Aug. 20, 1929. W. A. STEPHENS 1,725,602

CAP FEEDING MECHANISM FOR CLOSURES OF BOTTLES, CONTAINERS, OR THE LIKE

Filed July 22, 1927 2 Sheets-Sheet 1

FIG. 1.

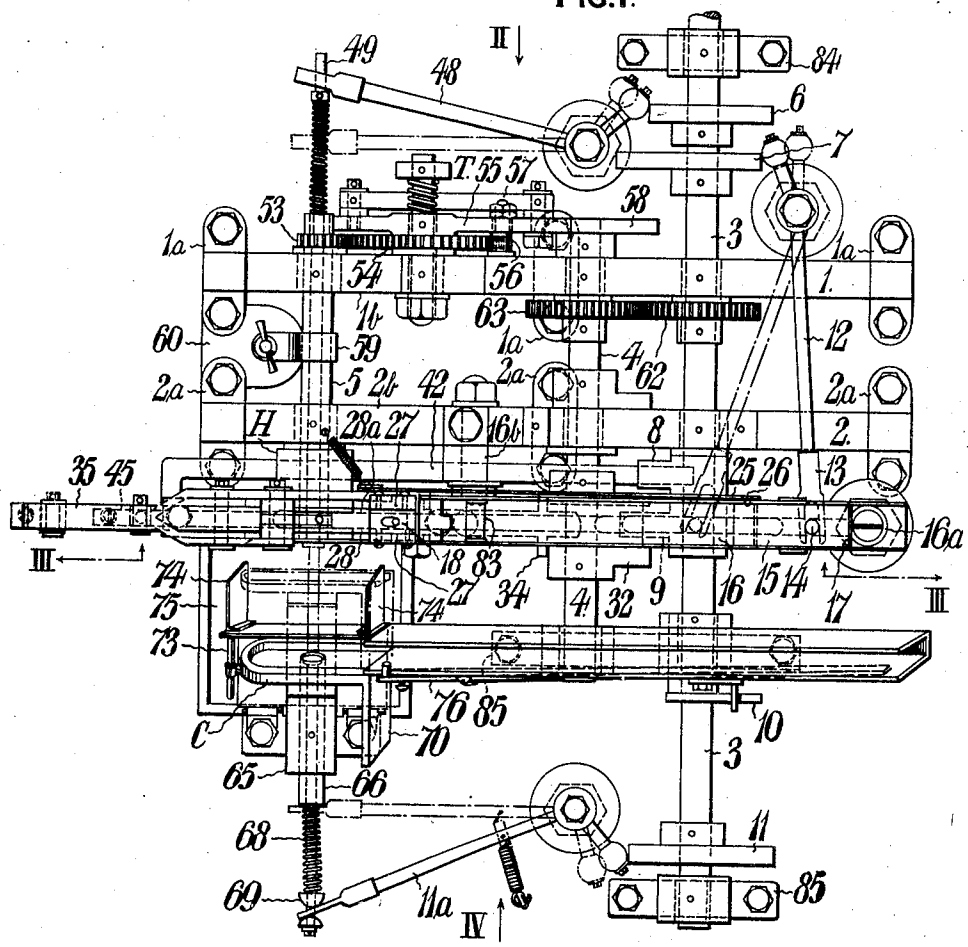
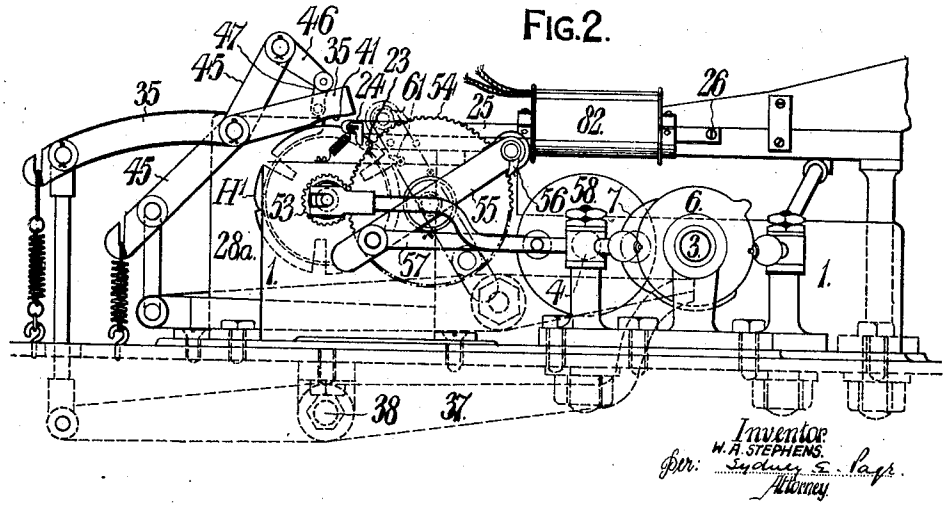


FIG. 2.



