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2,301,846

APPARATUS FOR MANUFACTURING METALLIC CLOSURES

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2 Sheets-Sheet 1

Fig. 1.

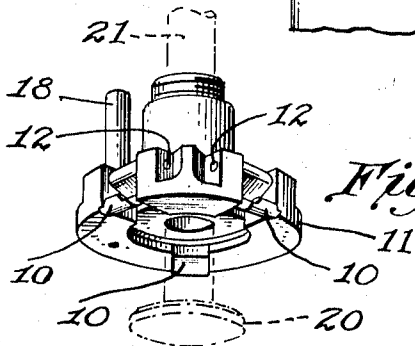
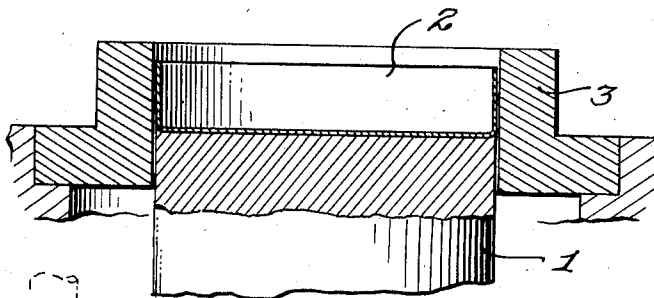
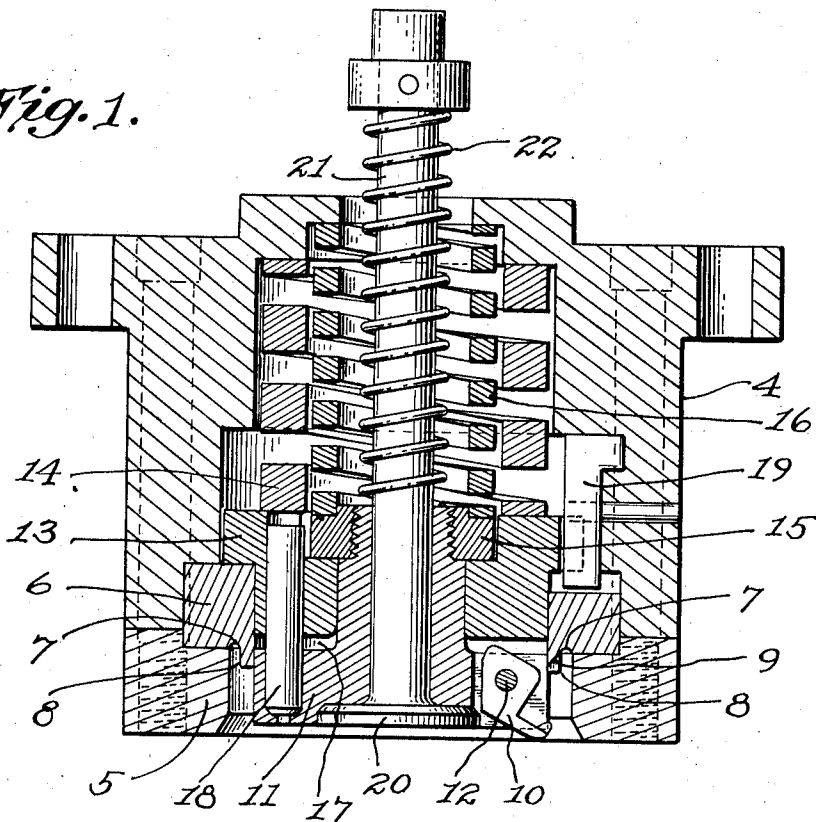


Fig. 3.

