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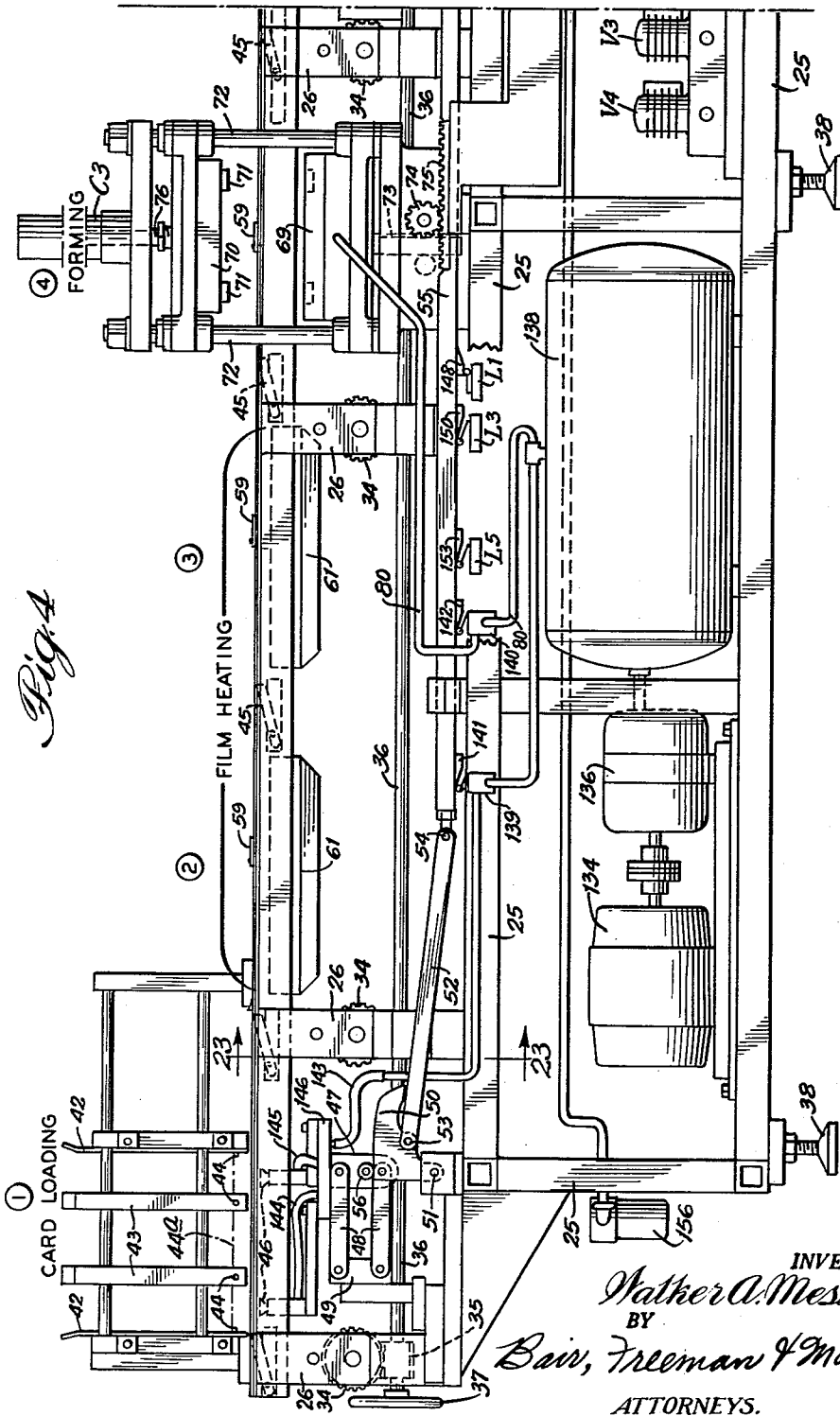
W. A. MESSICK

3,118,262

FORMING AND PACKAGING MACHINE

Filed May 28, 1962

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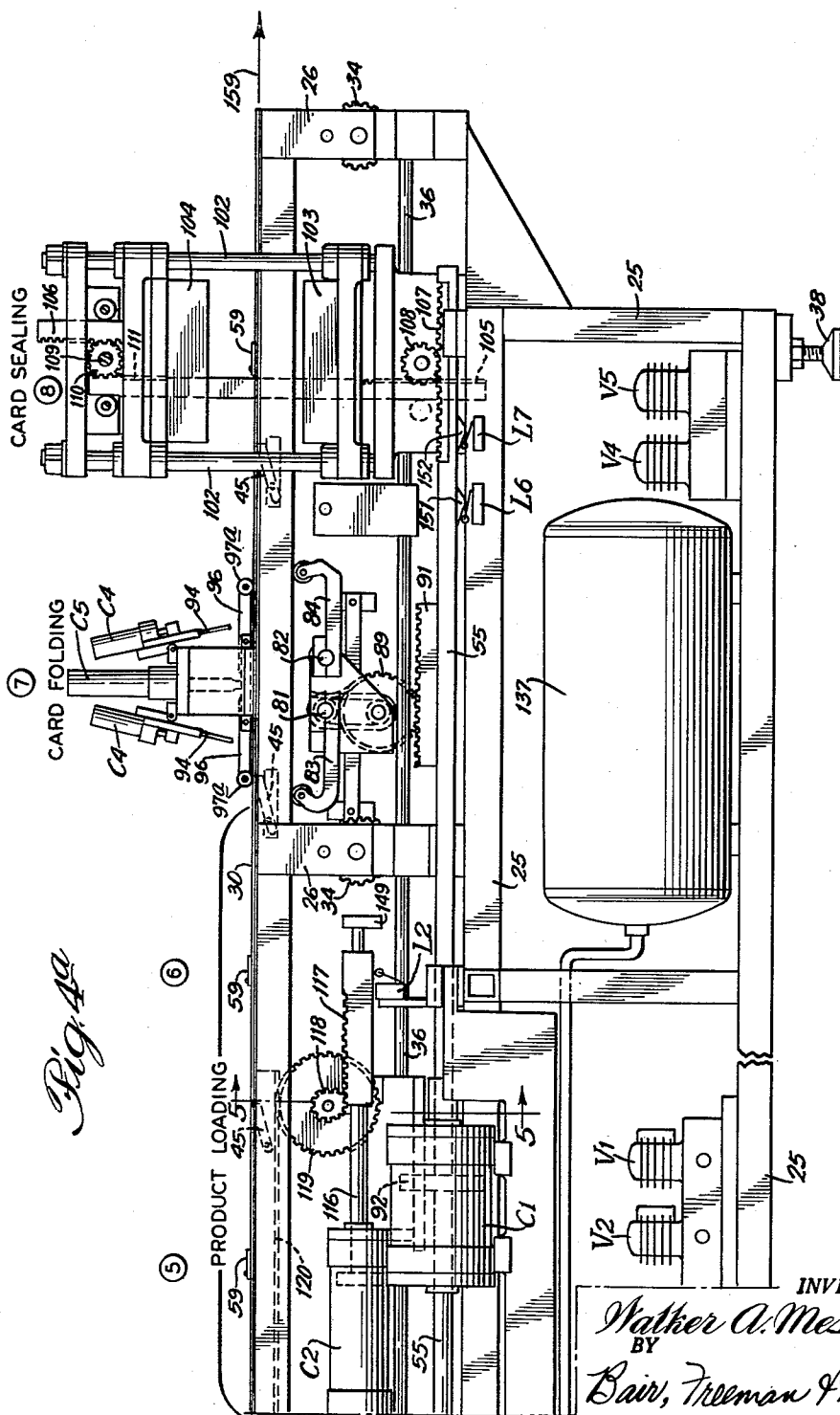
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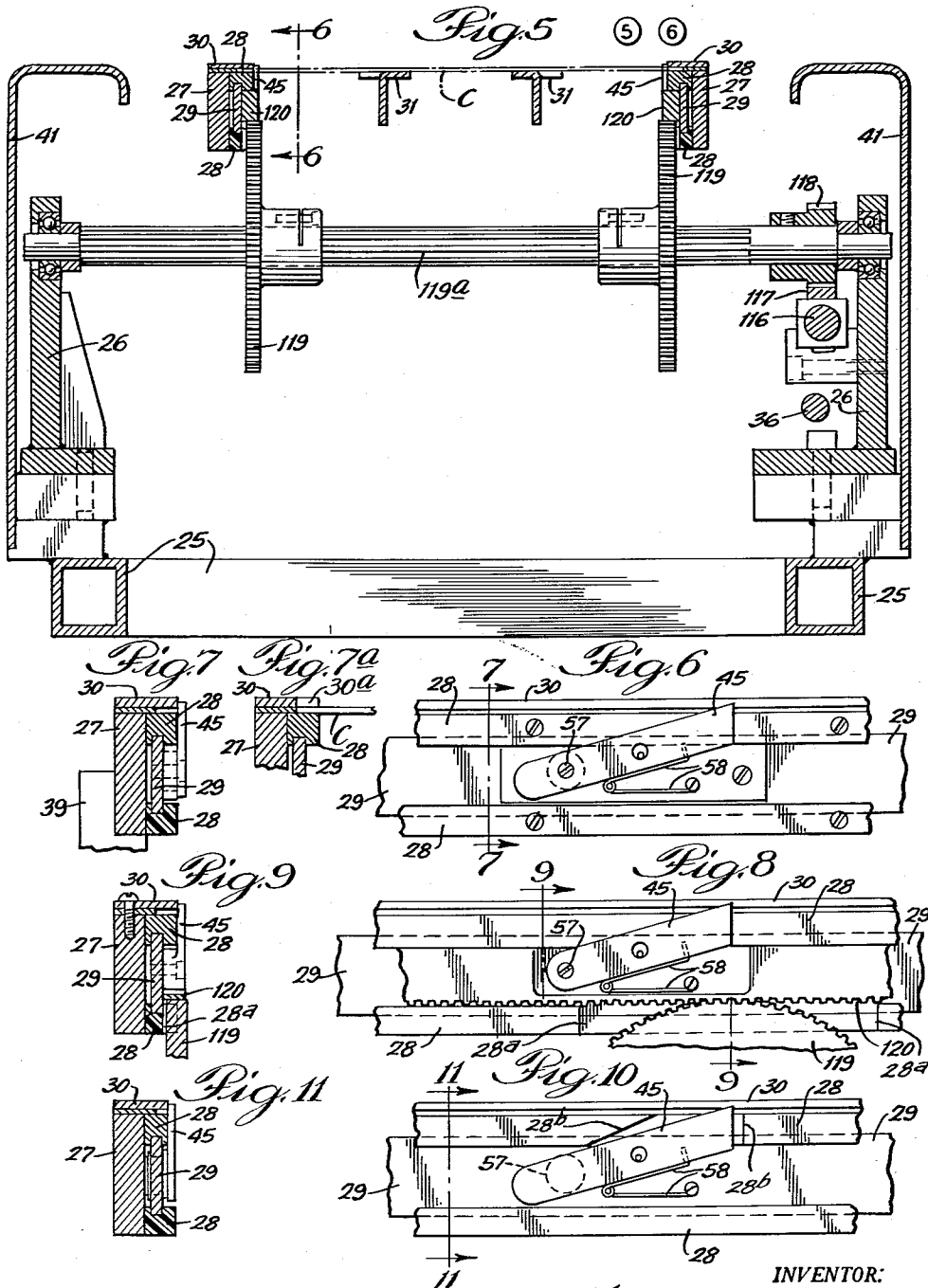
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10 Sheets-Sheet 4



