No. 755,275. PATENTED MAR. 22, 1904.

F. W. H. CLAY.

BOTTLE CLOSURE.

APPLICATION FILED APR. 13, 1903.

NO MODEL.

Fig. I

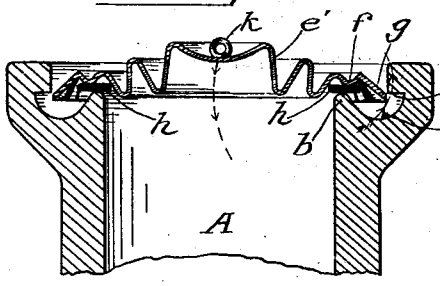


Fig. II

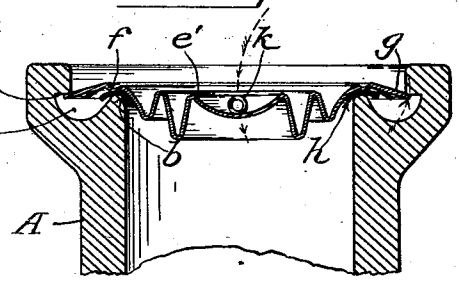


Fig. III

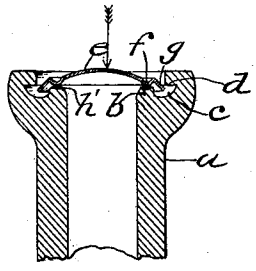


Fig. IV

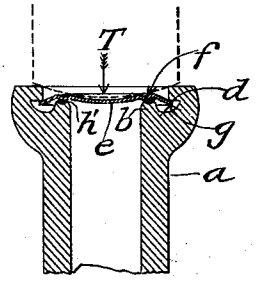


Fig. V

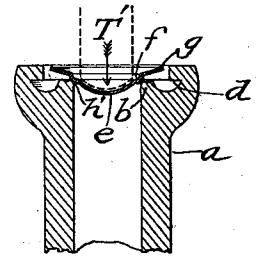


Fig. VI

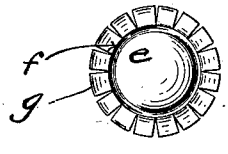


Fig. VII

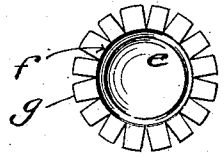


Fig. VIII

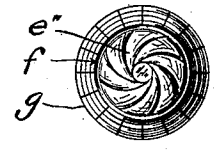


Fig. X

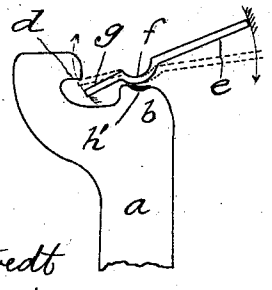
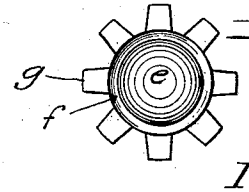


Fig. IX



Witness:
Paul Synnestvedt
Chas. H. Ebert

Inventor,
Francis W. H. Clay

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 755,275. Patented March 22, 1904.

UNITED STATES PATENT OFFICE.

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

BOTTLE-CLOSURE.

SPECIFICATION forming part of Letters Patent No. 755,275, dated March 22, 1904.

Application filed April 13, 1903. Serial No. 152,319. (No model.)

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 a certain new and useful Bottle-Closure, of which the following is a specification.

My invention relates to the means for hermetically sealing or stopping the mouths of bottles, jars and other like vessels; its primary object is to do away with the necessity in such devices of any packing having elasticity or resiliency; other objects are to avoid the use of rubber, cork, or other expensive or injurious material in contact with the contained liquid, to provide a stopper which by its own resiliency maintains the necessary pressure to make a perfect seal, and can be readily put in place and easily removed to open the bottle. Another object is to provide an efficient form of stopper-disk for these purposes. These objects and other advantages which will hereinafter appear, I attain by means of the device illustrated in preferred form in the accompanying drawings forming a part hereof, in which—

Figures 1 and 2 are sections of a jar and of one form of my closure in place therein, the first figure showing the stopper placed loosely in position and the second figure showing the same when buckled inward to make the seal.

