May 7, 1940. J. C. GIBBS 2,200,081

CLOSURE CAP

Filed Oct. 29, 1937 2 Sheets-Sheet 1

Fig. 1.

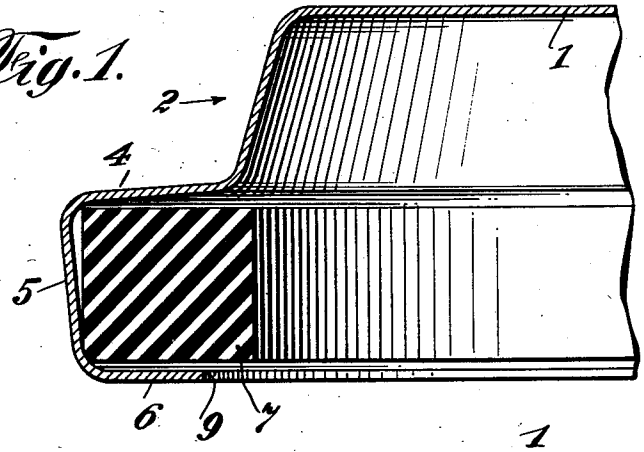


Fig. 2.

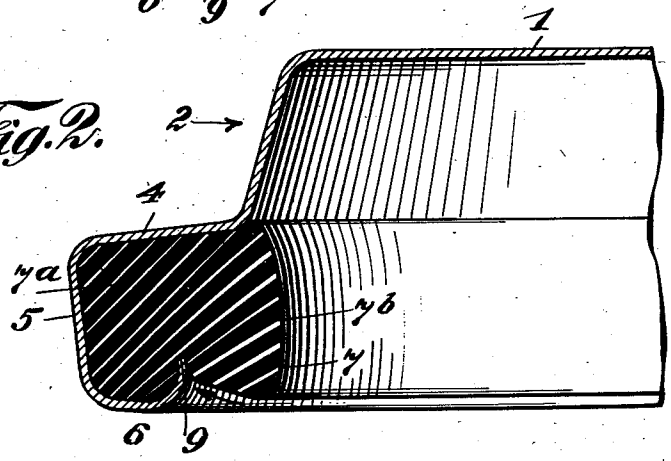
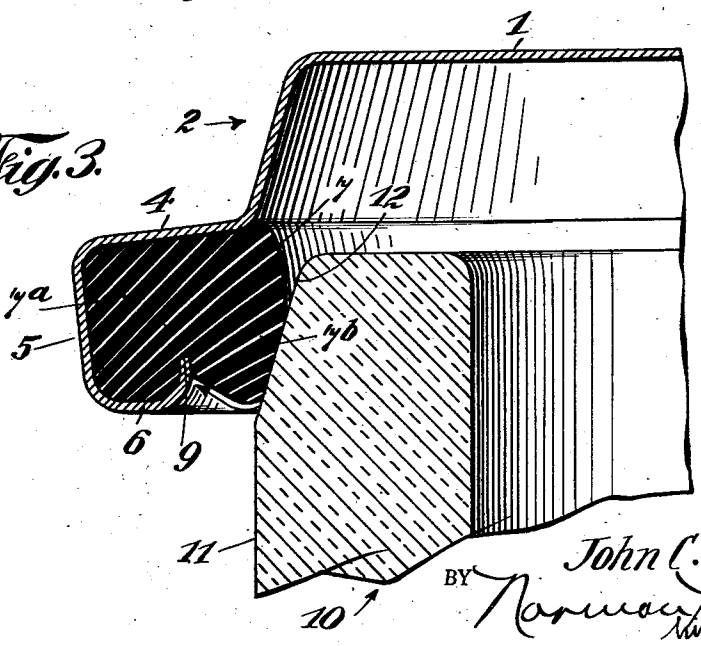


Fig. 3.



INVENTOR.
John C. Gibbs
BY Norman J. Holland
his ATTORNEY.

