

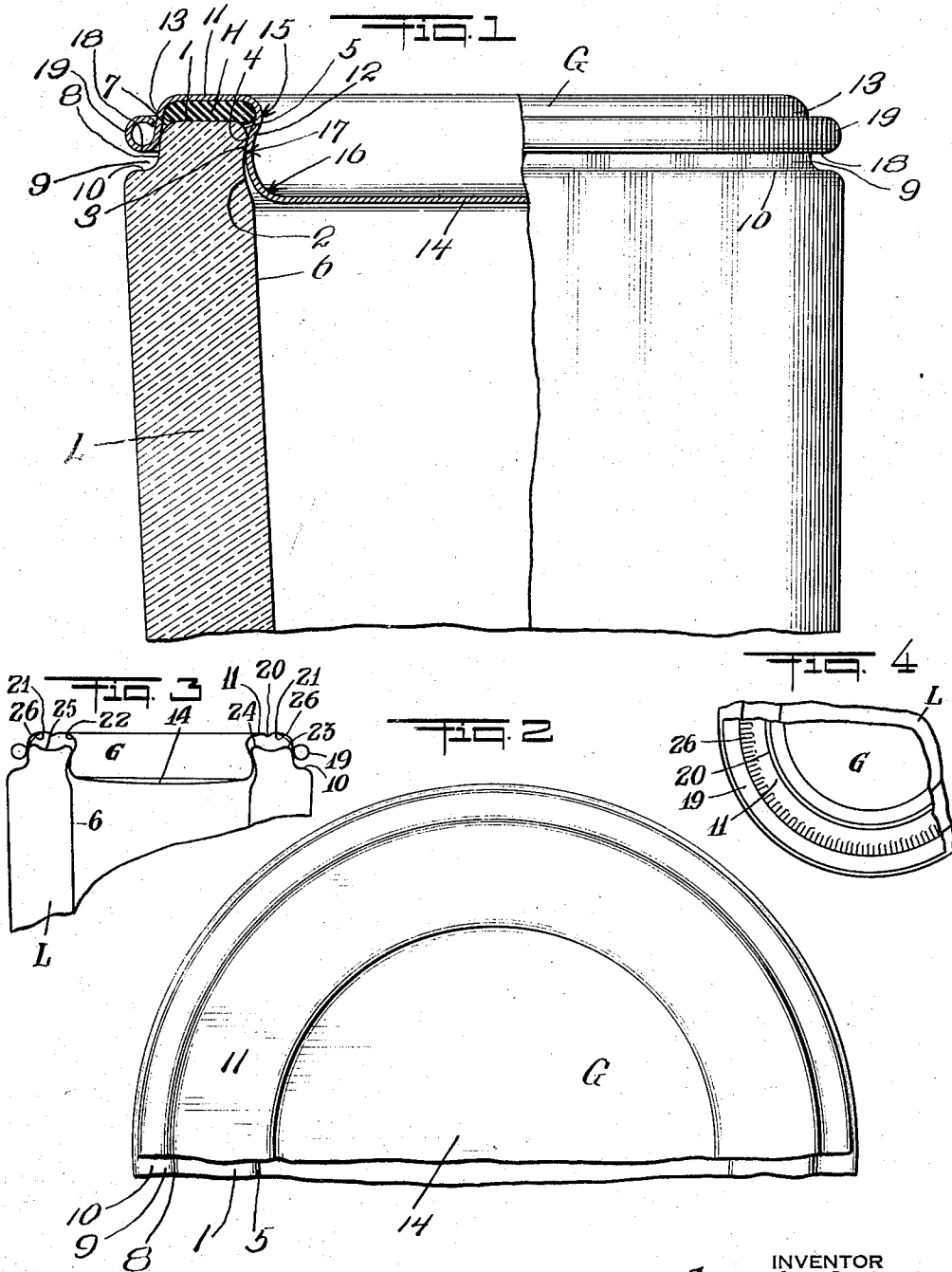
July 14, 1936.

