

June 9, 1942.

R. L. GANGLOFF.

2,286,079

AUTOMATIC MACHINE FOR CAPSULING BOTTLES

Filed March 18, 1938

3 Sheets-Sheet 2

Fig:6

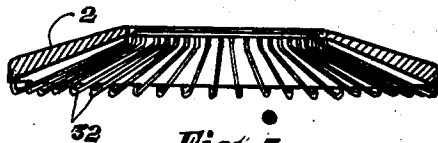


Fig:7

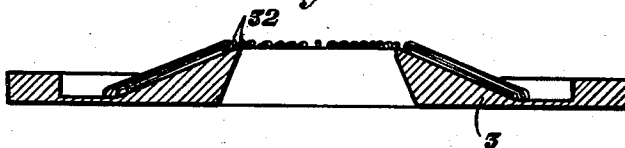


Fig:8

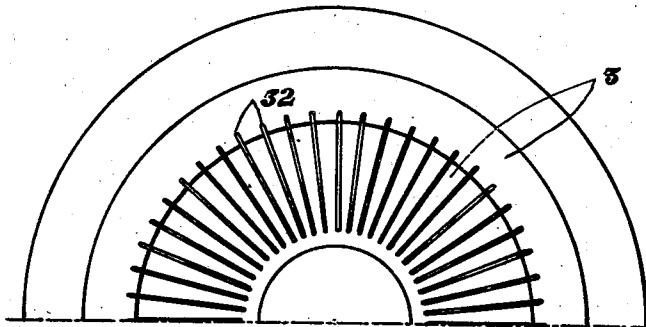
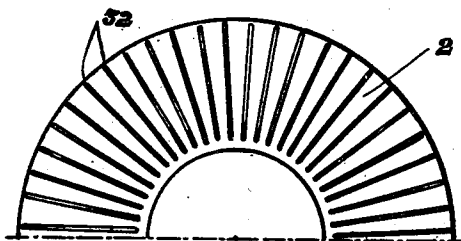


Fig:9



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3 Sheets-Sheet 3

Fig. 10

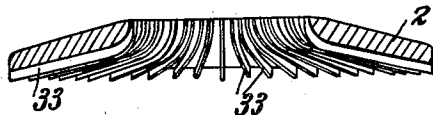


Fig. 11

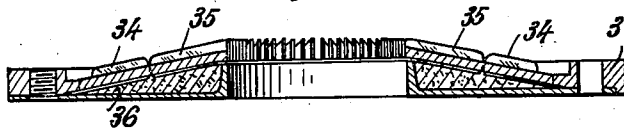


Fig. 14

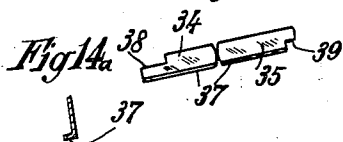


Fig. 13

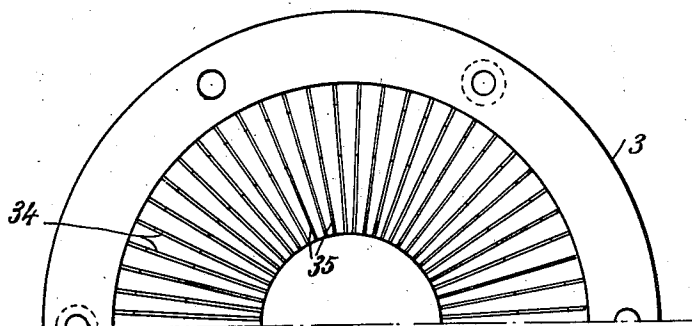
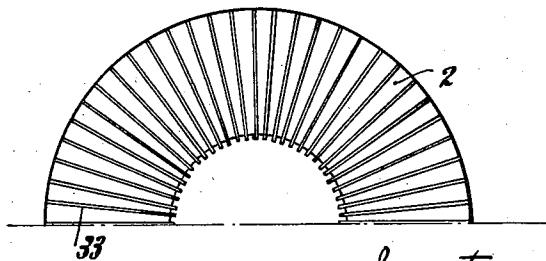


Fig. 12



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UNITED STATES PATENT OFFICE

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AUTOMATIC MACHINE FOR CAPSULING BOTTLES

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13 Claims. (Cl. 226—85)

The present invention relates to methods and apparatus for capsuling bottles previously stopped in any suitable manner.