May 7, 1940. J. C. GIBBS 2,200,081

CLOSURE CAP

Filed Oct. 29, 1937 2 Sheets-Sheet 2

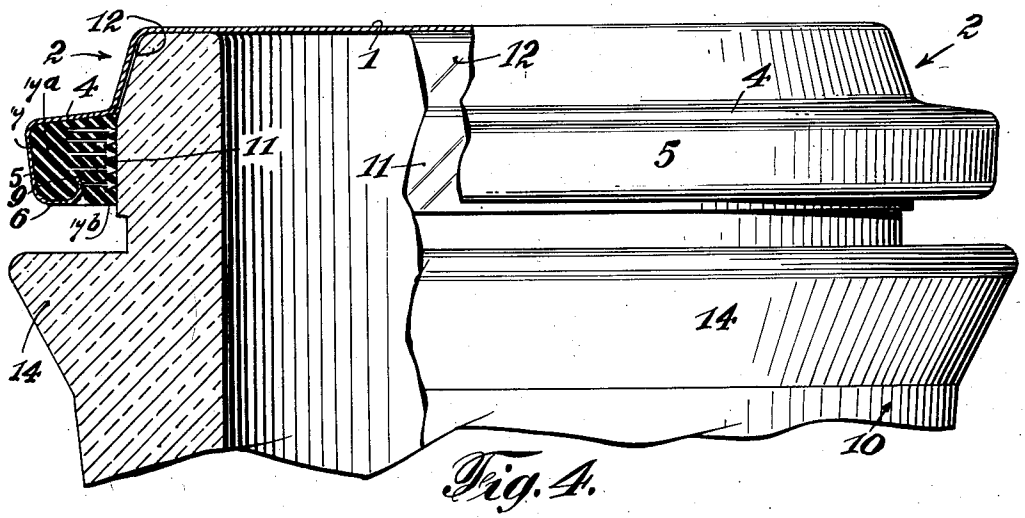


Fig. 4.

Fig. 5.

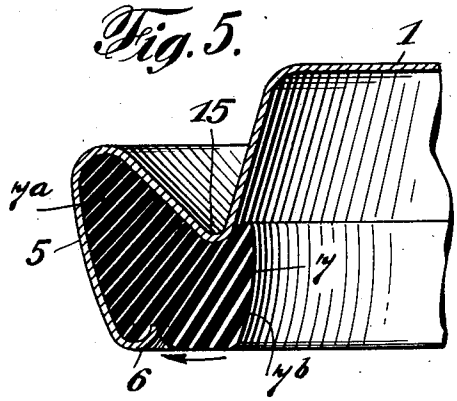


Fig. 6.

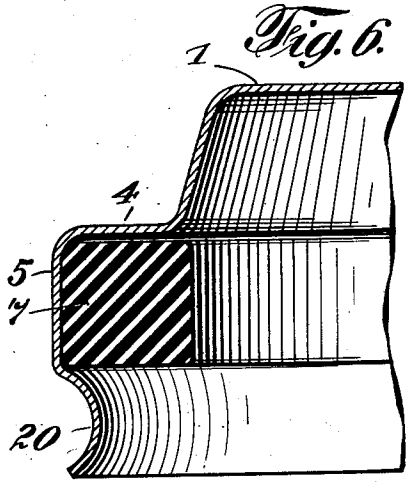
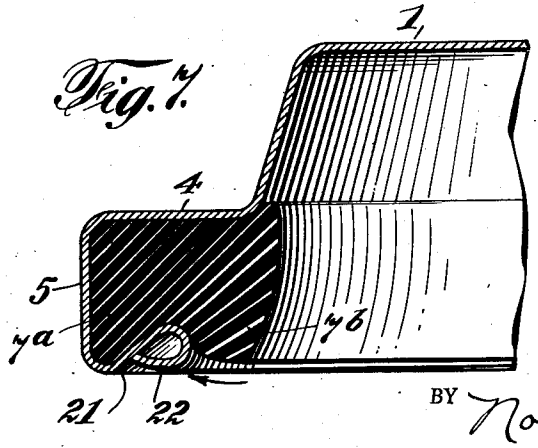


Fig. 7.



INVENTOR.
John C. Gibbs
BY Norman A. Holland
his ATTORNEY.