A. L. MEROLLE

2,047,281

SHEET METAL RECEPTACLE CLOSURE

Filed Aug. 24, 1932



INVENTOR
Augustus L. Merolle
BY
H. Sanford Handley
ATTORNEY

UNITED STATES PATENT OFFICE

2,047,281

SHEET METAL RECEPTACLE CLOSURE

Augustus L. Merolle, Brooklyn, N. Y.

Application August 24, 1932, Serial No. 630,160

6 Claims. (Cl. 215—47)

This invention relates to a sheet metal receptacle closure of the type which is adapted to be fixed in sealing position upon the mouth of the receptacle by simple downward pressure of the closure against the upper annular edge of the receptacle.

An object of the invention is to provide a closure which will be of extreme simplicity, one which will be highly efficient in use and which may be produced at very small cost.

A further object is to so construct the closure that it may be very easily attached to a receptacle or removed therefrom, and so that it will be adapted for re-use with practically the same degree of efficiency as when originally used.

A further object is to so construct the closure that it will include an outwardly bulging leaf-spring-like section extending annularly thereof adapted to engage resiliently against a co-operative interior annular surface portion of the receptacle, and to provide highly efficient means, also included in the same piece of metal as the remainder of the closure, adapted to re-inforce the receptacle against the bursting strains of said leaf-spring-like section.

A further object is to so construct the closure and the receptacle that they will co-operate for the efficient application and retention of the closure, and so that the closure will constitute an unobtrusive, neat and attractive terminal or top cover for the receptacle, and so that while the closure may be readily removed yet it will not be likely to be accidentally detached at any time.

A further object is to so construct the closure that it will include an annular part considerably further from the circumferential center of the closure than the annular portion of the closure which frictionally engages the receptacle to hold the closure attached, said part being adapted to be engaged and operated for lifting the closure out of frictional engagement with the receptacle.

A further object is to so construct the closure that it will include efficient means to prevent displacement of the gasket employed.

A further object is to so construct the closure, with respect to the receptacle, that the closure will include a wire edge adapted to directly overlie the annular upper edge corner of the receptacle as a protection for said edge corner.

A further object is to embody in combination in the structure a means whereby air pressure within the receptacle will increase the frictional engagement of the closure with the receptacle, also a means to prevent the frictional grip of the closure becoming so tight as to produce bursting

of the receptacle in the event of extreme air or gas pressure within the receptacle, also a means whereby the rubber gasket employed will be held against migration, and to in general provide a highly efficient friction closure employing a rubber sealing gasket.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of the elements, combinations, arrangements of parts and applications of principles constituting the invention; and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawing which is to be taken as a part of this specification, and in which I have shown merely a preferred form of embodiment of the invention:—

Fig. 1 is a vertical sectional view, partly in elevation, through a closure constructed in accordance with this invention and showing the same as it appears when in attached relation upon a receptacle.

Fig. 2 is a partial top plan view of the structure appearing in Fig. 1.

Fig. 3 is a diagrammatic sectional view similar to Fig. 1, but on a reduced scale, illustrating a modified arrangement of parts of the closure and the receptacle, and

Fig. 4 is a partial top plan view, also on a similar reduced scale, of the structure appearing in Fig. 3.

Referring to the drawing for describing in detail the structure as illustrated therein, the reference character L indicates the neck or upper portion of a glass or like receptacle, such as is commonly used for the preservation of jellies and preserves.

The reference character G indicates generally the closure here concerned.

The reference character H indicates a gasket of rubber or rubber-like material carried by the closure G and positioned to engage the flat upper annular edge surface I of the receptacle to constitute an air tight seal between the receptacle and the closure.

The interior annular surface of the receptacle L, at the upper edge portion thereof, is formed with a slight under-cut annular groove therein as at 2. This groove is so formed that its upper portion provides an annular surface as 3 which flares at a slight angle downwardly and outwardly from a ridge portion as 4 which, being of relatively a slightly less diameter than the bottom or largest diameter of the groove, overhangs the groove.

Above the ridge 4 the material of the receptacle is rounded upwardly and outwardly so as to merge into the surface 1 and to provide a properly inclining curved surface 5 leading from said surface 1 inwardly and downwardly to the ridge 4.

