METHOD OF MAKING A CLOSURE CAP AND CLOSURE CAP MADE THEREBY

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Filed Sept. 29, 1958, Ser. No. 763,921

6 Claims. (Cl. 154—89)

The present invention relates to a method of making a closure cap and more particularly to an improved method and means for securing a gasket in a closure cap.

The increased use of food products which are preferably packaged in hermetically sealed packages has made it desirable to use a closure cap which will form a hermetic seal not only when the package is initially sealed but also when the closure cap is re-applied to protect the unused portion of the contents.

Such closure caps are usually provided with sealing gaskets which form a tight seal with the rim of a container to hermetically seal the contents therein. In order to form a leak-proof seal, such sealing gaskets must be applied to the closure cap in such a manner as to prevent the entrance of air into the container.

So-called cut gaskets are obtainable from suppliers and are extensively used in screw caps, both of the lug and thread types, for various hermetic seals. These gaskets may be secured to the inside of the cover of the cap directly above the rim of the container by a suitable adhesive. Any break, crevice or opening in the adhesive between the gasket and the metal of the closure permits air to leak into the container thus impairing the seal and spoiling the product. Difficulty has been encountered with known adhesives and their methods of application in avoiding seepage of air between the upper side of the gasket and the cover of the closure.

The present invention aims to provide an improved method of providing a solid bond between the upper side of the gasket and the metal of the closure which does not have cracks or crevices and which prevents seepage of air between the top of the gasket and the metal of the cap. In addition, the adhesive may be kept within the confines of the width of the gasket so that it does not seep outside where it contacts with the product. The bond holds the gasket securely in position and prevents loss in shipment and in handling.

An object of the present invention is to provide an improved closure cap which has a cut gasket securely adhered thereto.

Another object of the present invention is to provide an improved closure cap in which a gasket is adhered thereto by a solid uniform bond of adhesive.

A further object of the present invention is to provide a method of applying a cut gasket to a closure cap by an adhesive which will minimize or eliminate the formation of cross channels or crevices in the adhesive.

Still further objects of the present invention is to provide an improved method of applying adhesive to a closure for adhering a gasket thereto which is simple and inexpensive.

Other and further objects of the invention will become obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a sectional perspective view of a preferred embodiment of a closure cap showing the adhesive for securing the cut gasket to the closure applied in accordance with the present invention;

Fig. 2 is a perspective view of the cut gasket to be applied to the closure cap shown in Fig. 1;

Fig. 3 is an enlarged sectional view showing the relative position of the cut gasket and the adhesive immediately prior to contact between the gasket and adhesive;

Fig. 4 is an enlarged sectional view showing the relative position of the adhesive and the cut gasket upon initial contact of the gasket with the adhesive;

Fig. 5 is an enlarged sectional view showing the relative positions of the gasket and the adhesive after the gasket has been fully pressed onto the closure;

Fig. 6 is a sectional perspective view showing a preferred embodiment of the finished closure;

Fig. 7 is a sectional view of the preferred mechanism for applying the adhesive to the closure in accordance with the present invention; and

Fig. 8 is an enlarged sectional view of a nozzle for applying adhesive to the closure in accordance with the present invention.

Referring more particularly to Fig. 1 the preferred embodiment of the invention is illustrated in the application of a gasket to a closure 1 having a cover portion 2 adapted to overlie the rim of a container and a skirt portion 3 depending therefrom. The cover portion 2 has a depressed portion 4 therein spaced from a skirt portion 3 to form a gasket-receiving channel 5. Prior to the application of a gasket in the closure, the edge 6 of the skirt portion 3 may be coated inwardly by any suitable means, as shown at 7 in Fig. 1.

A ring gasket 8 (Fig. 2) is adapted to be inserted in closure cap 1 and to be adhered thereto by a suitable adhesive. The ring gasket 8 is relatively thin and may be made of rubber or other suitable sealing material and is preferably cut from a tube of rubber which has previously been heated to cure or vulcanize it.

The gasket 8 is adhered to the closure cap 1 by applying adhesive in the gasket-receiving channel 5 of the closure cap in the form of a continuous thread of adhesive 9, as shown in Fig. 1. The thread of adhesive 9 is preferably substantially circular in cross section (Fig. 3) and is in the form of a continuous unbroken band or line. While the drawings, for purposes of clarity, show the thread of adhesive 9 as being of uniform shape and diameter, the shape and diameter of the thread of adhesive varies slightly due to the semi-liquid characteristics of the adhesive. However, the thread of adhesive 9 should be of sufficient diameter to give a solid bond around the entire circumference of the gasket 8 but should not be of such size as to be squeezed out from under the gasket 8 when the gasket is fully pressed against the closure cap as shown in Fig. 5.

