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2,274,173

COLLAPSIBLE TUBE

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Fig. 1.

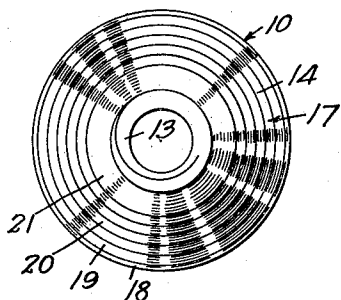


Fig. 2.

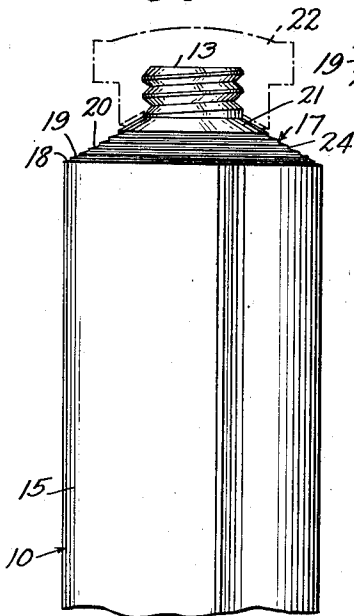


Fig. 3.

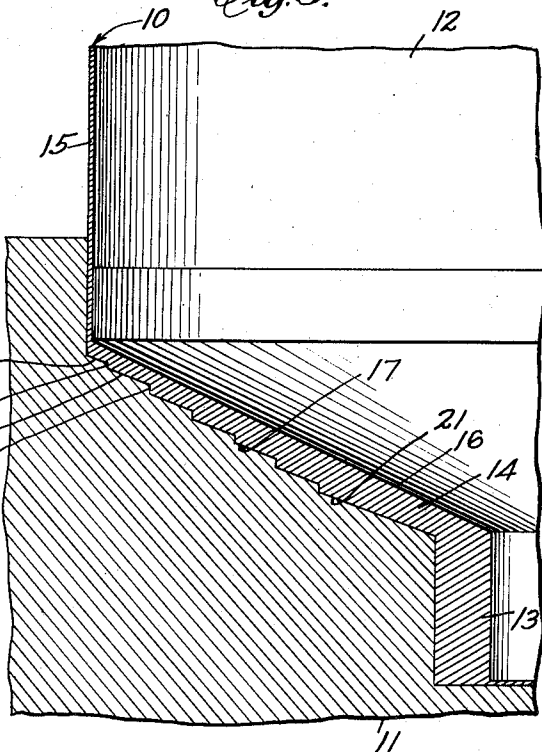
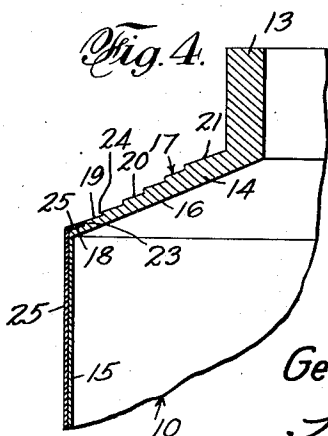


Fig. 4.



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COLLAPSIBLE TUBE

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5 Claims. (Cl. 41—10)

This invention relates to collapsible tubes and particularly to that type wherein a cylindrical body is connected to the usual threaded neck by means of a generally conical connecting wall or shoulder.

The cylindrical body is usually enameled and printed in various colors and much effort is expended in designing the tube so that it may present as attractive an appearance as possible. A cap for the tube is also made in various designs so that the entire container will present the best possible appearance. While attempts have also been made to ornament the shoulder, it has been difficult to do so because of the difficulties of impressing designs on or in the shoulder owing to the methods employed in the manufacture of collapsible tubes. Such tubes are made by the impact extrusion method, that is, by squeezing a slug of suitable material such as tin or aluminum in a female die by means of an elongated male die whereby part of the metal of the slug is formed into shape between the dies to produce the neck and shoulder, and the remainder squirts upwardly out of the female die and around the male die to form the cylindrical body. The flow of metal between the dies in the formation of the neck and shoulder of the tube causes the formation of fine radial lines, markings or streaks on the outer visible surface of the shoulder. Consequently, regardless of how highly the die surfaces are polished, the shoulder appears streaky and dull and is not given the desirable high polish needed for good appearance.

