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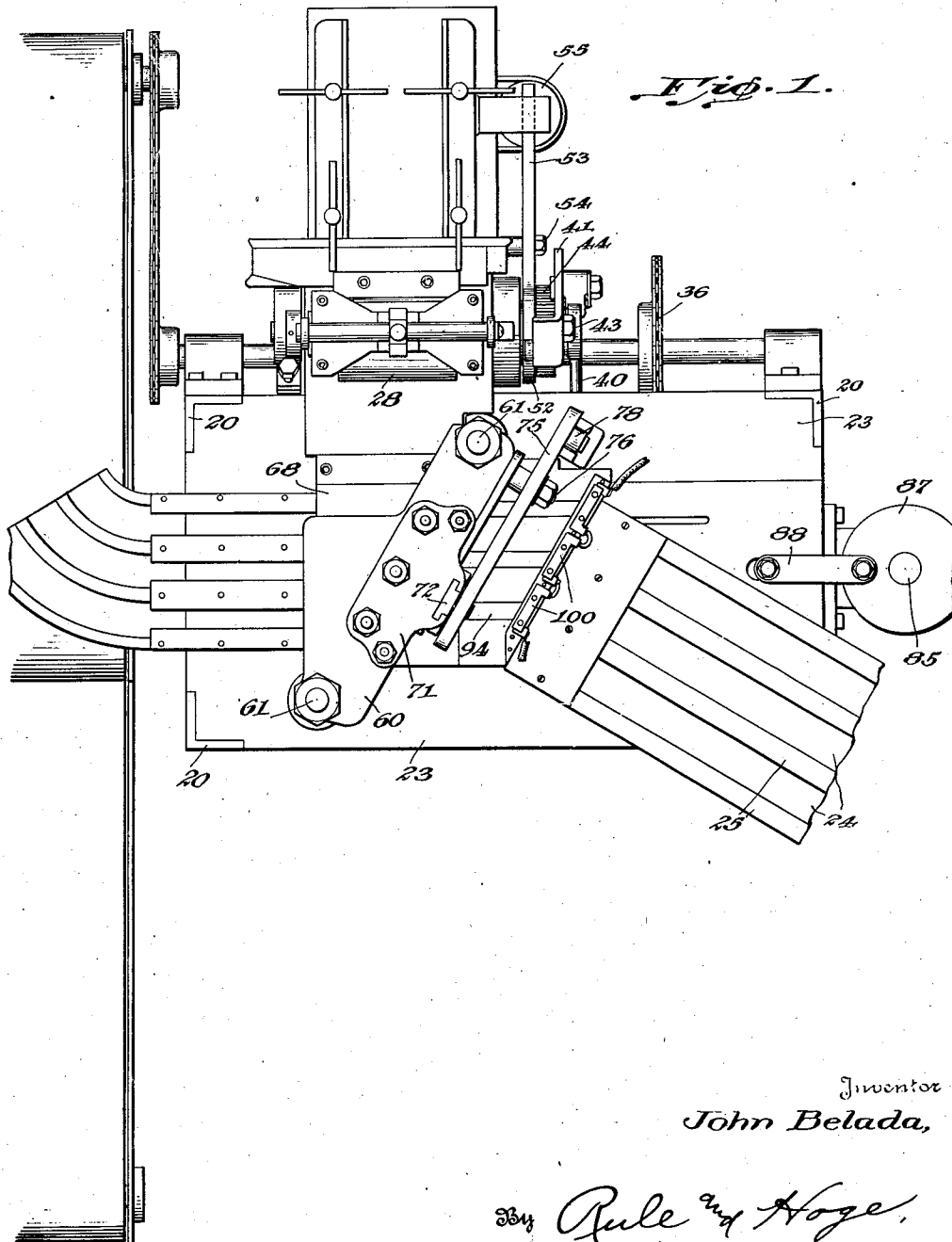
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2,391,381

