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CLOSURE FOR SHEET METAL CONTAINERS

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2 Sheets-Sheet 1

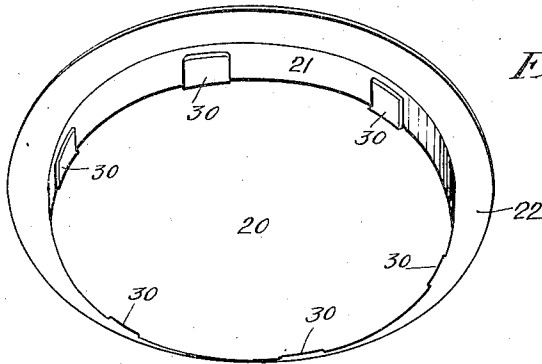


Fig. 3.

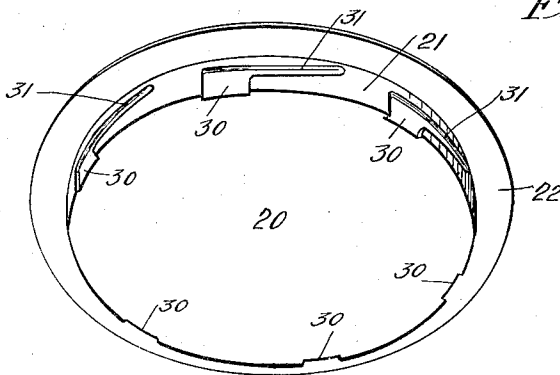


Fig. 2.

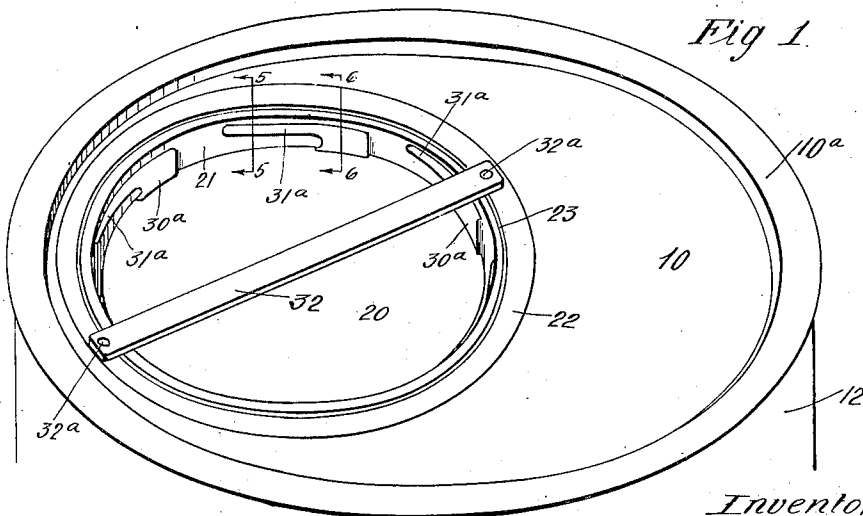


Fig. 1.

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2 Sheets-Sheet 2

Fig. 4.

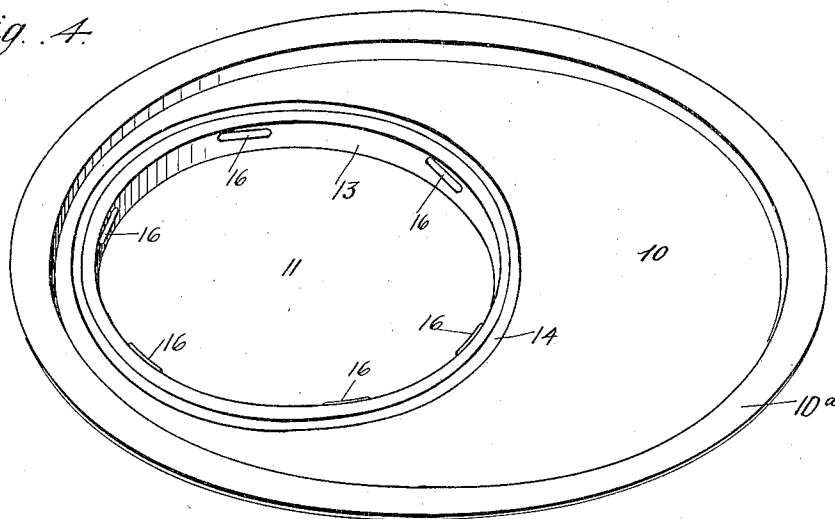


Fig. 5.

