

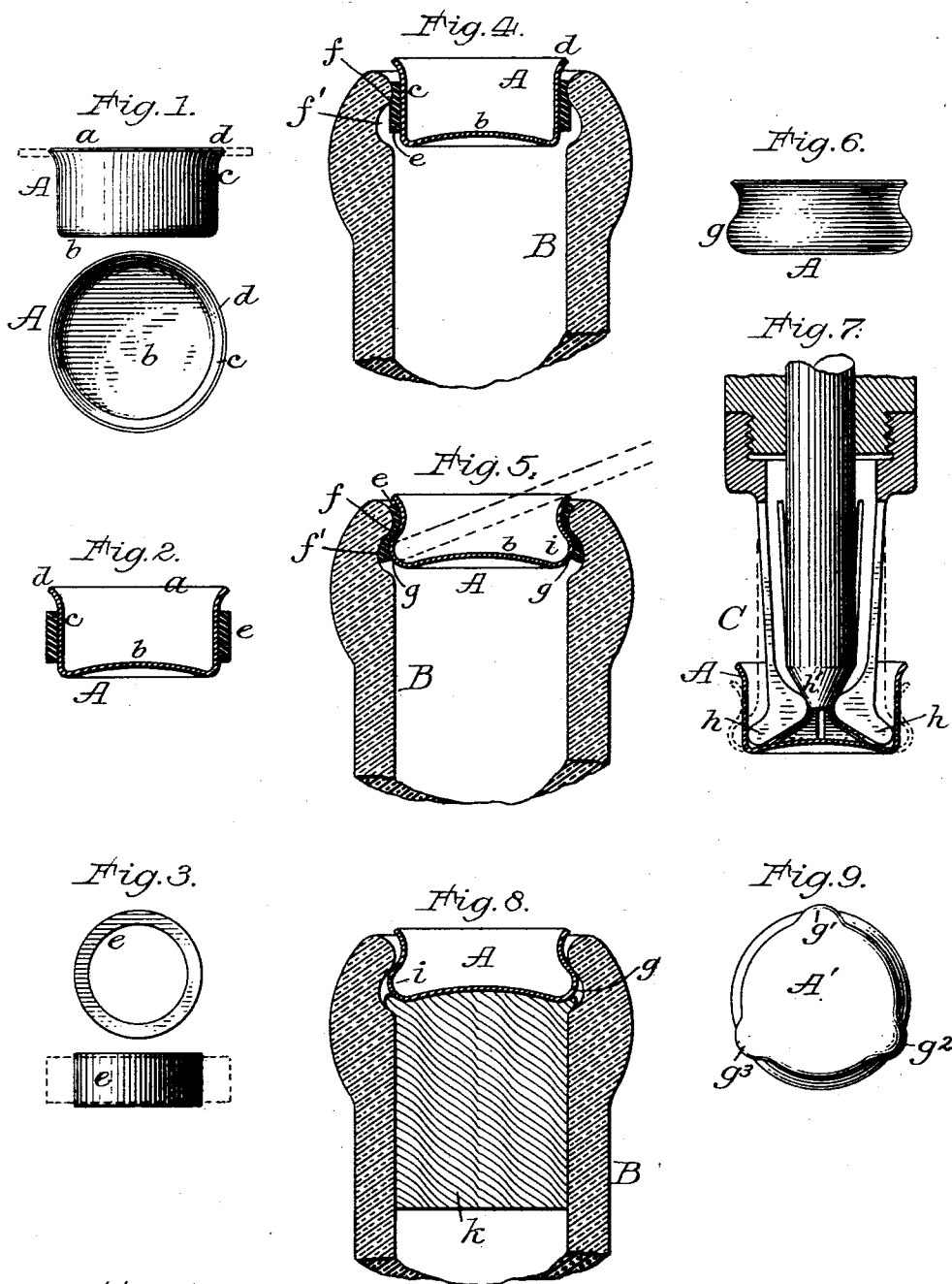
(No Model.)

2 Sheets—Sheet 1.

R. A. HALL.
BOTTLE SEALING DEVICE.

No. 541,203.

