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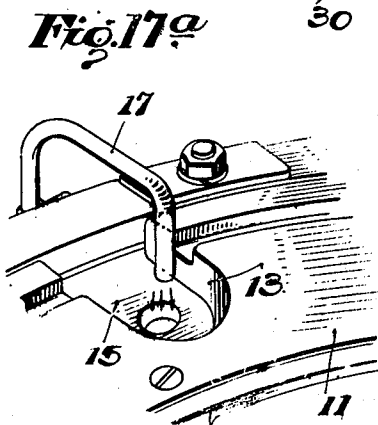
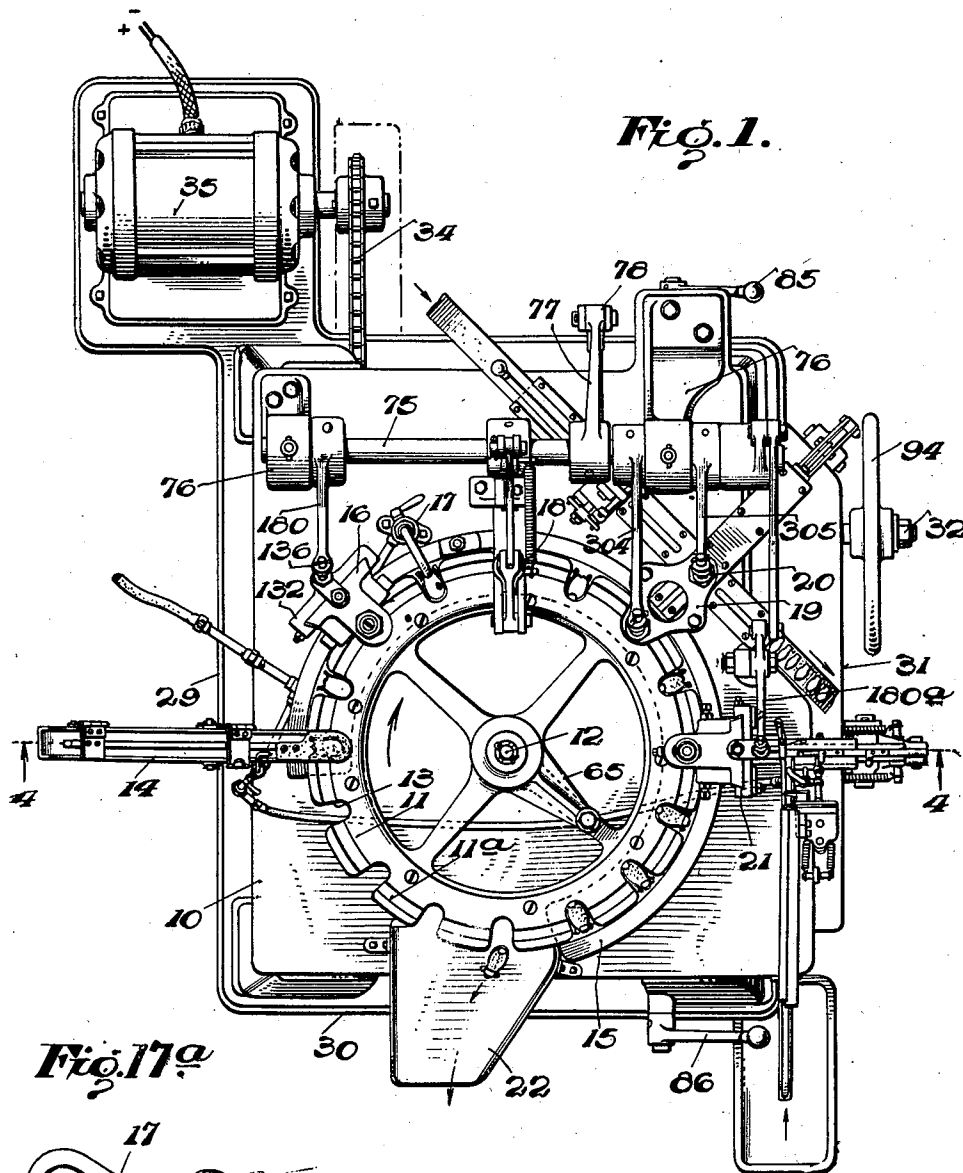
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2,339,807

CAP FORMING AND ASSEMBLING MACHINE

Filed Aug. 3, 1940

11 Sheets-Sheet 1



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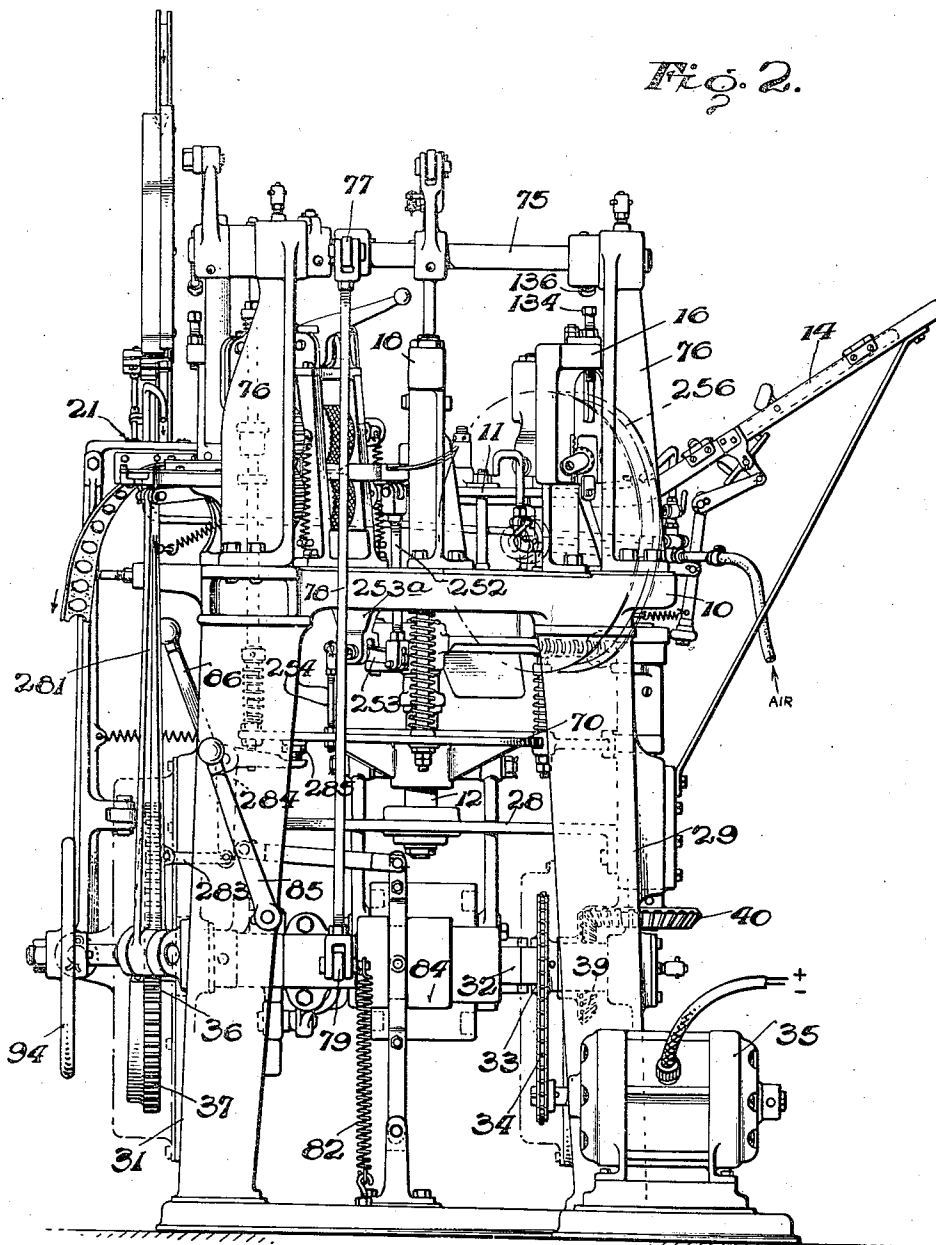
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CAP FORMING AND ASSEMBLING MACHINE

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11 Sheets-Sheet 2

Fig. 2.



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CAP FORMING AND ASSEMBLING MACHINE

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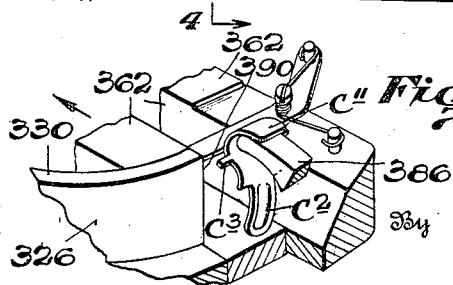
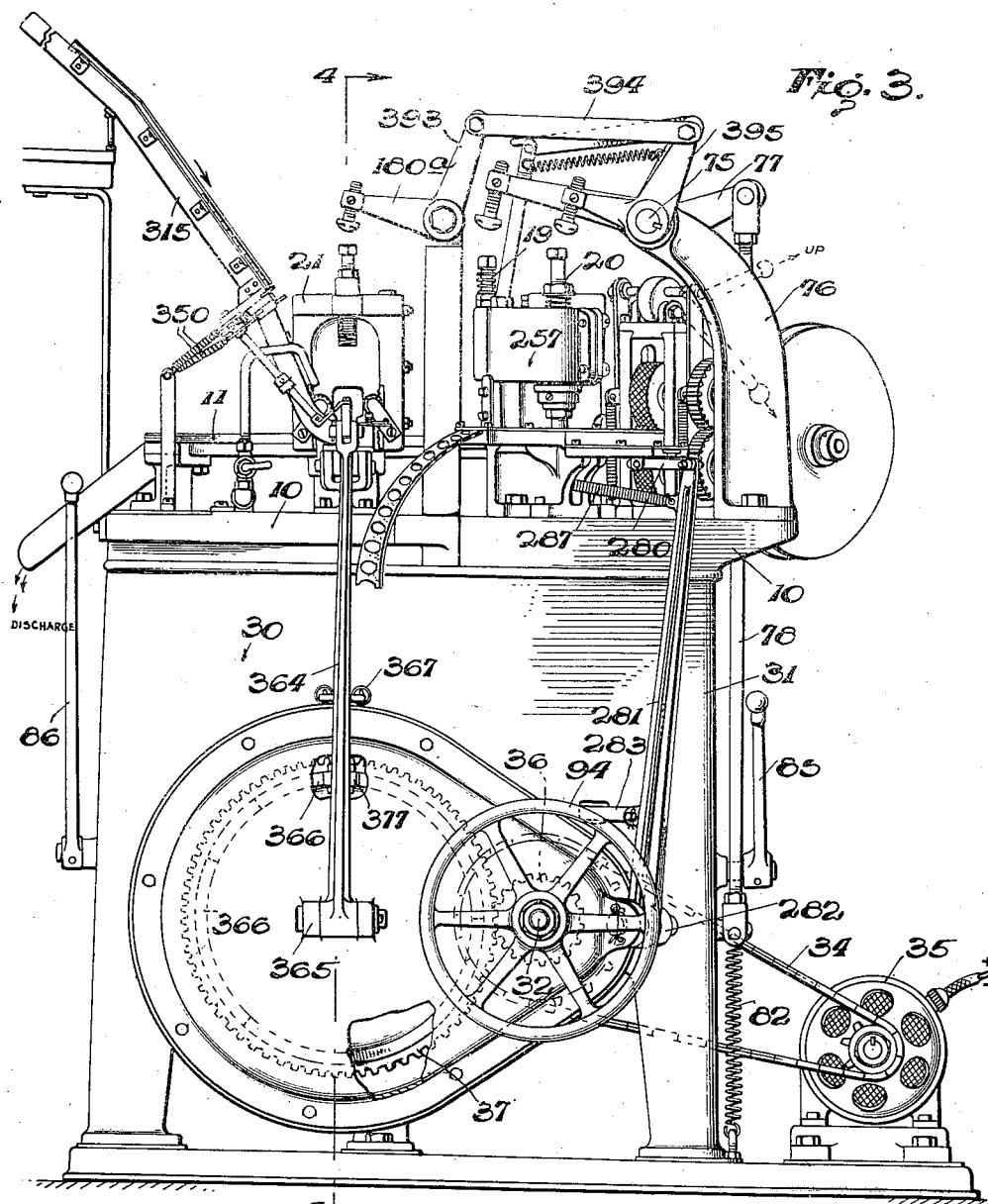


Fig. 35 a.

