Oct. 13, 1942. W. M. SCHWARTZ 2,299,041

ELECTRIC CONTROL SYSTEM FOR HOSIERY TREATING MACHINES

Filed April 4, 1940 4 Sheets-Sheet 1

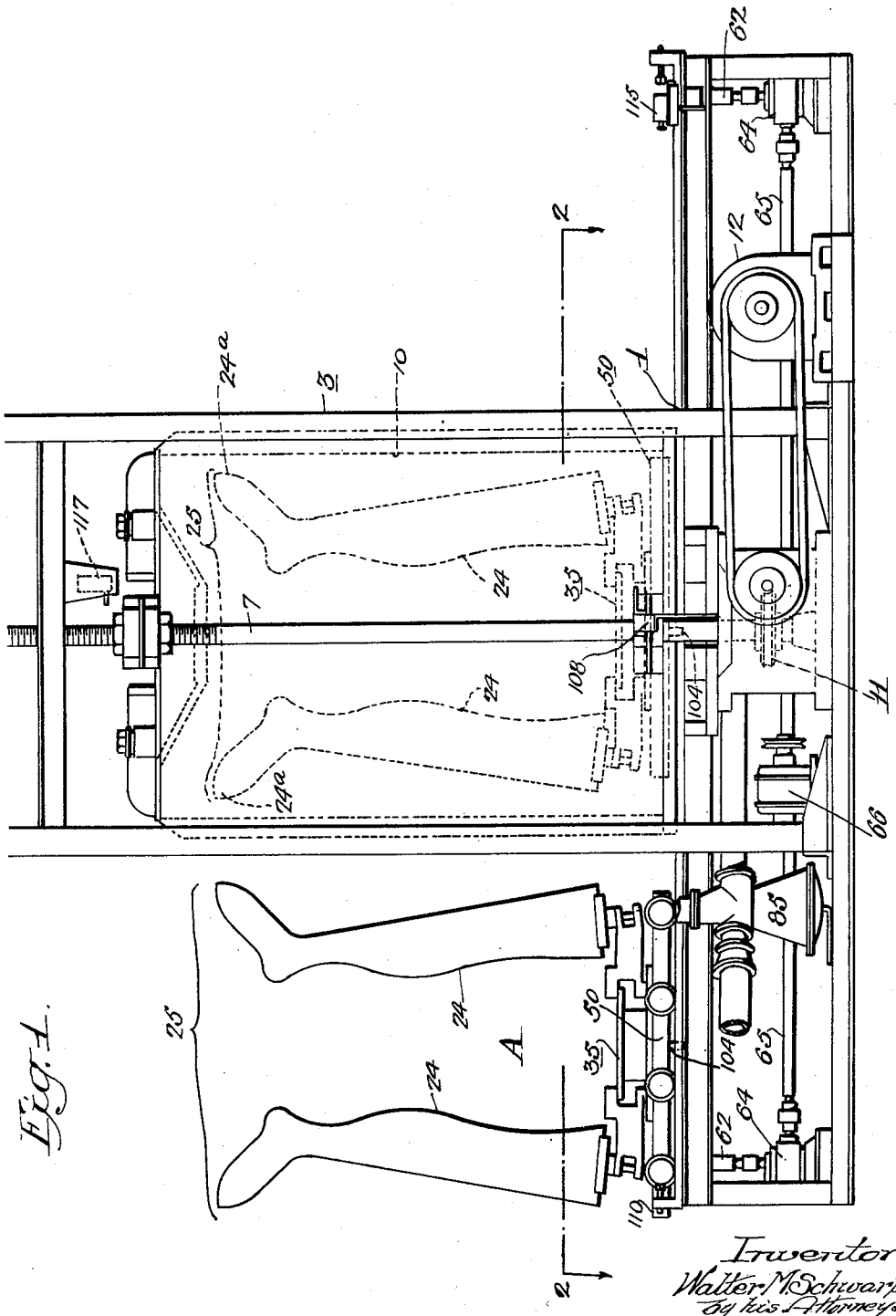



Fig. 1.

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Filed April 4, 1940 4 Sheets-Sheet 2