FEED CONTROL FOR LINING MACHINES

Filed March 25, 1942

5 Sheets-Sheet 1



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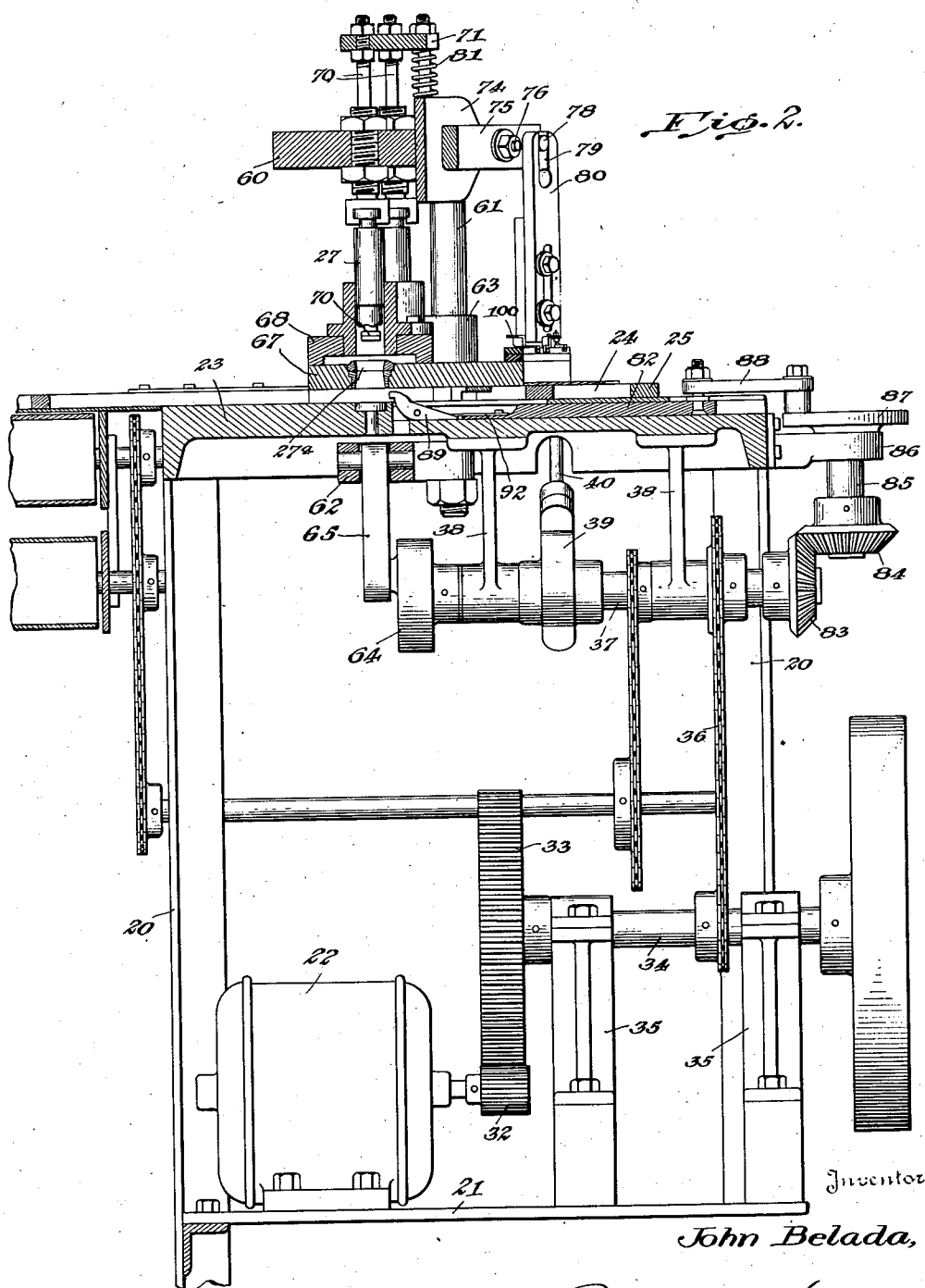