The chief object of the present invention is to permit of fitting a bottle of any size and shape with a capsule of thin metal by starting directly from a plane sheet of this metal, such for instance as aluminium.

According to an essential feature of the present invention, my method consists in cutting from said metal sheet a blank of suitable size and shape, forming in this blank radial folds as close to one another as possible by catching it between two suitable dies, provided with a central orifice and preferably of slightly conical shape, then engaging the neck of the bottle into said orifice so as to drive along the blank thus previously shaped, while applying the peripheral portion of said blank tightly against the lateral wall of said bottle neck, for instance through annular pressing or squeezing means. The capsule is thus shaped, placed and fitted by means of a single vertical relative position of the bottle.

Another feature of the present invention is the provision of a pre-shaping system of dies the radial elements of which are given a certain elasticity for the formation of the folds or creases above mentioned, so as to facilitate the correct disengagement of the blank.

Still another feature of the present invention consists in the provision of an automatic machine capable of cutting out the blanks from a metal sheet, pre-shaping them, and applying the peripheral portion thereof against the necks of the bottles.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is a diagrammatic sectional view of the pre-shaping dies engaged on the thin metal blank to be treated;

Fig. 2 is a half-plan view showing the metal blank such as it is shaped after treatment between the dies;

Fig. 3 is a diagrammatic view analogous to Fig. 1, showing in what manner the bottle neck catches its capsule;

Fig. 4 is an axial vertical section of an automatic capsuling machine made according to the present invention;

Fig. 5 is a sectional view of a modification of

the annular pressing or squeezing means included in said machine;

Fig. 6 is a cross section of the female die for pre-shaping the blank, according to an embodiment of the invention;

Figs. 7 and 8 are views, similar to Figs. 6 and 9, respectively, showing the corresponding male die for pre-shaping the blank;

Fig. 9 is a half plan view of the die shown in Fig. 6;

Figs. 10 to 13 are views, corresponding to Figs. 6 to 9, respectively, of another, and preferred, embodiment of the system of dies for pre-shaping the blank;

Fig. 14 is a detail view showing, in elevation, a line of blades of the male die of the last mentioned system;

Fig. 14a is a cross-section of a blade shown in Fig. 14.

Figs. 1 to 3 illustrate, in a diagrammatic manner, the method according to the present invention. The circular metal blank 1, cut for instance from a thin sheet of aluminium, is introduced into a system of dies consisting of two die elements 2 and 3 (Fig. 1). These two dies 2 and 3, the active faces of which are of slightly conical shape, are both provided with projecting radial parts. Therefore, when dies 2 and 3 are applied against each other with the blank 1 caught between them, said blank is given, on the one hand, a slightly conical shape, and on the other hand a radial corrugated or undulated shape for its peripheral portion (Fig. 2), or, to be more accurate, radial creases are started in this peripheral portion.

As shown by Fig. 3, I subsequently produce a relative movement of bottle 4 with respect to the system of dies 2—3. For instance, these dies are kept stationary while the bottle is displaced upwardly by the conveyer holder 4a which may be of any suitable conventional design along the axis of the system of dies, through the orifice 11 thereof, in the direction of arrow f. The neck of the bottle is then covered by the capsule 1, which is then tightly applied in an elastic manner against the bottle neck by a stationary annular pressing member. In order to prevent blank 1 from being moved out of center during this operation, it is advantageous to keep its central part applied against the edge of the bottle neck by means of an elastically mounted pressing piston 6, adapted to accompany the upward movement of the bottle.