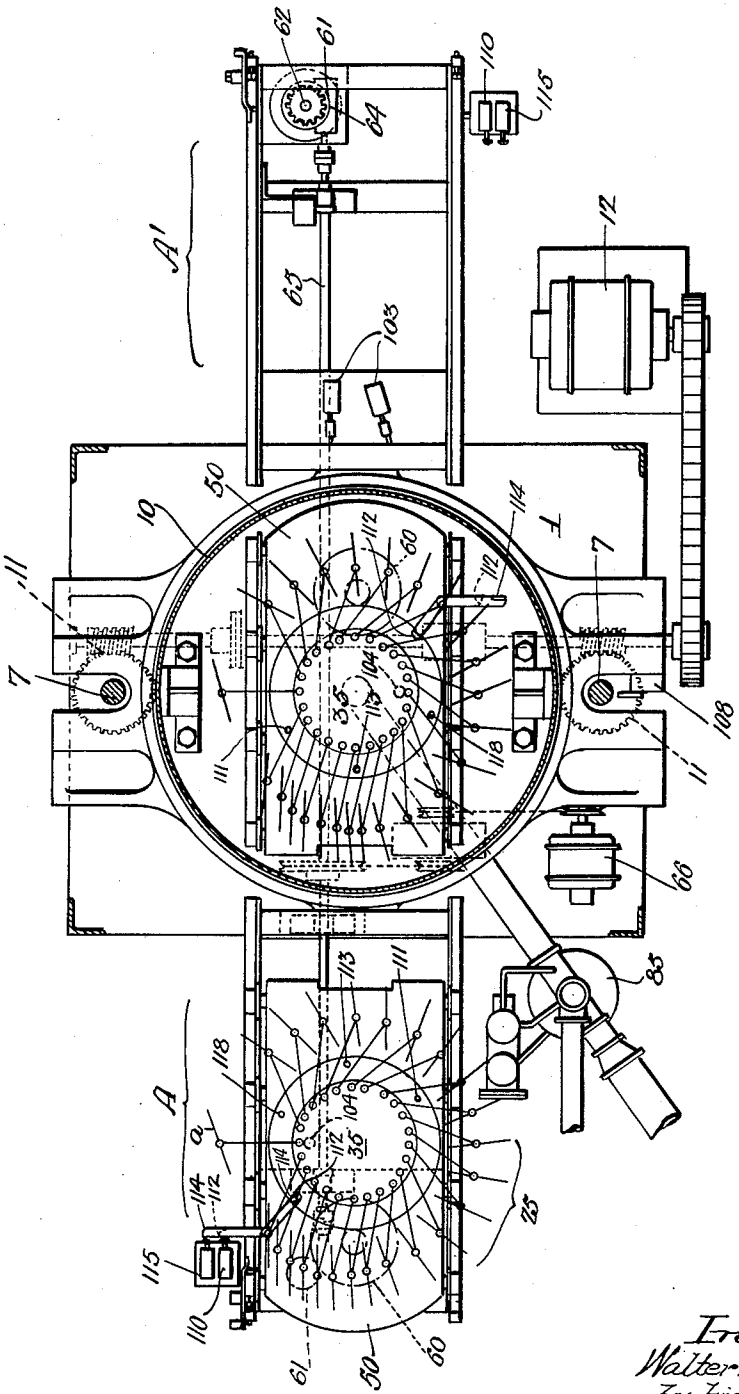



Fig. 2.

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Filed April 4, 1940 4 Sheets-Sheet 3

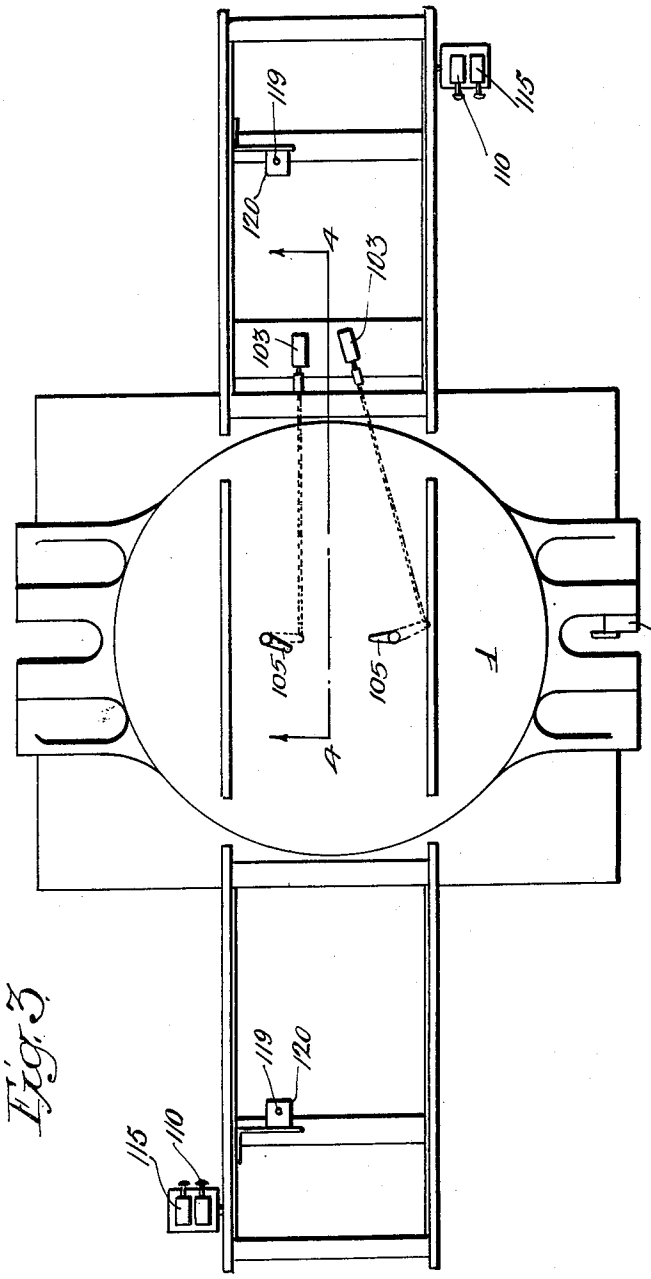



Fig. 3.

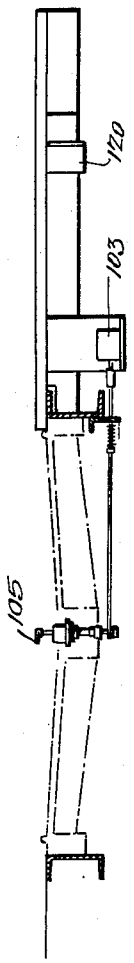



Fig. 4.