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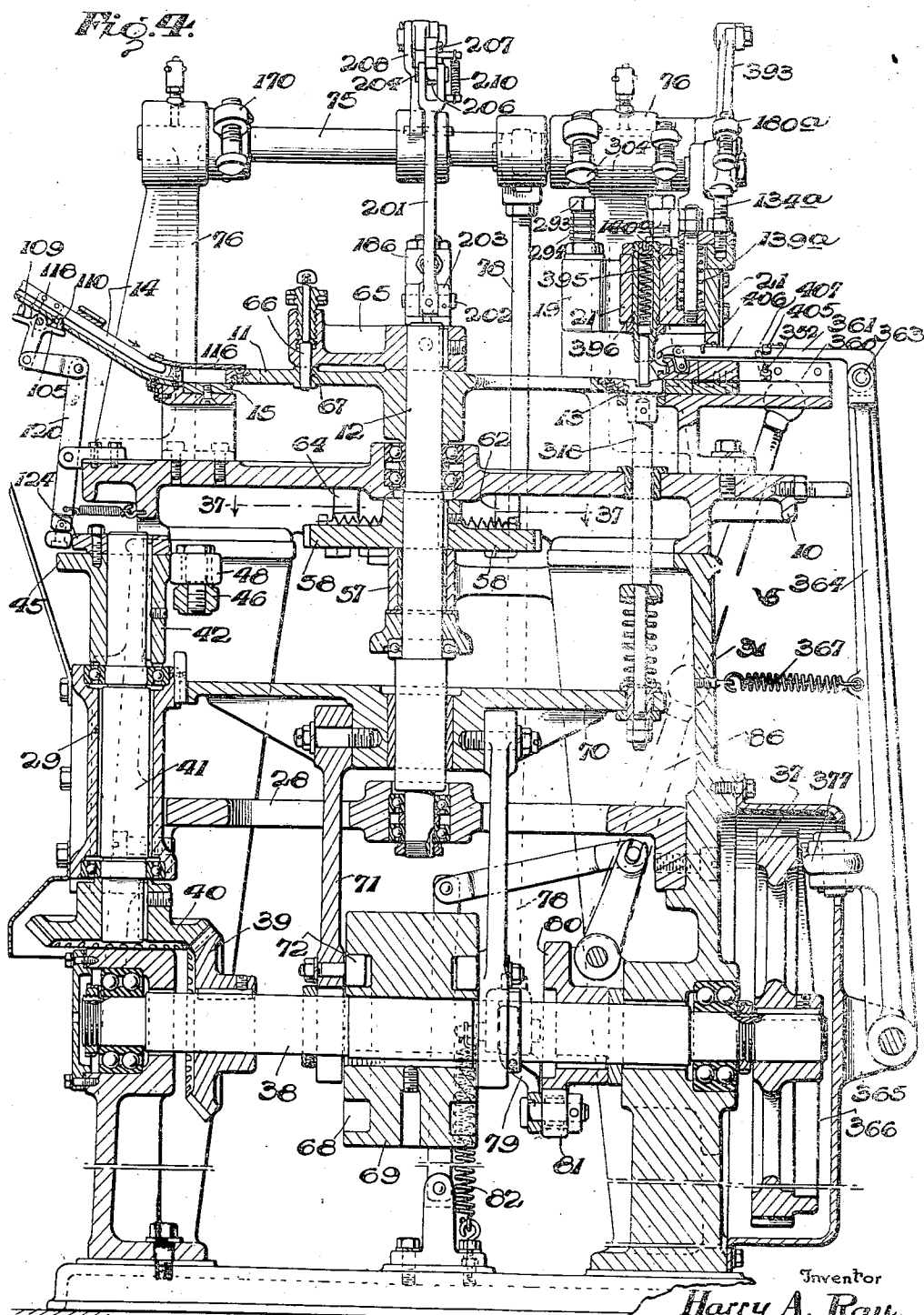
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2,339,807

CAP FORMING AND ASSEMBLING MACHINE

Filed Aug. 3, 1940

11 Sheets-Sheet 4



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Jan. 25, 1944.

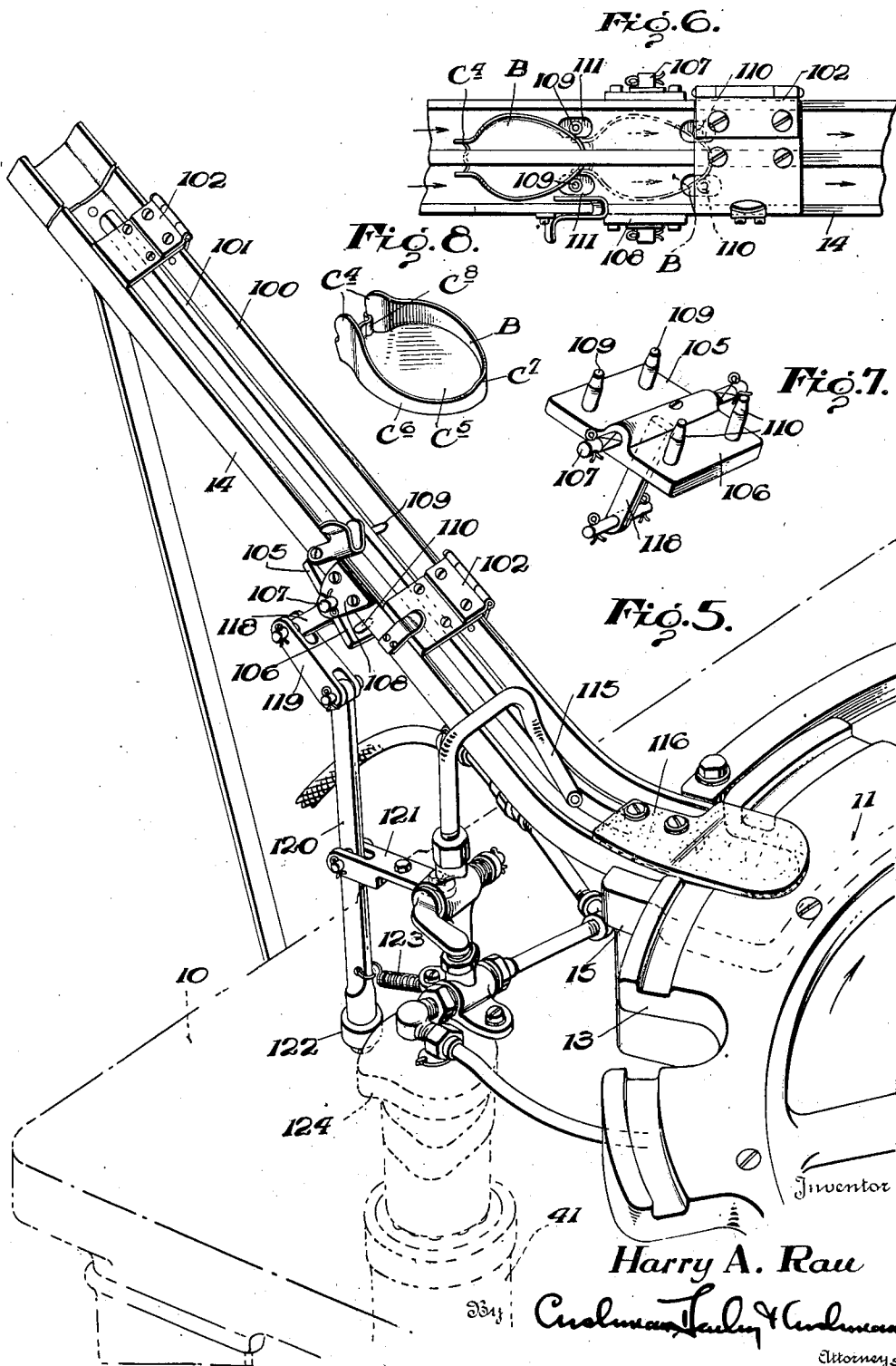
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CAP FORMING AND ASSEMBLING MACHINE

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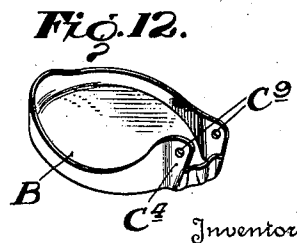
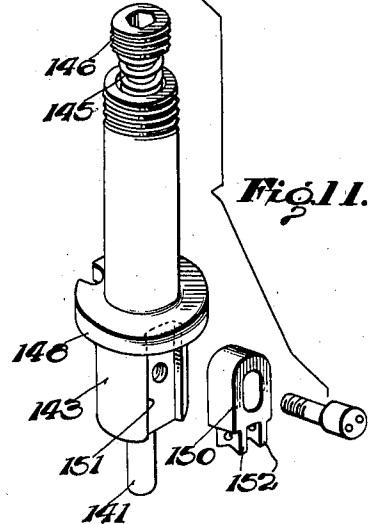
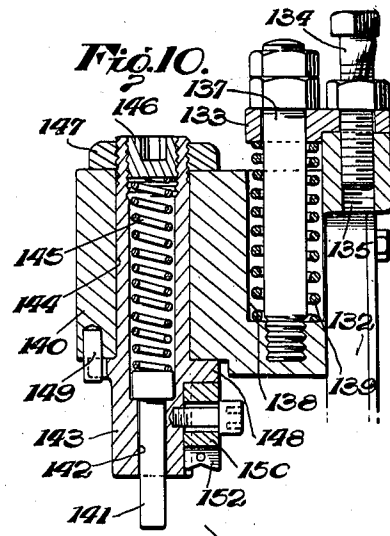
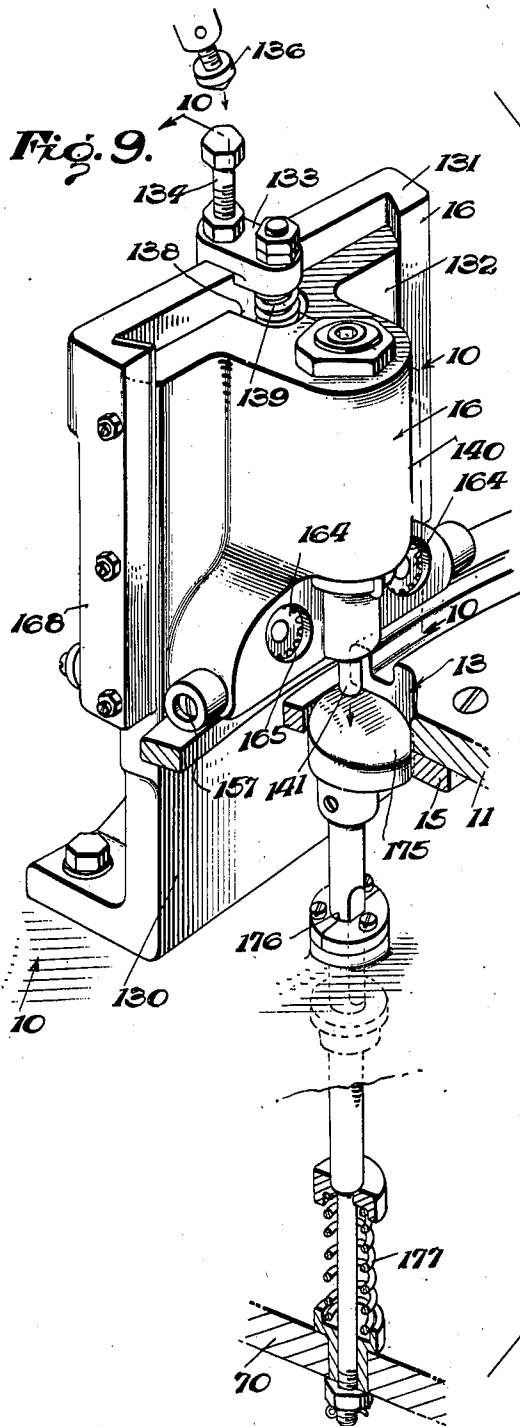
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CAP FORMING AND ASSEMBLING MACHINE