Below its region of greatest diameter the wall of the groove 2 is curved gracefully inwardly and downwardly so as to merge into the main inner surface as 6 of the receptacle without the formation of any abrupt corners or shoulders which might be difficult to clean and which might interfere with attachment, and re-attachment, of the closure.

The exterior annular surface of the receptacle, at the upper edge portion thereof, is curved outwardly and downwardly from surface 1 so as to provide an inclined guiding surface as 7 leading to an annular relatively vertical wall portion 8 which forms one wall of an annular corner groove 9, the other wall, as 10, facing upwardly and thereby offering a supporting surface for a tool which may be utilized in removing the closure as will be presently referred to.

The closure G is formed from a single disc of thin sheet metal. In forming the closure the material of the disc is pressed or bent so that it provides an annular wall portion as 11 disposed for overlying the upper annular edge surface 1 of the receptacle. Inwardly of the portion 11 the material of the disc is bent downwardly to provide a relatively vertical inner annular wall 12 adapted to extend into the mouth of the receptacle, and outwardly of the portion 11 the material of the disc is bent downwardly to provide a relatively vertical outer annular wall 13 adapted to extend into the corner groove 9 of the receptacle, said two walls 12 and 13 being adapted thereby to lap about opposite surfaces of the wall of the receptacle and to provide a downwardly opening channel between them for containing the gasket H which rests against the under-surface of the wall portion 11 within the annular groove or channel provided between the walls 12 and 13.

The central portion as 14 of the material of the disc stands somewhat below the portion 11 and is connected with said portion 11 by the annular wall 12, said portion 14 being adapted to stand within the mouth of the receptacle when the closure is attached.

The construction and form of the wall 12 is of the utmost importance to the successful manufacture and use of this closure, and in this connection it is noted that said wall is carefully shaped so as to bulge outwardly for the greater portion of its vertical height. This bulge is designed so that, between the points indicated 15 and 16 thereon, it constitutes in cross section a substantially vertically disposed annular leaf spring section which, when the closure is attached, is adapted to engage against the wall of groove 2 of the receptacle at or about the mid portion in the height of said leaf-spring section, as indicated at 17, and against the downwardly and outwardly inclining annular surface 3 of the groove. Resiliency of the leaf spring section 15-16 exerted constantly outwardly against the inclining surface 3 tends to draw the closure always downwardly into tighter engagement of the gasket against the receptacle.

The resiliency of the leaf spring section 15-16 also enables said section to yield radially inwardly to a sufficient degree to pass the ridge 4 when the closure is being attached to or removed from the receptacle.

It will be observed that in the drawing, pressing or spinning operation, which is used in displacing the central portion 14 of the closure from the plane of the portion 11 and to provide the wall 12, in the manufacture of this closure, the material of the disc which constitutes the wall 12 is considerably stretched and manipulated so that in the completed closure the material which constitutes the spring section of this wall is of a different character from the material of the remainder of the closure. The stretching to which the section 15-16 has been subjected has rendered it more resilient and springy and thereby better adapted to serve as a leaf spring in the manner herein explained.

It is noted further that the portion of the closure which constitutes the junction between the lower annular edge of the leaf spring section 15-16 and the outer annular edge of the central portion 14, as at the region indicated 16 in Fig. 1, is on a curve of considerable radius and is at a location widely removed from the point as 17 where the leaf spring section engages the wall of the receptacle so that there is a very considerable degree of resiliency provided between the annular edge of the central portion 14 and the region where the closure engages against the inner surface of the receptacle. This is important in that it provides for the resilient absorption in the spring section 15-16, and in said lower curved junction portion, of strains which would otherwise be imposed upon the material of the receptacle due to expansion and contraction of the portion 14 under changes of temperature, etc.

