Dec. 15, 1953 E. J. JONSSON 2,662,498

BOTTLE CAP FORMING APPARATUS

Filed April 25, 1946

4 Sheets-Sheet 1

Fig. 1.

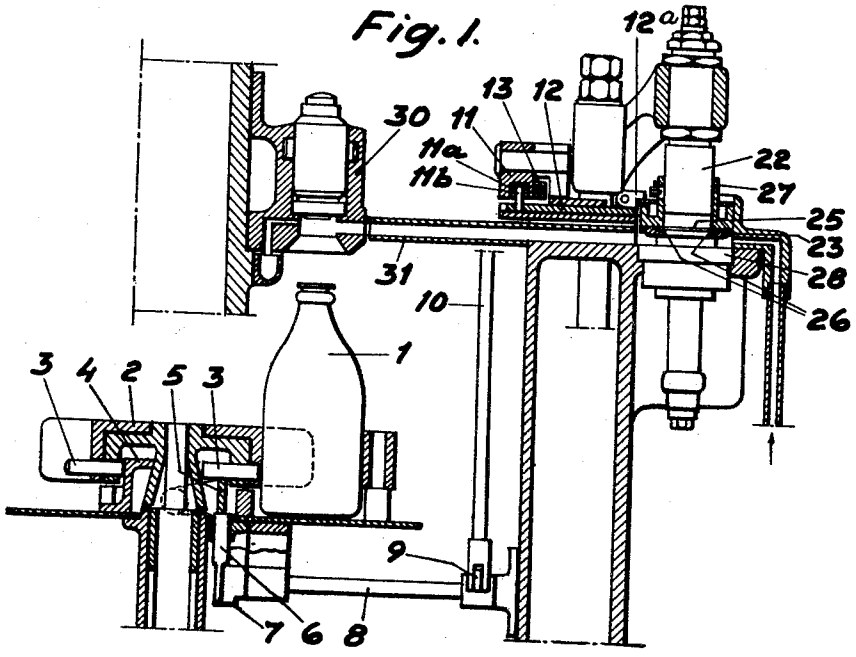
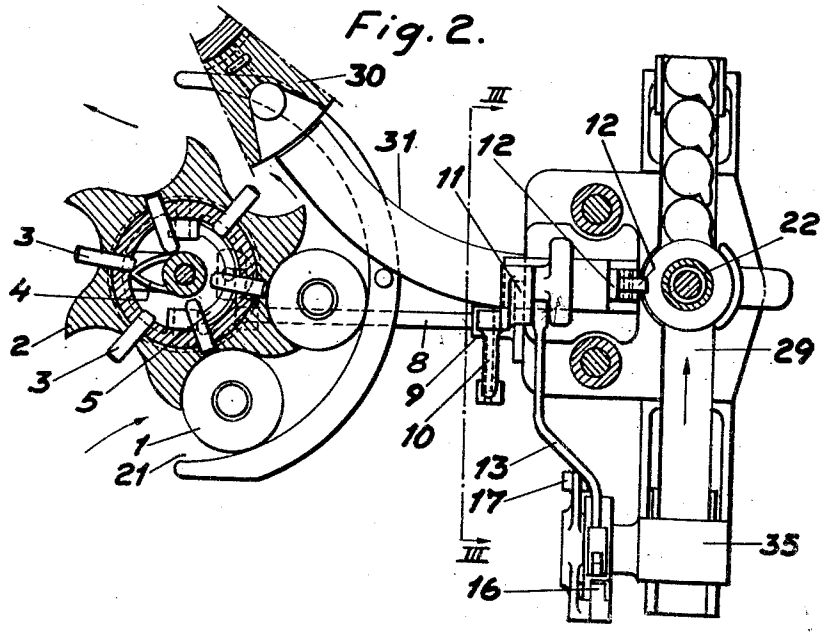


Fig. 2.



Einar Josef Jonsson
INVENTOR
By Otto Munk
his ATTY.

Dec. 15, 1953 E. J. JONSSON 2,662,498

BOTTLE CAP FORMING APPARATUS

Filed April 25, 1946

4 Sheets-Sheet 2

Fig. 3.