Filed Aug. 3, 1940

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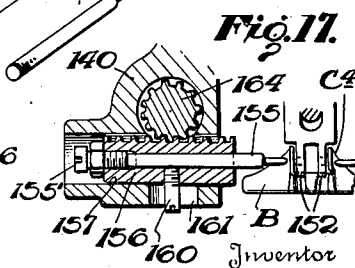
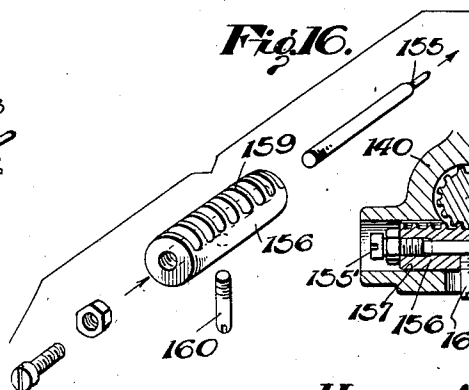
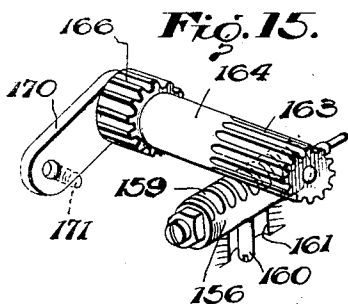
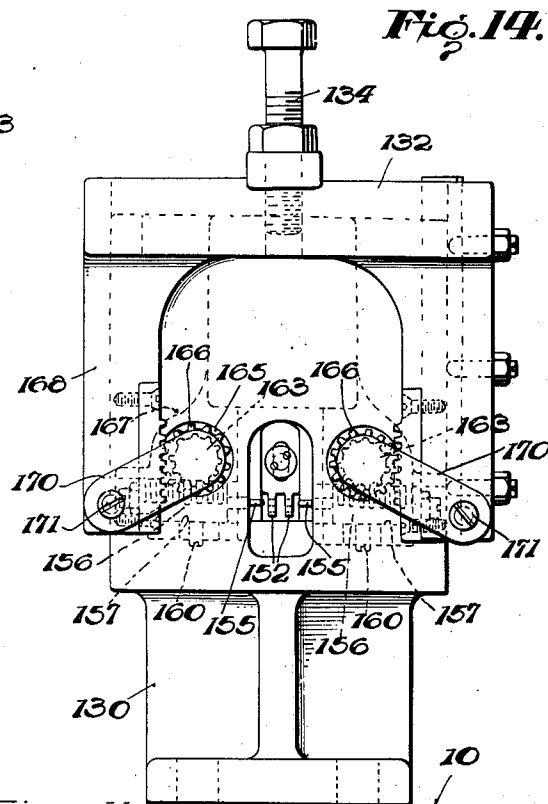
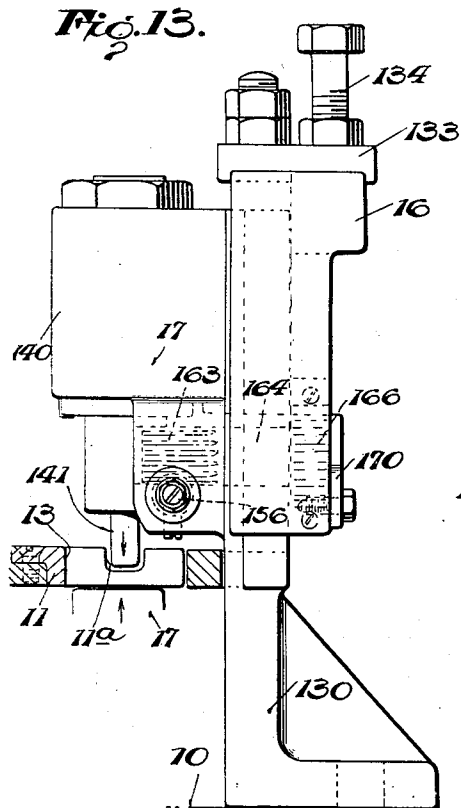
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CAP FORMING AND ASSEMBLING MACHINE

Filed Aug. 3, 1940

11 Sheets-Sheet 7



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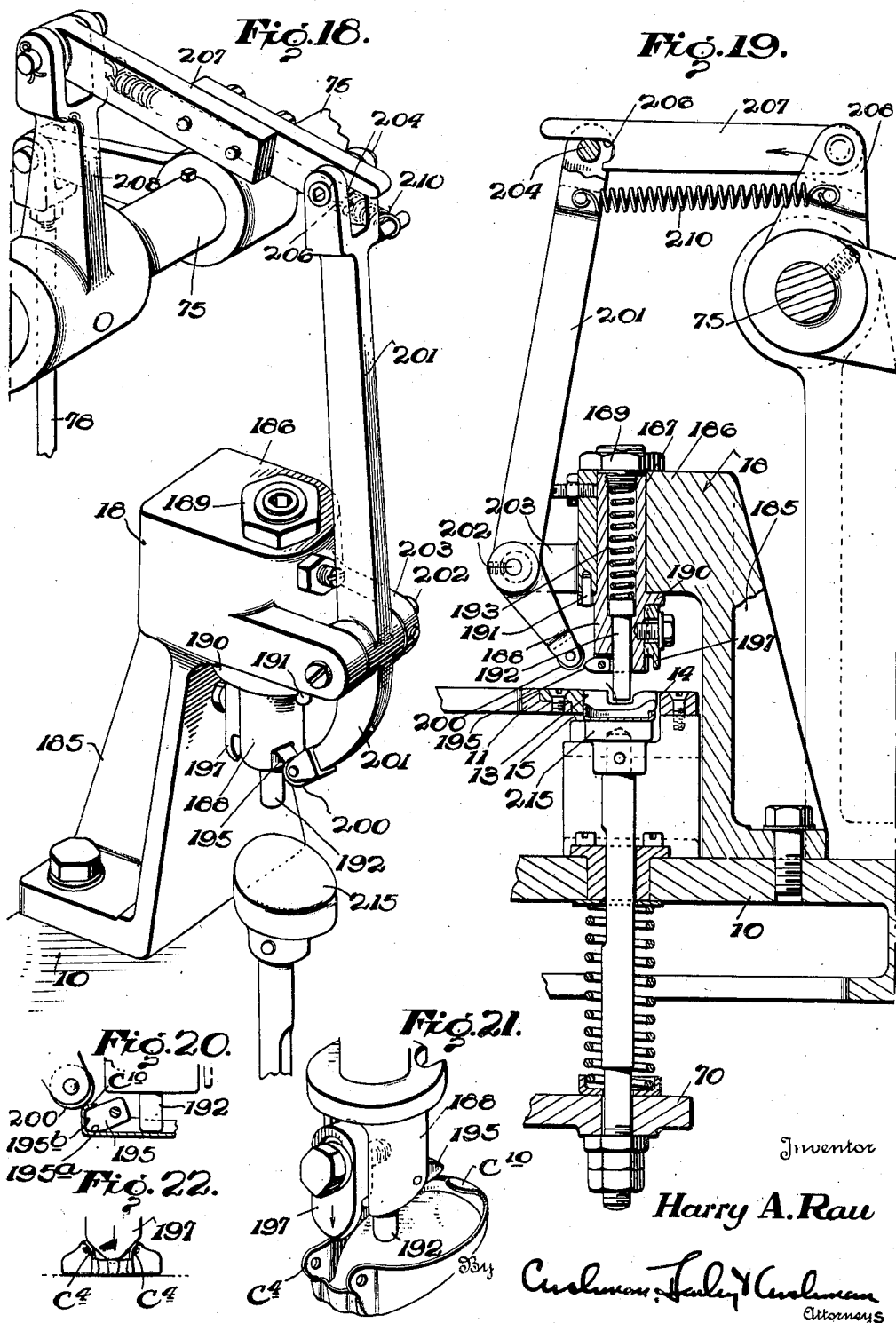
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CAP FORMING AND ASSEMBLING MACHINE

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11 Sheets-Sheet 8



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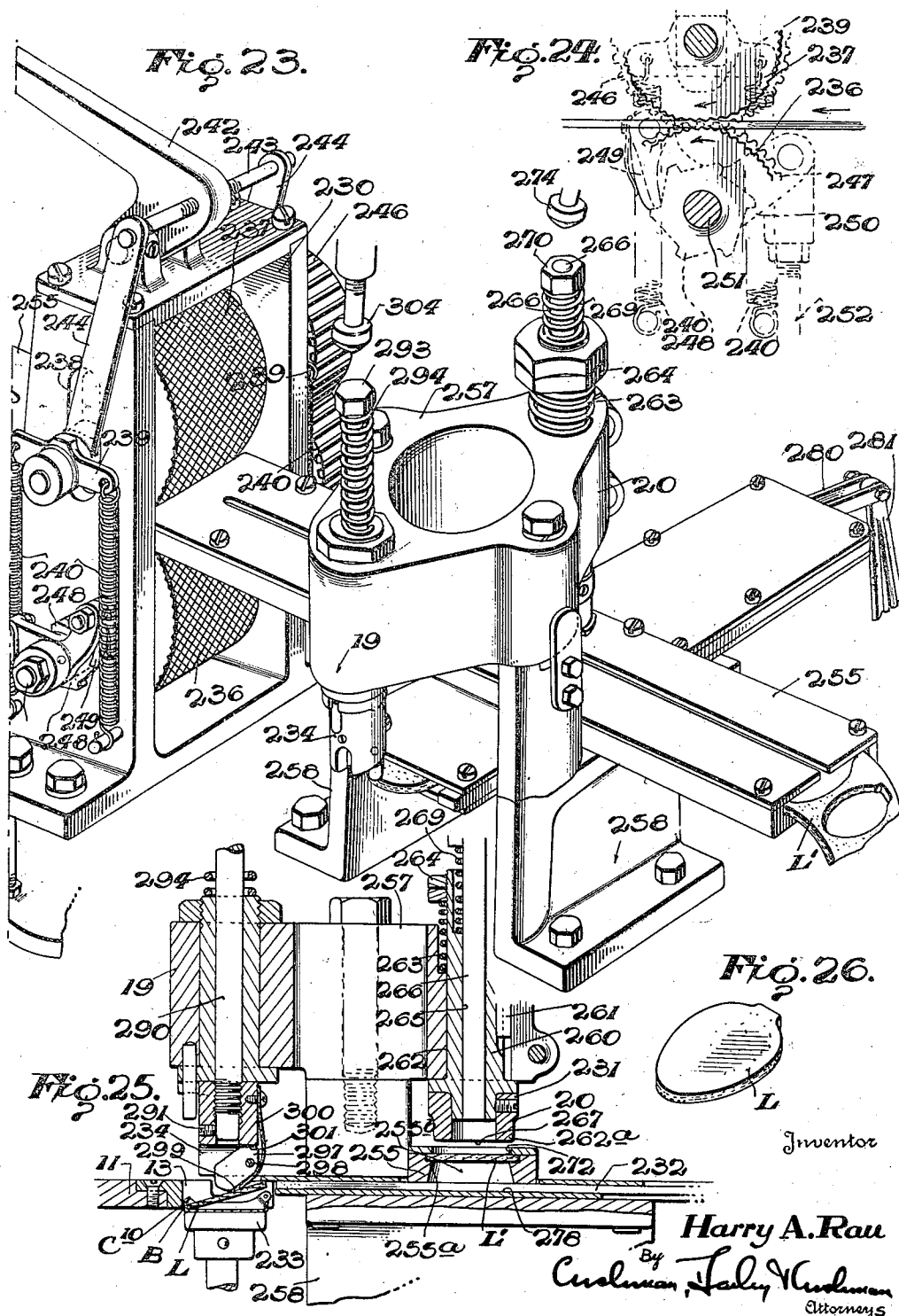
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CAP FORMING AND ASSEMBLING MACHINE

