Nov. 27, 1951 R. S. CONDON 2,576,446

METHOD OF SEALING END CLOSURES TO CONTAINERS

Original Filed March 9, 1945 3 Sheets-Sheet 1

Fig. 1

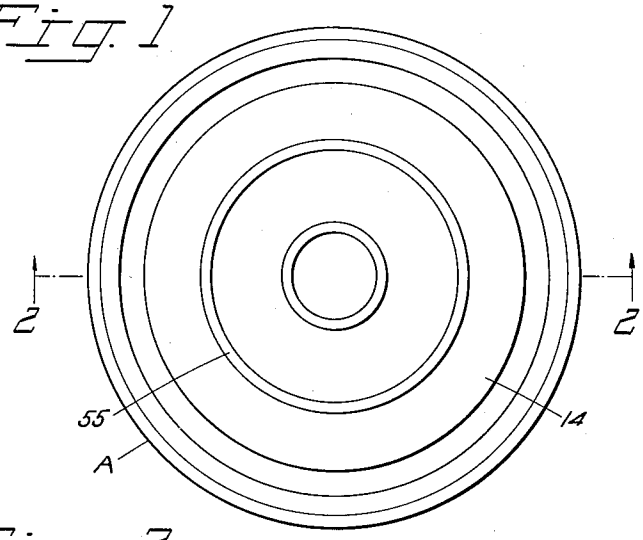


Fig. 2

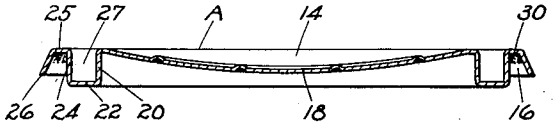


Fig. 9

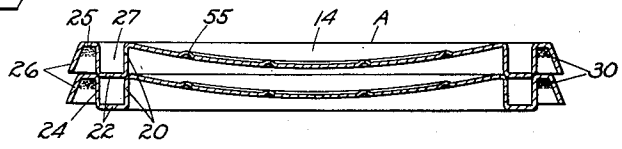
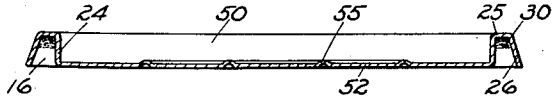


Fig. 10



Inventor
ROBERT S. CONDON

By W. Clay Lindsey.

Attorney

Nov. 27, 1951 R. S CONDON 2,576,446

METHOD OF SEALING END CLOSURES TC CONTAINERS

Original Filed March 9, 1945 3 Sheets-Sheet 2

Fig. 3

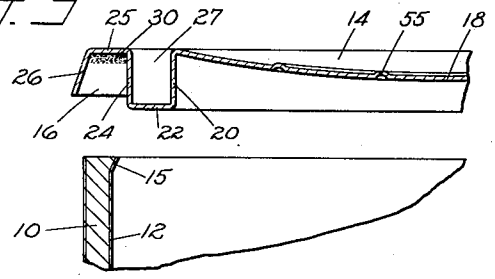


Fig. 4

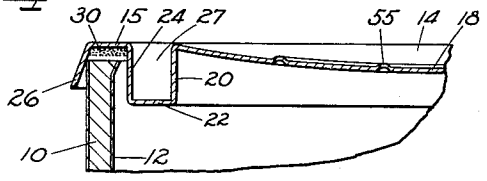


Fig. 5

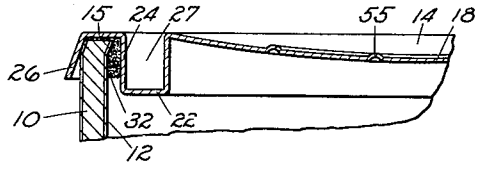


Fig. 6

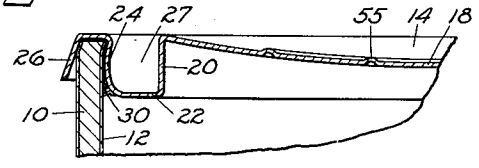
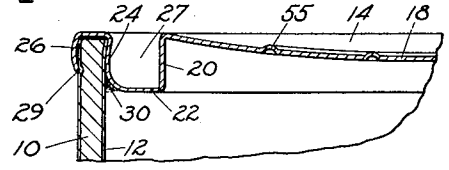