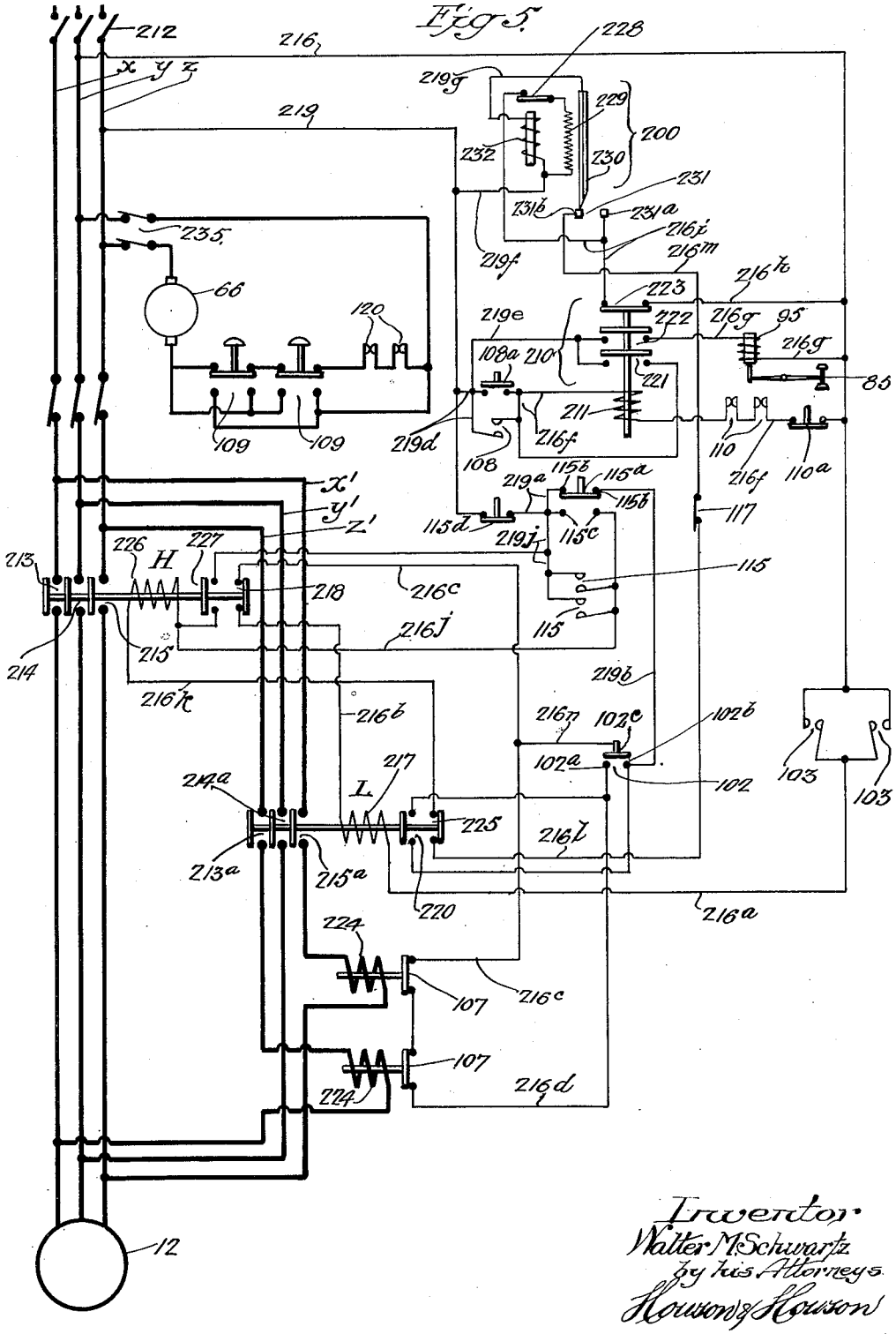

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Filed April 4, 1940 4 Sheets-Sheet 4

Fig 5.




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Patented Oct. 13, 1942 2,299,041

# UNITED STATES PATENT OFFICE

2,299,041

## ELECTRIC CONTROL SYSTEM FOR HOSIERY TREATING MACHINES

Walter M. Schwartz, Philadelphia, Pa., assignor to Proctor & Schwartz, Incorporated, Philadelphia, Pa., a corporation of Pennsylvania

Application April 4, 1940, Serial No. 327,900

16 Claims. (Cl. 223—76)

This invention relates to industrial control circuits; and particularly to an electrical circuit employed in connection with a machine for treating hosiery or other textile articles mounted on suitable supporting forms, as disclosed in the copending application, Serial No. 327,086, filed March 30, 1940, or kindred apparatus.

The principal object of the present invention is to correlate or coordinate a number of individual and/or interrelated operations of the machine for the purpose of automatically effecting an overlapping of the time periods normally necessary for carrying out each operation individually, and to automatically start and stop such operations in predetermined order or sequence, so as to avoid loss of time in effecting a complete cycle of operations of the machine.

Another object of the invention is to provide safety features in the circuit which will prevent injury to the operator, the machine, and/or the articles being treated in or by the machine during operation thereof.

In the accompanying drawings:

Fig. 1 is a side elevation of the machine;

Fig. 2 is a sectional plan view taken on the line 2—2, Fig. 1;

Fig. 3 is a diagrammatic plan view of the base portion of the machine and illustrates relative locations of various control switches employed in the circuit;

Fig. 4 is a sectional elevation taken on the line 4—4, Fig. 3; and

Fig. 5 illustrates the circuit in conventional diagrammatic form.

The specific machine for which the circuit of the present case has been particularly developed, as disclosed in the above noted copending application, involves steaming of hosiery or other fabricated articles while mounted on forms enclosed within a dome or bell-shaped chamber. The steaming chamber is movable vertically from its form-enclosing position to a position above the tops of a group of forms vertically aligned therewith, and vice versa.

Steam is admitted to the chamber as it is moved into its low position to enclose the group of forms; and is subsequently exhausted from the chamber, prior to the raising of the chamber to its high position, clear of the tops of the forms, to expose said group of forms.

The raising and lowering of the chamber is accomplished by a reversible electric motor, which lowers the chamber under power until the lower edge thereof jams tightly against a rigid base structure and forms a fluid-tight seal therebetween to prevent the escape of steam from the chamber. The motor continues in operation until the seal is completed and finally stalls causing certain electrical relays to open the circuit between the motor and its source of electrical energy.

The motor is arranged to hoist the chamber to a maximum high position, which, when attained, operates a limit switch in the circuit to open the circuit between the source of energy and the motor, thereby stopping the motor.

There are two separate groups of forms employed and each group is mounted on a separate turntable. The turntables are respectively mounted on a pair of trucks. These trucks are selectively movable, along horizontal rails beneath the raised chamber, from a stripping and loading position, at an operator's station remotely situated with respect to the compass of the dome or chamber, into position in vertical alignment with the raised chamber, and vice versa.

Should misalignment of the truck occur, or until proper alignment is effected, a safety switch in the chamber actuating motor circuit holds the circuit open or opens it, to prevent or stop lowering of the chamber until correct alignment is obtained.

When either truck is moved from alignment with the chamber to either of the two operator's stations respectively located on opposite sides of the chamber, driving means for the turntable, which is carried by the particular truck then located at the operator's station, is brought into operative relation with respect to driving means which is mounted in a fixed position at the operator's station. A single motor is provided for simultaneously actuating both driving mechanisms respectively located at the two operator's stations. However, either truck when in alignment with the chamber is disconnected from the turntable driving means at the operator's station from which that particular truck has been moved.

The turntable carried by the truck which is located at the operator's station, while the other truck is enclosed within the chamber, is caused to rotate intermittently by the single motor above noted, after the motor has been energized by operation of a manual switch at the operator's station. Intermittent rotation of the turntable brings the article laden forms of the group carried thereby into a definite position successively, for the operator to strip the previously treated

articles therefrom and to place untreated articles thereon.