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11 Sheets-Sheet 9



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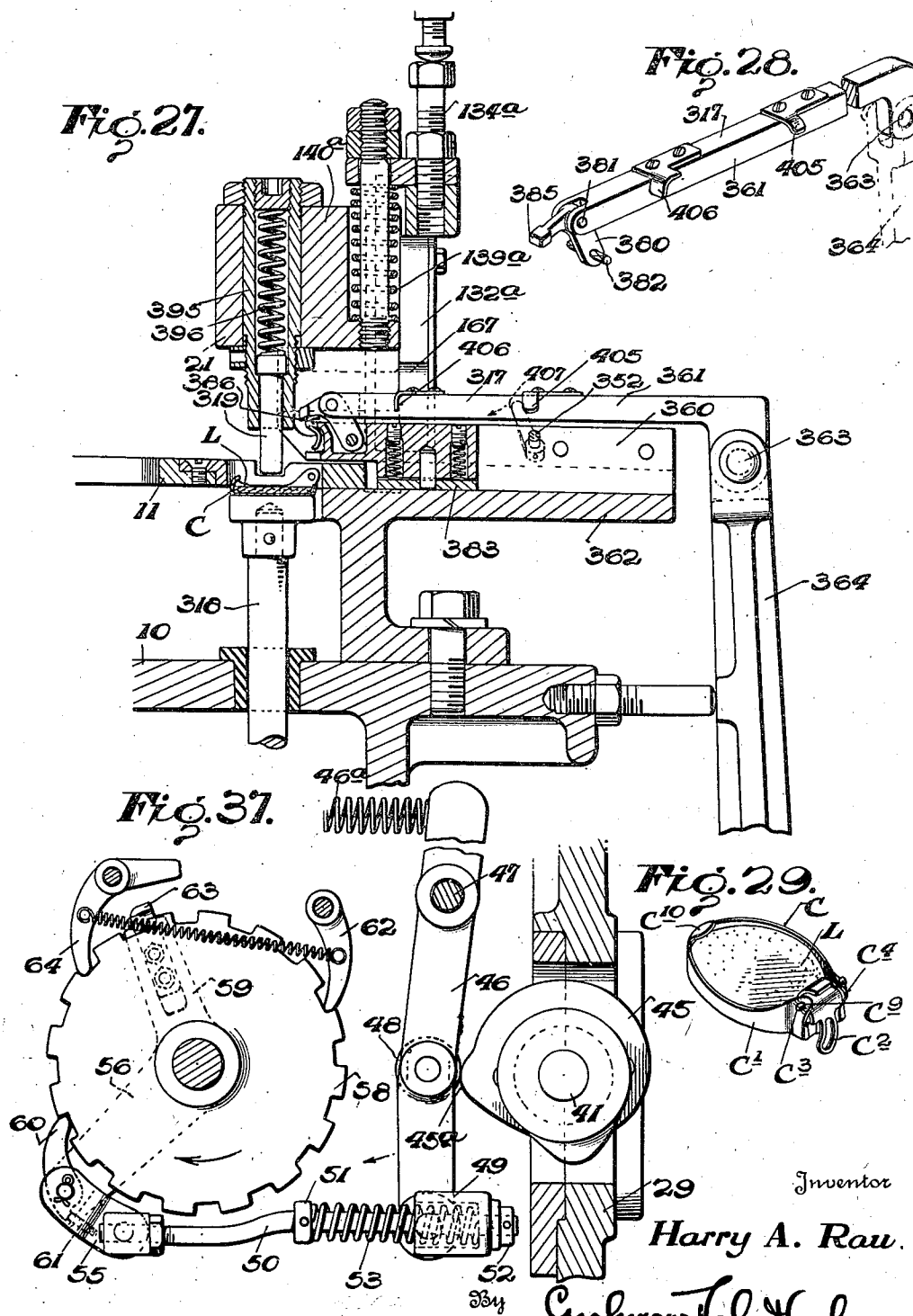
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CAP. FORMING AND ASSEMBLING MACHINE

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CAP FORMING AND ASSEMBLING MACHINE

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UNITED STATES PATENT OFFICE

2,339,807

CAP FORMING AND ASSEMBLING MACHINE

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Application August 3, 1940, Serial No. 350,707

7 Claims. (Cl. 29—84)

The present invention relates to a cap forming and assembling machine.

The embodiment of the invention disclosed herein is particularly adapted for forming from a substantially oval and cupped blank provided with projecting ears a completed cap of the type disclosed in the patent to Carl McQuinn, for Pouring spout and closure, No. 2,126,651, issued August 9, 1938. A completed cap of the above type includes a pivoted locking lever to enable the cap to be firmly clamped upon a container mouth and the present apparatus includes means to assemble such a locking lever with the cap blank.

The principal object of the invention is to provide a machine including mechanisms which will successively act upon a cap blank at high speed to shape the cap blank to the desired completed form.

A further object of the invention is to provide means to form liners and position them in cap blanks.

Another object is to provide arrangements for delivering locking levers to the caps and properly assembling the levers in the caps.

Another object of the invention is to provide an apparatus such as described above, which is capable of operation at high speed without danger of any of the mechanisms of the apparatus being damaged should a jam occur at any point.

A still further object of the invention is to provide an apparatus of the above type which is of such construction that should any cap become jammed therein, the machine can readily be manually operated to release the jammed article so that the machine can resume normal operation.

Still another object of the invention is to provide various improved devices for feeding articles to a machine of the above general type.

Other objects and advantages of the invention will be apparent from the following drawings, wherein:

Figure 1 is a top plan view of the machine.

Figure 2 is a rear elevation, the view being taken from the direction of the arrow marked "Figure 2" in Figure 1.

Figure 3 is an elevation of the machine as viewed from the right of Figure 1, and the left of Figure 2.

Figure 4 is a vertical sectional view on the line 4—4 of Figure 1 and also the line 4—4 of Figure 3.

Figure 5 is a perspective view of the blank in-feed mechanism.

Figure 6 is a fragmentary top plan view of the blank infeed mechanism.

Figure 7 is a detail perspective of the blank feed controlling element.

5 Figure 8 is a perspective view of a blank.

Figure 9 is a detail perspective view of the blank ear piercing mechanism.

Figure 10 is a vertical sectional view on the line 10—10 of Figure 9.

10 Figure 11 shows the elements of the female blank ear piercing die.

Figure 12 is a perspective of a blank after the ears have been pierced.

15 Figure 13 is a side elevation of the blank ear piercing mechanism.

Figure 14 is a view looking toward the right of Figure 13 and showing the rear side of the blank ear piercing mechanism.

Figure 15 is a detail of the ear piercing die.

20 Figure 16 is an exploded view showing the male blank ear piercing die.

Figure 17 is a vertical sectional view on the line 17—17 of Figure 13.

25 Figure 17a is a detailed perspective of an air-blast nozzle provided adjacent the blank ear piercing mechanism.

Figure 18 is a perspective of the lip bending mechanism.

30 Figure 19 is a vertical sectional view through the structure of Figure 18 taken radially of the machine.

Figures 20 to 22 show various stages in the lip bending operation.

35 Figure 23 is a perspective view of the liner feeding mechanism.

Figure 24 is a vertical sectional view through the liner strip engaging and driving members.

40 Figure 25 is a vertical sectional view through the liner feeding and inserting station, the view being taken radially of the machine.

Figure 26 is a perspective of a liner.

Figure 27 is a vertical sectional view through the locking lever inserting station, the view being taken radially of the machine.

45 Figure 28 is a perspective view of the locking lever supporting and feeding arm.

Figure 29 is a perspective view of a completely assembled cap.

50 Figure 30 is a vertical sectional view through the locking lever feed chute, the lower portion of the view showing the outer end of the locking lever inserting station.

Figure 31 is a perspective view of the locking lever feed control.

55 Figure 32 is a disassembled view of the mechanism of Figure 31.

Figure 33 is a perspective view of a cap blank and the die for bending the blank ears inwardly.

Figure 34 is a transverse vertical sectional view on the line 34—34 of Figure 30.

Figure 35 is an enlarged diagrammatic view of a portion of Figure 30.

Figure 35a is a detailed perspective view of the lower portion of the locking lever supply chute.

Figure 36 is a front view of the ear bending die, and

Figure 37 is a horizontal sectional view on the line 37—37 of Figure 4.

The mechanisms disclosed in the present apparatus are primarily intended for the formation of a cap of the type disclosed in the patent to Carl McQuinn for Pouring spout and closure, No. 2,126,651, issued August 9, 1938. Such a cap is illustrated at C in Figure 29 and generally comprises a body portion C1 and a locking lever C2 which includes trunnions C3 mounted in apertures provided in ears C4 extending from the rear end of the cap body.

The present apparatus forms the completed cap body portion C' of Figure 29 from the body blank B shown inverted in Figure 8 and which comprises a top wall C5 of generally oval form provided with a marginal skirt C6. Skirt C6 is deepened at its forward end on gradually curving lines to form a lip as indicated at C7 and also deepens at the other end toward the ears C4 which extend from the body portion on lines substantially parallel to the major diameter of the oval top wall. A low skirt portion C8 joins the ears C4, this skirt being of approximately the same depth as the major portion of the skirt C6. During the formation of the completed cap C of Figure 29 from the blank B of Figure 8, the present apparatus also inserts a liner or sealing pad L (Figure 29) in the cap body portion and fits the locking lever C2 in place between the ears C4.

GENERAL DESCRIPTION OF THE APPARATUS AND ITS OPERATION

The operation and construction of the present apparatus may be generally described as follows:

Referring to Figure 2, the machine comprises a table 10 mounted upon suitable legs or other supports and, as shown in Figure 1, table 10 has a dial 11 mounted above the upper portion thereof carried on a vertical shaft 12 adapted to be rotated step by step in a clockwise direction.