Furthermore, when the cylindrical tube body is enameled, some of the enamel overflows the juncture of the body and the shoulder at the base of the shoulder, causing a ring of enamel to be deposited at and around said base. Such ring is invariably of irregular outline since it cannot be controlled and detracts from the essential good appearance of the tube.

My invention therefore contemplates the provision of a tube having a shoulder from the outer surface of which the marks or streaks have been substantially eliminated as a direct result of the extruding operation and thereby presenting a polished and attractive appearance.

My invention further contemplates the provision of an outer surface on the tube shoulder formed of a series of concentric conical surfaces joined by coaxial cylindrical surfaces, which function to retard and limit the flow of metal on the shoulder during the extrusion operation, and which being substantially free of streaks retain their lustrous, polished, glistening and reflecting appearance, greatly improve the good appearance of the shoulder, and also serve to act as a barrier at the base of the shoulder limiting the flow of enamel past the body of the tube and causing the

formation of a precisely uniform and sharply defined ring of enamel at said base.

The various objects of the invention will be clear from the description which follows and from the drawing, in which,

Fig. 1 is a top plan view of a collapsible tube provided with a shoulder embodying my invention.

Fig. 2 is a fragmentary front elevation of the same showing the cap of the tube in dash-dot lines.

Fig. 3 is a fragmentary vertical section of a pair of extruding dies used in the extrusion of my improved tube and showing part of the tube formed thereby.

Fig. 4 is a fragmentary vertical section of the enameled tube showing the sharply defined inner edge of the ring of enamel at the base of the shoulder.

In the practical embodiment of my invention which I have shown by way of example, the tube 10 is formed by depositing a suitable disc or slug of metal in the female die 11 whereafter the male die 12 is forced into the female die to squeeze part of the slug into the proper shape to form the neck 13 and the shoulder 14 between the dies. The remainder of the metal of the slug flows rapidly upwardly out of the female die and around the male die 12 to form the cylindrical body portion 15 of the tube. The shoulder 14 is provided with the usual inner conical surface 16, but my invention contemplates that the outer surface 17 thereof be peculiarly formed. Said outer surface instead of being one continuous or substantially continuous conical surface is discontinuous in that it is stepped or given a "shingled" appearance. It consists of the comparatively narrow vertically spaced, coaxial and concentric conical surfaces 18, 19, 20 and the like, and terminates at its upper end where it joins the neck 13 in the somewhat wider conical surface 21 adapted to be covered by the cap 22. That conical surface 18 at the base of the shoulder is preferably somewhat narrower than the remaining surfaces 19, 20, and is intended to receive the overflow of the coat of enamel 25 on the body 15. Said coat of enamel, when applied to the body, overflows the edge of the body and is deposited on the narrow surface 18. The vertical cylindrical surface 23 at the inner edge of said surface 18 acts, however, as a barrier or dam for the overflowing enamel. Said shoulder 23 is concentric with the axis of the tube and with the conical surfaces 19, 20 and not only serves as a barrier for the flow of enamel therepast, but causes enamel to pile up against the shoulder thereby to form a ring having said shoulder as the sharply defined inner edge thereof. The remaining conical surfaces as 19, 20 also terminate in similar cylindrical surfaces as 24 of slight depth equal to a minor frac-

tion of the width of the cylindrical surfaces and on the order of several thousandths of an inch.

The surfaces 18, 19, 20 and 21 are concentric with and parallel to each other and each is arranged at an angle of about 10° to the line joining the upper edges of the shoulders 23 and 24, which line makes an angle of approximately 30° with the plane of the cross-section of the tube. There is thus formed a series of lustrous reflecting surfaces substantially free of streaks or markings as a direct result of the extruding operation and having a polished and reflecting appearance thereby reflecting light and forming a clean, neat and attractive surface without the necessity for any further finishing or operation thereon.

