Feb. 20, 1968 E. L. SEITZ, JR., ET AL 3,369,277

CLOSURE DEVICE

Filed Aug. 22, 1966

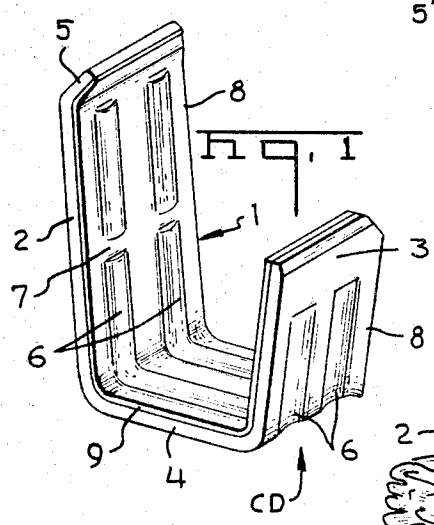


Fig. 1

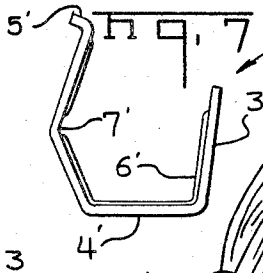
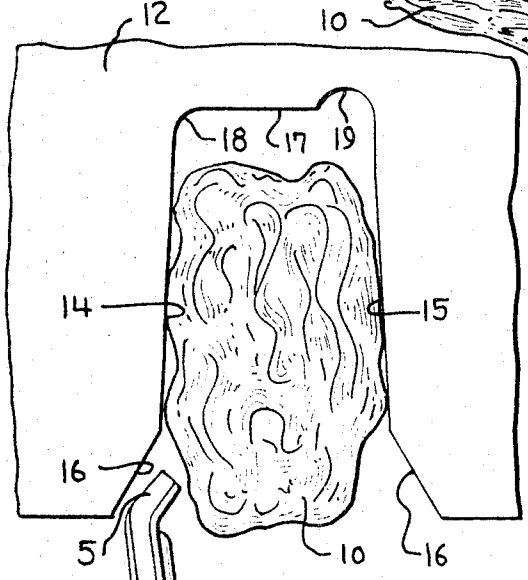
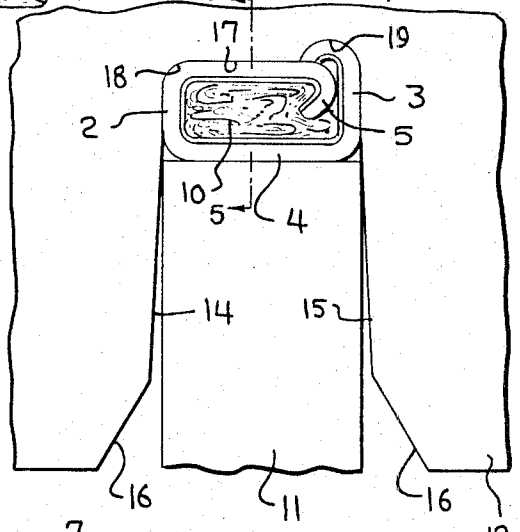


