Jan. 25, 1938. P. M. THORN 2,106,364

CLOSURE FOR RECEPTACLES

Filed Dec. 19, 1935 3 Sheets-Sheet 1

Fig. 1

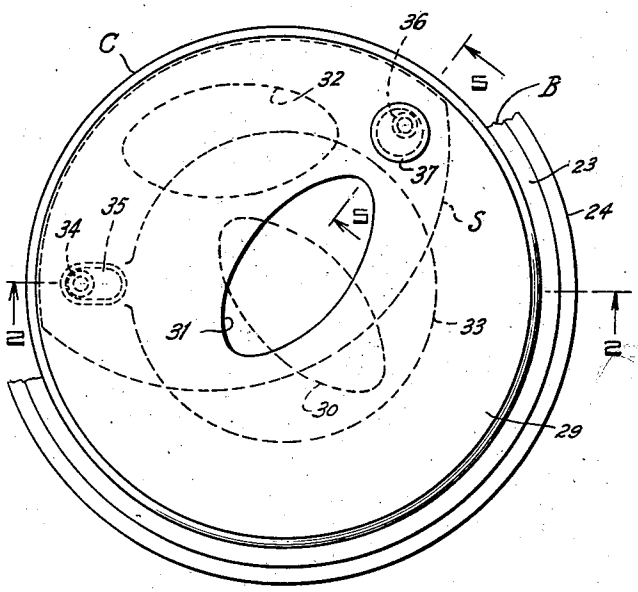


Fig. 3

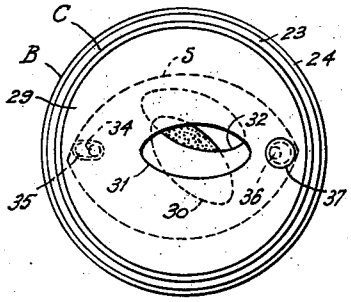


Fig. 4

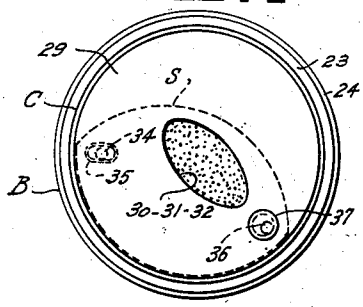


Fig 2

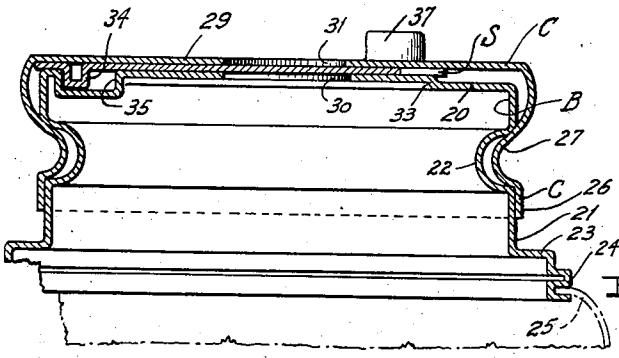


Fig 5

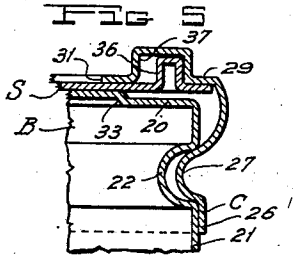


Fig. 7

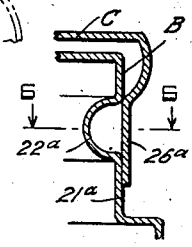


Fig. 8

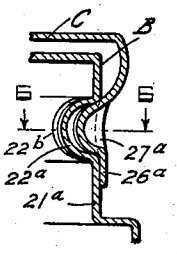
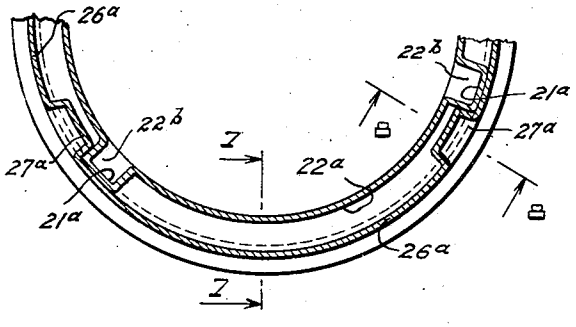


