Aug. 22, 1950 H. RICHTER 2,519,981

HOSIERY FINISHING MACHINE

Filed March 29, 1947 3 Sheets-Sheet 1

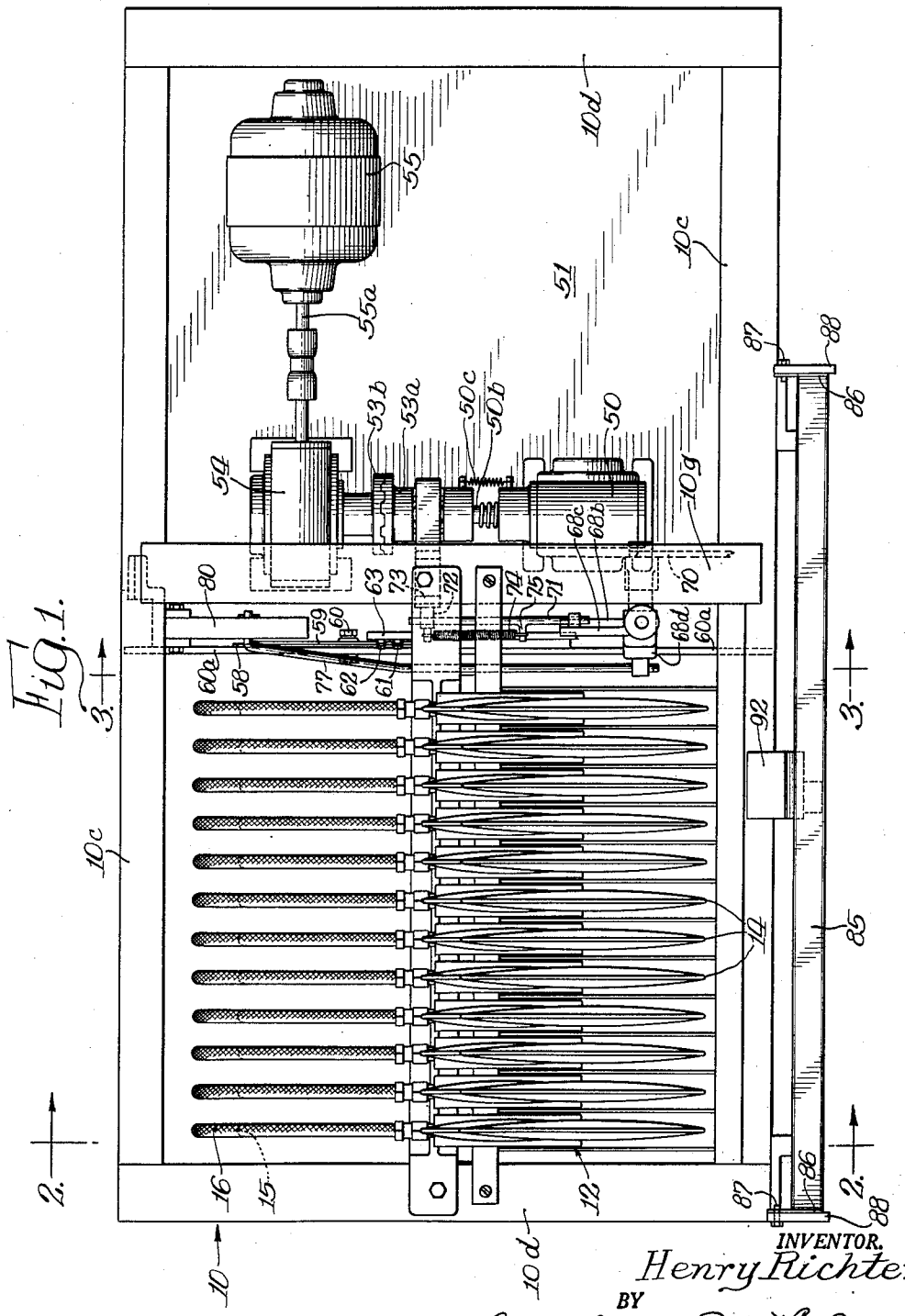


FIG. 1.