Each turntable acts as an electrical timing device and is provided with a plurality of buttons or pins which, at predetermined times during a single revolution of the turntable, actuate switches to shut off the supply of steam to the chamber, subsequently initiate raising of the chamber, and finally effect stopping of the turntable itself.

The steam is admitted to the chamber through an electrically controlled valve which is operated by the chamber itself just prior to the stalling of the chamber lowering motor, through actuation thereby of a switch located in the path of downward movement of the chamber. This switch, in turn, closes the circuit to the electrically operated steam valve. The steam valve is subsequently opened by one of the pins or buttons on the turntable, as previously noted.

A time relay is embodied in the circut to delay the raising of the chamber for a predetermined length of time after the electrically controlled steam valve has been actuated to shut off the supply of steam to the chamber and throw the chamber open to exhaust, to prevent steam under pressure escaping from the chamber and injuring the operator or other persons in the vicinity, should an attempt be made to hasten the raising of the steam chamber by operation of a manual switch incorporated in the circuit for independently raising the chamber out of its order of sequence with the other operations of the machine, should such independent or off-time operation be necessary.

As shown in the drawings, the machine comprises a general framework 1 which includes a tower 3 for rotatably supporting jack screws 7 for raising, lowering, and guiding the pressure chamber 10 with respect to a solid rigid base also forming part of the general framework of the machine. Through suitable worm gearing 11 enclosed within gear boxes or pedestals 2, one at each side of the machine, the jack screws 7 are rotated, first in one direction and then in the opposite direction, selectively, by a reversible electric motor 12.

The steam valve for admitting steam under pressure and exhausting steam from the interior of the chamber 10 is indicated at 85. Any suitable three-way valve of the rotary or reciprocating type, operable in one direction by a solenoid or other electrically actuated device to admit steam to the chamber 10, and in the opposite direction by gravity or spring tension to exhaust steam from said chamber, may be employed; and, as an example, reference is made to the valve disclosed in detail in the above noted copending application as being the type preferred.

The two trucks for supporting the two groups 25, 25 respectively of the hosiery supporting forms, 24, 24 are indicated at 50, 50, the one being enclosed with the chamber 10, as shown in Fig. 1, while the second is disposed at the left hand remotely disposed operator's station A.

The turntables which support the forms 24, 24 are indicated at 35, 35 respectively. The turntable on the truck 50 located at either one of the operator's stations A is driven by a motor 66, through a shaft 65, a gear box 64, a vertical shaft 62, and a gear 61 disposed at the upper end of the shaft 62. The gear 61 disengageably intermeshes with a gear 60 which is carried by the truck 50 and is operatively connected to the turntable 35 in any suitable manner to effect intermittent rotation of the turntable, while the shaft 62 is constantly rotated, as by a pawl and ratchet mechanism operable by a crank on or driven by the gear 60, or by a well known "Geneva" movement similar to that disclosed in detail in the above noted copending application.

The sequence of operations is as follows: Let it be assumed that one truck 50 and its article-laden forms 24, 24 are enclosed within the chamber 10, with steam being admitted to said chamber 10; and the second truck 50, with its group of forms, is in position at the operator's station A. The first board or form 24 of the exposed group carried by the truck 50, which is then located at the operator's station A, is in position to be stripped and reloaded. The motors 66 and 12 are stopped.

Included in the circuit for the motor 66, (see Fig. 5) is a pair of two-position switches 109, 109, each biased to one of its positions, as shown in Fig. 5; and a pair of normally closed switches 120, 120. When a truck 50 is moved into position at one of the operator's stations it opens one of the switches 120. Consequently when the operator moves one truck 50 from under the raised chamber 10 into one operator's station, and before he moves the other truck from the second operator's station into position below the raised chamber 10, both switches 120, 120 are open. Then, when the operator moves one of the trucks into position below the raised chamber 10 the switch 120 controlled thereby automatically closes but the switch 120 controlled by the other truck still remains open and keeps the circuit to the motor 66 open, hence the motor 66 remains inoperative during shifting of the trucks in the manner noted.

The operator proceeds to strip a previously treated article from the first form, marked *a*, on the truck at the operators' stations and then presses one of the manual switches 109 to close a circuit around the open switch 120 to energize and run the motor 66 until it moves the turntable 35 a sufficient distance to release the switch 120 controlled thereby, permitting this switch to return to its normal circuit closing position, whereupon the operator releases the switch 109 permitting it to return to its normal circuit closing position, after which the motor 66 continues to run and intermittently rotate the turntable 35.

When the 16th form of the exposed group 25 arrives at the operator's station A, a low pin 111 (see Fig. 2) carried by the turntable 35 of the exposed truck 50 engages the lowermost lever 112 of a pair including a second superposed lever 114 on the framework 1. Rocking of the lever 112 operates a normally closed switch 110. This opens the circuit to the solenoid winding 95 of the steam valve 85, causing the flow of live steam to the interior of the chamber 10 to be discontinued and said interior to be opened to exhaust.

When the 20th form of the exposed group 25 arrives at the operator's station A, a high pin 113 on the turntable 35 engages the second lever 114 of the superposed pair 112—114 on the framework 1. Rocking of the lever 114 operates a normally open switch 115, to close the circuit to the elevating-screw motor 12.

Incidentally the pin 113, in operating the lever 114 also operates the lever 112 again, but as the first operation of the lever 112 has accomplished its purpose the second incidental operation of said lever is ineffective.

Between the time the switch 110 is opened to

deenergize the winding 95 of the steam valve 85 and the time the switch 115 is closed to effect raising of the chamber 10 by the motor 12 the circuit to the motor 12 remains open until such time as the pressure of the steam within the chamber 10 has been exhausted sufficiently to reduce its pressure and volume to a point where it would be harmless if permitted to escape to the atmosphere surrounding the machine as by prematurely raising the chamber 10.

Off-time raising of the chamber 10 might be effected by indiscriminately closing a manually operable switch 115a which is included in the circuit as a means for intentionally effecting raising of the chamber out of its normal sequence in the operation of the machine should occasion arise.

The switch 115a is of the two-position type biased to one of its positions as shown in Fig. 5. This switch and each of the other similarly represented switches, may take the form of a spring-biased push-button switch.