Fig. 6



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CLOSURE FOR RECEPTACLES

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Fig. 9

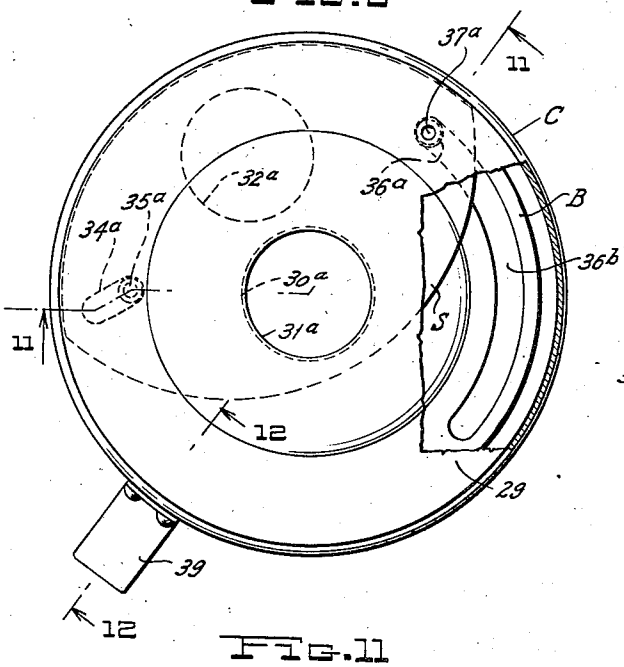


Fig. 10

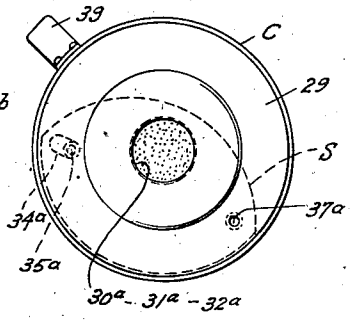


Fig. 11

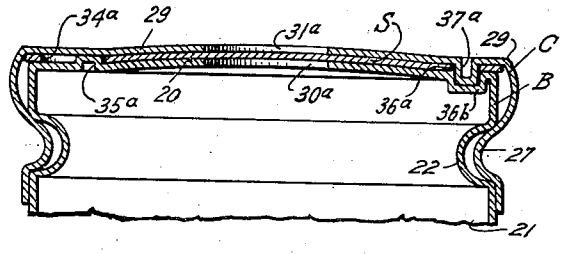


Fig. 12

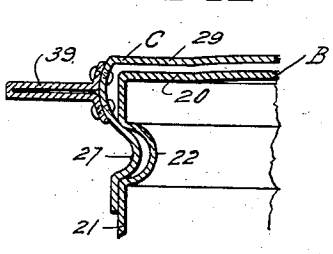


Fig. 13

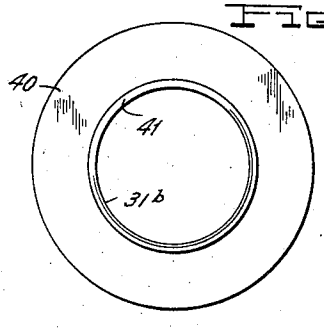


Fig. 14

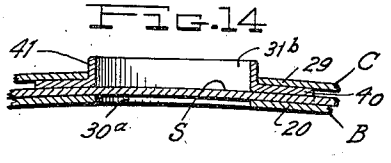


Fig. 15

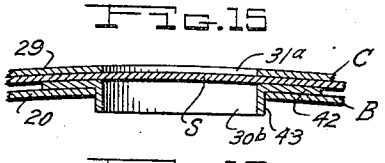
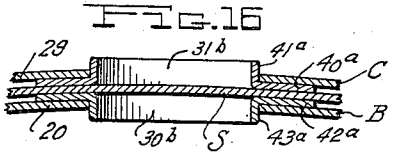


