

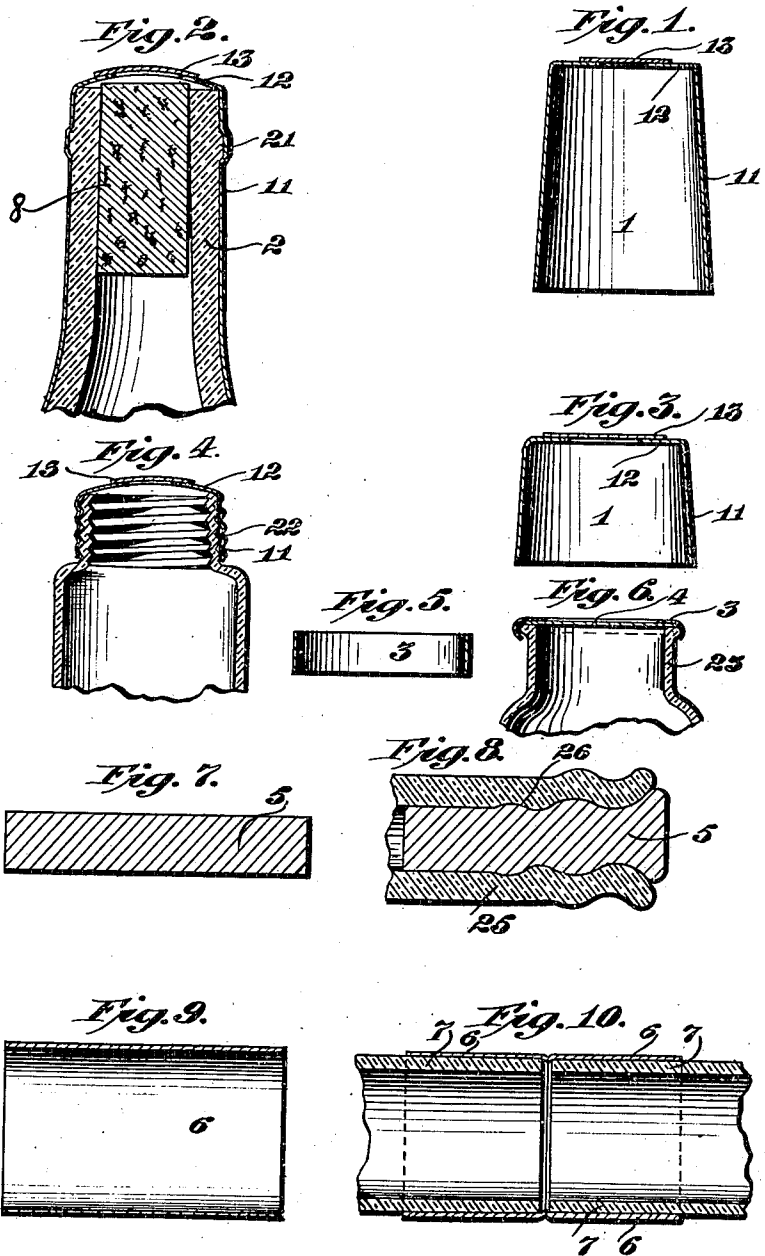
No. 825,115.

PATENTED JULY 3, 1906.

M. ENGELS.

CLOSURE AND PROCESS OF MAKING SAME.

APPLICATION FILED JUNE 13, 1905.



Attest:
C. Mitchell,
A. L. O'Brien

Inventor:
MAX ENGELS
by *Lickerson, Brown, Raegen & Binney*
Attys

UNITED STATES PATENT OFFICE.

MAX ENGELS, OF DÜSSELDORF, GERMANY.

CLOSURE AND PROCESS OF MAKING SAME.

No. 825,115.

Specification of Letters Patent.

Patented July 3, 1906.

Application filed June 13, 1905. Serial No. 265,001.

To all whom it may concern:

Be it known that I, MAX ENGELS, a subject of the German Emperor, residing at 72 Parkstrasse, Düsseldorf, Germany, have invented certain new and useful Improvements in Closures and Processes of Making the Same, of which the following is a specification.

My invention relates to a closure or joint former or protector made from a substance exemplified by celluloid in such a manner that it has the property of altering its dimensions under the influence of heat and to the process of making such closure or joint-cover. The product forms a strong, durable, efficient, and air-tight closure for bottles or other articles to which it is applied.

In the drawings, Figure 1 represents a bottle closure or cap embodying my invention. Fig. 2 represents the same cap as applied to a bottle. Fig. 3 represents a similar form of cap shown in Fig. 4 as applied to a bottle having a screw-threaded neck. Fig. 5 represents a tubular closure shown in Fig. 6 as used to secure a disk over the neck-opening of the bottle. Fig. 7 represents a rod shown in Fig. 8 as forming an interior closure for a bottle. Fig. 9 represents a tube shown in Fig. 10 as forming a joint cover or protector for two pieces of glass tubing.

