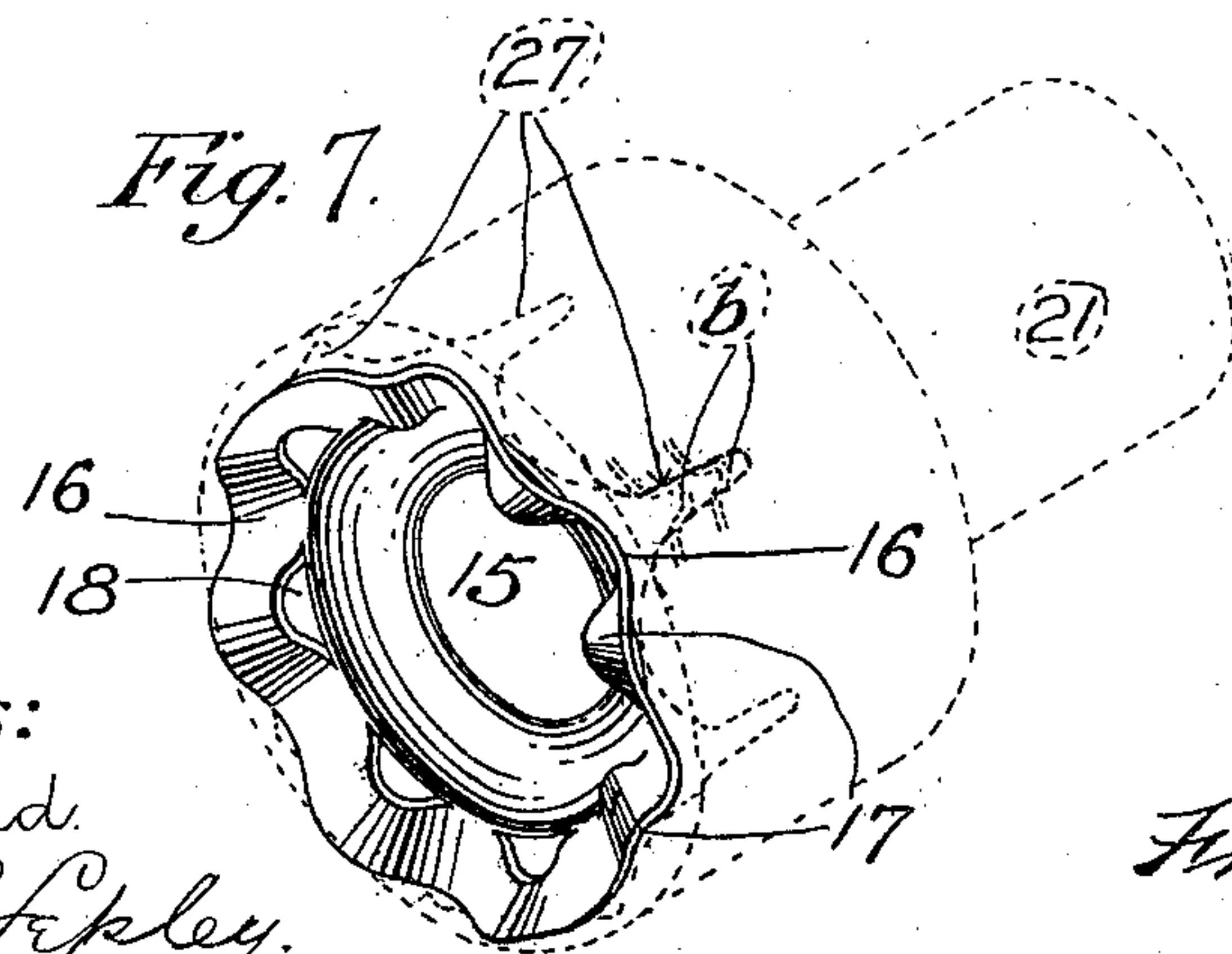
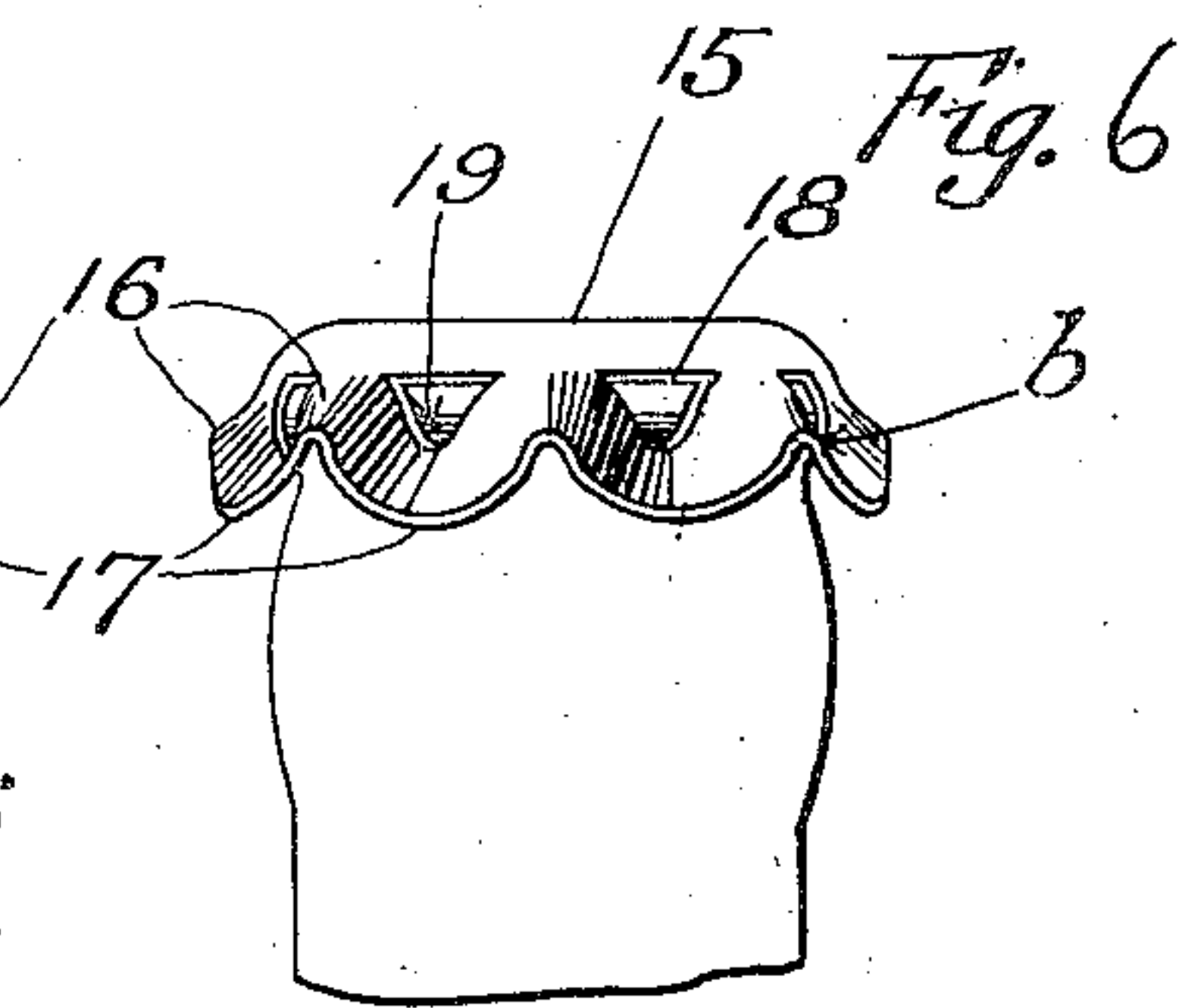
