May 17, 1949. H. RICHTER 2,470,266

EJECTOR MECHANISM FOR RETORTS

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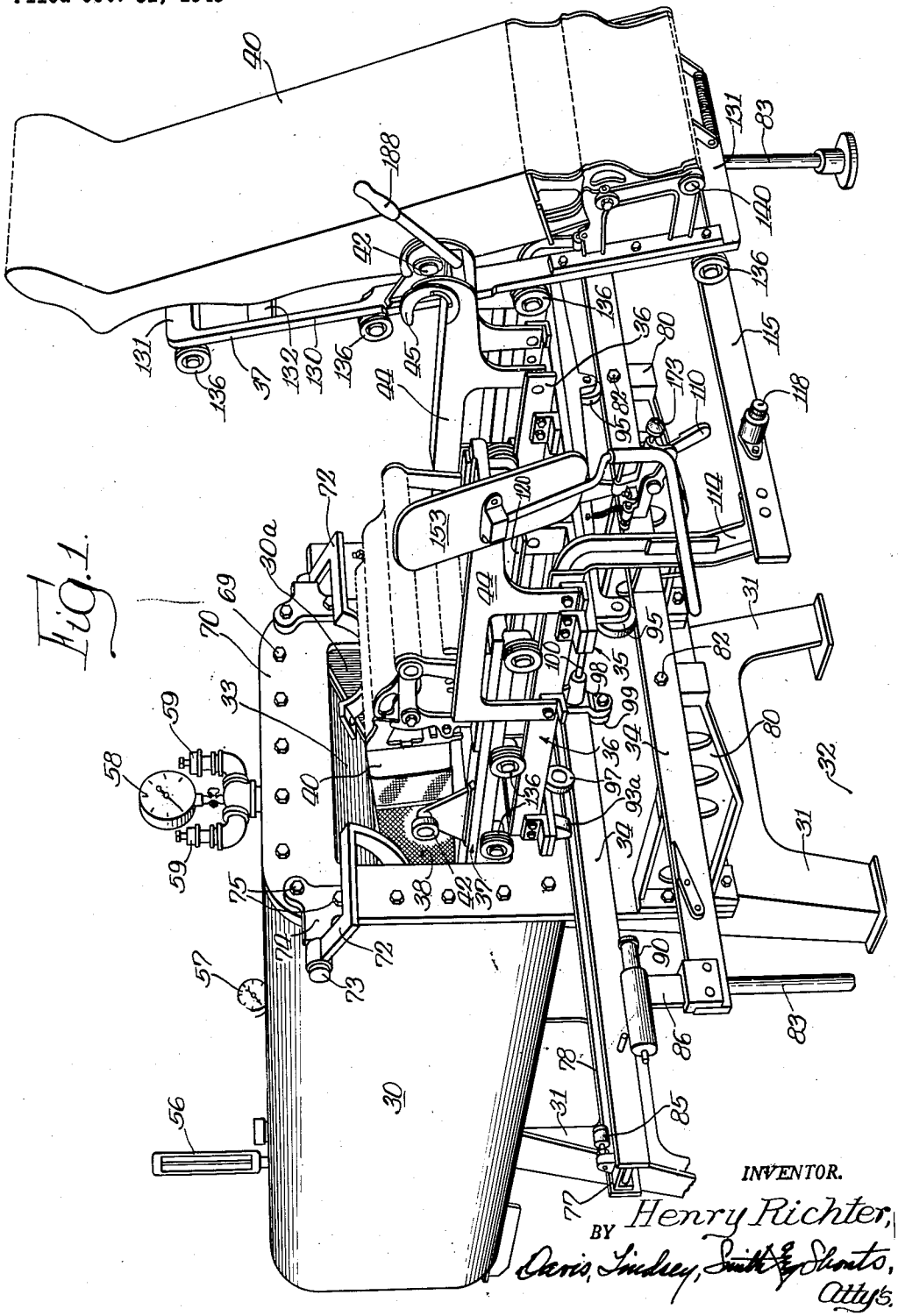


Fig. 1.

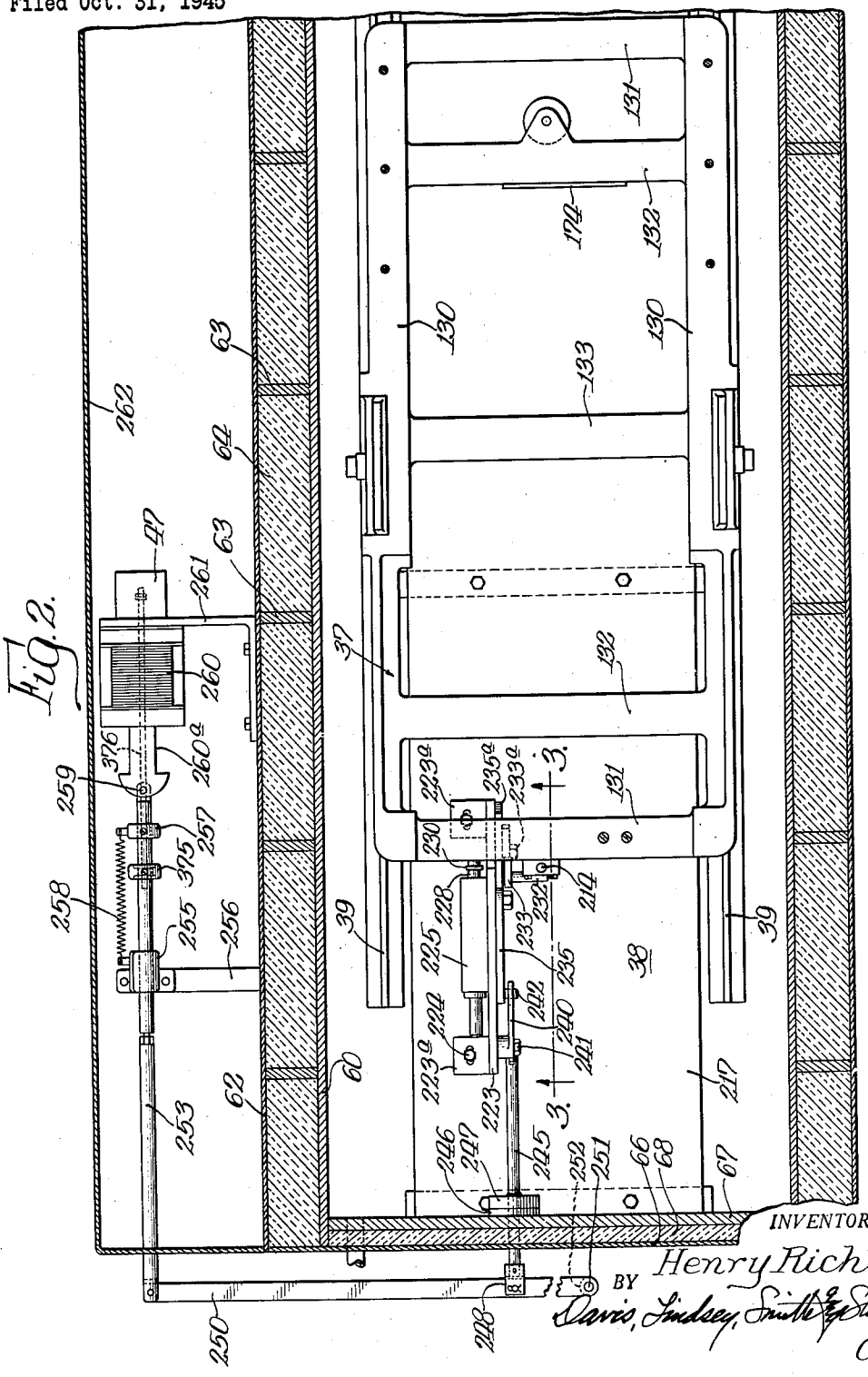
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EJECTOR MECHANISM FOR RETORTS

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Fig. 2.



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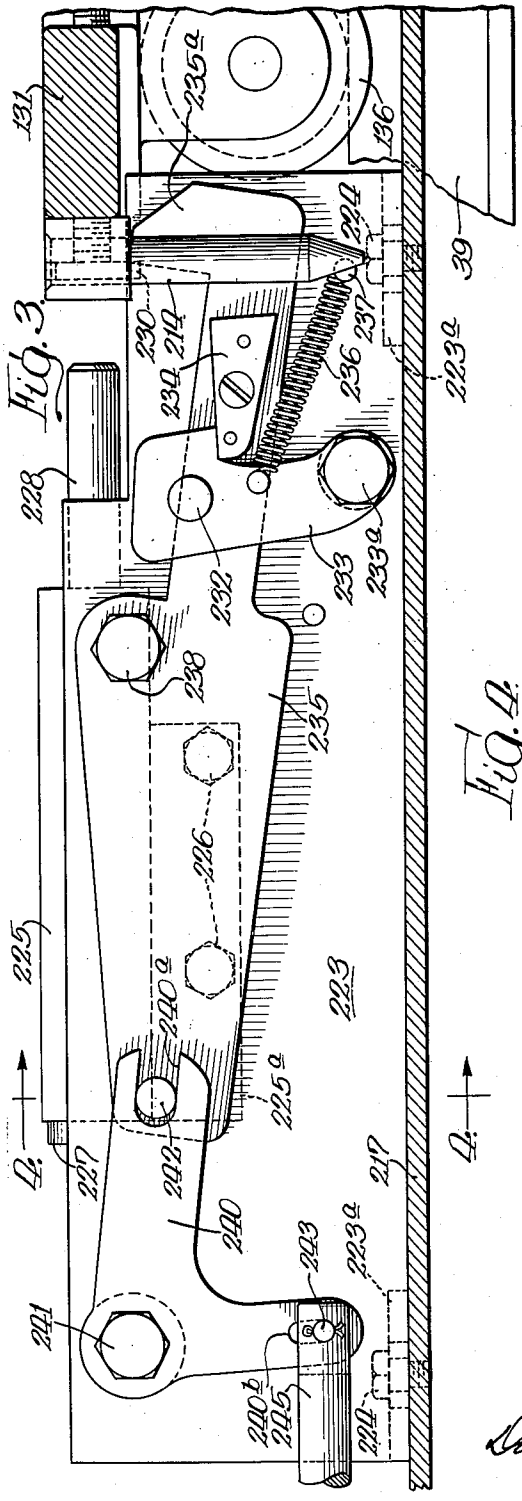


Fig. 3.