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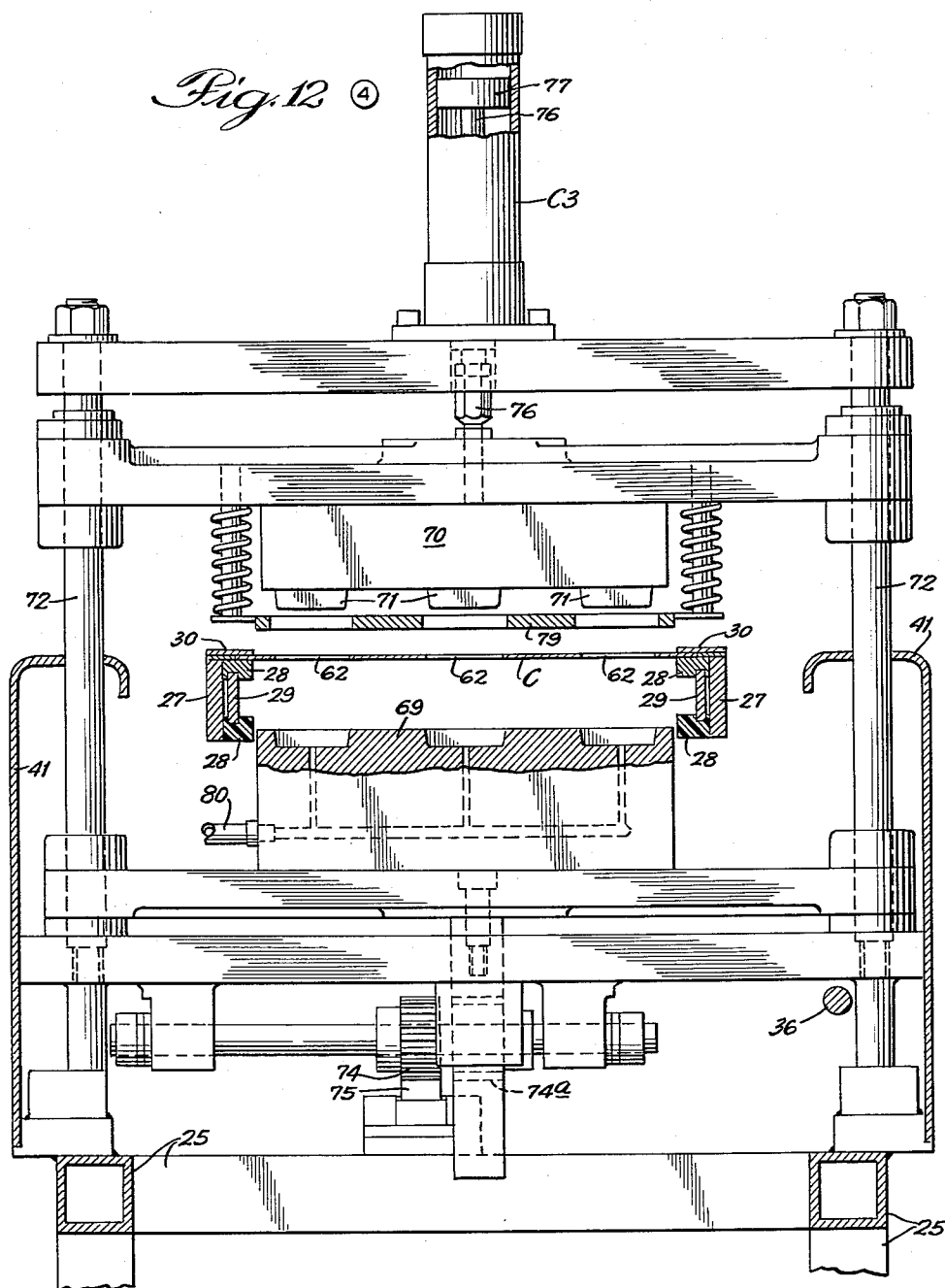
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FORMING AND PACKAGING MACHINE

Filed May 28, 1962

10 Sheets-Sheet 5



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FORMING AND PACKAGING MACHINE

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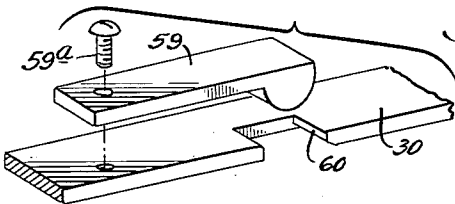
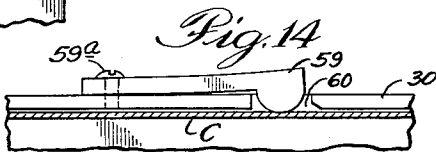
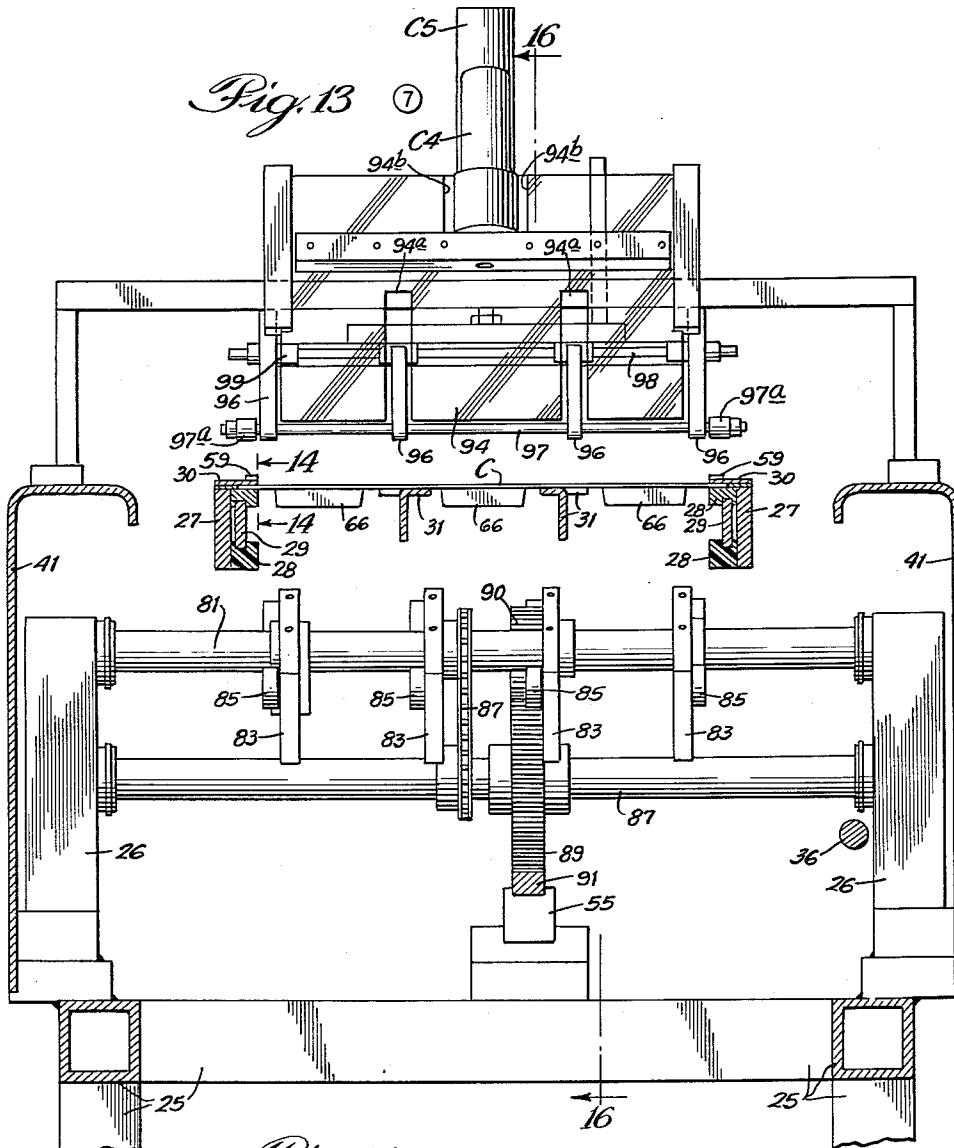