Patented May 7, 1940 2,200,081

UNITED STATES PATENT OFFICE

2,200,081

CLOSURE CAP

John C. Gibbs, Brooklyn, N. Y., assignor to Anchor Cap & Closure Corporation, Long Island City, N. Y., a corporation of New York

Application October 29, 1937, Serial No. 171,611

3 Claims. (Cl. 215—40)

The present invention relates to the sealing art and more particularly to an improved closure.

Closure caps having a gasket sealed on the outer cylindrical side wall of glass containers are popular because the seal is formed on a surface where defects in the glass are not likely to occur. Such caps are known as "side seal closures." They are superior to closures which attempt to seal the top or rim of a container because the rim is ordinarily wavy, that is, higher at one point than at another. This makes it difficult to form a good seal in all instances and, in addition, it is difficult to mechanically secure such top seal closures to the containers. Usually, a vacuum within the container must be relied upon to secure the closure.

Two types of side seal closures are now applied to containers. In the first type, illustrated in the Edgar Scofield Patent No. 1,611,955, the closure is provided with a gasket in the skirt which is larger than the container to which it is to be sealed. The cap is placed loosely on the container and a chuck or other sealing means is utilized to reform and constrict the skirt of the cap while it is on the container to squeeze the gasket against the side wall of the container. Such seals are very effective and will consistently hermetically seal containers varying a substantial amount in size and circularity. The objection to the seal is the complicated sealing equipment required which, in many cases, has to be operated in a vacuum chamber, increasing materially the cost of the sealing machines to the packers and, in addition, limiting the speed at which the seals can be made. These limitations are objectionable to the modern packer who desires simplicity and insists upon speed. Where it is desired to seal the closure on a container with a pry-off shoulder, the sealing chuck frequently engages the shoulder, breaking the container. Hence, this seal is not suitable for use with containers having pry-off shoulders which containers are popular with the housewife.

The second type of closure, illustrated in the Norman N. Holland Patent No. 1,909,406 was designed to overcome the above objections and has a gasket fitting loosely in the skirt thereof which is slightly smaller than the outer side wall of the container to which it is to be applied. The seal is formed by forcing the cap downwardly on the container by pressure on the top thereof to compress the gasket between the skirt of the cap and the side wall of the container. Such seals can be made at a much more rapid rate, with simple and inexpensive sealing equipment. The objection to the seal is that it will not take up variations in container size or circularity as great as the first type of seal. In addition, the seal is not as securely formed. In many cases, the skirt of the cap is crushed by the pressure required to force it on the container, due to twisting or buckling of the gasket. In addition, the packages cannot be sterilized in a processing retort because the pressure developed in the container is sufficient to blow the caps off the container because of the low holding power of this type of seal.

The present invention is an improvement upon the above two patents, particularly Patent No. 1,909,406, and aims to attain the advantages of both types of the above packages without incurring their disadvantages. In other words, the present invention aims to provide a closure which can be sealed with the ease of the second type of closure, which is forced on the container without reformation, and at the same time approximates the security of the seal attained with the first type of side seal closure. A further feature of the invention is in the construction of the closure and the method of making it.

An object of the present invention is to provide a simple, inexpensive closure cap adapted to form a vacuum or hermetic seal which is adapted to be pushed on a container without complicated sealing tools and be sealed as tightly as a closure which is reformed after being applied to a container.

Another object of the invention is to provide a closure cap having the advantages of caps reformed while on the container and caps sealed by being pushed on the containers, but not subject to the disadvantages of either of these types of caps.

Another object of the invention is to attain the above objects by securely fixing the gasket in position in the closure prior to sealing and thereby minimize buckling and twisting of the gasket to facilitate sealing and improve the seal.

Another object of the invention is to provide a closure cap having a gasket supporting flange and a concealed folded edge beneath the flange to facilitate removing the cap without distortion thereof.

Another object of the invention is to provide a closure cap which has a reinforced gasket bead to facilitate sealing without crushing the cap in forming a tight seal.

Another object of the invention is to provide a closure cap which may be sealed sufficiently by merely forcing it on the container to resist

relatively high pressures within the containers when the packages are processed.