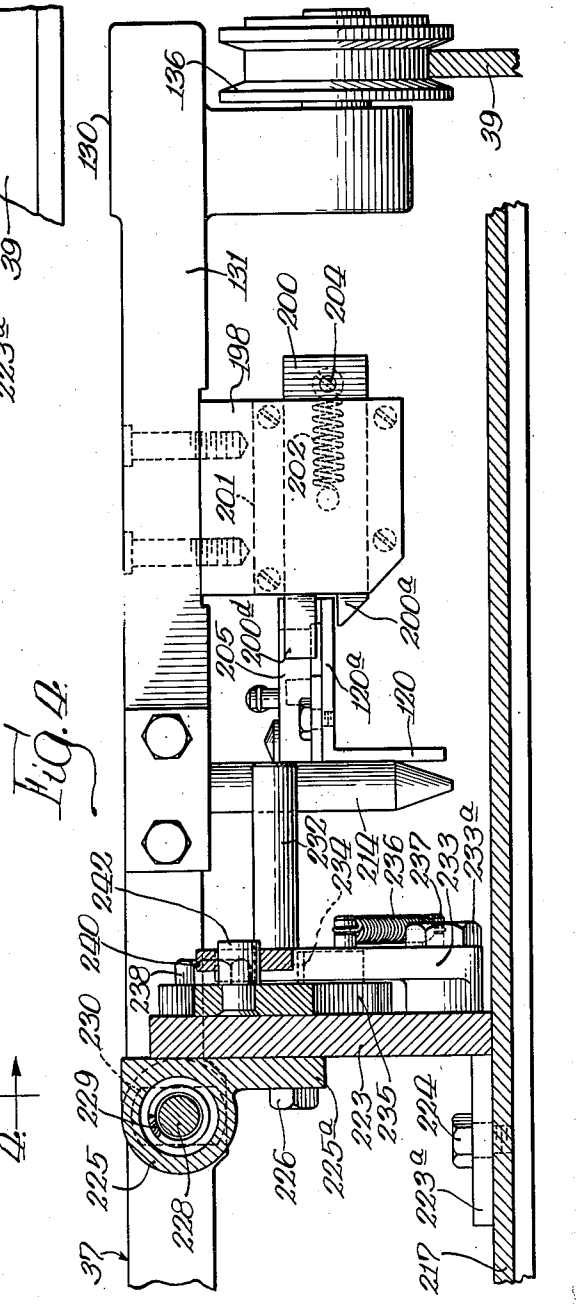


Fig. 4.

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EJECTOR MECHANISM FOR RETORTS

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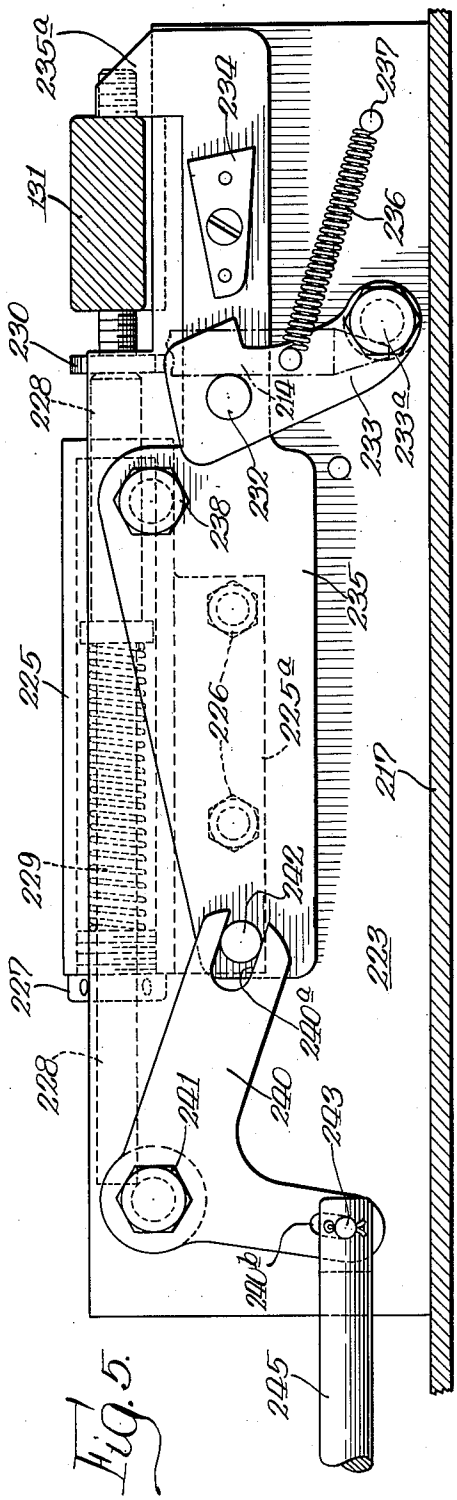


Fig. 5.

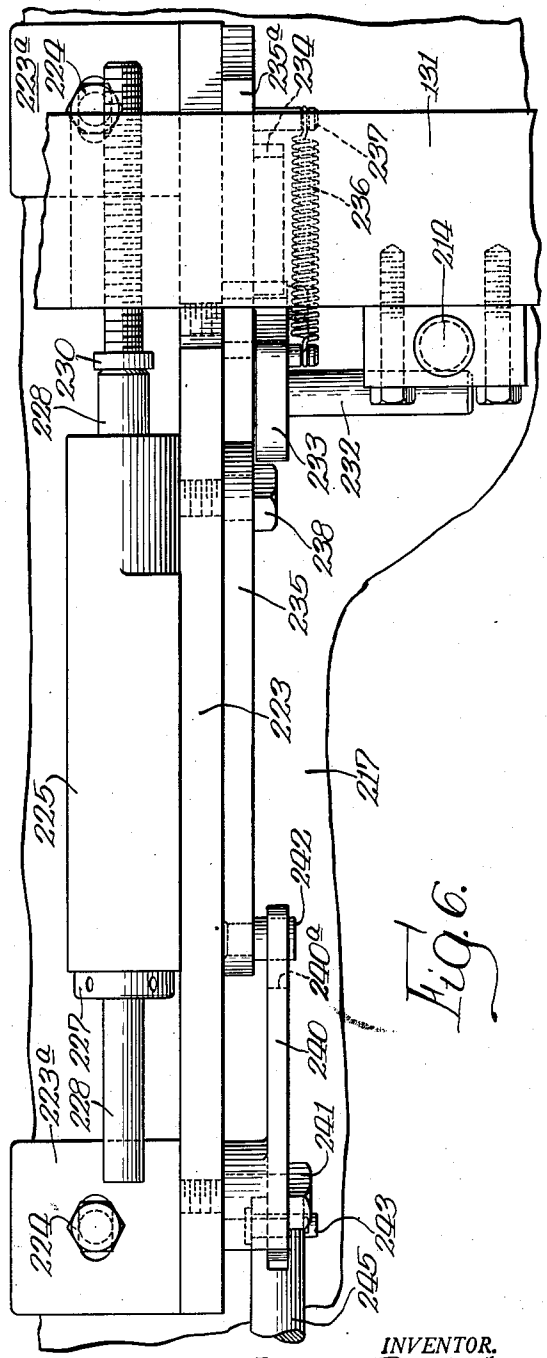


Fig. 6.

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EJECTOR MECHANISM FOR RETORTS

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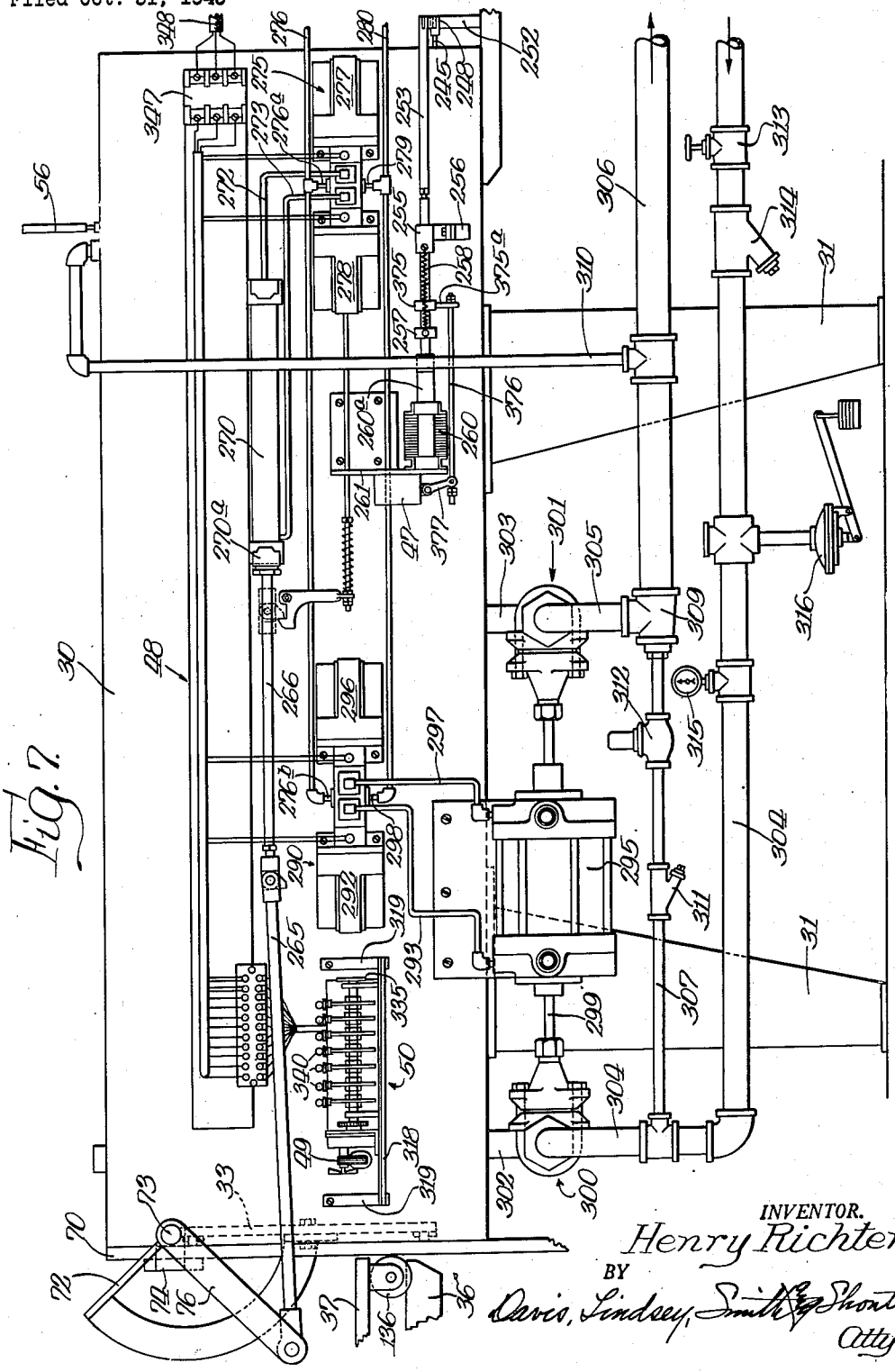


Fig. 7.