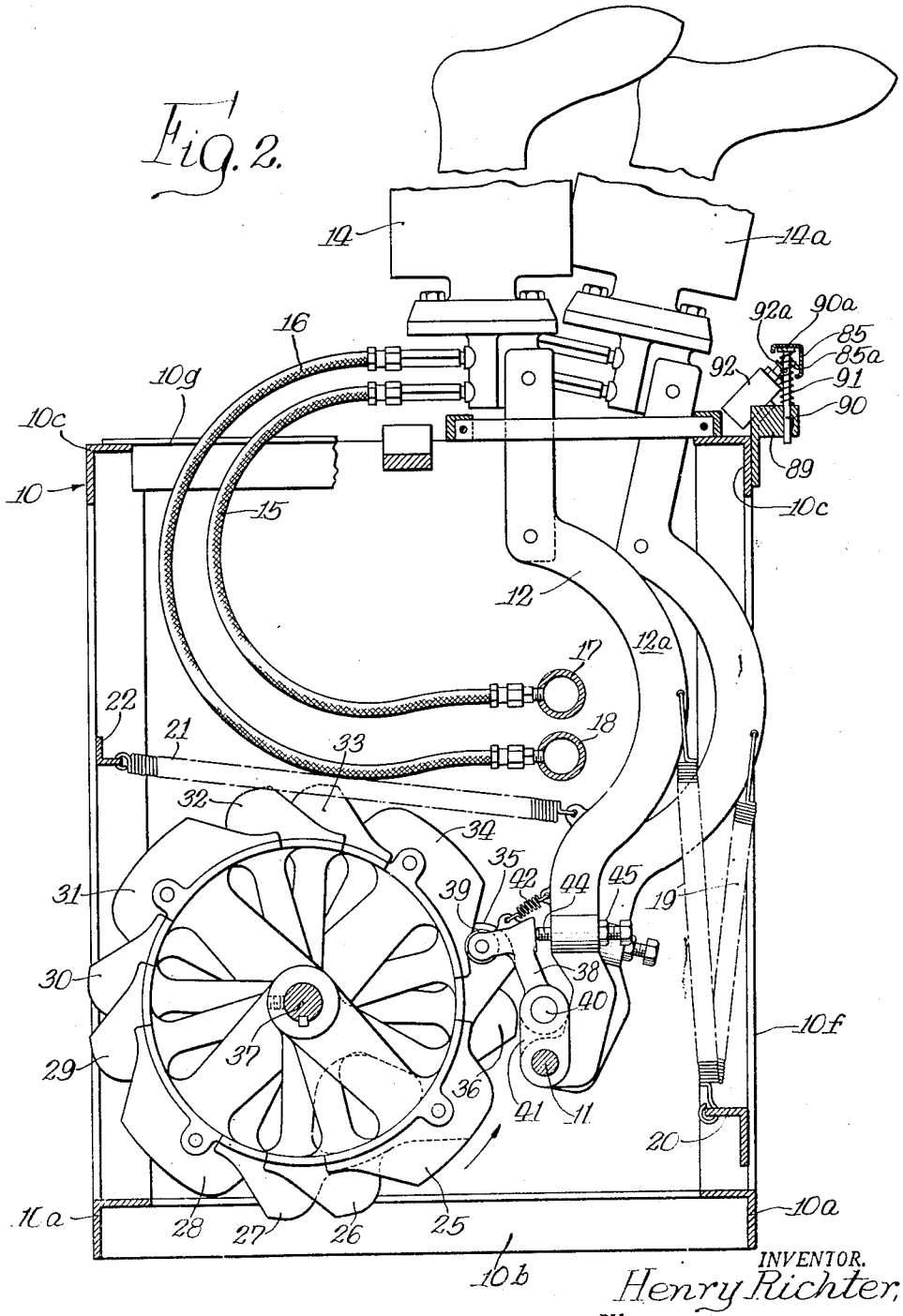
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Fig. 2.



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Fig. 3.