Fig. 7

Fig. 2

Fig. 4





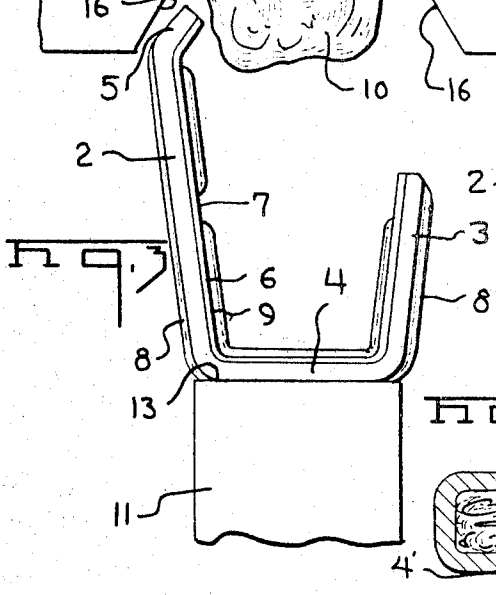


Fig. 3

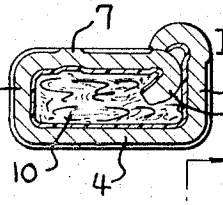


Fig. 6

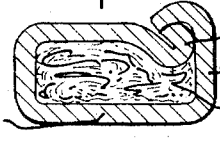


Fig. 8

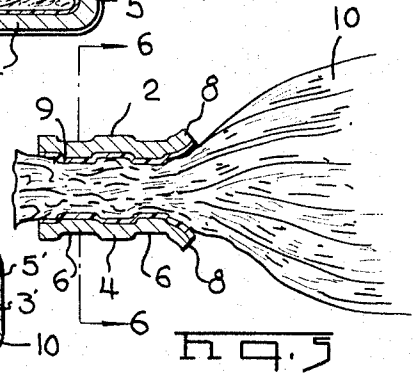


Fig. 5

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CLOSURE DEVICE

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ABSTRACT OF THE DISCLOSURE

A closure member of flexible but stiff metal comprises a body member having a first leg and a second leg with a bight connecting the legs together as a unitary member. The first leg has a length about twice that of the second leg and a free end of the first leg has a bent area. Inwardly-directed rib means extend along substantially the length of the body member in order to provide spaced sealing areas when the closure member is deformed into sealing engagement with an end of a flexible container.

This invention relates to a closure device and more particularly to a closure device for closing an end of a flexible plastic container or a container having the characteristics of flexible plastic.

The use of flexible plastic containers to carry material therein such as, for example, food, motor oil, explosives, etc. in an air-tight and water-tight environment is on the increase and to all intents and purposes, is likely to keep on increasing. The plastic containers generally take the form of a bag filled with the desired material and having one end closed or of a continuous supply of flexible container material having a desired length fed to station whereat one end of the desired length is closed to form a container member, material is placed within the container member and the other end of the container member is closed. Other ways of supplying containers of flexible material, filling them and closing them are known. Such containers are very economical, easy to ship and readily disposable.

Closing the end or ends of the flexible containers to effect air and water-tight closures is an important part in using these containers, and it has to be done quickly, easily, cheaply and effectively. Many types of closure members used heretofore have not been satisfactory since they frequently do not provide an effective seal even though they can be applied quickly, easily and cheaply.

An object of the invention is to provide a closure device to close the ends of flexible containers in a quick, easy, cheap and effective manner.

Another object is the provision of a closure member that is crimpable onto ends of flexible containers.

A further object is to provide a closure member having inwardly-directed ribs defining spaced sealing areas.

An additional object is the provision of a closure member having inwardly-directed ribs of different heights.

Still a further object is to provide a closure member having a plastic coating on the surface to engage the ends of flexible containers to be sealed.

A still additional object is the provision of a closure member having locking means to lock the closure member in place.

Other objects and attainments of the present invention will become apparent to those skilled in the art upon a reading of the following detailed description when taken in conjunction with the drawings in which there are shown and described illustrative embodiments of the invention; it is to be understood, however, that these embodiments are not intended to be exhaustive nor limiting of the invention but are given for purposes of illustration in order that others skilled in the art may fully understand

the invention and the principles thereof and the manner of applying it in practical use so that they may modify it in various forms, each as may be best suited to the conditions of a particular use.

The foregoing and other objects are achieved by a preferred embodiment of a closure member of flexible but stiff metal comprising a body member having a first leg, a second leg and a bight connecting the legs together as a unitary member, the first leg having a length about twice that of the second leg, a free end of the first leg having a bent area, and inwardly-directed rib means extending along substantially the length of the body member.

In the drawing:

FIGURE 1 is a perspective view of a closure device;

FIGURE 2 is a perspective view of a closure device of FIGURE 1 in position on the end of a flexible container member;

FIGURE 3 is a front elevational view of die members to effect the closure of the closure device onto the end of the container member;

FIGURE 4 illustrates the crimping dies in a closed position with the closure device crimped onto the end of the container member;

FIGURE 5 is a view taken along lines 5—5 of FIGURE 4;

FIGURE 6 is a view taken along lines 6—6 of FIGURE 5;

FIGURE 7 is a perspective view of an alternative embodiment of the closure device; and

FIGURE 8 is a cross-sectional view of the closure device of FIGURE 7 in a crimped position onto the end of a container member.

Turning now to the drawings and especially FIGURES 1 through 6, a closure device CD is illustrated which comprises a body member **1** having a first leg **2**, a second leg **3** and a bight or base **4** connecting the legs together as a unitary structure. As can be discerned, leg **2** is equal to or about twice the length of leg **3**. The free end of leg **2** has a bent area **5** which is bent inwardly at an angle of from 45° to 90° with respect to leg **2**. Inwardly-directed ribs **6** extend substantially along the length of body member **1** in a spaced and parallel manner. Ribs **6** terminate inwardly from the free end of leg **3** and at bent area **5** in leg **2**. Also, ribs **6** are interrupted at an area **7** in leg **2**. The height of one of the ribs is slightly larger than the height of the other of the ribs. Section **8** in legs **2** and **3** and bight **4** is bent in an outward manner. The highest rib is preferably located adjacent sections **8**. As can be seen from FIGURE 3, legs **2** and **3** form two obtuse angles with respect to bight **4** prior to being crimped onto the end of a container member.