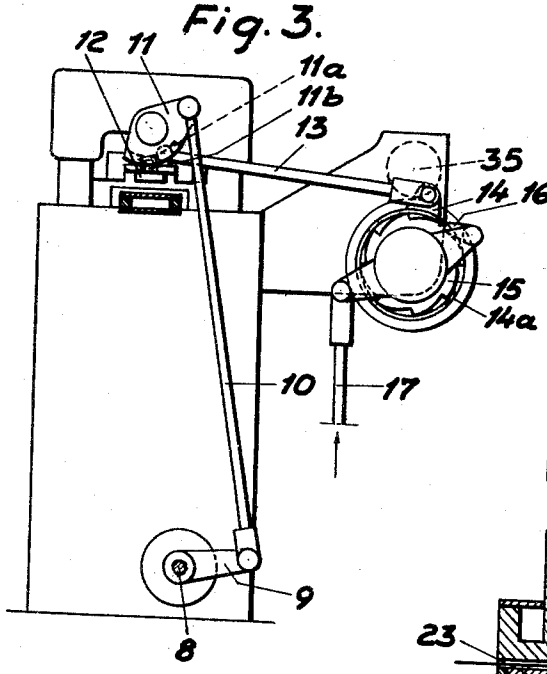


Fig. 4.

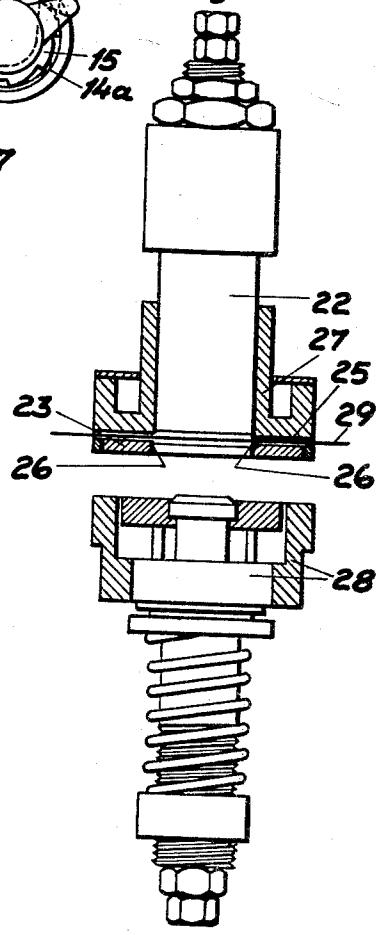
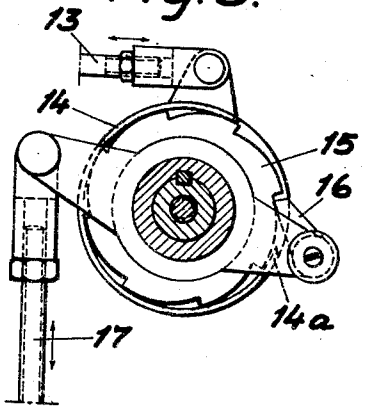


Fig. 5.



Einar Josef Jonsson
INVENTOR
By Otto Munk
his ATTY.

