

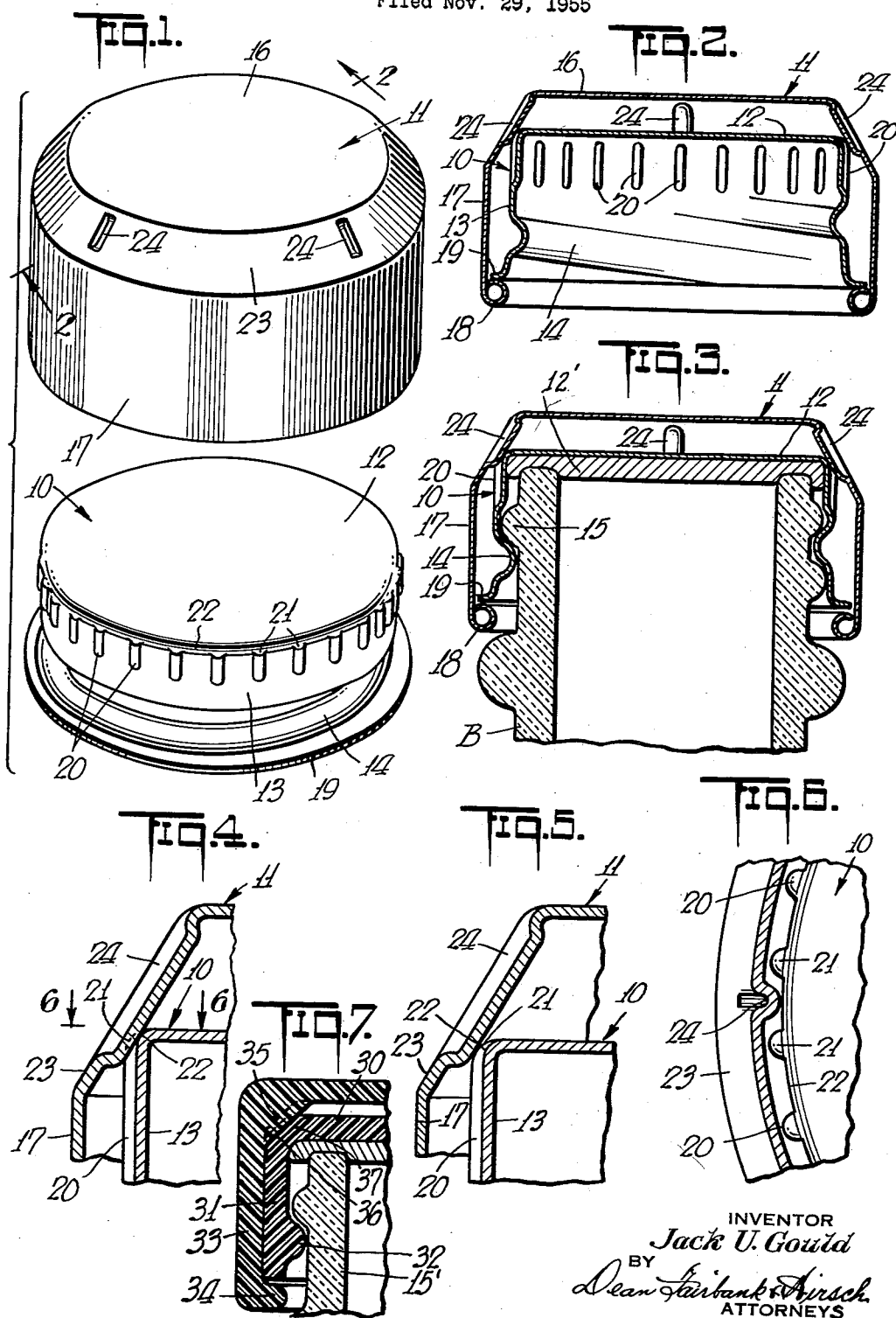
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J. U. GOULD