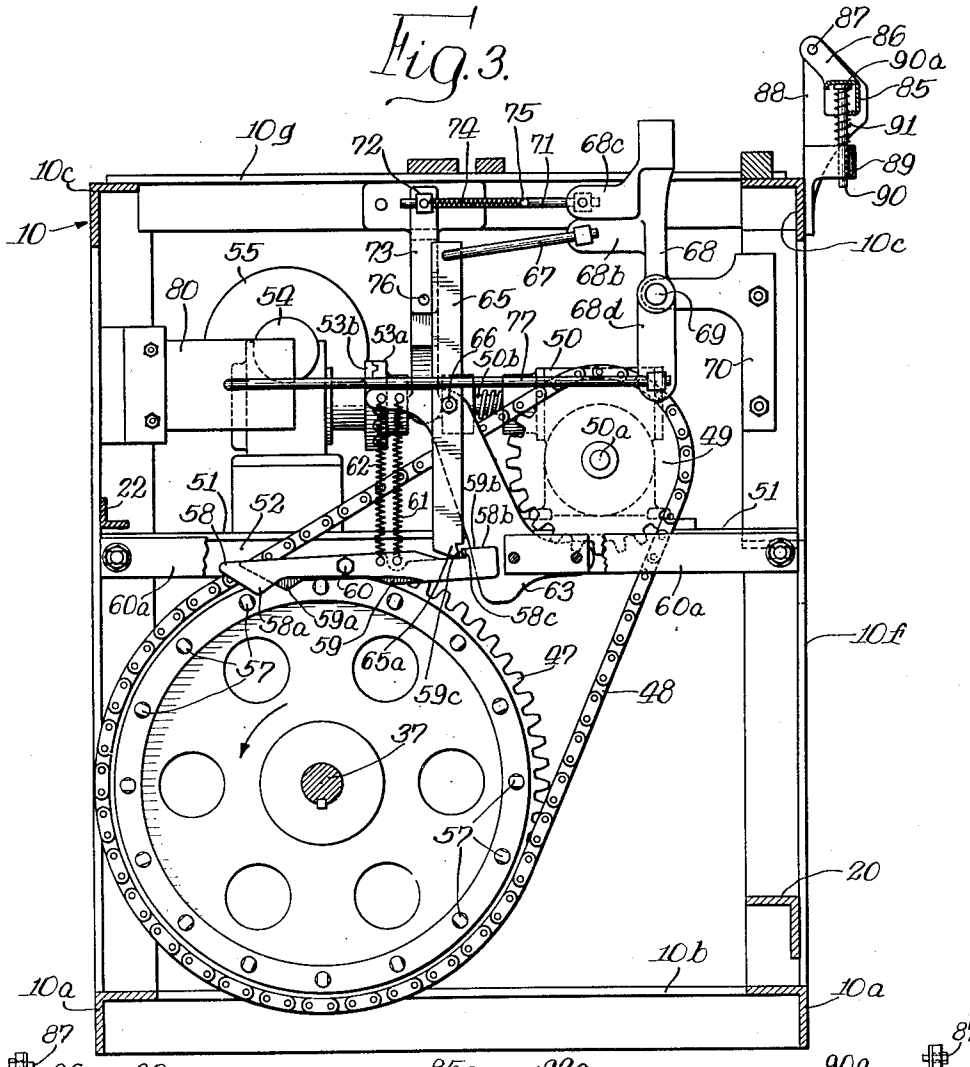
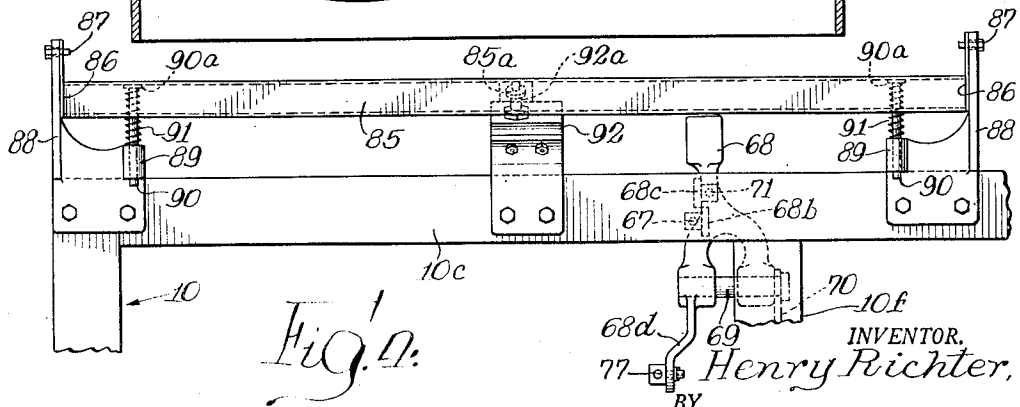


Fig. 4.