Dec. 15, 1953 E. J. JONSSON 2,662,498

BOTTLE CAP FORMING APPARATUS

Filed April 25, 1946

4 Sheets-Sheet 3

FIG. 6

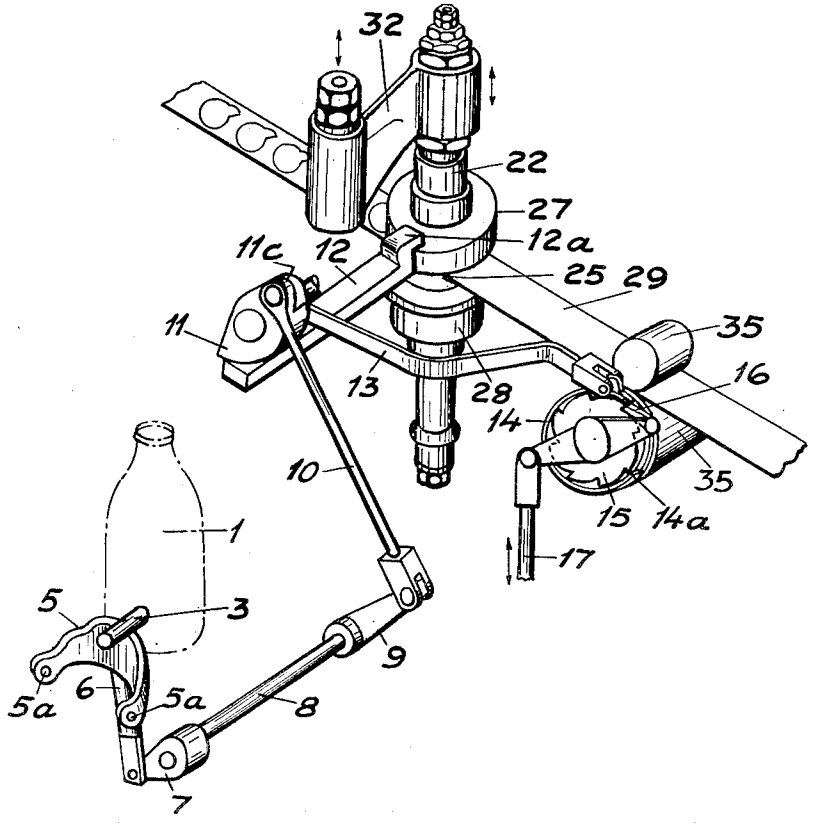


FIG. 7



INVENTOR:
EINAR JOSEF JONSSON
By
Richardson, David and Nordon
Atty's

Dec. 15, 1953

E. J. JONSSON

2,662,498

BOTTLE CAP FORMING APPARATUS

Filed April 25, 1946

4 Sheets-Sheet 4

FIG. 8

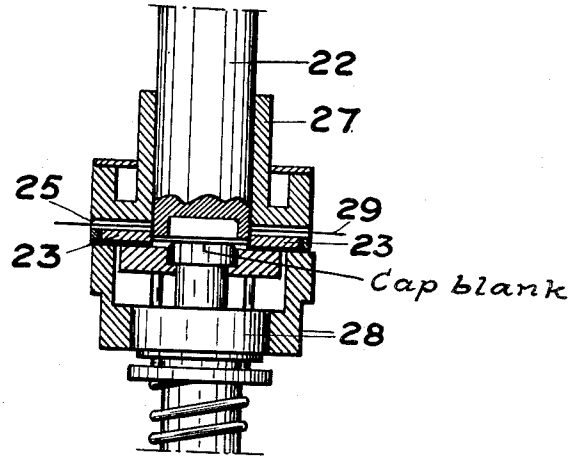
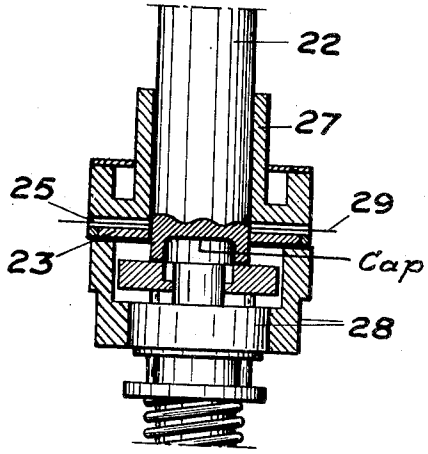


FIG. 9



INVENTOR:
EINAR JOSEF JONSSON

BY

Richardson, David and Nordon
ATTY'S

Patented Dec. 15, 1953

2,662,498

UNITED STATES PATENT OFFICE

2,662,498

BOTTLE CAP FORMING APPARATUS

Einar Josef Jonsson, Linkoping, Sweden, assignor to Aktiebolaget Alka Aluminiumkapslar, Linkoping, Sweden, a joint-stock company of Sweden