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EJECTOR MECHANISM FOR RETORTS

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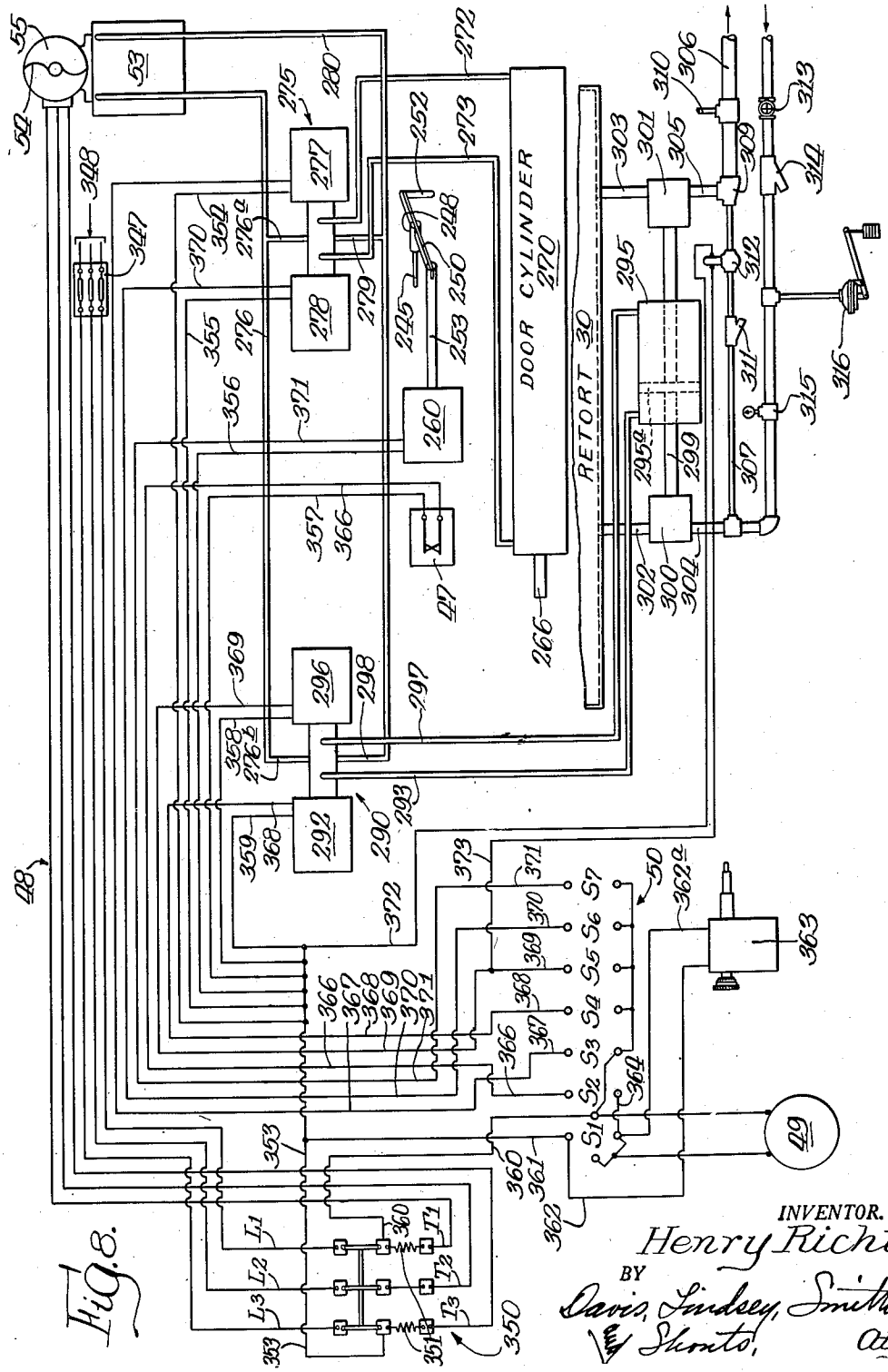


Fig. 8.

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EJECTOR MECHANISM FOR RETORTS

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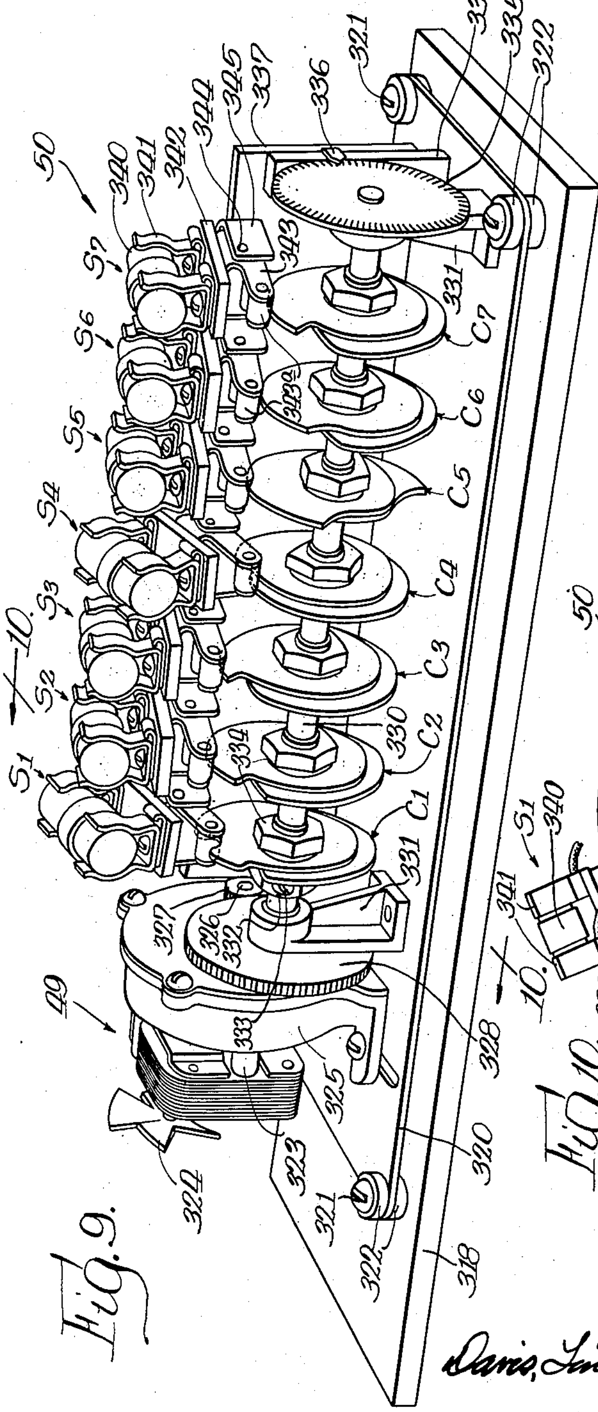


Fig. 9.

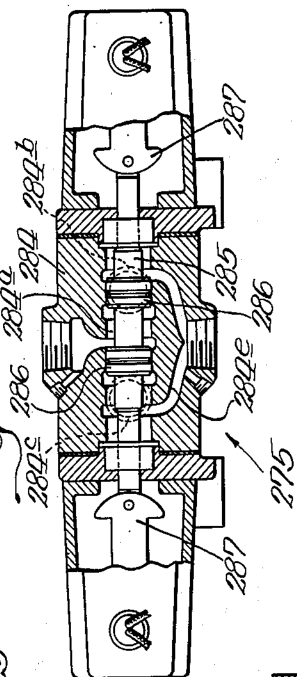


Fig. 11.

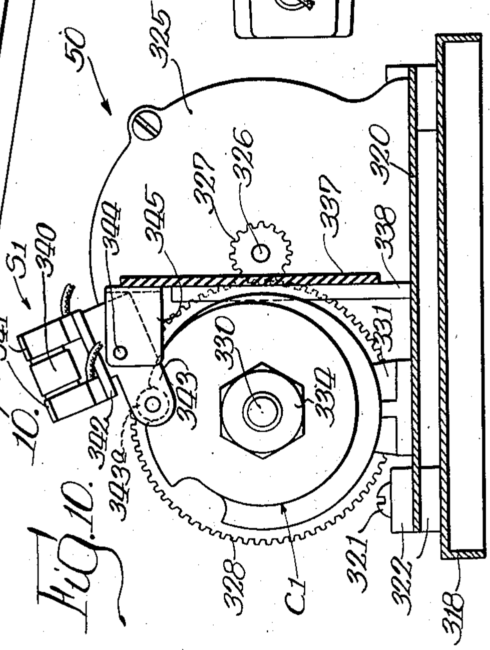


Fig. 10.

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UNITED STATES PATENT OFFICE

2,470,266

EJECTOR MECHANISM FOR RETORTS

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Application October 31, 1945, Serial No. 625,781

24 Claims. (Cl. 223—76)

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This invention relates to improvements in ejecting apparatus for retorts such as those employed in setting and shaping textile fabrics such as stockings and other fabrics formed by knitting linear condensation polyamide fibres of the kind known to the trade as nylon. The present invention is an improvement upon the ejecting apparatus described and claimed in my copending application Serial No. 581,210, filed March 6, 1945, and it may be employed with the retort and setting apparatus disclosed in United States Letters Patent No. 2,351,063, dated June 13, 1944.

