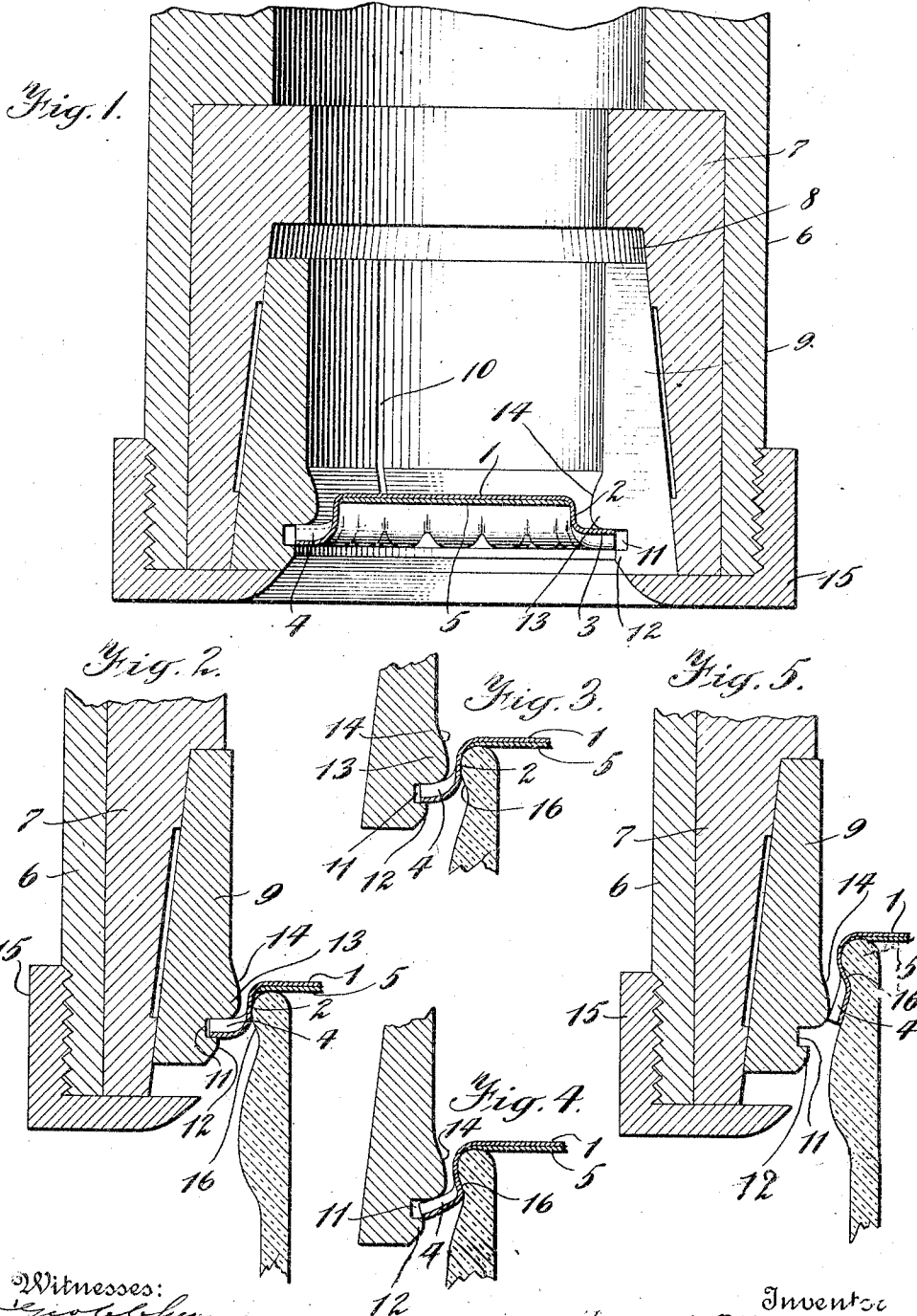


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METHOD OF APPLYING CAPS TO BOTTLES.
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1,043,133.