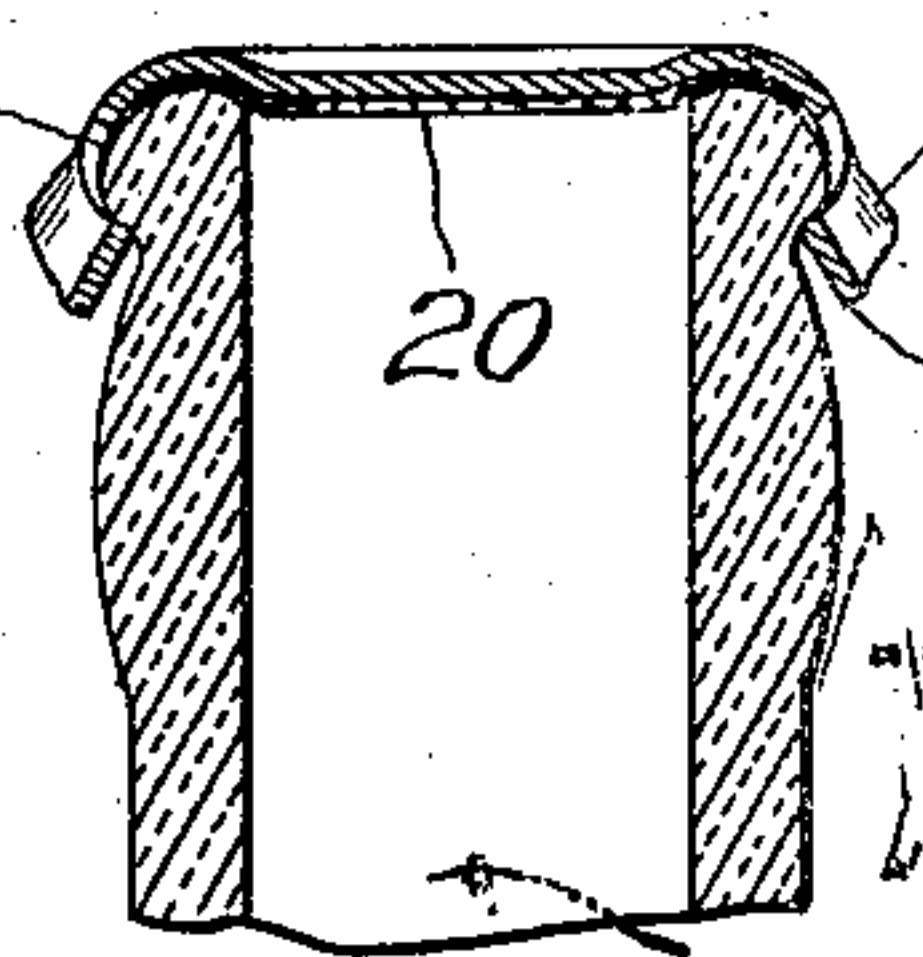
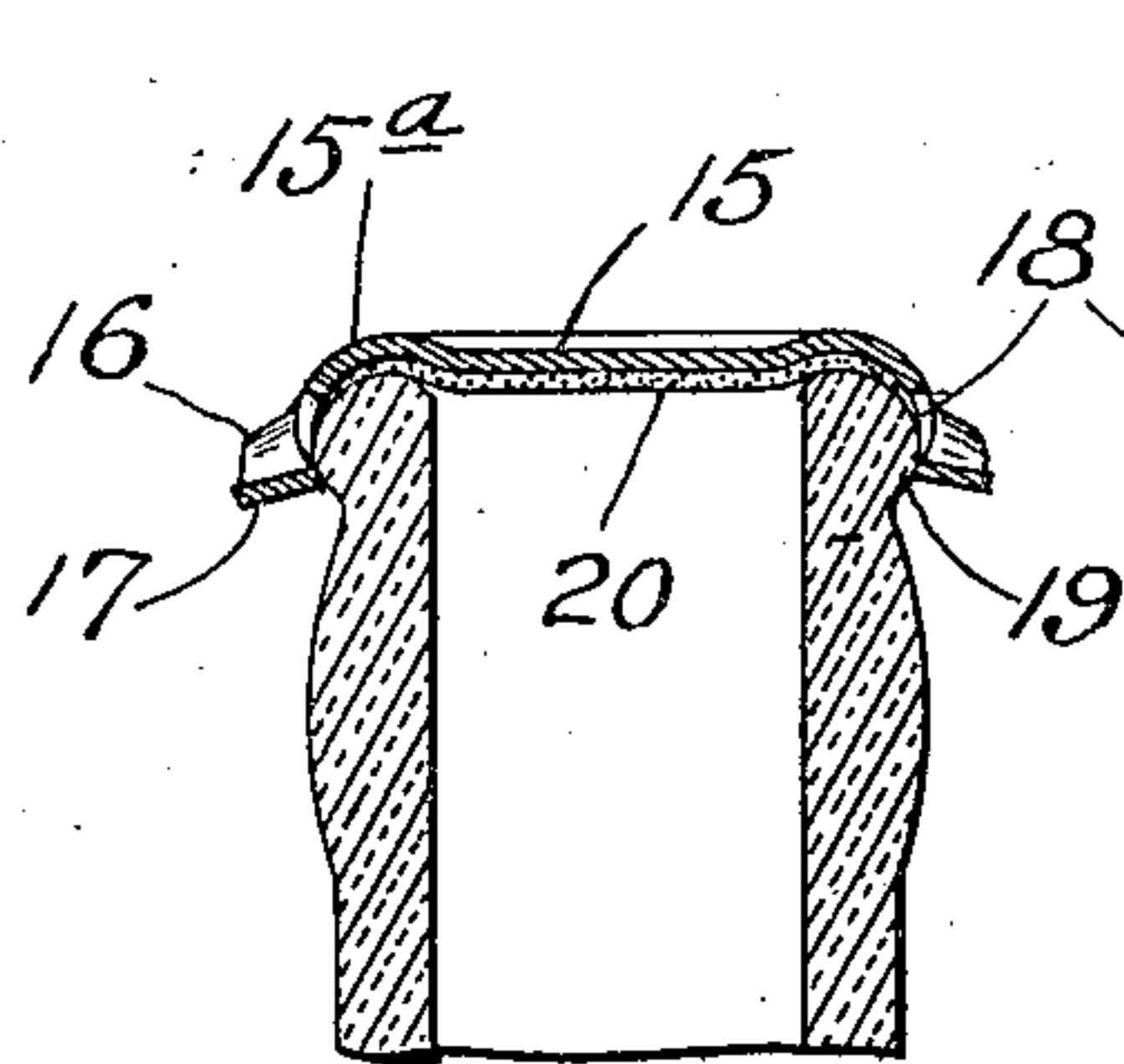