Figures 3, 4 and 5 are sections of a bottle head and another form of my stopper in place therein, respectively showing the same in loose position, then as closed to seal the bottle, and last in position assumed in opening by thrusting the stopper inward.

Figures 6 and 7 are plan views of the stopper of Figure 3, before buckling, and after buckling, respectively. Figure 8 is a plan of a different form of stopper disk, before expansion.

Figure 9 is another form of the stopper which may be used.

Figure 10 is a diagram showing the action of the metal of the disk in buckling inward and catching under the lip of the bottle neck to induce the required pressure on the seat.

In all bottle stopping devices at present known to me the necessary pressure for the sealing is induced directly by the elasticity of the packing used, the latter being either rubber, which is simply resilient, or cork, which is both elastic and has the property of swelling when wet. Also the pressure induced on the elastic packing is generally applied in a direction radial to the neck of the bottle. This latter action is objectionable because it frequently causes fracture of the glass and because it is a delicate and difficult task for machinery to put the stopper in place and bend the metal used. And there is serious objection to the use of rubber for packing because it spoils beer and many other liquids in a short time, and objection to cork because it only makes a tight seal when wet and therefore requires a certain position of the bottle, and also because it is expensive, difficult to cut and very irregular in quality and texture. Both materials, moreover, rapidly deteriorate, and otherwise cause leakage. Besides these draw-backs, all practicable devices for stopping bottles, other than simple corks, require special and expensive machinery to place the stoppers in place; and the removal of the stoppers, when required to be opened by the user, is always difficult and disagreeable.

In order to overcome all the above disadvantages I use the devices shown. The closure illustrated in Figures 1 and 2 is designed more particularly for use on fruit or milk cans and is made so that it can be used over and over. The disk e' is corrugated to make the action easier—preferably in the form of Fig. 1. The jar A is made with an inwardly projecting lip d and has a circumferential ridge b as shown. The disk e' has also an annular rib f which comes about opposite to the rib or ridge b. The disk is of a size to nicely fit in the mouth of the jar, and may be placed first on a ring of some packing, h, which comes between the two ribs named. The disk then being forced inward and "buckled," the outer edge of the disk, by revolving about the rib b, expands and catches under the lip d in the position shown in Figure 2, when the resiliency of the metal of the disk maintains a pressure on the packing h (which thus does not need to be elastic), and seals the vessel between the disk and the rib b. The disk may be made of tin or any other

material which is resilient; the outer rim *g* should be split at intervals down to the rib *f*, or may be cut out so as to leave merely a series of lips as shown in Figure 9.

In Figures 3, 4 and 5 I have shown a bottle neck and head, and the disk therein. In this case I prefer to make the annular rib or seat *b* with a flat or slightly concaved surface and place therein a little wax or paraffin, *h'*. (Of course if it is desired I may use a packing of paper, or even rubber or cork could be used if there were any occasion for it; but I have shown a mere coat of wax for making a tight joint because I wish to emphasize the fact that the elasticity of the packing itself is not at all depended on to make the seal.) The disk being placed as in Figure 3, the center is depressed, as by a tool as indicated in dotted lines in Figure 4, and as it is buckled inward the elasticity of the metal of the disk brings about a thrust upward against the lip *d* of the bottle neck and the reactionary thrust downward on the rib *b* seats the latter tightly thereon. From Figure 10 it will be plain that the lever-like motion of the inner portion of the disk, *e*, about the rib *b*, causes the edge of the disk, *g*, to move outward and catch under the lip *d*. This movement is amplified by the flattening of the curve of the depressed metal in the rib *f* of the disk. The sealing wax *h'* makes the closure perfect by filling any irregularities in the form of the ribs. As a rule, I think paper would be the cheapest material to use in this place.

The use of the part of the disk outside the rib *f*, being only to induce the reaction of the disk from the lip *d* on the rib *b*, it will generally be cheapest to make the disk of the form of Figure 9, with a few arms *g*. The form of the rib *f* causes it to be stiff, and therefore it does not need to be held down at every point.

