

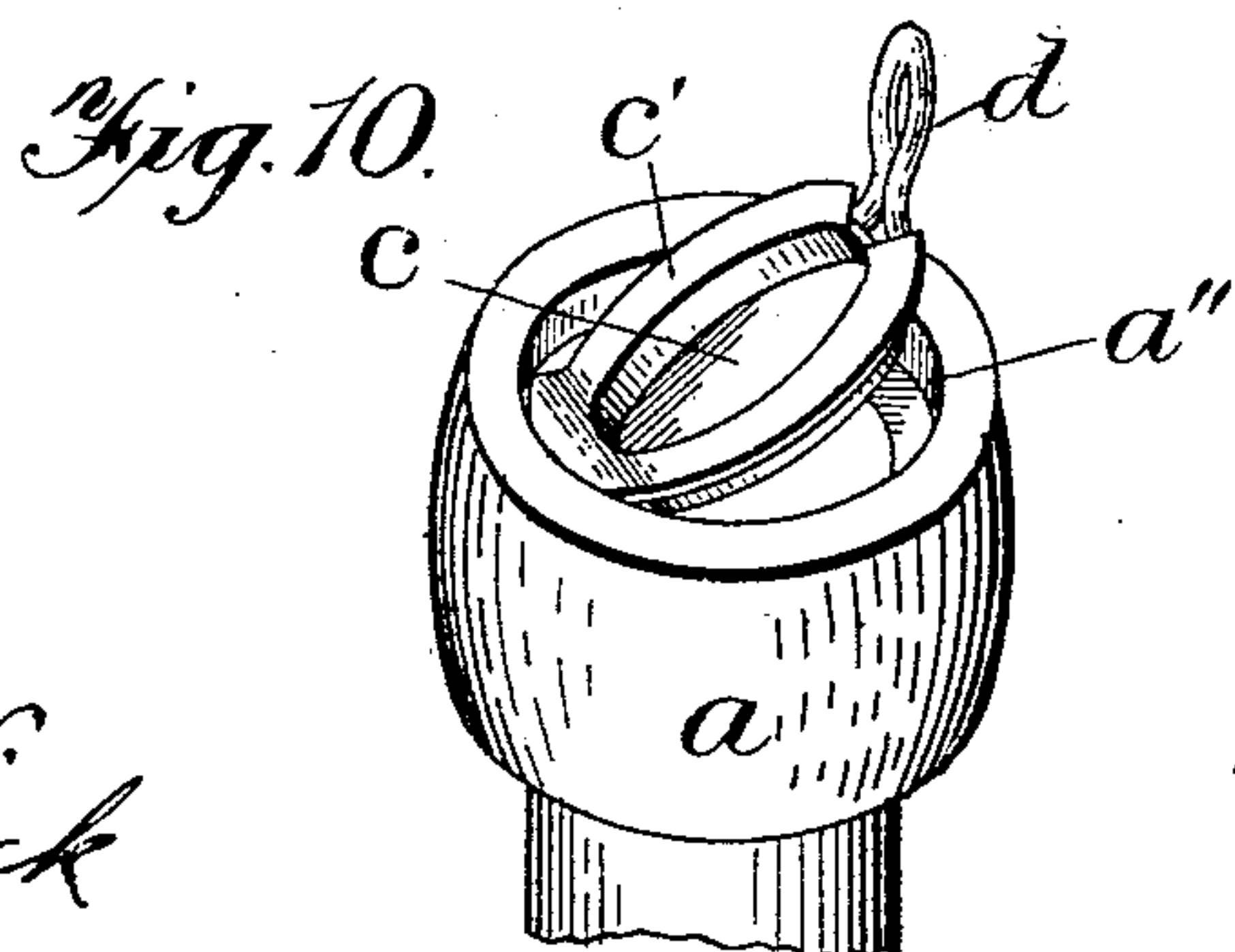
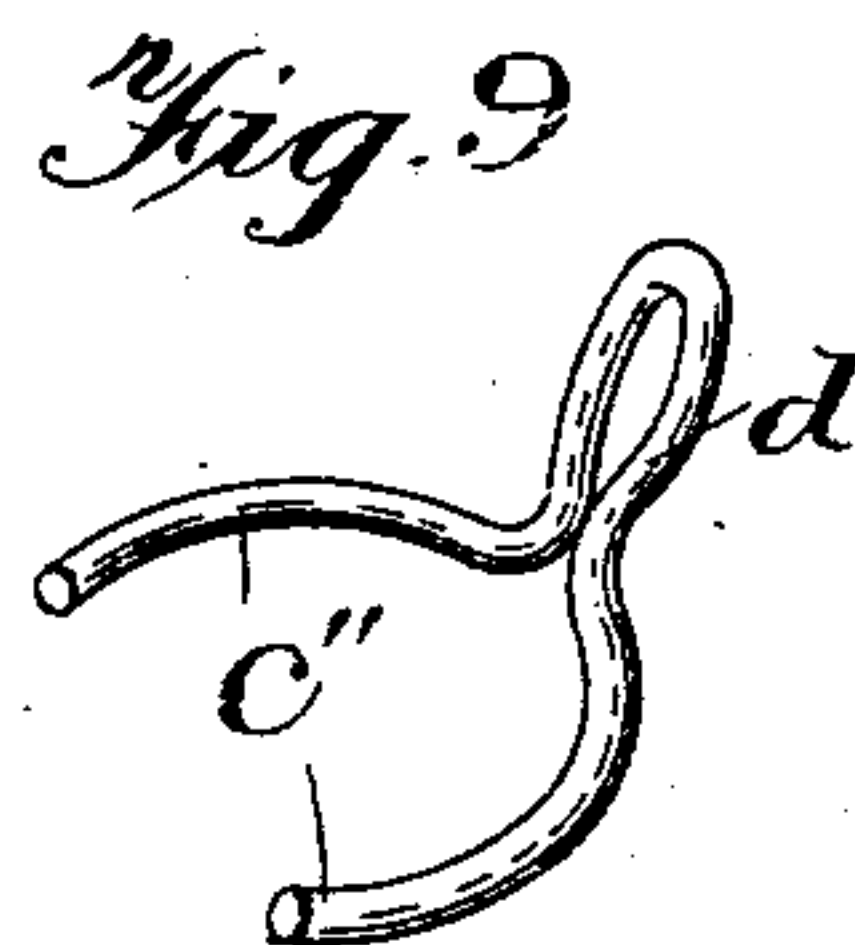
