

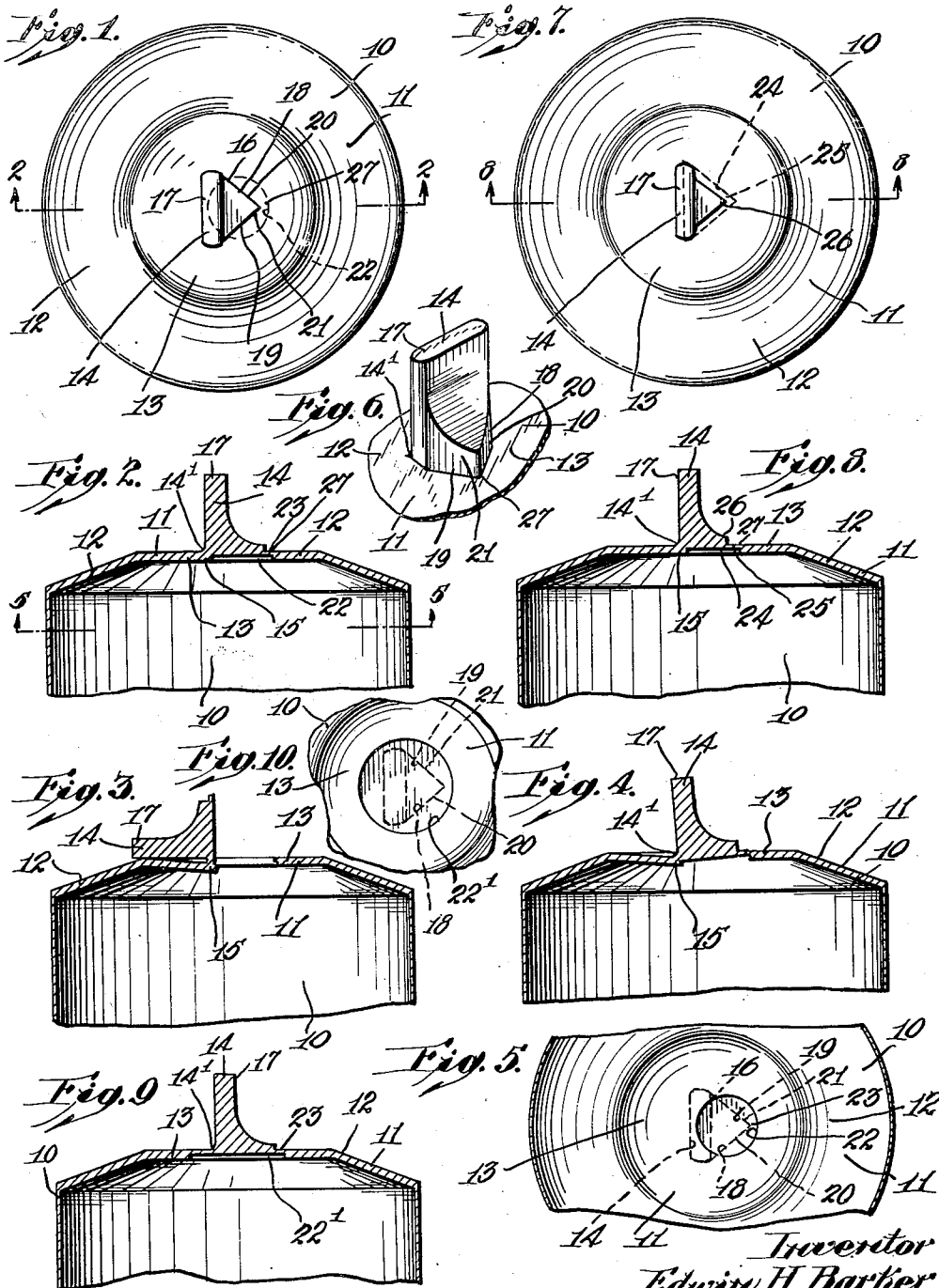
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SINGLE USE TUBE

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SINGLE USE TUBE

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This invention relates to single use collapsible metal tubes.

One of the purposes of the invention is to facilitate the opening of a single collapsible metal tube.

A further purpose is to provide an opening lever projecting from the shoulder of a collapsible metal tube, having the lever fulcrum on a relatively solid portion of the shoulder of the tube and adapted to break the tube open by tension along the outline of one of two lever arms.

A further purpose is to provide an opening lever with a fulcrum at an intermediate point in the lever length and with a wedge shaped attachment within the shoulder of a collapsible metal tube, the tube being weakened beneath the edge of this attachment so as readily to be torn by tilting the lever.

A further purpose is to provide the shoulder of a single use collapsible metal tube with a triangular projection terminating in an operating lever and weakening the tube beneath the edge of the triangular outline of the lever so as to facilitate tearing.

A further purpose is to provide tearing of the end of a single use collapsible metal tube with fulcrum upon metal thicker than that intended to be torn, adapted to replace the lever approximately to initial position for closure of the opening after tearing and partial discharge.