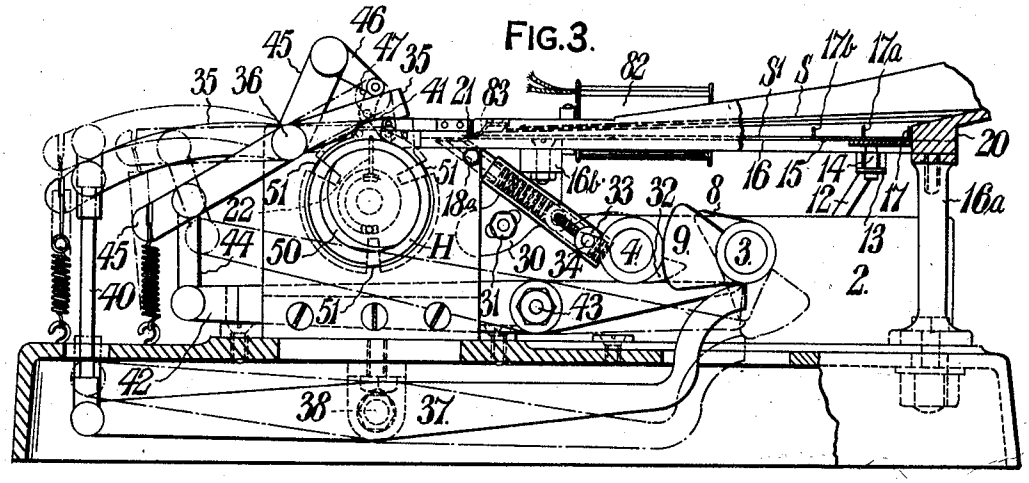
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CAP FEEDING MECHANISM FOR CLOSURES OF BOTTLES, CONTAINERS, OR THE LIKE

Filed July 22, 1927 2 Sheets-Sheet 2

FIG.3.



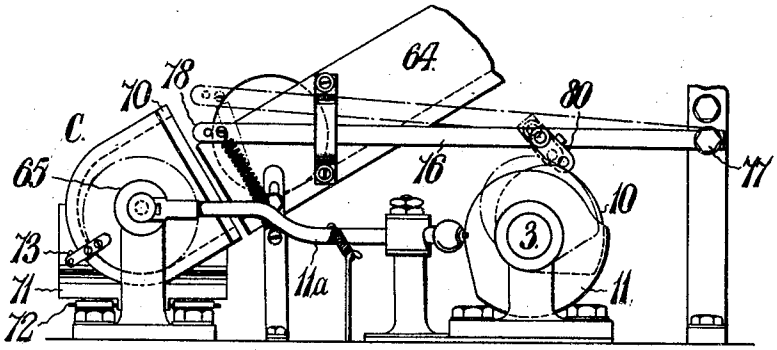


FIG.4.

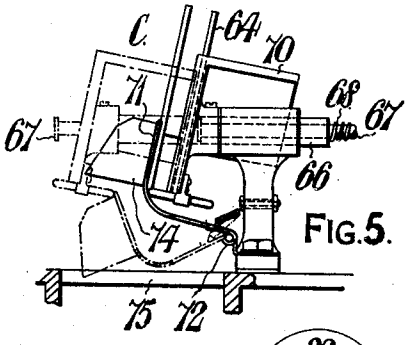


FIG.5.

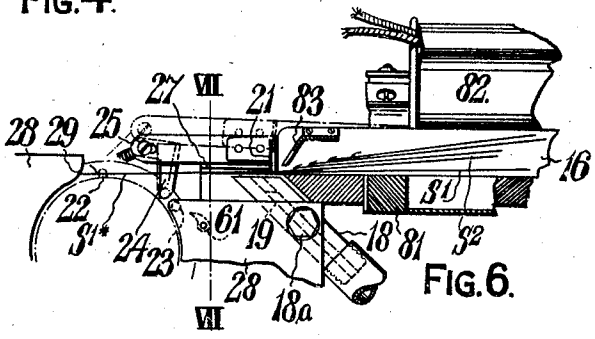


FIG.6.

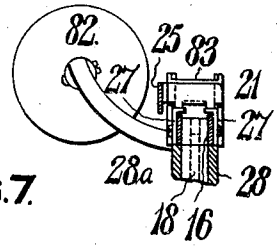


FIG.7.

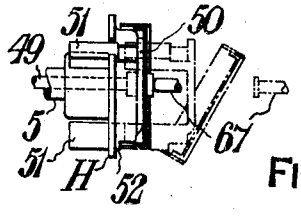


FIG.8.

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UNITED STATES PATENT OFFICE.

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CAP FEEDING MECHANISM FOR CLOSURES OF BOTTLES, CONTAINERS OR THE LIKE.

Application filed July 22, 1927. Serial No. 207,796, and in Great Britain August 16, 1926.

This invention relates to machines for making caps for bottles, jars or other containers.