It will also be noted that the portion of the closure which constitutes the junction between the upper annular edge of the leaf spring section 15-16 and the annular wall portion 11, as at the region indicated 15 in Fig. 1, is at a location widely removed from the point as 17 where the leaf spring section engages the wall of the receptacle and is curved and merged into the wall 11 and extends upwardly from the point 15 for approximately the thickness of the gasket H, thereby providing a certain desirable amount of resiliency between the point 17 and the wall 11, which resiliency is also important in that it provides for the resilient absorption in the spring section 15-16, and in the upper curved junction portion, of strains which would otherwise be imposed upon the material of the receptacle due to expansion and contraction of the annular wall portion 11 under changes of temperature, etc.

The spring action of the section 15-16 exerted against the ridge 4 as the closure is being applied onto the receptacle provides for a "snap" engagement of the closure onto the receptacle, and insures ample frictional tightness to hold the closure against accidental displacement.

The spring section 15-16 is intended to be sufficiently soft so that while it will readily pass the ridge 4 and still provide ample frictional engagement with the surface portion 3 of the receptacle, to hold the closure tightly connected with the receptacle yet it does not exert a too great bursting strain against the material of the receptacle at any time, and this degree of softness is obtained both by the shape and manner of forming the leaf spring section itself and by the shape and proportions of the parts which constitute the junctions between the leaf spring section and the walls 11 and 14.

The outer annular wall 13 is carefully designed to perform several important functions. Par-

ticularly, in addition to completing the annular groove for the gasket H, it rests in engagement with the annular wall surface 8 of the receptacle so as to re-inforce said wall against the bursting strains imposed upon the glass by the spring section 15—16 of the closure. And it provides an outwardly flaring annular flange portion as 18 spaced above the surface 10 of the corner groove of the receptacle and co-operative with said surface 10 to enable the removal of the closure by a suitable tool, such as a knife blade or the like between said flange and said surface 10 to pry the closure upwardly. And its extreme annular edge portion is turned over upon itself to at once hide the raw edge of the metal and provide a "wire edge" as 19 upon the closure which greatly strengthens the wall 13 and the flange portion 18 in the performance of their offices and adds materially to the inherent stiffness and strength of the closure at all times. The "wire edge" 19 also completes a desirably smooth and attractive margin for the closure, and standing, as it does in use, at the upper annular corner of the receptacle, it provides a suitably resilient buffer edge at said corner of the receptacle to protect the corner of the receptacle against injury such as might result from accidental blows directed against said corner.

The wire edge is preferably disposed so that in use it stands within the corner groove 9, and inside of the plane of the outer annular edge of the surface 10 of said groove so that it will not be likely to be accidentally engaged by a foreign object which might tend to lift the wire edge upwardly away from the surface 10.

While the point of engagement between the inner surface of the wall 13 of the closure and the wall 8 of the receptacle may be sufficiently far down along the height of the wall 8 so that it will serve as a frictional means to hold the closure onto the receptacle, yet this point of engagement is preferably at a location sufficiently near to the upper surface 1 of the receptacle so that although the engagement will operate to suitably re-inforce the receptacle against bursting strains from the spring section 15—16 it will not operate as a frictional engagement to hold the closure onto the receptacle.

The frictional retention of the closure onto the receptacle is preferably accomplished wholly between the receptacle and the leaf spring section 15—16. This leaf spring section being relatively nearer to the center of the closure than the flange 18 of wall 13 it will be apparent that the radial portion of the closure between the leaf spring section and the flange 18 constitutes in effect a lever-like extension radially beyond the leaf spring section which will materially facilitate the ease with which the leaf spring section may be forced upwardly beyond the ridge 4 to disengage the closure by means of a tool operating beneath the flange 18.

The leaf spring section bulges outwardly as an annular wall into the channel which contains the gasket H at a point below the gasket and thus constitutes a means to prevent displacement of the gasket out of the channel.

A closure constructed as herein disclosed has all of its parts so co-related and balanced with respect to each other as to produce a highly efficient receptacle seal notwithstanding its simplicity and its attractive appearance. In order to obtain the best results the closure may be made of sheet metal considerably thinner than sheet metal ordinarily used for closures of correspond-

ing diametric size, and the operations employed in the manufacture are simple and of well known standard character. Hence the closure may be produced at very small cost.