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UNITED STATES PATENT OFFICE

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HOSIERY FINISHING MACHINE

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7 Claims. (Cl. 223—76)

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This invention relates to improvements in hosiery finishing machines of the type in which a plurality of internally heated forms are mounted in parallel relationship and are capable of relative movement so that each form may be moved at the will of the operator between a treating position and a boarding position.

The present invention is an improvement of the form of apparatus described and claimed in the United States patent to Thomas W. Prosser and John H. Wahlbeck, No. 1,942,729, dated January 9, 1934, in which there is disclosed a form of hosiery drying apparatus having a plurality of internally heated hosiery forms mounted for pivotal movement about their support in response to the operation of a series of cams which are controlled at the will of the operator so that the forms are moved in groups or in succession from the treating position to the boarding position where the operator removes the hosiery which has been treated and replaces it with other untreated articles. Upon the completion of the boarding operation the forms are returned to the treating position and other forms are advanced to the boarding position. In said prior apparatus, the movements of the forms were controlled through mechanism actuated by a hand operated lever and considerable time of the operator was necessarily consumed in manipulating this lever to bring about the desired movements of the forms at the proper times.

The principal object of the present invention is to provide improved hosiery drying apparatus of the type referred to in which the relative movements of the forms are effected by mechanism controlled by the body of the operator so that both of the operator's hands are at all times free for manipulating the hosiery on the forms. More specifically, an object of the invention is to provide hosiery drying apparatus comprising a plurality of relatively movable pivotal forms adapted to be actuated periodically by a control mechanism operated by a movable bar against which the operator may lean at the desired time in order to set in motion the actuating mechanism for changing the positions of the forms.

Still another object is to provide a finishing machine of this type having a relatively long operating bar adjacent the operator's position which may be actuated by the operator at any point along the row of hosiery drying forms in order to cause the actuation of the mechanism by which the relative movement of the forms is effected.

Other objects of the invention relate to various

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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 top plan view of the improved hosiery drying machine of the present invention;

Fig. 2 shows a vertical sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 shows a vertical sectional view taken on the line 3—3 of Fig. 1; and

Fig. 4 shows a front elevation of the controlling bar and associated parts which are illustrated in Fig. 1.

In the embodiment of the invention illustrated in the drawings, the movable parts are supported by an upright frame 10 comprising lower longitudinal frame members 10*a* adapted to rest upon a floor or other support, and transverse frame members 10*b* also adapted to rest upon the floor, upper longitudinal frame members 10*c* and upper transverse frame members 10*d*. These horizontally extending frame members are connected by the corner frame members 10*e* and, between the ends of the frame, by other upright frame members 10*f*. The front and rear longitudinal frame members 10*c* are connected between their ends by a horizontal transverse frame member 10*g*. These frame members support other auxiliary parts of the frame structure which will be hereinafter referred to as the mechanism as described.

In the lower part of the frame structure, there is mounted a horizontally extending longitudinal shaft 11 having its ends fitted in bearings, not shown, which serves as a support for a plurality of upwardly extending form supporting arms 12 each of which has mounted on the upper end thereof a hosiery drying form 14 which is hollow and which is adapted to be internally heated by steam or the like supplied through a flexible inlet conduit 15 and exhausted through another flexible outlet conduit 16. These conduits are connected to the steam supply and exhaust pipes 17 and 18, respectively, which extend longitudinally of the machine above the shaft 11. The form supporting arms 12 are bowed in the region of the pipes 17 and 18, as shown at 12*a*, in order to permit the forms to be swung inwardly or rearwardly to positions wherein the forms 14 extend in vertical planes parallel to each other and in a continuous row. Any of the arms 12 may be rocked forwardly about the shaft 11 in order to move a form forwardly to the inclined position shown at 14*a* in Fig. 2 which is the boarding posi-

tion wherein the operator removes and replaces the hosiery being treated. Each arm 12 is normally moved toward its forward inclined position by a coil spring 19 connected at one end to the bowed portion 12a of the arm and at the other end to a horizontal frame member 20. Each form supporting arm is also actuated toward its rearward upright position by a coil spring 21 having its forward end attached to the lower part of the bowed portion 12a of the arm and having its rear end attached to a longitudinal frame member 22.