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SAFETY BOTTLE CLOSURE

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INVENTOR
Jack U. Gould
 BY *Dean Fairbank Hirsch*
 ATTORNEYS

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SAFETY BOTTLE CLOSURE

Jack U. Gould, Brooklyn, N.Y., assignor to Ferdinand Gutmann & Co., Brooklyn, N.Y., a corporation of New York

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1 Claim. (Cl. 215—9)

The present invention is concerned with safety bottle closures, more especially with re-seal bottle closures that cannot be opened by the mere act of unscrewing and this for the purpose of rendering them substantially proof against access by small children who thus are protected from sickness or death by tampering with bottles of pharmaceuticals, vermicides or other toxic substances.

It is among the objects of the invention to provide a screw or lug cap, tamper-proof for the purpose stated and of the type comprising two concentric shells, free from driving connection, so that turning the outer shell will not unscrew the inner shell, the latter to be driven by the former only by an operation in addition to the turning movement, beyond the scope of a small child, all without resort to a jostling operation or holding the bottle in an unusual position and without resort to a coin, key, nail or other tool, or to a keying instrumentality that is part of and extends from the cap, and in the absence of any auxiliary element, not even a spring or a gasket in addition to the two shell elements and which shall be of correspondingly low cost and ruggedness, and shall be substantially proof against derangement as by jamming or otherwise.

In general the invention involves the use of nothing more than two concentric shell elements, viz., a screw shell with its conventional liner to be pressed against the rim of the bottle, and an encompassing outer shell interturned at its rim to keep the two shell elements from disassembly. The screw shell and outer shell are made with complementary conformations that ride freely over each other in turning the outer shell, so that the screw shell cannot be unscrewed, but upon a manipulation, such as downward pressure maintained in the turning action, the conformities intermesh and remain intermeshed for driving the screw shell in turning the outer shell. These complementary conformations may be at any of a wide variety of positions in the shell elements but are preferably near the peripheries of the upper ends of the shells. For this purpose the skirt of the screw shell desirably has a knurled or toothed crown adjacent its end wall, the rim of which has a rounded fillet at the junction with the skirt and essentially below the top of which fillet the upper rounded ends of the crown teeth are located. The complementary conformation of the outer shell desirably consists of radial ribs in a peripheral chamfer connecting the end wall to the skirt of the outer shell, said ribs either resting upon the fillet of the inner shell or entering at most between the upper rounded ends of crown teeth, so that simply turning of the outer shell on the bottle will not result in driving the inner screw shell which remains affixed to the bottle neck. When, however, an initiated

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person turns the outer shell, while pressing its end wall downward, the ribs in the chamfer of the outer shell will effectively enter and remain between consecutive teeth of the knurled crown so that the two elements of the cap will be keyed together, and accordingly, in rotation of the outer shell, the inner shell will move therewith for opening the bottle and incidentally a like operation while turning in reverse direction is required for applying or re-applying the cap to the bottle.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a dropped perspective view showing the two component elements of the cap,

Fig. 2 is a longitudinal cross-section showing the cap in normal or non-driving relation of the outer to the inner shell thereof, and taken along line 2—2 of Fig. 1,

Fig. 3 is a view in longitudinal cross-section showing the relation of the cap parts when downward pressure is exerted on the outer cap for unscrewing the cap from the bottle,

Fig. 4 is a fragmentary sectional view of the cap on a greatly enlarged scale, showing the position of the two shell elements thereof for driving the inner from the outer shell,

Fig. 5 is a view similar to Fig. 4, showing the position of the shell elements when in normal or non-driving relation,

Fig. 6 shows a fragmentary cross-section taken on line 6—6 of Fig. 4, and

Fig. 7 is a fragmentary view in longitudinal cross-section showing an alternative embodiment of safety bottle closure installed upon a bottle.

Referring now to the drawings the tamper-proof bottle closure consists of an inner screw shell, desirably a stamped sheet metal screw shell 10 and an outer shell 11, desirably also of stamped sheet metal, which encompasses the inner screw shell and imprisons the latter from separation thereof by suitable enlargement at the rim of the outer shell, which extends under the rim of the encompassed screw shell 10.