It will be noted that the pressure of the male die 12 upon the female die causes the metal of the slug to flow generally upwardly and outwardly from the center of the female die. The metal thus attempting to flow is stopped by the stepped shoulders of the female die corresponding to the shoulders 23 and 24 of the tube. Said shoulders act as barriers preventing material flow of the metal and thereby prevent the marking and streaking above-referred to. This is particularly advantageous when metal such as aluminum or zinc and alloys thereof are used for the tube. Such harder metals are more easily streaked and dulled than the softer metals such as tin and while my invention is particularly applicable to the harder metals, it will be understood nevertheless that it is also applicable to tubes made of tin or the like. Furthermore, downward pressure of the die 12 upon the female die acts upon the metal caught by the stepped shoulders of the die and prevented from flowing, and presses or irons out the surfaces 19, 20 and 21 and thereby smooths out and eliminates any small streaks or markings which might otherwise remain in the surface, even though the flow of metal between one shoulder of the die and the next is comparatively small.

It will be seen that I have provided a tube having a shoulder presenting a polished and reflecting surface formed in one operation without the necessity for polishing or further finishing thereof, and that such surface is easily wiped and kept clean while presenting the much sought and highly desirably ornamental appearance and consequently meets the requirements of practical use.

It will be noted that while I have shown and described a particular embodiment of my invention, various changes may be made therein without departing from the spirit of the invention and coming within the range of equivalents afforded by the appended claims.

I claim:

1. In an impact extruded collapsible tube having a body portion and a neck joined by a shoulder, an outer discontinuous surface on the shoulder consisting of a series of spaced and coaxial lustrous and reflecting conical surfaces each tapering toward a different apex and each substantially free of die markings and being smooth and reflecting in the extruded state of the tube, and a series of coaxial cylindrical surfaces coaxial with the conical surfaces and each joining the inner edge of one conical surface to the outer edge of the adjacent conical surface and forming sharp corners at said edges, said tube and surfaces being formed by a single operation.

2. In an impact extruded collapsible tube, a generally conical shoulder having a stepped outer

surface consisting of a series of conical surfaces in vertical spaced relation, said surfaces being lustrous and reflecting as a direct result of a single extruding operation and tapering toward different apices, and a series of cylindrical surfaces coaxial with and having a width of a minor fraction of that of the conical surfaces, each cylindrical surface connecting the outer edge of one of the conical surfaces to the inner edge of the next adjacent conical surface and forming sharp corners at said edges.

3. In a collapsible tube having a body portion and an integral shoulder, a lustrous outer conical surface at the base of the shoulder extending to the body portion and of less width than that of the shoulder, a barrier cylindrical surface outstanding from the inner edge of the conical surface and having a height on the order of several thousands of an inch, and a coat of enamel on the body portion and on the conical surface and terminating at the cylindrical surface, said cylindrical surface constituting a barrier against the flow of enamel therepast when the enamel is in a fluid state.

4. In a metallic collapsible tube having a body portion and an integral shoulder extending from the body portion, a lustrous reflecting outer surface on the shoulder consisting of a plurality of vertically spaced and concentric conical surfaces each tapering toward a different apex and each terminating at its inner edge in a coaxial cylindrical surface having a height of a minor fraction of the width of the conical surface and formed in a single operation by limiting the distance through which the metal forming said surfaces is permitted to flow, and a coating of enamel on the body portion covering the adjacent conical surface and terminating at the cylindrical surface bounding said adjacent conical surface, said bounding surface preventing the flow of excess enamel therepast when the enamel is applied in a liquid state to the surface of the body portion of the tube.

5. An impact extruded collapsible tube comprising a body portion, a neck, and a shoulder joining the neck and body portion, said shoulder having a stepped outer surface thereon consisting of a series of vertically spaced coaxial and concentric conical surfaces each tapering toward a different apex, the inner edge of each of the conical surfaces being joined to the outer edge of the adjacent conical surface by a coaxial cylindrical surface having a height of a minor fraction of the width of the narrowest of the conical surfaces, there being sharp corners at the junctures of said surfaces, the conical surfaces each being arranged at an angle of approximately 10 degrees to the line joining the corresponding sharp corners of adjacent conical surfaces, said surfaces being lustrous and reflecting as the direct result of the extruding operation forming the tube, the conical surface at the base of the shoulder being of less width than the remaining conical surfaces, and a layer of enamel on the outer surface of said body portion extending on to and covering the conical surface at the base of the shoulder, the innermost edge of said layer stopping at and being limited and sharply defined by the cylindrical surface at the inner edge of the last-mentioned conical surface, whereby excess enamel piles up vertically against said last-mentioned cylindrical surface without flowing therepast.

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