Fig. 15

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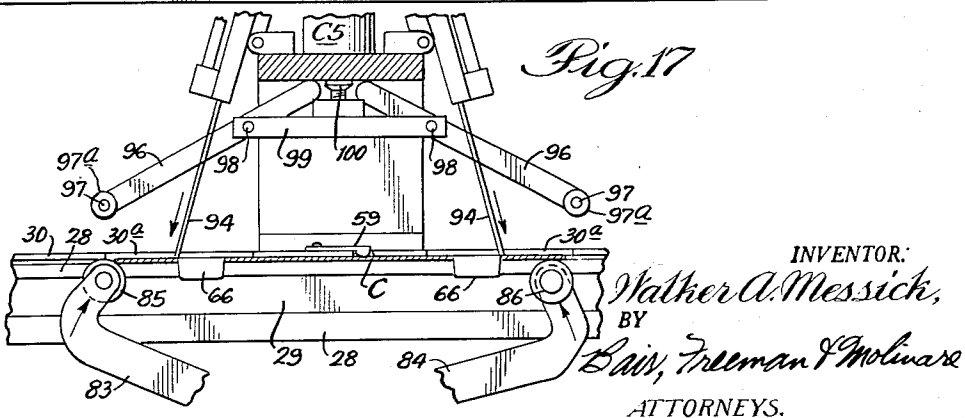
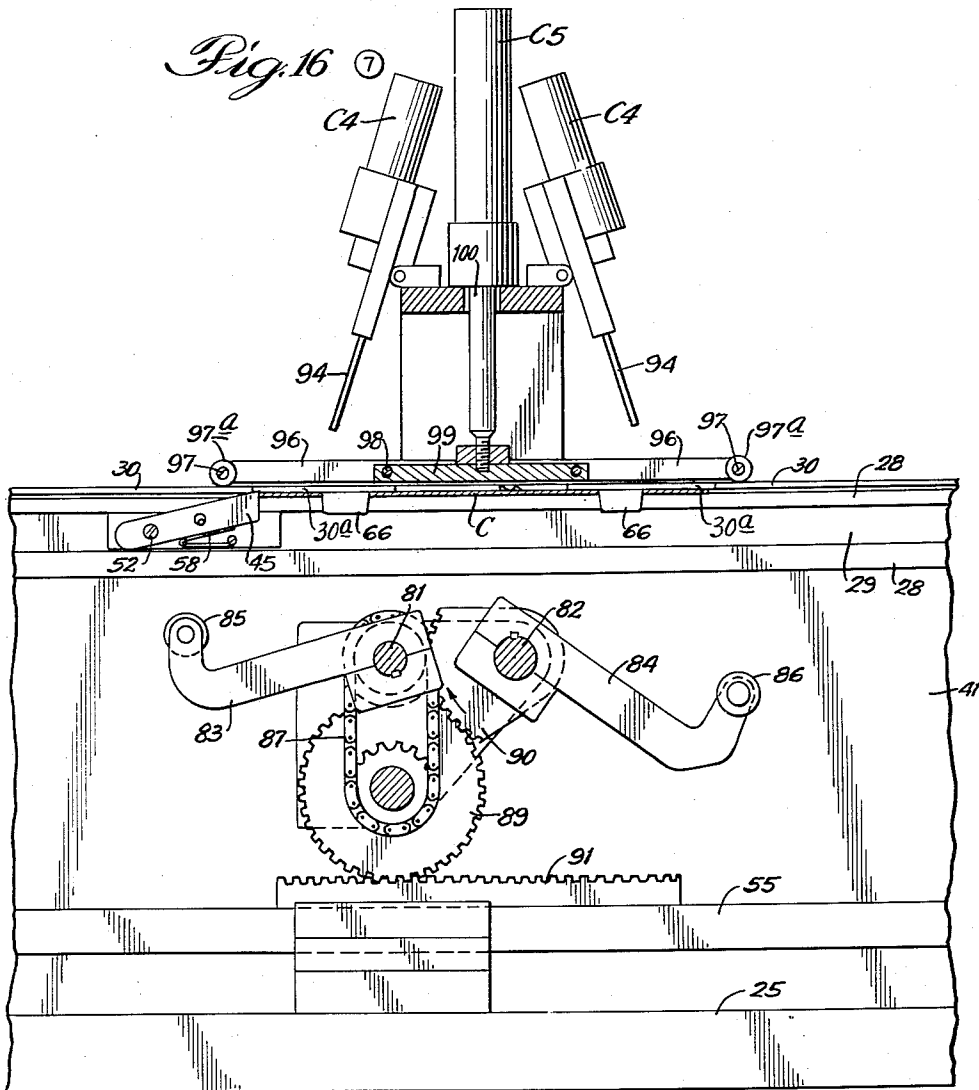
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FORMING AND PACKAGING MACHINE

Filed May 28, 1962

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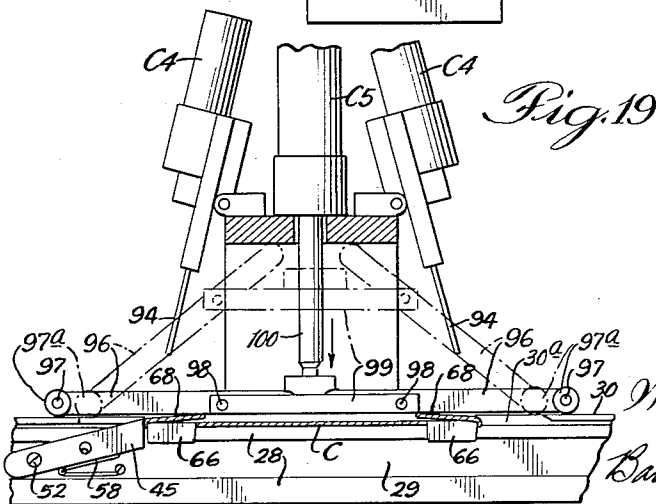
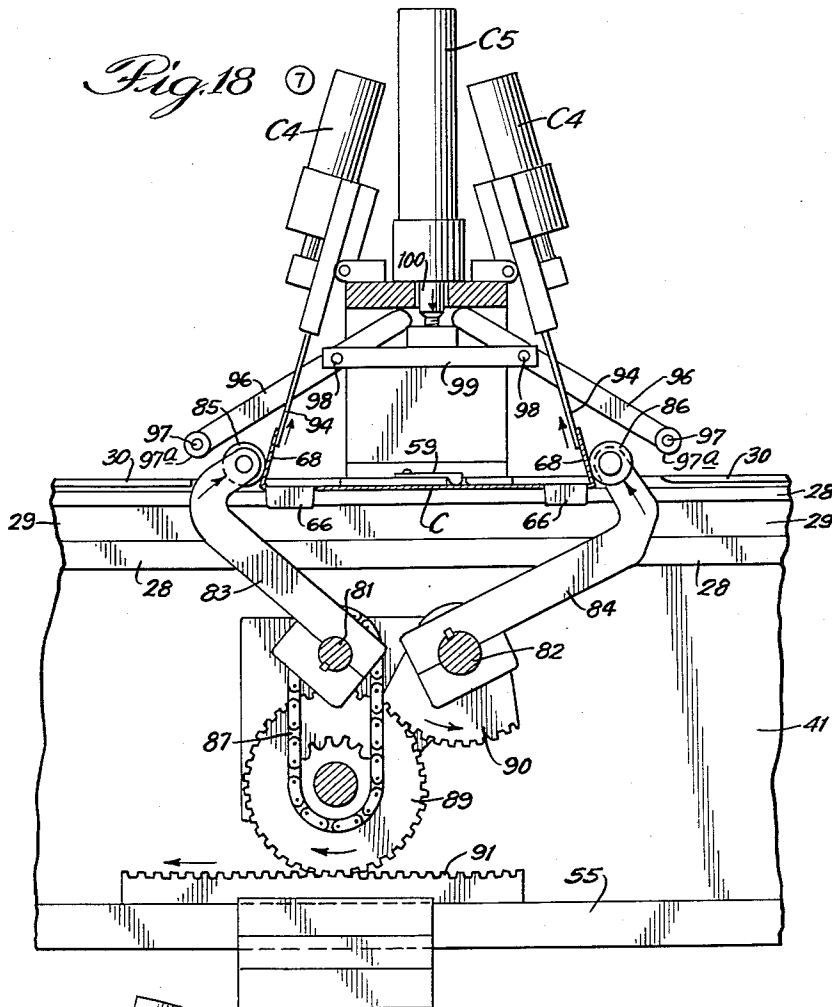
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FORMING AND PACKAGING MACHINE