Fig. 16



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CLOSURE FOR RECEPTACLES

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Fig. 17

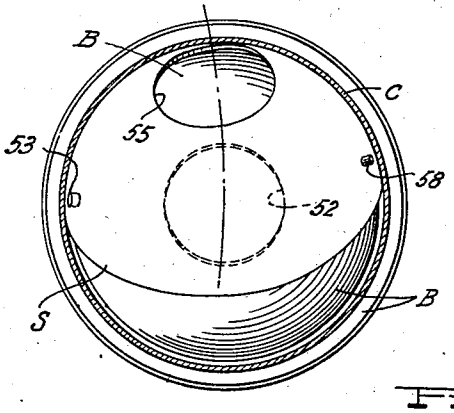

Fig. 18

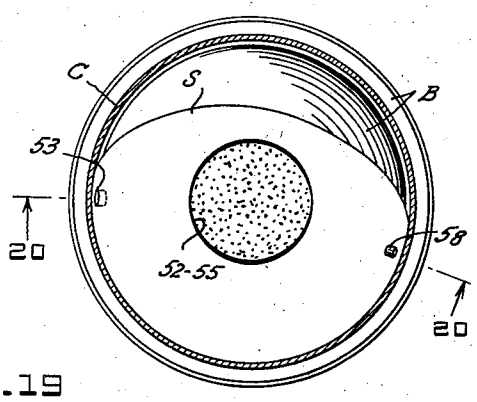

Fig. 19

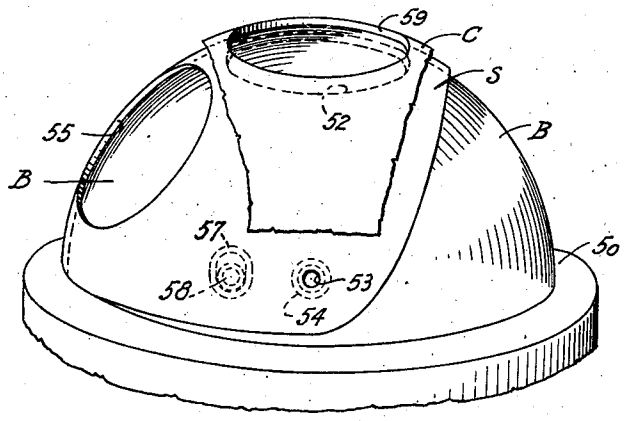

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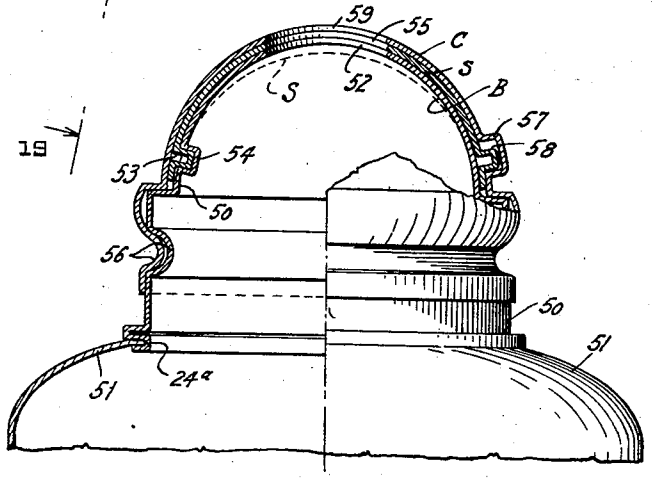
Fig. 20



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Patented Jan. 25, 1938 2,106,364

UNITED STATES PATENT OFFICE

2,106,364

CLOSURE FOR RECEPTACLES

Percy M. Thorn, New Rochelle, N. Y.

Application December 19, 1935, Serial No. 55,157

12 Claims. (Cl. 221—64)

This invention relates to closures for receptacles, and constitutes an improvement and modification of invention disclosed in my co-pending application, Serial #623,757.