Patented June 18, 1895.



Attest:
Howell Garth
N. B. Deal

Inventor:
Robert Allison Hall.
By *Wm. C. Hall*
Attorney.

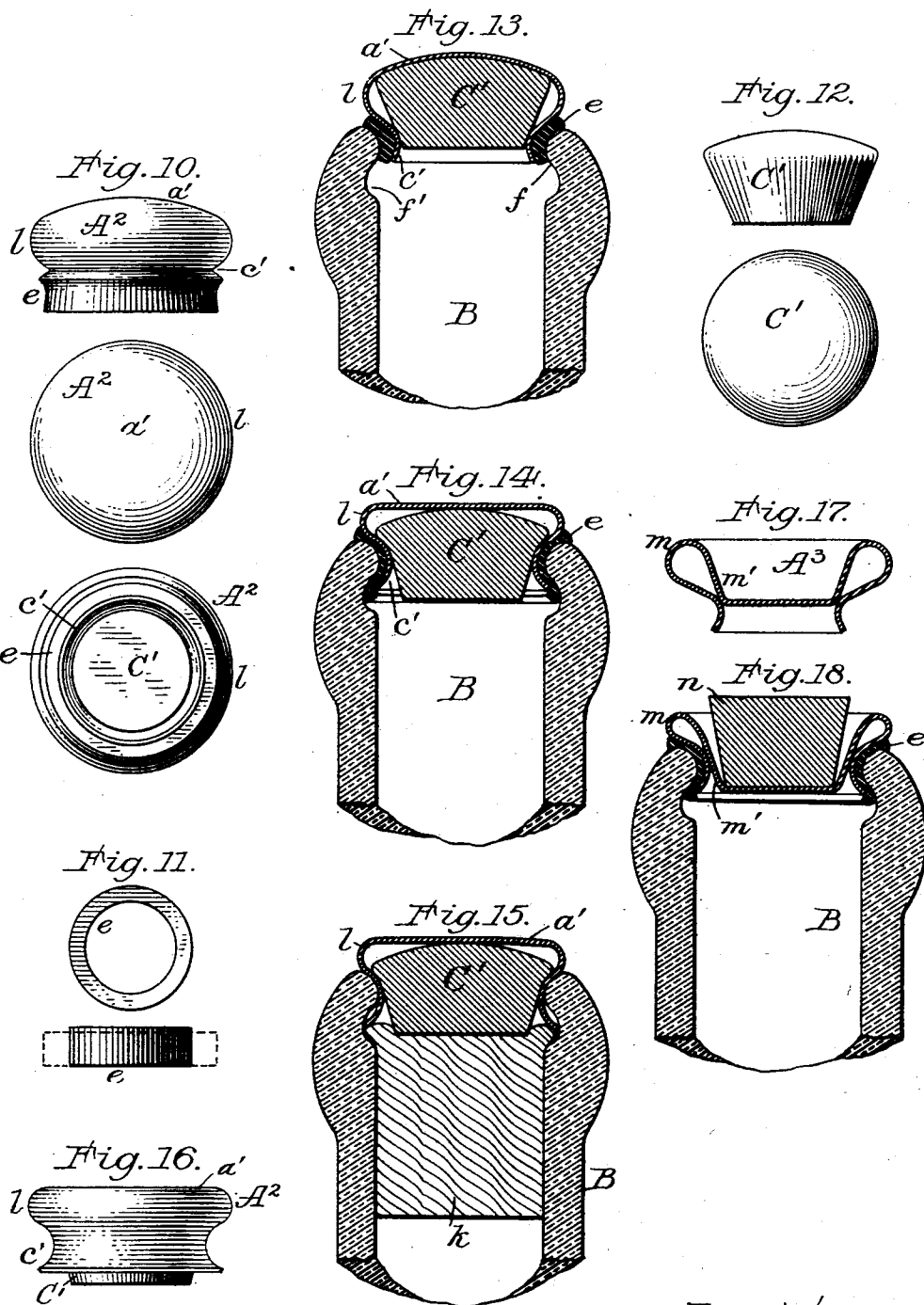
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2 Sheets—Sheet 2.