Caps including a flange which engages around the mouth of a container are usually made by being drawn from blanks and then operated on in a curling, turning or knurling machine. In such machine the drawn blank travels down a chute to a receiver from which it is pushed by a plunger on to the lower of the two operating rollers termed "blocks" of the machine, over which it loosely lies eccentrically until being engaged by the other (upper) block, when it becomes held to the lower block at the point of contact between the blocks which is the operating point. As soon as the cap has completely travelled around the lower block, it is ejected, the blocks rotating all the time.

Now in practice it is found that the machines have to be frequently stopped owing to the plunger not feeding the drawn blank properly, or owing to a finished cap springing off into the path of the next successive drawn blank.

The object of the present invention is to devise a construction in which there is always a certainty of accurate feed.

Another object of the invention is to prevent blanks having an edge contact at the junction of the chute and carrier.

Another object of the invention is to control the distribution of the caps after they are ejected.

Another object of the invention is to produce a carrier for feeding inners to a machine for manufacturing closures of the Phoenix type, and operating so that the inner and locking ring are associated by curling the strip from which the ring is made on the cap and thereafter jointing the ends of the strip thereon, as described and claimed in co-pending application, Serial No. 207,795 for an invention entitled "Method of and apparatus for manufacturing closures for containers."

A method according to the invention of feeding cap blanks to a rotatory holder on which the blank is to be worked, consists in bringing the blank to a position of rest opposite the holder and tilted from the vertical, moving the tilted blank up to the holder and then setting the blank parallel to the holder and pushing it into engagement therewith, and preferably the holder is itself tilted from the vertical and is adapted to hold one blank, the holder being provided with a plunger which strikes the rested cap centrally so as to tilt it back to the vertical and displace it from the carrier on to the holder.

By the use of the term "holder" is meant to include any rotatable wheel or drum member on which or to which a blank is to held while work is being done, as for example, the lower block of a curling, knurling or turning machine.

As already indicated, however, a particular application of the present invention is to its use in combination with a holder of a strip curling and jointing machine for use in the manufacture of Phoenix closures as described in co-pending application, Serial No. 207,795 and as this is the most important application of the invention, the construction of such a machine with a carrier according to the present invention will be hereafter fully described by way of example.

Fig. 1 is a plan of the apparatus as a whole;

Fig. 2 is an elevation looking in the direction of the arrow II of Fig. 1;

Fig. 3 is an elevation on the line III—III of Fig. 1;

Fig. 4 is an elevation looking in the direction of the arrow IV; showing only the cap or "inner" carrier and the operating means therefor;

Fig. 5 is an end view of the cap carrier construction shown in Fig. 4;

Fig. 6 is a section elevation to an enlarged scale showing the electro-magnetic means for maintaining strips straight on the platform;

Fig. 7 is an elevation on the line VII—VII of Fig. 6; and

Fig. 8 is an end view of the holder.

The apparatus as shown is a complete unit for curling and jointing strip blanks whilst associated with caps or inners so as to produce in a complete sequence of operations a closure of the Phoenix type ready to be applied to a container.

In the drawings the holder is identified by the reference H and a carrier constructed according to the present invention is identified by the reference C, the carrier being inclined slightly from the vertical, see in particular Fig. 5.

Generally speaking, the operation is as follows:

A strip is curled about the holder H

against the face of which a cap has already been placed by the advance of the carrier C to the holder, the plunger 67 holding the cap against the holder. The strip is then curled about the holder and cap, its ends linked and then pressed together. The holder is substantially the same diameter as the cap or inner and it is found in practice that the strip, when curled, tightly grips the cap while the cap has not in fact acted as a former for curling the strip, support for this purpose being obtained from the holder H.

During the feeding of the cap to the holder and its ejection the holder is stationary. There is avoided therefore the trouble arising from caps spinning when they are freed, viz the difficulty of collection, and in order to obtain further advantage from the construction involving a stationary holder during ejection the carrier is provided with a hopper like device for directing the ejected closures to any desirable collecting point.

In the description here following, the apparatus for delivering the strips to the holder will first be described, although it is exactly the same as shown and described in a co-pending application, and thereafter the preferred construction of carrier and associated hopper device will be referred to.

Referring now to the drawings, the apparatus comprises two vertical supports 1, 2, mounted on any suitable base or table, not shown, by feet 1^a, 2^a, respectively, in which are formed bearings for a main shaft 3, a transmission shaft 4 and a hollow shaft 5, the shaft 5 being carried in higher parts 1^b, 2^b, of the supports as clearly shown in Fig. 2 the higher part 1^b also forming a support for a timing gear T hereafter referred to.

On the shafts 3 are arranged cams 6, 7, 8, 9, 10 and 11. The cam 7 controls the strip feeding mechanism which includes the bell crank 12 formed at its free end as a fork indicated at 13 which straddles on pin 14 depending from a slide 15 which latter is movable to and fro along the platform 16 as the bell crank 12 is oscillated. The rear part of the slide 15 includes an upstanding abutment 17 for engaging the tails of the strips S, as each becomes lowermost of the pile, see Fig. 3, arranged on the platform. The strips S are not included in Fig. 1 for sake of clearness.