The normally closed contacts 115b, 115b, of the switch 115a are included in the portion of the circuit for controlling the lowering of the chamber 10 by the motor 12, thus when the switch 115a is moved to position across the contacts 115c, 115c, which are in the portion of the circuit for controlling the raising of the chamber 10 by the motor 12, the switch 115a serves as a means to prevent simultaneous closure of the raising and lowering circuits for the chamber 10.

Also included in the control circuit for the motor 12, is a centering switch 103 which is normally open and is closed only by a truck 50 when moved into and retained in proper axially aligned relationship to the chamber 10. This is accomplished by a pin 104, which projects downwardly from the underside of each truck 50, engaging a lever 105 which lies in a horizontal plane above the base 1. The lever 105 is connected by suitable linkage to the switch 103, which latter is normally biased by a spring into its open circuit position.

After the motor 12 starts to raise the chamber 10, it continues in operation until the lower edge of the chamber 10 reaches an elevation above the tips 24a of the forms 24 enclosed within the chamber, and as the maximum high position of the chamber is attained thereby, it automatically operates a limit switch 117, included in the raising control circuit, to open said circuit and thereby stop the operation of the motor 12.

From the time of initial operation of the manual switch 109, to start the turntable 35, and during the exhaustion of the steam from the chamber 10 and the raising of the chamber, the turntable 35 of the exposed group of forms 24 at the operator's station A continues to rotate intermittently, each form stopping at the station A for a sufficient length of time to permit the operator to strip one article from the form and place another article thereon.

When the last or 24th form of the exposed group arrives at the operator's station A, a pin or other projection 118 carried by the exposed turntable 35 engages a plunger 119 and opens a switch 120 in the circuit for the motor 66, thereby stopping the operation of this motor and the rotation of the turntable 35 as a result thereof.

The turntable 35 remains in this position relative to the plunger 19 during movement of the truck 50 from the operator's station into alignment with the chamber 10 and during return of the truck to the operator's station. As the truck leaves the operator's station the plunger 119 releases the switch 120 but as soon as the truck returns to the operator's station the plunger 119 again operates the switch 120 into circuit opening position, thus requiring the operator to hold in the starting switch 109, to begin rotation of the turntable 35, as described above.

After the turntable stops, the operator moves the truck 50, which is then axially aligned with the raised chamber 10, from beneath said chamber into position at the right hand operator's station A1, as viewed in Fig. 1. In so doing the gear 60, carried by that particular truck 50, is brought into operative engagement with the turntable driving gear 61 at the right hand station A1.

The operator then moves the reloaded truck 50 from the left hand station A into vertical alignment with the raised chamber 10, and in so doing effects closing of one of the centering switches 103 in the lowering control circuit for the motor 12.

The operator then closes a manually operable switch 102, included in the lowering control circuit for the motor 12, which starts rotation of the motor 12 in the opposite direction and starts the chamber 10 downwardly about the group of forms then axially aligned therewith.

The first portion of the downward movement of the chamber 10 releases the limit switch 117 and resets it for the next upward movement of said chamber.

The downward movement of the chamber 10 continues until the lower edge thereof closely approaches the base 1. Just prior to the sealing of the lower edge of the chamber 10 against the base 1, said chamber operates a normally open switch 108, to close said switch momentarily to effect energization of a coil 211 of a relay 210, through which the winding 95 of the steam valve 85 is energized to operate said valve from its exhaust position to its steam inlet position, for starting and continuing admission of steam to the interior of the chamber 10.

Between the momentary operation of the switch 108 and the actual admission of steam to the interior of the chamber 10, the motor 12 completes the movement of the chamber 10 into sealing contact with the underlying base 1, and continues to operate to jam the chamber 10 tightly down on the base 1 to produce a fluid-tight seal therebetween, and until the motor actually stalls by overload created by said jamming of the chamber 10 down on the base 1. Such overloading of the motor 12 causes opening of overload relays 107 in the motor circuit, whereby operation of the motor 12 is stopped. It will be understood that the relays 107 are not energized by normal current or load but are energized whenever the magnitude of the current drawn by the motor 12 reaches a predetermined abnormal value.

This completes one cycle of operation of the machine and sets the machine up for the beginning of the next cycle, with the form a of the exposed group located at the right-hand operator's station A1 in position to be stripped and reloaded by the operator, prior to the operator closing the manual switch 109 at that station to start the mechanical sequence of operations above noted.

The circuit disclosed in Fig. 5 is of the type generally referred to as a "three-phase" alternating current circuit. However, it will be understood that a "two-phase" A. C. or a "direct

current" circuit may be employed without departing from the spirit of the invention.

The "three-phase" A. C. circuit illustrated includes main power lines *x*, *y* and *z* respectively, which are connected to the motor 12 in the usual ordinary well known manner.

A gang switch 212 is included in the power lines *x*, *y* and *z* for completely disconnecting the electrical apparatus from the source of electrical energy when desired.

A branch power circuit, including power lines *x1*, *y1*, *z1* is shunted around a relay H having contacts 213, 214 and 215 for opening and closing the lines *x*, *y* and *z* respectively.

The branch or shunt circuit embodying the power lines *x'*, *y'* and *z'*, includes a relay L having contacts 213*a*, 214*a* and 215*a* for opening and closing the power lines *x'*, *y'*, *z'* respectively. It will be noted that a reversal in the direction of operation of motor 12 is effected through lines *x'*, *y'* and *z'* by reversal of two of the phases of the three phase supply line, as well understood by those skilled in the art.

The relays H and L govern the hoisting and the lowering of the chamber 10 and are so correlated as to form an electrical interlock, whereby the hoisting circuit is rendered and maintained ineffective during lowering of the chamber 10, and whereby the lowering circuit is rendered ineffective during the hoisting of said chamber.

After the operator moves one of the trucks 50 into vertical alignment with the raised chamber 10, and thereby operates one of the switches 103 into circuit closing position, operation of the manual switch 102 into circuit closing position across the terminals 102*a* and 102*b* causes current to flow from power line *y* through a conductor 216, one of the centering switches 103, and a conductor 216*a* to one side of a coil 217 of the relay L; thence, from the second side of the coil 217 through a conductor 216*b*, normally closed contacts 218, a conductor 216*c*, the normally closed contacts of overload relays 107, 107, and conductor 216*d* to the terminal 102*a* of the switch 102. The movable element 102*c* of the switch 102 is connected to conductor 216*c* by a conductor 216*n*, to by-pass the overload relays 107 and thus maintain the circuit in the event that one or both of the relays 107 should be energized by the starting current drawn by the motor 12.