It is an object of this invention to provide a closure of the character described which will be inexpensive to manufacture and efficient in operation. It is a further object to provide a closure which will have the maximum practical opening consistent with the diameter of the closure.

It is a further object of the present disclosure to provide a device suitable for manufacture from sheet metal and which, nevertheless, will maintain a tight closure at all times so that it may be opened and closed with ease without wearing loose.

It is a further object of this invention to provide a closure of the character described which will permit a free rotation of the operating cap to open and close the container, but which will definitely limit the rotation by a substantial stop when the desired amount of rotation has taken place, without imposing any strain upon the operating parts.

The invention accordingly comprises an article of manufacture possessing the features, properties, and the relation of elements which will be exemplified in the article hereinafter described and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a top plan view of the closure made in accordance with this invention in position to close the receptacle.

Fig. 2 is a vertical section along the line 2—2 of Figure 1.

Figs. 3 and 4, drawn to a reduced scale, show the top plan view with the opening partially opened and completely opened, respectively.

Fig. 5 is a section along the line 5—5 of Figure 1, showing the formation of the pin and socket which controls the shutter.

Fig. 6 is a fragmentary section showing an embodiment, having means for definitely limiting the rotation of the closure, as taken along the plane indicated by the line 6—6 of Figures 7 and 8.

Figs. 7 and 8 are respectively fragmentary sections along the lines 7—7 and 8—8 of Figure 6 respectively.

Figure 9 is a modification showing a different form of sealing the closure at the opening, the closure being shown in the closed position.

Figure 10 is a similar view drawn to a reduced scale, of the closure open.

Figure 11 is a section along the line 11—11 of Figure 9.

Figure 12 is a fragmentary section along the line 12—12 of Figure 9.

Figures 13, 14, 15, and 16 are modifications showing different methods of effecting the tight seal. Figure 13 being a top plan view of the structure shown in Figure 14, and Figure 14 being a longitudinal section of the structure shown in Figure 13. Figures 15 and 16 are views similar to Figure 14 with modifications.

Figures 17, 18, 19, and 20 are views showing a modification in which the operating parts of the shutter are made dome shaped. Figures 17 and 18 represent top plan views with the outer cap shown in section; Figure 17 showing the shutter in closed position, and Figure 18 in open position.

Figure 19 is an elevation in perspective taken at an angle as shown along the line 19—19 of Fig. 20, showing the relationship of the three operating parts, part of the cap being removed to show the interior construction.

Figure 20 is a longitudinal section along the bent line indicated by the numerals 20—20 of Figure 18.

Referring to Figures 1 to 5 inclusive, the base member B is generally cup shape, having a perforate end-wall 20 and a side-wall 21. This side wall is provided with a peripheral indentation 22 at its upper portion, and with a shoulder 23 at the lower portion projecting enough beyond the edge of the remainder of the side wall to extend beyond the outer diameter of the cap shape portion C. This shoulder is crimped at its lower edge as shown at 24 to the top portion 25 of the container with which the device is to be used.

The cap C is also substantially cup shape, having a side wall 26 fitting over the side wall 21 of the base member and having an indentation 27 fitting within the peripheral indentation 22 in the base B to hold the cap member C in place, and preferably engaging each other at both the top and bottom of that indentation providing two sets of opposite bearing surfaces completely to define the position of the cap along its axis without lost motion while at the same time permitting rotation of the cap about the base.

The cap member C is provided with a perforate end wall 28 disposed substantially parallel to the end wall 20 of the base, defining between

them a recess for the movement of the shutter S. These end walls 20 and 29 and the shutter S are provided with openings or perforations 30, 31 and 32 respectively, adapted to be in alignment with each other in one position of the cap; one or both of the end walls 20 and 29 are so formed as to engage the shutter S firmly in a line of contact completely surrounding the openings so as to maintain a tight joint at that point.

As illustrated in Figures 1 and 2, this is accomplished by raising the center portion of the plate 20 as shown at 33 to form a rim surrounding the opening. This opening is preferably elongated substantially in the direction of the axis of the shutter to provide a maximum opening with the minimum movement of the shutter.

