

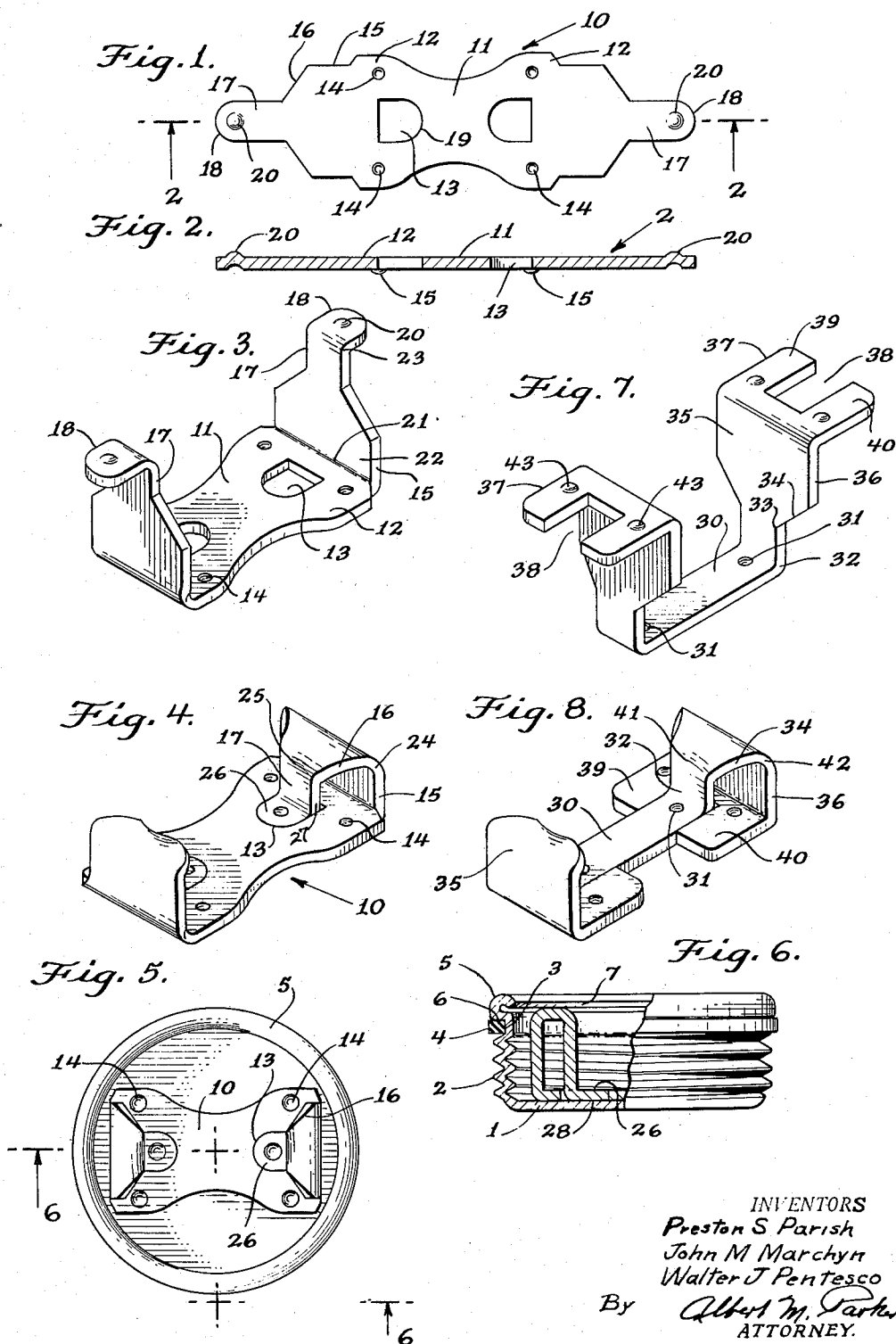
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CLOSURE PLUGS AND METHODS FOR FORMING THE SAME

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CLOSURE PLUGS AND METHODS FOR FORMING THE SAME

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This invention relates to closure plugs for containers and methods for making the same and is more particularly concerned with the combinations of plug bodies with means for actuating the plugs and methods for forming such combinations.