R. A. HALL.
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Attest:
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Inventor:
Robert Allison Hall.
By *Wm. C. Munn*
Attorney.

UNITED STATES PATENT OFFICE.

ROBERT ALLISON HALL, OF BALTIMORE, MARYLAND.

BOTTLE-SEALING DEVICE.

SPECIFICATION forming part of Letters Patent No. 541,203, dated June 18, 1895.

Application filed February 28, 1894. Serial No. 501,803. (No model.)

To all whom it may concern:

Be it known that I, ROBERT ALLISON HALL, of the city of Baltimore, in the State of Maryland, have invented certain new and useful
5 Improvements in Bottle-Sealing Devices; and I do hereby declare that the following specification, taken in connection with the drawings furnished and forming a part of the same, is a clear, true, and complete description
10 of my invention.

My said improvements pertain to that general class of "single use" bottle sealing devices, which are applied within the throats of bottles, as distinguished from those of the cap
15 type, which are applied upon, and outside of, bottle heads. Sealing devices adapted to, and intended for only a single use thereof, must of necessity be quite inexpensive, and they have been heretofore devised, and used in
20 various forms, and they have either embodied, or have been employed with, such elastic or resilient material, as is capable of affording sealing contact with the interior or throat surfaces of bottles. In some cases, these inside
25 or throat sealing devices have been wholly composed of such material as rubber, or cork, and with or without connected detaching or extracting appliances, while in other cases, they have embodied metal, wood, or other
30 solid material, and a sealing medium, such as rubber.

My said improvement involves the use with a suitable sealing medium and a suitable bottle, of a hollow plug, which is composed of
35 metal, and is expanded within the throat of the bottle into retaining engagement therewith, and which when so applied affords an accessible shoulder for engagement by a suitable bottle opener, the metallic plugs being
40 sufficiently strong and rigid to not only enable them to successfully resist displacement of the sealing medium under gaseous pressures, but also to enable their shoulders to bear the strain necessary for the removal of
45 the plugs when engaged by a bottle opener.

I am aware that a method of closing glass jars has been heretofore devised and patented, which involved the expansion of an inverted capsule of thin soft metal within
50 the annularly corrugated mouth or throat of a jar, with a view to securing an air tight closure. Aside from the employment of the

broad principle of expanding metal within the throat of a glass vessel, my system of bottle sealing is radically unlike said prior method, 55 in many essential features, among which are the following:

My hollow metal plugs are composed of strong metal, and hence are capable of performing their retaining duty; whereas the
60 said prior inverted metal capsule, was only the packing medium or gasket, between the glass and a solid or rigid plaster filling.

My metal plugs essentially co-operate with some sort of a separate sealing medium, 65 whereas in said prior method, the inverted capsule was relied upon as the sole sealing medium.

My metal plugs co-operate with a bottle having in its throat a mere shoulder, whereas by
70 said prior method, the inverted capsules co-operate with a throat essentially so corrugated, as to afford an extensive area or contact surface, against which the metal of the inverted capsule could be forced, with a view
75 to forming an air tight joint.

My metal plugs, in their best form, when applied to a bottle, are internally accessible, and the expanded portions thereof afford a
80 shoulder with which a bottle opener may engage, whereas the inverted capsule of said prior method, was filled with a rigid plaster filling and hence was not internally accessible.

My metallic plugs are specially adapted to ordinary bottling purposes, because of the
85 ease with which they may be properly removed in opening bottles, whereas the stoppers of said prior method, were of necessity, excavated in fragments, and also because the complex operations involved in building up said
90 stoppers, would practically preclude their use for ordinary bottling purposes.

My metallic plugs are in themselves complete, and are adapted to co-operate with sealing media of various forms, whether for simply confining the sealing medium to its seat, 95 or for that duty coupled with compressing the sealing medium between the plug and its seat; whereas undersaid prior method, the inverted capsule in itself constituted the sealing medium, and it was confined in its seat solely by a rigid plaster filling, and in itself it could perform no retaining duty. 100

I am also aware that circular openings in

the tops of tin cans have been heretofore closed by expanded leaden or other soft metal plugs provided with flanges, between which and the outer or top surface of the cans, adhesive sealing matter has been applied.