Application April 25, 1946, Serial No. 664,908

Claims priority, application Sweden May 3, 1945

4 Claims. (Cl. 113—1)

1

The present invention relates to a bottle or similar container capping machine which manufactures and, if desired, also fits out the caps necessary for the capping, the bottles being fed by a conveyor to the capping place, at which there is an adjustable member, the so-called feeler, which is adapted to be moved by engagement with each bottle when the same reaches and engages the feeler. The invention is generally characterized by the fact that the feeler is adapted to control a motion transmitting mechanism and that said mechanism is adapted in turn, to control the operation of one or more cap punches and a feeding mechanism for one or more blank strips while the driving mechanism for the punching and feeding means continuously maintains its motion. Each bottle (or container) which is to be capped, throws said working member or tool into operative condition through the action of the feeler. It is not necessary that the particular cap which is manufactured through the actuating impulse of a particular bottle, be applied on said bottle. It may be applied on a preceding or on a succeeding bottle.

The feeler is preferably mounted in the bottle conveyor portion of the machine, on the so-called star wheel, between the arms of which the bottles are inserted and adjusted and fed at a suitable mutual distance. In this star wheel there is, for example, a feeler at each bottle position. In a suitable embodiment the feeler consists of a radially movable pin which, upon engagement with a bottle, is adapted to slide inwardly in the star wheel and, upon such actuation, to cause operation of the motion control mechanism for the strip feeding and cap forming tools.

An embodiment of the invention is illustrated in the accompanying drawings, in which:

Fig. 1 shows the machine in lateral elevation and vertical section.

Fig. 2 in plan and horizontal section.

Fig. 3 shows the right hand part of the machine in a vertical section on the line III—III, Fig. 2.

Fig. 4 shows on a larger scale and in axial section a working member or tool, the so-called cap punch, which is described below.

Fig. 5 shows a detail on a larger scale.

Figure 6 is a diagrammatic perspective view of the strip feeding and cap forming mechanism of the invention.

Figure 7 is an enlarged elevational view of a helically grooved cam member.

2

Figure 8 shows a cap forming punch member after having cut a cap blank from a strip of cap material and immediately prior to the forming of the blank into a cap.

Figure 9 shows the cap forming punch member after the cut blank has been formed into a cap, with a die carrying sleeve member in the position which it occupies relative to the punch member while reciprocating therewith during intervals when no caps are being formed.

Referring to the drawings the bottles 1 to be capped are introduced at 21 to the conveyor comprising the feeding wheel 2, the wheel being in the form of a star so as to space each bottle at a predetermined distance from its neighbours. The feelers 3, are mounted in the feeding wheel 2 in such a way that, when each bottle is moved by the wheel, a feeler is moved by the bottle and set in operative position as is described below.

The feelers 3, which consist of pins, are radially and slidably mounted in the feeding wheel 2 so that each bottle, as it is introduced to the wheel, pushes a feeler inwardly towards the centre of the wheel to operative position. As the feeding wheel rotates, the inwardly moved feelers contact and ride over a stationary cam surface 4 (Figs. 1 and 2) positioned within the wheel and are moved outwardly to their initial or inoperative position. During rotation of the feeding wheel 2 each feeler 3 when in operative position, i. e., pushed inwardly by a bottle, comes into contact with a movable cam 5 having a contacting surface in the form of an arc and moves it downwardly. The cam 5 is connected to a lever 6 which in turn is pivoted to one end of an arm 7. The other end of the arm 7 is connected to one end of a shaft 8 so that with a downward movement of the cam 5 the shaft 8 is rotated. The other end of the shaft 8 is connected to one end of an arm 9 (Fig. 3) which is pivoted to a link 10 as shown. The link 10 is pivoted to an extension of a rotatably mounted helically grooved cam 11 which extension on a downward movement of the cam 5 and through the members 6, 7, 8, 9 and 10, is moved upwardly turning the cam 11 counter-clockwise as viewed in Fig. 3. Thus, it will be seen, the downward movement of the cam 5 caused by a feeler when in operative position causes a turning movement of the helically grooved cam 11.

The cam 11 has pivotally attached thereto one end of a link 13 the other end of which is pivoted to an extension of a split ring element 14 one end of which indicated at 14a is adapted to cover the teeth of coupling member in the form

of a ratchet wheel 15 movable by a pawl 16 as will be described.