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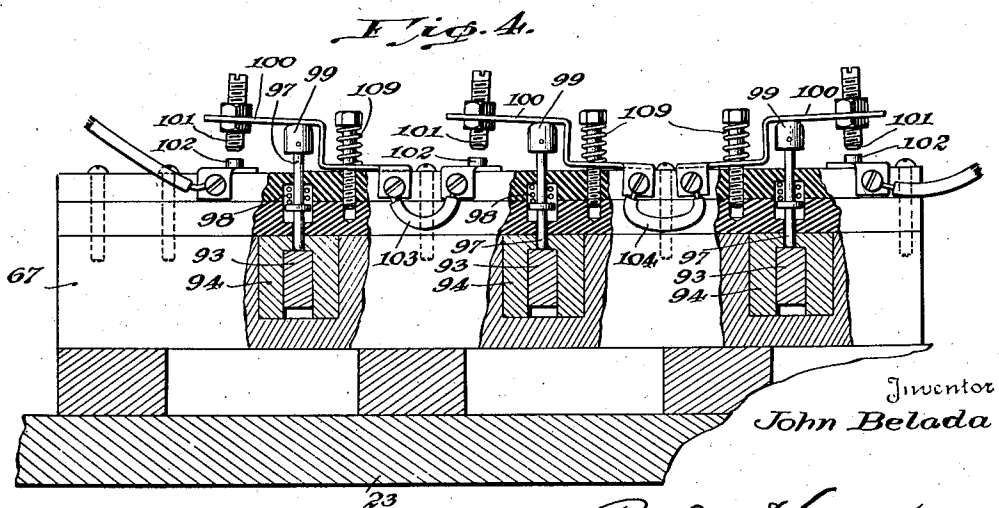
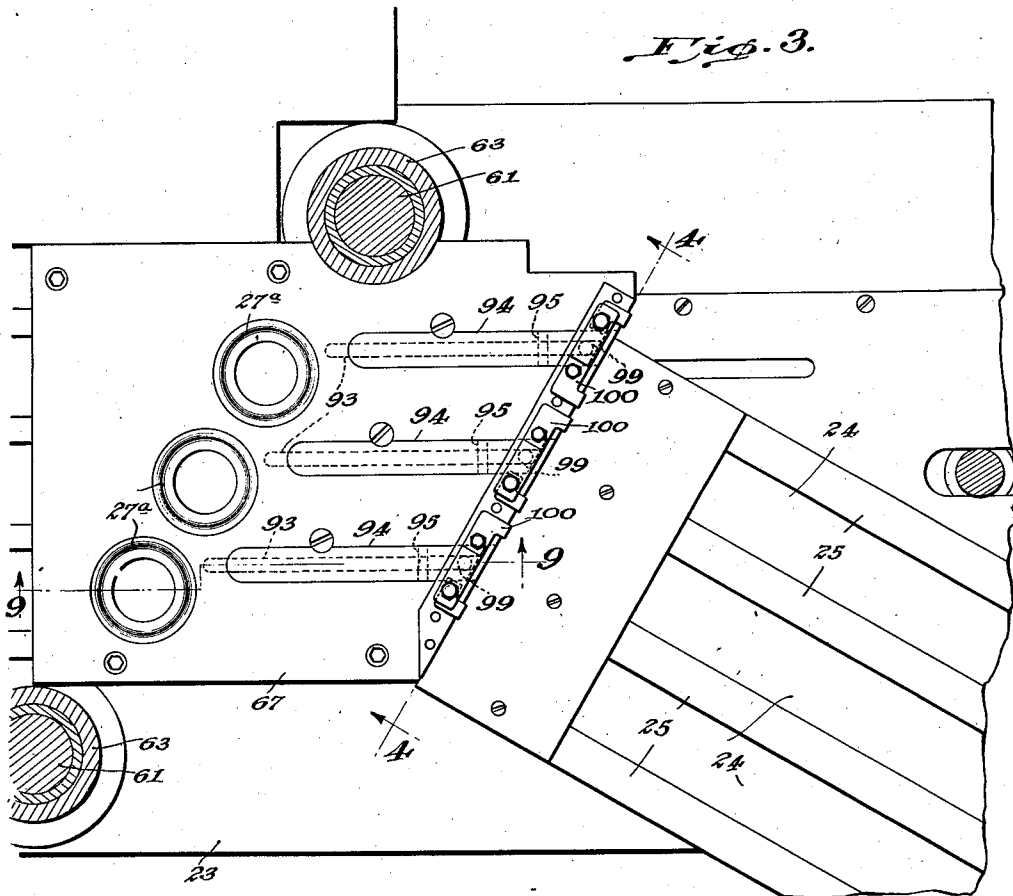
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5 Sheets-Sheet 3