Fig. 7



Inventor

ROBERT S. CONDON

By W. Clay Lindsey,

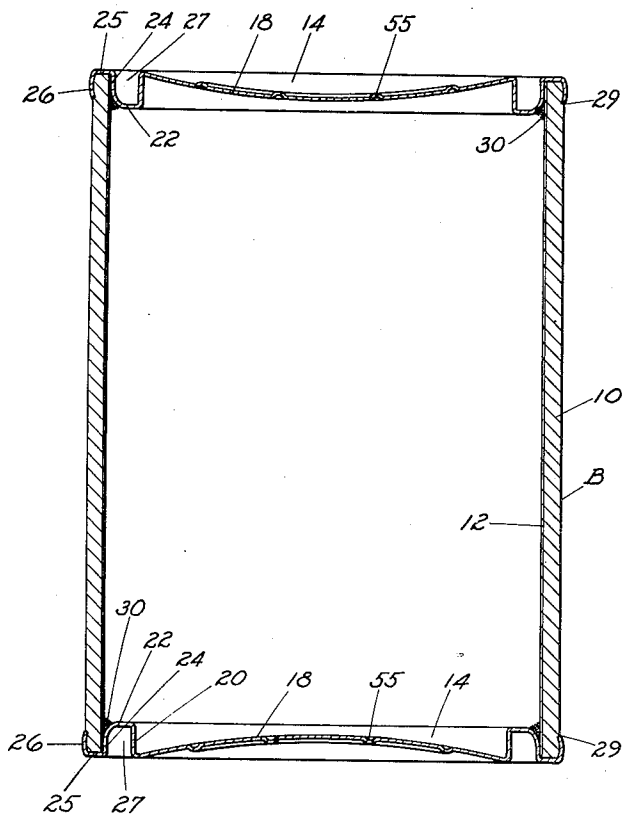
Attorney

Nov. 27, 1951 R. S. CONDON 2,576,446

METHOD OF SEALING END CLOSURES TO CONTAINERS

Original Filed March 9, 1945 3 Sheets-Sheet 3

Fig. 8



Inventor
ROBERT S. CONDON

By H. Clay Lindsley.

Attorney

Patented Nov. 27, 1951

2,576,446

UNITED STATES PATENT OFFICE

2,576,446

METHOD OF SEALING END CLOSURES TO CONTAINERS

Robert S. Condon, Rutland, Vt., assignor, by mesne assignments, to Continental Can Company, New York, N. Y., a corporation of New York

Original application March 9, 1945, Serial No. 581,899. Divided and this application August 29, 1946, Serial No. 693,773

3 Claims. (Cl. 93—55.1)

1

The present invention relates to metal closures for fibre bodied containers, and particularly to the method of sealing a container with such a closure.

The present application is a division of my application Serial No. 581,899, filed March 9, 1945 (now abandoned).

The sealing of fibre bodied containers presents many problems inasmuch as a leak-proof seal must be obtained, speed of production equal to metal can filling must be maintained, and the cost must be economically low. In addition, it is essential that the closure be so made and secured to the body that the seal will not be broken either by changes of pressure within the container or from shock such as occurs when the container is dropped.

In order to accomplish the foregoing, it is essential that the adhesive or sealing compound be accurately controlled during the sealing operation to assure its proper spreading and to reduce the quantity required to a minimum. The amount of adhesive used is a very important factor as it is an extremely expensive product in relation to the overall cost production of a container, and unless it can be used in very small quantities uneconomical production cost results.

It has been found that the amount of adhesive used in order to maintain a proper seal need only be a light film. However, such a light film will be effective only when the adhesive is properly applied and when the seal will not be subjected to rupturing through change in pressure or through shock.

Another reason for ineffective sealing of fibre bodied containers, where a theoretically effective minimum quantity of adhesive is employed, is the presence of a small circumferential burr on the inner peripheral edge of the containers, this burr being caused by the cutting tool during the winding operation. The burr, though small, prevents the adhesive from effectively covering the surface adjacent the mouth where sealing is to be accomplished by allowing the adhesive to flow over the end of the body by gravity.

The object of the present invention is to provide a method of sealing which overcomes the foregoing difficulties and which utilizes a minimum amount of adhesive, and wherein the closure is so constructed that control of the adhesive is assured during the sealing operation and wherein the seal will not be subjected to rupturing due to changes in pressure or due to shock.

These and other objects will become apparent from the following description when read with

2

reference to the accompanying drawings wherein:

Figure 1 is a plan view of a closure which may be used in carrying out my improved method of sealing;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1;

Figs. 3 to 7 are fragmentary enlarged views showing the method of sealing;

Fig. 8 is a sectional view of a sealed container;

Fig. 9 is a view showing two of the closures stacked; and

Fig. 10 is a sectional view of another form of closure.