The ratchet wheel 15 is driven in a step-by-step counter-clockwise direction by the pawl 16 which is driven constantly to and fro by conventional means (not shown) with which the pawl is in uninterrupted driving connection through the link member 17. Each movement of the ratchet wheel 15 operates a strip feeding mechanism generally indicated at 35 having rollers which feed a blank strip of capping material 29 in a step-by-step movement to the cap forming punch 22. The curved contacting surface of the cam 5 is of such a length as will permit one feeler, when in operative position, to be in contact with the depressed cam 5, before the preceding feeler in operative position has left contact with the cam 5, thus ensuring that the cam 5 is constantly depressed as long as the supply of bottles to the feeding wheel is continuous. Should there be a gap in this supply one or more feelers 3 (depending on the number of bottles missing) will not be pushed to operative position and the cam 5, after the last feeler in operative position has left contact therewith, will rise and its movement will be transmitted, through the members 6, 7, 8, 9 and 10, to the cam 11 which will thus rotate in a clockwise direction. The movement of the cam 11 will cause the link 13 (Figs. 3 and 5) to move to the left and the split ring element 14 will be moved round in the same direction as the ratchet wheel 15, i. e., counter-clockwise so that its end 14a covers the teeth of the wheel preventing them from being engaged by the constantly moving pawl 16. The pawl 16 will become disengaged from the ratchet wheel but will continue its movements and will ride over the split ring element end 14a shielding the teeth, thus producing no movement of the ratchet wheel. When the supply of bottles to the feeding wheel commences again the reverse of this operation will occur and the pawl will then rotate the ratchet wheel.

The mechanism for operating the cap punch and die will now be described.

The cam 11 accommodates in its helical groove 11a (Figs. 1 and 3) a pin 11b fixed to one end of a slide member 12 capable of moving relatively to the cam and having pivoted to its other end a retaining or holding member 12a adapted, by movement of the cam 11 and slide 12 through pin 11b, to be moved into and out of engagement with a sleeve 27 fitted around the cap punch 22. The sleeve is capable of movement relative to the cap punch, although a substantial amount of friction exists between the punch and the sleeve. The sleeve (Figs. 1 and 4) is provided with a slit 25 through which the blank strip 29 is passed, and a die 23 is incorporated in the lower part of the sleeve, in which a cutting edge 26 is provided. Fig. 1 shows the slit and the cutting edge in the transverse direction of the slit. Figs. 4, 8 and 9 show the same in the longitudinal direction of the slit.

The cap punch 22 is constantly vertically reciprocated by the conventional driving means with which it is in uninterrupted driving connection through the arm 32. When the supply of bottles to the feeding wheel is continuous and the cam 5 is constantly depressed as previously explained, the retaining member 12a is in engagement with the sleeve 27, as shown in Fig. 1 and the cap punch 22 reciprocates within the sleeve 27 which is held substantially stationary by the retaining member 27a. In its downward

stroke the cap punch forces the blank strip 29 in the slit 25 against the cutting edge 26 of the die and a cap blank is cut out of the strip. Continued downward movement of the punch forces the cap blank onto a fixed cap forming tool (generally indicated at 28) by passing the blank through the die 23 to the position shown in Fig. 9. During this movement, the cap blank is formed into a bottle cap. With the punch 22 and die 23 in the relative position shown in Fig. 9, the punch 22 engages the last hole cut in blank strip 29, thereby preventing movement of the strip 29 through the slit 25 until the parts are moved to the relative positions shown in Fig. 4, with the punch 22 spaced above the strip 29. When there is a gap in the supply of bottles to the feeding wheel 2, the sequence of events will occur as described with reference to the operation of the ratchet wheel mechanism, wherein movement of the rising cam 5 is transmitted through the members 6, 7, 8, 9 and 10 to the cam 11 which is thus rotated in a clockwise direction. Rotation of the cam 11 will cause the pin 11b accommodated in the helical groove 11a to move pin 11b to the left, moving the slide member 12 to which it is fixed away from the cap punch and disengaging the retaining member 12a from the sleeve.