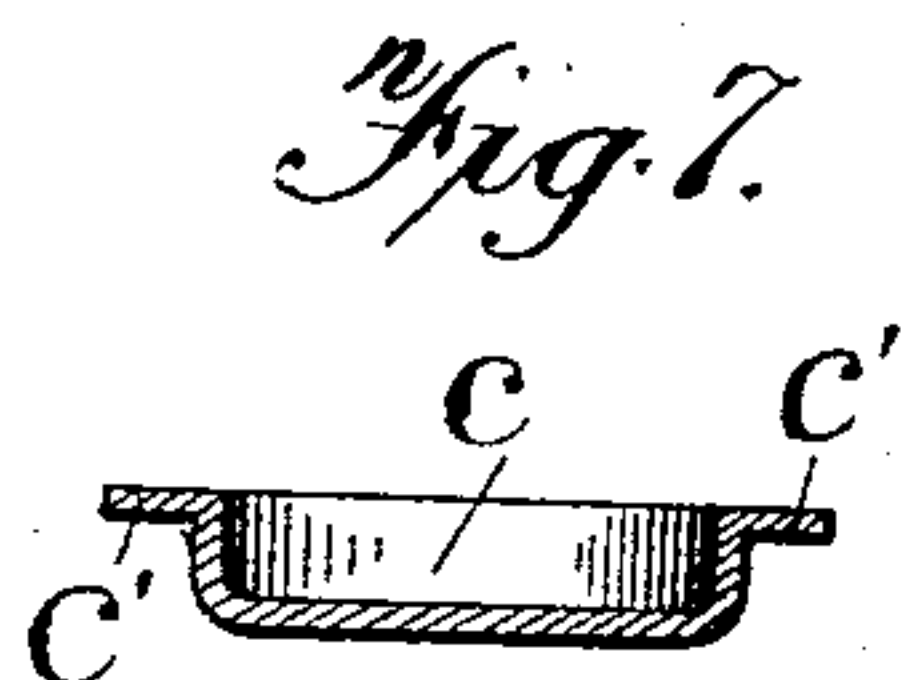
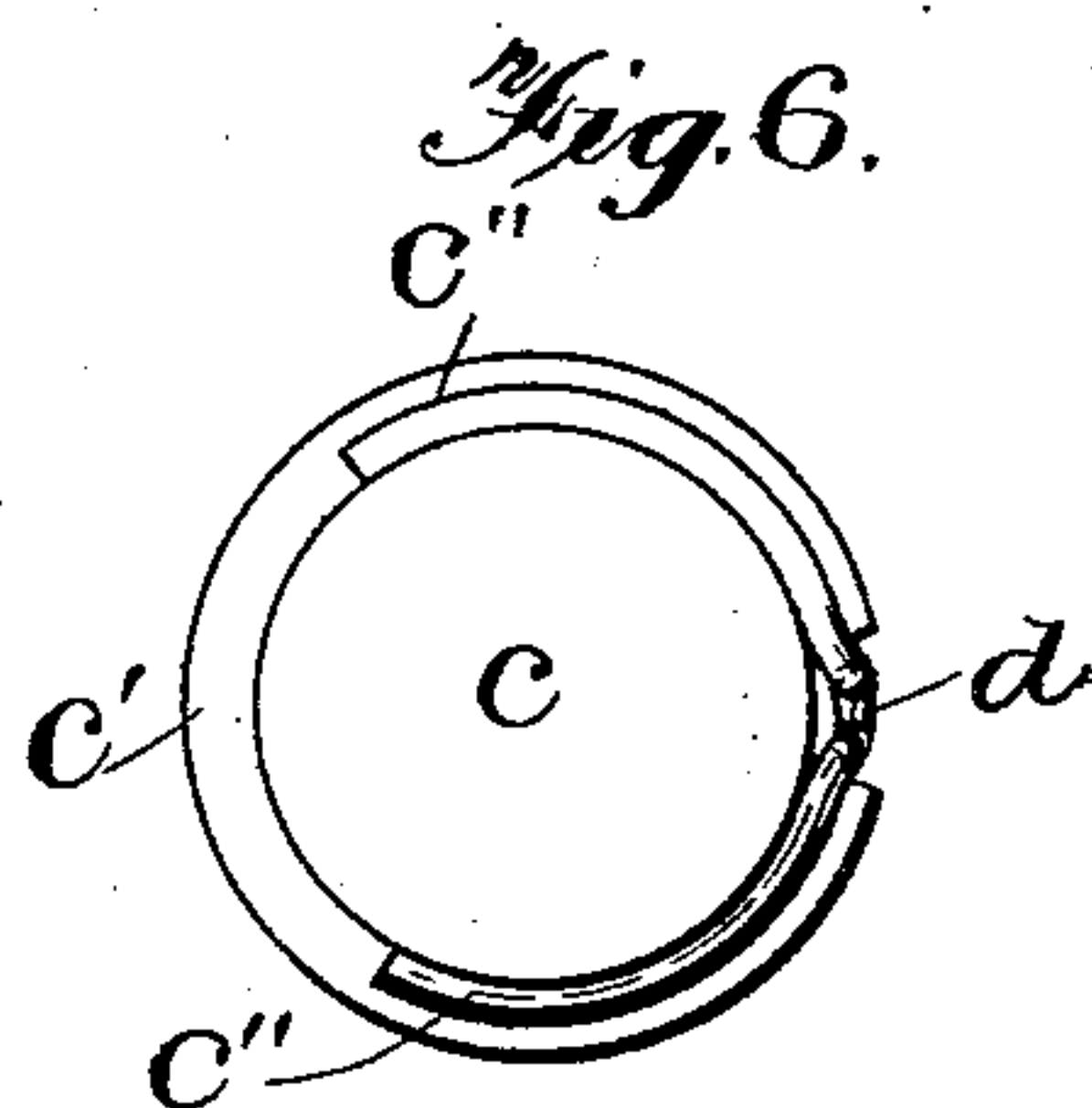