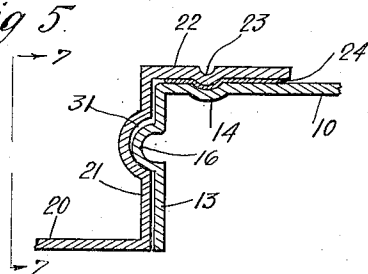


Fig. 6.

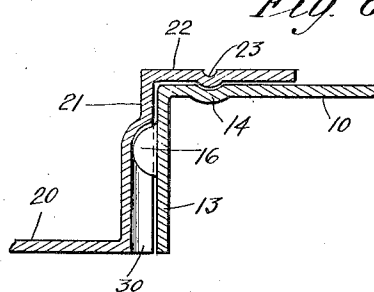
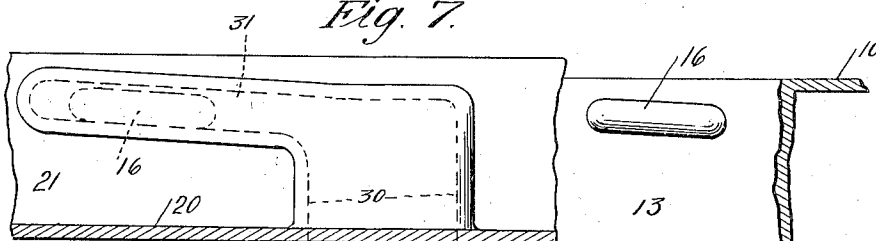


Fig. 7.



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CLOSURE FOR SHEET-METAL CONTAINERS.

Application filed August 31, 1925. Serial No. 53,498.

This invention has to do with closures for sheet metal containers and the like; and it may be preliminarily stated that the primary object is to provide a simple and inexpensive form of closure that does not depend upon the use of bolts or similar fastening means and that is easily and quickly operated to open or to tightly close a container.

Heretofore it has been the most common practice to close drums, cans and other sheet metal containers with a screw threaded plug, or, where the opening is large, with a friction top or with a plate secured in place by a plurality of bolts or screws. Where the opening is large it is impracticable to use a screw threaded plug; and on a great many containers it is necessary to have comparatively large openings. At the same time it is necessary to provide tight closures for these large openings, and this has usually been done by a friction cover or a cover secured in place by a plurality of bolts or similar fastening means. The friction covers are unsatisfactory in many situations; they are liable to deformation and are then useless. The bolt fastenings are objectionable for several reasons. They form inconvenient projections, they are liable to be damaged so that their operation is difficult or impracticable; and the time necessary to set and unset such fastenings means is sometimes a considerable item, especially where the container must be frequently opened and closed. A general result has been that such containers have quite commonly been left unclosed, leading to deterioration of the contents.

It is a general object of this invention to overcome these difficulties and to provide a form of closure that is at once extremely simple, that involves no fastening parts other than those contained within the formation of the container and closure itself. Just how this is done will be best understood from the following detailed description explaining the now preferred form and embodiment of the invention, reference for this purpose being had to the accompanying drawings, in which:

Fig. 1 is a perspective showing the closure applied, for instance, to a drum;

Fig. 2 is a perspective showing the under side of the cover;

Fig. 3 is a similar view showing the cover

as it appears at a certain point in process of formation;

Fig. 4 is a perspective showing that part of the closure which is contained, for instance, in the head of a drum;

Fig. 5 is an enlarged detail section taken as indicated by line 5—5 on Fig. 1;

Fig. 6 is an enlarged detail section taken as indicated by line 6—6 on Fig. 1; and

Fig. 7 is an enlarged detailed view with parts broken away for illustration, said view being taken in the aspect indicated by line 7—7 on Fig. 5.

Although the invention will be here described as applied to such a container as a drum, it will be understood that the invention is not limited to such application and use, neither is the closure limited to being placed in the head or end of a container. However, for the purpose of clear description it will be assumed that the closure is applied to the head of a drum, as that is a typical use of the closure.

The dies for some of the operations upon the closure here illustrated are the subject matter of my co-pending application Serial No. 53,499, filed on even date herewith, entitled Dies. This present application is restricted to the closure itself and to the method of forming it.