In the practical application of my invention, or, in other words, in securing an effective combination of hollow ductile metallic plugs with suitable bottles, the enlargement of the plug, at a portion of its periphery, may be variously accomplished, without departure from my invention. The expanding, or peripherally enlarging operation, necessarily involves pressure properly applied within the plug, and with one of my plugs, this operation is effected by means of a wedge acting expander, which constitutes no part of the sealing device, but is in fact, a tool for expanding many plugs. With another form of my plug, the expander is within, and is an inseparable portion of the sealing device; while with still another form, a metal portion of the plug itself, is made to do duty as an expander. Otherwise stated, in applying one form of plug, the expander is removed after doing its duty; in another form, the expander remains in the plug, but its mechanical function ends with its single performance of expanding duty; while with still another form, the expander is an integral portion of the hollow metallic plug. These expanders, therefore, may be widely varied in form, construction, and mode of operation, without in any manner affecting the main features of my invention, it being only necessary that proper means be provided and employed, for stretching, attenuating or enlarging a peripheral portion of the hollow ductile metallic plug, within the throat of bottle, and to thereby secure the desired degree of locking union with the bottle, in each case.

For securing the prime objects of my invention, the hollow metallic plug, however it may be varied in form, is provided with a peripheral packing ring, or gasket, but it is immaterial to what extent the plug may be covered or inclosed by said gasket, provided that sufficient packing is interposed between the portion of the plug which is to be, and is expanded, and that interior annular surface of the bottle throat, at which the locking, or securing and sealing contact, is to be specially assured.

As a rule, single use throat sealing devices as heretofore devised, have required the use of bottles having a comparatively small area of opening, but with my hollow expansible metallic plugs and peripheral gaskets, reliable results can be secured regardless of the size of the opening, it being immaterial whether the gasket be first seated in the throat of the bottle and then compressed by expanding the plug, or first mounted under tension, upon the plug.

To more particularly describe my invention, I will refer to the accompanying drawings, of which—

Figure 1 illustrates in side and top view the simplest form of hollow ductile metallic plug as employed by me in accordance with my invention. Fig. 2 illustrates the same in section, with an annular gasket thereon. Fig. 3, in top and side views, illustrates the annular gasket in its normal condition before being applied to the metal plug. Fig. 4 illustrates in section a suitable bottle-head and a combined metallic plug and gasket within the throat of the bottle and in position to be locked or secured therein. Fig. 5, in a similar sectional view, illustrates the bottle, the metallic plug, and the gasket as when properly united for service. Fig. 6, in side view, illustrates the metallic plug in the form it has been made to assume within the throat of a bottle. Fig. 7 illustrates in section one form of expander employed for expanding the metallic plug within the throat of a bottle, as shown in Fig. 5. Fig. 8 illustrates the metal plug as when employed without a gasket and as a mere holder for a cork previously inserted into a bottle, the latter, the plug, and the cork being shown in section. Fig. 9, in bottom view, illustrates the metal plug after appropriate portions of its periphery have been expanded for enabling it to perform simple cork-holding duty. Fig. 10, in top, side, and bottom views, illustrates another form of hollow metallic plug containing an expander. Fig. 11, in top and side views, illustrates the annular gasket detached from the plug, Fig. 10. Fig. 12, in side and top views, illustrates the expander employed within the metal plug, Fig. 10. Fig. 13, in a sectional view, illustrates a bottle-head and the metallic plug, Fig. 10, with its gasket in position to be forced into the throat of a bottle to be secured therein. Fig. 14, in a sectional view, illustrates a bottle-head and this same form of metallic plug and gasket properly united for sealing duty. Fig. 15, in a sectional view, illustrates a bottle-head with the same metallic plug without a gasket and employed as a mere cork-holder. Fig. 16, in side view, illustrates the metallic plug in the form it has been made to assume during the setting operation within the throat of a bottle. Fig. 17, in sectional view, illustrates still another form of my hollow metallic plug, an integral portion of which is relied upon for duty as an expander when forced inwardly. Fig. 18, in sectional view, illustrates the metallic plug, Fig. 17, with a gasket and applied to a bottle for sealing duty.