As set forth in said application, it is desirable to treat shaped textile articles, such as hosiery formed from nylon yarn, by a setting operation on forms of the desired shapes in the presence of saturated steam for the purpose of reducing the resiliency of the knitted loops and removing the natural wrinkles of the loose fabric, thereby causing the articles to retain the shapes of the forms during subsequent use and while being laundered. This treatment is carried on at a high temperature, preferably between 240° Fahrenheit and 260° Fahrenheit, for a short period and at a pressure above that of the atmosphere, thus requiring the use of a closed chamber for containing the articles.

The present invention is preferably employed with or as a part of the type of setting apparatus described and claimed in said application and in said Letters Patent wherein the forms carrying the articles are mounted in groups on carriages which are movable in succession into the chamber or retort, thus permitting the heat treatment of articles on one group of forms during the time that articles are being changed on other forms outside of the chamber. In said application there is disclosed a form of apparatus in which the operations of moving the forms into the chamber, closing the chamber, introducing steam into the chamber, shutting off the steam, exhausting the steam from the chamber, opening the chamber, removing the forms from the chamber, and determining the sequence and time duration of these operations, are effected and controlled automatically by power actuated means. The present invention is directed primarily to the means for removing or ejecting the forms from the chamber or retort at the conclusion of the heat treatment and to the new combination of apparatus which includes this ejecting means.

The principal object of the invention is to provide a heat treating chamber in combination with means for supporting the article carrying forms for movement into and out of the chamber and

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means including parts located outside of the chamber and only mechanically operated parts located in the chamber for ejecting the forms from the chamber, whereby the ejecting mechanism is not subject to deterioration by the action of the heat in the chamber and is capable of operating efficiently after long periods of use. A further object is to provide ejecting mechanism of the type referred to in which mechanical energy is stored in the chamber when the forms enter the chamber and is released by means operated from the outside of the chamber at the conclusion of the heating operation for effecting the movement of the forms from the chamber. Still another object of the invention is to provide a heat treating chamber in combination with a form supporting carriage movable into and out of the chamber, mechanical means operated when the carriage moves into the chamber for storing energy for effecting the subsequent ejection of the carriage, means for controlling the admission of steam to the chamber and its exhaust therefrom, means for opening and closing the chamber, and automatic means located outside of the chamber for causing the foregoing operations including the release of the stored mechanical energy to take place in the proper sequence and timed relation during a cycle of operations of the apparatus. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings, in which one embodiment is illustrated. In the drawings,

Figure 1 shows a perspective view of the improved apparatus of the present invention with the door of the retort in open position and with one form carriage entering the chamber of the retort while another form carriage, mounted on the same main carriage as the first mentioned carriage, is shown tilted to an upright position to permit the changing of articles on the hosiery forms which are mounted on this form carriage;

Fig. 2 shows a horizontal section taken through the rear portion of the retort shown in Fig. 1, illustrating the means for ejecting a form carriage from its position within the chamber of the retort;

Fig. 3 shows an enlarged vertical section taken on the line 3—3 of Fig. 2, illustrating the relative positions of the parts when the carriage is about to move into engagement with the spring actuated ejecting plunger while the latch hook of the ejecting mechanism is depressed;

Fig. 4 shows a transverse section taken on the line 4—4 of Fig. 3;

Fig. 5 is a vertical section similar to that of Fig. 3, illustrating the relative positions of the parts of the carriage ejecting mechanism after the plunger of the ejecting mechanism has been moved rearwardly by the inward movement of the carriage and after the latch member has swung upwardly to hold the carriage in its inner position;

Fig. 6 shows a top plan view of the apparatus illustrated in Fig. 5;

Fig. 7 shows a side elevation of the right-hand side of the setting apparatus illustrated in Fig. 1, with the auxiliary housing removed to show the controlling and actuating mechanism by which the operations of opening the door of the retort, turning on the steam, shutting off the steam, opening the door, and ejecting the form carriage from the retort, are controlled;

Fig. 8 is a somewhat diagrammatic view showing the electric circuit connections of the various pieces of apparatus employed for perfecting and controlling the ejection of the carriage, the opening and closing of the door, and the admission of steam to and the exhaust of steam from the retort;

Fig. 9 is a perspective view of the motor driven circuit controller which is embodied in the system shown in Figs. 7 and 8;

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 9; and

Fig. 11 shows a vertical section through one of the solenoid operated valves shown in Figs. 7 and 8.

Before describing the details of the apparatus illustrated in the accompanying drawings, reference will be made to the principal features thereof and to their general mode of operation. As illustrated in Figs. 1 and 7, the apparatus comprises a horizontal retort 30 carried by legs 31 adapted to rest upon a floor or other support 32, and provided at one end with a rectangular opening 30a which is normally closed by a hinged door 33. In front of the retort and extending transversely to the longitudinal axis thereof are a pair of parallel main tracks 34 upon which a main carriage 35 is mounted to travel. The main carriage has mounted thereon two pairs of form carriage track members 36 which extend parallel to each other and to the longitudinal axis of the retort. These track members 36 support two form carriages 37 which are identical in construction and the upper edges of these track members are located substantially flush with but slightly above the lower edge of the door opening 30a so that, when a pair of track members 36 are properly positioned with respect to that opening by the transverse movement of the main carriage 35, the form carriage on that pair of track members may be moved therefrom into the chamber 38 of the retort where it is then supported on the retort tracks 39, as shown in Fig. 2.

Each form carriage 37 has mounted thereon a group of setting forms 40 which, in this instance, are shown as being of the proper shape for the setting of ladies' nylon hosiery. These forms are so mounted that they normally extend substantially parallel to the body of the carriage by which they are moved, but they are capable of limited pivotal movement away from the carriage for the purpose of permitting the ready removal and replacement of articles of hosiery or the like located thereon. When a form carriage 37 has been withdrawn from the retort 30, a pair of

roller bearing trunnions 42 mounted on opposite sides thereof are adapted to travel on auxiliary horizontal track members 44 which are mounted on the main carriage 35, one of the auxiliary track members 44 being mounted adjacent to but at a substantially higher level than each of the track members 36. When a form carriage 37 reaches the limit of its outward movement on the track members 36, the trunnions 42 mounted on that carriage engage normally open hook-shaped bearing members 45 which are located at the outer ends of the auxiliary track members 44 and the form carriage then tilts upwardly to the position shown at the right of Fig. 1, so that the forms are then readily accessible to the operator who may tilt the forms forwardly on their supports for the purpose of removing previously treated hosiery therefrom and then placing upon these forms other hosiery to be treated.

While a form carriage 37 is being moved into and out of the retort 30, the main carriage 35 is latched in a position which locates the track members 36 for that form carriage in alignment with the retort tracks 39 and, when that form carriage is moved outwardly and tilted upwardly and forwardly, as above described, the main carriage 35 is automatically released so that it may be shifted laterally on its tracks 34 to locate the other form carriage 37 opposite the retort opening 30a with its track members 36 aligning with the retort tracks 39, whereupon the main carriage is automatically secured in the new position. The form carriage 37 last positioned opposite the opening 30a is then moved into the retort 30 while the form carriage 37 last removed from the retort and occupying the upwardly tilted position shown at the right of Fig. 1, has the treated hosiery on its forms removed by the operator and replaced by other untreated hosiery. In this way, the form carriages 37 are moved laterally into the retort and the forms 40 of each form carriage are worked upon by the operator while the forms carried by the other form carriage are in the retort. When a form carriage carrying untreated hosiery is tilted downwardly from its upwardly inclined position, it is automatically locked in its horizontal position and remains so secured while it is moved into the retort. When that form carriage is again removed from the retort, it is automatically released as it approaches its outer position on its track members 36 so that it can again be tilted upwardly. These features and the details thereof do not in themselves constitute a part of the present invention, except as they are associated with the improved ejecting mechanism, since they are described and claimed either in said Letters Patent or in said copending application.

In the embodiment of the present invention illustrated in the drawings, a form carriage 37 after being tilted downwardly to its horizontal position and located opposite the mouth of the retort, is pushed by the operator into the retort with sufficient momentum to cause it to operate the latch hook and compress the spring of the ejecting mechanism, whereupon the door of the retort is automatically closed, the steam is automatically turned on, and the heat treatment of the articles on the forms continues for a predetermined period at the conclusion of which the steam is exhausted from the retort, the door is opened, and the latch holding the carriage in the retort is released to permit the actuation of the spring pressed plunger which ejects the carriage from the retort with sufficient momentum to

cause it to move to the forward ends of the aligning track members 36 and to tilt upwardly upon the engagement of its trunnions 42 with the hook-shaped bearing members 45. These operations are effected by apparatus connected in an electric circuit 48, shown in Figs. 7 and 8, and when the carriage reaches its inner position in the retort in response to the manual push of the operator, an electric starting switch in this circuit is automatically closed, thereby starting an electric motor 49 which drives the controller 50 by which the several branches of the circuit are closed and opened in proper sequence to effect the desired operations of the apparatus in correct timed relation.

When a form carriage 37 has fully entered the retort, and the controller 50 has been thereby started in operation, hydraulic mechanism is operated to close the door 33 and the controller 50 then operates through the electric circuit 48 to actuate certain hydraulically operated valve mechanism which admits high pressure, high temperature steam to the interior of the retort. The temperature of the steam within the retort is indicated by a thermometer 56 and may preferably be within the range of from 240° Fahrenheit to 260° Fahrenheit. The pressure of the steam in the supply pipes is indicated by a gauge 57 and the steam pressure within the retort is shown by a gauge 58. Relief valves 59 are mounted adjacent the gauge 58 to relieve the pressure in the retort if it rises above a predetermined maximum. The pressure of the oil or other fluid in the hydraulic circuit may be shown by a gauge at the rear of the retort.

After the hosiery or other articles on the forms in the retort have been subjected to the action of the steam for a suitable interval, which may be about three minutes if nylon hosiery is being treated, the controller 50 operates to shut off the steam and connect the interior chamber to an exhaust conduit through which the steam is exhausted. At the end of a brief exhaust period, the controller closes a branch of the circuit 48 which causes the aforesaid hydraulic mechanism to open the door 33 which then remains open until another form carriage is moved into the retort during the next cycle of operations. As soon as the door 33 is opened, the controller 50 causes the operation of the carriage ejecting mechanism to move the carriage outwardly through the door opening 30a. This movement takes place in response to the mechanical energy stored in the ejecting mechanism within the retort and is sufficient to move the carriage to its forward position on the tracks 36 and to cause the upward tilting thereof to the position shown at the right of Fig. 1.