While various adhesives may be used to adhere the gasket 8 to the closure, the preferred embodiment utilizes plastisol. Plastisol is a compound comprised of a liquid plasticizer and a resin which does not dissolve in the plasticizer at normal room temperatures. Plastisol has the advantage of having a pleasant taste and odor. Preferably, the closure cap is subjected to heat at about 350° F. for about three or four minutes to harden the plastisol after the gasket 8 has been pressed in the closure.

Another adhesive which may be used is one which consists of a combination of plastic material having a Bakelite (phenolic condensation compound) base and an acetone solvent. This produces an adhesive which will
dry in three or four seconds and which does not require a curing operation after the gasket has been pressed into the closure.

It will be understood, of course, that the adhesives described above are the preferred types which may be used and that other adhesives may be utilized with the present method for adhering the gasket to the closure cap. After the thread or wire like band of adhesive has been applied to the closure, the gasket is pressed into the gasket-receiving channel 5 in the closure. Figs. 3 through 5 show the relative positions of the cut gasket 8 and the adhesive 9 as the gasket is being pressed in the gasket receiving channel 5.

In Fig. 4 the gasket 8 initially strikes the thread of adhesive 9 and begins to flatten the thread and to force it to spread along the gasket-receiving channel 5 in the cap. As the gasket 8 is further pressed into the closure, as shown in Fig. 5, the adhesive 9 will be spread on the surface of the gasket-receiving channel 5 to form a solid uniform bond between the gasket and the metal of the closure.

The flattening of the thread of adhesive will spread the adhesive uniformly over the gasket-receiving channel 5 so that the gasket 8 will be uniformly bonded to the cap without cross-channels and crevices. The adhesive is spread over the gasket-receiving channel 5 evenly in a solid bond which prevents or minimizes crevices and cross channels in the adhesive.

Suitable machinery may be utilized for inserting and pressing the gasket in the closure and for forming lugs on threads 11 and a strengthening bead 10 (Fig. 6).

Fig. 7 shows a preferred mechanism for applying the thread of adhesive to the closure cap in which the cap 1 is placed on a magnetized chuck 15 by a suitable pusher 16. After the cap is placed on the chuck 15, the chuck is raised and rotated in the direction of the arrow. Simultaneously with the rotation of the chuck 15, an adhesive-applying nozzle 17 is opened and adhesive under pressure from a source 18 is forced out of the nozzle 17 to form the thread of adhesive 9 (Fig. 8). When the chuck 15 completes a revolution, the adhesive-applying nozzle 17 automatically closes. The chuck 15 is then lowered and the pusher 16 pushes the cap off the chuck 15 and presents another cap to the chuck 15 and the operation is repeated.

The mechanism for automatically opening and closing the adhesive-applying nozzle 17 is also shown in Fig. 7 and comprises an air cylinder 19 having a piston 20 thereon in which is mounted a needle 21 which is adapted to open and close the nozzle 17.

The air cylinder 19 is connected to a control valve 25 by means of a nozzle-closing air hose 26 and a nozzle-opening air hose 27. Control valve 25 has an air inlet port 30 and a plurality of outlet ports 32 and 33. Exhaust ports 31 and 34 are also provided in the control valve 25 to permit pressure in the air lines 26 and 27 to drop. The inlet port 30 communicates with a circumferential channel 36 and the outlet channels 38 and 39, respectively. The exhaust port 34 communicates with a circumferential channel 40 and exhaust port 31 communicates with a circumferential channel 37.

Air under pressure is admitted to the control valve by means of an air conduit 41 connected at one end to the inlet port 30 and connected at its other end to a solenoid valve (not shown).

A spring pressed central plunger 28 is slidable mounted in the control valve 25 and is operable by a cam 29 which turns in synchronism with the rotating chuck 15 to selectively supply air to the outlet ports 32 and 33. The central plunger 28 is provided with a reduced portion 43 which is of sufficient length to permit the inlet circumferential channel 36 to communicate with inlet circumferential channel 39 to permit the inlet channel 39 to communicate with exhaust circumferential groove 37. Plunger 38 is provided with a second reduced portion 43 of sufficient length to permit the outlet channel 38 to communicate with inlet channel 36 and exhaust channel 40.