As hereinbefore indicated, the main features of my invention, have been variously embodied, but in each instance, the hollow ductile metallic plug is cup shaped, and in applying one form of plug to a bottle, it is inserted with its open end downward. Another form of the plug, is inserted with an open end downward, but it has also an open upper end, and a third form, is inserted with its open end upward, and is internally accessible to the entrance and removal of an expander, as

will be first described, in connection with Figs. 1 to 9, inclusive.

The plug A, is composed of strong but ductile sheet metal, and in its initial form, as illustrated in two views, in Fig. 1, it is open at its top *a*, and closed at its bottom *b*, the latter being usually slightly dished, although it may be flat without in any manner affecting its practical value. The plug is practically cylindrical, although its sides *c*, may be more or less tapered, provided, the bottom *b*, has a diameter, appropriately conforming with the diameter of the throat of the bottle to which it is to be applied. The top edge or rim *d*, of the plug, may be substantially plain, but as a rule, it is slightly flared as shown, and when desired, it may be provided with a strong, well defined flange, as indicated in dotted lines, in Fig. 1. In its initial form, this plug involves no material novelty, similarly shaped metallic plugs, having heretofore been employed in connection with short corks, and secured within bottles, by wire or twine, applied in the usual manner, the object being to economize in corks, and the function of the plug, being, to take up the space, between the top of a well inserted short cork, and the wiring.

When the plug A, is composed of a ductile and readily expansible metal, and is provided on its periphery, with an annular packing gasket *e*, the resulting combination is believed to be novel, and especially so, when said combination is adapted to be, and is employed with a bottle affording appropriate sealing contact surfaces within its throat in such a manner, that no tying or wiring is needed, and no cork stopper is required.

In its best form, the gasket *e*, is composed of good rubber, normally quite thin, and smaller in diameter than the outside diameter of the plug A, so that when the two are combined, the gasket will be slightly distended, and readily retained on the plug. This gasket may be widely varied in its character, it being only essential to secure good packing contact between the plug and the bottle, after the plug has been peripherally expanded, although the packing material should be such, as will not impart objectionable taste or odor to the contents of bottles. Such a hollow metallic plug, with its gasket, inserted into the throat of an ordinary bottle, affording a good sealing contact surface within its throat and with its plug then enlarged peripherally, so as to tightly and evenly compress the gasket, will secure a reliable sealing effect, quite equal to that afforded by the use of good corks in the ordinary way, and even should wiring be needed therewith, in some cases, substantial economy would be involved in the use of the plugs, as compared with the use of corks, capable of performing equally satisfactory duty. For securing the best results however, the bottles should be specially constructed for enabling the plugs to co-operate therewith in the best possible manner, and

hence the bottle B, within its throat a short distance below its top or lip, is provided with an annular shoulder *f*, which may be widely varied as to its form, without materially affecting the results, so long as a suitable abutment is thereby afforded, with which the sealing device may be made to securely engage. An annular space below said shoulder, is also provided, as at *f'*, into which a portion of the sealing device is laterally extended, this space, and said shoulder, being here afforded, by an annular groove in the throat of the bottle, but it will be obvious, that the abutment, and said space, would both be afforded by an annular projection, as the converse of the groove.

It is well known, that bottles which are intentionally of one size, frequently vary in area of throat openings, as well as in the contour thereof, and hence the plug and gasket should be so proportioned, that they may be freely inserted into the bottle, as shown in Fig. 4, so that the gasket *e*, will be coincident with the annular shoulder *f*, the width of the gasket, being sufficient to afford good sealing contact with the bottle, at and adjacent to said shoulder, as clearly indicated.