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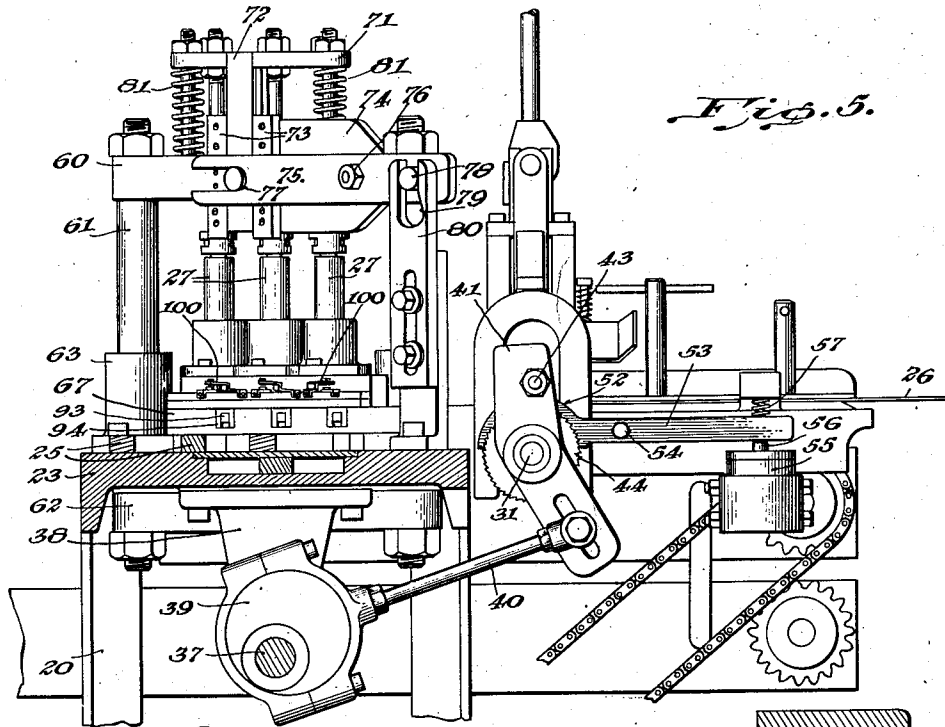


Fig. 5.