In attaching the closure the guide surfaces 5 and 7 of the receptacle are engaged by the leaf spring section and by the wall 13 respectively. The leaf spring section first engages the guide surface 5 and so centers the closure with respect to the receptacle that as the leaf spring section is snapped down past the ridge 4 the wall 13 will be guided to and along the surface 7 into its final position with the wire edge outside of the wall 8 as a guard for the edge corner of the receptacle.

When force is applied beneath the flange or wire edge 18—19 to lift the closure from the receptacle said force is applied in such close proximity to the sealing gasket H that the first stage of upward movement of the closure will destroy the seal between the gasket and the receptacle, even though the amount of movement may at this time have been almost imperceptible at the point of frictional engagement between the receptacle and the leaf spring section 15—16. Hence the further force applied to lift the closure is exerted almost wholly in sliding the leaf spring section along the inner surface of the receptacle, and little or none of the continuing force is required to disconnect the gasket from the material of the receptacle.

The part of the closure which extends into the receptacle, although made of unusually thin and weak sheet metal, is yet of such relatively small diameter as compared with its depth into the receptacle that it will not be likely to become distorted during the removal of the closure from the receptacle, and hence it will be readily capable of being again inserted into the receptacle as many times as may be required during the reuse of the closure.

Also, the wire edge so strengthens the portion of the closure radially outside of that portion which extends into the receptacle, and is in such close proximity to the sealing gasket, that it will operate to prevent any material distortion of the outer portion of the closure during the removal of the closure.

The modified structure shown in the illustrations Figs. 3 and 4 proposes that if desired certain features may be incorporated into the closure. These features include, first, a means whereby any excess of air or gas pressure which may be present or which may be generated within the receptacle will operate to increase the frictional grip of the closure upon the receptacle so that instead of causing unintentional displacement of the closure it will only lock the closure more efficiently onto the receptacle, except that if a dangerous excess of air or gas pressure should be generated the effect thereof will, instead of causing an even tighter grip of the closure onto the receptacle, now cause the frictional grip to become weakened so that if sufficient pressure be finally generated the closure will become displaced, instead of said pressure causing the bursting of the receptacle. This means consists simply in making the central portion as 14 of the closure to bulge normally downwardly, as indicated in Fig. 2, and to be sufficiently resilient so that it may be flexed upwardly to or near the flat horizontal plane illustrated in Fig. 1 under any air or gas pressure which may ordinarily be generated within the receptacle.

It will be understood that straightening of

the wall 14 in this manner will increase its diameter, also that the straightening movement will urge the spring section 15—16 to bulge outwardly to an increased extent about a fulcrum in the region 16, Fig. 1, in both of which cases the spring section will be pressed more firmly against the receptacle to a degree dependent upon the nearness to which the wall 14 approaches a flat condition.

It will be understood also that if the air or gas pressure within the receptacle becomes sufficiently great to flex the wall 14 above a flat condition, that is to cause it to become flexed upwardly, then the consequent reduction in diameter of the wall 14 will tend to reduce the pressure of the spring section 15—16 against the receptacle in proportion as the air pressure and the consequent convexing of wall 14 increases. In this connection it is noted that the presence of the wall 11 and its connection with the upper annular edge portion of the leaf spring section 15—16 acts as an effective deterrent against radial outward flexing of the leaf spring section such as tends to be increased when the wall 14 becomes convexed upwardly.

Second, a means to prevent migration of the material of the sealing gasket H out of sealing position, and to insure a highly efficient seal of the closure. This means consists in so forming the material of the receptacle and that of the closure that the channel provided between them for containing the gasket will be reduced, cross sectionally, at the inner and outer radial edges of said channel, and of providing a small annular rib as 20 in the material of the wall portion 11 of the closure to project downwardly into the gasket channel so as to sink into the material of the gasket. In the drawing, Fig. 3, the wall portion 11 of the closure, instead of being flat as in Fig. 1, is shown as being slightly radially concaved on its under surface so that its opposite annular edge portions as at 21 and 22 stand relatively nearer to the opposing edge portions as 23 and 24 of the receptacle than does the central annular portion of said wall containing the rib 20. The drawing also suggests that if desired the upper annular edge surface of the receptacle may be radially concaved as at 25 so that its opposite annular edge portions as 23 and 24 project upwardly into a close proximity with the portions 21 and 22 of the wall 11, the upper annular edge surface of the receptacle and the under annular surface of the wall 11 being thus oppositely concaved and thereby defining an annular gasket receiving cavity between said surfaces of convexo-convex radial cross section.