With the plug and its gasket in proper position, within the throat of the bottle B, as shown in Fig. 4, a portion of the metal in the plug is peripherally stretched, attenuated, or expanded, adjacent to the gasket, as clearly indicated at *g*, Fig. 5, thus not only tightly compressing the gasket between the plug and the adjacent glass surface, but also securely locking both the gasket and plug against displacement under any pressures practically encountered in bottling. It is obviously immaterial in what manner the plug may have been so expanded, although the active portions of one form of expander, are shown in a sectional view, at C, Fig. 7. Said expander comprises a set of vibratory pendent arms, provided with properly shaped lower ends *h*, annularly arranged with reference to a reciprocatory wedge *h'*, which by being forced downwardly, will force the working portions *h*, outwardly, and thereby peripherally stretch and expand the metal plug. During this working of the metal by the expander, the plug may either be held by its flange upon the lip of the bottle, or supported wholly by the expander, and in the latter case, if the expansion is to be extensive, it is generally advisable to apply light pressure to the rim or top edge of the plug.

When properly applied to a bottle, the metal plug is structurally quite unlike what it was originally, as will be readily seen on comparing Fig. 1, with Fig. 6, this latter, in side view, illustrating one of the metal plugs A, which has been properly applied to a bottle, and the latter then broken away, (and the gasket removed,) so as to leave the metal plug intact. It will now be observed, that there is, and need be, no actual contact of the peripherally stretched portion of the metallic plug with

the adjacent surfaces of the bottle, so long as the gasket has been tightly clamped into sealing contact with both the expanded portion of the plug, and the coincident surface of the bottle. In practice, the gasket will be sometimes reduced to a thin film, by the compression, but it is not liable to be ruptured, because the stretching or attenuation of the metal involves no cutting, stripping, or abrasive action with relation to the gasket.

In Fig. 5, the metal plug is shown to have been enlarged to a diameter a little greater than the diameter of the bottle throat, above the shoulder *f*, and, although a greater degree of expansion will sometimes be warranted, good retaining effects, suitable for low pressures, will be secured, with the expanded plug no larger than the smallest diameter of the throat, because of the wedging action of the heavily compressed gasket.

It will be obvious, that so far as properly locating the metal plug within a bottle is concerned, it will be quite immaterial, whether said location be gaged by the contact of a flange on the plug with the lip of the bottle, or by contact of the inner end of the plug, (or the edge of the gasket,) with the lower side of a groove in the throat of the bottle, or by holding the plug suspended upon an expander which is gaged as to its working position, by the lip of the bottle.

It will be seen that the enlargement of the metal plug at *g*, affords within the plug, an accessible annular groove *i*, and that the upper side of said groove, affords a suitable shoulder with which the tip of an ice pick, or a screw driver, or any suitable bottle opening device may engage, after the manner of a lever, for wrenching the plug from the bottle, as illustrated in dotted lines in Fig. 5. The presence of the gasket at the expanded portion of the metallic plug which affords the accessible shoulder, enables a bottle opener to so indent the metal as to assure a reliable engagement therewith.

If the rim of the plug be provided with a flange, as hereinbefore indicated, and as shown in dotted lines, in Fig. 1, said flange (the plug being composed of strong metal) may be relied upon for engagement by a forked bottle opener, capable of operating as a lever, for tilting and wrenching the plug from its sealing position.

As hereinbefore indicated, the combination with a bottle, of a suitable sealing medium, and a hollow metallic plug expanded within the throat of the bottle, as described, constitutes a feature of my invention, regardless of the particular character or arrangement of the resilient matter which affords the sealing effect or tight closure; as for instance, when the plug is employed as shown in Fig. 8, wherein the bottle B, is as before described, as well as the plug A, except that the latter is here expanded to a slightly greater degree, and made to slightly engage with the shoulder *f*, and thereby enabled to secure an ordinary

short cork *k*, in its proper position, the cork in this instance, being in sealing contact with the coincident sealing contact surface, within the throat of the bottle. The expansion of the plug when so used, should be just enough to secure a delicate abutment against the shoulder *f*, and said abutment being annular, will enable the plug to successfully resist displacement under heavy pressure operating in a right line, and at the same time, admit of its being readily displaced under a tilting strain, as when an opener is applied thereto. When the plugs are solely intended for such cork holding or retaining duty, it will often be desirable to peripherally expand the plug at say two or more different points, as illustrated in the plug A', Fig. 9, at *g'*, *g''* and *g'''*, all of which, when in abutting engagement with a shoulder *f*, will afford ample cork retaining capacity, and the plug will be more readily detachable than when fully expanded.