As shown, the platform is of rectangular form being carried on a standard 16^a and an arm 16^b carried by the part 2^b of the support 2. At the forward end the platform is forked, see Figs. 1 and 7, and within the fork is lodged the top end of a plunger barrel 18 bored for the projection therefrom of a plunger 19, see Fig. 6, which is operated when the head of the strip comes over the plunger and turns back the tongue to the desired angle.

Now in order that tongue turning gear may be supplied automatically and so that a maximum output obtains, the strips are arranged in piles over the platform, the tails being at a higher level than the heads and the tongue of each strip overlying the head of the strip next above. To this end there is provided at the rear part of the platform 16 an inclined support 20 for the tails of the strips S, see Fig. 3. The arrangement of this support 20 is such that when the abutment 17 of the slide 15 is in the rearward limit position a strip S′ is engaged by the abutment, the head of the strip being juxtaposed to a gate member 21. The superimposed strips are arranged in overlapping relation with all their tails resting on the support 20 and their heads underlapping the tongues of the next undermost strips.

The cam 7 which operates the bell crank 12 has two protuberances in order that there shall be a two-step progression of the slide 15. The first step places the head of the undermost strip over the plunger 19, the gate member 21 having been automatically lifted sufficiently to permit this progress of the lowermost strip.

The position of the abutment 17 when the head of the strip is over the plunger, is indicated at 17^a, Fig. 3, and the second step effected by the cam 7 causes the abutment 17 to move to the position 17^b as a result of which the head of the lowermost strip is pushed clear from the platform, this new position of the strip being clearly indicated in Fig. 6 by the reference S′. The overhanging head of the strip is engaged by a spring-pressed finger 22 on a rotatable holder H hereafter referred to, which in rotating withdraws the strip from the platform. The strip is being dragged from the platform by the holder H drags with it by friction the strip next above, indicated at S^2 Fig. 6, but as the gate 21 has been lowered the strip S^2 is arrested and then takes up the position originally held by the strip S′. In the meantime the abutment 17 is returned to the initial position ready to push forward strip S^2.

The operation of the gate 21 is preferably controlled by trip gear including an abutment 23 indicated in Fig. 2 and diagrammatically indicated in Fig. 6, arranged on the holder H and a lug 24 adjustably disposed on an arm 25 to which the gate is secured, the arm being pivoted at 26 on the platform.

Referring now to the means for curling and linking the strip after it has left the platform, and which includes the holder H. The controlling members of this mechanism are the cams 8, 9, and the timing gear T, the

holder H is mounted at one end of the hollow shaft 5 and is disposed in alignment with the platform so that its finger 22 can, as aforesaid, engage and pull a strip from the platform, and it will be noticed that the arrangement of the holder is such that the platform is not tangentially disposed with regard to the holder. This assures the head of the strip striking the bevelled tip of the finger 22 thereby depressing the finger until the slot behind the tongue is in register, at which movement the finger projects therethrough to pull the strip as aforesaid. Incidentally this arrangement imposes a tension in the strip as it is being curled round by the holder. At high speed, however, a further braking device such as 59 hereafter referred to is employed.

The platform is provided at its ends with plates 27 indicated clearly in Figs. 2, 6 and 7 which overlap the bifurcated ends of the platform and with them form guides within which the edges of the strip are held while the plunger 19 turns back the tongue and are constrained to pass in leaving the platform. These plates 27 may be constructed and the plunger so formed as to cut out the tongue from a blank strip as well as turning it back.

Alternatively, the blanks may be scored to demark the tongue, and then the tongue can be freed and turned back by a plunger operating with plate 27 as aforesaid.

Now in order to mechanically assist the engagement of the strip on the finger 22 and to effect the linking of the strip ends, two spaced guide plates 28 and 28ª including cam faces 29 are arranged about the holder, the cam faces merge into an internal circular periphery disposed in proximity to the path which will be taken by the head of the strip as impelled by the movement of the holder, thereby tending to prevent displacement of the head of the strip from the finger and to constrain the head of a strip leaving the platform on to the finger 22. This arrangement is clearly shown in Fig. 6.

It will be clear therefore, that the function of the holder H in the form shown, is to pull the head of the strip round through a circular path in order to eventually bring the head beneath the tail in order that the slot in the tail can be pressed over the tongue in the head. It is convenient therefore to adopt a holder of drum-like form to include the required anvil surface to support the ends of the strip during the pressing and hammering operation; such a holder acts as a former for the strip and prevents sagging between the head and the platform.

The plates 28, 28ª, are secured together at the bottom by screws and distance pieces, not shown, but in their upper corners the plates are used as supports for pivotal axes of the tongue opening plunger barrel 18, and the pressing and hammering means indicated at 18ª and 36 respectively, see in particular Fig. 3.