The movement of the form supporting arms 12 between the two extreme positions illustrated in Fig. 2 is effected by a series of cams 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36 which are fixed on a horizontal cam shaft 37 extending longitudinally of the lower part of the machine and having its ends journaled in bearings which are not illustrated. These various cams are capable of relative angular adjustment on the shaft 37 but are normally relatively fixed and are of such configuration that they bring about the desired sequential movement of the form supporting arms 12 in response to the manipulation by the operator of the control mechanism hereinafter described. The movement of the arms 12 by the cams on the shaft 37 is effected through a series of cam followers 38, each having the form of a bell crank lever provided at one end with a roller 39 adapted to be engaged by the surface of one of the cams. Each follower 38 is pivoted at 40 on a member 41 which is relatively fixed with respect to one of the form supporting arms 12 and each follower is normally moved in a forward direction against its arm 12 by a coil spring 42 connected between an ear on the upper part of the follower and another ear on the adjacent face of the arm 12. The extent of this movement of each follower toward its arm 12 is controlled by a set screw 44 having threaded engagement with the lower part of the arm 12 and adapted to be secured in adjusted position by a lock nut 45. By adjusting these set screws 44 the normal position of the cam follower 38 with respect to its arm 12 may be regulated as desired, thereby controlling the amplitude of movement of the arm 12 and its form 14.

The cam shaft 37 is driven by a sprocket gear 47 fixed on this shaft and arranged to mesh with an endless sprocket chain 48 which also passes around a sprocket pinion 49 fixed on the shaft 50a of a speed reducer 50 supported on a shelf 51 which is carried by intermediate longitudinal and transverse frame members 52, as shown particularly in Fig. 3. This speed reducer 50 has a horizontal driving shaft 50b, shown in Fig. 1, which has mounted thereon a clutch member 53a normally moved to its retracted position by a spring 53c and adapted to engage another clutch member 53b which is actuated by the shaft of a gearing device 54 arranged to be actuated by the shaft 55a of an electric motor 55. During the operation of the apparatus the motor 55 is continuously in operation and it is connected periodically to actuate the cam shaft 37 through the operation of the clutch members 53a and 53b.

The actuation of the form supporting arms 12 by the various cams on the shaft 37 is controlled by a series of index pins 57 which project laterally from the face of the sprocket gear 47, as shown particularly in Fig. 3. These pins are adapted to engage the teeth 58a and 59a of two trip levers 58 and 59 which are pivoted at 60 on a transverse frame member 60a of the machine and which are normally actuated to move the teeth 58a and 59a downwardly by means of two coil springs 61 and 62, respectively, which extend upwardly from the right-hand parts of these levers, as viewed in Fig. 3, and have their upper extremities attached to a bracket 63 fixed on the transverse frame member 60a of the machine. These trip levers 58 and 59 are provided at the ends thereof opposite the teeth 58a and 59a with flat surfaces 58b and 59b which terminate at their forward ends in shoulder 58c and 59c, respectively. These shoulders form the outer boundaries of recesses adapted to be engaged by the lower toothed extremity 65a of a latch lever 65, which is pivoted at an intermediate point on a stud 66 carried by the bracket 63. The upper end of this lever 65 is connected by a rod 67 with an arm 68b formed on a lever 68 which is pivoted at 69 on a fixed bracket 70. When the lever 68 is moved in a counterclockwise direction as viewed in Fig. 3, the toothed extremity 65a of the latch lever is moved toward the right and on to the surfaces 58b and 59b of the trip levers 58 and 59, assuming that these flat surfaces have then been depressed by the engagement of the teeth of these trip levers with one of the index pins 57.