The shutter S has the general contour defined by two circular arcs, and is articulated at one end to the base and at the other end to the cap, each articulation comprising a pin upon one part fitting into an opening in the other. As here chosen for illustration, the pins are upon the shutter. Thus, for example, there is provided at one end, a pin 34 fitting downwardly into and engaging a diametrically disposed recess 35 in the base B. The other end of the shutter is provided with a pin 36 extending upwardly to engage a recess 37 in the end wall 29 of the cap.

As the cap C is rotated about the base B, the wall of the recess 37 engages the pin 36, to swing the shutter from one side of the base member where the openings 30, 31 and 32 are in registry with each other, as shown in Figure 4, to the opposite side, where the opening 32 of the shutter becomes interposed between the blank areas of end-walls 20—29 as shown in Figure 1, thus closing the container.

In the practical manufacture of the shutter, the pins 34—36 may be struck up from the metal of the shutter itself, and the recesses 35 and 37 may be formed by indenting the metal of the base and cap respectively, without perforating said members.

From the manufacturing points of view and for many purposes this is a distinct improvement over the construction shown in my co-pending application, Serial #623,757, as it provides a cap bearing surface accurately to define the position of the cap to cause it to bear evenly upon the shutter at all times in an economical form suitable for quantity production from sheet metal.

With the foregoing construction, it would be clear that a tight closure can be maintained between the shutter and the base member at all times, both in the open and closed position of the receptacle, whereby the contents of the receptacle will not sift into the space between the cap member and the base.

For many purposes it is desired to provide means for definitely limiting the amount of rotation of the cap so that no strain is imposed on the pin. Figures 6 to 8 show a modification in which this is provided for by limiting the bearing surfaces corresponding to surfaces 22 and 27.

In this form there is provided peripheral indentations 22*a* in the base member interrupted at spaced points by stop portions 22*b* of the diameter of the wall 21*a*. The indentations 27*a* of the cap are limited in circumferential length to fit within the indentations 22*a* and provide only that amount of rotation the cap requires for opening.

In the form of the invention shown in Figures 9, 10, 11, and 12, the general construction is substantially the same as in the preceding embodiment and the parts therein have similar numbers. In lieu, however, of the raised rim 33 to exercise pressure against the shutter, the flat portion 20 of the base member is made convex relative to the cap member.

Stamping operation of the kind herein required may be caused to leave a slight convexity in these flat surfaces and the object herein desired may be achieved by causing the flat portion 20 to have a sharper curvature than portion 29 of the cap so that the rim 33 of the former modification may be dispensed with and yet the pressure may be maintained immediately surrounding the opening.

In this modification the shutter is shown provided with slots 34*a* and 36*a* into which project pins 35*a* and 37*a*, carried respectively by the base and cap portion. This avoids the projecting knob 37 of the construction of Fig. 1.

With this modification, moreover, the movement of the cap may be limited by providing a circular depression 36*b* in the base member into which the pin 37*a* extends; the length of the depression being such as to limit the movement of the pin to that required to open the shutter.

There is here further illustrated a handle 39 attached to the cap member to facilitate turning the cap member. Such a handle is particularly suitable wherever the closure is intended to be used for large openings.

In the form of the invention disclosed in Figure 14, there is inserted between the end wall 29 and the shutter S, a flange 40, having an upstanding rim 41. This flange serves a double purpose of confining the pressure between the shutter and the base member to the area immediately surrounding the opening and at the same time furnishing an outwardly extending rim or spout 41, which is of service where it is desired to use the closure as a drop dispenser.

In the form of the invention disclosed in Figure 15, a sleeve 42 of form similar to that described in Figure 14 is inserted between the wall 29 and the shutter, and a rim 43 extending inwardly of the receptacle. In the modification illustrated in Figure 16, two such sleeves 40*a* and 42*a* are employed.