The terminal 102*b* of the switch 102, is connected to the line *z* by a conductor 219, normally closed manual interrupting switch 115*d*, conductor 219*a*, switch 115*a* and its contacts 115*b*, 115*b* and conductor 219*b*.

Closing of the switch 102, therefore, energizes the coil 217 of the lowering relay L which in turn actuates the contactors 213*a*, 214*a*, and 215*a*, closing the lines *x'*, *y'*, *z'*, to the motor 12, which starts said motor to lower the chamber 10.

Relay L locks itself in through contacts 220 which are shunted across switch 102, thus maintaining the lowering control circuit after the switch 102 is released. Relay L also opens its interlock contacts 225 to prevent closure of the hoisting control circuit.

As the chamber 10 approaches its maximum low position, it engages and momentarily closes the switch 108, one side of which is connected by a conductor 219*d* to the conductor 219. The second side of the switch 108 is connected by a conductor 216*f*, through the coil 211 of relay 210 and the normally closed switches 110, 110 to the conductor 216.

Closing of the switch 108 energizes the coil 211 and operates the relay 210 to close the normally open contacts 221 and 222, and to open the normally closed contacts 223.

The contacts 221 serve to lock the relay in after the switch 108 is opened.

Closing of the contacts 222 causes current to flow from the conductor 219 through 219*d*, 219*e*, contacts 222, conductors 216*g* and the coil 95 of the steam valve 85 and conductor 216, thereby operating said valve into and holding it in position to admit live steam to the chamber 10.

The motor 12 continues to operate to form the seal between the lower edge of the chamber 10 and the base 1, which eventually places an overload on the motor. This overload causes a heavy surge of current in the coil 224 of one or the other of the overload relays 107, whereupon said relay opens the circuit through the coil 217 of the relay L, thus opening the contacts 213*a*, 214*a* and 215*a* to open the power lines *x'*, *y'* and *z'* to the motor 12.

When the 16th form of the exposed group arrives at the position to be stripped and reloaded, by intermittent rotation of the turntable 35 carrying the exposed group of forms one of the switches 110 is opened and causes deenergization of the coil 211 of the relay 210, whereupon the contacts 211 and 222 are reopened and the contacts 223 are closed.

Opening of the contacts 222 deenergizes the coil 95 of the steam valve 85, throwing the interior of the chamber 10 open to exhaust at the same time as the flow of live steam to the interior of the chamber 10 is stopped.

Closing of the contacts 223 permits current to flow from the conductor 216 through 216*h*, contacts 223, conductor 216*i*, switch 228 of the time relay 200, heating coil 229 of said relay, and conductor 219*f* to conductor 219.

The heating coil 229 heats up a thermo-sensitive element 230 of a time switch 231, one side 231*a* of which is connected to the conductor 216*i* while the other side 231*b* is carried by the thermo-sensitive element 230, the latter being connected through the conductor 219*g* to the coil of a solenoid 232 which is also connected to the conductor 219*f*.

About this time, the 20th form of the exposed group reaches the stripping position and in doing so the turntable which effects it operates one of the switches 115 tending to close a circuit from the conductor 219*a*, through 219*j*, switch 115, conductor 216*j*, coil 226 of relay H, conductor 216*k*, contacts 225, conductor 216*l*, limit switch 117 and conductor 216*m* to the terminal 231*b* of the switch 231. However, the circuit is open at contacts 231*b* and 231*a* and is prevented from closing until the said contacts close.

In the meantime, the thermo-sensitive element 230 is approaching the terminal 231*a*. As soon as it brings contact 231*b* into contact with the terminal 231*a*, the circuit for relay H is completed through contacts 223 and conductors 216*h* and 216. At the same time the element 230 closes the circuit through the coil 232, which opens the heater switch 228 and deenergizes the heating coil 229.

Closing of the contacts 213, 214, and 215 lets current flow through lines *x*, *y* and *z* to motor 12 which immediately starts to raise the chamber 10.

Relay H locks itself in through contacts 227 which are shunted about switches 115. The interlock contacts 218 are opened, thus preventing closure of the lowering control circuit.

When the chamber 10 reaches its maximum

high position it opens the limit switch 117 and opens the circuit to the relay H, whereby the contacts 213, 214, 215, 227 and 218 return to normal, stopping the motor 12 and setting up the circuit to the lowering relay L for the start of a new cycle of operations of the machine.

It will be seen that the cooling characteristic of the terminal time delay relay 200 must be such that the contacts 231*a*, 231*b* do not open until the hoisting operation is completed, otherwise the circuit of the hoisting relay H would be opened before the completion of the hoisting operation.

The turntable 35 of the exposed truck 50 and series 25 of forms 24, 24 being stripped and loaded by this time has reached the stage where the last or 24th form of the series is in stripping position. At this point one of the pins 118 on the turntable operates one of the switches 120 to open the circuit to the turntable motor 66, thereby stopping the turntable.

The operator then shifts the one truck from beneath the raised chamber 10 and pushes the newly loaded truck into alignment with the chamber, thereby closing one of the centering switches 103 and setting up the circuit to be closed by operating the manual switch 102, to lower the chamber 10.

The steam valve circuit may be manually closed by actuation of the switch 108*a*; and opened by actuation of manual switch 110*a*.

The chamber lowering circuit may be closed by actuation of the manual switch 102; and lowering of the chamber halted by actuation of the manual switch 115*d*.

The chamber raising circuit may be closed by actuation of the manual switch 115*a*; and raising of the chamber halted by actuation of the manual switch 115*d*.

The circuit for the turntable motor 66 may be rendered inactive at any time by actuation of a manual switch 235.

From the above it will be clear that the circuit involved in the present instance includes four essential portions namely:

(1) A chamber lowering portion;
(2) A chamber hoisting portion;
(3) A steam inlet and exhaust portion; and
(4) A turntable actuation portion.

It will also be clear that portions 1 and 2 supra, are so related and of such interlocking character that conflicting currents cannot be passed to the chamber operating motor 12 simultaneously.