As shown particularly in Figs. 1, 2 and 7, the retort 30 comprises an inner metal shell 60 of rectangular vertical cross section which is surrounded by an outer metal shell 62 of the same cross section, the two shells being spaced apart by the spacing members 63, thus forming a plurality of annular chambers which are occupied by heat insulating material 64. At the bottom of the retort, the lower wall of the outer shell may be formed of sections of greater thickness than those making up the remaining portion of this shell and the legs 31 are secured to these thick bottom plates to support the retort. At the rear end of the retort, the ends of the inner and outer shells 60 and 62, respectively, are closed by an outer end wall 66 and the rear end of the inner shell 60 is closed in a plane located inwardly from the plate 66 by another plate 67, leaving an intervening space which is occupied by heat insulating material 68. At the front end of the retort, the edges of the inner and outer shells 60 and 62, respectively, are welded to an end member (not shown) which in turn is secured by the studs 69 to the end plate 70 which has formed therein the previously described door opening 30a. The end plate 70 extends inwardly beyond the inner surface of the inner shell 60, thus forming an annular flange around the door opening against which the door 33 is adapted to seat when it is closed.

The door 33 is located entirely on the inside of the retort and when it is closed its outer margin seats against the inner surface of the end plate 70, being preferably provided around this margin with a strip of resilient compressible material which engages the plate 70 to form a fluid tight seal. With this arrangement, the steam pressure within the chamber tends to increase the tightness of the seal when the door is closed and the overlapping end plate 70 prevents the door from being blown out by the high pressures within the chamber. The door is carried by hinged brackets 72 of irregular form which are pivotally mounted on bearing members 73 carried by the brackets 74 secured to the end plate 70 by studs 75.

The tracks 34 which support the main carriage 35 are in the form of flat bars located in vertical planes and extending parallel to each other at the front of the retort transversely to the longitudinal axis of the retort. The rear track 34 is secured by intervening brackets 77 to a parallel rail 78 which is bolted or otherwise secured to the end plate 70 of the retort. This end plate extends downwardly below the body of the retort and has secured to the depending portions thereof two forwardly extending heavy brackets 80 which are provided at their forward ends with upturned flanges to which the forward track 34 is secured by bolts 82. In addition, the ends of the forward track 34 are supported by vertical rods or struts 83 which rest upon the floor 32. The brackets 77 at the ends of the rear track 34 carry stop members 85 which are adapted to engage the lugs 93a carried by the main carriage when this carriage is at either end of its path of travel. The forward track 34 is also provided at its ends with stop members 90 carried by brackets 86 and these stop members are resiliently mounted and adapted to be engaged by the ends of the forward portion of the main carriage so that the movement of the main carriage is cushioned as it approaches either limit of its travel on the track members 34.

The forward portion of the main carriage 35 is provided with depending ears in which are rotatably mounted the cylindrical wheels or rollers 95 which travel upon the forward track 34 and the rear portion of the main carriage is provided with other depending ears in which are rotatably mounted the grooved rollers 97 which embrace and travel upon the upper edge of the rear track 34, thus holding the main carriage against displacement transversely to the track members 34. The rear frame member of the main carriage 35 also carries depending brackets 98 in which are rotatably mounted rollers 99 which underlie the rear track 34, thus holding the rear part of the carriage 35 against displacement upwardly away from the rear track member 34.

The brackets 98 also serve as guides for locking bars 100, one of which is shown in Fig. 1,

which are adapted to position the main carriage so that a form carriage 37 thereon may be moved inward into the retort or to allow a carriage within the retort to be moved outwardly onto two of the track members 36 forming a part of the main carriage. When a form carriage 37 has been withdrawn from the retort 30 and is tilted upwardly as heretofore described, it is necessary to release the main carriage from the tracks 34 so that it may be moved longitudinally to permit the other form carriage to be passed into the retort. For this purpose, each of the locking bars 100 is arranged to be operated by means located at the forward side of the carriage 34 and adapted to be actuated by a releasing lever 110 which is positioned to be engaged by the carriage when the carriage is tilted upwardly to the position shown at the right of Fig. 1.

The main carriage 35 also comprises a pair of downwardly and forwardly extending brackets 114 which are secured at their lower ends to a flat bar 115 lying in a vertical plane and carrying resiliently mounted stop members 118 for cushioning the downward movement of the forward portion of a form carriage when this carriage is tilted to its inclined position.

Each of the form carriages 37 comprises a pair of side frame members 130, a pair of end frame members 131, a central transverse frame member 133, and two intermediate transverse frame members 132, as shown in Fig. 2. These frame members are preferably cast as one integral construction, being formed preferably of aluminum or the like which is light in weight and capable of withstanding high steam temperatures in the retort without corrosion, rusting or distortion. As shown in Fig. 1, each side frame member has formed on the underside thereof depending lugs on which are rotatably mounted the grooved rollers 136 which are adapted to travel upon the track members 36 and upon the retort tracks 39. In the embodiment illustrated, four grooved rollers 136 are provided at each side of each form carriage so that this carriage is adequately supported as it travels into and out of the retort.

Each form carriage 37 is adapted to support a plurality of the forms 40 which are arranged parallel to each other and which are adapted to be tilted about their pivotal axes 140 in the manner shown in said prior Letters Patent No. 2,351,063 so that any form may be moved out of alignment with the others for permitting the removal or replacement of an article to be treated in the retort. When the form carriages are tilted upwardly to permit access to the forms 40 mounted thereon, they are latched in the inclined position by latch members 173 which engage hard metal plates 174 carried by the forward transverse frame members 132, as shown in Figs. 1 and 2, thus holding the form carriage in its inclined position while the forms are being worked upon. When the form carriages are moved downwardly to their horizontal positions, they are latched to the main carriage during their travel through the door opening of the retort to prevent the accidental upward tilting thereof. These features do not constitute a part of the present invention and are, therefore, only briefly referred to. A handle 188 is mounted on each form carriage to facilitate the tilting thereof by the operator and a mirror 153 is mounted at one side of the main carriage so that an operator positioned at one side of a group of forms on a form carriage may observe the opposite side of a form being worked upon.

The means for locking a form carriage 37 in its horizontal position while it is being moved into the retort comprises a block 198, shown in Fig. 4, one of which is attached to a cross frame member 131 of each form carriage. Each block 198 has a guideway in which is slidably mounted a locking bolt 200 adapted to project under the horizontal flange 120a of an angle bar 120 mounted on the main carriage 35 and extending parallel to the track members 36. A coil spring 202 normally moves the bolt 200 to its locking position, this movement being limited by the engagement of a pin 204 with the end of a plate 201 which is attached to the block 198. The lower part of the projecting end of the bolt 200 is formed as a tooth 200a having an inclined under face which engages the edge of the flange 120a of the angle bar when the form carriage is lowered to its horizontal position, thus wedging the bolt to its retracted position, from which it is returned by the spring 202 when the carriage reaches its fully lowered position, whereby the tooth 200a underlies the flange of the angle bar. The bolt 200 remains in its locking position while it is in the retort and when the form carriage is again withdrawn from the retort onto the main carriage 35, the tooth 200a again travels under the flange 120a to prevent the upward tilting of the form carriage during the major portion of the forward or outward movement of the form carriage. As the end of this forward movement is approached, the bolt 200 is automatically retracted to release the carriage through the operation of a finger 205 which is pivotally mounted on the upper side of the flange 120a of the angle bar and which has a face adapted to coact with a wedging surface formed on the upper tooth 200d of the locking bolt and which acts at the proper time to retract the bolt 200. The form carriage may then be tilted upwardly and when it is subsequently lowered the bolt 200 again automatically engages and locks with the angle bar 120 and the tooth 200d of the bolt engages the free end of the pivotally mounted finger 205 to swing it in a forward direction, as shown in Fig. 4, against the tension of a spring, thus permitting the bolt 200 to pass by the finger 205 as the form carriage passes toward the retort. In order that the block 198 and its locking bolt may be properly positioned with respect to the adjacent angle bar 120 when the form carriage is lowered, a tapered centering pin 214 is secured to the transverse frame member 131 of each carriage to project downwardly therefrom so that as the form carriage approaches the limit of its downward swinging movement, this pin will pass downwardly in contact with the side of the vertical flange of the angle bar 120, as shown in Fig. 4, thereby locating the form carriage properly in a lateral direction as it reaches its horizontal position.

As a form carriage moves into the retort under the influence of a push imparted thereto by the operator, it travels on the retort tracks 39 and ultimately reaches a position where it is brought to rest by the cushioning and ejecting mechanism which is carried by a flat horizontal plate 217 extending substantially throughout the length of the retort and secured to the bottom wall thereof. This mechanism comprises a vertical plate or bracket 223 which extends longitudinally of the retort and which is provided with longitudinal ears or flanges 223a secured to the plate 217 by studs 224. A cylinder 225 is mounted at one side of and parallel to the upper part of the

plate 223 and has a depending flange 225a which is secured to the side of the plate 223 by studs 226. The cylinder 225 is closed at its inner or rear end by a threaded plug 227 in which is slidably mounted the stem of a piston rod or plunger 228 which is normally moved toward the right, as viewed in Figs. 5 and 6, by a coil spring 229 mounted between its intermediate enlarged portion and the plug 227. As a form carriage 37 reaches the rear limit of its travel into the retort, the projecting end of the resiliently mounted plunger 228 is engaged by the head of a stop screw 230 which is adjustably mounted in a threaded aperture formed in the rear cross frame member 131 of the form carriage. The movement of the form carriage is thus cushioned as it is gradually brought to rest.

As the form carriage reaches this inner position, the previously mentioned centering or guide pin 214 engages a pin 232 projecting laterally from the side of a latch hook 233 and thereby moves this latch hook 233 about its pivot 233a on the plate 223, thus moving the latch hook out of engagement with a block 234 secured to the side of the ejector latch 235. When thus released from the block against the tension of a coil spring 236 which connects it with a pin 237 on the plate 223, the latch hook 233 permits the ejector latch 235 to move about the stud 238, by which it is pivoted on the plate 223, under the influence of a spring connection hereinafter described, so that the hook portion 235a of the ejector latch moves upwardly in front of the rear cross frame member 131 of the carriage, thus holding the form carriage in fixed relation to the cylinder 225 with the plunger 228 in its inner position and with the spring 229 compressed, as shown in Fig. 5. The parts remain in these relative positions until the heat treatment of the articles on the forms has been concluded, whereupon the steam is exhausted, the door 33 opened and the ejector latch 235 is actuated by the mechanism hereinafter described to release the form carriage 37 and permit the spring pressed plunger 228 to eject the form carriage from the retort with sufficient momentum to cause it to tilt upwardly about the trunnions 42 at the end of its forward movement. When the ejector latch 235 is thus actuated to release the carriage, the spring 236 causes the latch hook 233 to move again into engagement with the block 234, thus holding the ejector latch in the position shown in Fig. 3 until a form carriage is again moved into the retort.