In the drawings a typical drum head is shown at 10, this head having an offset opening 11, of some considerable size as compared with the size of the head. These drum heads are usually made with a peripheral offset flange 10^a, the edge of which is beaded or otherwise secured to body 12 of the drum; but these are details that have no bearing upon my present invention. Opening 11 has an inwardly extending peripheral flange 13 and the opening is further stiffened by a circular bead 14, this bead also performing other functions, as will be hereinafter described. In the flange 13 there is a plurality of locking lugs 16 each of which is formed by pressing the metal of the flange inwardly in proper formation to form a lug 16. Each lug 16 is elongate in shape with somewhat rounded ends, is substantially semi-circular in cross section as is best shown in Fig. 5; and each lug is placed at a slight angle to the circumferential extent of flange 13, this angularity being best shown in Fig. 7. There may be as

many such locking lugs as desired; I have shown by way of illustration six such lugs in these drawings, equally spaced around the circumference of flange 13.

5 The cover that closes opening 11 is in the form of a shallow flanged cup, having a recessed bottom 20, cylindrical side wall 21, and a peripheral flange 22 at the upper edge of side wall 21. Cylindrical side wall 21 fits fairly closely but easily into opening 11, flange 22 being designed either to rest directly upon head 10 around the opening 11 or to rest upon a gasket placed between flange 22 and head 10. Flange 22 is beaded at 23 to correspond with the beading 14, so that bead 23 sets or nests in bead 14 when the cover is in place and if no gasket is used. If, however, a gasket is placed between flange 22 and head 10, then the gasket may not only be compressed flatly between the flange and head, but it may also be more or less crimped between the two beads so that a fluid tight joint is assured. Such a gasket is indicated at 24 in Fig. 5.

25 In the cylindrical side wall 21 of the cover there is a plurality of recesses 30 corresponding in number and placement to the number and placement of locking lugs on head 10. These recesses are sunk in the external face of wall 21 and extend upwardly from the bottom edge of that wall, as is clearly indicated in Figs. 2 and 3; and they are of sufficient peripheral length, and also of sufficient depth, that when the cover is initially placed in opening 11 by straight downward movement, these recesses 30 will pass the several locking lugs 16, so that the locking lugs will then occupy, with relation to recesses 30, somewhat the position shown in Fig. 6. Extending from the upper part of each recess 30 there is an angularly or spirally arranged groove 31. This groove is large enough to take a lug 16 easily, but with no excessive looseness, and long enough that rotation of the cover will bring these grooves into engagement with the locking lugs and the angular or spiral action between grooves 31 and lugs 16 will then cause the cover to be clamped down tightly. The angle of lugs 16 and grooves 31 is rather small, so that their wedging action to hold the cover down tight will be effective, and so that once the cover is tightened, the friction between the various parts will prevent the cover from being jarred loose. In other words, the angle of lugs 16 and grooves 31 to a circumferential line (or the angular pitch of the imaginary spiral on which a groove 31 or lug 16 is paid) is substantially less than the coefficient of friction which opposes rotation of the cover. At the same time this angle is not so small that an excessive rotation of the cover is required to tighten it down. In practice I have found that a spiral angle of about one-eighth inch

to two and one-half inches ($\frac{1}{8}$ inch rise to $2\frac{1}{2}$ inches length of groove 31) gives good practical results.

The cover conveniently has a handle of some sort; a simple handle is formed by a bar 32 extending diametrically across the cover as shown in Fig. 1. All the parts thus described are made of sheet metal except handle 32, which is preferably made of a bar; and all the locking parts are contained within the head and cover themselves.

The cover is formed from sheet metal of suitable thickness by a few simple operations. First from a sheet metal blank a flanged cup is formed as shown in Fig. 3. It will be well understood how such a shallow cup may be readily drawn from a sheet metal blank; and at the same time that the cup is formed—at the same time the cylindrical wall 21 is drawn—recesses 30 are also drawn as depressions in wall 21. These depressions, of course, show on the inside of wall 21 as indicated at 30^a in Fig. 1. The cup as shown in Fig. 3 having been formed by a single drawing and blanking operation, the next operation is to form grooves 31. These grooves are formed by operation of the dies explained in said co-pending application. After the operation of forming grooves 31, then as a final operation bead 23 is formed and the holes to take the handle rivets 32^a are punched. After placement of the handle the cover is then ready for use.