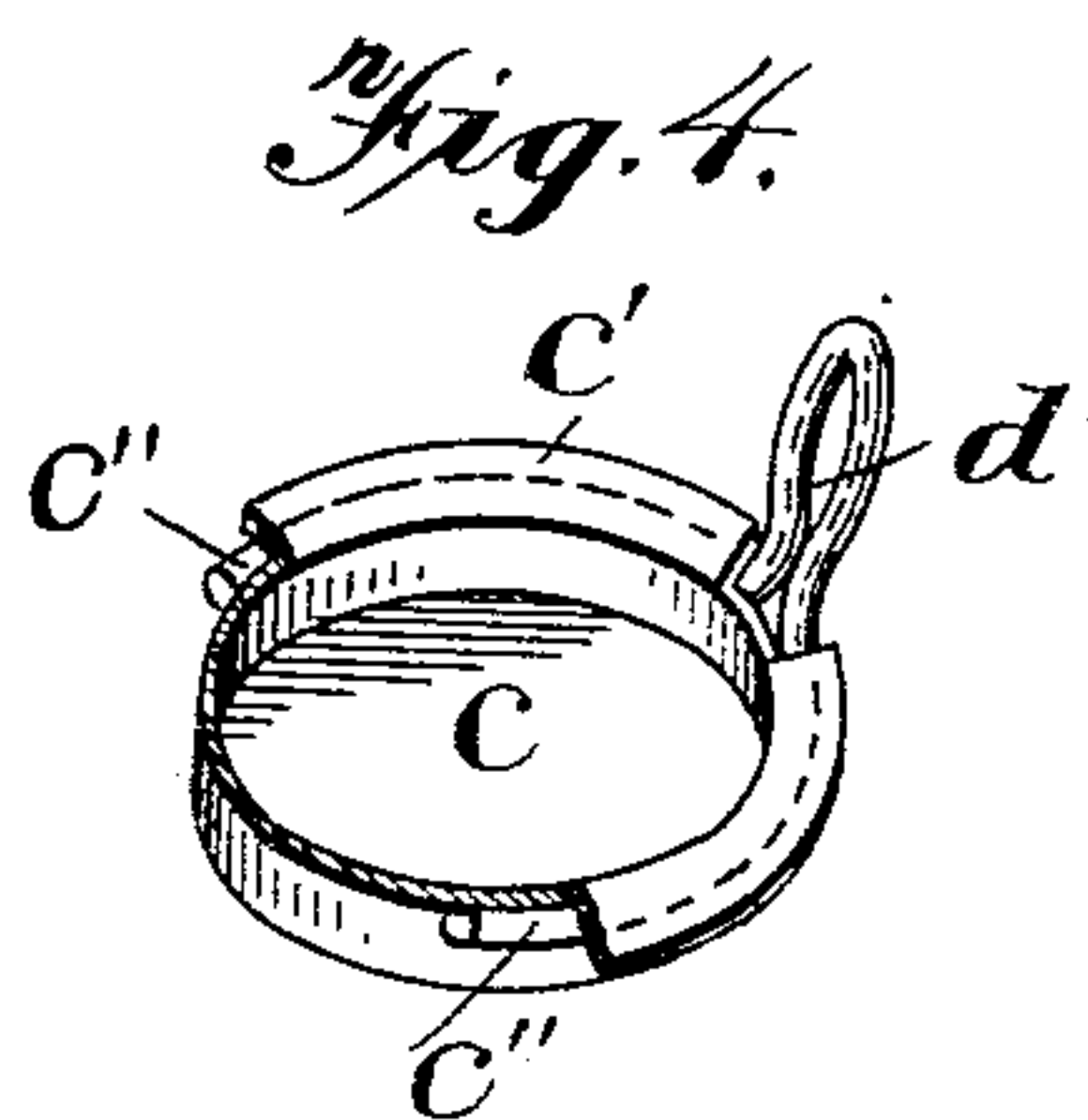
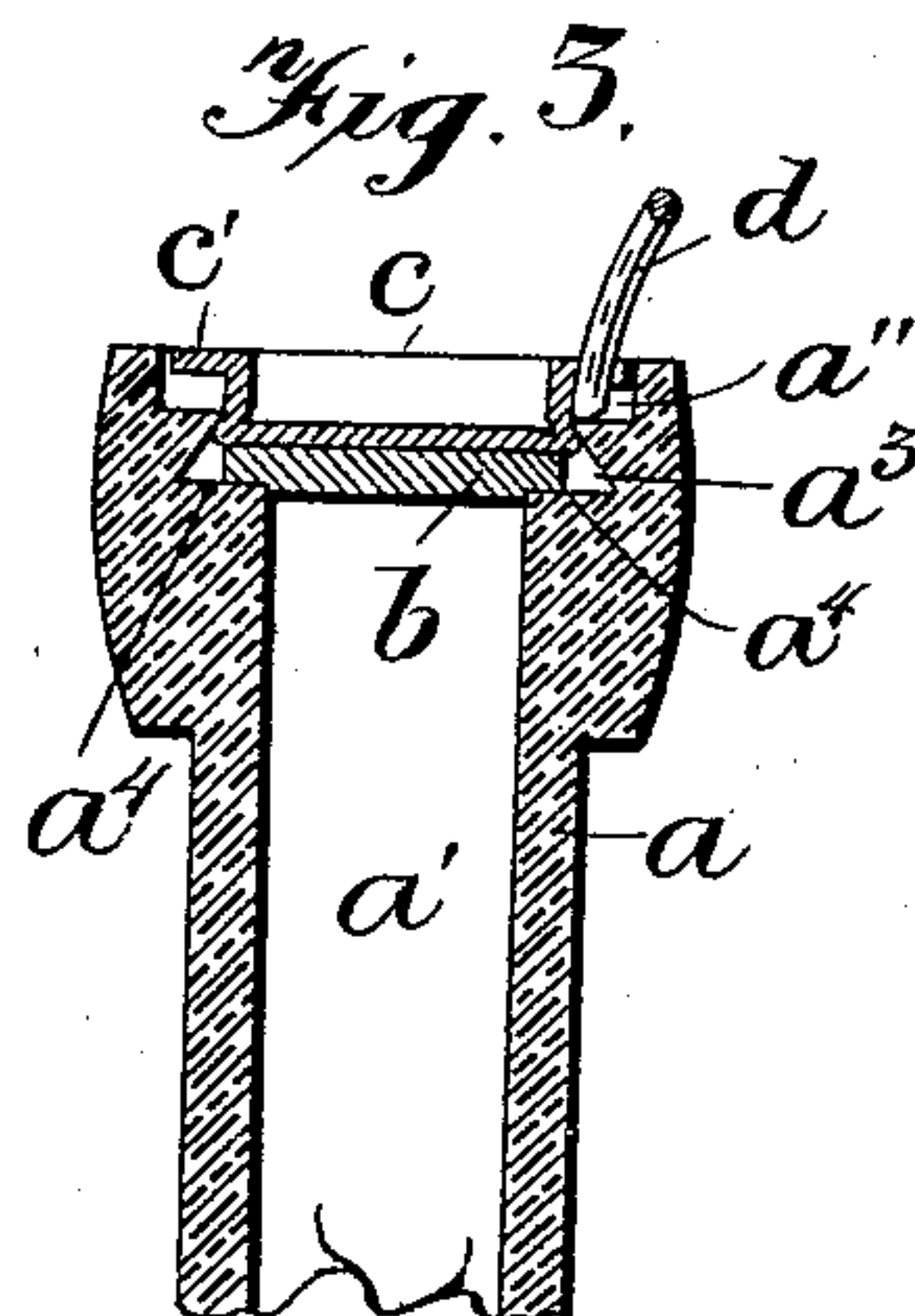