The ejector latch 235 is adapted to be actuated by a bell crank lever 240 which is pivoted on the plate 223 by means of a stud 241, shown in Figs. 3, 5 and 6. This bell crank lever has one arm provided with an elongated slot 240a having a sliding engagement with a pin 242 which is fixed on the inner end of the ejector latch 235. The other arm of the bell crank lever 240 is provided with an elongated slot 240b engaged by a pin 243 which is secured in the end of an ejector rod 245 arranged to extend horizontally through the rear end of the retort as shown particularly in Fig. 2. This rod has a close fit with apertures which are formed in the rear end wall of the retort and, for the purpose of forming a fluid tight connection when steam is admitted to the chamber of the retort, a rubber gasket 246 is secured to the inner face of the plate 67 and closely fitted by the rod 245. A steel disk 247 is secured to the rod 245 in such a position that when the form carriage is secured in position within the retort by the ejector latch 235 and steam has been admitted to the retort, the steam pressure acting upon the disk 247 will cause it to seat tightly against the rubber gasket 246 and thus form a fluid tight seal.

On the outside of the rear end of the retort, the ejector rod 245 has a sliding pivotal engagement at 248 with the latch operating lever 250 which is pivoted at 251 on a stationary member 252 carried by the shelf at the rear end of the retort upon which the driving motor and the oil supply tank are mounted. The free end of the lever 250 is pivotally connected to an actuating rod 253 which is slidably mounted in a bearing member 255 carried by a bracket 256 secured to the side of the retort, as shown in Fig. 2. A collar 257 is secured to the rod 253 forwardly of the bearing member 255 and a coil spring 258 extending between two pins secured in this collar and in the bearing member, respectively, serves normally to move the rod 253 toward the rear with the result that it effects through the lever 250 a corresponding rearward movement of the ejector rod 245, thereby actuating the ejector latch 235 to cause it to assume the position shown in Fig. 5 wherein it holds the form carriage in position against the plunger 229.

The rod 253 is pivotally connected at 259 to the magnetizable core 260a of a solenoid 260 which has its winding connected in the electric circuit 48, as hereinafter more fully described. The solenoid 260 is secured to an L-shaped bracket 261 which is attached to the side of the retort and all of these parts are enclosed within the auxiliary housing 262. When the solenoid 260 is energized, the core 260a is moved toward the right as viewed in Fig. 2, thereby causing a forward movement of the ejector rod 245 and the release of the form carriage 37 by the ejector latch 235 so that the form carriage is then ejected from the retort by the action of the spring pressed plunger 228.

The hydraulic system for operating the door 33 and controlling the flow of steam to the retort 30 and its exhaust therefrom is shown particularly in Figs. 7 and 8. The oil or other fluid is supplied under pressure from the tank 53 by the pump 54 and an electric motor 55 and the flow of oil to the various devices which effect the operations just referred to is controlled by solenoid operated valves which are operated, together with the carriage ejecting solenoid 260, by the electric circuit 48 under the control of the motor driven controller 50.

Referring first to the means for operating the door 33, it will be observed from an inspection of Fig. 7 that the door has a relatively fixed crank arm 76 which is pivotally attached to a connecting rod 265 extending rearwardly at the side of the retort within the auxiliary housing 262 and having its rear end pivotally connected with a piston rod 266 which is slidably mounted in one of the heads 270a of a cylinder 270. A pipe 272 leading to the rear end of the cylinder 270 is adapted to admit oil or other fluid under pressure to actuate the piston connected to the piston rod 266 to close the door 33. Another pipe 273 connected to the forward end of the cylinder 270 is adapted to admit fluid under pressure to move the piston rearwardly and thereby retract the rod 266 to open the door 33.

The oil or other fluid under pressure for actuating the piston of the door operating cylinder 270 is supplied to the pipes 272 and 273 by a solenoid operated valve 275 which controls the flow of oil

between a supply pipe 276, leading from the pump 54, and the branch pipes 272 and 273 previously referred to. The solenoid operated valve 275 comprises a solenoid 277 which, when energized, causes the flow of oil through the valve from the supply pipe 276 to the pipe 272 leading to the rear end of the cylinder 270, and another solenoid 278 connected to the other end of the valve 275 which when energized causes the flow of oil through the valve chamber from the supply pipe 276 to the pipe 273 leading to the forward end of the cylinder 270. A pipe 279 leading from the solenoid operated valve 275 is adapted to exhaust oil to the exhaust pipe 280 which communicates with the tank 53. Thus, when the pump 54 is operating, the door 33 may be closed and opened by energizing the solenoids 277 and 278, respectively.

The construction of the solenoid operated valve 275 is illustrated particularly in Fig. 11 and the description thereof will suffice for all such valves which are embodied in the system, since they are all substantially alike. The valve 275 comprises a central valve block 284 provided with a longitudinal bore in which there is slidably mounted a plunger or piston rod 285 of circular cross section having formed thereon two enlarged cylindrical pistons or valve members 286 which are located at the ends of a central chamber 284^a adapted to communicate with the outlet ports 284^b and 284^c to which the outlet pipes 272 and 273, respectively, are connected. The chamber 284^a is supplied with oil under pressure through an inlet port which communicates with the branch pipe 276^a leading from the supply pipe 276. The piston rod or plunger 285 is connected at its ends to the magnetizable cores 287 of the solenoids 277 and 278 and when one of these solenoids is energized, with the circuit of the other solenoid open, the magnetizable core 287 is moved endwise into its solenoid, thereby shifting the adjacent piston valve 286 to establish a communication between the central chamber 284^a and one of the outlet ports 284^b or 284^c. At the same time that the valve plunger is thus shifted to open an outlet from the chamber 284^a, the other valve member 286 is moved to close the communication between the central chamber 284^a and the other outlet port. When the valve member is moved in either direction, the excess oil in the discharge passages which is entrapped by a valve member 286 flows outwardly through one of the passages 284^c to the branch pipe 279 connected to the exhaust pipe 280 through which it flows back to the tank 53.

The flow of steam to and from the retort 30 is controlled by a solenoid operated valve 290 to which oil or other fluid under pressure is supplied from the pipe 276 through a branch pipe 276^b. This valve comprises a solenoid 292 which, when energized by the electric circuit 48, causes oil to flow through the valve into an outlet pipe 293 leading to the cylinder of a steam valve 295 which is adapted to control the steam flow as hereinafter described. The valve 290 also comprises another solenoid 296 which operates when energized to admit oil or other fluid under pressure through the valve to the pipe 297 which leads to the end of the steam valve cylinder 295 opposite that to which the pipe 293 is connected. The valve 290 has a branch pipe 298 for exhausting oil to the exhaust pipe 280 which leads back to the oil tank 53.

The steam valve 295 comprises a cylinder having mounted therein a piston 295^a fixed on a piston rod 299 which is adapted to effect the opening and closing of two gate valves 300 and 301 which are connected in steam pipes 302 and 303 respectively opening into the retort 30 through the bottom wall thereof beneath the previously described plate 217 upon which the ejecting mechanism is mounted. A pipe 304 leads to the valve 300 from a source of steam supply and is adapted to supply hot steam under pressure to the retort 30 when the valve 300 is opened in response to the admission of steam, oil or other fluid into the left-hand end of the cylinder 295, as viewed in Fig. 8, through the energization of the solenoid 292 of the electric circuit 48.

The valve 301 is connected by a pipe 305 with an exhaust pipe 306 through which steam is adapted to be exhausted from the retort 30 when the valve 301 is opened in response to the actuation of the solenoid 296. A live steam pipe 307 leads from the upright portion of the supply pipe 304 and communicates with a fitting 309 which connects the pipe 305 with the exhaust pipe 306, thus causing a jet of live steam to be discharged through the exhaust pipe and thereby creating a suction in the valve 301 and the connected pipes 303 and 305, whereby the steam in the chamber of the retort is drawn outwardly and carried away through the exhaust pipe. Another pipe 310 extends upwardly from the exhaust pipe 306 and communicates with the chamber of the retort through the top wall thereof to provide an additional channel through which exhaust steam may be withdrawn from the chamber of the retort due to the suction of the current of live steam passing through the pipe 306. The live steam pipe 307 has connected therein a strainer 311 adapted to remove any sediment in the live steam passing therethrough from the pipe 304 and this pipe 307 also has connected therein a solenoid operated valve 312 which is connected in the electric circuit 48, as hereinafter described, so that it is automatically opened at the time that the exhaust valve 301 is opened, thus causing high pressure live steam to be discharged through the restricted discharge opening of the fitting 309, to create the partial vacuum heretofore referred to which serves to draw the exhaust steam out of the retort. The pipe 304 has connected therein a shut-off valve 313, a strainer 314, a pressure gauge 315, and a pressure regulator 316.

Before describing the connections and operations of the electric circuit 48, reference will be made to the construction of the controller 50 which comprises a base plate 318 mounted on supporting brackets 319 which are secured to the outer wall of the retort within the auxiliary housing 262, as shown particularly in Fig. 7. The parts of the controller 50 and its driving motor are mounted directly on a plate 320 which is secured in place by screws 321 engaging the base plate and by insulating washers 322 which space the plate 320 from the base plate and from the screws. The motor 49 has its shaft 323 connected to an auxiliary shaft upon which is mounted a small fan 324 for the purpose of indicating to the operator whether or not the motor is running. The motor shaft 323 is connected through a gear reducing unit 325 with a driving shaft 326 having mounted thereon a driving pinion 327, shown in Fig. 10. The pinion 327 meshes with a large gear 328 fixed upon the controller shaft 330 which is journaled in bearing brackets 331 extending upwardly from the supporting plate 320. The shaft 330 has secured thereon a plurality of spaced

cams C1, C2, C3, C4, C5, C6 and C7, each comprising a plurality of plates of insulating material which are capable of relative angular adjustment for the purpose of changing the external configurations of the cams. In this instance, each cam comprises two insulating plates which are clamped against a nut 332 secured on the shaft 330 by a screw 333. The clamping of the plates against the screw 333 is effected by a nut 334 which engages a threaded portion of the shaft 330 at each side of each cam. At the end of the controller shaft opposite the driving gear 328, a calibrated disk 335 is secured to the shaft and graduated in degrees adjacent its outer periphery for registration with a stationary pointer 336. By the use of the disk 335 and the pointer 336, the disks of each cam may be adjusted with respect to each other and each cam may be adjusted angularly with respect to every other cam so that the circuit operations controlled by the cams take place in the proper sequence and timed relation.