Other and further objects of the invention will be 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 fragmentary sectional view of a partially formed closure;

Fig. 2 is a fragmentary sectional view of a completed closure;

Fig. 3 is a fragmentary sectional view illustrating the action of the cap and the sealing forces effective on the gasket during the sealing operation;

Fig. 4 is a fragmentary side elevational view, partly in section, illustrating the cap shown in Fig. 2 sealed on a container;

Fig. 5 is a fragmentary sectional view of a modified closure cap illustrating another embodiment of the invention;

Fig. 6 is a fragmentary sectional view of a partially formed closure illustrating a further modification; and

Fig. 7 is a fragmentary sectional view of the closure cap of Fig. 6 completed.

Referring to the drawings and more particularly to the construction shown in Figs. 1 to 4, there is shown a closure cap embodying the present invention. Preferably, the cap is stamped in any suitable manner from lacquered or decorated material such as tin-plated sheet metal or the like, and comprises a cover portion 1 and depending skirt or flange 2. The skirt preferably has an outwardly extending substantially rectangular or square gasket retaining bead at the lower portion thereof defined by an outwardly extending shelf or top portion 4, a substantially cylindrical side portion 5 formed by the lower part of the skirt, and an inwardly extending flange or shelf portion 6 at the lower edge of the skirt providing a support for an annular gasket 7. The gasket is formed of rubber or other suitable resilient material and preferably is substantially rectangular in cross-section so that it fits into the gasket retaining bead. The gasket may be inserted into the blank either by hand or by automatic machinery cooperating with the blank forming machine. The gasket retaining bead supports the gasket well below the rim of the container to avoid defects in the glass at the rim and to avoid the gasket wedging between the cover of the cap and the rim of the container.

The construction thus far is not claimed as new. The feature of the present invention is the clamping of the gasket in position to facilitate the sealing, and the particular means utilized in clamping the gasket in position. The gasket may be clamped in position by a suitable tool or chuck applied to the shelf or flange 6 at the bottom of the skirt to bend the flange 6 upwardly and then outwardly (Fig. 2) and to embed the raw edge 9 of the skirt into the bottom of the gasket 7 at substantially the middle thereof. In this manner, the raw edge is concealed and cannot corrode after the cap has been sealed on a container and the appearance of the cap is improved. The sharp edge of the skirt of the cap bites into the underside of the gasket to hold it securely in position. Also, in the rolling the edge of the cap upwardly and outwardly, the lower side of the gasket is forced upwardly and outwardly which pulls the inner lower edge of the gasket outwardly.

In addition, when the edge 9 of the flange 6 is embedded in the gasket, the outer annular portion 7a of the gasket, indicated in Figs. 2 and 3 by the more closely spaced section lines, is compressed while the inner annular portion 7b of the gasket remains uncompressed and relatively soft and yieldable so that it is adapted to be compressed when the cap is placed on a container. Also, by clamping the outer annular portion of the gasket between the shelf 4 and the flange 6, the inner annular portion 7b is set inwardly and the width thereof may be slightly increased.

An important feature is the clamping of the gasket in the bead to prevent it from being dislodged during sealing or removal of the cap. Thus, it is firmly held in position to prevent rolling or buckling under the pressure required to telescope the cap over the container. The free edge 9 of the skirt is embedded in the underside of the gasket, and pulls the lower inner side of the gasket outwardly, as illustrated by the arrow in Fig. 2, causing the sealing surface of the gasket to flare slightly inwardly and upwardly. In addition, during sealing of the closure to the container, the edge embedded in the gasket tends to pull the gasket downwardly over the wall of the container while holding it outwardly, as shown more particularly in Fig. 3 to overcome forces tending to cause buckling and wrinkling of the gasket during the sealing operation. The resulting downward and outward pull by the lower edge of the cap on the underside of the gasket, as illustrated by the arrow in Fig. 3, is many times more effective in applying the cap then an equal force pushing the upper side of the gasket downwardly. The combined push on the upper side of the gasket and the pull on the lower side permits the forming of a much tighter seal with the same sealing pressure and without increasing the strain on the cap during the sealing operation. This sealing action also affords secure seals on containers having excessive variations in size and circularity.