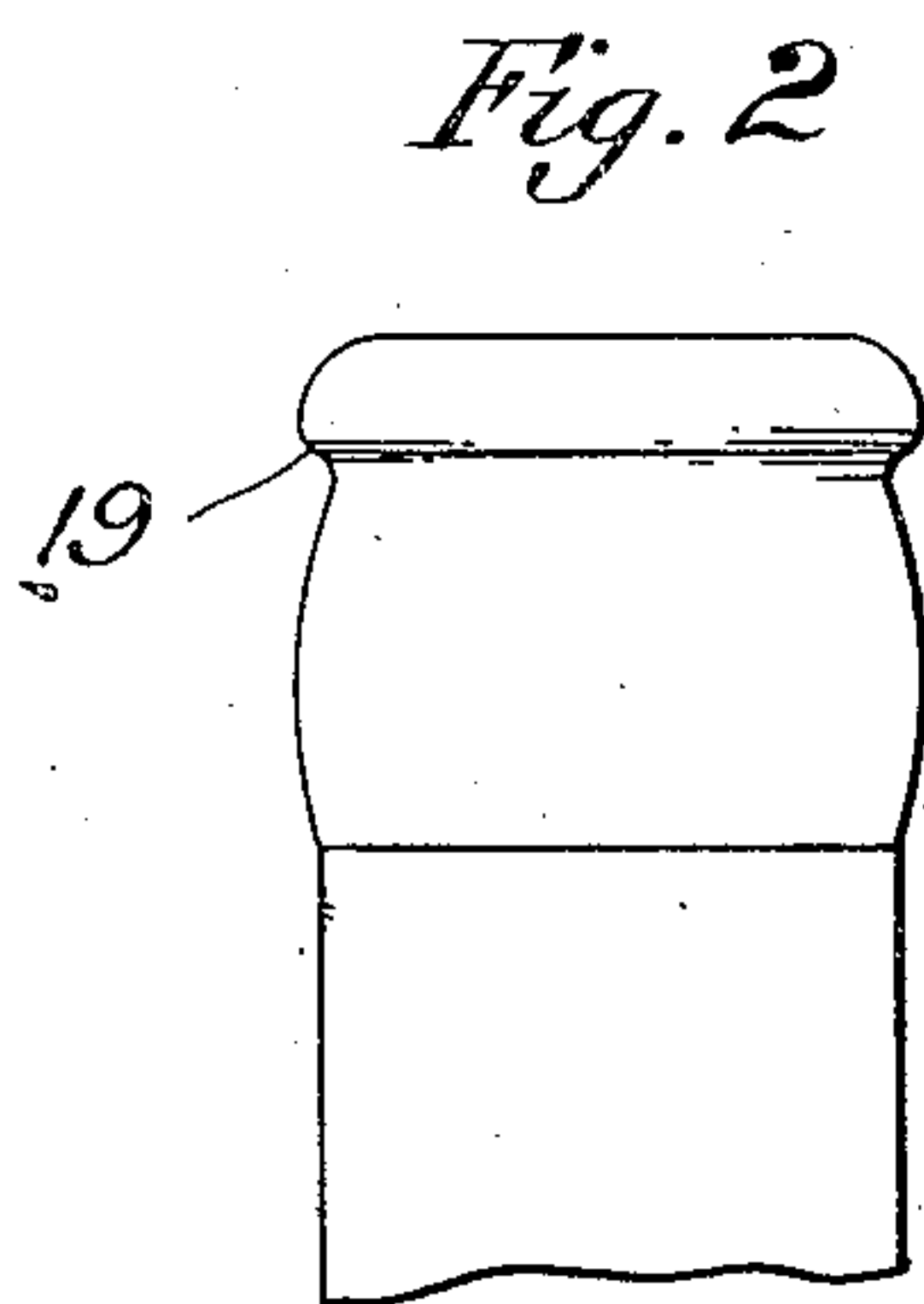