Above and somewhat to the rear of the series of cams mounted on the shaft 330, there are mounted a series of mercury tubes switches S1, S2, S3, S4, S5, S6 and S7 which are connected in the various branches of the electric circuit 48, as hereinafter described. These mercury tube switches are mounted upon an insulating plate 337 carried by supporting posts 338, one of which also carries the stationary pointer 336. Each mercury tube switch comprises the usual mercury tube 340 detachably secured by spring clips 341 upon a small insulating plate 342 carried by a bracket 343 which is pivotally mounted, by means of a pin 344, upon a U-shaped supporting bracket 345 having its back wall secured to the upper part of the insulating plate 337. Each switch bracket 343 carries at its forward end a roller 343a adapted to travel upon the surface of one of the cams carried by the shaft 330. When a roller 343a is in contact with that portion of a cam surface which is concentric with the axis of the controller shaft 330, the associated mercury tube is maintained in its horizontal position, wherein the contacts contained therein are connected by the body of liquid mercury contained in the tube, but when the roller 343a drops into a depressed portion of the cam surface, the mercury tube assumes an inclined position by gravity and the body of mercury thereby flows to one end of the tube and disconnects the contents in the usual manner.

The electric circuit 48 for operating the motors 49 and 55 and the solenoid operated valves 275 and 290 is diagrammatically shown in Fig. 8 and comprises three line conductors L1, L2 and L3 which are connected through the fuse block 347 with a 220-volt, three-phase alternating current supply source shown at 348. The line conductors lead through a three-pole safety switch 350 having protective resistance 351 connected in two of the lines and from this switch three motor supply conductors T1, T2 and T3 lead to the terminals of the three-phase alternating current motor 55 which drives the oil pump 54.

The solenoid operated valves and the motor 49 are operated by one phase only of the three-phase alternating current supply circuit, each solenoid having one of its terminals connected to the conductor T3 and having its other terminal arranged to be connected to the conductor T1 through one of the mercury tube switches of the controller 50, while the motor 49 is connected to one of the conductors T1 and T3 through the starting switch 47 through a branch circuit controlled by the switch S1.

As shown in Fig. 8, a branch conductor 353 is connected to one of the motor supply conductors T3, in advance of the resistance 351 connected in that line, and this conductor is connected to a plurality of other conductors which extend to the windings of the solenoid operated valves 275 and 290 and the solenoid 260, as well as to the switch 47. These branch conductors include a conductor 354 extending to the solenoid 277, a conductor 355 extending to the solenoid 278, a conductor 356 extending to the solenoid 260, a conductor 357 extending to the switch 47, a conductor 358 extending to the solenoid 296, and a conductor 359 extending to the solenoid 292. In this way, a permanent connection is established from one line conductor T3 to one terminal of each solenoid.

The connections to the other terminals of these solenoids are made from the line conductor T1 through a conductor 360, connected in advance of the resistance 351 in the line T1 and extending to the controller 50 where it is connected to one terminal of each of the mercury switches S3, S4, S5, S6 and S7, which control the circuits of the solenoids, and also to one terminal of the starting motor 49. A conductor 361 leads from the previously mentioned conductor 353 to a terminal of the switch S1 and a conductor 362 leads from this terminal to a thermostatic temperature switch 363 adapted to be located in the chamber 38 of the retort. Another conductor 362a leads from this temperature switch to the terminal of the switch S1 which is opposite that to which the conductor 361 is connected. The terminal of the switch S1 to which the conductor 362a is connected is also connected by another conductor 364 with one terminal of the switch S2.

The terminals of the various switches S2, S3, S4, S5, S6 and S7 which are opposite to the switch terminals connected to the conductor 350 are connected by other conductors to the terminals of the solenoid operated switches 275 and 290, the solenoid 260 and the switch 47. These additional conductors include a conductor 366 leading from the switch S2 to the starting or limit switch 47, a conductor 367 leading from the switch S3 to the solenoid 277 which closes the door, a conductor 368 leading from the switch S4 to the solenoid 292 for admitting steam, a conductor 369 leading from the switch S5 to the solenoid 296 for exhausting steam, a conductor 370 leading from the switch S6 to the solenoid 278 for opening the door, and a conductor 371 leading from the switch S7 to the solenoid 260 which actuates the ejector latch 235 and causes the ejection of the carriage from the retort by the action of the plunger 228.

In addition to the connections just referred to, the circuit 48 includes connections for operating the solenoid operated valve 312. These connections include a conductor 372 leading from the conductor 353 to one terminal of the solenoid operated valve 312 and a conductor 373 leading from the conductor 369 to the other terminal of the solenoid operated valve 312. The solenoid of the valve 312 is thus connected in parallel with the solenoid 296 which effects the opening of the exhaust valve 301 so that when the mercury switch S5 is closed to effect the opening of the valve it also closes the circuit of the solenoid operated valve 312, causing it to operate to permit live steam to flow through the pipe 307 for creat-

ing a suction to exhaust steam from the retort during the period that the valve 301 is open.

In the operation of the apparatus, after placing untreated hosiery on the forms 40 on a carriage 37 with this carriage in the tilted position shown at the right of Fig. 1, the main carriage 35 is shifted laterally to position this form carriage opposite the opening 30a of the retort in which position the main carriage is automatically latched by the locking means including the locking bar 100 which is released by the initial motion of the tilted form carriage in returning it to its horizontal position. As the form carriage reaches its horizontal position it is automatically latched to one of the angle bars 120 of the main carriage by the action of its locking bolt 200 and the operator then gives this form carriage a push toward the retort with sufficient force to cause it to travel rearwardly on its track members 36 and thence into the retort on the retort tracks 39 until it reaches its innermost position.

As the form carriage reaches its innermost position the pin 214 on this carriage engages the pin 232 and actuates the latch hook 233 to release the ejector latch 235 which moves from the position shown in Fig. 3 to that shown in Fig. 5 under the influence of the spring 258 which at the same time withdraws the core 260a from the solenoid 260, as shown in Fig. 2. At the same time, also, the starting switch 47 of the controller motor 49 is closed by the movement of the rod 253 which carries a collar 375 having a depending arm 375a, shown in Fig. 7, connected with a horizontal switch operating rod 376. This rod is adjustably connected to the operating lever 377 of the limit switch 47 which is secured to the bracket 261 by which the solenoid 260 is carried. The motor 49 is thus started in operation by the closing of the switch 47 since the mercury switch S2 is then held in its closed position by its cam C2, with the result that the rotating controller shaft causes the cam C2 to close the switch S3, thereby actuating the solenoid 277 and admitting oil or other fluid under pressure to the right-hand end of the cylinder 270 to close the door 33. As soon as the controller is started in operation its cam C1 closes the mercury switch S1 to establish the circuit of the motor 49 by this direct connection and the switch S2 is at the same time opened by its cam C2. The controller is then operated with the switch S1 closed and further rotary movement of its shaft causes the cam C4 to close the switch S4 and energize the solenoid 292, thereby opening the valve 300 and admitting steam to the retort. At this point, the switch S1 is opened by the cam C1, thus stopping the motor 49 so that the controller remains at rest while steam continues to flow into the retort. When the temperature in the retort reaches a predetermined value the normally open thermostatic switch 363 operates to close the circuit of the motor 49 again so that the controller 50 resumes operation and continues to operate during the heat treatment of the articles on the forms in the chamber of the retort. During this time the cam C1 again closes the switch S1 which then maintains the motor circuit during the subsequent stages of the cycle. By stopping the motor when the heat is turned on and starting it again when a predetermined temperature is attained in the retort, a uniformity of results is obtained since the time period of the heat treatment is always the same at the predetermined temperature. At the conclusion of the heat treatment the cam C5 closes the switch S5 and thereby closes the circuits of the solenoid 286 and of the solenoid operated valve 312, thus exhausting the steam from the retort. At the conclusion of the exhaust period, the cam C6 actuates the switch S6 to close the circuit of the solenoid 278, thereby admitting fluid under pressure to the left-hand end of the cylinder 270 and opening the door 33.

After the door has been opened, the cam C7 closes the switch S7 and thereby energizes the solenoid 260 which attracts the core 260a and moves the rods 245 and 253 toward the right, as viewed in Fig. 2, thus rocking the bell crank lever 240 and moving the hook portion of the ejector latch 235 downwardly to the position shown in Fig. 3, which has the effect of releasing the carriage 37 and allowing it to be ejected from the retort by the action of the spring pressed plunger 228. The latch hook 233 is operated at this time by the spring 236 to hold the ejector latch in the position shown in Fig. 3. When the solenoid 260 is operated to actuate the ejector latch 235, the rod 253 is operated to extend the spring 258 and to open the switch 47 in readiness for the next succeeding heat treating cycle. When the carriage is ejected, the cycle is ended and the cam C2 closes the switch S2 in readiness for the next cycle and immediately thereafter the cam C1 opens the switch S1 so that the motor is stopped and the controller brought to rest.

The insulating plates of each one of the various cams on the controller shaft 330 may be relatively adjusted in order to regulate the duration of the operations performed by that cam and their time relation to the operations performed by the other cams. By reference to the dial 335 on the end of the shaft 330 and the relation of its graduations to the pointer 336, the point in the cycle where each cam is brought into operation may be conveniently arranged. Although various time periods for each operation may be employed, depending upon the character of the articles being treated, it has been found, for example, that the steam treatment of ladies' nylon hosiery may be carried on satisfactorily if the cams of the controller are so adjusted as to close the switch S2 at 4° prior to the time the zero graduation on the dial is reached, at which time the switch 47 is closed, to close the switch S1 at the 10° graduation and open it again at the 44° graduation, to close the switch S1 the second time at 60° on the dial, to close the switch S3 at 9° on the dial, to close the switch S4 at 19° on the dial, to close the switch S5 at 268° on the dial, to close the switch S6 at 334° and to close the switch S7 at 348°.