As best shown in Figure 1, a cap blank B of the formation illustrated in Figure 8 is delivered to each of the pockets 13 formed in the periphery of the rotating dial 11 through a cap infeed chute 14 (Figure 2) provided with suitable feed control means. The blanks B move down in chute 14 in the position shown in Figure 6, that is, with the ears C4 rearward, so that these ears will lie at the outer portion of the pocket 13.

The pockets 13 extend entirely through the dial 11 and during the time that blanks are moving with the dial they rest and slide upon a stationary supporting plate 15.

As is generally illustrated in Figure 1, when a cap blank B has been positioned in one of the pockets 13 of dial 11, the dial will move clockwise, a step at a time, the second such movement bringing the pocket and cap blank opposite a blank ear piercing station 16. At this station the cap blank will be moved upwardly out of its pocket 13 by a plunger so as to be presented between two horizontally moving piercing dies, as best shown in Figures 9 to 17, so that apertures C9 will be punched in the ears C4 as shown in Figure 12.

The dial then rotates forward one step to position the cap blank beneath an air-blast device 17 shown in Figure 17a, which will remove from the cap blank the two small particles of metal which have been dropped within the same at the piercing station 16. A third forward movement of the dial 11 conducts the blank beneath a station 18 at which the die structure illustrated in Figures 18 to 22 will bend the ears C4 of the blank to the formation illustrated in Figure 22, that is, so that the ears will be bent outwardly from the vertical planes best illustrated in Figure 6 to the inclined planes illustrated in Figure 22. The station 18 also bends the lip C7 of the blank inwardly to form a web C10 diagrammatically illustrated in Figure 21.

A further rotation of the dial 11, preferably by two steps, carries the cap blank to a liner inserting station 19, best illustrated in Figures 23 to 25, wherein a liner L of the form shown in Figure 26 will be inserted in the cap by the device best illustrated in Figure 25. Liner L is punched from a strip of liner material L' by a die mechanism 20 shown in Figure 25. Further movement of the dial 11 will conduct the blank B with the liner L inserted therein to a locking lever inserting station 21 best shown in Figure 27. At this station, a locking lever C2 of the form best illustrated in Figure 36 and including oppositely projecting pivot tangs or trunnions C3 will be positioned between the ears C4 of the blank B, with the trunnions C3 aligned with the ear apertures C9, and the ears will simultaneously be bent inwardly to the form illustrated in Figure 29 so that the trunnions will project through the ears. In this position the ears will lie in substantially the same plane as they had when they entered the machine, but will be very slightly closer to each other so as to snugly engage the sides of the locking lever.

From station 21 the now completely assembled caps will be moved by a further rotation of the dial 11 to an outfeed chute 22 for removal from the machine.

Supporting structure and drive mechanism

As best shown in Figures 2 to 4 the table 10 is supported at three edges upon vertical walls 29, 30 and 31. As indicated in Figure 4, shaft 12 is journaled adjacent its upper end in table 10 and its lower end is journaled in a spider 28 supported from the vertical walls of the machine. The various horizontally extending shafts of the apparatus are journaled in the walls 29 and 31. Referring to Figures 2 and 3, the main drive shaft 32 of the machine has fixed thereto a sprocket wheel 33 which is driven through a sprocket chain 34 from a motor 35. At its opposite end shaft 32 has a small pinion 36 fixed thereto which pinion meshes with a large pinion 37 fixed to a second horizontal shaft 38. As best shown in Figure 4, shaft 38 is provided with a beveled pinion 39 at its opposite end which meshes with a beveled pinion 40 fixed to a vertically extending shaft 41 journaled in the vertical wall 29. At its upper end shaft 41 has keyed thereto a cam 45 which, as best shown in Figure 37, engages a lever 46 mounted intermediate its length on a pin 47 suitably supported from the side wall 29 so that lever 46 may swing horizontally. Lever 46 is provided on each side of its pivot with a roller 48 which contacts with cam 45 and beyond pivot 47 the lever has a coil spring 46a connected thereto so that roller 48 will be held in contact with cam 45. The end of the lever which carries

roller 43 pivotally supports a bracket 49 in which a rod 50 is slidably mounted. Rod 50 is fitted with spaced collars 51 and 52 and extends through the bracket 49 so that collar 52 will normally bear upon the rear surface of the bracket by the action of a coil spring 53 which encircles rod 50 between the inner face of a socket in bracket 49 and collar 51.

At its free end rod 50 is pivotally connected by a link 55 with an arm 56 extending from a collar 57 (Figure 4) journaled on shaft 12 immediately below a notched disc 58 keyed to shaft 12. Collar 57 has a second arm 59 extending therefrom at an angle to arm 56. A pawl 60 is mounted on the link 55 to coact with the notched disc 58 by the action of a spring 61.

Rotation of the vertical shaft 41 will cause the high point 45a of cam 45 to swing lever 46 to the left in Figure 37 and the result that a slight rotating movement will be imparted to the notched disc 58, keyed to shaft 12, this rotatable movement being in a clockwise direction with respect to Figure 37 and of sufficient extent to advance the pocketed dial 11 one step in the same direction by a drive connection hereinafter described. Figure 37 shows the rod 50 and pawl 60 in the relation to the notched disc 58 which they will occupy at the completion of such an advancing movement. When the high spot of cam 45 moves from beneath roller 48 lever 46 will be drawn to the right (in Figure 37) by the action of spring 46a. During such movement toothed wheel 58 will be held stationary by a pawl 62 and pawl 60 will simply ride rearwardly to the next succeeding notch in the disc. Since arms 56 and 59 move with the rod 50, this return movement of rod 50 will cause a shoe 63 carried at the outer end of arm 59 to ride beneath a second pawl 64 which engages disc 58 and tends to prevent its rotation in a clockwise direction. Shoe 63 will ride beneath pawl 64 to swing the latter out of engagement with the toothed disc during the initial portion of the succeeding driving movement, pawl 64 subsequently dropping into the succeeding notch to prevent overrunning of disc 58. The pawls 62 and 64 are connected by a coil spring in order to urge them into engagement.

It will be noted from Figure 4 that the dial 11 is not keyed to dial shaft 12 but is simply journaled on the shaft, the driving connection between the shaft and the dial being obtained through an arm 65 keyed to the extreme upward end of shaft 12 and provided with a pin 66 which extends into an aperture 67 in one of the spokes of the dial. Pin 66 is held downwardly in engagement with the aperture 67 by a suitable nut and, should the dial become jammed, pin 66 may be disconnected therefrom so that the dial can be swung by hand to clear the jam.

The cap blanks are lifted out of the pockets 13 of the dial 11 for some of the operations performed thereon at the various stations on the machine and vertical plungers, hereinafter referred to in detail, are provided beneath such stations and are adapted to be lifted to raise the cap blanks at the proper moment. These plungers are carried upon a circular plate 70 best shown in Figure 4 and which is mounted to vertically slide upon the dial carrying shaft 12. Plate 70 has a pair of depending rods 71 pivoted to its hub and these rods are provided with rollers 72 at their lower ends which engage in grooves 68 of a cam casting 69 fixed to shaft 38. Thus, the plate 70 and the plungers carried by the same

will be lifted by the action of the rods 71 upon each rotation of shaft 38.

Most of the stations which operate upon the caps also include plungers or other cap engaging elements which move downwardly to act upon the cap. These plungers are operated from a horizontally extending rock shaft 75 journaled in supports 76 which extend upwardly from the table 10. In order to impart a rocking movement to shaft 75 it has a rocker arm 77 fixed thereto which is connected at its outer end to a vertical link 78 which extends down alongside the machine, as best shown in Figures 2 and 4, to a pivotal connection with a generally horizontally extending lever 79 which is pivoted on shaft 32 and then extends into engagement with a cam 80 fixed on the other horizontal shaft 38 (Figure 4). The latter end of lever 79 is provided with a roller 81 to engage cam 80. A spring 82 serves to maintain link 78 downwardly and thereby hold roller 81 in contact with cam 80.

As shown in Figure 2, the machine includes a clutch of any suitable type interposed in shaft 32, this clutch being generally designated by the numeral 84 and operated through various link arrangements by means of levers 85 and 86 provided at opposite ends of the machine in order that the clutch may readily be controlled by the operator.

A hand wheel 94 is provided on the driven portion of shaft 32 to enable the machine to be turned by hand.

Other drive connections of the machine are hereinafter described in connection with the cap forming stations to which they are connected.

Cap blank feeding station

Figures 5 to 7 illustrate the cap blank feeding station 14 in detail, and the relation of this station to the remainder of the machine is best shown in Figure 1.

The cap blank feeding station includes a chute 100 in the upper end of which the cap blanks B are placed by hand by an operator with their ears C4 uppermost as indicated in Figure 6. In order to prevent the cap blanks from sliding on top of each other and also to prevent them from swinging to an angular position in chute 100, a bar 101 extends longitudinally of the chute intermediate the chute side walls and at a proper distance above the bottom wall of the chute. Bar 101 is carried upon spaced brackets 101 pivotally connected to one side wall of the chute.

In order to assure that only one cap will be fed at a time into the extreme lower portion of the chute, a stop mechanism 105 is provided near the bottom portion of the chute, this mechanism comprising a plate 106 including trunnions 107 extending through ears 108 extending downwardly from the side walls of the chute. Plate 106 includes a pair of pins 109 at its upper end and a second pair of pins 110 at its lower end which are adapted to project through apertures 111 in the bottom wall of chute 14, the pairs of pins being spaced apart just such distance that a cap may rest against the lower pins 110 and its body portion will at that time be clear of the apertures in which the upper pins 109 move.

The plate 106 is rocked by means hereinafter described, so that when the lowermost set of pins 110 extend upwardly through the apertures 111, thereby holding back the line of cap blanks in the chute above these pins, the uppermost pins 109 will be retracted below the bottom wall

of the chute. When the plate 106 is rocked to its opposite position to cause the uppermost pins 109 to be projected through the corresponding apertures 111, the cap blanks above the pins 109 will be held against movement, but the single blank previously positioned in contact with the lowermost pins 110, as indicated in dotted lines in Figure 6, will be released so that it may slide down the chute and into the dial pocket 13 which is at that moment aligned with the lower end of the chute.

In order that the cap blank will be properly positioned within the confines of the pocket 13, an airblast tube 115 has its nozzle positioned adjacent the lower end of the shaft to direct a blast of air against caps moving through the lower portion thereof and propel them into the aligned pocket. A plate 116 mounted on the upper surface of the lower end of chute 14 extends outwardly over the dial 11 to prevent the cap blank from being lifted out of the pocket by the blast of air.

The cap stop mechanism 105 is rocked by means of a mechanism including an arm 118 projecting downwardly from the plate 106 and connected by a link 119 to a relatively long rocking arm 120 pivoted intermediate its length to a bracket 121 secured to the table 10. The lower end of arm 120 is provided with a roller 122 which a spring 123 holds in contact with a cam 124 carried at the upper end of the vertical shaft 41. The mounting of this cam is also shown in Figure 4.

It will be observed that the caps fed into the pockets 13 of dial 11 will have their ears C4 outermost in the dial. The supporting plate 15 which is carried on the table 10 beneath the dial 11 supports the cap in the dial pocket at cap feeding station 14 and also supports the blank during its travel from the cap feeding station 14 to the blank ear piercing station 16.

It will be understood that feed device 105 is synchronized with the movement of the dial 11 so as to feed a cap to the dial immediately a dial pocket is aligned with chute 100.