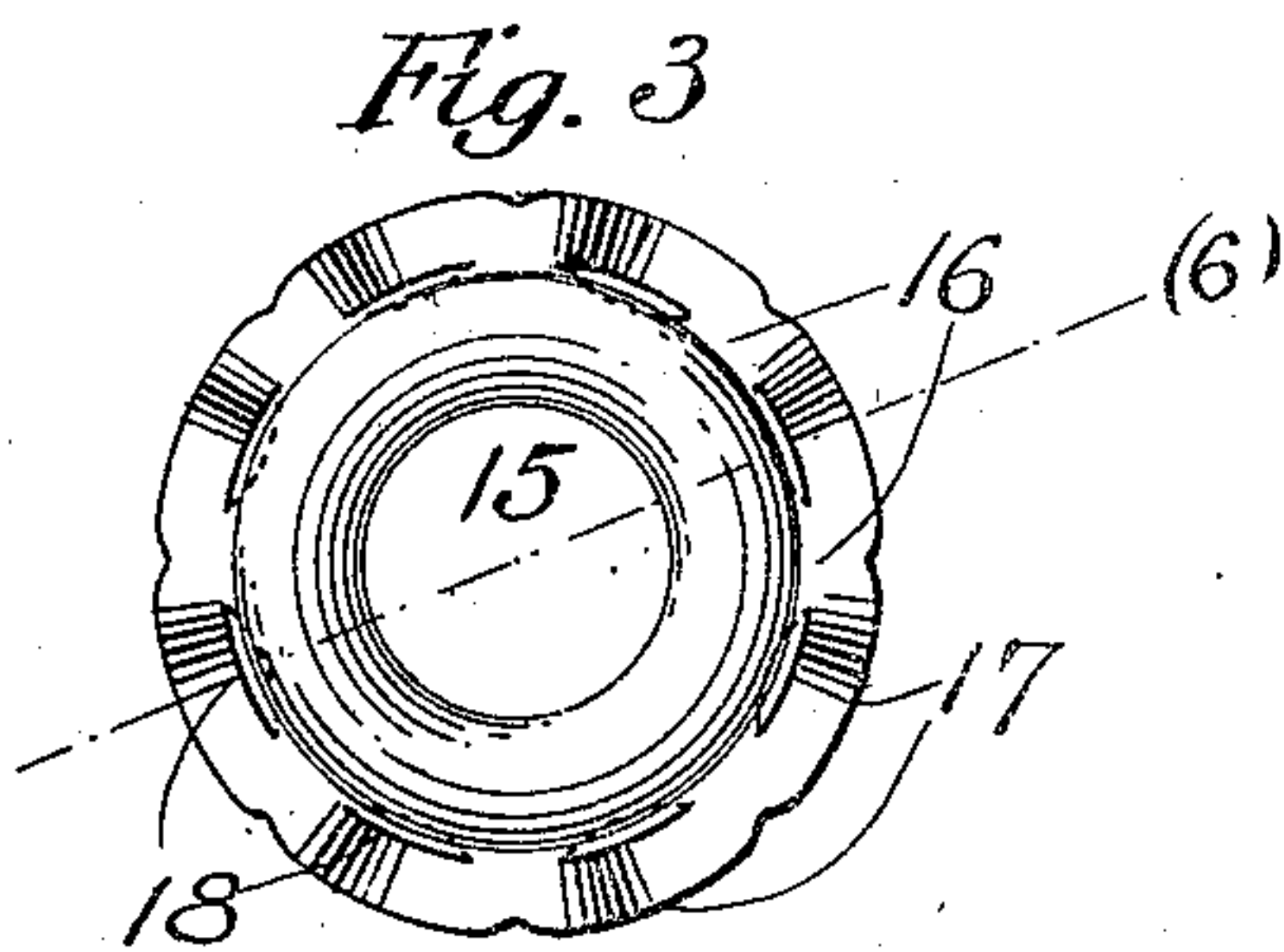
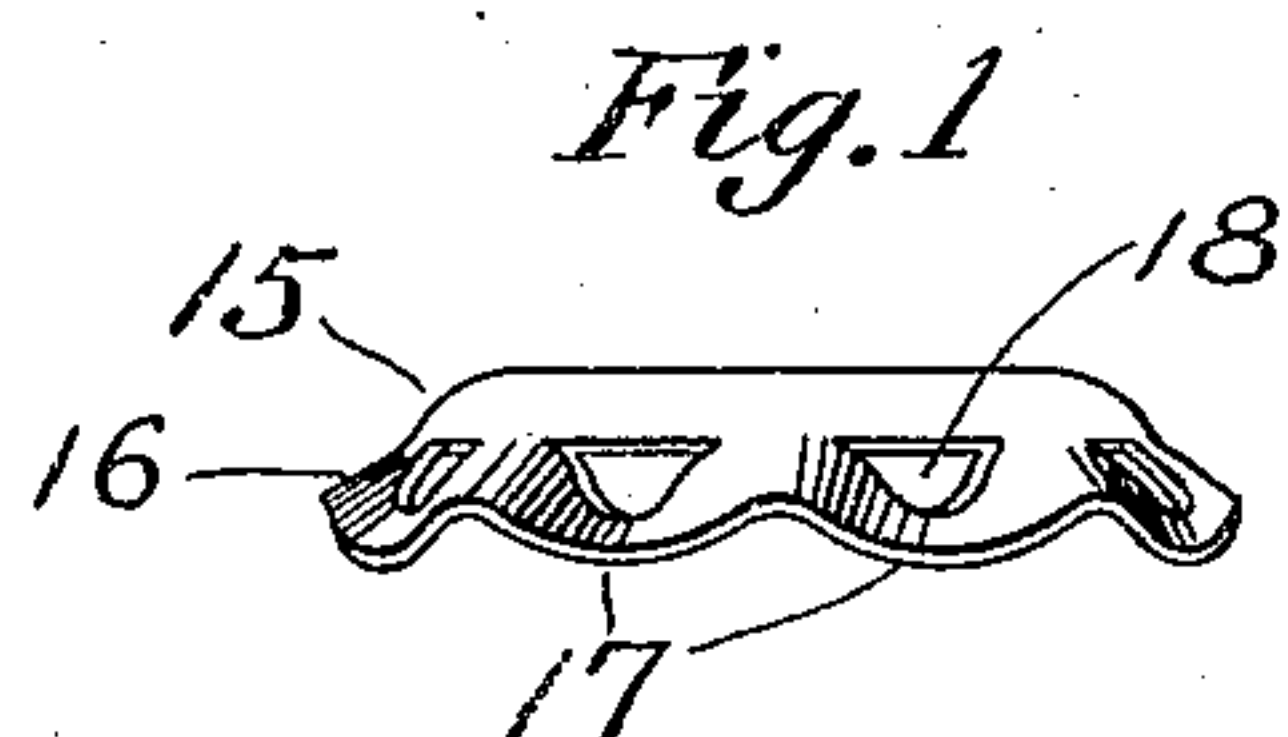