Although one form of the invention has been shown and described by way of illustration, it will be understood that it may be constructed in various other embodiments which come within the scope of the appended claims.

I claim:

1. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, and energy storing means actuated when said carriage is moved into said retort for subsequently ejecting said carriage entirely from said retort.

2. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, and spring actuated means located in a fixed position in said retort for ejecting said carriage entirely from said retort.

3. The combination in setting apparatus of the

class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in a fixed position in said retort for storing energy when said carriage is moved into the retort, and means for releasing said energy storing means to eject said carriage entirely from said retort.

4. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in a fixed position in said retort for storing energy when said carriage is moved into the retort, and means controlled from the outside of said retort for releasing said energy storing means to eject said carriage entirely from the retort.

5. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, a device located in fixed position in said retort and actuated to store energy by the movement of said carriage into said retort, and means actuated by the said movement of said carriage for holding said device and said carriage in relatively fixed positions.

6. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, a device located in fixed position in said retort and actuated to store energy by the movement of said carriage into said retort, means actuated by the said movement of said carriage for holding said device and said carriage in relatively fixed positions, and means comprising electrically controlled parts operated from the outside of said retort to release said holding means to permit said device to release its stored energy and discharge said carriage from said retort.

7. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, resilient means mounted in fixed position at the inner end of said retort for bringing said carriage to rest when it is moved into said retort, said resilient means being compressed by said movement, means for holding said carriage with said resilient means compressed, and electrically controlled means for releasing said holding means to allow said resilient means to eject said carriage from said retort.

8. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for linear movement into and out of said retort, resilient means mounted in fixed position at the inner end of said retort for bringing said carriage to rest when it is moved into said retort, said resilient means being compressed by said movement, means for holding said carriage with said resilient means compressed, means for permitting a tilting movement of said carriage to an inclined position when it is removed from said retort, and means for releasing said holding means to allow said resilient means to eject said carriage from said retort, said resilient means being arranged to impart sufficient momentum to said carriage to effect said tilting thereof at the conclusion of its linear movement from said retort.

9. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in a fixed position in said retort for storing energy when said carriage is moved into the retort, means for restraining said energy storing means with said carriage in contact therewith, means including a rod extending through the wall of said retort for releasing said restraining means to permit said energy storing means to eject said carriage from said retort, and means for forming a fluid tight seal around said rod at said wall.

10. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in a fixed position in said retort for storing energy when said carriage is moved into the retort, means for restraining said energy storing means with said carriage in contact therewith, means including a rod extending through the wall of said retort for releasing said restraining means to permit said energy storing means to eject said carriage from said retort, a resilient gasket around said rod at said wall, a disk secured to said rod inside of said gasket, means for closing said retort, and means for introducing high pressure steam into said retort.

11. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in said retort for ejecting said carriage from said retort, means including and actuating member extending through the wall of the retort for causing the actuation of said ejecting means, and means including a solenoid located outside of said retort for operating said actuating member.

12. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in said retort for ejecting said carriage from said retort, means including an actuating member extending through the wall of the retort for causing the actuation of said ejecting means, means including a solenoid located outside of said retort for operating said actuating member, and resilient means located outside of said chamber for restoring said actuating member to its normal position.

13. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in said retort for ejecting said carriage from said retort, means including an actuating member extending through the wall of the retort for causing the actuation of said ejecting means, a lever connected to said actuating member outside of said retort, a rod connected to said lever, and a solenoid having its core connected to said rod.

14. The combination of a setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, means located in said retort for ejecting said carriage from said retort, means including an actuating member extending through the wall of the retort for causing the actuation of said ejecting means, a lever connected to said actuating member outside of said retort, a rod connected to said lever, a solenoid having its core connected to said rod, means for restoring said rod and said core to their normal positions after they have been moved by energizing said solenoid, an electric circuit for energizing said solenoid, a switch connected in said circuit, and means actuated when said rod is moved for operating said switch.

15. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and

out of said retort, means located in said retort for ejecting said carriage from said retort, means including an actuating member extending through the wall of the retort for causing the actuation of said ejecting means, a lever connected to said actuating member outside of said retort, a rod connected to said lever, a solenoid having its core connected to said rod, and a spring connected to said rod for restoring said actuating member to its normal position after it has been moved by said solenoid.

16. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, a bracket fixed within and on the bottom of said retort beneath the plane of travel of said carriage, a plunger mounted on said bracket in the path of travel of said carriage, a spring adapted to be compressed when said carriage engages said plunger on movement into said retort, a latch, means for actuating said latch to hold said carriage in engagement with said plunger with said spring compressed, and means including a solenoid for actuating said last named means to disengage said latch from said carriage.

17. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, a bracket fixed within and on the bottom of said retort beneath the plane of travel of said carriage, a plunger mounted on said bracket in the path of travel of said carriage, a spring adapted to be compressed when said carriage engages said plunger on movement into said retort, a latch, means including a latch hook for holding said latch in an inoperative position, means carried by said carriage for operating said latch hook to release said latch upon movement of said carriage into engagement with said plunger, and means including a mechanical connection extending to the outside of said retort for causing said latch to engage said carriage when released by said latch hook to hold said carriage in engagement with said plunger with said spring compressed.

18. The combination in setting apparatus of the class described, of a retort having an opening, a form carriage mounted for movement into and out of said retort, a bracket fixed within and on the bottom of said retort beneath the plane of travel of said carriage, a plunger mounted on said bracket in the path of travel of said carriage, a spring adapted to be compressed when said carriage engages said plunger on movement into said retort, a latch, means including a latch hook for holding said latch in an inoperative position, means carried by said carriage for operating said latch hook to release said latch upon movement of said carriage into engagement with said plunger, means including a mechanical connection extending to the outside of said retort for causing said latch to engage said carriage when released by said latch hook to hold said carriage in engagement with said plunger with said spring compressed, and electrically operated means associated with said last named means for moving said latch out of engagement with said carriage.

19. The combination in setting apparatus of the class described, of a retort having an opening, a door for closing said opening, a form carriage mounted for movement into and out of said retort, means actuated when said carriage is moved into said retort for storing energy for subsequently ejecting said retort, means for restraining said energy storing means, and power actuated means for performing the steps of closing said door, introducing steam into said retort, then shutting off the steam and exhausting the steam from said retort, then opening said door, and then operating said restraining means to permit the ejection of said carriage from said retort by said energy storing means.

20. The combination in setting apparatus of the class described, of a retort having an opening a door for closing said opening, a form carriage mounted for movement into and out of said retort, means actuated when said carriage is moved into said retort for storing energy for subsequently ejecting said retort, means for restraining said energy storing means, power actuated means for performing the steps of closing said door, introducing steam into said retort, then shutting off the steam and exhausting the steam from said retort, then opening said door, and then operating said restraining means to permit the ejection of said carriage from said retort by said energy storing means, and means associated with said last named means for controlling the sequence and time duration of said steps.

21. The combination in setting apparatus of the class described, of a retort having an opening, a door for closing said opening, a form carriage mounted for movement into and out of said retort, means actuated when said carriage is moved into said retort for storing energy for subsequently ejecting said retort, means for restraining said energy storing means, power actuated means for performing the steps of closing said door, introducing steam into said retort, then shutting off the steam and exhausting the steam from said retort, then opening said door, then operating said restraining means to permit the ejection of said carriage from said retort by said energy storing means, means associated with said last named means and including an electric circuit and a motor driven controller connected therein for controlling the sequence and time duration of said steps, and a switch actuated by the operation of said restraining means for initially closing said circuit to start the operation of said motor driven controller.

22. The combination in setting apparatus of the class described, of a retort having an opening, a door for closing said opening, a form carriage mounted for movement into and out of said retort, means actuated when said carriage is moved into said retort for storing energy for subsequently ejecting said retort, means for restraining said energy storing means, power actuated means for performing the steps of closing said door, introducing steam into said retort, then shutting off the steam and exhausting the steam from said retort, then opening said door, then operating said restraining means to permit the ejection of said carriage from said retort by said energy storing means, means associated with said last named means and including an electric circuit and a motor driven controller connected therein for controlling the sequence and time duration of said steps, and a switch actuated by the operation of said restraining means for initially closing said circuit to start the operation of said motor driven controller, said controller comprising other switches which are operated to close the circuit of said motor after it has been initially started.

23. The combination in setting apparatus of the class described, of a retort having an opening, a door for closing said opening, a form carriage

mounted for movement into and out of said retort, means actuated when said carriage is moved into said retort for storing energy for subsequently ejecting said retort, means for restraining said energy storing means, means including an electric circuit for performing the steps of closing said door and causing a flow of steam into said retort, a motor driven controller connected in said circuit for controlling the sequence and time duration of said steps, a switch actuated by the operation of said restraining means for initially starting said motor to drive said controller, said controller being arranged to maintain the circuit of said motor thereafter until the flow of steam into said retort has started and then to open the motor circuit, and thermostatic means located in said retort and connected in said circuit for restoring the circuit of said motor and thereby continuing the operation of said controller when a predetermined temperature is created in said retort.

24. The combination in setting apparatus of the class described, of a retort having an opening, a door for closing said opening, a form carriage mounted for movement into and out of said retort, means actuated when said carriage is moved into said retort for storing energy for subsequently ejecting said retort, means for restraining said energy storing means, means including an electric circuit for performing the steps of closing said door, causing a flow of steam into said retort, shutting off the steam and exhausting the steam from the retort, then opening said door, and then releasing said restraining means to permit the ejection of said carriage from said retort by the operation of said energy storing means, a motor driven controller connected in said circuit for controlling the sequence and time duration of said steps, a switch actuated by the operation of said restraining means when said carriage enters said retort for initially starting said motor to drive said controller, said controller being arranged to maintain the circuit of said motor thereafter until the flow of steam into said retort has started and then to open the circuit of said motor, and thermostatic means located in said retort and connected in said circuit for restoring the circuit of said motor and thereby continuing the operation of said controller when a predetermined temperature is created by the steam in said retort, said controller having means for then maintaining the circuit of said motor during the remaining steps of the cycle.

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