Blank ear piercing station

The dial 11 will make two step by step movements after the insertion of a cap blank in a pocket and before that cap blank reaches the ear piercing station 16 illustrated in Figures 9 to 17.

As best shown in Figure 9 the ear piercing station 16 comprises an upstanding plate 130 having its edges bevelled to be engaged by the correspondingly beveled inner surfaces of the flanges 131 of a reciprocable plate-member 132 carried on the rear face of fixed plate 130. Slidable plate 132 carries an ear 133 centrally of its upper edge which is secured to plate 132 by a bolt 134 threaded into a socket 135 in the plate as illustrated in Figure 10. The upper end of bolt 134 serves as a contact member against which a striking head 136 hereinafter described abuts to cause plate 132 to be moved downwardly with respect to fixed plate 130. The position of bolt 134 with regard to sliding plate 132 may be adjusted by rotation of the bolt in the socket 135, the bolt then being held in adjusted position by a lock nut. Sliding plate 132 is normally held upwardly with respect to fixed plate 130 and in the position indicated in Figure 9 by reason of the fact that the ear 133 is apertured at its forward portion to surround a bolt 137 mounted in a socket 138 on the rear face of fixed plate 130, bolt 137 being

surrounded by a coil spring 139 which normally maintains ear 133 and hence plate 132 in upward position.

As is also best shown in Figure 10, the fixed plate 130 has a housing 140 extending inwardly from its forward face in which a downwardly projecting plunger 141 is resiliently supported. More particularly, plunger 141 is carried in a counterbore 142 within a sleeve 143 fixed in a bore 144 extending vertically through the housing 140 and all so arranged that the plunger 141 will be positioned centrally with respect to a pocket 13 of the dial 11. In order to maintain plunger 141 in a downward position its upper and headed end has a coil spring 145 bearing thereon mounted within the sleeve 143. The tension of the coil spring may be adjusted by a set screw 146 threaded in the upper end of sleeve 143. As best shown in Figure 13, in its normal downward position, the lower end of plunger 141 extends below the upper surface of dial 11 and into a circumferential groove 11a provided in the upper face of the dial. Groove 11a is of such depth that its lower surface will be approximately flush with the upper edge of the shallow side portion of the skirt C6 of a cap blank.

Sleeve 143 is held in proper position in the bore 144 by means of a nut 147 threaded upon the upper end of the sleeve and bearing upon the upper face of the housing 140. Nut 147 draws a flange 148 on the lower end of the sleeve up against the lower face of the housing, the flange 148 being radially slotted as indicated in Figure 10 to engage a pin 149 extending downwardly from the lower face of the housing, the pin thereby preventing the sleeve from rotating with respect to the housing.

On its lower rearward face the sleeve 143 carries an anvil member 150 secured in a groove 151 by means of a bolt as indicated in Figures 10 and 11. The anvil member includes two depending lugs 152, the outer faces of these lugs being so spaced with respect to each other that they will fit fairly snugly between the ears C4 of a cap blank B, so that the ears will be braced during the piercing thereof by reciprocable punch pins 155 as best indicated in Figure 17.

The punch pins 155 are fixed within cylindrical rack elements 156 slidable in bores 157 extending horizontally through the extreme lower portion of the fixed housing 140. It will be observed from Figure 14 that the punch pins 155 are opposed and that the bores 157 are aligned with each other. Referring to Figures 16 and 17, in order that the rack elements 156 will be maintained with the rack teeth 159 thereof uppermost these elements carry pins 160 which move in slots 161 in the lower face of housing 140. The pins 160 also act as set screws to prevent the punch pins 155 from moving from the elements 156, rearward movement of the punch pins being prevented by rear set screws and locknuts.

As shown in Figure 15, the rack teeth 159 of each rack element 156 are engaged by a set of gear teeth 163 on a pinion element 164 rotatably mounted in a bore 165 extending from front to rear of each side of the housing 140. The extreme rear ends of the pinion elements 164 are positioned to the rear of the fixed plate 130 (Figure 14) and are formed as pinions 166 which mesh with vertical racks 167 formed on the opposed faces of wings 168 which depend from the side and rear portions of the slidable plate 132. The pinion elements 164 are prevented from moving rearwardly in the sockets 165 by the engage-

ment therewith of plates 170 secured to the rear faces of the wings 168 by set screws 171.

The operation of the ear piercing mechanism 16 is as follows:

In presenting a cap blank B to the piercing station 16 the blank moving on positioning dial 11 will stop with the cap blank in exact alignment with a blank supporting plunger 175 which at the same time has its upper face exactly flush with the upper face of the circular blank supporting plate 15 along which the cap blank has been sliding. Immediately the dial stops its motion supporting plunger 175 will be raised by reason of the upward movement of the vertically reciprocable plate 70. The head of supporting plunger 175 is of the outline of a cap blank B and the plunger moves through an aperture 176 in stationary table 10. Also, plunger 175 is resiliently connected to reciprocable plate 70 by the spring connection generally indicated 177 in Figure 9 so that reciprocable plate 70 may move upwardly about the stem of plunger 175 should upward movement of the plunger be prevented when the plate moves upwardly.

Plunger 175 will rise sufficiently with plate 70 to carry the cap blank B upwardly out of the dial pocket 13 and bring the uppermost face of the cap blank top wall into contact with the upper plunger 141 so that the cap blank will be securely clamped between the two plungers. As best indicated in Figure 17, such upward movement of the cap blank will bring the ears C4 of the latter into position between the anvil ears 152 and the punch pins 155. With the cap blank in this position the driving mechanism of the machine is so timed that the horizontal rock shaft 75 (Figure 1) will be operated through link 78 to bring a tappet arm 180 which carries striker 136 into contact with the bolt 134 on sliding plate 132 so that plate 132 will be forced downwardly with respect to upstanding fixed plate 130 and against the action of the spring 139. Such downward movement of the plate 132 will cause the rack plates 167 (Figure 14) to move downwardly to rotate the pinion elements 164 by meshing engagement with the rearward teeth 166 of these elements. This rotation of the pinion elements 164 will cause the forward teeth 163 of these elements to move the rack elements 159 and the punch pins 155 carried thereby toward each other so that the inner ends of the punch pins are moved through the ears C4 of the cap blank and into the apertures of the anvil ears 152. When the tappet 136 of tappet arm 180 rises, sliding plate 132 will move upwardly by the action of spring 139 so as to cause the punch pins 155 to retract and immediately thereafter the reciprocable plate 165 will move downwardly so that the cap blank B will be returned to downward position within the pocket 13 of the dial 11.

The dial 11 will then move one step forward to bring the cap blank opposite an airblast station 17 best illustrated in Figure 17a so that a blast of air will be directed downwardly against the cap blank to blow from the latter the fragments of metal punched from the ears C4 at station 16. During the interval that a cap blank B is at the station 17, it will rest upon the supporting plate 15 but this plate may be apertured opposite the blast nozzle 17 if desired and as shown in Figure 17a.

In some instances a chute may be placed close to and behind the anvil 152 of ear piercing station 16 to receive the punchings and in such case the air blast station may be eliminated.

The ear spreading and skirt bending station

Station 18 at which the ears C4 of the blank are spread slightly apart to subsequently receive a locking lever C2 and the forward portion of the skirt of the blank is bent to form a web C10, as best shown in Figures 18 to 22.

Station 18 comprises a bracket 185 fixed to the table 10 and including an inwardly extending upper portion 186 which overhangs the periphery of dial 11, as shown in Figure 19. The portion 186 of bracket 185 is provided with a vertical bore 187 in which a sleeve 188 is positioned, the sleeve being supported in the bore by a nut 189 threaded on its upper end to hold a flange 190 on the sleeve upwardly against the under face of the overhanging portion 186. A slot in flange 190 engages a fixed pin 191 to prevent the sleeve from turning in the bore 187. Sleeve 188 is counterbored to support a plunger 192, the plunger being urged to downward position in groove dial 11a by a coil spring 193. At its lower portion and on the side thereof facing the center of the machine the sleeve 188 carries a pivoted anvil member 195. On its opposite face sleeve 188 is grooved to carry a spreading die 197, the lower end of which is beveled as shown in Figure 22. As hereinafter described, spreading die 197 spreads the ears C4 of the cap blank while the pivoted anvil member 195 cooperates with a roller die 200 to bend the forward edge of the skirt of the cap blank.

In order that the roller die 200 will have an inward and upward movement with respect to the anvil 195, roller 200 is carried at the lower end of an angled lever 201 pivoted as indicated at 202 between the lugs 203 extending inwardly from the bracket 185. The extreme upper end of lever 201 is bifurcated to support a transverse pin 204 adapted to be engaged in the notched end 206 of an arm 207 pivotally connected to a relatively short crank arm 208 extending upwardly from the upper rock shaft 75 of the machine. The pin 204 of lever 201 is urged into engagement with the notched end of arm 207 by means of a coil spring 210 connecting the lever 201 and crank arm 208. The releasable connection of lever 201 to link 207 permits the two elements to move relatively to each other in the event that any jam occurs.

The operation of the structure provided at station 18 is as follows: A cap blank presented at station 18 will be moved by dial 11 onto a plunger 215 supported for vertical reciprocation in the table 10 in alignment with upper plunger 192. Plunger 215 is adapted to be moved upwardly, immediately a cap blank is placed thereon, by the regular upward movement of the vertically reciprocable plate 70 to which the plunger 215 is resiliently connected so that plate 70 may move upwardly with respect to the plunger if a jam occurs. Such upward movement of the plunger 215 will lift the cap blank from the dial pocket 13 into contact with the lower end of the plunger 192 and still further upward movement of plunger 215 will bring the ears C4 of the cap blank alongside the beveled lower portion of spreading die 197 so that these ears will be spread at the upper portions, as best indicated in Figure 22.

At the same time, such upward movement of the cap blank will cause the forward and higher portion C7 of its skirt to move up alongside the pivoted anvil member 195. Immediately thereafter the bending roller 200 will swing inwardly to iron the extreme upper portion of skirt por-

tion C7 over the upper face of the anvil 195. It will be observed that the conformation of anvil member 195 is such that a lower face 195a thereof will lie against the body or top wall of the cap and a second face 195b will lie against the cap skirt while the third face will form a support for the bent over portion C10 of the skirt. At the time that the cap blank rises with the plunger 215, the anvil 195, by reason of its pivoted support, may hang downwardly at a slight angle but the lifting of the cap blank will swing the anvil member 195 to bring the face 195a thereof into contact with the body or top wall of the blank so that the remaining walls of the anvil member will be properly disposed with respect to the cap blank.

As soon as bending roller 200 is swung outwardly again by the action of the rock shaft 75 the supporting plunger 215 will descend. During the initial portion of this descent the cap blank will still have the upper plunger 192 bearing thereon so that as the blank moves away from anvil member 195 the latter will be caused to swing downwardly to clear the overhanging of web portion C10 of the blank and the blank ears will be readily withdrawn from about the spreading die 197. When the plunger 215 returns to normal position and the cap blank is entirely clear of the upper plunger 192 the dial 11 will rotate to conduct the blank to the next station.

The liner inserting station

The liner inserting station 19 is best shown in Figures 23 to 26 and generally comprises a roll stand 230 to move a strip of liner material L' to the die mechanism 20 including a punch 231 so that a liner L may be stamped from the strip and deposited in the path of a feed bar or pusher 232. The feed bar 232 will then move the liner into a cap blank B engaged by the dial 11 and supported upon a fixed support 233 so that a plunger 234 may then descend to seat the liner squarely within the blank.