The device as shown in Figures 1 and 2 may be opened by hand, by simply pulling out the crown of the disk by the eye *k*, buckling the disk back into its original position. The device as used on beer bottles, for instance, will need to be quite stiff in order to withstand the inside pressure; it is opened either by inserting a sharp tool, or, as I prefer, by pushing it inward as by the tool T' as indicated in Figure 5, or with the thumb, until the lip *d* releases the resilient edges, *g*, of the disk, when the stopper may be simply lifted out of place. In the manufacture of the disks *e* it is generally best to form the annular rib *f* by spinning, which increases the resiliency of the metal at this point so that the necessary elasticity of the flange parts outside of it is gained without making the inner portions of the disk too stiff for easy action in buckling inward. The thickness of the metal of the disk will, of course, be regulated by the pressure required in the reaction against the rib *b* to withstand the pressure of the contents of the bottle. The corrugated form of the disk shown in Figure 7 increases the ease with which the stopper may be put into place, without diminishing the resistance offered to the inside pressure. The design may be otherwise varied for this purpose.

It will be seen that when the stopper is put in place and bent into the form shown in Figure 4 the resiliency of the metal disk itself will induce a constant live pressure upon the rib *b* and on the packing thereon, so that no amount of shrinkage of the packing will weaken the seal, the condition of the packing being of no consequence and no elasticity of the packing being at all necessary. The extreme ease and convenience of the operation of opening the stopper will be at once apparent; and the cheapness and simplicity of the device also are evident. The placing of the stopper requires no special machine or implements.

I am aware of those constructions in which a metal disk is made non-resilient and expanded against an elastic packing in order to hold the latter in place by the permanent form of the disk; but the deterioration of the packing, or its shrinking, in such devices, releases the pressure and causes leakage. The device shown herein is designed to avoid this difficulty by providing for all the pressure in the disk itself, and not the packing, and the allowance of possible play in the position of the disk at all times, if the packing expands or contracts.

Having thus described my invention and illustrated its use, what I claim, and desire to protect by Letters Patent, is the following:

1. The combination with a vessel provided with two seating surfaces of different diameter, of a concave resilient disk buckled inward from normal position and resting in contact with said two surfaces by leverage stress induced by the buckling movement.

2. The combination, of a vessel having within its mouth an annular rib and an inwardly projecting ledge, and a resilient disk concaved upward and having an expansible flange to cooperate with the ledge of the vessel mouth to induce a thrust between the disk and the said rib when the disk is buckled inward.

3. In a bottle stopping device a concave disk having an annular bearing surface lying in a plane without the plane of the edge of the disk, whereby indenting the concave body of the disk alters the distance apart of the planes of the edge and of the said bearing surface, for the purpose described.

4. The combination with a vessel formed with a mouth having an annular bearing ledge and an annular bearing rib, of a concaved disk of resilient material adapted to be buckled or reversed in its concavity for the purpose specified.

5. A vessel having a mouth provided with two annular bearing surfaces therein of different diameters, combined with a concaved

disk of resilient material adapted to induce pressure on the said two bearing surfaces by reversing the concavity of the disk, substantially as described.

6. A bottle stopper comprising a resilient disk having a concaved center, an annular rib, and a divided annular flange outside the said rib, for the purpose described.

7. The combination with a resilient stopper disk, of a vessel having a mouth with a seating rim and an abutment ledge of different diameter from, but lying in nearly the same plane as, the said rim, for the purpose specified.

8. A bottle closure comprising in combination the bottle mouth having two bearing surfaces, and a resilient concave disk, the disk being adapted to engage its rim and catch under one of said surfaces by buckling inward and to rest by leverage stress on the other of said surfaces.

9. A vessel having a mouth provided with two annular bearing surfaces for vertical pressure, being of different diameters, combined with a concaved disk adapted to fit in the said mouth and rest on one of the said bearing surfaces and to expand its edges to engage the other of the bearing surfaces, when buckled in or reversed in its concavity, substantially as described.

10. A bottle stopping device comprising a disk of general concaved form having split or divided edges and having annular corrugations, substantially as described.

11. A bottle having a mouth provided with an annular rib therein, an annular retaining lip outside of the said rib, combined with a concaved disk having an annular ridge corresponding to the said rib of the bottle and a split outside flange whose edge lies in a different plane from that of the said ridge, to engage the said retaining lip of the bottle when the disk is buckled inward.

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

FRANCIS W. H. CLAY.

Witnesses:
PAUD SYNNESTVEDT,
CHAS. H. EBERT.