Referring to Figs. 1 and 2, 1 designates a cap formed from a tube of celluloid and having a flaring wall 11, formed with an inwardly-projecting annular flange 12 at its upper end, closed by a celluloid disk 13. 2 represents a bottle-neck having a bead 21. The cap 1 is produced by increasing the diameter of a tube of celluloid, so that initial strains are set up therein, the celluloid having the property of freeing itself from these strains under the action of heat, whereby it is caused to contract in diameter. It is applied to the bottle-neck 2, as shown in Fig. 2, by placing the cap 1 over the mouth of the bottle and exposing the same to heat, preferably in the form of steam or hot water. The cap 1 then shrinks to the form shown, tightly inclosing the neck of the bottle and forming an air-tight seal therefor. Owing to its ductility when heated, it adapts itself to rigidly inclose the bead 21 of the neck 2, whereby its accidental disengagement from the bottle-neck is prevented.

The form of cap shown in Fig. 3 is similar in design and construction to that shown in Fig. 1, except that the wall 11 is preferably somewhat shorter. It is applied in a similar

manner to a bottle having its neck 22 formed with an external screw-thread. In shrinking it adapts itself to this screw-thread and when allowed to cool may be screwed from the bottle-neck 22 and replaced thereon as often as desired, forming a perfect substitute for the metal screw-threaded cap usually employed. Fig. 5 shows a short tube 3 of celluloid, the wall of which may be made straight, as shown. As shown in Fig. 6, it is utilized by applying it to a bottle-neck 23, having an outturned bead 24, the mouth of the bottle being covered by a disk 4, which may be of metal or of any desired material. When the parts are assembled and exposed to heat, as before, the short tube 3 contracts over the periphery of the disk 4 and beneath the bead 24, forming with the disk 4 an efficient closure for a bottle.

Fig. 7 represents a rod 5, of celluloid, the diameter of which has been gradually decreased in the process of manufacture.

In Fig. 8 the rod 5 is shown as having been inserted in the bottle-neck 25, provided with interior corrugations 26. In this case the rod 5 when exposed to heat expands and fills the neck 25 of the bottle at all points for its entire length, forming an efficient closure therefor.

Fig. 9 designates a tube 6, of celluloid, which, as shown in Fig. 10, is employed to join two pieces of glass tube 7 7, placed end to end. Heat being applied, as above described, the tube then contracts and firmly holds the pieces of tubing together, forming an air and liquid tight joint therebetween.

I have described the various closures shown as formed of celluloid, for the reason that this material has in a marked degree the property of relieving itself from initial strains set up during the process of manufacturing an article therefrom by the application of heat, so that it readily changes its diameter or desired dimensions to fit either around or into any body to which it is applied.

I have illustrated various forms of my device, not with the intention of limiting myself to the use of such forms, but, *per contra*, to show that my invention may be employed for many purposes and embodied in diverse forms. I therefore in the claims employ the word "closure" in a broad sense to indicate either an interior or an exterior closure for an opening of definite size or an article adapted to join two or more parts, thereby acting as a closure for the gap between them, however

small this may be. Thus, *e. g.*, it is evident that the insertion in the bottle-neck 2 of a cork 8, (shown in Fig. 2,) although this would ordinarily be unnecessary, would not render the cap 1 any less a closure. My invention also includes the process of making a closure from celluloid or other material by setting up during the process of shaping the article or thereafter initial strains, the article being made of a material exemplified by celluloid, which is capable of relieving itself from such strains under the influence of heat. As has been explained, the closure may be in the form of a tube, of which both ends or one end may be open, a rod, or other suitable shape.

Without specifying materials or enumerating equivalents, what I claim is—

1. A closure of material under strain relievable by the action of heat.
2. A tubular closure of material under strain relievable by the action of heat.
3. A cap for bottles or the like of material under strain relievable by the action of heat.
4. A closure of celluloid or like material under initial strain.
5. A tubular closure of celluloid or like material under initial strain.
6. A bottle-closing cap of celluloid or like material under initial strain.
7. The process of making a closure, which consists in setting up initial strains by the deformation of a material capable of relieving itself of such strains under the action of heat.
8. The process of making a tubular closure, which consists in forming a tube and

setting up therein initial circumferential strains.

9. The process of making a closure, which consists in forming a mass of celluloid or like material into a suitable shape, and in setting up therein initial strains in a direction opposed to the desired molecular movement of the closure when put into position.

10. The process of making a tubular closure, which consists in forming a tube of celluloid or like material of a diameter differing from that desired in the closure when in position, and in setting up therein initial circumferential strains.

11. The process of making a contractile cap, which consists in forming from a material capable of relieving itself from initial strains under the action of heat, said cap being of larger diameter than is required for the article when in position, and in setting up therein initial strains tending to maintain such larger diameter.

12. The process of making a contractile celluloid cap, which consists in forming the cap of larger diameter than is required for the article when in position, and in setting up therein initial strains tending to maintain such larger diameter.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

MAX ENGELS.

Witnesses:

PETER LIEBER,

WILLIAM ESSENWEIN.