By pivoting the barrel of the plunger and providing it with a slotted quadrant 30, the position of the barrel can be angularly set by loosening and then tightening the nut member 31 as will be well understood, the plunger is operated by a pair of cams 32 on the shaft 4 acting with bowls 33 carried on trunnion members 34, connected to the plunger and passing through a slot in the barrel.

The strip having been pulled by the holder through 360° that is until the head is beneath the tail, the cams 29 on the guides 28 again operate and this time function to push the tail on to the head so that the desired tongue and slot engagement results. Then to press the two ends of the strip together to form a jointed locking ring, the bell crank including forked arm 35 and arm 35ª pivoted at 36 in the guide plates, is provided. The arm 35 descends through the operation of the cam 9 which rocks the lever 37 about its pivot 38 thereby causing an upward movement of the rod 40 and a corresponding rocking of the lever arm 35ª. The distance between the arms of the fork is such that they straddle the tongue of the strip and finger 22 of the holder H.

It wil be noted that the arms 35 have each a concave portion 41 of an arcuate form which is concentric with the holder when the lever arms 35 press against the linked ends of the strip. Whilst the ends are thus held pressed together the cam 8 rocks lever 42 about its pivot 43 and by reason of the link connection at 44 causes the bell crank 45 to rock. At the end of the bell crank is a link 46 which is pivotally connected by a second link 47 itself pivoted between the pressing arms 35. It will be observed therefore that with the lever arm 35 in the pressing position the pivotal axis thereon of the link 47 will be juxtaposed to the root of the strip and therefore that as the lever 45 rocks as a result of the cam action referred to the resultant movement of the link 46 causes the link 47 to move up against the upstanding tongue and then in a somewhat kneeling movement press over and hammer down the tongue.

The operation of linking, pressing and hammering the strip is then finished and a jointed locking ring is formed. It then remains to eject the strip from the holder H and this is effected by the cam 6 through the bell crank 48 which operates a rod 49 passing through the hollow shaft 5 and the holder H and terminating in a plate 50 having peripheral claws 51 for the reception of which the holder H is slotted so that in fact the claws form part of the periphery of the holder, the claws being shouldered as indicated at

52 against which the strip abuts when disposed about the holder so that the operation of the cam 6, as aforesaid, effects a peripheral ejection of the jointed ring from the holder.

The rotation of the holder H is effected from the timing gear T through a pinion 53 carried by the hollow shaft 5 and the arrangement is such that the holder is stationary during the pressing and hammering and ejection operations.

It may here be mentioned also that while the holder is stationary and just prior to ejection a strip is fed forward by slide 15 through the second progressive step from the platform 16 to the spring pressed finger 22 of the holder so that the new strip overlies the curled strip and is ready to be engaged by finger 22 immediately the curled strip has passed over the finger as a result of the ejector action.

The timing gear T aforesaid, which regulates the rotation of the holder H, includes a toothed timing wheel 54, on which is coaxially mounted a diametrical arm 55 carrying at one end a ratchet 56 preferably mounted for adjustment e. g. on an eccentric bush, engaging the timing wheel teeth, this timing wheel being in mesh with the pinion 53 associated with the holder H. The other end of the diametrical arm 55 is adjustably connected by a pitman or connecting rod 57 to a crank member e. g. disc 58, on the transmission shaft 4, or driven synchronously therewith, the arrangement being such that as the crank member 58 rotates it oscillates the arm on the timing wheel 54 and causes the ratchet 56 carried thereon to alternatively engage the teeth of the timing wheel and to slide thereover. Each oscillation of this radius arm 55 is of an amplitude of 90° so that there are four revolutions of the holder H for each single revolution of the timing gear, and at the end of each revolution the holder is in such position to correctly present the tongue and slot of a strip curled thereon to the pressing and hammering gear.

However, to prevent overrun of the holder a mechanically operated friction brake, e. g. the band brake 59 carried on support 60 may be employed on hollow shaft 5, alternatively a positive register gear may be employed including, for instance, a notch in the flange H′ of the holder H (see Fig. 2) disposed to receive a pivoted latch or catch indicated at 61 Figs. 2 and 6, retractable from the slot automatically at the commencement of the next rotary movement.

The cams hereinbefore referred to for operating the pressing and hammering devices are preferably set so that the pressing and hammering is effected at the same time as the feeding device moves a strip forward to have the tongue opened back, the holder at this time being stationary, and the second movement of the strip which finally disposes its head over the spring pressed finger on the holder is simultaneous with the ejection of the previously jointed ring, and in between these operations the holder rotates to effect the curling and linking operations.

It will be noted that the shaft 3 is connected to the shaft 4, for example, with pinions 62, 63, so that the shaft 4 is driven at the same speed as the shaft 3. It follows, therefore, that the control of the speed of the shaft 3 controls all the operations of the machine.