Of course, I might quite as well keep bottle 4 in fixed position and move the whole of 2—3—5 in a downward direction, and, as a matter of fact,

this may be preferable for large output automatic machines working with a chain.

Fig. 4 shows an embodiment of an automatic capsuling machine which works on the principle of the method above set forth.

This machine includes a stationary frame 7 provided with a circular central aperture 8 and supporting four vertical guiding columns 9. A movable frame 10 is adapted to slide vertically along these columns.

In this stationary frame 7, the male die 3 of the die system is fitted. In Fig. 4, the dies are supposed to be made according to the embodiment which will be hereinafter described with reference to Figs. 10 to 14. The central orifice 11 of the die system is arranged in coaxial relation with the aperture 8 of the frame and said system is mounted on spring guides 12 which permit a slight elastic transitory displacement in the vertical direction. Aperture 8 is made sufficiently large for affording passage to bottle necks of different shapes and sizes. However, in order to obtain a correct axial guiding of bottle necks of small size, a certain number of elastic centering projecting elements are provided in this aperture, consisting for instance of three balls 13 subjected, in corresponding housings 14, to the respective actions of coil springs 15, which are all of the same strength.

The female die 2 of the die system is fixed to the lower part of the movable frame 10, this die being also of the kind illustrated by Figs. 10 to 14. Movable frame 10 also carries an annular pressing device 16, elastically mounted on spring bolts 17 slidable in said frame 10.

Frame 10 contains the elastic annular presser member 5, which consists of a cylindrical ring of rubber or another analogous material, which is squeezed around the neck of the bottle, at the proper time, by a compression mechanism analogous to that described in my French Patent No. 806,853, filed May 25, 1936.

The compression jaws 18 are pushed toward the axis of the machine when the bevel-shaped annular edge 19 of piston 20 is moved downwardly by a piston 21 the rod of which is actuated through any suitable means, for instance a cam mechanism. This movement of piston 21 is transmitted to piston 20 by four rods 22 slidable through a plate 23 rigid with frame 10. At the same time, the rubber element 5 is vertically compressed by the internal annular edge 24 of piston 20. In a suitable cavity between edges 19 and 24 of piston 20 is located a ring member 18' which by means of springs 18'' (one shown) presses the jaws 18 against the lower cavity of frame 10 to ensure the jaws 18 from axial movement.

Coaxially with the movable frame 10, there is provided a presser piston 6 the under face of which is fitted with a layer of rubber or any other elastic matter 25. This piston is fixed to a sleeve 26 adapted to slide freely inside a cylinder 27 rigid with plate 23, against the action of a coil spring 28 which bears upon a small plate 29 which closes cylinder 27 at its upper end.

The machine above described works in the following manner:

A continuous sheet or band of metal is brought to the machine by any feed device, not shown by the drawing. When the capsules are to carry a printed inscription in their central part, it is necessary accurately to fix the position of this printed inscription which is nearly necessarily made in advance. This result can be obtained,

according to a feature of the present invention, by combining the capsuling machine with a feed device which brings, in a discontinuous manner, to the machine a continuous band printed and provided with marking perforations, by means of a toothed mechanism analogous to the driving mechanisms of cinematographic films. The combination of the movements of the capsuling machine and of the feed device can be obtained without difficulty through any suitable known means.

When the capsules are to be provided with a stamped inscription, I combine with the capsuling machine and its feed device a stamping mechanism of a known type, working in synchronism with the capsuling machine and which forms the desired marks in relief on the metal sheet before the latter reaches the capsuling machine. In this case, the accurate positioning of the sheet is obtained automatically by the working of the machine and it is unnecessary to provide perforations.