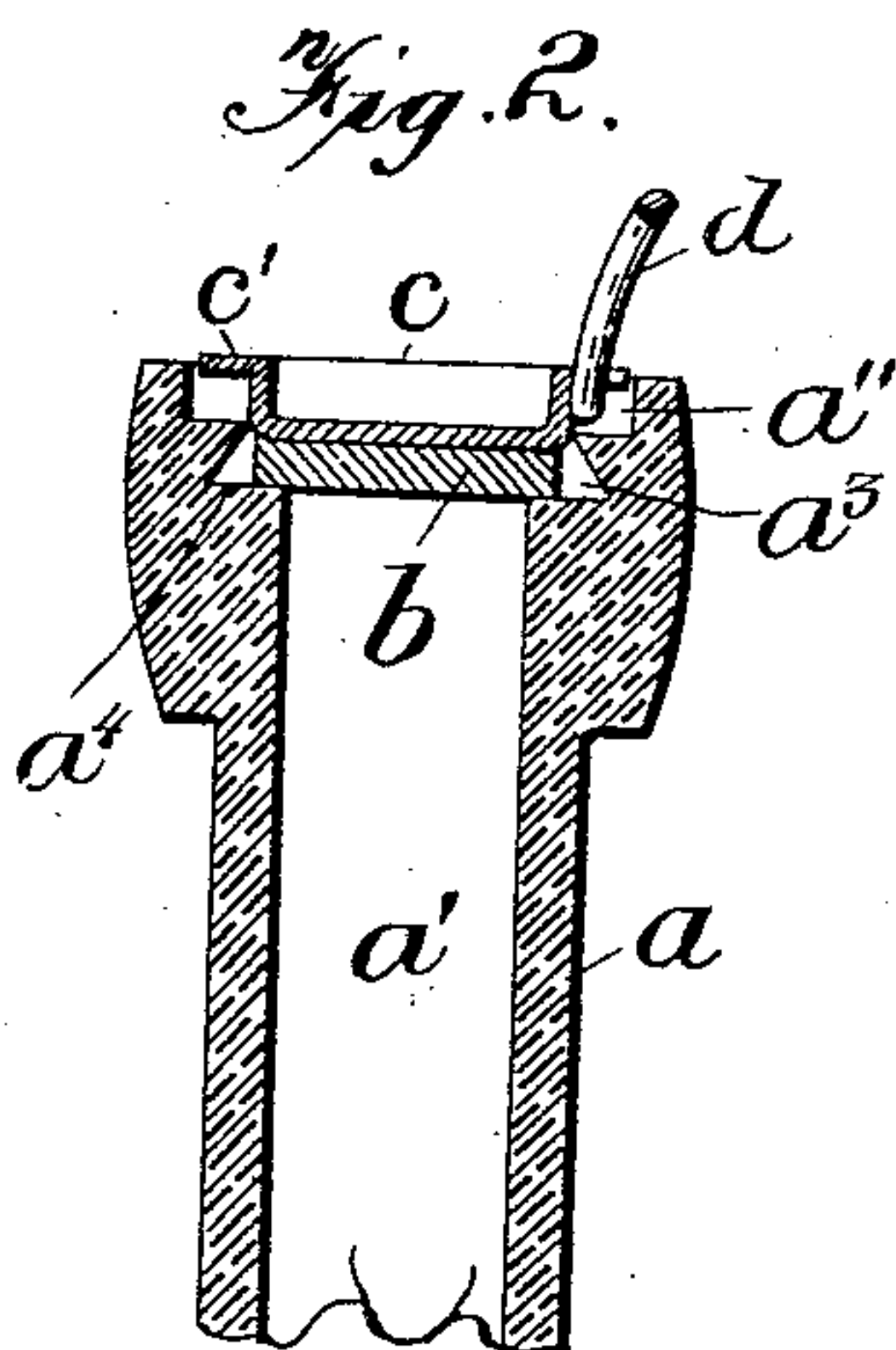
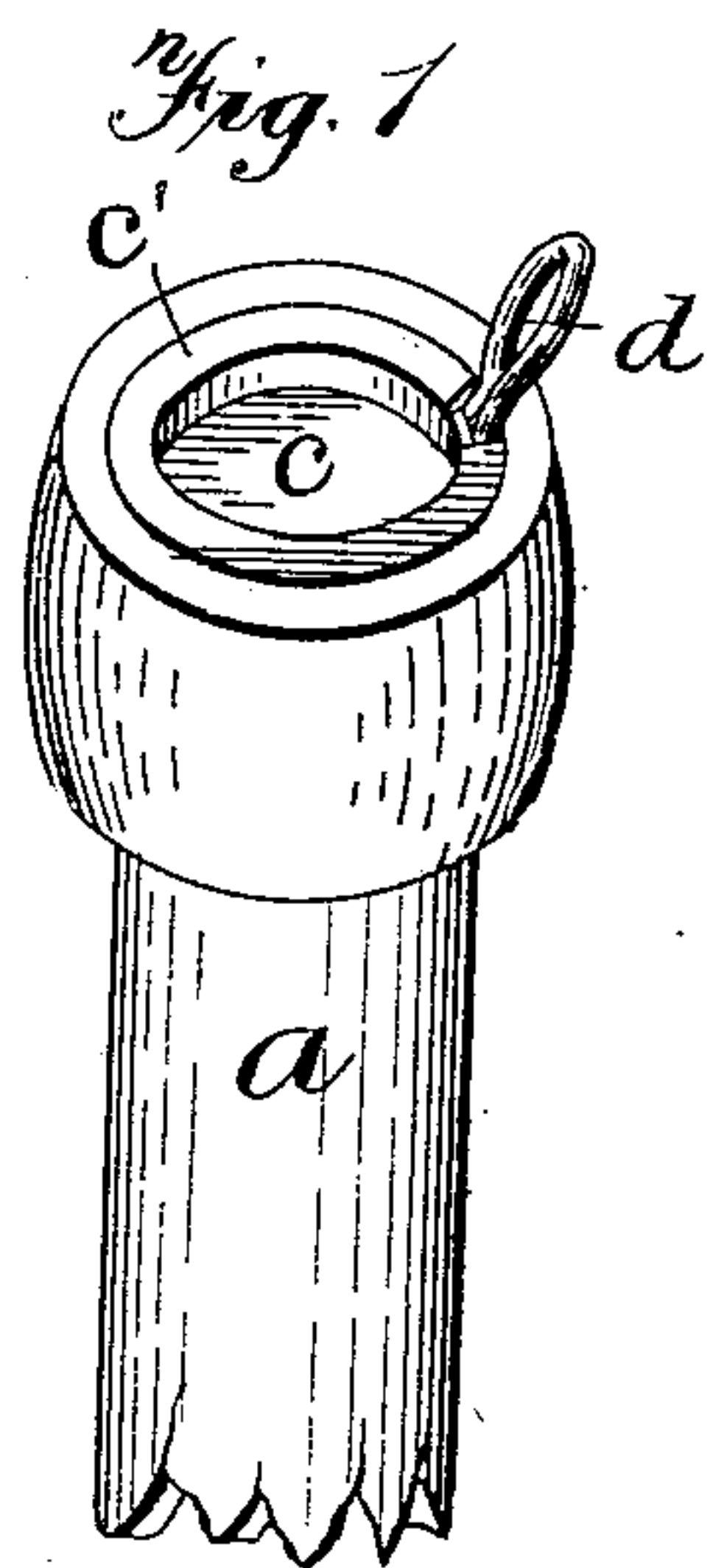
No. 664,636.