Where threaded closure plugs, particularly those principally designed for use in the closing of openings in large containers, are made out of relatively lightweight metal, the problem of providing them with proper actuating means becomes acute. The forces exerted in applying and tightening such closure plugs are often considerably greater than necessary for effective closing. Thus, unless the plugs are properly constructed, the application of excessive forces, instead of providing a tight closure, can result in distortion of the plug and consequent leakage.

Accordingly, in providing wrenching means, adequate strength must be provided in the means itself, the means must be engaged with the plug in a manner of comparable strength and, at the same time, protection of the plug against distortion must be taken into consideration. Nevertheless the whole construction must provide a simple, economical, effective closure in order to make it commercially attractive. All these criteria of an effective closure plug are met by the instant invention.

It is accordingly an object of this invention to provide lightweight closure plugs with effective wrench engaging means.

Another object is to provide for a strong engagement between the wrench engaging means and the plug.

Still another object is to provide for such engagement in a manner to protect the plug against distortion when actuated.

Further objects are to provide methods for forming the plug inserts carrying the wrench engaging means and for assembling such inserts with the plug body in simple economical manner.

Still further objects will in part be obvious and in part be pointed out as the description of the invention, taken in conjunction with the accompanying drawing, proceeds.

In that drawing:

Fig. 1 is a plan view of the blank for the preferred form of actuating member insert in accordance with the invention;

Fig. 2 is a vertical section thereof taken on lines 2—2 of Fig. 1 and looking in the direction of the arrows;

Fig. 3 is a perspective view of the blank of Fig. 1 in partially formed condition;

Fig. 4 is a perspective view of the preferred form of insert in finished position, ready to be assembled with the plug body;

Fig. 5 is a plan view of a plug, in accordance with the invention, embodying the Fig. 4 insert;

Fig. 6 is an elevation of the plug of Fig. 5 with a fragment broken away and in section generally on line 6—6 of Fig. 5;

Fig. 7 is a view, similar to Fig. 3, of a modified form of insert; and

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Fig. 8 is a view of the Fig. 7 modification, corresponding to Fig. 4.

Considering first the body of the plug as seen in Figs. 5 and 6, the same has a base or bottom 1, an upstanding threaded side wall 2 therearound and a depressed gasket seat 3 the head of the threads carrying the gasket 4. Above that gasket seat, forming one border thereof, is the head 5. The head 5 extends outwardly at the upper border of the gasket seat 3 and then is turned or beaded upwardly and back inwardly to overlie its commencing portion and terminate at 7 in a free edge. The free edge 7 is spaced only slightly inwardly of the back portion of the gasket seat 3. The return-bent beading of the head 5 serves to strengthen the plug and preserve its concentricity and other configuration where such is most needed. This need is greatest in the gasket seating portion of the plug for it is the gasket, rather than the threads, which prevent leakage. The threads are principally effective as the holding means.

The threading of the side wall of this plug is shown as being of the rolled type. Such threading is provided by the roller swaging of thin sheet metal, saving considerable metal by enabling plugs to be formed of lighter stock than is required where the threads are cut into the metal. By the same token the lighter material, though fully effective for proper closing, is more easily distorted in response to excessive torque than are the so-called "cut thread" plugs. It is hence desirable that the means employed for actuating the plug does not impart its torque to any particular section of the threads but, that instead, the torque is distributed all over the plug. It is further and at least equally desirable that no operative distorting action be transmitted to the gasket seat or head. The actuating member of this invention and the manner of applying the same meet these requirements.

The preferred form of actuating member is shown in the flat blank at 10 in Fig. 1. The body of this blank has a center connecting portion 11 and is enlarged in each direction therefrom in securing portions 12, each of which portions are perforated at 13, intermediate their sides. Depressions 14 are formed in the stock of the portion 12 between the perforation 13 and the outer edge of that stock. These, being caused by a pressing operation, produce projections 15 on the bottom side of the member 10, as seen in Fig. 2. The projections or pimples 15 serve to localize the welding current employed in securing the actuating member in place in the plug body. Their position, at the widest part of the blank and towards the outer ends of that widest part, is of importance, as will appear hereinafter.

From the widened parts 12 the blank is reduced slightly to extend straight outwardly in the straight sided portion 15 and is then inclining inwardly at 16 to terminate in a reduced extending or securing tab 17, which tab has substantially the same width as the recess 13 and is otherwise formed to seat within and substantially fill that recess. As here shown the end 18 of each tab 17 is rounded in a curve complementary to the rounded end 19 of the recess 13.