The roll stand 230 comprises an upright framework in which is journaled a lower roll 236 and an upper roll 237. Both rolls preferably have roughened surfaces so that they will forward the liner strip L' without slippage. Upper roll 237 has its shaft extending through vertical slots 238 in the side walls of the frame 230 and arms 239 free on the shaft are engaged by coil springs 240 to hold the upper roll under tension. In order to permit upper roll 237 to be lifted there is provided a cam rod 242 pivotally mounted on a cross bar 243 fixed to arms 244 which are also free on the roll shaft. The cam rod 242 is adapted to engage the upper wall of the frame 230.

The springs 240 tend to hold the shaft of upper roll 237 in a downward position.

Upper roll 237 is geared to lower roll 236 by means of pinions generally indicated by the numeral 246, the teeth of the pinions being sufficiently deep to permit the position of the upper roll to be adjusted somewhat without moving the pinions out of mesh.

The lower roll 236 is not vertically movable and carries a ratchet wheel 248 which is engaged by a spring pressed pawl 249 pivotally mounted on an arm 250 loosely journaled on the shaft 251 of lower roll 236. Arm 250 is adapted to be oscillated about the roll shaft 251 by a link 252 connected to the vertically reciprocable plate 70 (as best shown in Figure 2) through the medium of a lever 253 pivoted on a bracket 253a

fixed to the underside of table 10, the opposite end of lever 253 being pivotally connected to a rod 254 fixed to plate 70. By this arrangement, the pawl 249 will give a driving impulse to ratchet wheel 248 to advance the liner strip L' toward the punch 231 upon each descent of the plate 70. The strip of liner material will be furnished to the roll stand 230 through a channel member 255 from a suitable drum 256 as best shown in Figure 2.

Referring to Figure 25, the punch 231 and plunger 234 are reciprocally mounted in a casting 257 supported above the table 10 on the brackets 258. The liner strip guiding channel 255 extends beneath the outward portion of the casting 257 and the punch 231 is mounted in this portion, the punch being carried by a sleeve 260 keyed as indicated at 261 in a bore 262 in the casting. A spring 263 mounted in a counter-bore of bore 262 has its upper end in contact with lock nuts 264 threaded upon the sleeve 260. The bore 265 of sleeve 260 has an ejector plunger 266 mounted therein and the lower end 267 of this plunger is normally held flush with the lower surface of the male punch die element 262a by means of a coil spring 269. Coil spring 269 is mounted within a counterbore of the sleeve 260 with its upper end in contact with a lock nut 270 threaded on the upper end of the ejector plunger 266.

As best shown in Figure 25, the male punch die 262a is normally in alignment with an aperture 272 in the upper wall of the channel member 255, and the liner strip L' is supported in grooves 255a formed between the upper wall and a female die or aperture 255b which flares downwardly. When a tappet 274 descends into contact with the upper end of the ejector plunger 266 it will bring the plunger into contact with the liner strip L'. Spring 269 will then be sufficiently compressed to exert force upon the die carrying sleeve 260 so that the latter will be moved downwardly through the liner strip L' to punch out a liner L. This punching action will sufficiently retard the movement of the die carrying sleeve 260 that plunger 266 will move slightly further downwardly to free the punched out liner which will then fall downwardly through the flaring aperture 255b and into a horizontal slideway 278.

Slideway 278 has the feed bar 232 mounted therein, this feed bar being connected at its outer end to a link 280 extending to a vertical lever 281. As best shown in Figure 3, lever 281 is pivoted at 282 to the side wall 31 of table 10. A link 283 extends from the lower portion of the lever 281 through the side wall 31 and as illustrated in Figure 2 is pivotally connected to the depending arm of a bell crank 284 pivoted to the table structure. The horizontal arm of the bell crank 284 is in contact with a tappet 285 carried by the reciprocating plate 70. By the above arrangement, when plate 70 moves upwardly the upper end of lever 281 will be drawn inwardly by the coil spring 287 which extends between the upper end of lever 281 and the table 10. Feed bar 232 will therefore be moved inwardly to move the punched liner through the slideway 278 and into the cap blank B carried by the pocket 13 of dial 11 which is at that moment aligned with the slideway and supported upon the fixed support 233 which extends upwardly from table 10.

Referring to Figure 25, the plunger 234 which is aligned with the cap blank B comprises a stem 290 having a foot piece 291 threaded to its lower end. Stem 290 moves in the bore of a sleeve 292

removably secured in the casting 257 and, as appears from Figure 23, the plunger is provided at its upper end with a head 293. A coil spring 294 is positioned between the head 293 and the upper end of the sleeve 292. Plunger 234 is held against rotation in sleeve 292 by engagement of a slot in a flange on the plunger foot piece 291 with a pin fixed to the lower face of casting 257. The extreme lower portion of the plunger is bifurcated to provide a slot in which a shoe 297 of plate-like form is pivotally mounted upon a fixed cross pin 298.

Shoe 297 includes a downwardly inclined edge 299 which faces the outer end of the slideway 278 and which is contacted by the lower end of a bent leaf-spring 300 fixed to the foot-piece 291. Spring 300 thereby holds an upper edge 301 of shoe 297 in contact with the upper wall of the slot in which it is carried. The remainder of the upper edge of shoe 297 is substantially parallel to its lower edge 299.

At the moment that the liner L is initially moved into the cap blank B, the shoe 297 will be in the position illustrated in Figure 25 so that the leading edge of the incoming liner will be deflected downwardly and guided beneath the overhanging web C10 of the cap blank. Immediately thereafter the plunger 234 will descend and during this descent the shoe 297 will rock upwardly on pin 298 so that a flat surface will be presented to the liner to force it down to a flat position within the cap blank. The liner will then fit snugly within the blank. As the plunger 234 rises the foot 297 again will be swung downwardly by the action of spring 300 to the position shown in Figure 25.

The plunger 230 is moved downwardly against the action of spring 294 by a tappet 304 which, as best shown in Figure 2, is fixed to the horizontal rock shaft 75. Rock shaft 75 also carries an arm 305 which carries the tappet 274 for actuating the punch die 231 as hereinbefore described.

It will be observed that the punch 231 will be actuated simultaneously with the actuation of the plunger 234 and that when these elements rise the dial 11 will move to present a new cap blank beneath the plunger 234, whereupon feed bar 232 will be moved inwardly to conduct the freshly punched liner to the new cap blank. The resulting descent of punch 231 will cause the liner formed thereby to drop upon the upper side of the feed bar 232, but when the feed bar retracts to a position beyond the aperture 255b, a newly punched liner will then drop in front of the feed bar.

The locking lever inserting station

The station 21 at which a locking lever C2 is inserted in each cap blank is best illustrated in Figures 27 and 30, and may be generally described as comprising a supply chute 315 (Figure 30) for the locking levers which is controlled by a gate device 316 (see also Figure 31) to deliver locking levers one at a time to a reciprocable feeding element 317. The feeding element 317 conducts each locking lever to the cap blank C which is at that time supported upon a lower plunger 318 reciprocable beneath an upper plunger 319. When the lever is in proper position with respect to the arms C4 of the cap blank these arms are bent inwardly by horizontally reciprocating dies 320.

Referring to Figure 30, the supply chute 315 is suitably supported from the base of the machine and comprises a chute or trough element 315

which, as best shown in Figure 34, is U-shaped in vertical section and includes upstanding walls 326 and 327. Considered longitudinally, the chute 315 disclosed herein comprises an infeed end 328 which is inclined downwardly at a sufficient angle to cause the locking levers to slide downwardly along the same and then a more steeply angled middle section 329 and, finally, an outfeed portion 330 which is initially still more steeply inclined than the portion 329, but has its downward end curved so that locking levers will be upright, that is, will lie in a vertical plane, when they move from the same into the reciprocable feeding element 317.

The feed control device 316 is positioned at the lower portion of the middle section 329 of the chute. From the feed control device 316 upwardly to a point a slight distance from the extreme upper end of the chute, the chute side wall 326 is provided with an upstanding plate 333 (Figure 34) fixed to the outer surface of the wall, the plate having an overhanging upper edge 334 spaced a substantial distance above the top edge of chute wall 326. The opposite chute wall 327 has a plate 335 spaced above its top edge, which plate extends inwardly over the chute to a point slightly past the inner surface of chute wall 327. Plate 335 is carried upon suitable brackets as indicated at 336 and the extreme upper end of plate 335 is downwardly inclined toward the upper surface of chute wall 327 as indicated at 335a in Figure 30.

By the above arrangement, an operator may drop locking levers C2 into the upper end of chute 315, it only being necessary for the operator to place the shank of the locking levers downwardly in the chute and with the trunnion portion of the levers nearest the chute wall 326, which wall is innermost with respect to the machine. Locking levers thus placed in the chute will slide downwardly so that their cam portions C11 will ride up the inclined upper end 335a of plate 335 to rest or hang on that plate as shown in Figure 34. The inner surface of the chute wall 327 will then contact with the arched portion C12 of the shank and the hump C13 of the lever will contact with the inner surface of the plate 333. Since each lever is hanging upon the plate 335 by its upper portion, its shank C14 will, by its own weight, swing very slightly in a counterclockwise direction as viewed in Figure 35 so that, as indicated in that figure, the downwardly directed trunnion lug C3 will ride up upon the upwardly directed trunnion lug C3 of the preceding locking lever in the chute. Thus, the adjacent locking levers will have the relationship shown in Figure 35, that is, with each locking lever having its downward trunnion nested above the upper trunnion of the preceding locking lever.

The stop mechanism 316 comprises a pair of horizontal arms 340 and 341, respectively, provided with depending shanks 342 and 343. These arms are vertically reciprocable in a block structure generally designated by the numeral 344, fixed to the chute 315 adjacent the side wall 327 at the lower end of the middle section 329. The arm 340 is notched at its lower outer edge as indicated at 345 and a similar notch 346 is provided at the lower outer edge of the arm 341. The shank 342 of arm 340 moves in a vertical groove 348 in the downwardly facing wall of the block 344 as indicated in Figure 32, this groove being normally closed by a plate 348a as shown in Figure 31. The arm 340 itself extends along a horizontal groove 347 in the top surface of the

block 344. The shank 343 of arm 341 extends downwardly through a groove 349 which faces the chute wall 327, the arm 341 normally being partially within this groove as indicated in Figure 31.

The two arms 340 and 341 are urged to downward positions in block 344 by coil springs 350 connected to the lower ends of their shanks and the arms are automatically raised by the engagement of rocker arms 351 extending in opposite directions from a rock shaft 352, the rocker arms being adapted to have their upper surfaces alternately engage pins 353 projecting from the shanks 342 and 343 as indicated in Figure 32.

As best indicated in Figure 30, the arms 340 and 341 are spaced a sufficient distance apart along the chute 315 to permit a locking lever C2 to be positioned between the same. However, it will be noted that the trunnions C3 of the locking lever may extend beneath the arms 340 and 341 so that actually only the body portion of the locking lever will be positioned between the two arms. In any event, when the lowermost arm 341 is in the downward position illustrated in Figure 30, it will hold the entire line of locking levers against downward movement in the chute 315. However, when the upper arm 340 moves down against the upper surface of the chute and the lower arm 341 rises, the lowermost locking lever C2 will slide on down through the section 330 of the chute while arm 340 holds the remaining locking levers against movement. Then when arm 340 rises and arm 341 drops, the line of locking levers will move downwardly to position the lowermost locking lever against arm 341.