Referring to the drawings, the closure A (Fig. 1) is particularly adapted for sealing the fibre container body B (Fig. 8) which body comprises a member 10 made, for example, by convolutely winding a strip of chipboard until desired strength is obtained and having a suitable lining 12 to render the body moisture or liquid proof. The lining may be a suitable coating material either applied in liquid form and permitted to dry, or in sheet form suitably secured to the inner surface of the body. Due to the cutting action in the making of the containers, a burr 15 (Fig. 3) is formed on the inner peripheral edge which burr has, as previously stated, heretofore prevented the obtaining of a proper seal with a theoretically effective minimum amount of adhesive.

Herein the closure A is made of metal and comprises a generally circular body part 14 and a circumferential bottom facing sealing channel or groove 16 secured to the end of the body part 14 and within which the end of the body B is received and secured. More specifically, the body part 14 includes a central disk or concave flexible diaphragm 18 having a cylindrical supporting wall 20 depending from the peripheral edge thereof, and a spacing member or ring 22 extending laterally from the lower edge of wall 20. The spacing member 22 provides a support for the inner cylindrical sealing wall 24 of the channel 16, this wall extending vertically to the same height as wall 20 and paralleling same, the circumference of the wall 24 being less than the inside circumference of the body B. Extending laterally outward from the upper edge of wall 24 is a connecting web 25 having an outer circumference larger than the inside circumference of the body B, but smaller than the outside circumference of the body B. Depending from the outer peripheral edge of web 25 is an outer sealing flange 26, this flange tapering outwardly with a gradually increasing circumference from its top to bottom edge with the bottom edge having a cir-

cumference larger than the outside circumference of the body B.

To complete the closure, the ceiling of channel 16 has a band of adhesive 30 therein, the band extending to a level approximating the point where the circumference of the flange 26 is equal to the outside circumference of the container body B. The adhesive must be sufficiently viscous not to flow when handling, and the type used will depend upon the article to be packaged and the manner in which the closures are fed onto the body during the sealing operation. For example, when oil is to be packaged, the adhesive must be insoluble in oil, whereas this is not essential for powdered products, though in each instance a liquid or moisture proof seal is necessary.

With the closure A so made, it will be seen that upon applying it to the end of the body B, the body end will move readily into the channel 16 (Fig. 3) until its outer edge contacts the inner surface of the flange 26 (Fig. 4) at a point above the lower edge and approximately at the level of the adhesive 30, the inner wall 24 being spaced from the inner wall of the body B and fitting loosely within same. Thereafter, as the closure is subjected to downward pressure, the adhesive is displaced inwardly and against the inner wall 24 (Fig. 5) outward displacement being prevented by the damming action of the contacting edge of the body and the inner face of flange 26. By displacing the adhesive inwardly, it is forced or sprayed across the burr 15 and onto the wall 24 to form a band 32 (Fig. 5) of adhesive which will tend to flow down and spread evenly over the surface of the wall 24.

To complete the seal, the wall 24 (Figs. 6 and 7) is then offset or flowed against the body either by seaming wheels or expanding chucks whereby the adhesive is evenly spread to provide a film of adhesive between wall 24 and the inner wall of the body B, this film extending slightly beyond the wall, as at 30 in Fig. 7. Simultaneously, the flange 26 is brought into contact with the outer face of the body and, if desired, its lower peripheral edge peened into the body, as at 29.

It has been found that this film is sufficient to maintain the proper seal if it completely covers the area between the wall 24 and the inner surface of the body contacted by the wall 24 and, as a result, a minimum of adhesive or sealing compound is required. The amount can readily be determined since the area to be covered is known inasmuch as it is equivalent to the surface area of wall 24. Because of this, the cost is reduced to a minimum and no excess adhesive is used.

In addition to providing a seal, it is also essential that the seal be undisturbed due to pressure changes within the container. Such pressure changes most frequently result when heat sealing is used, that is, when the adhesive 30 is a type which is normally set but is rendered fluid or semi-fluid by application of heat. As previously stated, the central diaphragm 18 is flexible, this being accomplished by making the closure of extremely light metal, the thickness being exaggerated in the drawings. As a result, when pressure builds up within the container, the diaphragm will tend to flex and flatten without placing any strain on wall 24. In the preferred embodiment, the possibility of strain is further prevented by the provision of the supporting wall 20 and spacing ring 22. With this arrangement, it will be seen that, when the diaphragm tends to flatten, wall 20 will flex toward wall 24 about the ring 22 as a fulcrum and thus no strain is placed on wall 24 tending to pull it from the body.