The cap fully sealed on the container 10 is illustrated in Fig. 4. The container has a substantially cylindrical sealing surface or zone 11 and preferably, a tapered or inclined zone 12 above the sealing zone for facilitating application and removal of the closure. If desired, a suitable pry-off ledge 14 may be provided beneath the cap adapted to serve as a fulcrum or support for a coin, knife blade or other tool utilized for forcing the cap upwardly from the container.

Preferably, the caps are sealed by placing them on containers and exerting downward pressure thereon to simply push them on the containers without the use of a collapsible chuck or other intricate sealing equipment usually required to reform the bead as described in detail above. The caps can be readily applied while the containers are in a vacuum sealing chamber and due to the simplicity of the sealing operations can be applied while the containers pass continuously, without interrupted movement, under the sealing machine. With the present cap, vacuum seals may be formed at the rate of 125 a minute with a relatively simple sealing machine, as

against seventy seals a minute with complicated sealing machines.

During the sealing of the caps, the tapered zone 12 of the containers guides the caps into sealing position and gradually increases the wedging action of the inner portion 7b of the gasket against the sealing zone 11 of the container. Since the inner annular portion of the gasket is set inwardly and is uncompressed or relatively soft, it is susceptible to an increased amount of compression when the cap is sealed and is effective to provide a seal having the tightness and other desirable characteristics of seals which are made by reforming the caps while on the containers. By increasing the width of the gasket at the inner side thereof without impairing its resiliency, less rubber or other material is required.

Another advantageous feature as noted above in describing the cap, is that the outer lower portion of the gasket is securely held by the clamping action of the shelf 4 and the flange 6 to prevent the gasket from shifting upwardly with respect to the container and to pull the gasket down over the container. By thus securing the gasket in the cap, any tendency of the gasket to wrinkle or buckle during application to form an uneven sealing surface is eliminated. As a result, the surface of the gasket engaging the sealing zone 11 is smooth throughout its width and circumference and is free from wrinkles or gaps which might permit air to enter the capped container and spoil the contents thereof. By keeping the gasket smooth and free from wrinkles only forces tending to compress the gasket need be overcome to seal the cap and no vertical forces other than friction caused by telescoping the gasket over the sealing zone resist application. After the cap is sealed, the gasket exerts forces substantially perpendicularly to the sealing zone which tend to hold the cap on the container with a maximum degree of tightness. Also, by preventing wrinkles the gasket, when sealed, does not exert vertical forces tending to move the cap upwardly.

It will be noted that the inturned flange 6 materially strengthens and reinforces the cap to hold the gasket firmly under compression and to prevent distortion during application or removal of the cap and, in addition, provides a good purchase for a cap removing tool. The inturned flange strengthens the cap to maintain the gasket in sealed position and prevents the metal of the cap from yielding materially after being folded to compress the gasket. By clamping the gasket in position and preventing rolling or wrinkling of the gasket during sealing, a much tighter seal can be formed by a simple downward movement of the cap than would otherwise be possible.

Packers who have installed sealing machines for reforming the caps after being placed on the containers may prefer to purchase the closure in the form illustrated in Fig. 1, and fold the flange 6 upwardly into the gasket by a collapsible sealing chuck or the like which simultaneously compresses the gasket 7 against the sealing zone of the container. When the caps are sealed in this manner, the tendency of the chucks to exert excessive pressure is eliminated since the chucks are effective to compress the middle portion of the gasket vertically and force the inner annular portion 7b inwardly toward the container.

In Fig. 5 a modification of the invention is illustrated wherein the shelf or upper wall 4 of the gasket bead is bent downwardly to form an annular projection 15 adapted to compress the gasket 7 vertically. An advantage of this construction is that the gasket can be compressed a greater amount to set the inner annular portion 7b further inwardly. Also, the projection 15 and the upwardly extending inturned flange 6 cooperate to clamp the gasket more securely and prevent shifting thereof while the cap is being sealed. Preferably, the upwardly facing clamping portion 6 is offset outwardly with respect to the groove 15 in the upper side of the bead to rotate the gasket as viewed in Fig. 5 in a clockwise direction to flare the inner cylindrical sealing surface thereof and to hold the lower inner periphery of the gasket outward during the sealing operation. The modified construction attains the advantages of the preferred embodiment and can be manufactured by the same methods.

