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PATENTED SEPT. 4, 1906.

W. A. LORENZ.
HERMETIC CLOSURE FOR TUMBLERS.
APPLICATION FILED DEC. 18, 1905.

Fig. 1

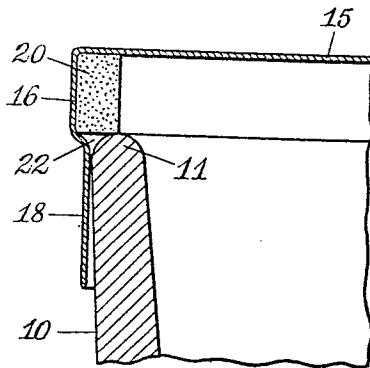


Fig. 2

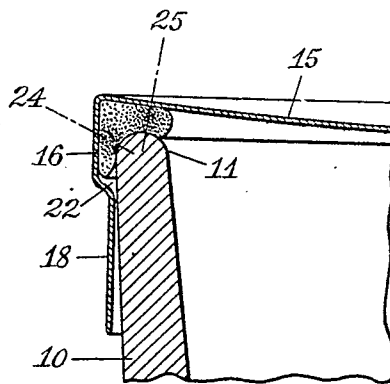


Fig. 4

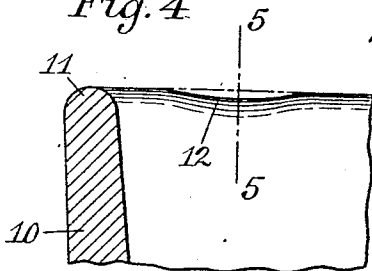


Fig. 5

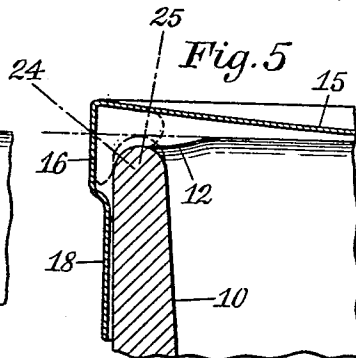


Fig. 6

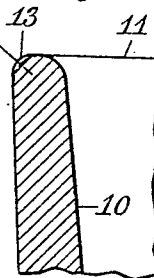
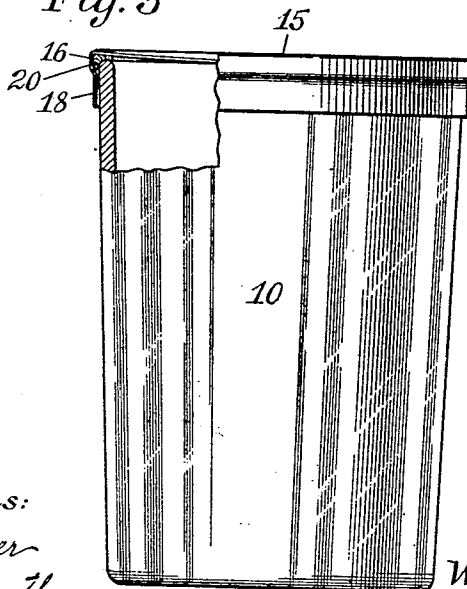


Fig. 3



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UNITED STATES PATENT OFFICE.

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HERMETIC CLOSURE FOR TUMBLERS.

No. 829,979.

Specification of Letters Patent.

Patented Sept. 4, 1906.

Application filed December 18, 1905. Serial No. 292,219.

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, and a resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Hermetic Closures for Tumblers, of which the following is a full, clear, and exact specification.

This invention relates to improved means for hermetically closing the tops of tumblers, mugs, and similar plain-rimmed receptacles, and is especially adapted for sealing by well-known vacuum processes.

Figure 1 of the drawings is a sectional view, in enlarged scale, of the left-hand upper side of a tumbler, showing my improved closure resting thereon in uncompressed or unsealed condition. Fig. 2 is a view similar to that of Fig. 1, but showing the closure in its compressed or sealed condition. Fig. 3 is a side view, in smaller scale, showing a sealed tumbler, the left-hand upper portion being broken away to show the closure-joint in section. Figs. 4, 5, and 6 are fragmentary views, in enlarged scale, illustrating the adaptability of this improved closure to the sealing of tumblers which are more or less irregular in the contour of their rims, this being a fault to which tumblers are liable in commercial manufacture. Fig. 4 represents a tumbler having a depression in its rim. Fig. 5 is a view in section, taken on the line 5 5 of Fig. 4, showing how my improved closure conforms to the depression. Fig. 6 is a similar view showing a tumbler-rim which is unsymmetrical or irregular in cross-section, the contour of the outer side being fuller than the contour of the inner side.