The feeding element 317 whereby a locking lever C2 is moved from the lower portion of chute 315 to a properly aligned position with a cap blank at that moment supported at the locking lever inserting station 21 is best shown in Figures 4, 27, 28 and 36. Feeding device 317 comprises a lower element 360 and an upper element 361 best shown in assembled position in Figure 27 and both of which elements move in a slideway 362 which projects outwardly from the table 10 in a direction radially of dial 11. As best shown in Figure 28 the upper element 361 is in the form of a bar and is pivotally connected at its outer end as indicated at 363 to a vertical lever 364 which is caused to swing on its pivot 365 (Figure 4) by the action of a cam track 366 best shown in Figure 4 and carried on the large pinion 37 of shaft 38. Cam 366 is engaged by a roller 367 on lever 364, the roller being held in contact with cam 366 by springs 367.

Referring to Figures 27 and 28, the inner end of the upper bar element 361 pivotally carries within a recess at its forward end a link 380 of angled form. The lower portion of link 380 is provided with a pin 382 by which it is connected to the lower element 360 of feed device 317.

Lower element 360 bears upon the upper surface of the slideway 362 but in order that its movement along the slideway will be somewhat retarded, the lower element 360 is provided with a shoe 383 of friction material urged against the bottom wall of the slideway by means of springs as shown in Figure 27 but held in proper position on element 360 by means of a pin extending downwardly from the element.

The link 380 has a forward extension at its upper end which serves as a movable jaw 385

adapted to cooperate with a fixed jaw 386 extended forwardly from lower element 360.

By the above arrangement, including the friction shoe 383, when the vertically extending lever 364 moves outwardly from the position shown in Figure 27, its outward movement will first cause the upper or bar element 361 to have a translational movement relative to the lower element 360 by a swinging movement of the link 380, thereby lifting the jaw 385 on the link away from the jaw 386 formed on the lower element 360. When the upper element 361 has thus been moved relatively to the lower element so as to open the jaws described above, the continued outward pull by vertical arm 364 will overcome the friction of the friction shoe 383 so that the two elements of the feeding device will move outwardly along the slideway 362.

Such outward movement of lever 364 will carry the inner portion of the feeding device 317 to a point directly opposite the lower end of the supply chute 315, where it will stop with the movable jaw 385 still raised from the lower and fixed jaw 386.

The plates 333 and 335 on chute 315 and shown in Figure 34 terminate at gate device 316, so that a locking lever moving through the lower portion 330 of the chute may drop vertically in the chute from the slightly elevated position shown in Figure 34. This will bring the lower portion of the lever hump C13 into riding contact with the inner edge of the chute wall 326 and prevent the lever from falling forward in the chute.

In outward and stopped position of feed device 317 the fixed jaw 386 will be in such position as regards the chute wall 326 that a locking lever C2 moving down the chute will have its upwardly positioned cam portion C11 slide directly onto the ledge portion of the fixed jaw 386, as best indicated in Figure 35a. The locking lever will further be guided to this position on the jaw by reason of the fact that the forward edge 390 of a pivotal plate 391 will, at that moment, be in alignment with the wall 326 of chute 315, thereby positively guiding the locking lever to a position where its cam portion will hang upon the jaw 386.

As best shown in Figure 35a, the plate 391 is pivoted in the upper edge of the slideway 362 so that it may swing out of the way of the feed device 317 when the latter moves in the direction of the arrow in Figure 35a to conduct the locking lever toward the cap blank.

As soon as the locking lever has been positioned on the jaw 386, as described above, the rotation of cam 366 will bring a dwell opposite roller 377, so that the springs 367 may move the feed device 315 inwardly. During the initial portion of the inward movement of lever 364, the upper or bar element 361 will move inwardly to swing the link 380 forwardly to a position such as indicated in Figure 28, so that the movable jaw 385 will swing downwardly into contact with the cam portion C11 of the locking lever hanging on jaw 386. When this clamping action occurs, the continued inward swing of the lever 364 will cause the lower element 360 to slide inwardly despite the friction effect of shoe 383 in the slideway 362.

The locking lever C2 will thus be moved by the feed device 317 to the position illustrated in Figure 27. During the inward movement of feed device 317 the cap blank C supported on the lower plunger 318, will be lifted by the upward movement of plate 70 to bring the liner L in the

cap blank into contact with the lower end of the upper and spring pressed plunger 319 so that the blank will be clamped between the two plungers. The plunger 318 will rise sufficiently far to cause plunger 319 to be entirely retracted against the action of spring 396 within its supporting sleeve 395 fixed in the housing 140a. The cap blank will thus be firmly clamped at the moment that the apertures C9 of its ears C4 come opposite the trunnions C3 of the locking lever C2.

Immediately the cap blank has been raised to the above described position, a punch 320, best shown in Figure 33, will engage the outer surface of each cap ear C4 so as to bend these ears toward each other a sufficient distance that the trunnions of the locking lever will project a substantial distance through the ears.

The dies 320 are operated by an arrangement identical with that used at the ear piercing station 16 and clearly illustrated in Figures 9 to 17, and it is, therefore, thought unnecessary to again describe this construction except to state that it includes a fixed upstanding plate 130a and a plate member 132a reciprocable thereon to oscillate, through a rack structure such as shown in Figures 9 to 17, a pinion element 164a. This will cause the cylindrical rack elements 156a to properly move the dies 320. The reciprocable plate member 132a is moved downwardly against the action of a spring 139a by a rocker arm 180a pivoted on a post 392. Arm 180a includes an upstanding arm 393 which is connected by a link 394 (Figure 3) to a crank arm 395 on rock shaft 75. In order that the flat face 401 may firmly contact with the outer surface of the ear, the upper face of each die 320 is recessed as indicated at 402 to permit the trunnion C11 of the locking lever to be nested therein when the die plunger advances.

When the locking lever has been firmly clamped in the cap blank as described above, the dies 320 will retract and the locking lever feeding device 317 will move outwardly. As has already been described, the initial outward movement of the vertical lever 364 which actuates the feeding device 317 will cause the movable jaw 385 to rise from the position illustrated in Figure 27. As soon as feeding device 317 has moved outwardly sufficiently far that the lower jaw 386 will clear the locking lever now clamped in the cap blank, the plunger 318 will descend to return the cap blank to the position shown in Figure 27. Table II will then move several steps forward, until the cap blank slides off the disc 15 and down the discharge chute 22.

The rock shaft 352 which actuates the locking lever gate devices 340 and 341 is controlled by lugs 405 and 406 fixed to the upper bar 361 of feed device 317. As diagrammatically illustrated in Figure 27, the lower end of rock shaft 352 is provided with a radially extending crank or arm 407 positioned in the path of movement of the above mentioned lugs. In Figure 27, the outer lug 405 has contacted with the arm 407 to swing it inwardly, having accomplished this action during the latter portion of the inward movement of the feed device 317. The turning movement thus given the rock shaft 352 has rotated the latter a short distance in the direction of the arrow shown in Figure 32, so that the upper arm 340 of the gate device 316 has been lifted and the lower arm 341 has been permitted to lower by the action of its spring 350. The line of locking levers will thus move down against the lower arm 341.

During the latter portion of the following outward movement of the feed device 317, the innermost lug 406 will contact with the crank 407 to swing the latter outwardly, thereby rotating shaft 352 in the direction indicated by the arrow in Figure 31, so that the lower arm 341 of gate device 316 will be raised and the upper arm 340 will be lowered. As a result, the locking lever which has been bearing against the lower arm 341 will slide beneath the latter and down the supply chute 315 onto the fixed jaw 386 of the feed device 317. The remaining locking levers will, of course, be stopped by upper arm 340.

The general operation of the entire apparatus has been described above in the portion of the specification entitled "General description of the apparatus and its operation" and the specific operation of each mechanism of the device has been set forth in connection with the description of the construction of each such mechanism.

It will be noted that all working strokes, i. e., movements toward cap blanks and locking levers, are accomplished either by springs or through intermediate cushioning springs. Thus, if the working stroke of any mechanism is prevented by an improperly positioned cap blank or locking lever, damage to the machine will be prevented.

It will be understood that while the various mechanisms described herein are highly efficient when used together they may be used in combination with other mechanisms.

Subject-matter disclosed, but not claimed herein, may form the basis of claims in my divisional application for Cap-forming and assembling machines, Serial No. 477,436, filed February 27, 1943.

The terminology used in the specification is for the purpose of description and not of limitation, the scope of the invention being set forth in the claims.

I claim:

1. In an apparatus of the class described, a feed device for locking levers which locking levers are provided with oppositely disposed pivot trunnions, a support for apertured ear cap blanks, means to move said feed device to position a locking lever carried thereby between the ears of a cap blank on said support with the trunnions in substantial alignment with the apertures of a blank, a pair of dies mounted coaxially and normally spaced apart at opposite sides of said support, and means to move said dies toward each other to engage said ears to move the same about the trunnions of the locking levers to thereby place the trunnions in the ear apertures.

2. In an apparatus of the class described, means to support a cap blank which includes spread-apart apertured ears, means to feed a locking lever including trunnions, means to relatively move said cap support and said feeding means so that the apertures in the ears of the cap blank will be brought into alignment with and positioned outwardly of the trunnions of the locking lever, and means to bend the ears of the cap blank inwardly about the trunnions of the locking lever to thereby place the trunnions in the ear apertures.

3. In an apparatus of the class described, a feed device for locking levers which locking levers are provided with pivot trunnions, said feed device being movable along a predetermined line, a support for apertured ear cap blanks movable along a line at an angle to the first line, means to move said feed device and said support relative to each other to bring the apertures of cap ears in align-

ment with the trunnions of a lever, and means to bend the ears in about the trunnions to thereby place the trunnions in the ear apertures.

4. In an apparatus of the class described, a feed device for locking levers which locking levers are provided with pivot trunnions, said feed device being movable along a predetermined line, a support for apertured ear cap blanks movable along a line at an angle to the first line, means to move said feed device and said support relative to each other to bring the apertures of cap ears in alignment with the trunnions of a lever, means to bend the ears in about the trunnions to thereby place the trunnions in the ear apertures, and means to subsequently free the locking lever from said feed device.

5. In an apparatus of the class described, a feed device for locking levers which locking levers are provided with pivot trunnions, said feed device being reciprocally movable along a predetermined line, a support for apertured ear cap blanks movable along a line at an angle to the first line, means to move said feed device and said support relative to each other to bring the apertures of cap ears in alignment with the trunnions of a lever, means to bend the ears in about the trunnions to thereby place the trunnions in the ear apertures, and means carried by said feed device to grip a locking lever during movement toward said support and to release the locking lever upon movement in the opposite direction.

6. In an apparatus of the class described, a base, a pocketed table rotatable on said base, a

vertically reciprocable plunger, means to rotate said table to carry a cap blank provided with apertured ears to said plunger, a feed device for locking levers which include pivot trunnions, said feed device being movable in said base radially of said table, means to move said feed device toward the table to align the trunnions of a locking lever with the ear apertures of a cap blank, punch elements supported on said base to move toward and away from each other along a line at right angles to the movement of said feed device, and means to move said punch elements together to bend the cap blank ears together to thereby place the trunnions in the ear apertures.

7. In an apparatus of the class described, a feed device for locking levers, which locking levers are provided with oppositely disposed pivot trunnions, a support for apertured ear cap blanks, means to move said feed device to position a locking lever carried thereby between the ears of a cap blank on said support, with the trunnions in substantial alignment with the apertures of a blank, a pair of dies mounted coaxially and normally spaced apart at opposite sides of said support, and means to move said dies toward each other to engage said ears to move the same about the trunnions of the locking levers to thereby place the trunnions in the ear apertures, each of said dies having a flat face portion to bear on the ears and a recessed portion to receive the ends of the trunnions.

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