With any of the above constructions, it would be clear that there is provided a simple and inexpensive closure which may be made as tight as desired and it will retain its tightness throughout its entire life. It would be clear, moreover, that the closure may be made by simple stamping operations and by automatic assembling and yet the parts will be uniformly tight and will function properly without binding.

In the form of the invention shown in Figures 17 to 20, the mating surfaces assume the form of segments of the surface of a sphere. To this end the base member 50 may be made as a hemisphere attached as previously described to a container 51, and having an opening 52 in its top. The shutter S has also a spherical form provided with a pin 53 fitting into a recess 54 in the base member 50. This pin is raised above the diameter of the base member and as illustrated, the line connecting the pin 53 with the center of the sphere of the base member makes an angle of about 20° with the horizontal. The shutter member S is provided with an opening 55 which in one position of the shutter registers with the opening 52 of the base. This shutter S moves about upon the base member as though pivoted to it along a diameter running through the pin 53. A cap member

C is also in spherical form and is attached to the base member by means of the indentations 56 as in the previous modification so that the cap may be made to rotate about the base member without lost motion along its axis. The cap member is provided with an outwardly extending recess 57 to engage a pin 58 with lost motion along the tangent.

From this construction it will be seen that as the cap member C is rotated about the base, the recess 57 moves in a circle about the vertical axis of the cap while the pin 58 moves in a circle perpendicular to the diameter through the pin 53.

It will thus be seen that while the recess 57 maintains a constant height above the base, the pin 58 dips downwardly at each end of its stroke, and the lost motion between the pin and the recess must be sufficient to take care of this dipping.

With this construction it will be clear that as the cap is rotated about its vertical axis, the shutter S is caused to move over the curved surface of the base about the diameter of the hemisphere passing through the pin 53. The cap member C is provided with an opening 59 in registry with the opening 52 and this movement of the shutter from one side to the other causes the opening 55, in one position, to come into registry with the openings 52 and 59 to open the top, and in another position to pass out of registry with them to close the top.

In order to accentuate the pressure between the shutter and the base end-cap respectively to the area immediately surrounding the opening, the base member and the cap member may be formed slightly out of the truly spherical by an amount to create the pressure desired, but to permit the parts to be held in substantially spherical form when assembled. To accomplish this result the inner or base member is slightly sharper than a true sphere and the cap member C is slightly more flat, but when assembled together they are caused to exert a mutual pressure at the point desired.

This particular embodiment has a mere ornamental appearance for many purposes and at the same time it permits a wider opening for a given outside diameter.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A closure of the character described comprising in combination a base portion having an end wall and a side wall, and a circumferential indentation within the side wall, a cap portion having an end wall and a side wall, fitting over said base portion and having an indentation fitting within the indentation in said base portion and engaging both edges of said indentation to prevent movement of the cap portion along the axis in either direction, a shutter movable between said end walls and pivoted at its opposite ends to the base portion and the cap portion respectively, said base portion and said cap portion and shutter having registering openings in one position of the shutter, the end walls of said base portion and cap portion being so formed as to exert pressure upon the shutter immediately surrounding the opening in the base portion.

2. A closure of the character described comprising in combination a base portion having an end wall and a side wall, and a circumferential indentation of limited circumferential extent within the side wall, a cap portion having an end wall and a side wall, fitting over said base portion and having an indentation fitting within the indentation in said base portion and engaging both edges of said indentation to prevent movement of the cap portion along the axis in either direction, whereby rotation of the cap is limited to the amount required to move the shutter, a shutter movable between said end walls and pivoted at its opposite ends to the base portion and the cap portion respectively, said base portion and said cap portion and shutter having registering openings in one position of the shutter, the end walls of said base portion and cap portion being so formed as to exert pressure upon the shutter immediately surrounding the opening in the base portion.

3. A closure of the character described comprising in combination a base portion, a cap portion fitting over said base portion, each of said portions comprising end and side walls, a shutter fitted between said end walls and articulated to both of said portions whereby a limited rotary movement of the cap portion will actuate the shutter, inter-engaging bearing surfaces upon said side walls for defining the position of said cap portion upon said base portion in an axial direction and having a definite limited circumferential extension to limit rotary movement of the cap to the amount necessary to move the shutter, whereby the strain of stopping the movement of the cap portion is taken by the bearing surface.