It will be obvious, that the peripheral enlargement of a hollow metallic plug operating as a controller of the sealing medium within the throat of a bottle, involves the application of a principle, which is not restricted to the use of an expander, which after performing its duty is removed from the plug, inasmuch as the relations of the plug, the gasket or other sealing medium and the bottle, are in no manner affected by the removal of the expander, and hence the same principle is involved, when, as in one form of my metal plug, the expander, after performing its duty, remains within the plug, as illustrated in Figs. 10 to 16, inclusive. This plug A², is composed of strong ductile metal, as already described, and it is hollow, and cup shaped, but its open end is inserted within the bottle throat, and its closed end, is provided with an enlargement or flange *l*, which affords a shoulder, with which a bottle opener may reliably engage. The top *a'*, of the plug, is normally arched, as shown in Figs. 10 and 13. The barrel (or sides) *c'*, of the plug, like the corresponding portion of the plug A, is provided with a gasket *e*, but the seat for the gasket, is concave, the diametrical dimensions of this portion of the plug and the gasket, enabling it to freely enter the throat of the bottle, and then it requires only, that it be expanded peripherally adjacent to the gasket, for causing it to operate in like manner as already described. Within the metal plug, there is an expander C', which is inclosed therein during the formation of the plug. This expander may be composed of wood, or any other material which will enable it to act as a cylindrical wedge, capable of stretching the metal, and expanding the plug adjacent to the gasket. The top of this expander, is normally closely adjacent to, or in contact with, the inner surface of the arched top *a'*, while its lower end, is in contact with, or closely embraced by the metal plug, at or slightly above the portion thereof which is to be first expanded. As a rule, an expander for this par-

ticular form of plug, should have inclined sides, as shown, but it will be obvious, that a straight sided expander, sufficiently larger in diameter, than the smallest internal diameter of the plug, will act in like manner as an expanding wedge, when forced inwardly as described. When this plug A^2 , is so inserted that it bears at its flange l , upon the lip of a bottle B , the latter being as already described, pressure is applied to the arched top of the cap, sufficiently to flatten, or centrally depress it, as shown in Fig. 14, thus forcing the expander C' downwardly, and causing the metal plug adjacent to the gasket to be peripherally expanded to such an extent, that the co-operative relations of the metal plug, the gasket, and the bottle, are established in like manner, as with the plug A , before the expander C , has been removed. The edge of the metal plug A^2 , not being reinforced, (as it is in the plug A by the portion of metal at the closed end,) is, with some kinds of metal, liable to slightly split, but this does not materially affect the throat sealing operation of the device, and said liability, can, if desired, be wholly obviated, by initially corrugating said edge to a slight degree. The change in the form of the metal plug A^2 , due to the expanding or setting operation, will be fairly indicated by comparing the plug, Fig. 10, with the expanded plug, Fig. 16, said change being quite as radical, as with the plug A , as shown in Figs. 1 and 6.

It will be readily seen, that the presence of the expander C' , after it has performed its duty, is quite immaterial, as it has no further mechanical function; and that it does not operate obstructively during the extraction of the plug, by strain applied to the flange, because the tilting of the plug, causes a portion of the metal which has been expanded, to readily retire, at the initially lifted side. This cylindrical expander snugly occupying the plug, will, however, serve to prevent liquid from entering the plug, and restrict metallic exposure to the bottled liquid to that small portion of the plug which extends below the expander and gasket.

Having thus described a hollow metal plug containing no means for expanding it, and another containing an inclosed expander, I will next describe another form of my plugs, wherein a portion of the plug itself, may be made to perform duty as an expander, as illustrated in Figs. 17 and 18. This plug A^3 , has an exterior contour at its sides, which quite closely conforms to that of the plug A^2 , and it is provided with a similar gasket e . Instead however, of having an arched top, this plug is deeply recessed, or introverted at the top, thus forming an interior portion, which is as readily accessible, externally, as the corresponding portion of the plug A . The flange or top edge of this plug A^3 , is initially quite fully rounded, as at m , thus affording ample metal for permitting the introverted portion, m' , to be still further forced inwardly, for

causing it to operate as an expander for that portion of the plug, which is encircled by the gasket.