The securing tab 17, adjacent the end 18 thereof, is provided with an upstruck projection 20 similar to, but extending reversely of the blank with respect to the pimples 15. Like the pimples 15, however, this projection is provided for localizing welding current and, when the blank has its ends folded around into position to be secured, the direction of the extension of the pimple 20 becomes the same as that of the pimple 15.

In Fig. 3 the blank 10 is shown as being partially formed into its finished state. Each end thereof is bent upwardly about the line 21. This line is substantially at the beginning of the reduced portion 22, extending from the enlarged portion 12. This reduced portion is thus bordered

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by the straight side walls 15. The securing tab 17 is bent outwardly at the position 23 intermediate its length, such bending being at substantial right angles to the commencing portion of the tab.

In Fig. 4 the blank 10 is shown in its completely formed state, ready for application to the plug body. Here two additional right angle bends have been made, one at 24, across the outer terminus on the straight sides 15, and the other at 25 where the inclined sides 16 meet the straight sides of the tab 17. These two additional right angle bends result in the toe 26 of the tab 17 being seated in the recess 13 with the upper surface of that toe lying flush with the upper surface of the body 10. Furthermore the direction of extension of the toe 26 is now reversed from what it was in the original blank so hence the pimples thereon extend in the same direction as the pimples 15.

There are important features to be noted here. They can best be seen by reference to Fig. 5 where the insert is shown seated within the hollow of the plug. In the first place it will be seen that the actuating member, as formed from the blank 10, extends substantially the whole way across the interior of the plug body. Next the welding positions 14 are spaced widely apart with respect to the bottom 1 of the plug and are located as close towards the periphery of that bottom as can be reasonably accomplished. Turning forces applied to the actuating member and transmitted through the welded joints are distributed widely over the bottom of the plug and through the body of the plug. Hence distortion of the plug, through actuation of the same, is kept at a minimum.

From Figs. 4 and 6, it is seen that a strong closed rectangle construction is presented for the wrench engaging ends of the actuating member. In the forming of those ends the metal employed has merely been bent around rather than being weakened by drawing. Further, the surfaces 16, being angled inward, and the surface 27, which extends downwardly therefrom into the toe 26, present a substantial edge area for engagement by the wrenching means and substantially prevent distortion of the ends until the metal thereof is sheared. Finally, the toe 26 is not only seated in the recess 13 but is also welded to the base 1 of the plug so it doubly resists distortion.

The actual welding of the actuating member within the plug body is illustrated in Fig. 6. Here only the weld 28, resulting from the projection 20 on the toe 26, is shown, but it is to be understood that projections 15 are similarly welded to the base 1 of the plug. This welding, due to the provision of the current localizing projections, is very quickly and simply accomplished.

The completed actuating member is merely dropped into the hollow head of the plug body where, due to its size and formation, it necessarily adopts a proper position. A welding electrode is then introduced into the plug head to seat on the actuating member and overlie the localizing positions. The bottom 1 of the plug body is in contact with the other electrode of the welding system. It is merely necessary then to apply sufficient pressure between the opposed electrodes to hold the actuating member and plug body together while, at the same time, passing a welding current therethrough. In this manner a quick effective joint is made.

Finally, it is to be noted that in the event the sealing of the plug in position in an opening is to be accomplished by a lead and wire seal, no special perforation of any portion of the plug is necessary. All one needs to do is to pass the wire under through the rectangular wrench engaging end.

A modified form of blank for the actuating member is illustrated in Figs. 7 and 8. Here a center reduced bridging portion 30 is depressed at 31 intermediate its ends to provide welding current localizing projections on the opposite surfaces thereof. Just beyond those depressions the stock of the blank is bent upwardly at 32 and, after continuing for a short distance in the narrow width desired for the inner portion of the end members, it commences to

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widen out at 33 in an inclined side 34, comparable to the incline 16 of the form of Figs. 1 to 6.

At the outer extent of the incline 34, the enlarged ends 35 straighten out into a side wall 36 generally comparable to the side walls 15 of the form of Figs. 1 to 6. Here, however, instead of a toe being turned inward to seat in a depression, the terminating ends 37 of the blank are recessed at 38 in the manner of a two-pronged fork whose prongs 39 and 40 are designed and spaced to embrace the end portions of body 30. This is accomplished, as seen in Fig. 8, by first bending the blank substantially horizontally outwardly about the position 41 and then bending it vertically downwardly about the position 42. This results in reversing the initial outward extent of the prongs 39 and 40 and bringing them around to lie alongside of the ends of the center section 30.