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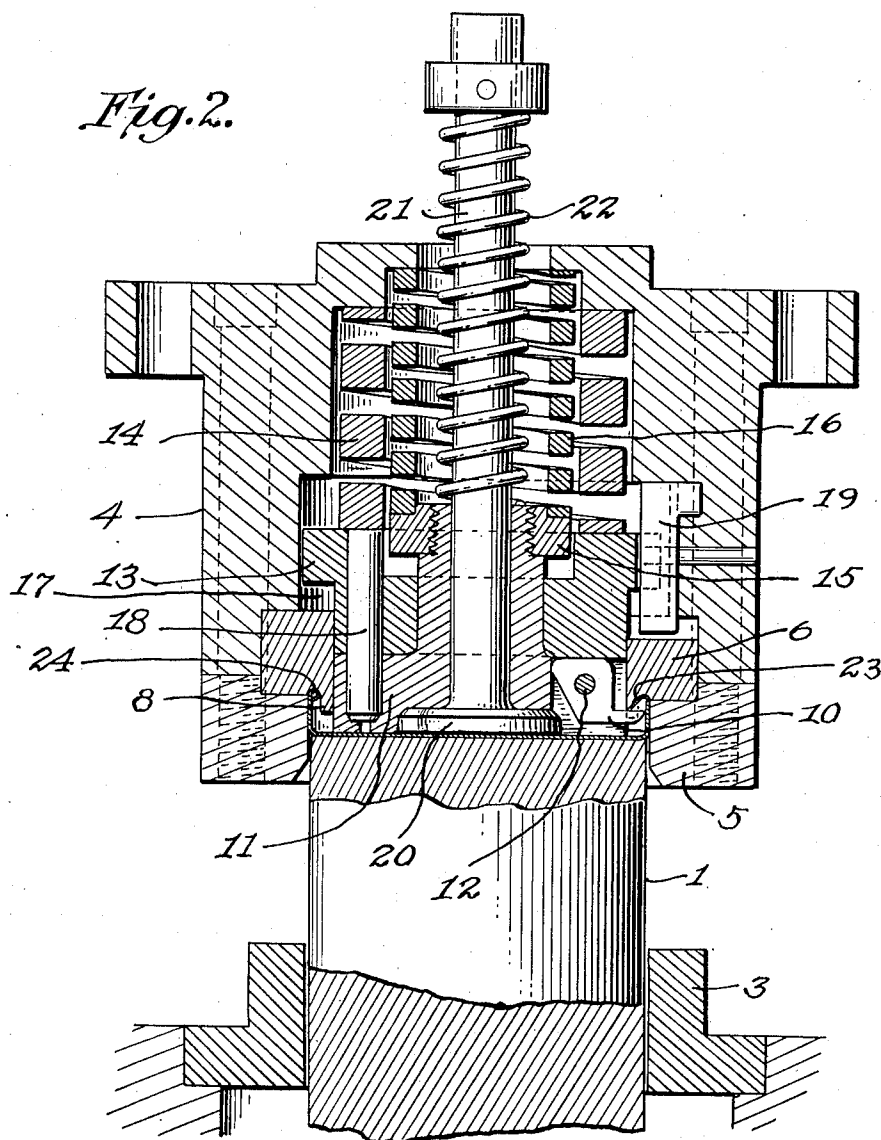
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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APPARATUS FOR MANUFACTURING
METALLIC CLOSURES

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Application August 5, 1941, Serial No. 405,546

8 Claims. (Cl. 153—48)

The invention relates to an apparatus for manufacturing metallic closures, and particularly closures having inwardly extending lugs by which the closures are secured on glass containers or other receptacles.

One of the main objects of the present invention is to provide an apparatus by which it is possible to manufacture lug caps having an unusually shallow skirt, which results in a very material saving of metal.

Another object of the invention is to provide a simple apparatus by which lug caps can be manufactured at very high speed.

Various other objects and advantages of the invention will be apparent to those skilled in the art, from the following detailed description, when taken in connection with the accompanying drawings, in which:

Figure 1 is a vertical sectional view of the apparatus, with the parts of the die in position to receive a blank.

Figure 2 is a vertical sectional view of the apparatus, with the parts of the die in cap-forming position; and

Figure 3 is a detail perspective view of the finger carrying member.

Referring to the drawings in more detail, numeral 1 indicates the usual plug which is reciprocated by the press, and which is adapted to carry the cap blanks 2 upwardly in cooperative relation to the cap forming die. A ring 3 preferably surrounds the plug 1 and assists in positioning the blanks on the plug.

Numeral 4 refers to a die holder suitably mounted on the press, and a centering ring 5 is attached to the lower end of the die holder.