The metallic sheet being thus fed between the stationary frame 7 and the movable frame 10, the latter is automatically moved downwardly by a suitable control member, not visible on the drawings, and actuated, for instance by a cam. Presser member 16 then elastically applies the sheet against the annular plane surface 30 of the piece which holds die 3 on frame 7. Then the circular edge 31 of frame 10, acting as a cutting punch, cuts a blank disk 1 from this sheet by cooperating with the inner edge of piece 30.

As frame 10 further moves downwardly, disc 1 is imprisoned and shaped between the two dies 2 and 3, then frame 10 is stopped in the limit position thus reached. At this time, a bottle 4, fed by any suitable conveyer, not shown by the drawing, is lifted through lifting means which need not be described, in such manner that the neck of said bottle is engaged into orifice 11, as diagrammatically shown by Fig. 3. When it is at the end of its upward movement, that is to say when the neck, carrying the capsule, is engaged inside the rubber ring 5, the compressing device 18—20 is brought into play in the manner above described. This machine permits of fitting the capsule so tightly on the neck of the bottle that the folds of said capsule are hardly visible.

The compressing mechanism is then released. The bottle is brought back to its initial position, while the movable frame 10 is also brought back to its upper position, all these displacements being possible without friction or interference owing to the fact that the capsule has been tightly applied against the neck of the bottle. Then the feed device brings opposite the dies a new portion of the sheet or band of metal, and the whole operation above described is repeated for the next bottle.

The arrangement of the inlet orifice 8 and that of the pressing sleeve 5 permit of capsuling in perfectly satisfactory manner all kinds of bottles the necks of which are of different profiles and diameters and the width of which can vary within very wide limits. Besides, the machine may be built with dimensions of the parts thereof corresponding more especially to a predetermined type of bottle which is to be used practically always with the machine. In particular, compressing device 18 may be made to give optimum results for a given profile of the bottle neck, in particular when said profile includes very sharp projections and hollows, which might produce fissures in the capsule if special precau-

tions were not taken. In this case, it may be advantageous to decompose the compression jaws 18 into a plurality of elements 18a to 18c (Fig. 5) arranged in sliding contact with one another along horizontal planes and each of the most suitable height. The action of the annular bevel-shaped edge 19 is then gradual and can be compared, in a way, to a smoothing action effected manually.

The die system shown by Figs. 6 to 9 is of a particularly simple structure. Each of the die elements 2 and 3 is fitted, on its conical active face, with a number (for instance sixty) of flexible rays 32, constituted by steel wires (piano string) having their ends driven into the body of the die. The two dies 2 and 3 are positioned, with respect to each other, in such manner that the rays of one of them can engage into the intervals between the rays of the other one.

Figs. 10 to 14 correspond to an embodiment of the dies 2 and 3 which is more elaborate.

As shown by Figs. 10 and 12, the female die 2 is made of a single piece machined in such manner as to include a plurality of projecting radial blades 33, fixed and rigid, which extend inwardly as far as the central annular orifice of the die. This arrangement has the advantage of automatically grouping the folds of blank 1 when the latter is being caught by the neck of the bottle, and of ensuring an even distribution of said folds about the neck.

The male die (Figs. 11 and 13), on the contrary, is fitted with independent blades 34, 35, elastically mounted in corresponding slots of the body 3 of the die. The latter is, in the portion thereof carrying the blades, of a relatively small thickness, and between this body 3 and a lower annular piece 36, there is imprisoned a packing of soft rubber or another equivalent elastic matter. Blades 34, 35, arranged edgewise, bear upon this packing through their lower edge 37, which is provided with a short flange bent at right angles (as shown in section in Fig. 14a). This flange also serves to prevent the blades from escaping through the slots of die 3.

In the drawings, I have shown two concentric circular rows of blades 34, 35, respectively, contiguous to each other, but I might provide only one row, or, on the contrary, more than two rows. The advantage of providing two rows of blades, or more, is the following: as the blades of the two rows are independent, if a slight defect in the folding takes place at a point of blank 1, the resulting perturbation on the blades at this point does not occur for the other row or rows of blades, so that the defect of the capsule is not made worse and, on the contrary, can be eliminated by the blades of the other row or rows.