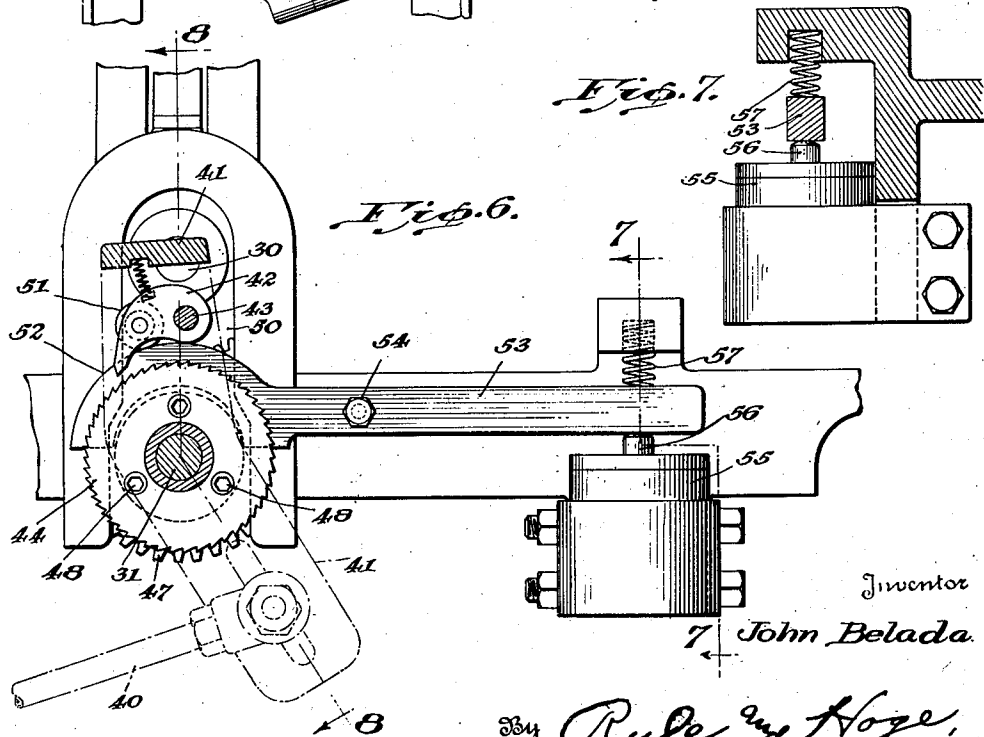


Fig. 6.

Fig. 7.

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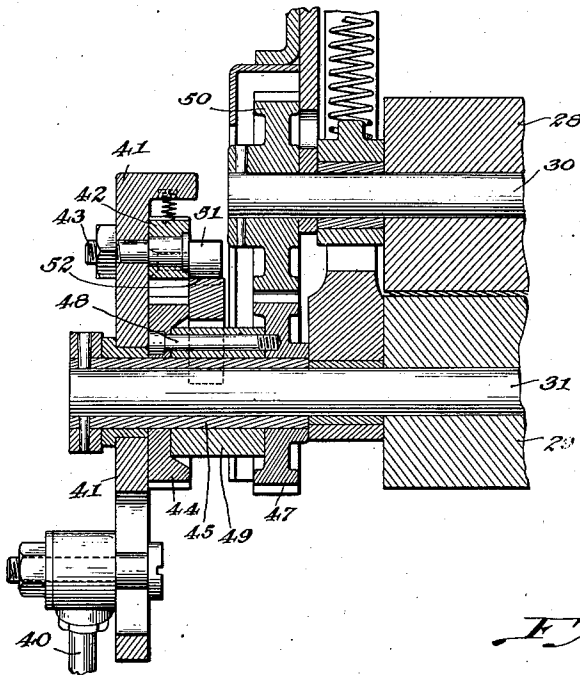


Fig. 8.

Fig. 9.