Patented Dec. 25, 1900.

W. E. HEATH.
BOTTLE SEAL.

(Application filed Jan. 20, 1900.)

(No Model.)



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BOTTLE-SEAL.

SPECIFICATION forming part of Letters Patent No. 664,636, dated December 25, 1900.

Application filed January 20, 1900. Serial No. 2,129. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HEATH, a citizen of the United States, residing at the city of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Bottle-Seals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain improvements in bottle-seals; and the objects and nature of the invention will be clear to those skilled in the art in view of the following description and the accompanying drawings, which, however, show merely one example of a construction within the spirit and scope of my invention.

The invention consists in certain novel features of construction and in combinations and arrangements of parts and details, as more fully and particularly pointed out and described hereinafter.

Referring to the accompanying drawings, Figure 1 is a detail perspective of the neck of a bottle sealed in accordance with my invention. Fig. 2 is a longitudinal section through the bottle-neck, showing the sealing disk or cork and the locking-plug therefor in the position they assume before being compressed and locked. Fig. 3 is a view similar to Fig. 2, showing the parts compressed and locked and the seal effected. Fig. 4 is a detail perspective, enlarged, of the cup-shaped metal plug, a portion of the plug being broken away to show that the portion thereof diametrically opposite the extractor-arm is free to collapse during the extracting operation. Fig. 5 is a detail perspective, enlarged, of the plug, showing a portion thereof bent or collapsed as a result of the extracting operation. Fig. 6 is a bottom plan, enlarged, of the plug. Fig. 7 is a detail cross-section of the plug. Fig. 8 is a plan view of the sealing cork or disk. Fig. 9 is a detached perspective of the lever extractor-arm and its attaching means. Fig. 10 is a perspective view of the upper part of a bottle-neck, showing the plug in the act of removal and illustrating how the plug can bend or collapse at its edge or portion diametrically opposite the extractor-arm.