It will be readily seen, that this plug A^3 , may have its introverted portion m' , forced inwardly by means of direct pressure, as by way of a cylindrical block n , Fig. 18, after which said block can either remain, or be removed. So also can this plug be expanded, by means of the tool expander C , Fig. 7, operating not only to afford direct pressure, but also with the lateral expanding pressure, as when setting the plug A , it being obvious, that in either case, the gasket e , will be expanded, and tightly compressed between the expanded portion of the plug, and the adjacent surface of the glass. This plug A^3 , is readily detachable by means of any lever acting opener, applied to the flange, and when the plug is set by a tool expander C , an internal shoulder will be afforded, for engagement with an opening device, as with the plug A .

It will be seen that in each instance, the hollow plugs have an accessible shoulder for engagement by a bottle opener, and that they can be removed substantially intact, whether said plug has a flange or projection which overlies the lip of the bottle, or the interior shoulder which is afforded by the enlargement of the periphery of the plug, as in the best embodiment of my invention.

Although each of these several forms of my metal plug, involves in the effective combination with gaskets and bottles, a peripheral enlargement of the plug within the bottle, and a corresponding enlargement and annular compression of the gasket, it will be obvious that the simplest form first described, should be relied upon for securing the greatest degree of economy, as well as the very best sealing effects.

The metal of which the plugs are composed, need only be sufficiently thin and ductile, to admit of its being readily attenuated or stretched to the desired degree for securing requisite expansion in each case, and of sufficient strength to thereafter enable the plug to reliably perform its proper locking or holding duty, while admitting of reasonable freedom in extracting the plug, and therefore I do not restrict myself to the use of any particular metal, but it is to be understood that well selected tin plate, will ordinarily serve my purposes, and that its use will afford that degree of economy, which is usually desirable in the production of single use bottle sealing devices.

The contact of bottled liquids, with certain metals, especially iron, and those alloys which are frequently used in the production of so called tin plate, should as a rule, be avoided; and hence I coat the internally exposed portions of the metal plugs, with any suitable tasteless and odorless matter, such as paraffine, or shellac, for avoiding corrosive action and preventing impairment of the liquids. I have produced plugs composed of aluminum, and of course they do not require any special

coating, as a rule, and the same would be true of plugs composed of other metal, electroplated with silver.

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

1. The combination substantially as hereinbefore described, of a suitable bottle having a throat affording a sealing contact surface, a hollow ductile metallic plug having a portion of its periphery expanded within the throat of the bottle, and having an accessible shoulder for engagement by a bottle opener, and a sealing medium, which is in contact with said sealing contact surface and is securely maintained in its sealing position by said plug.

2. The combination substantially as hereinbefore described of a suitable bottle, a hollow ductile metallic plug which has a portion of its periphery expanded within the throat of the bottle and has an accessible shoulder for engagement by a bottle opener, and a gasket which is interposed between the metallic plug and the bottle, and is compressed and maintained in its sealing position by said plug.

3. A bottle sealing device embodying in combination, a hollow plug composed of strong

but ductile metal, and an annular gasket mounted peripherally on the plug, substantially as described, the whole being adapted to freely enter the throat of a suitable bottle, and to be secured therein with sealing function, by peripherally expanding the portion of the plug which is adjacent to the sealing gasket, and the latter enabling the metal to be indented and strongly engaged by a bottle opener.

4. The combination substantially as hereinbefore described, of a bottle having in its throat an annular shoulder, an annular packing or gasket, and a hollow ductile metallic plug, peripherally expanded as described adjacent to said gasket and shoulder, and thereby not only compressing the gasket into sealing contact between the plug and bottle, but also securing the plug and gasket against displacement under internal pressure, and also affording within the plug an accessible shoulder for engagement by a bottle opener.

ROBERT ALLISON HALL.

Witnesses:

ALBERT A. CARPER,
CHARLES H. MILES.