The sleeve is now free to move with the constantly reciprocating punch 22 and as there is a substantial amount of friction between the punch and the sleeve as already stated, the latter will participate in the reciprocating movement of the former, with the result that there is no relative movement between the punch, the die and the sleeve and therefore the punch cannot operate effectively to cut a cap blank or form a bottle cap.

During this ineffective vertical reciprocation of punch 22 together with the die 23, the strip material 29 in the slit 25 will also reciprocate vertically, feeding action being prevented by the punch 22 which remains in a position projecting into the die 23 through the last hole cut in the strip 29. As effective operation of the blank strip feed rollers is also stopped simultaneously with the stoppage of effective operation of the cap punch, there is no feed of the blank strip through the slit 25 in the sleeve whilst the punch is ineffectively operable. When the supply of bottles to the feeding wheel commences again, the feelers in operative position will depress the cam 5 the movement of which will be transmitted through the members 6, 7, 8, 9 and 10 to the cam 11 as previously explained, which will be rotated in an anti-clockwise direction, and cause the slide member 12, through the helical groove and the pin 11b therein, to move towards the cap punch, and the retaining member 12a to re-engage the sleeve 27, thus permitting the punch to reciprocate therein relative to the die and effectively operate.

It will be seen that the effective operation of the cap punch and die and the strip feed rollers is controlled simultaneously by the bottles as they are moved by the feeding wheel, and that the absence of a bottle or bottles will cause the simultaneous ineffective operation of the cap punch and feed rollers, without disconnecting the drive of either from the main drive of the machine.

The finished cap is moved, in a known way, from the cap punch to the capping head 30 by compressed air which blows the cap through the

channel 31 to the head below which a bottle 1 is ready to receive the cap.

The machine according to the invention has great advantages, as the cap punch and the mechanism for the feed rollers are in uninterrupted driving connection with their driving means, the machine will have a smoother run than if the larger part of the machine mass were started at each operation, which is of great importance particularly at high speeds.

The machine may include other devices used in bottle capping machines such as a mechanism for inserting sealing discs in the bottle caps and a mechanism for making flutes or corrugations in the tearing off tabs of caps which may also be in uninterrupted driven connection with the main drive shaft of the machine and caused to operate effectively by couplings actuated through feelers in a simular manner to that described herein.

Having now particularly described and ascertained the nature of my invention and in what manner the same is to be performed, I claim:

1. A device of the class described, comprising: conveyor means for individually delivering a series of containers to have a cap applied thereto; continuously operable drive means for operating said conveyor means; feeler means actuable by the presence of a container at a predetermined position with respect to said conveyor means; cap forming means comprising a continuously reciprocating punch member having a cap forming cavity formed in an end portion thereof, said punch member being connected for continuous driving with said conveyor means, and a cutting die member cooperating with and frictionally engaging said punch member for movement therewith; holding means actuable for preventing said die member from moving with said punch member; controllable strip feeding

means connected for continuous driving with said conveyor means for feeding blank strip cap material to said die member; a cap forming member aligned with said punch member and shaped for engagement with said cavity for forming a cap therebetween from a blank cut from said strip by said punch and die members; and means actuated by said feeler means for controlling simultaneous operation of said holding means and said feeding means.

2. A device according to claim 1, in which said conveyor means comprises a wheel having outwardly extending arm members for spacing each container at a predetermined distance from its neighbors.

3. A device according to claim 2, in which said feeler means comprises a plurality of radially slidable members carried by said wheel and each actuable by engagement with a container positioned intermediate two adjacent ones of said arm members and wherein said means actuated by said feeler means comprises a movable cam member adapted for engagement by any slidable member actuated by one of said containers.

4. A device according to claim 3, further comprising fixed cam means for restoring each of said slidable members to its initial position after actuation by engagement with a container.

EINAR JOSEF JONSSON.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,212,665	Nordstrom	Jan. 16, 1917
1,995,357	Liss	Mar. 26, 1935
2,049,768	Glunz	Aug. 4, 1936
2,490,926	Slater	Dec. 13, 1949
2,600,393	Cohn	June 17, 1952