A further purpose is to tilt a lever upon a fulcrum acting as a hinge, tearing and detaching the lever and freeing from the rest of the tube, the fulcrum permitting replacement of the lever to close the opening after partial discharge.

A further purpose is to connect a tiltable, opening projection along one portion or face with a stronger front tube wall than along other portions thereof, facilitating tearing of the weaker front wall by tilting of the projection upon the stronger wall as a fulcrum.

A further purpose is to provide a tearing lever arm integral with a tube wall, the lever arm having an extended fulcrum bearing at one end and a narrow tearing point at the other.

Further purposes will appear in the specification and the claims.

Figure 1 is a top plan view of one form of my invention.

Figures 2, 3, and 4 are sections corresponding in position to line 2-2 of Figure 1 and showing a tube before and after opening and after subsequent partial reclosure of the tube.

Figure 5 is a section of Figure 2 upon line 5-5, looking in the direction of the arrows.

Figure 6 is a perspective view of an operating lever which may be used to carry out the invention.

Figure 7 is a top plan view of a modified form.

Figure 8 is a section of Figure 7 upon line 8-8.

Figure 9 is a fragmentary section of a further slightly modified form.

Figure 10 is a fragmentary bottom plan view of the form of Figure 9.

In single use collapsible metal tubes many efforts have been made to provide for ultimate tearing of tube walls while maintaining sufficient present strength and reliability of closure of the tubes for shipping and storage purposes pending opening of the tubes for use.

In the present invention it is the intention to provide a fulcrum or heel upon the shoulder of the tube for a tiltable opening lever, one of whose "arms," comprising the inner end of the lever, acting as a toe is integral with the end of the tube. It opens by tearing out a part of the shoulder of the tube as the lever is turned about its fulcrum.

In the best embodiment known to me the metal of the end at the fulcrum of the lever is made thicker than the connection of the lever along the paths at which tearing is intended to take place, the projection being triangular, using one of the sides of the triangle as a fulcrum and tearing along the other sides. In particular, it is desirable to have the bearing or support for the fulcrum much more extensive than the tearing end or "point" of the lever "arm," at which point tearing normally will start.

The tube 10 is shown as closed at the front by shoulder 11. The general contour of the surface of this shoulder 11 is shown conventionally since the shape may vary greatly. In this conventional showing the front tapers to form a convex ring 12 about a central transverse plate 13 which is used as a convenient place for the tearing section. The opening lever 14 is integrally connected with this section 13.

The base 15 of the opening lever 14 is integrally connected with the front wall. The lever fulcrums upon this shoulder as it turns in its movement to open the tube. The fulcrum support has the width of one side of the lever base and is preferably given the normal thickness of the front shoulder.

In the preferred form the base 16 of the opening lever is triangular. At one side, the fulcrum side, the metal extends away from the front in a bar 17 to the full operating lever length. Filletting is

shown at 14'. At the other two sides 18 and 19 of the triangular base the walls 20 and 21 are short and the metal surface merges into the operating lever bar surface. The lever has two arms. One is bar 17, the other is the triangular base defined by the metal between sides 18 and 19.

The outer face of the plate 13 may be generally plane, a matter of appearance rather than of mechanical construction.

- 10 The fulcrum of the operating lever is not fixed. The lever does not turn upon a surface but about the adjacent metal of the shoulder. Its effective axis may progressively vary but lies somewhere in the shoulder wall. Where the metal has been reduced in thickness about the fulcrum, as in Figures 9 and 10, the fulcrum locus will lie largely, if not wholly, within the thinner part of the adjacent strip.

- 20 The opening lever 14 in turning about its fulcrum tilts the other two sides 18 and 19 of the triangular base, and the metal between, and tears the metal along these sides loose from the rest of the front of the tube. The tearing strain appears first and is greatest at the outer lever and where these sides meet.

- 30 In any particular construction the designer will, of course, give the fulcrum needed support for the lever's tearing function, depending, among many considerations upon the stiffness of the shoulder, the metal employed, and the amount to which the metal may safely be weakened along the tearing area.

- Construction and test with tubes of nearly pure tin containing some copper, in the form seen in Figures 9 and 10, have shown that the fulcrum can be supported satisfactorily by a thickness of metal immediately adjacent the fulcrum considerably less than the normal thickness of the shoulder. This can be understood from the fact that the fulcrum support extends over a considerable shoulder area whereas the tearing strain is concentrated initially upon a small area. For additional stiffness the metal at the fulcrum has been shown in the other figures as the normal thickness of the shoulder. The metal along the other two sides 18 and 19 of the triangular base, and at the junction of these sides, viewed as the apex of the triangle, is weakened so as to facilitate the tearing operation.

- 50 The weakening of the tube is shown as located in any of several slightly different areas; for example, in Figures 1-5 the metal is relieved at 22 over an area shown as circular within the under side of the shoulder (and part of it beneath the lever, where of course it does not weaken) so as to leave the wall beneath the fulcrum of the full thickness of wall 12 while thinning over an area 23, corresponding to that part of the area 22 which lies adjacent to and outside of sides 18 and 19 and their junction point.