Each prong, adjacent its beginning, is upstruck to provide localizing projections 43. These, along with the projection resulting from the depressions 31, serve for a single-step welding of this actuating member in place against the bottom of the plug. This member, when secured, serves for the manipulation of the plug in the same manner as does the actuating member of Figs. 1 to 6.

Though in the foregoing description and in the accompanying drawing a preferred and alternate form of the invention have been shown and described, it is to be understood that the article and method, so disclosed, are presented for illustrative and not limiting purposes.

Having disclosed our invention what we claim is new and desire to secure Letters Patent for is:

1. In closure plugs of the character described, a base, an upstanding side wall therearound and an actuating member engaging element received within said side wall, said engaging element including a body portion lying in substantially a single plane and upwardly extending engaging portions, each of said engaging portions extending upwardly away from said body portion and returned downwardly to terminate in a securing element lying in the same plane as said body portion, said body portion and said securing element being unitarily joined to the inner face of the base of said plug.

2. In closure plugs of the character described, a base, an upstanding side wall therearound and an actuating member engaging element received within said side wall, said engaging element including a body portion formed with a recess therein, and upwardly extending engaging portions, said engaging portions extending upwardly away from said body portion and returned downwardly to terminate in a securing element seated in said recess and lying in the same plane as said body portion, said body portion and said securing element being unitarily joined to the inner face of the base of said plug.

3. In closure plugs of the character described, a base, an upstanding side wall therearound and an actuating member engaging element received within said side wall, said engaging element including a body portion formed with a recess within the confines thereof and upwardly extending engaging portions, said engaging portions extending upwardly away from said body portion and returned downwardly to terminate in a securing element mated with said recess and seated therein and lying in the same plane as said body portion, said body portion and said securing element being unitarily joined to the inner face of the base of said plug.

4. In closure plugs of the character described, a base, an upstanding side wall therearound and an actuating member engaging element received within said side wall, said engaging element including a body portion and upwardly extending engaging portions, said engaging portions extending upwardly away from said body portion and returned downwardly to terminate in securing elements lying alongside of said body portion and in the same plane as said body portion, said body portion and said securing elements being unitarily joined to the inner face of the base of said plug.

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5. In closure plugs of the character described, a base, an upstanding side wall therearound and an actuating member engaging element received within said side wall, said engaging element including a body portion and upwardly extending engaging portions, said engaging portions extending upwardly away from said body portion and returned downwardly to terminate in securing elements lying in the same plane as said body portion, said body portion and said securing elements being unitarily joined to the inner face of the base of said plug at spaced points.

6. In closure plugs of the character described, an actuating member engaging insert, comprising a body portion and actuating elements formed integrally therewith and extending therefrom, said body portion being formed with recesses therein and said actuating elements extending upwardly away from said body portion, returning downwardly toward said body portion and terminating in securing elements, said securing elements being received within said recesses in said body portion.

7. In closure plugs of the character described, an actuating member engaging insert, comprising a body portion and actuating elements extending therefrom, said body portion being formed with recesses therethrough and said actuating elements extending upwardly away from said body portion returning downwardly toward the same and terminating in securing elements extending at an angle with respect to said downwardly returning portion, said securing elements being seated in said recesses and lying in substantially the same plane as said body portion.

8. In closure plugs of the character described, an actuating member engaging insert, comprising a body portion and actuating elements formed integrally therewith and extending therefrom, said body portion being formed with recesses therein within the confines thereof, and said actuating elements extending upwardly away from said body

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portion returning downwardly toward the same and terminating in securing elements extending at an angle with respect to said downwardly returning portion, said securing elements being seated in, and mated with, said recesses and lying in substantially the same plane as said body portion.

9. The method of forming a closure plug which comprises forming a hollow cup-shaped member with a bottom and with an upstanding side wall therearound, forming an actuating member engaging insert for reception within said cup-shaped member by blanking out a strip of sheet metal having a body portion and end portions, forming recesses in said body portion and forming tongues on said end portions for reception in said recesses, bending said end portions upwardly away from said body portion, downwardly towards the same and seating said tongues in said recesses in the same plane as said body portion, mounting said actuating member on the inner face of the bottom of said cup-shaped member and simultaneously welding the base of said actuating member and said tongues to the base of said plug.

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