Filed May 28, 1962

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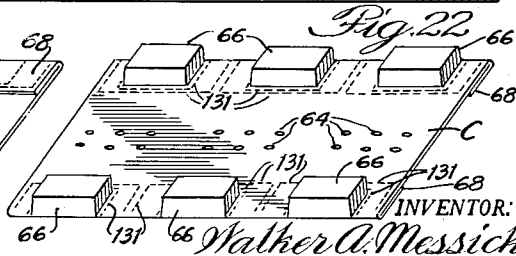
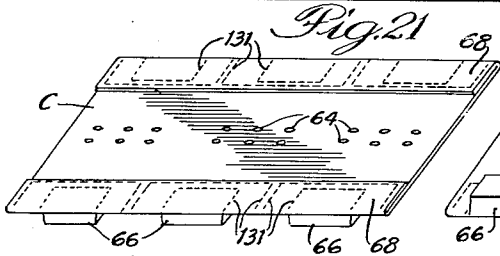
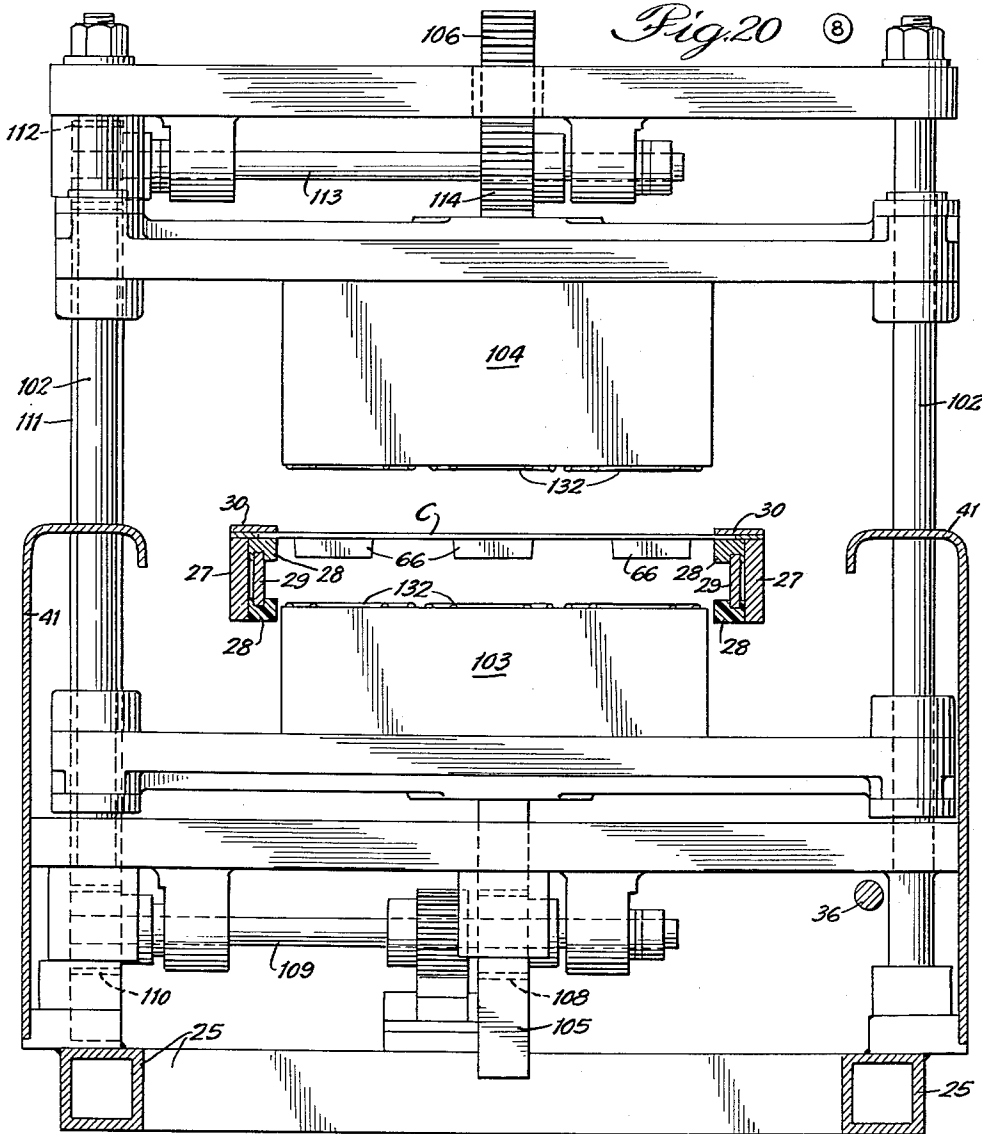
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10 Sheets-Sheet 9



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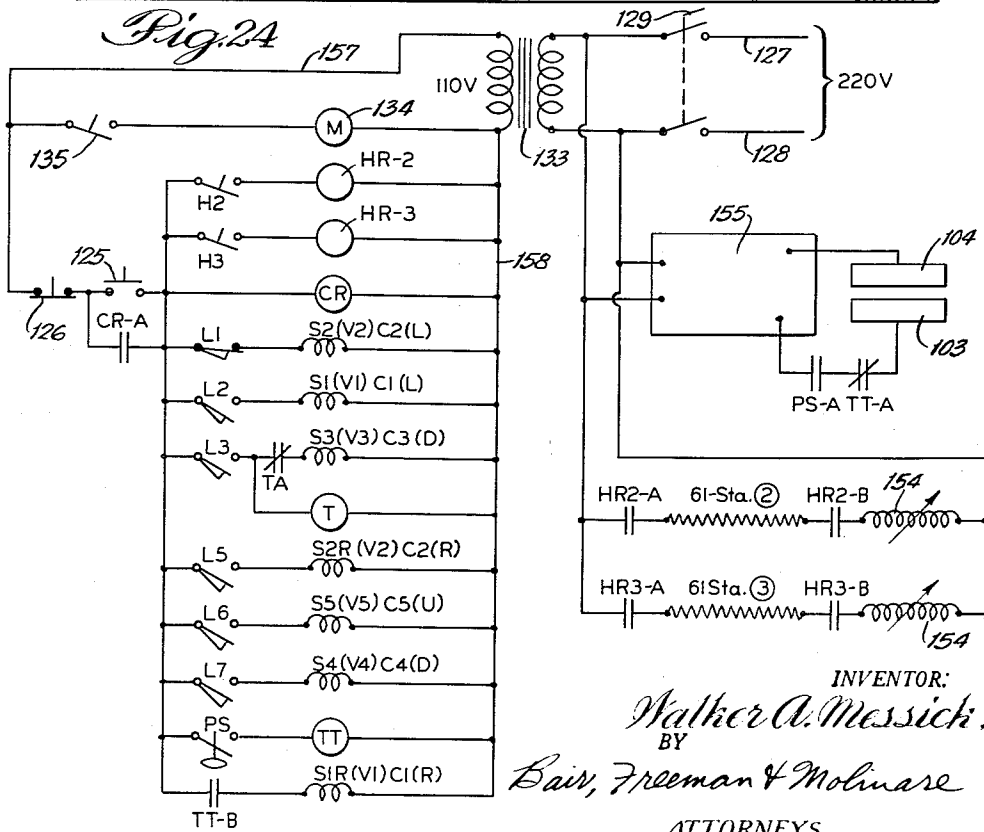
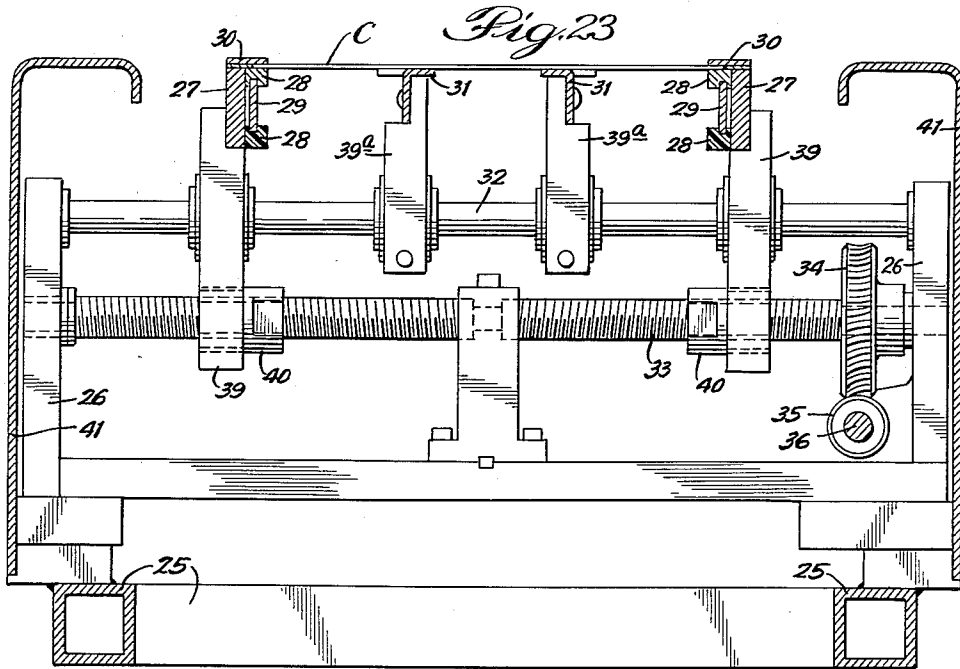
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FORMING AND PACKAGING MACHINE

Filed May 28, 1962

10 Sheets-Sheet 10



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3,118,262

FORMING AND PACKAGING MACHINE

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Filed May 28, 1962, Ser. No. 198,056
25 Claims. (Cl. 53—184)

This invention relates to a machine for forming pockets in article receiving cards, and packaging the articles in the cards.

One object of the invention is to provide a machine for forming pockets in cards in which articles may be inserted, and folding parts of the card over to enclose the articles in the pockets whereupon the packages are sealed closed.

Another object is to provide a machine including a plurality of stations at which various operations are performed such as loading cards one at a time into the machine at one station, heating stretchable films of the cards at another one or two stations, forming the heated films into article receiving pockets at another station, loading product into the pockets of the cards at another one or two stations, folding certain parts of the card over so as to enclose the articles in its pockets at another station and sealing the pockets closed by means of high frequency currents at a final station of the machine.

A further object is to provide means to insure proper operation of the mechanism at each station of the machine by utilizing the movements of a piston in a main cylinder to mechanically perform most of the operations at the various stations and to provide limit switches actuated thereby for controlling other operations at some of the stations in conjunction with the mechanical operations performed by the main cylinder, thus insuring a proper sequence of operations at each station of the machine and minimizing the possibility of any jamming of the machine at any station due to malfunctioning.

Still a further object is to provide a card loading station where a vacuum pick-up arrangement is mechanically actuated by the main cylinder to remove cards one at a time from a magazine and deposit them for advancement by card slide bars.

An additional object is to provide at a forming station of the machine a forming mold actuated by the main cylinder and a cooperating forming plate actuated by a cylinder under control of a limit switch that is actuated by the main cylinder.

Another additional object is to provide at a card fold station a combination of mechanically and pneumatically actuated folding means cooperating with each other wherein the pneumatically operated folding means is actuated by limit switches controlled by the main cylinder.

A further additional object is to provide a card-sealing station where electrodes are brought into simultaneous contact with the upper and lower surfaces of the card to seal it by means of high frequency currents, the electrodes being actuated by the main cylinder.

Still a further additional object is to provide a second cylinder for actuating the card slide bars, such cylinder being under control of a limit switch actuated by the main cylinder, the second cylinder in turn actuating a limit switch for causing actuation of the main cylinder.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my forming and packaging machine, whereby the objects above contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in detail on the accompanying drawings, wherein:

FIG. 1 is a perspective view of a pair of card slide bars and eight cards associated therewith and being

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operated upon by my machine. The progressive operations performed on the cards at all eight stations of the machine are illustrated.