It will also be clear that the inlet of steam to the chamber 10 will be controlled by the chamber itself being in correct position to receive the steam; and that the raising of the chamber will be controlled by the exhaust of the steam from the chamber, thus avoiding injury to the operator or others in the vicinity of the machine.

It will also be clear that the exhaust of the steam and the raising of the chamber are primarily controlled by the operation of the turntable, while the operator is still stripping and reloading the exposed forms, thus effecting an overlapping of the time periods necessary for the individual operations and consequently reducing the time for a complete cycle of the machine to a minimum.

It will also be clear that the various portions of the circuit may be rendered active or inactive, as the case may require, by manual controls, if and when off-time operation or cessation of activity therein becomes necessary, and that the circuit as a whole, under such circumstances, will react to protect the machine and operator, etc.

In some instances it may be advisable to maintain the enclosing chamber in a fixed position, vertically, horizontally, or at an angle, with a group of acticle supporting forms mounted directly on a base arranged to move with respect to the chamber from a position exposing the forms for stripping and loading to a position enclosing the forms within the chamber for treatment, and vice versa. In such cases the steam inlet and exhaust may be connected to the chamber instead of the base and the base may be employed to operate the steam valve control as it moves into sealing relation to the open end of the chamber. Such modifications and others within the scope of the invention will readily be conceivable by one skilled in the art as a result of the foregoing disclosure.

I claim:

1. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, automatic timing means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, and means for interrupting said activity in said second portion of the circuit when said forms are fully exposed.

2. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, automatic timing means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, and means included in each of said circuit portions and operable by the motor influencing activity initiated therein to prevent such motor influencing activities in both of said circuit portions simultaneously.

3. In a machne of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, automatic timing means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms,

means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, and means operable by said one member when moving into form-enclosing position for initiating activity in a third portion of said circuit for admitting fluid to the interior of said form-enclosing member prior to interruption of activities in the first portion of the circuit.

4. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, automatic timing means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, means operable by said one member when moving into form-enclosing position for initiating activity in a third portion of said circuit for admitting fluid to the interior of said form-enclosing member prior to interruption of activities in the first portion of the circuit, and means for initiating reversal of the activities in said third portion of the circuit to exhaust said fluid from said form-enclosing member prior to initiating said activities in said second portion of said circuit.

5. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, means for initiating activity in a third portion of said circuit for admitting fluid to the interior of said form-enclosing member prior to interruption of activities in the first portion of the circuit, means for initiating reversal of the activities in said third portion of the circuit to exhaust said fluid from said form-enclosing member prior to initiating said activities in said second portion of said circuit, and means included in said third portion of said circuit for delaying the effecting of said activities in said second portion of the circuit and inaugurated by said initiation of said reversal of activities in the third portion of the circuit.

6. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, means for initiating activity in a third portion of said circuit for admitting fluid to the interior of said form-enclosing member prior to interruption of activities in the first portion of the circuit, means for initiating reversal of the activities in said third portion of the circuit to exhaust said fluid from said form-enclosing member prior to initiating said activities in said second portion of said circuit, means included in said third portion of said circuit for delaying the effecting of said activities in said second portion of the circuit and inaugurated by said initiation of said reversal of activities in the third portion of the circuit, and a fourth portion of said circuit including a timing device for operating the means for initiating said reverse activities in said third portion of said circuit, and said activity initiating means for said second portion of said circuit in predetermined time relation to each other.

7. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, means for initiating activity in a third portion of said circuit for admitting fluid to the interior of said form-enclosing member prior to interruption of activities in the first portion of the circuit, means for initiating reversal of the activities in said third portion of the circuit to exhaust said fluid from said form-enclosing member prior to initiating said activities in said second portion of said circuit, means included in said third portion of said circuit for delaying the effecting of said activities in said second portion of the circuit and inaugurated by said initiation of said reversal of activities in the third portion of the circuit, a fourth portion of said circuit including a timing device for operating the means for initiating said reverse activities in said third portion of said circuit and said activity initiating means for said second portion of said circuit in predetermined time relation to each other, manually operable means for initiating activity in said fourth portion of said circuit to start operation of said timing device, and means operable by said timing device for stopping the timing device activities in said fourth portion of the circuit subsequent to said timing device initiating activities in said second portion of said circuit.

8. In a machine of the class described, a form-supporting member, a form-enclosing member,

reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, means included in each of said circuit portions and operable by the motor influencing activity initiated therein to prevent such motor influencing activities in both of said circuit portions simultaneously, means for initiating activity in a third portion of said circuit for admitting fluid to the interior of said form-enclosing member prior to interruption of activities in the first portion of the circuit, means for initiating reversal of the activities in said third portion of the circuit to exhaust said fluid from said form-enclosing member prior to initiating said activities in said second portion of said circuit, means included in said third portion of said circuit for delaying the effecting of said activities in said second portion of the circuit and inaugurated by said initiation of said reversal of activities in the third portion of the circuit, a fourth portion of said circuit including a timing device for operating the means for initiating said reverse activities in said third portion of said circuit and said activity initiating means for said second portion of said circuit in predetermined time relation to each other, manually operable means for initiating activity in said fourth portion of said circuit to start operation of said timing device, and means operable by said timing device for stopping the timing device activities in said fourth portion of the circuit subsequent to said timing device initiating activities in said second portion of said circuit.

9. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means included in said circuit for preventing or stopping said activities as a result of misalignment between said form-supporting member and said enclosing member, means for interrupting said activity when said forms are fully enclosed, means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms, and means for interrupting said activity in said second portion of the circuit when said forms are fully exposed.

10. In a machine of the class described, a form-supporting member, a form-enclosing member, motor driven means for moving one of said members into form-enclosing relation to and into fluid-sealing contact with the other of said members, and a circuit in which said motor is included comprising feed lines for said motor to afford continuation of operation of the motor until said fluid-sealing contact between said members is fully effected thereby, and an automatic circuit breaker in said circuit for opening said feed lines operable by overloading of said motor resulting from jamming and stalling of the motor in effecting said fluid-sealing contact between said members.