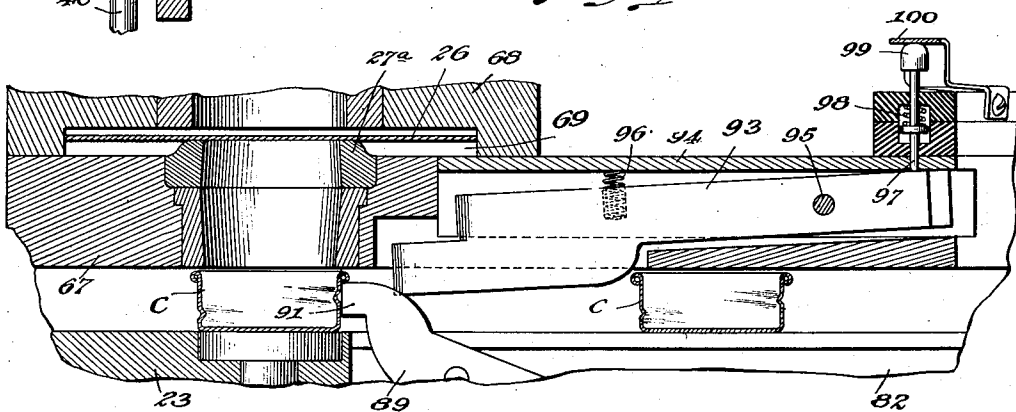
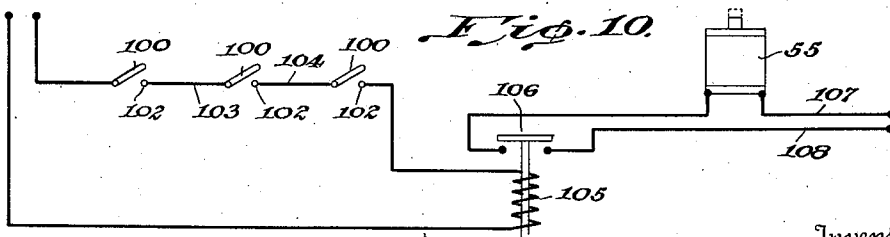


Fig. 10.



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UNITED STATES PATENT OFFICE

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FEED CONTROL FOR LINING MACHINES

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Application March 25, 1942, Serial No. 436,148

1 Claim. (Cl. 113—113)

My invention relates to machines for punching liners from strip stock and assembling them with caps or closures for containers. The machine in its preferred form comprises means for feeding the inverted caps in a row or rows to an assembling station, means for feeding a strip of lining material to said station with the strip positioned over the inverted caps, dies including punches by which the liners are punched from the strip, and means for assembling the liners with the caps.

An object of the present invention is to provide improved means by which the forward feed of the stock strip of liner material is prevented automatically whenever a cap or caps are missing at the assembly station. More particularly the invention provides a novel form of electrical control means operable automatically to prevent the forward feed of the strip when a row of caps has been exhausted or whenever, for any reason, a cap is missing at the assembly station.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a plan view of a machine embodying the present invention.

Fig. 2 is a part-sectional elevation of the machine.

Fig. 3 is a sectional plan view showing a portion of the cap feeding and control mechanism.

Fig. 4 is a section at the line 4—4 on Fig. 3 showing a series of electric switches and their operating mechanism.

Fig. 5 is a sectional elevation of the upper portion of the machine viewed in a direction at right angles to that of Fig. 2.

Fig. 6 is a sectional elevation of means for feeding the stock strip and electromagnetic control device therefor.

Fig. 7 is a section at the line 7—7 on Fig. 6.

Fig. 8 is a section at the line 8—8 on Fig. 6.

Fig. 9 is a sectional elevation at the line 9—9 on Fig. 3, showing means actuated by the inverted caps as they are fed to the punch press, for controlling the operation of the stock strip.

Fig. 10 is a wiring diagram of the electrical control mechanism.

Referring particularly to Figs. 1 and 2, the mechanism is mounted on a framework including a vertical frame 20, a lower platform 21 on which is mounted an electric motor 22, and an upper platform or table 23. The caps C (Fig. 9) may be fed from a magazine to the assembling station along a chute or runway 24 including a horizontally disposed portion overlying the platform 23, said chute comprising parallel strips 25 spaced to provide individual runways for a plurality of rows of caps.

The liners for the caps are punched from strip stock 26 of liner material such as paper impreg-

nated with paraffin or other material suited for the intended purpose. The strip 26 is fed forward intermittently step by step and passes between the upper and lower die members 27 and 27a of a battery of dies individual to the rows of caps C. The upper die members 27 reciprocate vertically, each being in the form of a press plunger or punch by which liners are punched from the stock strip, and each including means for pushing the liners into place within the inverted caps C therebeneath.