Secured in the die holder, above the centering ring, is a curling die 6. This die is provided with an annular groove 7, and extending downwardly from the inner side thereof is a vertical flange 8, provided at spaced intervals with inclined cutaway portions 9. The cap lugs are formed at the cutaway portions, and in the embodiment illustrated three cutaway portions are provided as the particular caps have three lugs, but of course the number of lugs may be greater or less.

Numeral 10 refers to lug-forming fingers which are pivotally mounted in a finger holder 11, as by pins 12. The fingers, when free, swing downwardly by gravity, as shown in Figure 1. In the particular apparatus illustrated there are three of these fingers 10, which cooperate with the three cutaway portions 9 of the curling die, to form the cap lugs, but of course the number of

fingers will vary, depending upon the number of lugs to be formed in the caps.

The finger holder is slidably mounted in a finger holder control sleeve 13, and this control sleeve is normally held down against the curling die 6, by a heavy coil spring 14.

The finger holder extends upwardly through the control sleeve, and has a nut 15 secured on its upper end. The nut is normally held down against the control sleeve by a lighter coil spring 16. When the parts are in their normal positions, as shown in Figure 1, the control sleeve is held down against the curling die, and the nut on the finger holder is held down against the control sleeve, and there is a space 17 between the finger holder and the control sleeve. This space permits relative vertical movement between these two parts, for a purpose which will presently appear.

The finger holder, the control sleeve, and the curling die are maintained in proper radial relation with each other and with the die holder 4, by a pin 18 fixed to the finger holder and slidably mounted in the control sleeve, and by a key 19 which is mounted in the die holder and received in appropriate grooves provided in the curling die and in the control sleeve.

Numeral 20 refers to an ejector which has a stem 21 slidably mounted in the finger holder 11. The ejector is normally held in its elevated inoperative position, by a coil spring 22. When in this position the ejector is housed in an appropriate pocket provided in the bottom of the finger holder; the bottom of the ejector and the bottom of the finger holder being in the same horizontal plane.

The present invention is an improvement in the apparatus of John J. Williams Patent No. 2,094,031, granted September 28, 1937. In the apparatus disclosed in the Williams patent, the ejector contacts the lower side of the lug-forming fingers to move them outwardly to operative position. And because of this operation performed by the ejector of the Williams patent, it must have considerable thickness, for otherwise it will become warped.

As the ejector of the Williams patent is necessarily beneath the lug-forming fingers, and as the ejector is necessarily of considerable thickness, it follows that the Williams apparatus is not adapted to the making of caps having unusually shallow skirts. In accordance with the present invention the lug-forming fingers are not moved to operative position by the ejector, as will appear from the following description of the operation

of the apparatus, and as the ejector performs no operation other than ejecting completed caps, it can be housed in the bottom of the finger holder, and thereby make it possible to manufacture caps of this type having much more shallow skirts than was possible heretofore.

In operation, a cap blank 2 is deposited on the plug 1, by any desired means. The plug is now elevated and it will first cause the cap blank to engage the bottom of the finger holder 11. The continued upward movement of the plug causes the finger holder to move upwardly, against the pressure of coil spring 16, relative to the control sleeve 13 which for the instant remains stationary under the pressure of the coil spring 14. This upward movement of the finger holder relative to the control sleeve, which is possible because of the space 17 between the two members, causes the upper tilted ends of the fingers to engage the bottom of the control sleeve, whereby the lug forming ends of the fingers are swung outwardly into operative relation with the cutaway portions 9 of the curling die 6.

The continued upward movement of the plug 1 now causes the finger holder 11 and the control sleeve 13 to move upwardly together, against the combined pressure of coil springs 14 and 16. In the meantime, the edge of the blank skirt engages the annular groove 7 in the curling die 6, and this groove in conjunction with the flange 8 causes the metal of the skirt to curl inwardly. But at the spaced cutaway portions 9, the lug-forming fingers 10 have been moved to operative or lug-forming position, as previously described. Hence at these points the incurling metal engages over the fingers to thereby form inwardly extending lugs 23 on the cap, and while the lugs are being formed the metal of the skirt between the lugs continues curling to form an incurled bead 24.