The closure device is susceptible to mass production by automatic machinery and is conveniently formed by shaping a sheet metal blank or strip of a suitable metal such as copper, brass, bronze, aluminum or the like in successive forming steps. The metal is sufficiently hard and resilient to impart thereto a spring-like character yet it is sufficiently malleable to permit crimping of the closure device onto the end of a flexible container.

A coating or liner **9** is applied to the inner surface of closure device CD and this coating can be polyvinyl chloride, Teflon, polypropylene, polyethylene or any other suitable material that will accomplish the desired result. Coating **9** can be applied in any conventional manner such as by spraying, gluing, vacuum deposition or the like. The coating is preferably applied to the metal before the metal is subjected to the stamping operation to form the closure device in strip form.

As shown in FIGURE 2, a flexible container **10** of any suitable plastic such as, for example, polyethylene, polyvinyl chloride or other synthetic material or natural flexible material, such as intestine, weasand, or paper is closed

and sealed by gathering the material comprising the neck of the flexible container into a tight compression and surrounding it with closure device CD which is deformed into position on the end of the flexible container by die members **11** and **12** illustrated in FIGURES 3 and 4 to deform the closure device into a substantially rectangular configuration in cross section.

Die member **11** comprises flat surface **13** on which bight **4** rests as illustrated in FIGURE 3. Die member **12** comprises side surfaces **14** and **15**. Side surfaces **14** and **15** merge into beveled surfaces **16** at one end. An inner flat surface **17** is connected to side surfaces **14** and **15** via arcuate surfaces **18** and **19**. Arcuate surface **18** merely connects side surface **14** with flat surface **17** as a radius therebetween whereas arcuate surface **19** is radiused inwardly beyond flat surface **17**. Side surfaces **14** and **15** and surface **17** form three sides of a rectangle while flat surface **13** forms the fourth side of the rectangle. Side surfaces **14** and **15** from surfaces **16** to arcuate surfaces **17** and **18** are slightly tapered.

In operation, a closure device CD is placed on flat surface **13** of die member **11** and the end of container **10** is introduced within the closure device. Die member **12** is moved toward die member **11** and bent area **5** of leg **2** engages beveled surfaces **16** which moves leg **2** inwardly and as leg **2** moves along side surface **14**, this tapered side surface moves leg **2** in a further inward direction. As leg **2** is moving along side surface **14**, leg **3** engages beveled surfaces **16** and begins to move along side surface **15** which moves leg **3** inwardly. As leg **3** begins to move into engagement with side surface **15**, bent area **5** begins to engage arcuate surface **18** and, when bent area **5** moves into engagement with inner front surface **17**, leg **2** begins to bend about area **7**. The upper part of leg **2** then begins to move along flat surface **17** which surface, as die member **12** continues in its movement toward die member **11**, bends leg member **2** toward leg member **3** with the end of container **10** being compressed within the collapsing closure device. Flat surface **17** moves leg **2** to an almost parallel position with respect to bight **4** and bent area **5** is disposed adjacent leg **3** whereupon arcuate surface **19** begins to bend the free end of leg **3** toward leg **2**, and, as die **12** moves to its final crimp height position tightly compressing the end of container **10** within the deformed closure device, leg **3** engages bent area **5** bending the bent area inwardly and the free end of leg **3** is bent into an arcuate configuration conforming to that of arcuate surface **19** and the free end of leg **3** is brought into engagement with leg **2** to apply continuous pressure thereto.

Inwardly-directed ribs **6** apply pressure sealing points at spaced locations instead of over the entire area or length of the closure device. As the crimping pressure on the end of the container is building up to its final amount, the crimping pressure is greatest within the areas delimited by ribs **6** instead of over the entire area of the closure device and the parts of the container within the areas of ribs **6** extrude longitudinally on each side of ribs **6**. Thus, the areas on each side of ribs **6** define extrusion areas into which a crimped portion of the container collect to permit the crimping pressure to be properly distributed along the closure device to effect an air-tight and water-tight seal therealong.

Coating **9** also serves to distribute crimping pressure since the coating acts as a cushion and will flow out from under the highly compressed areas which are within the areas of the ribs into the extrusion areas resulting in a redistribution and equalization of the compression throughout the closure device.

Sections **8** form a bell mouth after the closure device has been crimped into position on the end of the container to prevent a sharp edge on the closure device from cutting the container. Since the ribs are of different heights, a tapered crimp is obtained which provides areas of progressively increased compression to effect a better seal. Since ribs **6** provide sealing at spaced points over small areas, effective crimping is obtained by less crimping pressure because sealing does not have to be along the entire length of the closure device. The reduced crimping pressure does not work harden the metal of the closure device and the wear and tear on the crimping dies and machinery to operate the crimping dies is substantially reduced.

