

Nov. 21, 1944.

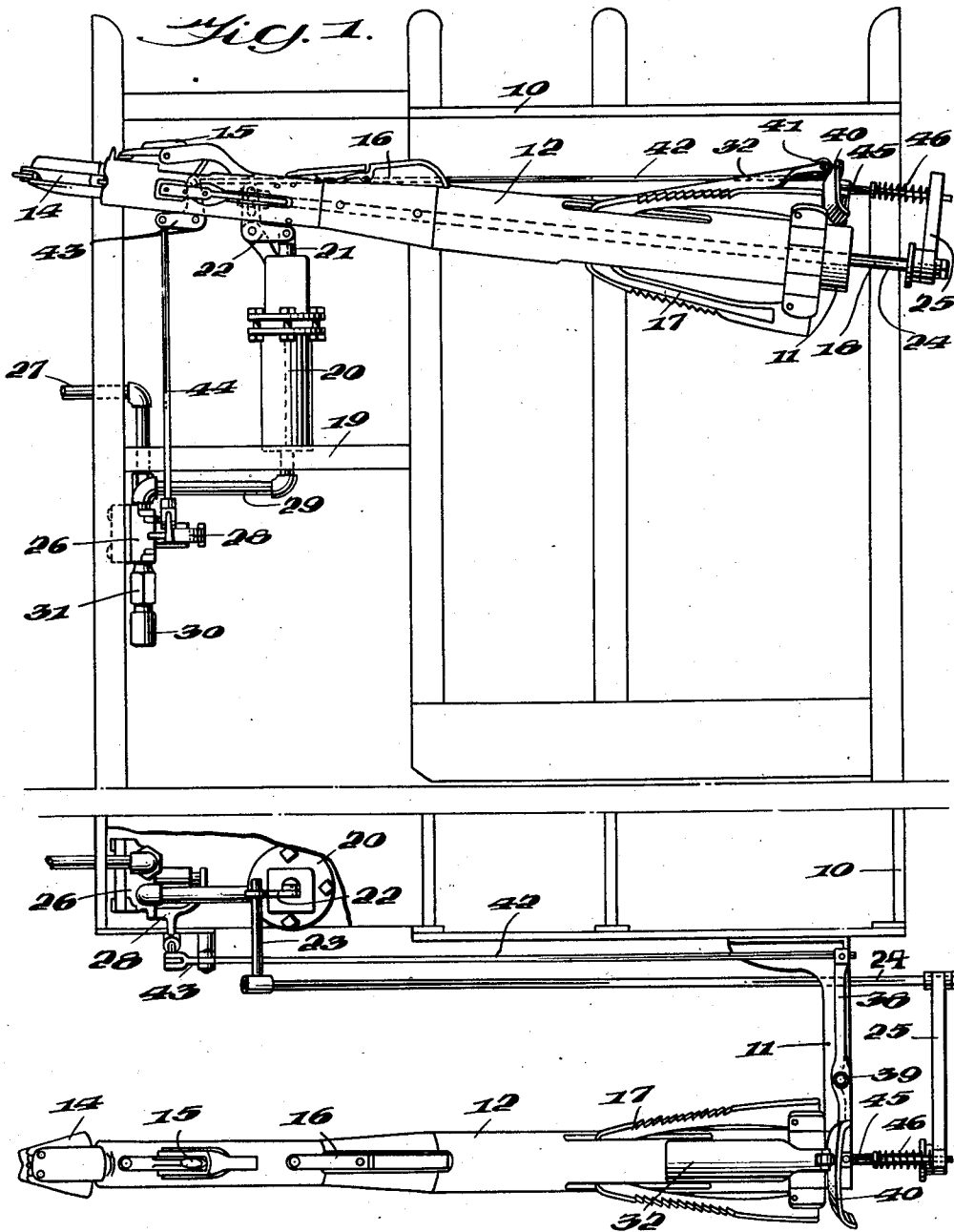
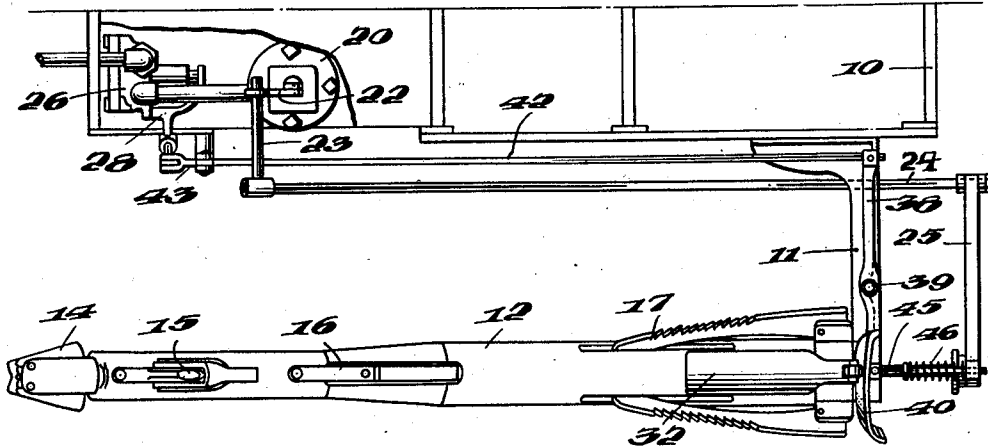
E. R. AMMON