Finally, as shown by Figs. 11 and 14, the blades of the inner row, to wit blades 35, are notched at 38, in such manner as to bear through their ends against piece 3. On the other hand, blades 34 bear through their opposed ends upon the bottom piece 36. With this arrangement, the rows of blades are such that the two corresponding blades of said respective rows located in line with each other are so to speak hinged at their opposed ends and can thus yield to the maximum degree to a pressure in the vicinity of the circle along which these two rows adjoin each other. On the other hand, blades 34 are notched at 38, in order to avoid of interfering with the cutting off of the circular blank 1.

The present invention has the following important industrial advantages:

1. It permits of replacing capsules for covering stopped bottles made in advance as it was the practice up to now by a blank which is cut by the capsuling machine itself, whatever be the shape of the bottle neck, which reduces the cost by avoiding the necessity of shaping the capsules in advance and storing them up.

2. It permits of utilizing smooth metallic sheets of a thickness sufficient for imitating the usual appearance of the capsules commonly used for covering the tops of wine and liquor bottles. This result is obtained owing to the flexibility of the pre-shaping rays or blades whereas wholly rigid dies only permit of utilizing sheets of extra-thin metal, capable of obviating, by their own extensibility, small as it may be, the strains which occur in the course of the shaping operation, the appearance of such capsules being very different from that obtained according to the present invention.

3. The capsules fitted on the necks of the bottles according to the present invention are so tightly molded thereon that it is wholly impossible to remove them without tearing them off, so that they constitute an absolute guarantee against the fraudulent refilling of original bottles with a spurious liquid.

4. The flexibility of the pre-shaping die system and of the annular pressing device ensures, in combination with the elastic pressing piston, the production of capsules which are always correctly centered, folded and fitted on the bottle neck, without any possibility of tearing or cracking, and this in connection with bottles of various shapes and heights.

Of course, the specific arrangements above described are not by far the only possible ones. In particular, elasticity of the pre-shaping blades or rays might be provided either for one or the other of the die elements of the die system or for both.

On the other hand, while I have referred only to the capsuling of bottles, it is quite obvious that the machine might be adapted to the capsuling of other containers, such for instance as jars, cans, and the like.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, capsule pre-forming die means comprising, in combination, a pair of die members having coacting respective conical faces with registering axial holes, and radial co-operating projections on said faces, at least the projections carried by one of said faces consisting of steel wires fixed to the corresponding die members each at both of its ends.

2. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, capsule pre-forming die means comprising, in combination, a pair of die members having coacting respective conical faces with registering axial holes

and co-operating radial projections on said faces, the projections on one of said faces consisting of blades rigidly secured to said face and the projections on the other face consisting of small blades resiliently mounted thereon.

3. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, capsule pre-forming die means comprising, in combination, a pair of die members having coactive respective conical faces with registering axial holes in said members and co-operating radial projections on said faces, the projections on the female die member being rigid therewith, the male die member being provided with radial slots and the projections on said male member consisting of blades projecting through said slots, and a resilient cushion carried by said male die member and forming a base for said blades.

4. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, capsule pre-forming die means comprising, in combination, a pair of die members having coactive respective conical faces with registering axial holes in said members and co-operating radial projections on said faces, the projections on the female die member being rigid therewith, the male die member being provided with radial slots and the projections on said male member consisting of blades projecting through said slots, and a packing of soft rubber mounted in said male die member and forming a base for said blades.

5. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, capsule pre-forming die means comprising, in combination, a pair of die members having coactive respective conical faces with registering axial holes in said members respectively, and co-operating radial projections on said faces, the projections on the female die member being rigid therewith, the male die member being provided with radial slots, and the projections on said male member consisting of at least two annular rows of blades inserted in said slots, and a resilient cushion under said slots carried by said male die member so as to form a support for said blades.

6. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, capsule pre-forming die means comprising, in combination, a pair of die members having coactive respective conical faces with registering axial holes in said members respectively, and co-operating radial projections on said faces, the projections on the female die member being rigid therewith, the male die member being provided with radial slots, and the projections on said male member comprising two annular rows of blades, the respective pairs of which are inserted in the respective slots and pivotally supported therein at their respectively non-contiguous ends, and a resilient cushion under said slots, carried by said male member and adapted yieldingly to support the contiguous ends of said blades.

7. In an automatic capsuling machine of the type described, a combination of means, for capsuling a bottle with a substantially smooth long-skirted metal cap from a sheet of plastic metal, comprising a supporting table having a punching opening therein, a lower annular die member in said table opening, sloping radially outwards from substantially the level of the table to a lower level, in a slightly conical shape, and having

similarly sloping radial ribs on its upper surface, a punch and upper annular die member, adapted to co-operate with said table and lower die member for punching a blank out of a metal sheet and forming a relatively large skirt portion thereof with closely spaced shallow and narrow creases and then yieldingly to compress the creased skirt portion, means for moving the neck of a bottle through said die members holding a creased blank, thereby to draw the blank radially between the die members and against the neck and then axially through the central openings of the die members, thus to shape it into a cap substantially close on the neck, and radial pressure means for tightening and smoothing the cap on the neck.

8. In an automatic capsuling machine of the type described, means for tightening a cap on the neck of a bottle, comprising a plastic annular member adapted to surround the cap on the neck and a combination of plunger means for axially compressing said member, jaw means for radially compressing same and jaw guiding means for preventing axial movement of the jaws.

9. In an automatic machine of the type described, for capsuling bottles with long-skirted caps, means for tightening and smoothing a cap on the neck of a bottle, comprising an annular plastic member adapted to surround a cap on a neck, axially superposed severally movable annular sets of jaws for radially compressing said member, to tighten the respective annular sections of the cap, and means for successively forcing the jaws radially inwards, thereby to effect a smoothing action on the cap.

10. In an automatic machine of the type described, for capsuling bottles having necks with an annularly shaped surface contour, means for tightening a cap on the shaped neck of a bottle, comprising an annular plastic member having a plain cylindrical hollow and adapted to surround a cap on said neck, axially superposed annular sets of jaws having different widths according to the surface contour of the neck and severally movable for radially compressing said member, to engage the respective annular sections of the cap, and means for imparting compression strokes to the respective sets of jaws, said strokes of the sets of jaws being different from one set to the other in accordance with the respective width of each set in accordance with the surface contour of the neck.

11. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, the combination of a first die member having an unobstructed central hole and an annular conical face around said hole; a plurality of radially positioned, capsule engaging members supported solely on said annular conical face for resiliently yielding motion; and a second die member adapted to cooperate with the first die member, having for coaction with the said annular conical face, a corresponding unobstructed central hole and an annular conical face with radial projections adapted to cooperate with the capsule engaging members.

12. In a machine for covering the top and the upper neck portion of a bottle or other container with capsules made from capsule blanks, the combination of complementary, annular die members having registering unobstructed central holes and generally conical facing parts for pre-forming a capsule between them, the conical part on one of said members having radially

projecting portions defining radial recesses between them; with separate indenting members, constructed to be yieldable at least in an intermediate portion of their length, lying in radial projecting position over the generally conical part of the other die member so as to register with the recesses on the first die member and to leave the said holes wholly unobstructed, said indenting members being supported solely on the side facing the first member, for accommodation of the yielding motion of at least their intermediate portions. 10

13. In a machine of the type described, for capsuling bottles with caps of relatively thick plastic sheet material, die means having radially arranged creasing ribs yieldingly supported by the operating surface thereof, to yield severally and independently only within the limits necessary to meet local irregularities in said sheet material.

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