FIG. 2 is a plan view of a card suitable for forming and packaging in my machine.

FIG. 3 is an enlarged sectional view thereof on the line 3—3 of FIG. 2 showing part of the card folded over.

FIG. 4 is a side elevation of a forming and packaging machine embodying my invention, showing the intake half thereof including stations (1) to (4) inclusive.

FIG. 4a is a similar side elevation thereof showing the discharge half thereof and is a continuation of the right hand end of FIG. 4. FIG. 4a shows stations (5) to (8) inclusive of the machine.

FIG. 5 is an enlarged transverse vertical sectional view between stations (5) and (6) as taken on the line 5—5 of FIG. 4a and shows the operating mechanism for a pair of card slide bars of the machine.

FIG. 6 is an enlarged side elevation of a card slide bar and a pusher finger carried thereby as viewed on the indicating line 6—6 of FIG. 5, the pusher finger here shown being the type provided at stations (1), (2), (3), (4) and (7) of the machine.

FIG. 7 is a vertical sectional view thereof on the line 7—7 of FIG. 6.

FIG. 7a is a similar sectional view for stations (1) and (7) only.

FIG. 8 is a side elevation similar to FIG. 6 showing the type of pusher fingers used at stations (5) and (6).

FIG. 9 is a vertical sectional view on the line 9—9 of FIG. 8.

FIG. 10 is a view similar to FIGS. 6 and 8 showing the pusher finger used at station (8).

FIG. 11 is a vertical sectional view thereof on the line 11—11 of FIG. 10.

FIG. 12 is an enlarged transverse vertical sectional view of mechanism of my machine at station (4) thereof showing a forming mechanism.

FIG. 13 is a transverse vertical sectional view at station (7) of the machine showing a card folding mechanism.

FIG. 14 is a detail on the line 14—14 of FIG. 13 showing a hold-down finger.

FIG. 15 is a perspective view of the finger and an associated part of machine.

FIG. 16 is a vertical sectional view on the line 16—16 of FIG. 13 showing the parts of the card folding mechanism in one position.

FIG. 17 is a view similar to a portion of FIG. 16 showing the parts in a different position during the card folding operation.

FIG. 18 is a similar vertical sectional view similar to FIG. 16 showing a further position of the parts.

FIG. 19 is similar to FIG. 17 showing the final position of the parts with the card completely folded.

FIG. 20 is a transverse vertical sectional view at station (8) of the machine showing a card sealing mechanism.

FIG. 21 is a perspective view of the finished or formed and packaged card.

FIG. 22 is a similar view thereof showing the card turned over.

FIG. 23 is an enlarged vertical sectional view taken on the line 23—23 of FIG. 4 and shows a typical supporting and adjusting means for card slide bars of my machine in order to adapt them for cards of different dimensions laterally of the machine, and

FIG. 24 is an electro diagrammatic view showing a control circuit for accomplishing automatic operation of my folding and packaging machine.

On the accompanying drawings I have used the refer-

ence numeral 25 to indicate in general a skeleton base frame. This frame is shown in FIGS. 4 and 4a as being provided with supporting feet 38.

Six supporting brackets 26 extend upwardly from the frame 25 and are provided in pairs transversely of the machine as shown in FIG. 23. A pair of parallel supporting bars 27 extend longitudinally of the machine and are provided with upper and lower channel strips 23 to slidably receive card slide bars 29. The upper strips 28 are adapted for a card C to slide thereon. The supporting bars 27 are mounted on brackets 39 which in turn are supported on a supporting shaft 32 and an adjusting shaft 33 for each pair of the brackets 26. The adjusting shaft 33 is provided with a worm gear 34 with which a worm 35 meshes, the worm being mounted on an adjusting shaft 36 extending longitudinally of the machine and terminating as shown in FIG. 4 at its left hand end in an adjusting hand wheel 37.

As shown in FIG. 23 the shaft 33 is provided with right and left hand threads which are threaded in nuts 40 of the brackets 39 so that as the hand wheel 37 is rotated in one direction the adjusting shaft 33 will be likewise rotated and move the brackets 39 toward each other for a narrower card. Reversely the brackets may be moved apart for accommodating a wider card. The machine is thus readily adapted for supporting cards C of various widths.

The cards used are usually of cardboard, and it is desirable to have intermediate supports such as shown at 31. These supports are in turn supported by brackets 39a similar to the brackets 39 except they are clamped to the supporting shaft 32 by clamp screws 40a. FIG. 23 shows a pair of cover guards 41 to enclose some of the mechanism which will hereinafter be described. These cover guards are omitted from FIGS. 4 and 4a.

As shown in FIG. 1 station (1) of the machine is a card loading station. Stations (2) and (3) are film heating stations. Station (4) is a film forming station. Stations (5) and (6) are product loading stations. Station (7) is a card folding station, and station (8) is a card sealing station. At station (1) a magazine is provided comprising ends 42 and sides 44. These are suitably adjustable to accommodate cards of various sizes, the cards being stacked as illustrated in FIG. 1 and resting upon small projections 44 shown in FIG. 4 in such manner that vacuum cups may contact the lowermost card and withdraw it downwardly past the projections and deposit it on the upper channel strips 28 to be slid therealong by pusher fingers 45 such as shown in FIG. 6. Card keeper bars 30 extend longitudinally of the supporting bars 27 and the upper channel strips 28 as shown in FIG. 23 and also in FIGS. 6 to 10. In FIG. 7a the card keeper bar 30 is notched as indicated at 30a at station (1) to permit downward movement of the card from the card holding magazine 42-43 into the position indicated by the card C.

The vacuum cups above referred to are shown at 46 in FIG. 4 and are carried by a bracket 47 supported by parallelogram links 48 from a stationary bracket 49. The bracket 47 is adapted to be cyclically elevated from the position shown in FIG. 4 and then brought down again by means of a cam 50 which is pivoted at 51 to the frame 25 and operatively connected by a link 52 pivoted at 53 to the cam and at 54 to a reciprocable rod 55 extending longitudinally of the machine. It will be obvious that as the rod 55 slides toward the left from the position shown in FIG. 4 it will rock the cam 50 upward and move the bracket 47 upwardly by coacting with a roller 56 carried thereby.

After a card has been deposited on the upper channel strips 28 it may be moved longitudinally thereof by the fingers 45 which as shown in FIG. 6 are pivoted at 57 to the slide bars 29 and urged upwardly by light springs 58. In FIGS. 4 and 4a it will be noted there is a finger 45 for each station of the machine and as shown in FIG.

5 the fingers are arranged in pairs, one for the right side and one for the left side. The fingers at the far left in FIG. 4 will engage the card and move it toward the right as the slide bars 29 are likewise moved toward the right, and the cards will be left in their new positions when the slide bars return in the opposite direction by reason of the fingers 45 pivoting downwardly and dragging under the cards, the cards being held by hold-down fingers 59 shown in FIGS. 14 and 15 operating in notches 60 of the card keeper bars 30. The fingers 59 are resilient for this purpose, being formed of nylon or the like, and under tension when the screws 59a are tightened during assembly. Thus each cyclical reciprocation of the card slide bars 29 results in advancing cards from each station to the next succeeding station.

At stations (2) and (3) as shown in FIG. 4 film heaters 61 such as radiant electric heating elements formed of resistance wire or the like are provided for heating films carried by the cards C. A typical card is shown in FIG. 2 and it will be noted that it is provided with openings or windows 62 which are covered by strips of transparent film such as acetate or the like indicated at 63. Perforations 64 are shown for hanging the package on a hook or display board after it is completed, and a series of cut lines 65 is illustrated. The card C shown is accordingly adapted to be cut into six individual cards after the package is loaded and sealed.

The machine here disclosed is particularly designed for loading a type of card which has pockets into which the articles to be sold are loaded, one such pocket being shown at 66 in FIG. 3. The marginal edges of the cards beyond the fold lines 67 shown in FIG. 2 are adapted to be folded over as shown at 68, after which the pocket is sealed closed as will hereinafter appear.

To form the pockets 66, a forming mechanism is provided at station (4) but some films have to be heated in order to be properly formed. Accordingly as the cards pass over and pause at stations (2) and (3) they are heated by the heaters 61 and are thus ready for forming at station (4).

For this purpose a forming mold 69 is shown with which a forming plate 70 cooperates (see FIG. 12). The plate 70 is provided with pocket forming plugs 71. Vertical guide rods 72 are provided on which the mold 69 and plate 70 are slidable. The mold 69 is adapted to be slid upwardly along the guide rods 72 by a rack 73 meshing with a pinion 74 which in turn meshes with a rack 75 on the reciprocating rod 55 (see FIG. 4). The plate 70 is adapted to be slid downwardly along the rods 72 by a piston rod 76 mounted on a piston 77 slidable in a cylinder C3 as shown in FIG. 2. FIG. 12 also shows a pressure pad 79 associated with the forming plate 70, and a means for vacuumizing the pockets of the forming mold 69 by means of a vacuum line 80.

Referring to FIGS. 13 and 16 the card folding station (7) is shown together with the card folding mechanism thereat. This mechanism comprises a pair of transverse rock shafts 81 and 82 on which are four folder arms 83 and four folder arms 84 respectively terminating in rollers 85 and 86. The rock shaft 81 is driven by a chain 87 from a rock shaft 88 and the rock shaft 82 is driven from the same rock shaft but in the reverse direction by means of a gear 89 and a gear sector 90. The gear 89 meshes with a rack 91 also mounted on the reciprocating rod 55 (also see FIG. 4a). The rod 55 serves as a piston rod and has a piston 92 mounted thereon and reciprocable in a main cylinder C1.

The card folding mechanism also includes a pair of breaker blades 94 suitably supported by pistons and piston rods, the pistons being slidable in cylinders C4. There are also fold arms 96 carrying cross rods 97 on which are connected to a piston rod 100 which is suitably provided with a piston reciprocable in a cylinder 101. The function of these parts and their operation will hereinafter appear.