When the chuck 15 is rotated the cam 29 moves the air control plunger 28 to a position so that the reduced portion 43 of the outlet channel 38 and permits air to pass from the inlet port 30 to the outlet port 32 and through hose 27 to the lower side of piston 20 in air cylinder 19 to move the piston 20 in an upward direction which raises the needle 21 and opens the nozzle 17 to permit adhesive from source 18 to be forced therethrough onto the closure.

When the chuck 15 stops rotating after a complete revolution, the cam 29 will move the sliding plunger 28 in the control valve 25 to such a position that reduced portion 44 connects the inlet channel 36 to the outlet channel 39 to permit air to pass from the inlet 41 to the outlet 33 and through conduit 26 to the upper side of the piston 20 in the air cylinder 19 to move the needle 21 to its nozzle-closing position thereby shutting off the supply of adhesive.

In order to relieve the pressure in the conduits 26 and 27 and permit the piston 20 to be moved, when the reduced portion 43 connects inlet channel 36 to outlet channel 38 to open the nozzle 17, the exhaust channel 38 is closed and the reduced portion 44 connects the outlet channel 39 to exhaust channel 37 to relieve pressure in air line 26. When the reduced portion 44 connects inlet channel 36 to outlet channel 39 to close the nozzle 17, the exhaust channel 37 is closed and the reduced portion 43 connects outlet channel 38 to exhaust channel 40 to relieve pressure in air line 27.

In order to prevent the nozzle from opening when no cap is presented to the chuck 15, a magnetic proximity detector unit 50 is mounted beneath cap pusher 16. This detector creates a magnetic field which senses the presence of caps in pusher 16. When no cap is present in pusher 16 the detector 50 will sense the absence of a cap and will energize a solenoid valve (not shown) which will stop air from being passed into inlet conduit 41 and will supply air to conduit 26 through conduit 51 behind the air cylinder 20 to maintain the needle 21 in its downward position and maintain the nozzle 17 closed so that no adhesive passes therethrough.

It will be seen from the above that the present invention provides an improved closure cap which has a ring gasket securely adhered thereto and which utilizes a solid bond of adhesive to adhere the gasket thereto. The present invention also provides a method and means of bonding a cut ring gasket to a closure cap by an adhesive which minimizes the formation of crevices or cross channels in the adhesive and which is simple and inexpensive to operate.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. The method of adhering a gasket to a closure which comprises applying an uninterrupted ring of adhesive having a circular cross section to a peripheral zone on the inside of said closure cap, and placing a gasket on said adhesive to adhere the gasket to the closure.

2. The method of adhering a gasket to a closure having a cover portion and a skirt portion which comprises rotating said closure, applying a continuous ring of adhesive having a circular cross section to a peripheral zone on the inside of said portion, placing a ring gasket on said adhesive, and applying pressure to the gasket to flatten the adhesive and to secure the gasket to the closure.

3. The method of adhering a ring gasket to a closure as claimed in claim 2, wherein the adhesive comprises
the combination of a liquid plasticizer and a resin which does not dissolve in the plasticizer at normal room temperature.

4. The method of adhering a ring gasket to a closure as claimed in claim 2, wherein the adhesive comprises the combination of a plastic material having a phenolic condensation base and an acetone solvent.

5. The method of adhering a gasket to a closure cap having a cover portion and a skirt portion which comprises rotating said closure, applying a continuous ring of adhesive having a circular cross section to a peripheral zone on the inside of said portion, placing a ring gasket on said adhesive, applying pressure to the gasket to flatten the adhesive and to secure the gasket to the closure, curling the edge of the skirt portion inwardly to form a bead, and forming inwardly directed retaining lugs on said bead.

6. The method of adhering an annular gasket to a closure cap having a flat cover portion and a skirt portion which comprises rotating said closure cap, applying a thread of adhesive of uniform cross-section to the peripheral zone of the inside of the cover portion to form a continuous ring thereon in spaced relation to said skirt portion, and placing on said ring of adhesive a flat annular gasket wider than the width of said ring of adhesive to adhere the gasket to the closure cap and pressing the gasket down onto the ring of adhesive to thereby spread the adhesive to substantially the width of the gasket.

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