In the hermetic sealing of tumblers and similar round-rimmed receptacles considerable difficulty has been experienced in providing a closure which will seat and centralize itself correctly upon the tumbler-rim and at the same time produce an effective and permanent closure when sealed by vacuum processes. This difficulty is due to several causes. Even when the rim is circular and level and uniform in cross-section at all portions of the rim the closure when pressed down is liable to slide down on one side or the other of the rounded rim, and the difficulty of securing a uniform and continuous zone of pressure around the tumbler-rim is increased by imperfections to which these tumblers are

liable in the commercial manufacture. The melting heat to which the tumbler-rims are subjected in the fire-finishing operation is liable to be applied more or longer at one place than at another, resulting in a lack of symmetry in the round of the rim and sometimes results in melting down one portion of the rim considerably lower than other portions, as illustrated in Figs. 4 and 5. Even when the rims are uniformly fire-finished the circle of the tumbler-rim is liable to be flattened or otherwise distorted, making the mouth-opening more or less oval or elliptical instead of circular. To overcome these difficulties is the object of the present invention. This is accomplished by employing a closure which comprises a cap having a flexible rim; the lower portion of which engages with the tumbler below the rim to centralize the closure with the rim, while the upper portion of the flange is considerably larger than the tumbler-rim, thus providing an annular pocket around the outer side of the tumbler-rim, which as the gasket is pressed down in the sealing operation opens an annular space around the rim wide enough to receive a substantial thickness of the lower edge of the gasket. This enlarged annular pocket extends a substantial distance above the level of the tumbler-rim far enough so that when the closure is in its compressed or sealed condition there is still considerable space above and on the outer side of the tumbler-rim. The downward movement of the cap during the sealing operation reduces the cross-sectional area of the gasket-space much more rapidly than that space is increased by the continued opening annular space around the lateral side of the rim. Hence the gasket is compressed by a sort of differential action which exerts a powerful degree of pressure upon the gasket, while at the same time the downwardly-extending space at the lateral side of the rim allows the lower portion of the gasket to be forced with safety and certainty down on the outer side of the rim. Thus one portion of the gasket is compressed against an outer zone of the tumbler-rim while another portion of the gasket is compressed upon the top of the tumbler-rim or slightly upon the inner side thereof by the top wall of the cap. Thus in addition to providing a substantial thickness or cushion of gasket disposed and distributed so as to fill up the

inequalities of the rim this closure has the further advantage of providing a secondary circle of seal which is formed inside of and subsequent to the first seal.

5 The tumbler 10 is of the ordinary well-known form, having a rounded rim 11, the rims of such receptacles being generally rounded for appearance, and to avoid corners and burs which may cut the hands or lips of the users.

10 The cap 15 is made of sheet metal or other flexible material and is provided with a gasket-receiving portion 16, which is of a diameter substantially larger than the outside of the tumbler-rim 11, thus providing a space 15 which, as the gasket is pushed down in the sealing operation, provides an annular pocket on the outside of the rim, as shown in Fig. 2. The enlarged portion of the cap extends a 20 substantial distance above the level of the rim far enough to leave a substantial space above and outside of the rim when the closure is in its sealed condition, as shown in Figs. 2 and 5. The lower portion 18 of the 25 flange is turned inwardly beneath the gasket to engage with the receptacle and center the closure therewith, the flexibility of the metal enabling the flange to adapt itself approximately to the oval or other distortions from 30 the circular form to which tumblers are liable in commercial manufacture.

The gasket 20, which may be of round or square or any other compact form of cross-section, is preferably made cylindrical, as 35 herein shown, fitting the enlarged gasket-space 16 closely enough to retain its place therein by friction while it is being handled and stored before use. The greater portion of the bulk of the gasket lies outside of the 40 circle of the crown of the rim, so that from the beginning of the downward movement of the cap the lower edge of the gasket will project outwardly over the outer side of the rim; but the thickness and other propor- 45 tions of the gasket may be varied as may be found desirable for different conditions of service.

In Figs. 4, 5, and 6 is illustrated some of the distortions to which these tumbler-rims 50 are liable in commercial manufacture. The depression 12 (shown in Figs. 4 and 5) may result from the application of too much heat at this point during the fire-finishing operation, while the corner 13 of Fig. 6 is raised somewhat above its proper contour, which may 55 happen through being subjected to insufficient heat in the fire-finishing operation. As shown in Fig. 5, the cushion of gasket material is sufficient to cover or compensate for 60 considerable variation and inequality in the rim.

These improved closures are self-contained and may be manufactured and sold independently of the tumblers themselves, in which 65 case the gaskets 20 should be made large

enough, so that they remain in place in the caps through the entire handling to which they might be subjected in commercial use, or they should be fastened in place by cement.

70 These closures may be sealed upon the tumblers in various well-known ways employed for vacuum-sealing. I prefer, however, to seal these closures in accordance with the process described and claimed in United States Patent No. 711,431, of October 14, 1902. It is obvious, however, that these closures may be sealed in many other well-known ways, either by hot or cold processing.