In the drawings, *a* is the neck of a bottle, having the liquid-passage *a'* and formed with the annular seat or recess *a''* in its upper end around the mouth or open end of said liquid-passage. This recess has the depressed usually flat floor, as seen clearly in Figs. 2 and 3. The surrounding wall of the liquid-passage is annularly (or otherwise, if need be) undercut immediately below the said floor of the top recess to form the enlarged portion *a³* of the liquid-passage immediately below said floor and above the annular stop shoulder or ledge *a⁴*, a short distance below said floor of the said recess. This annular shoulder is preferably formed with a flat top face, and the diameter of the liquid-passage at the inner edge of said shoulder is less than the diameter of the passage at the inner edge of the floor of said top recess, so that the sealing element, such as the cork or disk and the plug, can freely move past said top floor and yet will engage and be limited against farther downward movement by said shoulder, against which the seal is effected. The diameter of the liquid-passage is contracted from said shoulder downward a suitable distance. Usually, although not necessarily, the wall of the liquid-passage tapers upwardly and inwardly from the outer edge of said shoulder to the inner edge of said top floor, and hence the inner face of said liquid-passage is formed with an abrupt edge (approximately annular sharp edge) at the inner surrounding edge of said top floor, for reasons which will appear hereinafter.

The seal is effected by a cork or disk *b*, preferably imperforate and of such diameter as to pass freely into the liquid-passage to the annular ledge or shoulder *a⁴*, against the upper face of which said disk is adapted to rest completely around the liquid-passage and so as to form a liquid-tight joint or seal therewith when compressed and locked. This disk can be formed of any suitable and desirable material, although as at present advised I usually employ suitably-prepared cork; but my invention is not so limited.

c is a locking plug or disk formed of thin sheet metal sufficiently ductile or pliable to permit the expansion hereinafter set forth and so that the cap after being expanded will remain in that condition to maintain the liq-

uid-tight joint. The metal of the plug possesses such characteristics as to maintain the seal after being locked in the bottle-neck by expansion, yet is capable of easy extraction when the necessary pressure is applied in the proper direction, as hereinafter set forth. The plug is hollow and cup-shaped by a shallow central depression having a circular flat floor or bottom of such external diameter as to pass snugly through the liquid-passage at the abrupt inner edge of the said top floor. Said diameter of the central depression or lower end of the plug is greater than the diameter of the liquid-passage at the stop ledge or shoulder and is usually, although not necessarily, approximately the same as the diameter of the sealing cork or disk, on which it flatly rests in maintaining the seal and liquid-tight joint. The upper edge or end of the plug is formed with the outer surrounding flat flange c' of such external size or diameter as to permit the same to enter the annular top recess of the bottle-neck. Before the plug has been applied to the bottle it is preferably cylindrical and of the same diameter from its lower end to the flange, as shown in Fig. 2, although the lower end of the same can be rounded, if desired, about as shown in Fig. 7.

It has been found exceedingly difficult and inconvenient to extract or remove the ductile-metal bottle-seals heretofore produced from the bottle. It has been necessary to have at hand peculiar tools in order to remove the metal disk or seal. It is an exceedingly difficult and inconvenient operation for an inexperienced person to remove such seals even with the peculiar tool provided for each particular device, in view of the rocking or lever movement necessary to tilt or twist the disk, plug, or cap in releasing it from the bottle. It is practically impossible to pull such plug stoppers directly out from the end of the bottle; but in order to effect release it is necessary to tilt or rock the plug or disk upwardly or back from one edge or side with a twisting or lever action. I avoid these objections and generally follow the above-noted opening movement by employing a sealing plug, disk, or cup of any shape or form provided with a projecting lever-arm or extractor thumb-piece or projection suitably attached to or formed with the seal. The extractor-lever or thumb-piece can be of any suitable form or construction and applied to any sealing disk or plug in any suitable manner or by any suitable means. A bottle-seal constructed with such an extractor can be easily removed by placing the thumb against the outer face of the lever or extractor arm and bracing the hand by placing several fingers on top of the seal and then pressing inwardly or inwardly and upwardly on the said arm, whereupon the seal will be broken and the disk, cup, or plug tilted or rocked from the bottle-mouth by a lever action, the arm and plug usually moving together approximately

as one lever. I provide the plug with an approximately rigid lever extractor-arm, projection, or thumb-piece d , approximately rigid with the plug and moving from the bottle with the plug in the extracting operation. This arm projects from the top edge of the plug to a point at the exterior of the bottle-neck, where free access can be had thereto for the application of the necessary pressure to effect the extraction. In the specific example shown the arm-piece projects upwardly through a suitable opening formed in the flange c' and is deflected laterally. Suitable means can be provided to firmly affix the arm to the plug in an approximately permanent or rigid manner. As a suitable mechanism for this purpose I show the arm formed by a lateral central loop or deflection in a length of wire or rod of metal possessing the desired qualities. The two projecting ends c'' c'' are bent to form a ring-like portion which partially embraces the cylindrical plug just beneath the top flange thereof. These projecting portions or ends of the extractor-arm can be secured in any manner to the plug, but usually are compressed thereon, so as to firmly grip the same, and are held in place against pulling therefrom during the extracting operation by the said top flange. For reasons which will be set forth hereinafter these wire ends or arms need not completely embrace the plug, but can leave a blank space between their ends and diametrically opposite the extractor-arm. However, I do not wish to limit the broad features of my invention to such specific construction.

Fig. 2 shows the sealing-disk in position on the sealing-shoulder in the bottle-neck, with the plug resting thereon and the flange of the plug above the top recess of the bottle-neck and the wire arms in said recess and a distance above the floor thereof. Through the medium of the proper tool the plug is then forced downwardly until the said wire arms engage the floor of said top recess, and the top flange of the plug is about flush with the upper edge of the bottle-neck. By this operation the sealing-disk is tightly compressed between the flat lower end of the plug and the said sealing shoulder or ledge of the bottle-neck, and the lower end of the plug is forced below the plane of said abrupt edge of the top floor, and while the pressure on the plug is maintained the proper implement expands the lower end of the plug, so that its lower end projects laterally beneath said abrupt edge of the top floor and into said enlarged portion of the liquid-passage, and thereby locks the plug in the bottle-neck, holding the sealing-disk compressed and the liquid-tight joint effected. In this construction advantages are attained by expanding the lower end of the plug resting on the disk against the beveled face of the wall of the liquid-passage, as the disk is thereby in a measure more tightly compressed against the sealing-shoulder of the bottle-neck. Advantages are also