The inner sheet metal screw shell 10 has an end wall 12 and a skirt 13, the latter with a screw thread indentation 14 for coaction with the thread 15 molded about the neck of a conventional bottle B. The inner shell has the conventional liner 12' against its end wall 12.

The outer shell 11 is unthreaded and comprises an end wall 16 and a cylindrical skirt 17. The skirt of the outer sheet metal shell is preferably interturned by beading inward as at 18 under the lower edge 19 of the inner shell to prevent separation of the shell elements.

The respective shells are conformed in such manner that the outer shell, which alone is accessible for manipulation when the cap is positioned over the bottle neck, either in application or removal, will turn freely over the inner shell and so will deliver no torque, either for screwing the inner shell upon the bottle neck or for unscrewing it from the bottle neck.

For transmission of torque for either screwing the inner shell upon, or unscrewing it from the bottle, the respective shells have complementary conformations integral therewith, which effect a torque transmitting connection therebetween only while hand pressure is applied downward against the exposed end of the outer shell 11.

For this purpose the inner shell is provided with a series of teeth 20 equidistantly spaced about the inner shell, each of said teeth 20 being shown as extending at right angles to the end wall or parallel to the axis and may be in the order of .06 inch long. The center to center distance between consecutive teeth 20 is desirably about .09 inch, while the width of each knurl tooth may be in the order of .03 inch circumferentially of the shell so that the trough between consecutive teeth may be in the order of .06 inch in width circumferentially of the shell. The radial thickness of the teeth may be in the order of .010 inch. As best shown in Figs. 5 and 6, each tooth is rounded at 21 at its upper end, which may merge with the rounded fillet 22 between the end wall 12 and skirt 13 of the inner shell 10.

The outer shell 11 is peripherally chamfered at 23 between its end wall 16 and its skirt 17. That chamfer may desirably extend at an angle of about 45°. The chamfer has a plurality of radial inwardly extending ribs, which in the sheet metal embodiment shown are shown indentations 24. Illustratively such indentations are uniformly spaced at intervals of 90° around the periphery of the upper end wall 16 of the outer shell, though of course any other number of indentations could be used that constitutes a factor of the number of teeth on the inner shell. Thus if the inner shell has 36 teeth, the ribs or indentations in the chamber of the outer shell may be 2, 4, 6, 12 or 18 or 36 in number, four, six or twelve such ribs or indentations distributing the turning twist adequately to avoid undue wear of the teeth. The indentations are illustratively in the order of about .080 inch long, about .030 inch wide and .015 inch deep. With the outer shell normally resting on the inner shell, the radial indentations 24 of the outer shell, either rest upon the curved ends 21 of the corresponding teeth 20 or may extend between such curved ends, as shown in Fig. 6. In turning the outer shell, as thus rested, the radial indentations 24 therein will simply ride over the ends of the knurl teeth 20 and be cammed outward. Accordingly, no driving torque is or can be transmitted to the inner screw shell which cannot be removed by merely turning the outer shell, regardless how vigorously.

However, if pressure is applied, as for instance by the palm of the hand, against the end wall 16 of the outer shell, while turning such outer shell, the pressure will cause the radial indentations 24 of the outer shell to enter and remain between the upper ends of consecutive teeth 20, and as the outer shell is turned while the pressure of the palm is thus continuously exerted, the radial indentations 24 will remain between the corresponding teeth 20 so that the inner shell will be effectively keyed to the outer shell and be rotated therewith, either for applying the cap to or removing the cap from the bottle.

Thus by a simple conformation, effected in the single fabricating stamping operation of the inner screw shell and a like single stamping operation of the outer shell, and by simply rolling the rim of the outer shell under the inner rim of the screw shell after the latter has been inserted, a cap is produced which is tamper-proof as far as small children are concerned.