The strip 26 is fed forward by a pair of feed rolls 28 and 29 (Fig. 8) keyed respectively to shafts 30 and 31. The feed rolls are driven by the motor 22 operating through a gear train including a pinion 32 on the motor shaft driving a gear 33 keyed to a drive shaft 34 journaled in standards 35 on the machine frame. The shaft 34 has driving connection through a sprocket chain 35 with an upper shaft 37 journaled in hangars 38 depending from the platform 23. An eccentric 39 (Figs. 2 and 5) fixed to the shaft 37 operates through a connecting rod 40 to oscillate a rock arm 41 which is mounted to swing about the axis of the shaft 31 (Figs. 5, 6 and 8). A dog 42 on a pivot pin 43 on the arm 41, cooperates with a ratchet wheel 44 mounted on a sleeve 45 (Fig. 8) keyed on the shaft 31. The ratchet wheel 44 is connected to a spur gear 47 by bolts 48 which extend through a collar 49 on the sleeve 45, the gear 47 being secured for rotation with the shaft 31. The gear 47 meshes with a gear 50 keyed to the shaft 30, thereby providing a positive drive for the rolls 28 and 29.

The dog 42 carries a roll 51 which runs on the curved surface 52 of an arm 53 connected by a pivot bolt 54 to the machine frame. The arm 53 is adapted to be rocked about its pivot by a solenoid electromagnet 55 having an armature or core 56 to engage the under surface of said arm. While the magnet remains deenergized the arm 53 is held in the Fig. 6 position by a compression spring 57, in which position the dog 42 is held out of engagement with the ratchet wheel. When the electromagnet is energized, the arm is rocked thereby to effect a driving engagement of the dog and ratchet. During normal operation of the machine the electromagnet is periodically energized as hereinafter described in timed relation to the rocking movements of the arm 41 so that the feed rolls 28 and 29 are rotated intermittently and advance the stock strip 26 step by step.

The press plungers 27 are attached to the upper cross bar 60 (Figs. 2 and 5) of a frame including posts 61 which are attached at their lower ends to a cross-bar 62 beneath the platform 23. This frame is adapted to be reciprocated vertically for operating the plungers, the posts 61 extending through and being slidable in

bearing sleeves 63 on the platform. The reciprocating movement of the plungers is effected by means of a crank 64 on the shaft 37, connected through a link 65 to the cross-bar 62. The lower die members 27a (Figs. 2, 3 and 9) are mounted in a plate 67 overlying and bolted to the platform 23. A plate 68 overlying the plate 67 has its lower surface recessed to provide a passageway 69 through which the liner strip 26 is fed into position between the die members. When the plungers descend and in cooperation with the die members 27a sever the disk liners from the stock strip, the liners are carried on down into the caps C which have been positioned in register with the die members, and are tamped into place by tamping rods 78. These rods extend through the tubular plungers 27 and are connected at their upper ends to a tie-bar 71. A vertical guide bar 72 attached to the bar 71 is slidable in guideways 73 on a plate 74 attached to the frame member 60. An arm 75 is connected by a pivot pin 76 to the plate 74 and has an operating connection with the tamping rods through a slot and pin 77, the latter attached to the bar 72. The arm 75 carries a pin 78 movable up and down in a slot 79 formed in a standard 80. Coil springs 81 are positioned between the cross bar 60 and the bar 71. The operation of the tamping rods is as follows: When the bar 60 and press plungers 27 are moved downward, the tamping rods are carried therewith until arrested by the stock strip 26. As the bar 60 continues its downward movement the arm 75 swings about its pivot. The pin 78 reaches the bottom of the slot 79 about the time the punches reach the strip 26 and sever the liners, so that during the continued downward movement of the plungers 27 and bar 60, the arm 75 is swung about the pin 78 as a fulcrum. As the pivot pin 76 is much closer than the pin 77 to the fulcrum pin 78, the arm 75 operates to move the tamping rods rapidly downward, thereby forcing the liners into position.