4. A closure top comprising in combination a base portion having end and side walls, a cap portion fitting upon said base portion having end and side walls, a shutter movable between the end walls of said base portion and said cap portion, and movable beyond the side walls of the base portion, said cap portion being of larger diameter than the base portion, pivots at the opposite ends of said shutter portion to connect it to the base portion and cap portion respectively, and means upon the side walls of said portions for connecting the cap portion to the base portion, positively preventing lost motion along the axis.

5. A closure top comprising in combination a base portion having end and side walls, a cap portion fitting upon said base portion having end and side walls, a shutter movable between the end walls of said base portion and said cap portion, and movable beyond the side walls of the base portion, said cap portion being of larger diameter than the base portion, pivots at the opposite ends of said shutter portion to connect it to the base portion and cap portion respectively, the side walls of said base portion and said cap portion having mating circumferential bearings to limit the movement of the cap to that required to move the shutter.

6. A device of the character described comprising in combination a base portion and a cap portion, each of said portions comprising a side wall and an end wall, a shutter movable between said end walls adapted to extend beyond the edges of the end wall of the base portion, such shutter

being pivotly connected at its opposite ends to the end wall of the base portion and the cap portion respectively, said cap portion being adapted to fit over said base portion and said shutter, and means to hold said cap portion in place upon said base portion.

7. A closure of the character described comprising in combination a base portion, a cap portion fitting over the base portion, each of said portions including a side wall and an end wall, a shutter confined between said end walls and articulated to both, said end walls and said shutter having centrally disposed openings in a position to be aligned in one position of the parts, said parts being shaped to create a yielding pressure between the shutter and the end wall of the base substantially confined to that portion of the base immediately surrounding the opening.

8. A closure of the character described comprising in combination a base portion, a cap portion fitting over the base portion, each of said portions including a side wall and an end wall, a shutter confined between said end walls and articulated to both, said end walls and said shutter having openings in a position to be aligned in one position of the parts, and means carried by one of said end walls for exerting pressure upon said shutter immediately surrounding the openings, including a lip extending outwardly of the opening in said end wall and above the level of said end wall.

9. A closure of the character described comprising in combination a base portion having an end wall and a side wall, and a circumferential indentation within the side wall, a cap portion having an end wall and a side wall, fitting over said base portion and having an indentation fitting within the indentation in said base portion and engaging both edges of said indentation to prevent movement of the base cap portion along the axis in either direction, a shutter movable between said end walls and pivoted at its opposite ends to the base portion and the cap portion respectively, said base portion and said cap portion and shutter having registering openings in one position of the shutter.

10. A closure of the character described comprising in combination a base portion having an end wall and a side wall, and a circumferential indentation of limited circumferential extent within the side wall, a cap portion having an end wall and a side wall, fitting over said base portion and having an indentation fitting within the indentation in said base portion and engaging both edges of said indentation to prevent movement of the base portion along the axis in either direction, whereby rotation of the cap is limited to the amount required to move the shutter, a shutter movable between said end walls and pivoted at its opposite ends to the base portion and the cap portion respectively, said base portion and said cap portion and shutter having registering openings in one position of the shutter.

11. A closure top comprising in combination a base portion having end and side walls, a cap portion fitting upon said base portion having end and side walls, a shutter movable between the end walls of said base portion and said cap portion, and movable beyond the side walls of the base portion, said cap portion being of larger diameter than the base portion, pivots at the opposite ends of said shutter portion to connect it to the base portion and cap portion respectively.

12. A closure of the character described comprising in combination a base portion, a cap portion fitting over the base portion, each of said portions including a side wall and an end wall, a shutter confined between said end walls and articulated to both, said end walls and said shutter having openings in a position to be aligned in one position of the parts, and means carried by one of said end walls for exerting pressure upon said shutter immediately surrounding the openings, including a lip surrounding one of said openings.

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