When the closure is pressed onto the receptacle the bulk of the gasket material will be urged toward the annular center of the gasket channel and confined and compressed in the vicinity of the rib 20, instead of being urged to flatten out from between the walls 1 and 11 as is the case in the structure illustrated in Fig. 1.

Third, a means whereby to prevent distortion of the closure incident to the application of pressure downwardly thereagainst when the closure is being attached to a receptacle. This means consists in forming the portion of the closure which constitutes the junction between the walls 11 and 13 so that said portion is vertically corrugated as at 26 and thereby stiffened and made rigid against any tendency of said portion to become flattened out when the attaching pressure is exerted against the wall 11. The corrugations 26 merge into the wire edge and con-

stitute in effect an extension and enlargement of the stiffening effect of said wire edge right up to, and into the wall 11. The corrugations also provide a formidable arm or directly at the annular edge corner of the receptacle, co-operative with the wire edge to at all times save the annular edge of the receptacle from harm.

As many changes could be made in this construction without departing from the scope of the invention, as defined in the following claims, it is intended that all matter contained in the above description, or shown in the accompanying drawing, shall be interpreted as illustrative only and not in a limiting sense.

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

1. A receptacle closure comprising a single piece of sheet metal bent to provide a relatively flat horizontal annular top wall portion to overlie the upper annular edge of a receptacle, an outer annular wall portion depending from the outer margin of said top wall portion to extend downwardly outside the said receptacle, a dependent annular wall portion to extend relatively vertically downwardly into the receptacle from the inner annular edge of the top wall portion, and a central relatively horizontal wall portion adapted to stand within the mouth of the receptacle in continuation of the lower annular edge of said dependent wall said dependent wall serving to connect the central wall with the top wall, said dependent wall being bulged radially outwardly to dispose the annular mid-portion of its height radially furthest from the center of the closure for engaging against the inner surface of the receptacle, and said dependent wall being of a height and character rendering its said annular mid-portion resiliently yieldable radially of the closure in a manner to constitute said dependent wall as an annular spring section of the closure adapted by frictional engagement with the inner surface of the receptacle to yieldably hold the closure attached to the receptacle, said top wall being substantially unyieldable radially of the closure and by its connection with the spring section co-operating with the central wall to support and stiffen the spring section.

2. A receptacle closure comprising a single piece of sheet metal bent to provide a relatively horizontal, flat, annular top wall portion to overlie the upper annular edge of a receptacle, an outer annular wall portion depending from the outer margin of said top wall portion to extend downwardly outside the said receptacle, a dependent annular wall portion to extend relatively vertically downwardly into the receptacle from the inner annular edge of the top wall portion, and a central relatively horizontal wall portion adapted to stand within the mouth of the receptacle in continuation of the lower annular edge of said dependent wall said dependent wall serving to connect the central wall with the top wall, said dependent wall being bulged radially outwardly to dispose the annular mid-portion of its height radially furthest from the center of the closure for engaging against the inner surface of the receptacle, said dependent wall being of a height and character rendering its said annular mid-portion resiliently yieldable radially of the closure in a manner to constitute said dependent wall as an annular spring section of the closure adapted by frictional engagement with the inner surface of the receptacle to yieldably hold the closure attached to the receptacle, and said central

wall being flexible for movement by pressure from within the receptacle and its connection with said dependent wall being of a character to move radially outwardly the annular mid-portion of said dependent wall for thereby increasing the frictional grip of said mid-portion against the receptacle incident to movement of the central wall by pressure from within the receptacle.