No. 862,307.

PATENTED AUG. 6, 1907.

F. W. H. CLAY.  
BOTTLE CLOSURE.  
APPLICATION FILED JULY 3, 1906.

2 SHEETS—SHEET 1.



Witness:  
E. R. Rodd.  
Chas. S. Spley.

Inventor,  
Francis W. H. Clay

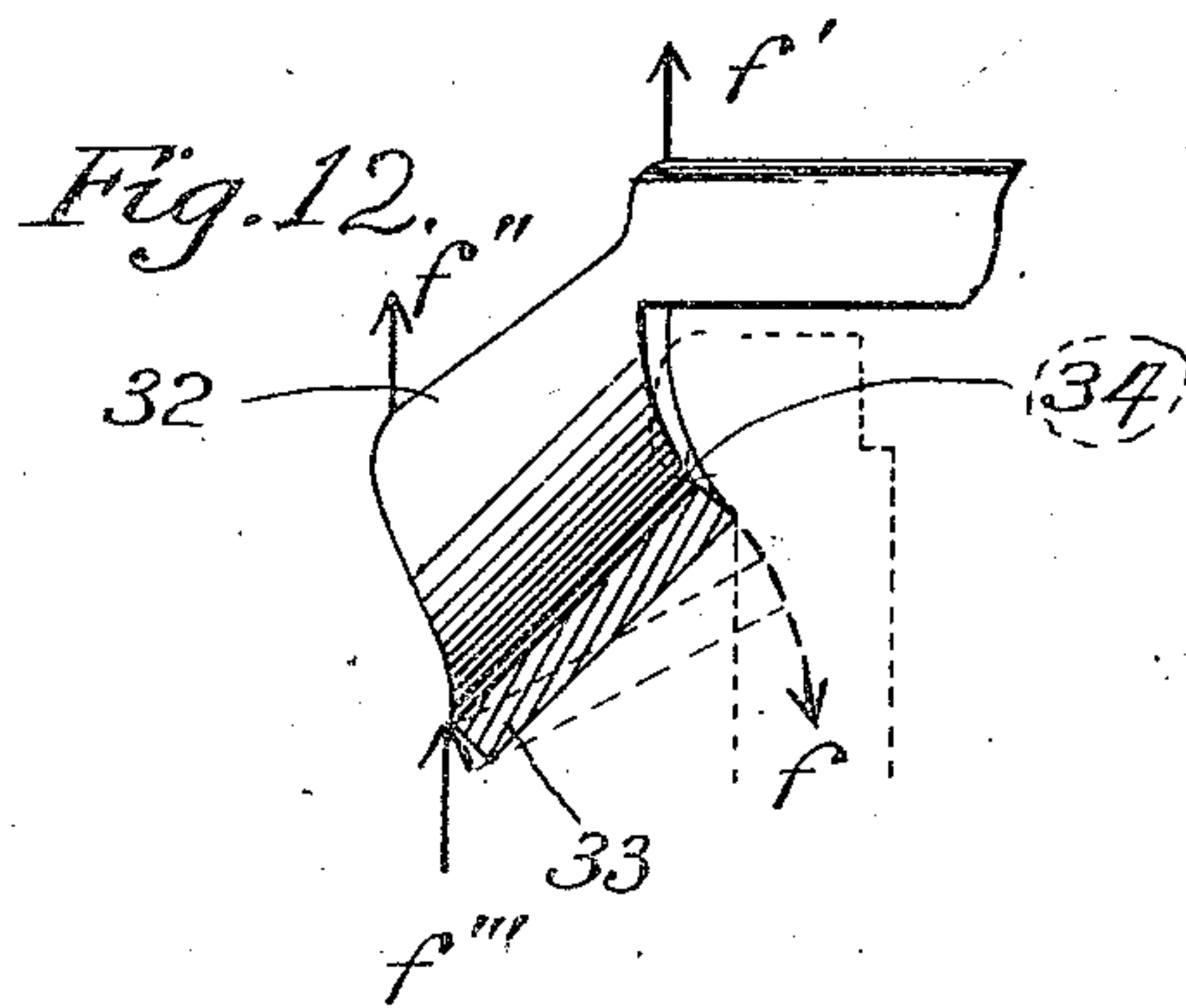
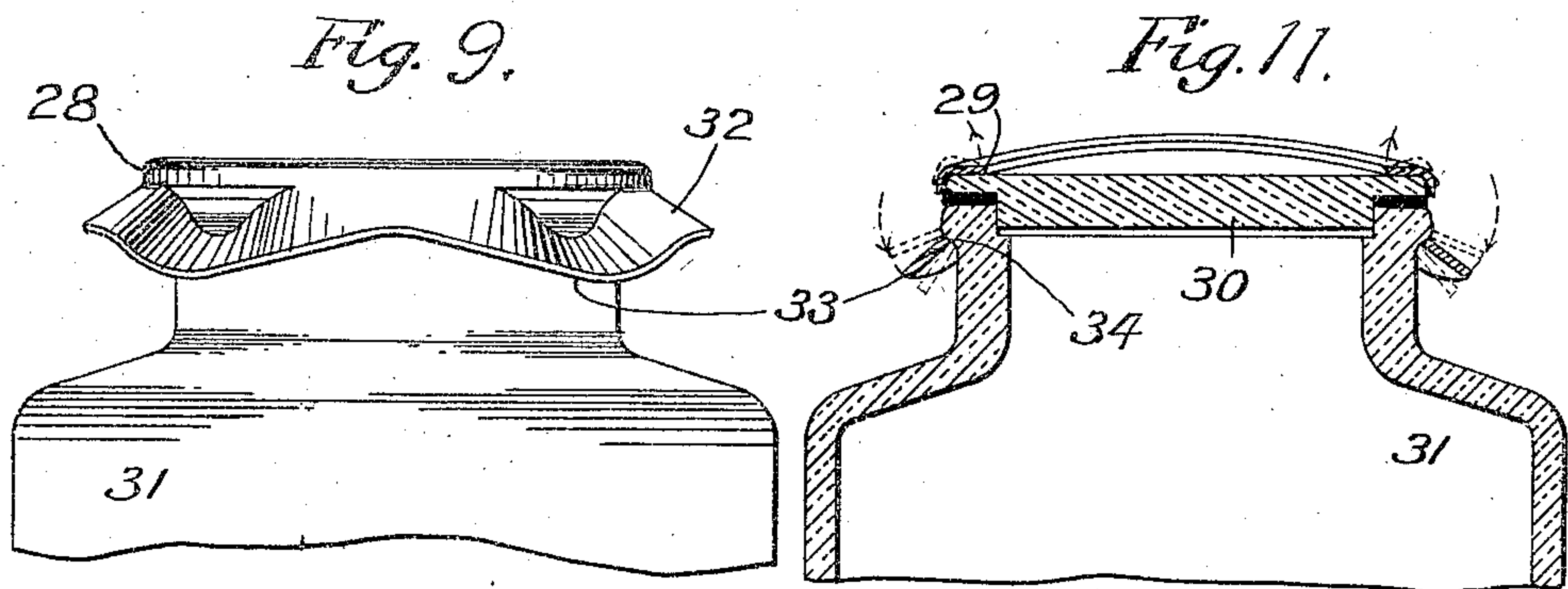
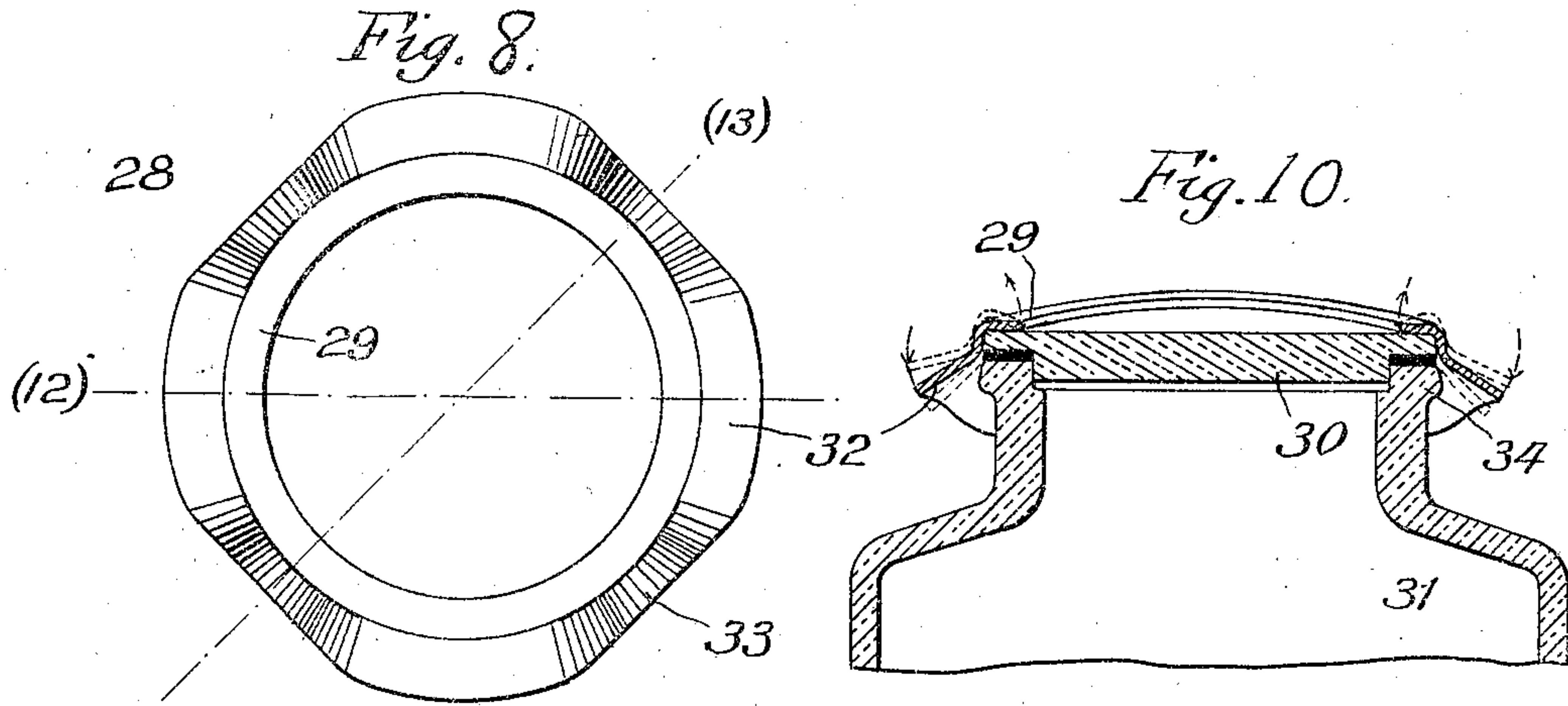
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