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At station (8) card sealing mechanism is provided comprising vertical guide rods on which are slidable lower and upper induction heating electrodes 103 and 104. These electrodes are adapted to move simultaneously upwardly and downwardly respectively, and press against the folded card, whereupon suitable high frequency currents pass between the electrodes. For this purpose the electrodes are moved by means of racks 105 and 106 respectively arranged as shown in FIG. 4a so that a rack 107 meshes with a pinion 108 on a shaft 109 which in turn has a pinion 110 meshing with a rack 111 as shown in FIG. 20 which in turn meshes with a pinion 112 on a shaft 113 provided with a pinion 116 meshing with the rack 106. Thus the two electrodes 103 and 104 are always in synchronism and movable equally in opposite directions to contact the top and bottom of the card C without tending to either raise or lower it.

As shown in FIG. 4a a slide bar cylinder C2 is provided in which a piston is reciprocable and connected with a piston rod 116 terminating in a rack 117. The rack 117 meshes with a pinion 118 which drives a gear 119 that meshes with a rack 120. The rack 120 is mounted on a card slide bar 29 and in practice there are two of the gears 119 (see FIG. 5) mounted on a splined shaft 119a to which the pinion 118 is fixed, and two of the racks 120, one for each of the slide bars so that they are reciprocated in synchronism. Referring to FIGS. 8 and 9 the lower channel strips 28 are notched at 28a to accommodate the gear 119.

As shown in FIG. 13 the breaker blades 94 are of transparent plastic material so that their action during operation can be observed and likewise any malfunctioning thereof. They are notched as indicated at 94a to clear the fold arms 96 and at 94b to clear the cylinders C4.

Referring to the electric diagram in FIG. 24 line wires 127 and 128 supply current for the circuit illustrated. A main switch 129 when closed supplies current to the film heaters 61 under the automatic control of Variacs 154. Branch wires 130 extend to a high frequency generator 155 for generating the proper current for the electrodes 103 and 104 which have suitably shaped extensions 132 as shown in FIG. 20 to form the seal patterns 131 shown in dotted lines in FIGS. 21 and 22. Current is also supplied to a transformer 133, the line wires 127 and 128 being preferably at 220 volts whereas the secondary of the transformer 133 provides current at 110 volts.

A motor 134 under control of a switch 135 is provided for operating a vacuum pump 136 that produces vacuum in a vacuum tank 138 shown in FIG. 4. Compressed air is supplied through an air regulator and lubricator to a compressed air supply tank 137 for operating under the control of solenoid operated valves V1, V2, V3, V4 and V5 which control the flow of air to the cylinders C1, C2, C3, C4 and C5. The various conduit connections however have been omitted from the drawings but are in accordance with legends to be found on FIG. 24.

The vacuum tank 138 is connected to vacuum valves 139 and 140 which are adapted to be opened by cams 141 and 142 respectively secured to the reciprocating rod 55. A vacuum connection 143 extends from the valve 139 to a manifold 146 which in turn is connected by vacuum connections 144 and 145 to the vacuum cups 46. Only two of the cups are shown but there are preferably four or six provided for adequate coaction with the relatively large card C, and they are mounted on adjustable arms that swing relative to the manifold 146 so that they can be variously positioned to accommodate cards of different types, different shapes, and the like.

The vacuum valve 140 is connected to the hose 80 which leads to the forming mold 69 (also FIG. 12).

Returning to FIG. 24 the motor 134 is energized from 110 volt wires 157 and 158 extending from the secondary of the transformer 133. The valves V1 to V5 inclusive

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are energized by these wires under the control of limit switches (and other switches which will be later identified) indicated L1, L3 and L5 in FIG. 4 and L2, L6 and L7 in FIG. 4a. The reciprocating rod 55 has a series of cams 148, 150, 153, 151 and 152 respectively for these limit switches except for the limit switch L2 which as shown in FIG. 4a is actuated by a striker plate 149 on the rack 117.

The solenoid valve V1 has a solenoid S1 as shown in FIG. 24 to throw it in one direction and a solenoid valve S1R to throw it in the reverse direction. This is indicated by "(V1)" following S1 and S1R. Actuation of these solenoids cause operation of the cylinder C1 to drive its piston 92 toward the left and toward the right respectively as indicated by (L) and (R). Likewise the solenoid valve V2 has solenoids S2 and S2R for the cylinder C2 to drive its piston to the left and right respectively. A single solenoid S3 is provided for the valve V3 and when energized sends the piston of the cylinder C3 downwardly (D), and when de-energized the piston moves upwardly. Similarly the solenoid valves SV4 and SV5 are actuated by solenoids S4 and S5 to drive the pistons of the cylinders C4 and C5 downwardly and upwardly respectively when energized. When de-energized, the pistons of C4 return upwardly and the piston of C5 returns downwardly.

Practical Operation

Assuming the various elements of the machine in the position shown in FIG. 4 and the magazine 42-43 loaded with cards C, the machine is ready for operation and at rest between cycles. Since the reciprocating rod 55 is at its right hand limit of motion the cam 148 (see FIG. 4) has closed the normally open limit switch L1. Closure of the start button 125 accordingly energizes solenoid S2 to operate solenoid valve V2 for supplying compressed air to the right hand end of the cylinder C2 to drive the rack 117 toward the left. Accordingly the rack 120 is driven toward the right and the slide bars 29 move forward, the fingers 45 at station (1) carrying a card deposited from the stack 16 forward one station. At the end of the stroke of the rack 117 the striker plate 149 closes limit switch L2 thereby energizing solenoid S1 for the valve V1 that sends compressed air to the right hand end of cylinder C1 to slide the rod 55 toward the left. Closure of the start button 125 also energizes a control relay CR and its holding contacts CR-A are thereby closed to keep the machine in operation after the start button is released. Since there are numerous operations performed directly from the rod 55, each station operation will now be described in detail.

Card loading station (1).—As the rod 55 moves toward the left the link 52 will swing the cam 50 about the pivot 51, and the cam through the roller 56 will elevate the right hand ends of the links 48 to raise the vacuum cups 46 into contact with the next card at the indicated dot-and-dash line position 44a.

During the pivoting of the cam 50, the cam 141 at the left hand end of the rod 55 will open the vacuum valve 139 for pulling a vacuum on the cups 46. The position of all components at station (1) remain until the piston of the cylinder C1 moves toward the right whereupon the bottommost card C in the magazine 42-43 is pulled past the projections 44 and deposited on the upper channel strips 28 as in FIG. 7a ready for subsequent pick-up and transfer to station (2).

Film heating stations (2) and (3).—As the cards C pause at these stations the film heaters 61 heat the films 63 to facilitate forming them at station (4) with pockets 66 as shown in FIG. 3. As shown in FIG. 24 the heaters 61 at stations (2) and (3) are individually controlled by manual heater switches H2 and H3 respectively, these switches in turn controlling relays HR2 and HR3 the coils of which are in the 110 volt circuit and identified as HR2-A, HR2-B, HR3-A and HR3-B. Thus before the machine is started in operation the heaters 61 may be

turned on to attain their proper operating temperature, and depending on the character of the film 63 either one or both heaters may be turned on as some films require more heat than others.

Forming station (4).—As the piston of cylinder C1 travels toward the left the forming mold 69 is elevated through the rack 75, pinion 74 and rack 73 into contact with the lower surface of the card C at this station. Limit switch L3 is closed by the cam 150 connected to the rod 55 thus energizing the solenoid S3 of the valve V3 through the contacts T-A of a pneumatic timer T whereby the valve V3 introduces air to the cylinder C3 to cause the piston therein to descend and thereby move the pressure pad 79 shown in FIG. 12 downwardly whereby the pad first contacts the card C and grips it with pressure between the forming mold 69 and the pressure pad which is spring loaded. The forming plate 70 and the pocket forming plugs 71 thereafter engage the card. Initial contact of 79 with the card thus occurs prior to contact of the forming plate 70 therewith, and the card as well as the film 63 around the pockets 66 is thus firmly clamped while the plugs 71 form the pockets by bearing upon the preheated stretched film on the card to carry it into the pockets of the forming mold 69, stretching it to conform to the plug. Prior to maximum penetration the vacuum valve 140 is opened by the cam 142 on the rod 55, thereby allowing vacuum to be drawn in the forming mold.

The forming plate 70 is retracted at a preset time for which the timer T is set thereby opening its contact T-A to de-energize the solenoid S3 whereupon the valve V3 is reversed and air supplied to the lower end of the cylinder C3 for elevating the piston therein.

Product loading stations (5) and (6).—At these two stations whatever product is to be loaded into the pockets 66 of the cards C may be loaded by hand or automatically by suitable conveyor or the like.

Card folding station (7).—As the piston of cylinder C1 moves toward the left, a two-way cam 152 adjacent the right hand end of the rod 55 (see FIG. 4a) closes the normally open limit switch L7 to energize solenoid S4 of the solenoid valve V4 thus sending air to the tops of the two cylinders C4 to lower the breaker blades 94 into contact with the card C at its fold lines 67. The high point of the cam 152 then passes the switch L7 to open it again thus reversing the pistons in the cylinders C4 as in FIG. 18 to retract the breaker blades 94. The piston in cylinder C5 is normally down as shown in FIGS. 4a and 16 until limit switch L6 is closed by cam 151 whereupon the piston is elevated for moving the fold arms 96 from the position of FIG. 16 to the position of FIG. 17 to permit the folder arms 83 and 84 and their rollers 85 and 86 to engage the ends of the card C for folding them over as indicated at 68 in FIG. 3 and as shown in FIG. 18. At the extreme left hand position of the rod 55, cam 152 rides off limit switch L7 and at approximately the same time cam 151 rides off limit switch L6 so that the pistons in the cylinders C4 are returned upwardly as shown in FIG. 18 and the fold-overs 68 are in position to be folded down by the fold arms 96 as in FIG. 19, and the piston in the cylinder C5 moves downwardly, first causing the rollers 97a to contact the card keeper bars 30 as shown by dotted lines and then swing down to the supine positions illustrated against the fold-overs 68 which are now in position to be sealed at station (8). The fold-overs are retained by the fold arms 96 completing the fold to a lay-flat position which is retained while the card C is being transferred to the seal station (8). The limit switches L6 and L7 are of one-directional type so as to be closed and re-opened as the rod 55 strokes to the left but remain open as the rod strokes to the right thus preventing undesirable actuation of the pistons in the cylinder C4 and C5 during the latter stroke. The card fold over assembly is adjustable lengthwise and widthwise for

central location with respect to the length and width of the card C and relative to the starting point of the fingers 45.