2,363,380

HOSIERY INSPECTING MACHINE

Filed July 17, 1941

3 Sheets-Sheet 1



INVENTOR
EDWARD R. AMMON;

ॐ

Edmund H. Parry

Nov. 21, 1944.

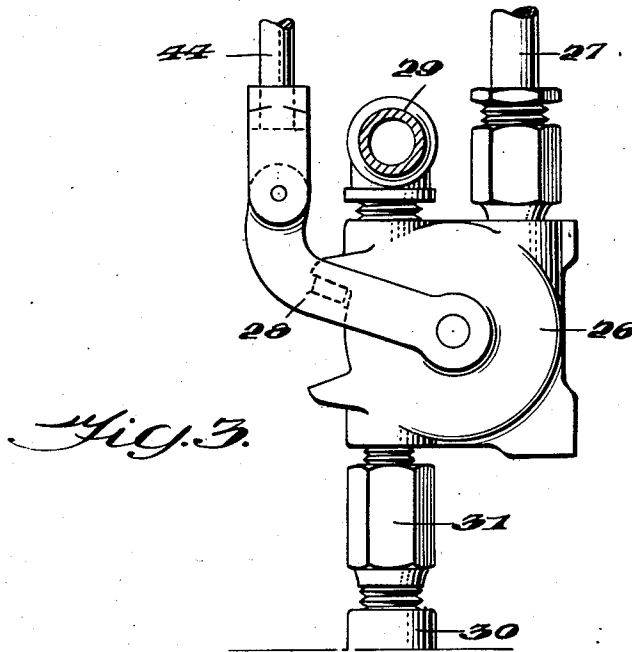
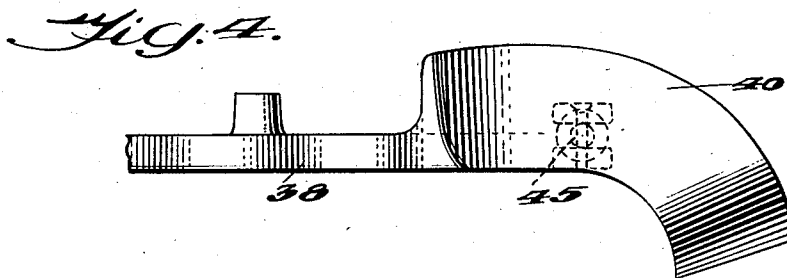
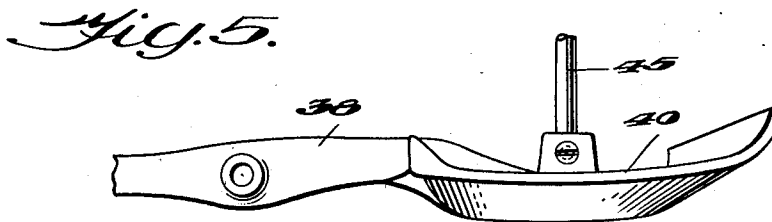
E. R. AMMON

2,363,380

HOSIERY INSPECTING MACHINE

Filed July 17, 1941

3 Sheets-Sheet 2



Inventor
EDWARD R. AMMON,

By *Edmund H. Perry*
Attorney

Nov. 21, 1944.