- In Figures 7 and 8 an alternative construction is shown in which the metal is relieved throughout an area shown within the triangle dotted in Figure 7 as at 24 so that there are narrow strips 25 adjacent to and outside of the sides 18 and 19 of the triangle and their junction point 26 which are weakened effectively. Again relieving the portion of the triangular area lying beneath the triangle base does not result in weakening that wall; and as in Figure 1 it is only where the relieved portion lies outside of the base of the tiltable lever that it is effective for the purpose of weakening the shoulder.

- In either event the V-shape of the tearing portion of the lever concentrating initial tearing pres-

sure upon point 26 greatly facilitates the tearing of the weakened metal in the front wall. The tearing tends to start at 27, closely adjacent the point 26 of the V. This tendency is due in part to the greater distance of this point from the fulcrum and in part to the fact that the pull upon the adjacent metal is most effective when it is concentrated as at the point 26.

In Figures 9 and 10 the relieved area 22', also shown as circular, weakens the shoulder walls throughout an area completely surrounding the lever base.

In operation the lever is pressed by hand from the position seen in Figure 2 to approximately that seen in Figure 3. It tends to turn about the fulcrum. When the pressure is first applied the tendency to lift the point about the fulcrum concentrates pulling strain upon the apex (26) of the triangle, since this lies farthest from the fulcrum. The strain causes the metal to be torn progressively from point 27 along sides 18 and 19.

One of the advantages of the invention is that the lever 14 can be swung back from the open position to approximately the position seen in Figure 4 after part of the contents have been withdrawn, so that the lever can be used as a plug to close the opening.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A collapsible metallic tube including a shoulder and a lever integral with the shoulder, one lever arm extending away from the shoulder as an operating arm and the other arm, a tearing arm, forming part of the shoulder and having a wide fulcrum end and a narrow tearing end.

2. In a single use collapsible metal tube, a collapsible tube body terminating in a shoulder and a lever on the shoulder having a portion adapted to act as a fulcrum and a portion of V section adapted to act as a lever arm for tearing purposes.

3. In a single use collapsible metal tube, a collapsible metal body having a closed shoulder and an opening lever upon the front of the shoulder, the base of the lever connecting in one portion of its attached area with thicker shoulder metal than in other portions of its attached area.

4. In a single use collapsible metal tube, a collapsible tube having a shoulder largely of normal thickness and a portion of the shoulder of reduced thickness and a lever on the shoulder, a part of the lever connecting with shoulder material which is not reduced in thickness and a part of the lever connecting with adjacent shoulder material of reduced thickness.

5. In a single use tube, a tube body terminating in a shoulder thinned in a part of its area in combination with an opening lever having a heel and a toe integrally united with the shoulder and adapted to tilt about the heel to break the shoulder along the lines of the toe and at the thinned area.

6. In a single use collapsible metal tube, a tube body terminating in a shoulder reduced in thickness in one section and an opening lever integral with the shoulder having a fulcrum out-

side the reduced thickness section and a tearing part within the reduced section.

5 7. In a single use collapsible metal tube, a tube body terminating in a shoulder having a portion of the shoulder recessed from the interior of the tube to reduce the thickness of the shoulder and an opening lever having a base connected in part with the unreduced shoulder and in part with the recessed shoulder, the recess being off center with respect to the base of the lever so that a portion of the lever base rests free from the recess.

10 8. In a single use collapsible metal tube, a tube body terminating in a shoulder having a portion of the shoulder recessed from the interior of the tube to reduce the thickness of the shoulder and an opening lever connected in part with the unreduced shoulder and in part with the recessed shoulder, the base of the lever being tapered and the recess being circular and extending beneath the smaller end and the adjacent sides of the taper.

15 9. In a single use collapsible metal tube, a tube body terminating in a shoulder having a portion of the shoulder recessed from the interior of the tube to reduce the thickness of the shoulder and an opening lever connected in part with the unreduced shoulder and in part with the recessed shoulder, the lever having a broad base and narrow end and the recessed portion following the outline of the intermediate sides and

about the narrow end to provide for tearing along two sides of the base.

10. A collapsible metallic tube having a closed shoulder and a lever integral with the shoulder having a triangular tearing arm forming part of the shoulder and the other arm an operating arm extending outwardly from the shoulder from the position of one of the sides of the triangle whereby the juncture of the other two sides of the triangle becomes effective as a tearing point to start tearing of the shoulder when the lever is tilted about the fulcrum at the first named side.

11. In the opening of a single use collapsible metallic tube having a closed shoulder and a lever on the front of the shoulder with one arm whose base lies therein. The method of facilitating tearing of the shoulder which consists in providing a wide fulcrum for the lever and a narrow point at the opposite end of said lever arm.

12. In the opening of a single use collapsible metallic tube having a closed shoulder and a lever on the front of the shoulder with one arm whose base lies therein, the method of facilitating tearing of the shoulder which consists in providing a wide fulcrum for the lever and a narrow point at the opposite end of said lever arm and in weakening the shoulder metal adjacent the narrow end of the lever arm.

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