11. In a machine of the class described, a form-supporting member, a form-enclosing member, a supplemental carrier on said supporting member for one group of forms, a second supplemental carrier on said supporting member for a second group of forms, said carriers and the groups of forms thereon being selectively enclosable by said form enclosing member, one of said carriers and its forms being exposed during enclosure of the other carrier and its group of forms, means for effecting relative movements between said supporting and enclosing members to enclose one of said carriers and its group of forms, means for admitting and exhausting fluid to and from said form-enclosing member while enclosing one carrier and its forms, means rotatably supporting the exposed carrier on said form-supporting member, means for rotating said exposed carrier, a circuit including a motor for operating said enclosing member, a motor for operating said exposed carrier, and means on said carrier for controlling said circuit to initiate activities in said circuit for controlling predetermined actuations of said motors and said fluid admitting and exhausting means in predetermined order.

12. In a machine of the class described, a form-supporting member, a form-enclosing member, a supplemental carrier on said supporting member for one group of forms, a second supplemental carrier on said supporting member for a second group of forms, said carriers and the groups of forms thereon being selectively enclosable by said form-enclosing member, one of said carriers and its forms being exposed during enclosure of the other carrier and its group of forms, means for effecting relative movement between said supporting and enclosing members to enclose one of said carriers and its group of forms, means for admitting and exhausting fluid to and from said form-enclosing member while enclosing one carrier and its forms, means rotatably supporting the exposed carrier on said form-supporting member, means for rotating said exposed carrier, a circuit including a motor for operating said enclosing member, a motor for operating said exposed carrier, means on said carrier for controlling said circuit to initiate activities in said circuit for controlling predetermined actuations of said motors and said fluid admitting and exhausting means in predetermined order, and manually operable means included in said circuit for initiating operation of said motors to begin form-enclosing movement of said form-enclosing member and rotation of said exposed carrier respectively.

13. In a machine of the class described, a form-supporting member, a form-enclosing member, a supplemental carrier on said supporting member for one group of forms, a second supplemental carrier on said supporting member for a second group of forms, said carriers and the groups of forms thereon being selectively enclosable by said form-enclosing member, one of said carriers and its forms being exposed during enclosure of the other carrier and its group of forms, means for effecting relative movement between said supporting and enclosing members to

enclose one of said carriers and its group of forms, means for admitting and exhausting fluid to and from said form-enclosing member while enclosing one carrier and its forms, means rotatably supporting the exposed carrier on said form-supporting member, means for rotating said exposed carrier, a circuit including a motor for operating said enclosing member, a motor for operating said exposed carrier, means on said carrier for controlling said circuit to initiate activities in said circuit for controlling predetermined actuations of said motors and said fluid admitting and exhausting means in predetermined order, manually operable means included in said circuit for initiating operation of said motors to begin form-enclosing movement of said form-enclosing member and rotation of said exposed carrier respectively, and means included in said circuit for stopping operations of the motor for said form-enclosing member at opposite ends respectively of its movements to form-enclosing and form-exposing positions with respect to said form-supporting member.

14. In a machine of the class described, a form-supporting member, a form-enclosing member, a supplemental carrier on said supporting member for one group of forms, a second supplemental carrier on said supporting member for a second group of forms, said carriers and the groups of forms thereon being selectively enclosable by said form-enclosing member, one of said carriers and its forms being exposed during enclosure of the other carrier and its group of forms, means for effecting relative movement between said supporting and enclosing members to enclose one of said carriers and its group of forms, means for admitting and exhausting fluid to and from said form-enclosing member while enclosing one carrier and its forms, means rotatably supporting the exposed carrier on said form-supporting member, means for rotating said exposed carrier, a circuit including a motor for operating said enclosing member, a motor for operating said exposed carrier, means on said carrier for controlling said circuit to initiate activities in said circuit for controlling predetermined actuations of said motors and said fluid admitting and exhausting means in predetermined order, manually operable means included in said circuit for initiating operation of said motors to begin form-enclosing movement of said form-enclosing member and rotation of said exposed carrier respectively, and means included in said circuit for rendering the manual starting means for the form-enclosing member motor ineffective under misalignment of or absence from alignment with said enclosing member of the form carrier selected to be enclosed thereby.

15. In a machine of the class described, a form-supporting member, a form-enclosing member, a supplemental carrier on said supporting member for one group of forms, a second supplemental carrier on said supporting member for a second group of forms, said carriers and the groups of forms thereon being selectively enclosable by said form enclosing member, one of said carriers and its forms being exposed during enclosure of the other carrier and its group of forms, means for effecting relative movement between said supporting and enclosing members to enclose one of said carriers and its group of forms, means for admitting and exhausting fluid to and from said form-enclosing member while enclosing one carrier and its forms, means rotatably supporting the exposed carrier on said form-supporting member, means for rotating said exposed carrier, a circuit including a motor for operating said enclosing member, a motor for operating said exposed carrier, means on said carrier for controlling said circuit to initiate activities in said circuit for controlling predetermined actuations of said motors and said fluid admitting and exhausting means in predetermined order, manually operable means included in said circuit for initiating operation of said motors to begin form-enclosing movement of said form-enclosing member and rotation of said exposed carrier respectively, means included in said circuit for rendering the manual starting means for the form-enclosing member motor ineffective under misalignment of or absence from alignment with said enclosing member of the form carrier selected to be enclosed thereby, and manually operable means in said circuit for interrupting initiated activities in said circuit.

16. In a machine of the class described, a form-supporting member, a form-enclosing member, reversible power means including a motor for moving one of said members toward and away from the other of said members to enclose and expose the forms on said supporting member, means for admitting and exhausting fluid to and from the interior of said form-enclosing member when in form-enclosing relation to said form-supporting member, a control circuit including manually operable means for initiating activity in one portion of said circuit to cause said motor to move the one member to effect enclosing of said forms, means for interrupting said activity when said forms are fully enclosed, automatic timing means for initiating activity in a second portion of said circuit to cause said motor to move said one member in an opposite direction to expose said forms and to exhaust fluid from said form-enclosing member, means for interrupting said activity in said second portion of the circuit when said forms are fully exposed, and means included in said circuit independent of said automatic timing means for delaying operation of the motor for the form-enclosing member to move said member into form-exposing position as initiated by said automatic timing means for that purpose subsequent to prior initiation of activities for exhausting fluid from said form-enclosing member by said automatic timing means for that purpose.

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