant and impervious to water and gases, has an optimum of resilience, i. e., compression and rebound, and the particle faces comprise a substantial portion of the surface area. Also, the discs and liners made from the material are free from any tendency to curl and do not warp or lose their shape, when wetted and subsequently dried. In other words, they will remain permanently flat and are not objectionably affected by conditions of temperature and moisture.

The material is produced by a method of procedure wherein (*a*) molded products of any required shape will be formed, and (*b*) continuous strip material will be produced.

The method is carried out with nice control of the ratio of cork and rubber and regulation of the chemical action whereby the cellular character of the rubber and of the expanded material is determined. In connection with the latter, the method provides for expanding the material and rendering the rubber cellular by means of a gas forming or blowing agent and in situ, that is in the form of the final product, i. e., the block, rod, strip or liner, and substantially immediately thereafter vulcanizing the mass.

In carrying out the method of the invention, the mixture of cork and rubber and the chemical constituents, i. e., accelerators and blowing and vulcanizing agents and/or plasticizers and softening agents, are first prepared in the form of a partially vulcanized or set mass. This mass is placed in a mold of desired shape to form blocks, sheets, rods or liners, and in its partially set condition, is subjected to the blowing operation whereby the material fills the mold cavity, immediately followed by vulcanization, both steps taking place in the mold. That is to say, the mass is expanded simultaneously with the step of rendering the rubber cellular and

immediately vulcanized whereby the product is obtained in its maximum blown or expanded and shaped condition. In the case of sheet material the mold is usually omitted, the strip material being passed in sheets through a heating chamber, and expanded and immediately vulcanized therein.

In the drawing:

Figure 1 is a sectional view through the cushion liner material;

Figure 2 is a view showing the cushion liner material provided with a film deposit or layer of a suitable acid and alkali resistant lacquer;

Figure 3 is a view similar to Figure 2 showing the cushion material having united to its face a layer of paper or foil;

Figure 4 is a view showing the cushion material having applied to one side thereof a layer of adhesive;

Figure 5 is a view showing a disc of the cushion material in position in a closure cap;

Figure 6 is a similar view showing the face of the cushion liner provided with a center spot liner;

Figure 7 is a bottom view showing the cap of Figure 6;

Figure 8 is a top elevation of a sealing ring; and

Figure 9 is a section on the line 9—9 of Figure 8.

Referring to Figure 1, I have shown at 10 a section of the improved cushion material. It is to be observed that the cork and rubber are prepared as a retiform structure, that is to say, a close expanded network which is impervious to liquids and gases and which is pressure resistant. The material is characterized by numerous but non-communicating pores and interstices and the rubber is rendered cellular. The cork particles are encased in the rubber and the rubber adhesively unites the cork particles and fixes them in substantially permanent position.

The material is characterized by a high degree of resiliency and since the cork particles are positioned by the rubber to have a compensatory movement, regardless of the sealing pressures, the cushion material will not be ruptured.

In Figure 2 of the drawing, I have illustrated the cushion material provided with a surface facing 11 of acid and alkali resistant varnish.

In Figure 3, I have illustrated the cushion material as having applied thereto a layer 12 of thin liner material such as varnished express paper, metal foil, as well as "cellophane."

In Figure 4 of the drawing, I have shown the cushion material provided with a facing layer 13 of adhesive which may be in the form of a pressure or heat sensitive adhesive or a heat coagulable adhesive.

In Figure 5 of the drawing, I have illustrated a cap 14 having a disc 10' of the cushion material disposed therein and completely surrounded by the skirt of the cap. The disc 10' is preferably united to the underside of the cap top by any suitable adhesive such as a heat fusible lacquer applied as a coating to the adjacent metal surface of the cap, or by means of the adhesive 13 which may be pressure and heat sensitive, such as gutta percha, or heat coagulable, such as albumen. The adhesive strata is shown at 15.

In Figures 6 and 7, I have shown the face of the cap provided with a center spot liner 16 of varnished express paper or metallic foil such as tin foil and aluminum foil. This spot is united to the cushion material by means of a heat and/or pressure sensitive adhesive or a heat coagulable adhesive, as just described.

Instead of using a center spot, I use, in some cases, an overall or coextensive liner of paper or metal foil, such as tin foil or aluminum foil, and unite the same to the cushion material as described.

In Figures 8 and 9, I have illustrated an ordinary ring gasket 17 constructed of the material shown in Figure 1.

In forming discs of the cushion material, I proceed in several ways. In order to form the cushion liner 10' of Figure 5, I will punch discs of suitable size from a strip of the material. In this connection, the strength of the material is such that even in the thinnest gauges, it may be suitably punched without fear of disruption or otherwise weakening the disc. For this reason cushion discs of very thin gauge, less than that of the usual cork composition discs, are employed, being both economical and assuring a better seal.

As an alternative process, I will form the material in the form of a tube or rod of suitable diameter and slice therefrom discs of the appropriate thickness. Such rod or tube may be extruded, and the material then expanded and vulcanized or the expansion and vulcanization take place in a suitable mold from which the rod will be withdrawn for slicing.

The strip material of Figures 2, 3, and 4 will likewise be punched to produce a cushion disc having (1) a coextensive facing layer 11 of lacquer, (2) a coextensive facing or overall liner 12 of paper, cellophane or tinfoil, and (3) a disc having applied to one surface thereof a layer of heat or pressure sensitive adhesive or heat coagulable adhesive 13. Also discs will be punched from a sheet having a facing as described, and the opposite surface provided with an adhesive layer.

It will be understood that the adhesive layer will, in some cases, be applied to the sheet material shown in Figures 2 and 3, and the resultant composite structure punched to produce the discs.

With respect to the sealing rings shown in Figures 8 and 9, this may be either severed from a hollow tube of the material or punched from a suitable sheet.

The lacquer or varnish facing 11 for the cushion disc 10', or liners 12 and 16, may comprise a suitable oil varnish, cellulose lacquers, collodium, synthetic resin lacquers, latex films, and in fact, any impervious deposit which will be acid and alkali and oil resistant.

In lieu of using a center spot of paper or foil or an over-all liner of this material, a facing film of a cellulose ester e. g. nitrocellulose will be employed.

I have stated that the adhesive bonding material 15 between the cushion and the cap is, in some cases, formed on the metal on the interior of the cap top, and in other cases, is provided as a film upon the cushion material. Such adhesive may consist of albumen, a synthetic resin of the glyptal type, a latex adhesive, a protein adhesive, such as casein, or a resin-copal-alcohol varnish.

The cushion liner is useful in connection with lug caps, screw caps, divided thread caps, crown caps, and caps of molded form, as well as the disc type closures as shown and described in the allowed application of George W. Booth, Serial No. 553,464.

With respect to synthetic resins of the adhesive type, while I have referred to glyptal resins, it will be understood that I will use various of these resins such as bakelite and similar aldehyde condensation products.

I claim:

1. A cap comprising a metal shell and a liner disc therefor of an expanded body of comminuted cork and rubber forming a resilient and flexible layer, the cork constituting a body material and forming a substantial portion of the exposed face of the liner.

2. A cap comprising a metal shell of the crown type and a liner disc therefor of an expanded body of comminuted cork and vulcanized rubber forming a resilient and flexible layer, the cork constituting a body material and forming a substantial portion of the exposed face of the liner.

CHARLES S. McMANUS.