Card sealing station (8).—Through the racks 107, 105, 111 and 106 and the pinions 108 and 110, the electrodes 103 and 104 are moved simultaneously upwardly and downwardly respectively and their extension 132 engage the card C at substantially the same instant. Further movement then exerts pressure on the card C. Contact with the card limits the travel of the piston of the cylinder C1 whereupon the pressure in the cylinder builds up and is applied through the electrodes to the card. Cards of various thicknesses are thus automatically compensated for.

At a predetermined set pressure attained in a pressure switch PS that is responsive to the pressure of air being applied to the cylinder C1, contacts PS-A close to energize the high frequency generator 155 to effect the seals shown by dotted lines 131 in FIGS. 21 and 22. A second pneumatic timer TT is also energized by closure of the pressure switch PS. When the timer TT times out it opens contacts TT-A to de-energize the electrodes 103 and 104, and closes contacts TT-B for energizing the solenoid S1R to actuate the piston in cylinder C1 for movement toward the right and return of the rod 55 to initial position and the limit switch switches actuated thereby likewise to their initial positions (all open except L1 closed).

As the piston of the cylinder C1 reaches the extreme left hand position limited by travel of the electrodes 103 and 104 of the seal station (8) limit switch L5 is contacted by the cam 153 to energize the solenoid S2R of the solenoid valve V2 thus returning the piston in the cylinder C2 toward the right and the card slide bars 29 accordingly toward the left. As the pick-up fingers 45 pass under the cards they detent and return, then spring up behind the cards after passing them and are ready for pick-up of the cards in the next cycle to advance each card to the next station. Referring to FIG. 10, the upper channel strips 28 are notched at 28b so the fingers 45 at station (8) may be set further apart to accommodate an electrode 103 wide enough to extend to substantially the outer limits of the card C.

The completely packaged cards that issue from station (8) of my machine (arrow 159, FIG. 4a) may then be cut along the cut lines 65 shown in FIG. 2 and at station (8) in FIG. 1 to form six individual packages that can be hung by means of the perforations 64 on display peg boards. Card sizes and number of packages per card can be varied throughout a considerable range as may fold-over proportions and pocket shapes. The magazine ends and sides may be adjusted on the rods that mount them, the arms that mount the vacuum cups 46 may be adjusted relative to the manifold 146, the distance apart of the channel strips 28 (FIG. 23) may be increased or decreased and the positions of the gears 119 on the shaft 119a (FIG. 5) may be varied to accommodate different size cards. The forms 69 and 70 and the electrodes 103 and 104 may be replaced with others of different size and/or pattern, and the breaker blades 94 and fold arms 96 may be replaced with others of different design to accommodate many different package designs.

From the foregoing description it will be obvious that I have provided a forming and packaging machine which has a plurality of stations at which different operations are performed, and all operations are mechanically synchronized by operation of the piston in the main cylinder C1. The card loading mechanism, at station (1), part of the forming mechanism at station (4), part of the card folding mechanism at station (7) and the sealing dies 103 and 104 at station (8) are directly mechanically interconnected with the piston of this cylinder, and the limit switches L1, L3, L5, L6 and L7 as well as the vacuum valves 139 and 140 are all actuated by this same cylinder and accordingly timed in relation to its movement. The various cams 141, 142, 148, 150, 151, 152 and 153

may be adjusted longitudinally of the rod 55 for operation, each at the proper time. The limit switch L2 is operated in response to card advance movement to insure that the cards are properly advanced before the other operations dictated by movement of the piston in the cylinder C1 takes place.

The card withdrawing operation at station (1) is performed by actuation of the cylinder C1 and the forming operation at station (4) is completed by the limit switch L3 and cylinder C3 with the timer T also controlling C3. The card folding operation at station (7) is completed by the limit switches LS6 and LS7 and the cylinders C4 and C5 and the timing of the high frequency sealing current at station (8) is accomplished by the pressure switch PS and the timer TT which also return the piston of the cylinder C1 to initial position for starting another cycle of operations. These cycles will continue until such time as the stop switch 126 is depressed for opening the holding circuit through the relay contacts CR-A by de-energizing the relay CR.

While I have shown in FIG. 12 at station (4) a forming mold 69 and forming plugs 71 for certain types of films 63, there are other types that require only the forming mold 69 and the vacuum connection 80. Accordingly the forming plate 70 and the pocket forming plug 71 can be disabled and this type of package (usually called a "blister" package) can be formed by merely elevating the forming mold 69 into contact with the card C and drawing a vacuum in the pockets thereof. At station (7) in FIG. 16 the machine can be adapted for a single fold-over card by disabling the folder arm 84, the cylinder C4 and its breaker blade 94. At station (8) as shown in FIG. 20 I provide the electrodes 103 and 104 and their extensions 132. In place of electrodes these may be electric heaters for certain types of film 63 that may be sealed by heat. Other obvious modifications can also be made to readily adapt the machine for a variety of types of packages.

Some changes may be made in the construction and arrangement of the parts of my forming and packaging machine without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may reasonably be included within their scope.

I claim as my invention:

1. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having spring actuated card pick-up fingers pivoted thereto for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, vacuum cup means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said vacuum cup means being operatively connected with said actuated element for alternately elevating and lowering the vacuum cups each cycle of operation, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said

actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said vacuum cups at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said forming piston and cylinder means, said breaker blade piston and cylinder means and said fold arm piston and cylinder means all three being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said forming piston and cylinder means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said main piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said main piston and cylinder means for returning said actuated element in the opposite direction.

2. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up fingers for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said last means being operatively connected with said actuated element, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said forming piston and cylinder means, said breaker blade piston and cylinder means and said fold arm piston and cylinder means all three being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said forming piston and cylinder means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said main piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said main piston and

cylinder means for returning said actuated element in the opposite direction.

3. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having spring actuated card pick-up fingers pivoted thereto for each of said stations, card advance means for reciprocating said card slide bars, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, vacuum cup means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said vacuum cup means being operatively connected with said actuated element for alternately elevating and lowering the vacuum cups each cycle of operation, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first operating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a second operating means for operating said breaker blades, a third operating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said vacuum cups at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said first operating means, said second operating means and said third operating means all three being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said first operating means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said piston and cylinder means for returning said actuated element in the opposite direction.

4. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pickup fingers for each of said stations, card advance means for reciprocating said card slide bars, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said last means being operatively connected with said actuated element, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first operating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold

arms engageable with the folded over portions of the cards to complete the folding operation, a second operating means for operating said breaker blades, a third operating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said first operating means, said second operating means and said third operating means all three being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said first operating means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said piston and cylinder means for returning said actuated element in the opposite direction.

5. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having spring actuated card pick-up fingers pivoted thereto for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, vacuum cup means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said vacuum cup means being operatively connected with said actuated element for alternately elevating and lowering the vacuum cups each cycle of operation, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for supplying high frequency current to said electrodes.

6. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up fingers for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said means being operatively connected with said actuated element,

a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for supplying high frequency current to said electrodes.

7. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having spring actuated card pick-up fingers pivoted thereto for each of said stations, card advance means for reciprocating said card slide bars, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, vacuum cup means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said vacuum cup means being operatively connected with said actuated element for alternately elevating and lowering the vacuum cups each cycle of operation, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first operating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a second operating means for operating said breaker blades, a third operating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for supplying high frequency current to said electrodes.

8. In a forming and packaging machine, an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up fingers for each of said stations, card advance means for reciprocating said card slide bars, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said last means being operatively connected with said actuated element, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first operating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the

folding operation, a second operating means for operating said breaker blades, a third operating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for supplying high frequency current to said electrodes.

9. A forming and packaging machine of the character disclosed comprising an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up fingers for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means operatively connected with said actuated element for withdrawing cards from said magazine and depositing them on said card slide bars, heaters for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, breaker blade piston and cylinder means for operating said breaker blades, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said card withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said forming piston and cylinder means and said breaker blade piston and cylinder means both being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said forming piston and cylinder means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said main piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said main piston and cylinder means for returning said actuated element in the opposite direction.

10. A forming and packaging machine comprising an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having means to advance cards therealong to each of said stations, a first actuating means for reciprocating said card slide bars, a second means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, withdrawing means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said withdrawing means being operatively connected with said actuated element for withdrawing a card from said magazine each cycle of operation, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by

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said actuated element, a second actuating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a third actuating means for operating said breaker blades, a fourth actuating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said second, third and fourth actuating means being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said second actuating means, completion of the stroke of said actuated element effecting retraction of said card slide bars, means responsive to closure of said electrodes for energizing the same, and a second timing means for de-energizing said electrodes and effecting operation of said actuated element in the opposite direction.

11. A forming and packaging machine comprising an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having means to advance cards therealong to each of said stations, a first actuating means for reciprocating said card slide bars, a second means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, withdrawing means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said withdrawing means being operatively connected with said actuated element for withdrawing a card from said magazine each cycle of operation, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a second actuating means for actuating the other of said forming element, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a third actuating means for operating said breaker blades, a fourth actuating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for supplying high frequency current to said electrodes.

12. In a forming and packaging machine, an elongated frame having a card loading station, a forming station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up means at each of said stations to advance a card to the next station, card advance means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said means being operatively connected with said actuated element for actuation thereby

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each cycle of operation of the machine, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first actuating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a second actuating means for operating said breaker blades, a third actuating means for operating said fold arms, said folder arms being actuated by said actuated elements, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said card withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said first, second and third actuating means being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said first actuating means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said main piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said main piston and cylinder means for returning said actuated element in the opposite direction.