Referring now to the means for applying the caps and inners to the holder H according to the present invention and which involves the tilted carrier C, see Fig. 5, the carrier is of U shape and is normally disposed at the end of an inclined chute 64 down which the inners or caps are fed for successive reception by the carrier C.

The caps are fed to the holder so as to be lodged within the guide plate 28 and against the ejector plate 50 against which it is held by cap feeding plunger 67 (hereafter referred to) see Fig. 8.

In this position the cap is retained in desired relation with the anvil surface of holder H so that a strip is curled about the cap, the latter being located from one edge of the strip so as to be ready for treating in flanging machine, e. g. a dial feed press.

The carrier is provided with a sleeve 65 in which is slidably disposed a second tube 66 within which is the rod 67 passing through both tubes and through the carrier C, and connected to the second tube by a spring 68. The function of this rod is finally eject a cap from the carrier C on to the holder H, and it is operated by the cam 11 on the main shaft 3 through the bell crank 11^a in exactly the same way as the ejector rod 49 before referred to.

The cam gear is such that the inner sleeve 66 first moves the carrier C up to the holder H. At this moment the effort of placing the cap on to the holder compresses the spring 68 on the axial rod 67 with the result that the rod moves onward and centrally taps the cap on to the holder H so that the cap lies flatly thereon, it being understood that a spring 68. The function of this rod is to withdrawn by spring 68 acting between sleeve 66 and abutment 69 from the face of the carrier.

Associated and movable synchronously with the carrier is a cut off member, e. g. a plate 70 which, as the carrier moves to the holder, cuts off the chute until the carrier has returned to position to receive the next cap.

In front of the carrier C is a guard plate 71 which prevents caps jumping out as they roll in from the chute 64, the plate being

pivoted at 72, and the carrier is provided with a finger 73, which as the carrier moves forward displaces the guard plate to the position, shown in dot and pick lines Fig. 5, where it is out of the path of advance to the holder H.

The guard plate is conveniently provided with wings 74 which straddle the holder H and form with the plate a hopper device for guiding finished closures ejected from the holder H down through a conduit 75 (Fig. 1).

At the side of chute 64 is a spring controlled arm 76 (Fig. 4) pivoted at 77 which operates as a selector by reason of a pin 78 at its extremity intercepting the foremost cap in the chute and holding it back clear of the carrier C thereby definitely separating the cap in the carrier from those following. Such arrangement eliminating the possibility of edge engagement of the two caps as the carrier moves forward probably resulting in tipping of the cap in the carrier owing to the frictional adhesion by reason of the rough edges.

To permit movement of the caps in the chute 64 to the carrier C, cam 10 is mounted on shaft 3 and is designed to lift the lever 76 through the agency of the abutment 80 as soon as the carrier has moved forward thereby permitting the next cap to roll to the cut off plate 70 ready to enter the carrier when it is again retracted back to alignment with the chute 64.

In practice caps vary as regards construction, and the strips vary as regards width. In order to accommodate different types of caps the front face of the holder may be dished, or the holder may be hollow and have its engaging face constituted by a movable ring or rings so that an end face may be formed on the holder to correspond to the cap which is going to be used, and as regards the accommodation of strips of varying width, or wherein the tongue and slot are not centrally disposed, the rear face of the holder may be provided with a movable flange adjustable on the holder, or it may be substituted by other flanged members so as to act as a stop or guide for the strip on that side of the holder.

Electro-magnetic means may also be included, as shown for example in Figs. 2, 3 and 6, but omitted from Fig. 1 for sake of clearness, for maintaining the strips flat on the platform when being pushed along by the abutment 17.

As clearly illustrated in Fig. 6 the poles 81 are arranged beneath the platform and energized from the coil 82 through suitable circuits controlled by the rotation of the shaft 3. The platform 16 may also be provided with an eliminator plate 83 clearly shown in Fig. 6 cut away in the centre (for the passage thereunder of strip tongues) leaving prongs which are of a length to engage, for example, the top strip when three overlapped strips attempt to pass thereunder. With such an arrangement when one strip has arrived at the gate the third will be held up by the eliminator plate 83.

84 and 85 (Fig. 1) are auxiliary supports for the shafts 3 and 4.

Generally speaking, and as already indicated, it is preferred to operate all the members by cam actuating gear, the retraction of the different members being assured by springs, or equivalent resilient means, the operation of the several parts being effected from a mechanical motor, by manual power through suitable gearing, or by magnetic or electro-magnetic or fluid control. Various modifications, however, may be effected without departing from the spirit of the invention, for instance, the ejection and the feeding of the cap and strips may be effected by a magnetic or electro-magnetic apparatus.

Electrical circuits may also be included to stop the machine when the supply of strips or caps has run out. Conveniently, the centre of the cap holder H or the ejector plate 50 may form one terminal of such an alarm circuit and the axial plunger of the carrier as the other, so that if the two meet as the result of the absence of a cap the circuit is completed. To this end the centre of holder H may be provided with an insulating bushing within which is the terminal lying just behind the holder face so that caps placed in the holder do not come in contact with it.