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UNITED STATES PATENT OFFICE.

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METHOD OF APPLYING CAPS TO BOTTLES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, TOIMI A. NISSINEN, a subject of the Czar of Russia, a legal resident of Helsingfors, Finland, at present residing at New York city, in the borough of Bronx and State of New York, have invented certain new and useful Improvements in Methods of Applying Caps to Bottles, of which the following is a full, clear, and exact description.

This invention resides in an improved method of applying sealing caps to bottles and similar vessels, whereby an effective seal is produced without the aid of complicated cap-applying devices, and without danger of breaking the bottle.

In many of the commercial cap applying machines there is provided a plunger, whose function is to press against the top of the cap to effect a sealing engagement between the packing disk within the cap and the mouth of the bottle, after which certain flange bending dies act upon the flange of the cap to force it under the external bead on the bottle and thus hold the cap in its sealed relation with the bottle. Since bottles vary in length, due to imperfection in manufacture, or from other causes, the bottles are sometimes broken in the capping operation, unless some provision is made in the stroke of the capping machine for this variation in the bottle. In the practice of my improved method the sealing pressure and the locking of the flange of the cap upon the bottle are accomplished by the same die or portion of the capping machine, and the ordinary plunger which has been commonly used to obtain the sealing pressure as well as the compensating device which necessarily accompanies it, are dispensed with.

In carrying out my improved method, a support is provided for the extreme outer edge of the cap flange, and simultaneously a downward pressure is brought to bear upon an intermediate part of the flange. This results in a downward pressure upon the top disk of the cap (which may be limited only by the strength of the metal of which the

cap is composed) which compresses the sealing disk between the cap and the mouth of the bottle. The downward pressure upon the intermediate portion of the flange of the cap, resisted by the support at the outer edge of the flange, causes the intermediate part of the flange to bow downward and inward toward the bottle, and thus forces the metal of the flange around the bead on the bottle, and into the depression immediately under the same. This bowing or movement of the intermediate portion of the flange causes the outer edge of the flange to gradually recede from its support until finally it is entirely free therefrom, whereupon the continued downward pressure upon the flange finally forces the latter snugly against the neck of the bottle. The capping device is a hollow cylindrical body which comes in contact with the flange, only, of the cap, so that in the capping operation the head of the bottle carrying the cap may project through the cylindrical portion to whatever extent the length of the bottle may require, there being no plunger or other part having a fixed stroke to interfere with the movement of the bottle with respect to the capping machine.

My invention will now be described in connection with the accompanying drawing, in which:

Figure 1, is a central vertical section of a capping head forming a part of a capping machine; and showing one of the bottle caps inserted therein ready for the capping operation. Figs. 2, 3, 4 and 5, are sectional views of portions of the capping head, the bottle and the cap, at different stages of the capping operation.

The bottle cap is indicated by the numeral 1, and is similar in shape and construction to the commercial bottle caps, except that the flange after extending downward vertically, as at 2, a short distance, is bent outwardly at substantially right angles to form a horizontal rim 3, the latter being provided with corrugations 4 of any or the usual form. The usual packing disk 5 is placed inside of the cap, but in this

instance, on account of the effective method of sealing, very thin material, such as paper or tin foil, may be substituted for the ordinary cork disk.

5 In order to explain the method of sealing it is necessary to understand the construction of the capping head. This head comprises a tube 6 carrying a socket piece 7 which is provided with a conical interior
10 chamber 8. In this chamber is located a die 9 comprising three segments which bear against the conical walls of the chamber 8, but are of slightly less length than said walls, so that they may have a vertical
15 play in the chamber 8, which will cause the segments of the die 9 to contract, or permit them to expand, depending upon the direction of movement. The segments are separated by slight spaces 10, which are
20 practically closed when the die is in the upper part of the chamber. The lower inner face of the die is provided with an annular groove 11 bounded below by a ledge 12 and above by an over-hang 13, the latter
25 projecting inward considerably beyond the ledge 12, and having a rounded face 14. The vertical width of the groove 11 is such as to just admit the corrugated rim of the cap.
30 15 is a retaining ring which screws onto the lower end of the tube 6 to hold the socket piece 7 and the die 9 in place.