The lever 68 also has an arm 68c extending parallel to the arm 68b and having a pivotal connection with a rod 71. The rod slidably engages a block 72 mounted on the end of a clutch operating lever 73. A coil spring 74 is mounted on the rod 71 between a fixed pin 75 on the rod and the block 72 and this spring is of such strength that a thrust on the rod 71, toward the left, as viewed in Fig. 3, rocks the clutch lever 73 about its pivot 76 thereby disengaging the clutch members 53a and 53b which are normally moved into engagement with each other by the springs previously described.

The lever 68 also comprises a depending arm 68d which has its lower end pivotally connected with an operating rod 77 adapted to be actuated by the movable core of the solenoid 80 to which it is connected. This solenoid is mounted at the rear of the machine and when its core is moved toward the rear of the machine by the energization of the winding of the solenoid, the lever 68 is rocked about its pivot in a clockwise direction, as viewed in Fig. 3, the clutch members 53a and 53b are engaged and the extremity 65a of the latch lever 65 moves into the recesses opposite the shoulders 58c and 59c of the trip levers 58 and 59. This causes the rotation of the sprocket gear 47 and of the cam shaft 37 and at the same time permits the teeth 58a and 59a of the trip levers to drop down into the path of travel of the index pins 57.

The cam shaft 37 thereupon causes the actuation of certain of the cams 25 to 36 which are mounted on the cam shaft with the result that one or more of the forms 14 are rocked in a forward direction from the treating position to the boarding position. After this movement has been effected, the extremities 58a and 59a of the trip levers are engaged by the succeeding index pin 57 of the series, thereby depressing the right-hand portions of the trip levers, as viewed in Fig. 3, and permitting the hooked extremity 65a of the latch lever to ride up over the surfaces 58b and 59b of the trip levers under the influence of the springs which then cause the clutch members 53a and 53b to become disengaged. The parts are then brought to rest with the desired forms 14 in the forward boarding position and with the teeth of the trip levers held in their upper positions out of the path of travel of the

index pins 57 by the engagement of the lower end of the latch lever 65 with the surfaces 58b and 59b of the trip levers. When the operator has finished working on the forms which are in the boarding position, the solenoid 80 is again actuated to cause another movement of the cams on the shaft 37 whereby the forms previously moved in a forward direction are retracted and a succeeding form of the series is moved to the boarding position.

The control of the operations of the cams on the shaft 37 and of the corresponding movements of the forms 14 is effected by an operating bar 85 which extends in a horizontal direction at the forward side of the machine near the top of the frame 10. The ends of this bar are attached to arms 86 which are pivoted at 87 on fixed brackets 88 attached to the end portions of the frame. A bearing member 89 is secured to the bracket 88 and has mounted therein a vertically slidable pin 90 having a flat head which engages the underside of the horizontal top portion of the operating bar 85. A coil spring 91 is mounted on the pin 90 to bear at its upper end against the head 90a of the pin and at its lower end against the bearing member 89, with the result that the bar 85 is normally moved in an upward direction to the extent permitted by stop pins which are attached to the brackets 88.

At an intermediate point between the brackets 88 there is mounted an electric switch 92 which is connected in the electric circuit of the solenoid 80 and which has a spring actuated plunger 92a adapted to be actuated by a lug 85a formed on the inside of the bar 85. The bar 85 is located at such an elevation that it may be conveniently engaged by the hip or thigh of the operator during the boarding process so that the solenoid 80 may be actuated to bring about the desired sequence of movements of the forms 14 while at the same time leaving both hands of the operator free to manipulate the stockings which are being removed from and placed upon the forms which are in the boarding position. The bar 85 is of substantial length so that it may be engaged by the operator in any position along the length of the row of forms and when the solenoid has been energized to initiate the closing of the clutch and the consequent rotation of the cam shaft, the operator releases the pressure on the bar 85, whereupon it is restored to its normal position by the springs 91 and the switch 92 is opened.