An apapratus comprising integers hereinbefore described provides a continuous means of feeding the strips and caps so that they, in proper time, arrive at the holder so that a strip can be jointed around a cap and ejected in locked association, all automatically effected, thereby, enormously expediting the production of these articles in comparison with the output at present obtained by the existing usual hand operations.

What I claim is:—

1. Feeding apparatus for delivering cap blanks to a rotatory holder on which the blank is to be worked in the manufacture of closures for containers, comprising in combination a carrier for a single blank and means for reciprocating the carrier laterally including a compression spring and a telescopic member, the telescopic member including a plunger disposed to pass axially through the carrier and means for reciprocating the plunger, the arrangement being such that initial advance of the plunger is transmitted through the spring to cause the desired advance of the carrier then to move the plunger relatively to the carrier so as to set a blank in the vertical position, and thereafter to displace the blank laterally from the carrier.

2. Feeding apparatus for delivering cap blanks to a rotatory holder on which the blank is to be worked in the manufacture of closures for containers, comprising in combination a tilted carrier capable of receiving a single blank, a boss at the back of the carrier, a plunger slidable through said boss and carrier, an abutment at the free end of the plunger, a compression spring between said boss and abutment, and means for reciprocating said carrier and plunger operating through said plunger.

3. In combination, a carrier adapted to hold a single blank inclined from the vertical, a guard plate adapted to lie across the carrier, said guard plate being pivoted to a fixed support such that a predetermined lateral advance of the carrier causes the guard to rock about its pivot and to be displaced from the front of the carrier, means for advancing the carrier and ejecting a blank therein, means for retracting the carrier and for replacing the guard plate.

4. In combination, a carrier adapted to hold a single blank inclined from the vertical, a guard plate adapted to lie across the carrier, wings to the guard plate such that it forms in nature a hopper device in front of the carrier, said guard plate being pivoted to a fixed support such that a predetermined lateral advance of the carrier causes the guard to rock about its pivot and to be displaced from the front of the carrier, means for advancing the carrier and ejecting a blank therein, and means for retracting the carrier, and for replacing the guard plate.

5. In combination, a chute, a carrier laterally reciprocable from the end of the chute and adapted to hold a single blank inclined from the vertical, a blocking abutment near the end of the chute, means for momentarily removing the abutment when the carrier and chute are in alignment, and means for setting a blank in the carirer to the vertical when the later has been advanced and for ejecting the blank laterally.

6. In combination, a chute, a carrier adapted to hold a single blank laterally reciprocable from the end of the chute, said carrier and chute being slanted from the vertical, a blocking abutment near the end of the chute, means for momentarily removing the abutment when the carrier and chute are in alignment and means for setting a blank in the carrier to the vertical when the latter has been advanced and for ejecting the blank laterally.

7. In combination, a chute, a carrier adapted to hold a single blank laterally reciprocable from the end of the chute, a blocking abutment near the end of the chute, means for momentarily removing the abutment when the carrier and chute are in alignment, a guard plate adapted to lie across the carrier, said guard plate being pivoted to a fixed support such that a predetermined lateral advance of the carrier causes the guard to rock about its pivot and to be displaced from the front of the carrier, a plunger carried centrally by the carrier, means for advancing the carrier and then the plunger, and means for retracting the carrier and for replacing the guard plate.

8. In combination, a chute, a carrier adapted to hold a single blank laterally reciprocable from the end of the chute, a blocking abutment near the end of the chute, means for momentarily removing the abutment when the carrier and chute are in alignment, a guard plate adapted to lie across the carrier, wings to the guard plate such that it forms in nature a hopper device in front of the carrier, said guard plate being pivoted to a fixed support such that a predetermined lateral advance of the carrier causes the guard to rock about its pivot and to be displaced from the front of the carrier, means for advancing the carrier and for ejecting a blank therein, and means for retracting the carrier and for replacing the guard plate.

9. In combination, a chute, a carrier adapted to hold a single blank laterally reciprocable from the end of the chute and adapted to hold a blank inclined from the vertical, a blocking abutment near the end of the chute, means for momentarily removing the abutment when the carrier and chute are in alignment, a spring controlled guard plate adapted to lie across the carrier, said guard plate being pivoted to a fixed support, such that a predetermined lateral advance of the carrier causes the guard to rock about its pivot and to be displaced from the front of the carrier, means for reciprocating the carrier including a compression spring and a telescopic member, the telescopic member including a plunger disposed to pass axially through the carrier and means for reciprocating the plunger, the arrangement being such that initial advance of the plunger is transmitted through the spring to cause the desired advance of the carrier to move the plunger relatively to the carrier so as to set a blank in the vertical position and thereafter to displace the blank laterally from the carrier.