Referring now to the operation, or method of applying the cap, the cap is first adjusted in the die preparatory to applying it
35 to the bottle, as shown in Fig. 1, the rim of the cap fitting friction tight into the entrance of the groove 11. A bottle is then placed centrally below the cap and either
40 the capping head is brought downward or the bottle is forced upward to make the capping stroke. In either case, after the top of the bottle enters and seats within the cap, the die 9 moves upward, and, owing to the
45 conical shape of the socket, also inward, causing the rim 3 to enter the annular groove 11, as seen in Fig. 2. Let us now consider that the position of the bottle remains fixed and the capping head moves
50 downward, although the same effects will be produced if the capping head remains fixed and the bottle moves upward. It will be seen that the outer edge of the rim 3 is supported by the ledge 12, and while the
55 downward movement of the overhang 13 is uniform with that of the ledge 12, the former impinges upon the upper surface of the rim 3 at a point nearer the vertical flange 2, so that as the die 9 moves downward there
60 will be a drawing downward upon the vertical flange 2 which will compress the sealing disk 5 against the top of the bottle. The action which takes place may be compared with that of a lever, the rim 3 having its

fulcrum at the line where it joins the flange 2, with its free end supported upon the ledge 12, and with the power applied at an intermediate point by the over-hang 13. The free end or outer edge tends to move faster than the intermediate part which is acted upon by the over-hang, but since it cannot do so, the pivotal point must yield downward and this motion is transmitted through the vertical flange 2 to the top disk of the cap, which compresses the packing disk 5 against the bottle. The pressure which may thus be obtained is limited only by the strength of the metal of which the cap is made. As the capping head continues downward the edge of the rim 3 is gradually drawn out of the groove 11, and the metal of the rim is bowed toward the bottle neck, as seen in Figs. 3 and 4, causing it to bend or form around and under the head 16 on the bottle. The rim finally leaves the groove 11 entirely and is then unfolded and forced against the neck of the bottle immediately beneath the head by the rounded face of the over-hang 13, in which position the cap is held under the pressure that was initially
90 applied. It will be seen that the bowing or inward movement of the intermediate portions of the flange is due to the fact that its outer extremity cannot move as rapidly as the intermediate portions must, and as the
95 metal must go somewhere, it naturally travels around and under the head, and as the outer edge is not freed from the ledge 12 until the intermediate portions have been carried under the head, the pressure on the
100 packing disk will not be eased to any extent when the outer edge of the rim leaves the ledge 12.

It will be seen that the stroke of the capping head, or of the bottle, in the capping
105 operation, may be of any length, regardless of the length of the bottle, since the movement of the head of the bottle through the hollow die 9 is unobstructed. The corrugations of the rim 3 afford added strength to a
110 given weight of metal, and also furnish a hold for a bottle opening device.

It is to be understood that my invention is not limited to the precise form of cap herein described and illustrated, as good results
115 can be obtained by the exercise of the same method upon a cap whose rim extends either slightly upward or slightly downward from the horizontal position described.

Having described my invention, I claim:

1. In the method of applying caps to bottles and similar vessels, the step consisting in compressing the packing within the cap by positively engaging the opposite faces of the cap flange and drawing downward
125 thereon while simultaneously permitting the cap to travel freely downward over the mouth of the bottle.

2. The method of applying caps to bottles and similar vessels which consists in first pressing the cap on the vessel by positively engaging the opposite faces of its flange and drawing downward thereon while simultaneously permitting the cap to travel freely downward over the mouth of the bottle, and then forcing the skirt of the flange

into engagement with the bottle beneath the head thereon.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

TOIMI A. NISSINEN.

Witnesses:

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