An adult or a grown child of adequate discretion, will have no difficulty in unscrewing the cap from the bottle of pharmaceutical, verimicide or other toxic substances in the manner set forth. A young child, however, would lack the ability and strength to unscrew the cap.

It will of course be understood that either or both of the shell elements could be made if desired of plastic rather than of metal. If the inner shell is of plastic, the outer shell can be rolled under its rim exactly as shown in Figs. 2 and 3, if that shell be of metal.

In the embodiment of Fig. 7, there is shown a safety bottle closure installed on bottle neck 15' in which the inner shell 30 of suitable plastic has a skirt 31 with thread conformation 32 coacting with the thread molded on the bottle neck 15'.

The outer shell 33 also of plastic has an inturned peripheral ledge 34 extending under and confining the inner shell 30.

To effect the driving connection between the two shells, knurl teeth 35 molded illustratively on the chamfer 36 between the end and skirt of the inner cap 30 coact with ribs 37 formed radially in the chamfer junction between the end and skirt of the outer shell 33.

In order to permit assembly of the two shell elements without a subsequent molding operation, the outer shell 33 is preferably made of suitable elastic material such as polyethylene which permits it to be stretched outwardly for introduction of the inner shell therein so that upon release it snaps back into normal position to extend under the edge of the inner shell. The mode of coaction between the two shells for free rotation of the outer shell upon simple turning and for driving connection with the inner shell upon downward pressure concurrently with the turning will be apparent from the foregoing description of the embodiment of Figs. 1 to 6.

It will of course be understood that alternatively the inner shell in Fig. 7 could be of elastic material such as polyethylene to permit it to be compressed in diameter for insertion past the rim 34 of the rigid outer shell, and upon release it will snap outwardly into the position shown in Fig. 7.

It will of course be understood that the rigid shell element could be of plastic or sheet metal, whether it be the inner shell or the outer shell, and the complementary shell member, if not of sheet metal, would then be of elastic plastic material to permit assembly.

Thus a screw cap is provided, according to the present invention, which dispenses with the need of auxiliary tools, such as a screw driver, a coin or a nail or special handles to effect a driving connection between the inner and outer shell for removal of the cap; it likewise dispenses with the need for auxiliary locking wedges or the like to effect the driving connection, or the need for some separate manipulation such as shaking or moving the bottle to inclined position; there is also no need for auxiliary gripping material, or of one or more auxiliary springs or of elaborate machining operations to obtain the result.

Thus a safety screw cap has been provided that affords assurance against opening by small children of bottles of pharmaceutical, verimicide or other toxic substances and which has no complications or likelihood of becoming jammed or deranged and which involves nothing more than two shell stampings of conformation such as described, without any of the complications or cost involved in prior constructions for the purpose.

While the dimensions of knurl teeth, spacing thereof and of keying ribs or indentations above set forth are desirable in one practical embodiment of the invention, it is obvious that the invention may be utilized to advantage with different dimensions of the parts.

The term "screw shell" and "conformation for threaded engagement" as used in the claim is of course intended to cover the equivalent lug shell.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claim, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

A safety bottle cap consisting of two parts, namely an inner shell and an outer shell, each said shell having an end face and a skirt with a lower rim, the inner shell having a conformation at its skirt for threaded engagement with a bottle to which it is to be applied, the outer shell encompassing the inner shell and resting directly

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thereon for free rotation with respect thereto, the two shells having complementary conformations below the respective end faces thereof and near the peripheries of the upper ends of the inner and outer shells respectively, but at a substantial distance above the respective rims for interlock upon pushing the outer shell downward, for keying to the inner shell to effect turning movement of the two shells in unison, said complementary conformations consisting of (a) a series of teeth equidistantly spaced about the inner shell, each said tooth being rounded and terminating substantially at the end face of

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said shell, and (b) a frusto-conical surface connecting the end face and skirt of the outer shell, said surface having spaced inwardly extending ribs thereon rounded in cross section, said ribs cooperating with teeth on the inner shell when downward turning pressure is applied.

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