The cap is now completed, and the parts are as shown in Figure 2, with the finger holder 11 engaging the control sleeve 13, and the control sleeve spaced upwardly from the curling die 6. The plug 1 now starts its downward stroke, and the parts of the die all move downwardly together, under the pressure of coil springs 14 and 16, until further downward movement of the control sleeve is prevented by its engagement with the curling die. But the finger holder continues its downward movement, under pressure of coil spring 16, until the nut 15 engages the control sleeve. This further downward movement of the finger holder spaces it from the control sleeve, and thus the lug-forming fingers are released so that they can drop to the position shown in Figure 1. Of course the plug has continued on down to its original position, ready to receive another cap blank 2, and the ejector is now moved downwardly by any desired means, to eject the completed cap, and the ejector is then returned to its housed position in the base of the finger holder, by the coil spring 22.

While we have described the plug as reciprocable and the die holder as stationary, of course the die holder could be reciprocated while the plug remained stationary.

From the foregoing description it will be apparent that we have devised an apparatus by which it is possible to manufacture lug caps of the type described, having unusually shallow skirts, whereby a very considerable saving of metal is effected.

It will also be apparent that the apparatus

will produce caps of the type described at very high speed.

Having fully described the invention, what we claim is:

1. An apparatus for forming metallic lug caps, including a die holder, a curling die mounted therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in the cap, and a finger control member above the finger holder for moving the fingers outwardly into operative lug-forming relation with the curling die.

2. An apparatus for forming metallic lug caps, including a die holder, a curling die mounted therein, said curling die having spaced cutaway portions at which lugs are formed, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in the cap, and a finger control member above the finger holder for moving the fingers outwardly into operative lug-forming relation with the cutaway portions of the curling die, when the finger holder is moved upwardly relative to the die holder.

3. An apparatus for forming metallic lug caps, including a die holder, a curling die mounted therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in the cap, and a finger control member mounted in the die holder above the finger holder, said finger control member causing the fingers to move outwardly into operative lug-forming relation with the curling die, when the finger holder is moved upwardly relatively to the die holder.

4. An apparatus for forming metallic lug caps, including a die holder, a curling die mounted therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in the cap, a finger control member slidably mounted in the die holder above the finger holder, the finger holder and the finger control member being normally spaced and relatively movable vertically in the die holder, and said fingers caused to move outwardly into operative lug-forming relation with the curling die by relative movement of the finger holder and the control member toward each other.

5. An apparatus for forming metallic lug caps, including a die holder, a curling die mounted therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in the cap, a finger control member slidably mounted in the die holder above the finger holder, the finger holder and the finger control member being normally spaced and relatively movable vertically in the die holder, relative movement of the die

holder and the plug causing the finger holder to move toward the finger control member to swing the fingers outwardly into operative lug-forming relation with the curling die.

6. An apparatus for forming metallic lug caps, 5 including a die holder, a curling die mounted therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in 10 the die holder, fingers pivotally attached to the finger holder for forming lugs in the cap, a spring normally holding the finger holder in its down position in the die holder, a finger control member slidably mounted in the die holder above the 15 finger holder, a spring normally holding the finger control member in its down position in the die holder, the finger holder and the finger control member being vertically spaced when in their down positions, and upward movement of the 20 finger holder relative to the finger control member causing the fingers to swing outwardly into operative lug-forming relation with the curling die.

7. An apparatus for forming metallic lug caps, 25 including a die holder, a curling die mounted

therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in said cap, means for moving the fingers outwardly into operative lug-forming relation with the curling die, the bottom of the finger holder provided with a pocket, and an ejector housed in said pocket.

8. An apparatus for forming metallic lug caps, including a die holder, a curling die mounted therein, a plug for receiving a cap blank, the die holder and plug being relatively movable to bring the blank into cooperative relation with the curling die, a finger holder slidably mounted in the die holder, fingers pivotally attached to said finger holder for forming lugs in said cap, means above the finger holder for moving the fingers outwardly into operative lug-forming relation with the curling die, and an ejector mounted in the die holder, the periphery of the ejector being inwardly of the lug-forming fingers.

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