attained by having the expanded portion of the plug immediately below and in the direct line of the strain of the extractor lever-arm on the plug—as, for instance, in the specific example illustrated the shallow cylindrical portion of the plug to which the lever-arm is secured is also the portion of the plug which is expanded to lock the plug, and the distance between the attaching-wire ends of said arm and the expanded portion of the plug is very slight—viz., only the thickness of the abrupt edge of the floor of the top recess around the bottle-mouth. By reason of this arrangement the plug is easily and quickly extracted by the necessary lateral and slightly-upward pressure on the extractor lever-arm, as the pull from the lever-arm is directly on the expanded portion of the plug, immediately under the junction between the said arm and plug, and hence the initial tearing away or release of the expanded portion of the plug takes place under said arm, and as the side of the plug provided with the arm moves up the diametrically opposite side of the plug is forced downwardly, and hence the expanded portion of the plug opposite the arm is withdrawn laterally from the undercut portion of the bottle-neck, and the plug is tilted or rocked from the bottle. In effect, the lock is broken as soon as the initial release of the expanded portion of the plug takes place under the extractor-arm, and the remainder of the extracting operation is comparatively simple. I have found that material advantages are attained by so forming the portion of the plug diametrically opposite the extractor-arm as to permit downward movement thereof, whereby the plug during the extracting operation might be said to rock on an axis at a line intermediately between the lever extractor-arm and the diametrically opposite edge of the plug—say about on the ends of the wire projections from the said arm embracing the plug. By permitting this peculiar function it is only necessary to forcibly tear or pull the expanded portion of the plug immediately under the lever-arm from the undercut part of the bottle-neck, while the diametrically opposite expanded portion of the plug can move inwardly or radially of the liquid-passage from the undercut portion, as partially illustrated in Fig. 10. To permit this downward movement of the portion of the plug opposite the arm, I have left a clear space between the top flange of the plug at such point by not extending the encircling wire completely around the plug, so that said portion of the plug can move downward and can collapse or double up, if necessary, although possibly this collapse or doubling of the plug will not always take place, as shown in Figs. 5 and 10. So far as I am now advised by experiments, it would seem that the peculiar advantages are attained by so constructing the plug as to cause the same to rock or tilt during the extracting operation on an axis at right angles to and intermediate the

length of the diameter or plane including the extractor lever-arm. It should be understood, however, that my invention in this particular is not limited to the peculiar plug and imperforate sealing-disk herein shown, as the disk might be otherwise formed than imperforate and the plug might be otherwise formed. In the specific construction illustrated I attain advantages by employing the imperforate disk, as the liquid contents of the bottle are thereby kept from contact with the plug, and a cheaper metal can be employed for the plug than is necessary where a surrounding washer only is employed and the liquid has free engagement with the plug. It is also obvious that my invention is not limited to the peculiar construction of bottle-neck shown nor to the peculiar construction of lever extractor-arm and its attaching means.

I do not wish to limit my invention in all respects to the employment of a sealing medium, nor, if such be employed, to a sealing medium of any particular material.

It is evident that various changes and modifications might be resorted to in the forms, constructions, and arrangements described and shown without departing from the spirit and scope of my invention. Hence I do not wish to limit myself to the construction illustrated.

Having thus fully described my invention, what I claim is—

1. The bottle-seal comprising the hollow cup-shaped ductile-metal plug cylindrical in shape with the surrounding top flange and closed approximately flat lower end adapted to be annularly expanded in the bottle-neck, and an approximately rigid lever extractor-arm projecting from the upper end of the plug and having a securing portion under said flange and partially embracing said cylindrical portion, substantially as described.

2. The cup-shaped hollow ductile-metal sealing-plug adapted to be locked in a bottle-neck by expansion, and provided with a projecting lever extractor-arm at its upper end, means attaching the arm to the plug and constituting a fulcrum on which the plug rocks, during the extracting operation, in a plane traversing an intermediate portion of the diameter of the plug including said arm, substantially as set forth.

3. A hollow bottle-sealing plug formed of ductile metal and arranged to be expanded in a bottle-neck and provided with an approximately rigid lever extractor-arm projecting upwardly from its upper end, whereby the plug can be extracted from the bottle-neck by lateral pressure on said arm which tilts the plug, substantially as described, said plug constructed and arranged to tilt on an axis intermediately between the extractor-arm and the diametrically opposite portion of the plug, whereby the portion of the plug having the extractor-arm moves upwardly, while the diametrically opposite portion of the plug moves downwardly, substantially as described.

4. A bottle having a top recess around its mouth, and an internal sealing-face, in combination with a hollow metal plug adapted to be locked in the bottle-neck by expansion and
5 to form a liquid-tight seal in conjunction with said face, the plug having a top flange in said recess, a lever extractor-arm projecting from the upper end of the plug and having attaching-arms fitting the plug beneath said flange,
10 and only partially encircling said plug, for the purposes substantially as described.

5. The bottle-seal consisting essentially of the imperforate sealing-disk, and the cup-shaped ductile-metal plug having the top
15 flange and the closed flat lower end seated on said disk, the lower end of the plug formed to be radially expanded above said disk, and the upwardly-projecting rigid lever thumb-piece having attaching means fitting said
20 plug below said flange, substantially as described.

6. A bottle having an annular sealing-shoulder in its liquid-passage, and a top recess, in combination with a cup-shaped ductile-metal
25 sealing-plug having a flat closed lower end opposing said shoulder and a top flange at said recess, the plug formed to be locked by having its lower end expanded above said shoulder and a rigid upwardly-projecting
30 lever thumb-piece fixed to the plug beneath said flange and entering said recess, the portion of the plug diametrically opposite said thumb-piece being collapsible, whereby lateral pressure against the thumb-piece will
35 tilt the plug with a lever action from the bottle-mouth, said diametrically opposite portion of the plug capable of moving inwardly and downwardly, substantially as described.

7. A bottle having a top recess at its mouth
40 and a sealing-seat below the same, in combination with a cup-shaped metal sealing-plug arranged to oppose said sealing-seat and formed for locking in the bottle by radial expansion, and provided with a rigid lever
45 thumb-piece projecting upwardly therefrom and fixed to the plug in said recess, the upper portion of the plug diametrically opposite said thumb-piece free to move downwardly when the plug is tilted from the bottle by a
50 lever action under lateral pressure applied to said thumb-piece, substantially as described.