Two trip levers 58 and 59 are provided so that the shoulder (58c or 59c) of one lever will be free to engage the latch 65a of the lever 65 even though the sprocket gear 47 stops with one of the teeth (58a or 59a) resting upon one of the index pins 57, which is permitted by reason of the fact that one of the shoulders 58c is at a greater distance from the pivot 60 than the other shoulder 59c. When the solenoid 80 is energized by an instantaneous light touch on the operating bar 85, the clutch member 53a instantly engages the clutch member 53b. The latch lever 65 must then operate to hold the two clutch members engaged and the shoulder 59c of the lever 59 is then free to swing upwardly under the influence of the spring 62 because its tooth 59a is then free of the index pin, assuming that the wheel 47 has previously stopped with the tooth 58a resting on one of the pins 57. Then, as soon as the wheel 47 rotates sufficiently to allow the tooth 58a to lower, the shoulder 58c also moves upwardly to latching position under the influence of the spring 61. When the next index pin 57 moves to tripping position, this pin first raises the tooth

59a, thereby lowering the shoulder 59c, and allowing the latch 65a of the lever to swing into engagement with the shoulder 58c, while at the same time engaging the shoulder 59b to hold the shoulder 59c depressed. The disengagement of the clutch members 53a and 53b does not occur until the index pin raises the tooth 58a and thereby lowers the shoulder 58c. Both shoulders 58c and 59c being then lowered, the clutch members disengage, thus stopping the rotation of the sprocket gear 47 and leaving the tooth 58a resting on an index pin.

The cams which operate the arms 12 to move the forms 14 may be of such configuration and relative arrangement as to move the forms to the boarding position in any desired sequence. With the arrangement shown in the drawings, the cams 25, 26 and 27 move three forms to boarding position upon the initial actuation of the bar 85 at the beginning of the operation of the machine. After the three stockings are stripped from these forms, the second and third forms are then returned to the drying position, leaving one form out in the boarding position to permit another stocking to be placed thereon by the operator. When the next index pin 57 engages the trip levers, the first form is returned to the drying position and cam 26 then moves the second form to the boarding position. After a stocking has been placed on this second form it returns to the drying position and cam 27 then moves the third form to the boarding position. These successive operations are then duplicated by the next group of cams 28, 29 and 30 and, thereafter, by the two other groups of cams 31, 32 and 33, and 34, 35 and 36. By reason of the improvement of the present invention the operator is enabled to strip the hosiery from the forms and to place new untreated hosiery thereon much more rapidly than has heretofore been possible because at all times both hands of the operator are free for the stripping and boarding operations.

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. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, power operated means for moving said forms in both directions selectively between said positions, actuating mechanism for controlling the operation of said moving means, and electrically operated means for operating said actuating mechanism.

2. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, power operated means for moving said forms selectively between said positions, actuating mechanism for controlling the operation of said moving means, and means operable by the body of the operator in a plurality of positions for controlling the operation of said actuating means.

3. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, power operated means for moving said forms selectively between said positions, actuating mechanism for controlling the operation of said moving means, and means including a bar extending horizontally and transversely to the direction of movement of said forms adjacent the operator's posi-

tion to be engaged by the body of the operator above his knees for controlling the operation of said actuating means.

4. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, means for moving said forms selectively in groups and individually in both directions between said positions, actuating mechanism for controlling the operation of said moving means, an electric circuit including a solenoid for controlling the operation of said actuating means, and means including a movable bar mounted adjacent the operator's position in a location to be engaged at any one of a plurality of points thereon by the thigh of the operator for controlling the operation of said solenoid.

5. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, means for moving said forms selectively between said positions, actuating mechanism for controlling the operation of said moving means, an electric circuit including a solenoid for controlling the operation of said actuating means, a horizontal bar movably mounted adjacent the operator's position for bodily movement transversely of its length, and a switch connected in said circuit and actuated by said bar when engaged by the body of the operator for closing said circuit.

6. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, means for moving said forms selectively between said positions, actuating mechanism for controlling

the operation of said moving means, an electric circuit including a solenoid for controlling the operation of said actuating means, a horizontal bar movably mounted adjacent the operator's position for bodily movement transversely of its length, a switch connected in said circuit and actuated by said bar when engaged by the body of the operator for closing said circuit, and means for returning said bar to its initial position after it has been operated.

7. A hosiery drying machine comprising a plurality of drying forms each movable between a drying position and a boarding position, means including a series of cams for moving said forms selectively between said positions, means for rotating said cams, a clutch for controlling the operation of said rotating means, means for selectively determining the sequence of movement of said forms by said cams, and means including an electric circuit and a switch operating bar adapted to be actuated by the body of the operator for controlling the operation of said selective means and said clutch.

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