3. A receptacle closure comprising a single piece of sheet metal bent to provide a relatively horizontal, flat, annular top wall portion to overlie the upper annular edge of a receptacle, an outer annular wall portion depending from the outer margin of said top wall portion to extend downwardly outside the said receptacle, a dependent annular wall portion to extend relatively vertically downwardly into the receptacle from the inner annular edge of the top wall portion, and a central relatively horizontal wall portion adapted to stand within the mouth of the receptacle in continuation of the lower annular edge of said dependent wall said dependent wall serving to connect the central wall with the top wall, said dependent wall being bulged radially outwardly to dispose the annular mid-portion of its height radially furthest from the center of the closure for engaging against the inner surface of the receptacle, said dependent wall being of a height and character rendering its said annular mid-portion resiliently yieldable radially of the closure in a manner to constitute said dependent wall as an annular spring section of the closure adapted by frictional engagement with the inner surface of the receptacle to yieldably hold the closure attached to the receptacle, and said central wall being flexible for movement by pressure from within the receptacle and its shape and manner of connection with said dependent wall being of a character to first move radially outwardly and then inwardly the annular mid-portion of said dependent wall for thereby first increasing and then reducing the frictional grip of said mid-portion against the receptacle as movement of said central wall by pressure from within the receptacle progresses.

4. A receptacle closure comprising a single piece of sheet metal bent to provide a relatively horizontal, flat, annular top wall portion to overlie the upper annular edge of a receptacle, an outer annular wall portion depending from the outer margin of said top wall portion to extend downwardly outside the said receptacle, a dependent annular wall portion to extend relatively vertically downwardly into the receptacle from the inner annular edge of the top wall portion, and a central relatively horizontal wall portion adapted to stand within the mouth of the receptacle in continuation of the lower annular edge of said dependent wall said dependent wall serving to connect the central wall with the top wall, said dependent wall being bulged radially outwardly to dispose the annular mid-portion of its height

radially furthest from the center of the closure for engaging against the inner surface of the receptacle, said dependent wall being of a height and character rendering its said annular mid-portion resiliently yieldable radially of the closure in a manner to constitute said dependent wall as an annular spring section of the closure adapted by frictional engagement with the inner surface of the receptacle to yieldably hold the closure attached to the receptacle, and said central wall being normally convexed downwardly from its juncture with the dependent wall but being resiliently flexible upwardly by pressure from within the closure and its connection with said dependent wall being of a character to flex radially outwardly the annular mid-portion of said dependent wall for thereby increasing the frictional grip of said mid-portion against the receptacle incident to upward flexing of said central wall.

5. A receptacle closure comprising a single piece of sheet metal having its central portion pressed out of the plane of its marginal portion thereby providing a stretched portion of the material of said sheet as a connecting wall between the outer edge of the central portion and the inner edge of the marginal portion, the marginal portion being flat and extending laterally outwardly from said wall as a reinforcing flange thereon, and said wall being bulged between said central and marginal portions as a spring section for resilient frictional engagement with a receptacle wall to yieldingly retain the closure upon the receptacle and said closure having a depending wall at the outer margin of said marginal portion, said depending wall being adapted to engage the outside of the receptacle.

6. A receptacle closure comprising a single piece of sheet metal bent to provide a relatively horizontal annular top wall portion to overlie the upper annular edge of a receptacle, an outer annular wall portion depending from the outer margin of said top wall portion to extend downwardly outside the said receptacle, a dependent annular wall portion to extend relatively vertically downwardly into the receptacle from the inner annular edge of the top wall portion, and a central relatively horizontal wall portion adapted to stand within the mouth of the receptacle, the top wall being flat and extending laterally outwardly as a re-inforcing flange at the upper annular edge of the dependent wall, a gasket beneath said flange surrounding said dependent wall, and said dependent wall being bulged radially outwardly beneath said gasket in engagement therewith so as to retain said gasket and being resilient so as to constitute an annular spring section for resilient frictional engagement against the inner surface of the receptacle wall to yieldingly retain the closure upon the receptacle.

AUGUSTUS L. MEROLLE.