8. The cup-shaped ductile-metal sealing-plug adapted to be locked in a bottle by
55 radial expansion, and provided with an upwardly-projecting lever extractor-arm provided with securing means fitting the exterior of the plug immediately above the portion of the plug adapted for radial expansion, and
60 forming fulcrum or bearing points for the plug during the lever-action extracting operation, substantially as described.

9. A bottle having the annular top recess, in combination with a cup-shaped metal sealing-plug formed for radial expansion in the
65 bottle-neck and having a flanged upper end above the floor of said recess, and the up-

wardly-projecting extractor lever-arm rigid with a securing portion resting on the floor of said recess and extending from said arm
70 in opposite directions only partially around said plug, whereby the portion of said plug diametrically opposite said arm and above the floor of said recess is free to move downwardly during the extracting operation, substantially as described. 75

10. A bottle having a seat in its mouth and a radial enlargement above the same, in combination with an imperforate ductile-metal disk opposing said seat, a sealing medium covering the disk and compressed between the same and said seat of the bottle-mouth, said disk having the vertical cylindrical flange extending upwardly and vertically approximately to the top of the bottle-mouth and expanded into said enlargement and provided with an upwardly-projecting extractor attached thereto, substantially as described. 80 85

11. A cup-shaped sealing-plug formed of ductile metal adapted to enter and be expanded within a bottle-neck to seal the same, in combination with a projecting approximately rigid thumb-piece, and means whereby said thumb-piece is confined to the upper part of
90 the plug so that lateral pressure against said thumb-piece will tilt the plug with the thumb-piece, from the bottle-neck, substantially as described. 95

12. A metal bottle-seal formed of non-elastic ductile metal adapted to be bent into engagement with the bottle-neck to seal the same, said seal provided with an approximately rigid thumb-piece projecting from its edge and having an approximately non-elastic
100 connection with the seal and forming a lever with the seal so that the seal and thumb-piece tilt together in extracting the seal, substantially as described. 105

13. A bottle in combination with a ductile-metal plug expanded therein, said plug provided with an approximately non-elastic thumb-piece projecting upwardly from its upper edge and having a non-elastic connection with the plug whereby the thumb-piece
110 constitutes a lever when the plug is tilted from the bottle-neck by pressure against the thumb-piece, substantially as described. 115

14. A metal bottle-seal, having an edge flange and a wire bent to fit the seal beneath
120 said flange and formed with a lateral deflection constituting a thumb-piece, whereby lateral pressure against the thumb-piece tilts the seal and thumb-piece together from the bottle-neck, substantially as described. 125

15. A bottle having a top recess, and an internal sealing-seat below the recess, the bottle internally enlarged above said seat and below the floor of said recess, in combination with a sealing medium, and a metal plug having a
130 rigid upwardly-projecting lever-arm fixed to its upper part in said recess, the plug radially expanded into said enlargement and immediately under the plane of the attachment of

said arm to the plug, whereby lateral pressure on the arm tilts the plug from the bottle with a lever action, substantially as described.

16. A bottle-seal comprising a metal plug 5 having sealing means, and a rigid upwardly-projecting lever-arm fixed to the upper end thereof, the plug formed for radial expansion between the sealing medium and the plane of attachment of said arm to the plug, whereby 10 the arm and plug move together approximately as one lever during the extracting operation, substantially as described.

17. A bottle-seal comprising a plug having 15 a cylindrical portion formed for radial expansion to lock the plug in the bottle, and an upwardly-projecting lever-arm having attaching means fitting the plug immediately above said expansible portion, whereby lateral pressure against said arm exerts a direct extracting strain on the expanded portion of the 20 plug immediately below said arm, substantially as described.

18. A hollow metal sealing-plug having a top flange, and a rigid projecting lever-arm 25 having attaching-arms fitting the plug under the flange, the plug formed for radial expansion immediately under said attaching-arms, substantially as described.

19. A metal sealing-plug for bottles having 30 an annular edge flange and provided with a projecting lever thumb-piece having an attaching portion fixed to said plug by said flange, said plug and thumb-piece tilting from the bottle together approximately as one lever, substantially as described. 35

20. A bottle having an annular floor or seat, and an internal enlargement immediately below said floor in combination with a cup-shaped sealing-plug adapted for radial expansion into said enlargement and having a top 40 flange and a rigid lever extractor-arm formed with attaching means grasping the plug under the flange and immediately above said expansible portion, said means adapted to rest on said floor, substantially as described. 45

21. A hollow ductile-metal sealing-plug having a rigid lever extractor-arm projecting

upwardly therefrom and rigid therewith, the arm and plug tilting from the bottle together approximately as one lever during the extracting operation, substantially as described. 50

22. A bottle provided with a top annular recess in its mouth and an annular sealing-shoulder below the floor of said recess, in combination with a sealing-disk adapted to be expanded and locked in the bottle-mouth and 55 having a top flange in said annular recess, said disk provided with a rigid upwardly-projecting thumb-piece extending from the portion of the disk in said recess, substantially as described. 60

23. A bottle having a top annular recess in its mouth and an annular shoulder below the floor of said recess, in combination with a sealing-plug adapted to be expanded in said bottle-mouth and thereby locked therein, a sealing medium interposed between said shoulder and the plug, and an upwardly-projecting rigid thumb-piece having attaching means 65 located in said top recess and engaging the upper portion of said disk, substantially as described. 70

24. A bottle having a top annular recess, a radial enlargement below the recess and an annular seat below said enlargement, in combination with a cylindrical hollow metal plug 75 having a flat bottom above said seat and a top lateral flange in said recess, the cylindrical wall of the plug expanded into said enlargement, said plug provided with extractor means below the flange, substantially as described. 80

25. A hollow metal sealing-plug having a top lateral flange and an upwardly-extending extractor-arm secured to the plug, the flange 85 being displaced to receive said arm, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM E. HEATH.

Witnesses:

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