The means for feeding the caps C from the chute 24 into register with the dies includes a feeder in the form of a plate 92 (Fig. 2) mounted for reciprocating movement on the table 23, the latter being recessed to provide a guideway for the plate 92. The means for reciprocating said plate comprises driving connections from the shaft 37 including mitre gears 83 and 84 connected respectively to the shaft 37 and a shaft 85 journaled in a bearing bracket 86 and carrying a crank disk 87 connected through a link 88 to the feeder plate 92. Dogs 89 pivoted to the feeder plate are arranged to engage behind the caps C at the forward end of the chute 24 and push them forward into register with the dies. Each dog 89 is normally held with its nose 91 projecting into the path of the caps by a light leaf spring 92.

The electrical control mechanism for preventing the feeding movement of the stock strip when a cap C is missing at the assembly station, as, for example, when a row of caps has been exhausted, will now be described. Electrical circuit control devices, individual to the cap feeder dogs 89, each includes a rocker bar 93 mounted in a channel-shaped holder 94 for swinging movement about a pivot 95, the holders 94 being mounted in channels provided therefor in the plate 67. The forward ends of the rocker bars 93 extend downward (Fig. 9) into the paths of the caps C, and are normally held in such position by gravity supplemented by coil springs 96. The rear end of each rocker 93 extends beneath

a rod 97 mounted for vertical movement and held against the rocker by a coil spring 98. The rod 97 has a head 99 which contacts the lower surface of a switch arm in the form of a leaf spring 100. An electrical contact 101 adjustably mounted on the arm 100 cooperates with a stationary contact 102. The switches are electrically connected in series by connectors 103 and 104 in a circuit including the magnet coil 105 (Fig. 10) of a relay 106. The circuit comprising the switches 100 may be supplied with current from any suitable source. When the switches are closed and a circuit thereby established for the relay magnet 105, the latter operates to establish a circuit for the electromagnet 55, which circuit includes conductors 107 and 108 which may be connected to the mains of a commercial circuit.

As before described, the electromagnet 55 (Fig. 6) must be energized to permit the pawl and ratchet device to operate the feed rolls for the stock strip. This requires that all of the switches in the relay circuit be closed, which is done by the caps C (Fig. 9) engaging the rockers 93 as the caps are advanced by the dogs 89. As the forward ends of the rockers are swung upward by the caps, the rods 97 are lowered, so that the switch arms 100 move downward and close the circuit. Coil springs 109 insure the closing movement of the switch arms. The closing of the relay circuit is timed to maintain the electromagnet energized during the strip stock feeding operation. If a cap C should be missing from one of the feed lines when the feeder plate 92 carrying the dogs is advanced, the corresponding rocker 93 would remain inoperative and the relay circuit would therefore remain open so that the stock strip 26 would not be fed forward. Each cap C is advanced beyond the assembly station by the next succeeding cap. In other words, each cap as it is pushed into line with the punch by the dog 89, pushes forward the preceding cap which has just received its liner. Consequently, if the supply of caps in any row runs out the last lined cap will remain in register with the plunger. Continued operation of the press plunger would then cause the liners to be piled up in the cap and eventually clog the machine. This is prevented by the electromagnetic mechanism operating as above described to prevent the continued feed of the stock strip.

Modifications may be resorted to within the spirit and scope of my invention.

I claim:

A lining machine comprising in combination, feed rolls for feeding lining material to an assembly station, a motor, driving connections between the motor and feed rolls including a dog and ratchet, means for holding the dog out of driving engagement with the ratchet, an electromagnet operable when energized to move the dog into engagement with the ratchet, a plurality of channels, means for advancing rows of closure devices through said channels to the assembly station, rocker bars individual to said channels and mounted to swing into and out of the paths of the closure devices in the channels, an electrical control circuit for the electromagnet, switches individual to said channels and connected in series in said circuit, and means actuated by said rocker bars for holding said switches open while the rocker bars are projected into the path of the closure devices and for closing said switches when the rocker bars are actuated by the closure devices.

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