In Figs. 6 and 7 another modification of the invention is illustrated wherein the blank has an inwardly extending annular groove 20 at the lower part of the skirt (Fig. 6). The groove is adapted to support the gasket during the manufacture of the cap and is adapted to be folded by a suitable curling tool into a flange portion 21 terminating in a folded edge 22 (Fig. 7). Preferably, the folded edge is positioned beneath the middle portion of the gasket and is set upwardly to compress the gasket and hold it in the cap. The folded edge conceals the raw edge of the metal and stiffens the cap to prevent distortion thereof while the gasket is held under compression thereby and during sealing. By preventing the cap from being distorted, the compressing forces effective on the gasket are confined within the gasket bead so that the gasket exerts a greater amount of sealing pressure inwardly against the sealing zone. The folded edge also affords a good purchase for a cap removing tool or the like.

It will be seen that the present invention provides an inexpensive closure cap adapted to be made by an improved method to partially compress the gasket and position it to form a secure seal when the cap is applied to a container. The caps are adapted to form a vacuum or hermetic seal and can be applied by the packer with simple sealing machinery. The caps are materially strengthened by the folded edge or embedded flange to prevent crushing of the caps during application, or distortion during removal. Also, the raw edge is concealed and does not mar the appearance of the cap, and the bottom of the skirt provides a good purchase for a cap removing tool. By vertically clamping the gasket in the cap before application to the container, an approximation of a chuck sealed cap is attained by simply forcing the cap on the container.

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. As an article of manufacture, a preformed closure cap adapted to form a side seal on a substantially cylindrical side wall of a glass container comprising a cover portion, a depending skirt, a gasket retaining bead at the bottom of said skirt, a gasket in said bead having an inner substantially cylindrical surface adapted to engage and form a seal on the cylindrical side wall of the container, the bottom edge of said cap being turned upwardly to engage and grip the lower side of the gasket intermediate the inner

and outer edges thereof and sufficiently near the inner edge thereof to force the lower side of said gasket upwardly and outwardly and to exert a downwardly and outwardly directed pulling effect on the lower inner cylindrical surface of the gasket when downward pressure is applied to the closure for application to a container, thereby to facilitate forcing the cap on a container to form a wedging side seal and to prevent wrinkling and buckling of the gasket during said sealing operation.

2. As an article of manufacture, a closure cap adapted to form a side seal on the side wall of a glass container comprising a cover portion, a depending skirt, a gasket retaining bead at the bottom of said skirt, a gasket in said bead having a substantially cylindrical surface on the inner periphery thereof, the upper side of said bead having a depending groove adjacent its inner periphery to compress the upper side of the gasket, the lower edge of the cap forming the lower side of the bead being turned upwardly and outwardly to engage and clamp the gasket in position prior to sealing the cap to a container, said upwardly and outwardly turned edge being offset outwardly with respect to the groove on the upper side of the gasket to tilt the gasket slightly inwardly to flare downwardly and outwardly the inner substantially cylindrical sealing surface of the gasket and said upwardly outwardly turned edge engaging the lower side of the gasket sufficiently near the lower inner edge thereof to exert a pulling effect on the lower inner side of the gasket to prevent wrinkling and buckling thereof and to facilitate forcing the cap over the side wall of the container to form a seal.

3. As an article of manufacture, a closure cap adapted to form a side seal on the side wall of a glass container comprising a cover portion, a depending skirt, a gasket retaining bead at the bottom of said skirt, the lower side of the bead being formed by an inturned flange at the bottom of the cap, the free edge of said flange being folded to provide a folded edge, said flange at the folded edge being forced upwardly and outwardly to clamp the gasket rigidly in position in the bead prior to sealing the cap on the container, said upwardly and outwardly turned folded edge engaging and gripping the gasket sufficiently near the inner lower edge thereof to exert a downwardly and outwardly pulling effect on the lower inner side of the gasket when the cap is forced on a container to prevent wrinkling of the gasket during the sealing operation.

JOHN C. GIBBS.