Likewise, if the container is dropped or subjected to other shock, the seal will not be broken by radial folds which form in the closures under such conditions. In the present closure, the fold will start at the top of wall 20 and move in across the diaphragm, the walls of the channel remaining undisturbed and the seal unbroken.

In addition to the other advantages, the use of an extremely light metal saves considerable weight which reflects savings in the cost of production as well as in shipping costs, and by raising the diaphragm to the level shown by use of wall 20 substantially full capacity of the body is retained.

The present closure is also particularly adapted for rapid feeding as it can be stacked without nesting. As seen in Fig. 9, because of the parallelism of wall 20 and wall 24, there is provided a top facing groove 27, the peripheral upper edges of which act as a seat for the spacing ring 22 upon which the latter will rest with sufficient contact to retain the closures seated and yet permit one to be readily slid away from the other. This is a decided advantage in the capping operation following filling, for, with present production lines, the containers may be filled at the rate of one hundred and sixty (160) to one hundred and eighty (180) a minute. It will also be noted that the groove 27 provides space for reception of an expanding chuck.

In Fig. 10, there is shown a closure similar to that shown in the preceding figures insofar as the method of sealing is concerned. The closure has a body part 50 and a sealing groove 16. The body part here comprises a circular flexible disk 52 and, supported on its outer peripheral edge and extending vertically therefrom, is the inner wall 24 of the sealing groove 16, this groove being identical to that in the first embodiment with like parts having like numbers. The seal is formed by the same method as that described.

Although the closures have been described as circular, it is apparent that they could be of oval shape and the same advantages obtained. Therefore, the terms circular and circumferential as used herein are to be interpreted as including oval or elliptical closures, for it is obvious that wherever circumference has been used in the description, the same results are obtainable by measuring the circumference of an oval or ellipse.

I claim as my invention:

1. The method of sealing a fibre container body with a closure having a downwardly facing sealing channel with an inner generaly cylindrical wall and a downwardly and outwardly tapering outer flange, said wall and flange being of substantially greater depth than the thickness of the body wall, which comprises placing an adhesive in the channel so as to form a band of adhesive in the ceiling thereof, positioning the closure upon the end of the fibre body with the outer flange resting between its extremities upon the outer edge of the body wall with the inner wall being spaced inwardly from the body wall, pressing the closure and body towards each other for moving the end of the body along the outer flange and into the channel for forcing a portion of the adhesive into the space between the body wall and the inner wall of the closure channel, maintaining pressing engagement during said movement between the outer edge of the body

wall and the outer flange for retaining the adhesive against outward movement, and finally outwardly expanding the inner wall and inwardly moving the outer flange into gripping engagement with the body wall.

2. The method of sealing a fibre container body with a closure having an inverted channel of substantially greater depth than the thickness of the fibre container body wall, said channel including an inner generally cylindrical wall of lesser circumference than the inside circumference of the body and a downwardly and outwardly tapering flange having a circumference between its extremities corresponding to the circumference of the outer edge of the body wall, which comprises providing a band of adhesive in the ceiling of the channel to a level not extending outwardly beyond the outer edge of the body wall, placing the closure upon the end of the body with the outer flange resting upon the outer edge of the body wall with the inner wall spaced inwardly from the body wall, pressing the body and closure towards each other for forcing the end of the body along the outer flange and into the channel for forcing a portion of the adhesive onto the inner surface of the body, and then expanding the inner wall of the closure against the body while simultaneously bringing the outer flange of the closure into contact with the outer surface of the body.

3. A method of sealing a metal closure to an end of a tubular fibre container body, said closure having a peripheral channel provided with

an inner generally cylindrical wall and an outer wall diverging therefrom, said inner and outer walls being of substantially greater depth than the thickness of the body wall, the base of the outer wall being of less diameter than the outside diameter of the body and the inner wall being of less diameter than the inside diameter of the body, which comprises placing a predetermined amount of sealing compound in the base of the channel, positioning the outer wall of the channel against the end of the body to prevent the passage of sealing compound therebetween, pressing the closure onto the body for forcing a portion of the compound into space between the inside surface of the body and the inner wall of the channel, and finally moving the inner and outer walls of the closure into pressing engagement with the body.

ROBERT S. CONDON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,230,987	Karl	Feb. 4, 1941
2,238,056	Hothersall	Apr. 15, 1941
2,413,449	Hatch	Dec. 31, 1946

FOREIGN PATENTS

Number	Country	Date
376,960	Italy	Dec. 1, 1939