FRANCIS W. H. CLAY, OF PITTSBURG, PENNSYLVANIA.

## BOTTLE-CLOSURE.

No. 862,307.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed July 3, 1906. Serial No. 324,652.

*To all whom it may concern:*

Be it known that I, FRANCIS W. H. CLAY, a citizen of the United States, residing at Pittsburg, in the State of Pennsylvania, have invented certain new and useful  
5 Improvements in Bottle-Closures, of which the following is a specification.

My invention relates to closing devices for bottles, jars, and the like, and particularly to metallic bottle caps.

10 The primary objects of the invention are, to provide for maintaining the pressure necessary to effect a seal by means of the resiliency in the metal of the cap and to provide for a more secure holding of the cap and to render the putting on and removal of the same easy.

15 More specifically, one object of the invention is to provide a cap engaging the bottle head by the edges of arches of metal, and to give the cap such a form that said arches of metal may be used as levers to induce a pressure by changing the angularity or convexity of the  
20 arch, and to maintain resilient pressure by means of such arch, tending to return to normal position under the stresses.

Another object is to design the cap in such form that the internal pressure on it will tighten its grip upon  
25 the bottle head.

These objects, and other advantages which will hereinafter appear, are attained by means of the construction which is illustrated in the accompanying drawings.

30 Figure 1 is a side elevation of a bottle cap, and Fig. 2 a convenient form of bottle head for use with the same. Fig. 3 is a top plan view of the cap in normal shape. Fig. 4 shows a section of the cap placed on the bottle ready for operation of the tool, and Fig. 5 a section of  
35 the cap as fixed in place, both sections being on line (6) of Fig. 3. Fig. 6 is a side elevation of the cap closed in place on the bottle head. Fig. 7 is an under-side perspective view of the bottle cap, and an outline of the placing tool shown therewith, illustrating the action  
40 in changing the bends of the arches of metal. Figs. 8 and 9 are respectively a top plan and a side elevation of a modified form convenient for use on fruit jars and to be operated by hand. Figs. 10 and 11 are central cross sections, respectively on the lines (12) and (13)  
45 of Fig. 8, showing the holding ring and cover in place on a jar. Fig. 12 is a fragmentary diagram of the holding arch, illustrating the effect on the arch of internal pressure in the jar or bottle.

From the drawings it will be seen that, in the form  
50 of the invention shown the bottle cap 15 comprises a cover which has an attached skirt or flange which flange consists of a series of upward and outward bent arches 16, integral with the cover, and alternating therewith the downward and inward bent gripping

arches 17, separated by slits 18 from the cover and 55 adapted to engage under the rim or ledge 19 of the bottle head.

From Figs. 4, 5, and 6 it will be seen that in normal position the cap is placed on the bottle head provided inside with a packing disk 20 and the bead 15<sup>a</sup> of the 60 cap fits snugly over the top rim of the bottle; in this condition the upper arches 16 stand out at a rather wide angle and are well rounded, and the downward arches 17 snap under the ledge 19 of the bottle. The cap is then pushed down to settle it neatly in place on the 65 packing 20 and at the same time or just afterward the arches 16 are depressed, which will shove the gripping arches 17 under the ledge; the upward arches 16 may be then squeezed or contracted into a smaller bend, (b as shown in Fig. 6). The tool for accomplishing this 70 may be of any suitable form desired.