13. A forming and packaging machine comprising an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having pick-up means for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said last means being operatively connected with said actuated element for operation each cycle of operation of the machine, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at

said card sealing station, said forming piston and cylinder means, said breaker blade piston and cylinder means and said fold arm piston and cylinder means all three being actuated as a result of such movement of said actuated element in said one direction, means to terminate the actuation of said forming piston and cylinder means, completion of the stroke of said actuated element effecting retraction of said card slide bars, and timing means effecting operation of said main piston and cylinder means for returning said actuated element in the opposite direction.

14. A forming and packaging machine comprising an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having pick-up means for each of said stations, card advance piston and cylinder means for reciprocating said card slide bars, main piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said last means being operatively connected with said actuated element for operation each cycle of operation of the machine, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for supplying high frequency current to said electrodes.

15. In a forming and packaging machine, an elongated frame having a card loading station, a forming station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up fingers for each of said stations, card advance means for reciprocating said card slide bars, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, a first means for withdrawing cards from said magazine and depositing them on said card slide bars, said first means being operatively connected with said actuated element, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a second means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, a third means for operating said breaker blades, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously move said electrodes in opposite directions to engage opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated elements for actuating said first means at said card loading station,

actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said second and third means being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said second means, completion of the stroke of said actuated element effecting retraction of said card slide bars, a pressure switch responsive to said piston and cylinder means for energizing said electrodes, and a second timing means for de-energizing said electrodes and effecting operation of said piston and cylinder means for returning said actuated element in the opposite direction.

16. A forming and packaging machine comprising an elongated frame having a card loading station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having card pick-up means for each of said stations, card advance means for reciprocating said card slide bars, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards from said magazine and depositing them on said card slide bars, said last means being operatively connected with said actuated element for operation thereby, a pair of forming elements at said forming station for engaging opposite sides of the card and forming article receiving pockets therein, one of said forming elements being actuated by said actuated element, a first operating means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, a second operating means for operating said breaker blades, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said card withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said first and second operating means being actuated as a result of such movement of said actuated element in said one direction, a first means to terminate the actuation of said first operating means, completion of the stroke of said actuated element effecting retraction of said card slide bars, and a second means for effecting operation of said piston and cylinder means for returning said actuated element in the opposite direction.

17. A forming and packaging machine comprising an elongated frame having a card loading station, a forming station, a product loading station, a card folding station and a card sealing station, means for advancing cards from station to station along said frame, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards from said magazine and depositing them on said card advancing means, said last means being operatively connected with said actuated element for operation thereby each cycle of its operation, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, forming piston and cylinder means for actuating the other of said forming elements, folding means at said card folding sta-

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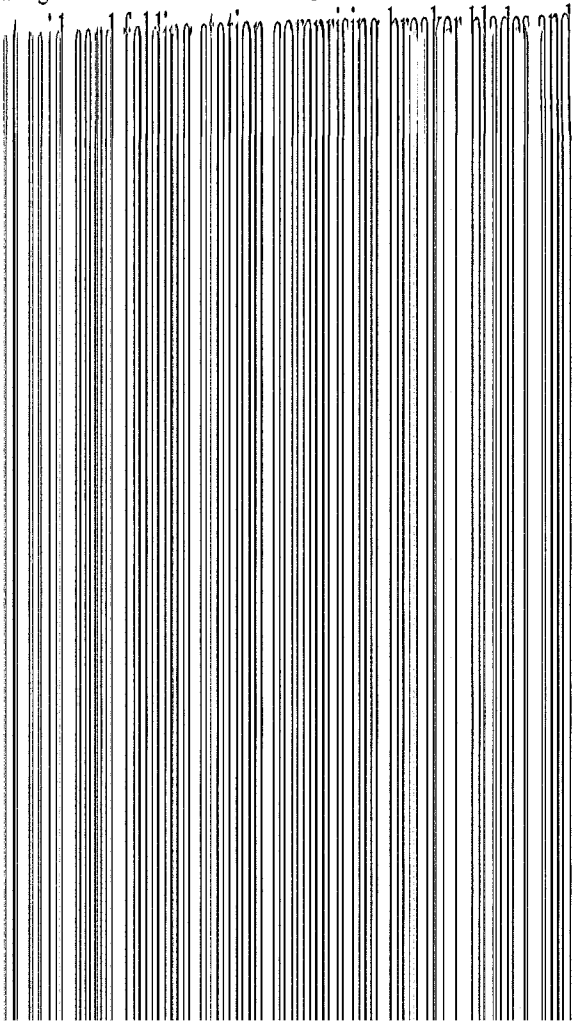
tion comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, breaker blade piston and cylinder means for operating said breaker blades, and fold arm piston and cylinder means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card.

18. A forming and packaging machine comprising an elongated frame having a card loading station, a forming station, a product loading station, a card folding station and a card sealing station, means for advancing cards from station to station along said frame, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards one at a time from said magazine and depositing them on said card advancing means, said last means being operatively connected with said actuated element, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first means for actuating the other of said forming elements, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a second means for operating said breaker blades, a third means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, and means for

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on said card advancing means, said last means being operatively connected with said actuated element, a heater for the cards at said heating station, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a first operating means for actuating the other of said forming element, folding means at said card folding station comprising breaker blades and folder arms for folding over portions of the cards to enclose the pockets thereof, fold arms engageable with the folded over portions of the cards to complete the folding operation, a second operating means for operating said breaker blades, a third operating means for operating said fold arms, said folder arms being actuated by said actuated element, and sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card.

21. A forming and packaging machine comprising an elongated frame having a card loading station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having means to advance cards therealong to each of said stations, a first actuating means for reciprocating said card slide bars, a second means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, withdrawing means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said withdrawing means being operatively connected with said actuated element for withdrawing a card from said magazine each cycle of operation, a pair of forming elements at said forming station for engaging opposite sides of the card and forming pockets therein, one of said forming elements being actuated by said actuated element, a second actuating means for actuating the other of said forming elements, folding means



means for operating said breaker blades, a fifth actuating means for operating said fold arms, said folder arms being actuated by said actuated element, sealing electrodes at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said electrodes with opposite sides of the card, means for supplying high frequency current to said electrodes, and control means for the foregoing elements wherein completion of the advance of said card slide bars effects actuation in one direction of said actuated element for actuating said withdrawing means at said card loading station, actuating said one of said forming elements at said forming station, and actuating said folder arms at said card folding station and said sealing electrodes at said card sealing station, said first, third, fourth and fifth actuating means being actuated as a result of such movement of said actuated element in said one direction, a first timing means to terminate the actuation of said third actuating means, completion of the stroke of said actuated element effecting retraction of said card slide bars, means responsive to closure of said electrodes for energizing the same, and a second timing means for de-energizing said electrodes and effecting operation of said actuated element in the opposite direction.

23. A forming and packaging machine comprising an elongated frame having a card loading station, a forming station, a product loading station, a card folding station and a card sealing station, means for advancing cards from station to station along said frame, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, means for withdrawing cards from said magazine and depositing them on said card advancing means, said last means being operatively connected with said actuated element for operation thereby each cycle of its operation, a forming element at said forming station having forming pockets therein, said forming element being elevated into engagement with a card at said station by said actuated element, folding means at said card folding station comprising a breaker blade and a folder arm for folding over a portion of the card to enclose the pockets thereof, a fold arm engageable with the folded over portion of the card to complete the folding operation, a breaker blade piston and cylinder means for operating said breaker blade and a fold arm piston and cylinder means for operating said fold arm, said folder arm being actuated by said actuated element, and heated sealing element at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said sealing elements with opposite sides of the card.

24. A forming and packaging machine comprising an elongated frame having a card loading station, a heating station, a forming station, a product loading station, a card folding station and a card sealing station, card advancing means reciprocable longitudinally of said frame for advancing cards from station to station therealong, piston and cylinder means having an actuated element reciprocable longitudinally of said frame, said card load-

ing station having a magazine for cards, means for withdrawing cards from said magazine and depositing them on said card advancing means, said last means being operatively connected with said actuated element, a heater for the cards at said heating station, a forming element at said forming station having forming pockets therein and a vacuum connection thereto, said forming element being actuated by said actuated element into contact with the card, means thereupon operable to draw a vacuum in said forming pockets, folding means at said card folding station comprising a breaker blade and a folder arm for folding over a portion of the card to enclose the pockets thereof, a fold arm engageable with the folded over portion of the card to complete the folding operation, a first operating means for operating said breaker blade, a second operating means for operating said fold arm, said folder arm being actuated by said actuated element, and sealing elements at said card sealing station, said sealing elements being heated and said actuated element being operatively connected therewith to simultaneously engage said sealing elements with opposite sides of the card.

25. A forming and packaging machine comprising an elongated frame having a card loading station, a forming station, a product loading station, a card folding station and a card sealing station, card slide bars reciprocable longitudinally of said frame and having means to advance cards therealong to each of said stations, a first actuating means for reciprocating said card slide bars, a second means having an actuated element reciprocable longitudinally of said frame, said card loading station having a magazine for cards, withdrawing means for withdrawing cards one at a time from said magazine and depositing them on said card slide bars, said withdrawing means being operatively connected with said actuated element to withdraw a card from said magazine each cycle of operation, a forming element at said forming station for engaging the bottom of the card and having forming pockets therein, said forming element being engaged with a card by said actuated element, means operable to draw a vacuum in said forming pockets when said forming element is so actuated, folding means at said card folding station comprising a breaker blade and a folder arm for folding over a portion of the card to enclose the pockets thereof, a fold arm engageable with the folded over portion of the card to complete the folding operation, a second actuating means for actuating said breaker blade, a third actuating means for operating said fold arm, said first, second and third actuating means being operable by movement of said actuated element and said folder arm being also actuated thereby, and heated sealing elements at said card sealing station, said actuated element being operatively connected therewith to simultaneously engage said elements with opposite sides of the card.

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