10. In combination, a chute, a carrier adapted to hold a single blank laterally reciprocable from the end of the chute said chute and carrier being slanted from the vertical, a blocking abutment near the end of the chute, means for momentarily removing the abutment when the carrier and chute are in alignment, a spring controlled guard plate adapted to lie across the carrier, said guard plate being pivoted to a fixed support,

such that a predetermined lateral advance of the carrier causes the guard to rock about its pivot and to be displaced from the front of the carrier, a boss at the back of the carrier, a plunger slidable through said boss and carrier, an abutment at the free end of the plunger, a compression spring between said boss and abutment, and means for reciprocating said plunger.

11. A unit apparatus for manufacturing closures for containers of the type wherein a cap is surrounded with a tongue and groove band comprising in combination a chute and a carrier for the reception of "inners" one at a time reciprocally arranged at the end of the chute, both chute and carrier being slanted from the vertical, a rotatable holder of drum like form including a finger extending from the cylindrical wall thereof, means for intermittently revolving the holder through one revolution, means for advancing the carrier to the holder when the latter is stationary, a guard plate lying across the carrier and pivoted so as to be displaced as the carrier is advanced, means for simultaneously feeding a strip from which the ring of the closure is made to the finger, means for linking the ends of the strip and means operable after each revolution of the holder for pressing and securing the linked ends on the inner.

12. A unit apparatus for manufacturing closures for containers of the type wherein a cap is surrounded with a tongue and groove band comprising in combination a chute and a carrier for the reception of "inners" one at a time reciprocally arranged at the end of the chute, both chute and carrier being slanted from the vertical, a blocking abutment near the end of the chute, means for momentarily moving said abutment when the chute and carrier are in alignment, a rotatable holder of drum like form including a finger extending from the cylinder wall thereof, means for intermittently revolving the holder through one revolution, means for advancing the carrier to the holder when the latter is stationary and means for simultaneously feeding a strip from which the ring of the closure is made to the finger, a guard plate lying across the carrier and pivoted so as to be displaced as the carrier is advanced, wings to the guard plate such that it forms in nature a hopper device between the holder and carrier when the latter is retracted, and means operable when the holder is stationary for linking and pressing together the ends of the strip.

13. A unit apparatus for manufacturing closures for containers of the type wherein a cap is surrounded with a tongue and groove band comprising in combination a rotatory holder on which a blank is to be worked, feeding apparatus for delivering "inners" to the rotatory holder, including a tilted carrier capable of receiving a single cap, a boss at the back of the carrier, a plunger slidable through said boss and carrier, an abutment at the free end of the plunger, a compression spring between said boss and abutment, and means for reciprocating said carrier and plunger operating through said plunger, a pinion connected to the holder, a toothed wheel driving the pinion and means for intermittently driving the toothed wheel, including a diametrically disposed rocking arm, a pawl at one end thereof engaging the teeth of the wheel in one direction and sliding over them in the other, means for oscillating the arm, said oscillating means being synchronously driven with means for reciprocating the carrier such that the advance of the carrier obtains when the pawl is slipping, means for feeding a strip to the holder whilst the latter is stationary, and means for curling the strip about the holder.

14. Unit apparatus for manufacturing closures for containers of the type wherein a cap is surrounded with a tongue and groove band comprising in combination a cylindrical former and a carrier reciprocal to and from the former for feeding inners thereto one at a time, said carrier being inclined from the vertical, a plunger operating through said carrier to set an inner resting therein in the vertical and for displacing it laterally to the holder, means for curling a strip about the holder and juxtaposed cap, means for linking the ends of the strip and pressing means for securing the linked ends, and means for ejecting the cap and associated jointed ring from the former.

15. Unit apparatus for manufacturing closures for containers of the type wherein a cap is surrounded with a tongue and groove band comprising in combination a cylindrical former and a carrier reciprocal to and from the former for feeding inners thereto one at a time, said carrier being inclined from the vertical, a plunger operating through said carrier to set an inner resting therein in the vertical and for displacing it laterally to the holder, means for curling a strip about the holder and juxtaposed cap, means for linking the ends of the strip and pressing means for securing the linked ends, a guard plate lying across the carrier and pivoted so as to be displaced as the carrier is advanced to the former, and wings to the guard plate such that it forms in nature a hopper device between the carrier and former when retracted from the former, and means for ejecting the cap and associated jointed ring from the former.

16. Apparatus for making closures of the Phoenix type comprising in combination a drum like former about which the closure ring is curled, linked and pressed, of a diam-

eter substantially equal to the diameter of the cap of the closure and a carrier adapted to receive caps one at a time tilted from the vertical and reciprocal to and from the former including means for displacing a cap held therein from the carrier and against the former when the carrier is advanced, a guard plate adapted to lie across the carrier, wings to the guard plate such that it forms in nature a hopper device when retracted from the former and means for ejecting the closure therefrom.

In testimony whereof I affix my signature.

WILLIAM ALFRED STEPHENS.