In forming the part of the closure contained in the head 10, the head is first formed with its flange 13 surrounding opening 11. The opening 11 is punched out and flange 13 drawn in a single operation. Then locking lugs 16 are formed by operation of the die explained in said co-pending application; the head 14 is formed subsequently. The head is then ready to receive the cover. In forming the cover, as is explained in said co-pending application, the dies are so constructed that groove 31 is made to communicate smoothly with recesses 30, the bottom or back wall of the groove being made to coincide with the bottom or back wall of the recess 30, so that when the cover is rotated locking lug 16 slips easily from a position in recess 30 to a position in groove 31. It will be understood that grooves 31 are formed, like recesses 30, by depressing the sheet metal of wall 21, so that the grooves 30 show as raised portions 31^a on the inside of cover wall 21. I have said that the cup-shaped cover fits opening 11 with fair snugness and yet not too loosely. A slight looseness is allowed so that the cover cup may be put into opening 11 easily; and this slight looseness also plays another part, as will now be described. Locking lugs 16 and the grooves 31 are substantially semi-circular in section, as is best shown in Fig. 5. When the cover is rotated so that the

under wall of the groove is brought up against the under wall of lug 16, the slight amount of looseness present causes the groove to be so situated with reference to the lugs that downward pressure of the lug in the groove tends to press the groove somewhat inwardly, or to the left in Fig. 5. This action tensions the cylindrical wall 21 by pressing it inwardly and also tensions flange 13 by pressing it outwardly (to the right in Fig. 5) and also by the slight wedging action causes the cover to be more tightly and securely held in its final position.

It has been found from experience that closures made as herein described are very serviceable. They are capable of being very strongly made, so that they can stand usage and they always lock tightly without any great effort being exerted upon them. In their locked position they are not apt to become loosened by vibration or any accidental force that may be applied to them; fitting a container as closely as they do, it is almost impossible that any rotary force that would tend to loosen them can ever be applied to them except with some definite purpose.

I claim:

1. A sheet metal closure embodying in combination with an apertured sheet metal wall, an inwardly projecting flange around said opening, spirally extending locking lugs pressed inwardly from the metal of the flange, and a cover in the form of a shallow cup whose side wall fits down into the flanged opening with the cup bottom substantially on a level with the inner edge of the flange, the cover having a peripheral flange adapted to bear against the sheet metal wall around said aperture, said side wall of the cup having therein a plurality of drawn lug-receiving recesses reaching up from the bottom of said side wall, and a plurality of pressed spiral grooves each communicating with a recess and extending spirally therefrom and each adapted to spirally co-act with a locking lug which has passed up into its corresponding recess, said locking lugs being elongate in elevation with round ends and being substantially semi-circular in section; said drawn recesses being substantially rectangular in elevation and the spiral grooves leading from said recesses being substantially semi-circular in section; and the cup fitting said aperture somewhat loosely so that the semi-circular lugs and grooves in reaction with each other have a tendency to wedge substantially as described.

2. A sheet metal closure embodying in combination with an apertured sheet metal wall, an inwardly projecting flange around said opening, spirally extending locking lugs

pressed inwardly from the metal of the flange, and a cover in the form of a shallow cup whose side wall fits down into the flanged opening with the cup bottom substantially on a level with the inner edge of the flange, the cover having a peripheral flange adapted to bear against the sheet metal wall around said aperture, said side wall of the cup having therein a plurality of drawn lug-receiving recesses reaching up from the bottom of said side wall, and a plurality of pressed spiral grooves each communicating with a recess and extending spirally therefrom and each adapted to spirally co-act with a locking lug which has passed up into its corresponding recess, said locking lugs being elongate in elevation with round ends and being substantially semi-circular in section; said drawn recesses being substantially rectangular in elevation and the spiral grooves leading from said recesses being substantially semi-circular in section; and the cup fitting said aperture somewhat loosely so that the semi-circular lugs and grooves in reaction with each other have a tendency to wedge substantially as described; said sheet metal wall having a circular bead around its aperture, and the peripheral flange of the cover having a similar circular bead adapted to nest in the first mentioned head.

3. A sheet metal closure embodying in combination with an apertured sheet metal member, a circular flange wall around the aperture, a cover in the form of a circular shallow cup whose circular side wall fits into the flanged opening, the cover having a peripheral flange adapted to bear against the sheet metal member around the aperture, spirally extending locking lugs raised in the metal of one of said circular walls, the other of the circular walls having therein a plurality of lug-receiving recesses reaching vertically from one edge of the wall, and having a plurality of sunk spiral grooves each communicating with a recess and extending spirally therefrom and each adapted to spirally co-act with a locking lug which has passed into its corresponding recess; said lugs being substantially circular in section; said recesses being substantially rectangular in elevation and the spiral grooves leading therefrom being substantially semi-circular in section; and the cup fitting the aperture somewhat loosely so that the semi-circular lugs and grooves in reaction with each other have a tendency to wedge substantially as described.

In witness that I claim the foregoing I have hereunto subscribed my name this 8th day of August 1925.

ALFRED J. MUHLBACH.