Referring to Fig. 7 it will be seen that changing the inclination of the apex of the arch 16 by means of any convenient tool such as indicated at 21, in dotted lines will press the gripping arches 17 inward so that they 75 take hold by their edges upon the ledge 19 of the bottle. Thereupon the outward arches 16, being further engaged by the slots 27 of the tool as shown in dotted lines, will gradually pinch up the arches into sharper bends b as illustrated in dotted lines. The effect of this is to 80 give an additional inward thrust to the gripping arches 17, and when the tool is removed the natural tendency of the resilient metal to open the bends b again has the effect of still further thrusting downward and inward the gripping arches 17. The arches 17, having been 85 flattened by pressure on the bottle, now tend to close again and thus tighten their grip. While the tendency of both arches is to return to the original shape, they operate to off-set each others movement to some extent, but both tend to tighten the grip. The arch which is 90 compressed should always have a smaller bend than the gripping arch.

It will be evident from this construction that the cover of the cap is positively drawn down with a strong resilient pressure upon the packing 20 by means of the 95 lever action of the arches 17, and that the natural resiliency of the metal will not only maintain this pressure but constantly tend to increase it as the gripping arches 17 press inward and upward. The internal pressure on the cap taking effect through rigid arches 100 16 tending to lift them, will act on the outer sides of arches 17 and tend to revolve them inwardly, thereby tightening the hold on the bottle and rendering it impossible to slip or give way without rupture of the metal. On the other hand by engaging any tool, such as a knife, 105 or key, or screwdriver, under the outwardly flared skirt of the arches 17, the cap may be easily loosened and removed. Where there is not great internal pres-



sure in the bottle the cap may be used over again. The packing does not need to be resilient, and I prefer to use oiled or paraffined paper for the purpose.

On Sheet 2 of the drawings, there is shown a modification for use on fruit and pickle jars, to be operated by hand. An open ring 28, made resilient against buckling, consists of a holding portion 29 to engage the glass cap 30 of a fruit jar 31, and outside this is a skirt consisting of upward bent integral arches 32 and downward bent severed arches 33, which latter are pushed inward to make the distance between them smaller than the diameter of the ledge 34 of the jar. As shown by dotted lines in Figs. 10 and 11 the ring is pushed down over the sloping ledge 34 and the conical ring is thus opened or spread so as to snap the arches 33 under the lid. The tendency of the metal ring to regain its normal position, as indicated by the dotted lines below, will cause the gripping arches 33 to push upward on the ledge and draw down the cover 30 by means of the rim 29.

In Fig. 12 I have illustrated the action of the upward pressure on the cover, showing how it tends to cause the gripping arch 33 to turn inwardly at  $f$  by reason of the action of forces  $f'$ ,  $f''$ ,  $f'''$  caused by the upward pull on the rigid arch 32. Thus while the ring may be easily put on by hand it produces its own constantly exerted and resilient pressure upon the mouth of the jar and this pressure is augmented by the action of the internal pressure lifting on the rim.

In many forms of the device, for convenience a skilled mechanic can make provisions for taking up the surplus metal on the outward bent portion 16, but usually the pressure of any circumferential tool will effect a pinching up of the arch  $b$  as shown in Fig. 6, and the metal is thus taken up. When the arch  $b$  is pinched by a slotted tool, the effect is much better and the upward bend being thus made small and forming a stiff ridge in the flange, the cap is more securely held in its proper condition after putting it on the bottle.

It will be understood that the forms of the invention

shown are merely for illustration and the skilled mechanic will readily develop other forms and uses of it.

What I claim as new and desire to secure by Letters Patent, is the following:

1. The combination with a bottle having an external ledge on the head, of a closing cap provided with downwardly inclined arches or bends adapted to engage said ledge by their edges, and also means on the cap for thrusting downwardly and inwardly said engaging arches. 45
2. The combination with a bottle head, of a closing cap comprising a cover, a series of inclined arches integral therewith and a series of intervening inclined arches severed therefrom, said arches being depressed and engaging the bottle head, substantially as set forth. 50
3. The combination with a bottle head having an external annular ledge, of a stopper cap comprising a cover and an inclined skirt or flange, parts of which flange are severed from the cover and depressed into locking engagement with said shoulder. 55
4. The combination with a bottle head, of a closing cap comprising a cover portion having attached thereto downwardly and inwardly bent arches of metal and intervening upwardly and outwardly bent arches, the downward bend engaging the bottle head by the edge of the metal and both arches standing at an acute angle with the plane of the cap. 60
5. A bottle closing cap having a flange with severed portions bent into downward arches gripping the bottle by their edges, said arches standing at an acute angle with the vertical when in place on the bottle. 65
6. A bottle closing cap comprising a cover having a radially fluted flange, the downward bends of said flange being severed from the cover and standing at an acute angle with the cover, and the upward bends being compressed to hold inward the downward arches to engage the bottle head on the edge of the metal, substantially as described. 70
7. In a bottle closing device, the combination with the bottle head, of a metallic cap having a continuous rim with portions severed and depressed into position to engage the bottle head by the edges of the metal of such depressed portions, the rim being inclined to the vertical. 75

In testimony whereof I have hereunto signed my name in presence of two witnesses. 80

FRANCIS W. H. CLAY.

In presence of—

E. R. RODD,  
CHAS. S. LEPLEY.