The substantially rectangular cross-section of the closure device in its crimped condition provides a more satisfactory sealing member than an arcuate surface. Any attempt of one of the corners or surfaces to withdraw or springback will cause a substantial tightening on the corresponding sides.

FIGURES 7 and 8 illustrate another embodiment of the invention which illustrates a closure device CD' similar in configuration to closure device CD except that bent area **5'** is bent in an outward direction at substantially right angles with respect to leg **2'**, and leg **2'** is also prebent at area **7'** in which no part or ribs **6'** are located so that the inner part of leg **2'** from bight **4'** to area **7'** is bent in a direction away from leg **3'** while the upper part of leg **2'** is bent inwardly toward leg **3'**. The inner surface of closure device CD' may have a coating in the same manner as closure device CD.

Closure device CD' is crimped onto the end of flexible container by die members **11** and **12** in the same manner as closure device CD except that the free end of leg **3'** is curved around bent area **5'** to secure the ends of the closure device together by overlapping of the free ends of the legs thereby preventing it from being removed from the end of container **10** except by using a tool to free leg **3'** from bent area **5'**. The reason that leg **2'** is prebent is to permit outwardly-bent area **5'** to clear the beveled surfaces **16** of die member **12**.

Die member **11** has been disclosed as stationary while die member **12** moves relative thereto, however it is obvious that the opposite action therebetween can be performed to obtain the same end result. A complete disclosure of the machine for applying the closure devices to the ends of containers is set forth in U.S. patent application, Ser. No. 574,090 filed Aug. 22, 1966. The coating may or may not be used on the closure devices and this depends upon the application to be performed and the type of material to be used.

As can be discerned, there has been disclosed a unique and novel closure device to close the ends of flexible containers and to provide an air-tight and water-tight seal if the material of the flexible container can provide such.

It will, therefore, be appreciated that the aforementioned and other desirable objects have been achieved; however, it should be emphasized that the particular embodiments of the invention, which are shown and described herein, are intended as merely illustrative and not as restrictive of the invention.

The invention is claimed in accordance with the following:

1. A closure member of flexible but stiff metal comprising a body member having a first leg, a second leg and a bight connecting the legs together as a unitary member, the first leg having a length about twice that of the second leg, a free end of the first leg having a bent area, and inwardly-directed rib means extending along substantially the length of the body member.

2. A closure member according to claim **1** wherein said rib means in said first leg are interrupted.

3. A closure member according to claim **1** wherein said bent area is bent toward said second leg.

4. A closure member according to claim **1** wherein said bent area is bent away from said second leg.

5. A closure member according to claim **1** wherein said rib means in said first leg are interrupted at an area opposite a free end of said second leg and said first leg is bent at this area to define a first section and a second section, said first section from said bight to said area being directed away from said second leg and said second section

from said area to a free end being directed toward said second leg.

6. A closure member according to claim 1 wherein said legs and said bight have outwardly-directed sections along one edge to define a bell mouth.

7. A closure member according to claim 1 wherein a coating of plastic is disposed on an inner surface of said body member.

8. A closure member according to claim 1 wherein said rib means includes parallel ribs with one of said ribs having a height in excess of the other of said ribs.

9. A closure member according to claim 1 wherein said legs extend outwardly from said bight at obtuse angles with respect thereto.

10. A closure device for application onto an end of a flexible container to maintain the end in a closed position, said closure device comprising a body member having a base and a first leg and a second leg extending outwardly from said base, said first leg having a length substantially twice that of said second leg, and parallel inwardly-directed ribs extending along substantially the entire length of said body member and transverse to a longitudinal axis thereof, said body member adapted to receive said end of said flexible container and said legs being moved inwardly by deformation of said body member with said first leg being bent inwardly at an area substantially opposite a free end of said second leg to provide a first section of said first leg substantially parallel to said second leg and a second section substantially parallel to said base, said free end of said second leg being bent into an arcuate configuration and into engagement with said first leg adjacent a free end thereof so that said body member thereby surrounds said end of said flexible container with the area of said end within said body member

being placed under compression and under higher compression within the areas of said inwardly-directed ribs.

11. A closure device according to claim 10 wherein the free end of said first leg includes a bent area directed toward said second leg which is bendable toward said base by said second leg.

12. A closure device according to claim 10 wherein the free end of said first leg includes a bent area directed away from said second leg and is engaged by said arcuate configuration of said second leg to lock said legs together.

13. A closure device according to claim 10 wherein a liner of material having the properties of plastic is disposed on an inner surface of said body member.

14. A closure device according to claim 10 wherein said base and said legs include outwardly-directed sections along the same edge to provide a bell mouth away from the end of said flexible container.

15. A closure device according to claim 10 wherein one of said ribs is higher than the other of said ribs.

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