75 During the sealing operation as the closure is moved downwardly from its initial position (shown in Fig. 1) toward its sealed position (shown in Fig. 2) the annular space 22 beneath the gasket and on the outer side of the rim is extended downwardly, the pressure of 80 the top of the cap upon the top of the gasket forcing the latter downwardly. The outer side of the lower edge of the gasket being left without support over the annular space 22 finds its easiest escape from the pressure by 85 protruding downwardly into that annular space, the downward inclination of the outer rounded side of the rim also favoring this direction of flow of the gasket. Inasmuch as the increase in the area of the space 22 during the 90 downward movement of the closure is much less than the contraction of the gasket area at the top of the gasket, the result is a sort of differential action, by which the lower edge of the gasket is compressed into the mouth 95 of the annular space 22. Thus the tendency is to give precedence to the making of the seal at the upper portion of the annular space 22 approximately around the zone represented by the line 24. As the compression at this 100 zone increases the inner side of the top portion of the gasket is projected inwardly over the rim of the tumbler, and as the top wall of the cap is carried downwardly by the continued downward movement of the closure 105 this inwardly-protruding portion of the gasket is caught between the rim of the tumbler and the upper wall of the cap, thus during the final sealing movement establishing a second line of seal approximately at the zone indicated by the line 25. 110 115

The increased cushioning effect obtained by this closure does not necessarily involve the use of an increased amount of gasket material, but is mainly effected by the proper 120 initial disposition and distribution of the gasket material in connection with the use of a flexible cap having a suitable contour for confining and directing the flow of the gasket material during compression, all of which results in distributing the gasket material between two narrow sealing zones, utilizing the 125 space between those zones as a reservoir-space, from which the gasket material flows to the respective sealing zones as the need 130

therefor is developed during the sealing operation and in accordance with the requirements of each individual tumbler instead of allowing a considerable volume of the material to protrude uselessly at one or both sides of the sealing-joint.

I claim as my invention—

1. The combination with a receptacle having a rounded rim, of a hermetic closure comprising a cap having a flexible flange which engages with the receptacle below the rounded rim to center it, and having a circumferentially-enlarged portion above the said engaging portion extending a substantial distance above the level of the receptacle-rim when the closure is in sealed position, and an annular gasket seated in said enlarged portion with its lower surface resting on the receptacle.
2. The combination with a tumbler, of a hermetic closure comprising a cap, provided with a flexible flange having an annular portion substantially larger in diameter than the tumbler-rim, and extending a substantial distance above the level of that rim, when the closure is in sealed condition, and an annular gasket seated in said enlarged portion of the cap, with its lower surface resting on the said rim, portions of the cap-flange being turned inwardly beneath the gasket to engage the receptacle, and center the closure therewith.
3. The combination with a tumbler or similar receptacle having a rounded rim, of a hermetic closure therefor, comprising a cap provided with a flexible flange which substantially fits the receptacle below the rounded rim, and having a circumferentially-enlarged cylindrical portion above the said fitting portion extending a substantial distance above the level of the receptacle-rim when the closure is in its sealed condition, and an annular gasket seated in said enlarged portion, with its lower surface resting on the receptacle-rim.
4. The combination with a tumbler or similar receptacle having a rounded rim, of a hermetic closure therefor, comprising a cap pro-

vided with a flexible flange approximately fitting the receptacle, and having an annular portion substantially larger in diameter than the receptacle-rim, and extending a substantial distance above the level of the rim, when the closure is in its sealed condition, and an annular gasket seated in said larger portion with the greater portion of its bulk disposed outside of the circle of the crown of the said rim.

5. The combination with a tumbler or similar receptacle having a rounded rim, of a hermetic closure therefor comprising a cap provided with a flexible flange engaging the tumbler below the rim to center it, and having a circumferentially-enlarged portion extending above the level of said rim, and a gasket seated in said enlarged portion and having a thickness substantially greater than the width of the enlargement, whereby an annular space outside of the tumbler-rim is opened by the said enlargement as the cap is pressed down in the sealing operation, and whereby the lower portion of the gasket is compressed into said opening.

6. The combination with a tumbler or similar receptacle, having a rounded rim, of a hermetic closure therefor, consisting of a cap provided with a flexible flange fitting the outside of the receptacle-rim, and having a circumferentially-enlarged portion above the fitting portion to form an annular space between the receptacle and the flange as the cap is pushed down in the sealing operation, and an annular gasket seated in said enlargement and having a cross-sectional area greater than that of the said enlargement, whereby the gasket is compressed into said annular space as the cap is pushed down in the sealing operation.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM A. LORENZ.

Witnesses:

H. MALLNER,
JANETTE S. ELLSWORTH.