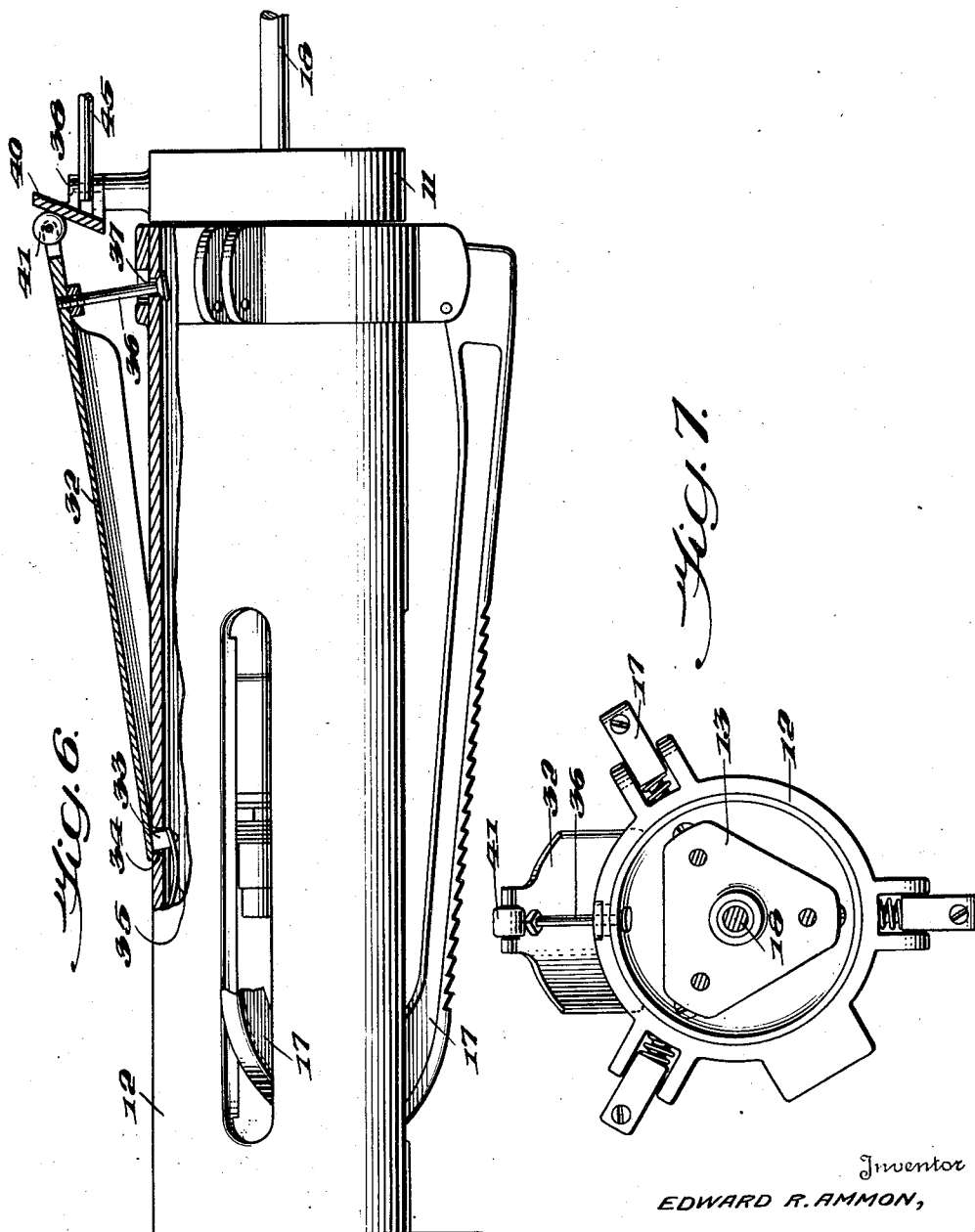
E. R. AMMON

2,363,380

HOSIERY INSPECTING MACHINE

Filed July 17, 1941

3 Sheets-Sheet 3



Inventor
EDWARD R. AMMON,

By *Edmund H. Perry Jr.*
Attorney

UNITED STATES PATENT OFFICE

2,363,380

HOSIERY INSPECTING MACHINE

Edward R. Ammon, Reading, Pa.

Application July 17, 1941, Serial No. 402,824

9 Claims. (Cl. 223-77)

This invention is directed to improvements in hosiery inspecting machines of the expansible form type, instances of which are found in my various prior patents, including No. 1,727,499, granted September 10, 1929; No. 2,010,172, granted August 6, 1935; No. 2,023,946, granted December 10, 1935; and No. 2,090,883, granted August 24, 1937. Such devices include a stocking supporting form provided with relatively movable stocking stretching parts adapted to distend the stocking in various areas to show up defects in fabric, seaming and looping.

The primary object of the invention is to provide an improved form of actuating mechanism for expanding the inspection form which will increase the efficiency, and minimize the effort required, of the machine operator.

In previous inspecting machines expansion of the stocking stretching parts of the form has been effected ordinarily through a foot pedal. Because substantial power is required, approximately thirty pounds, to stretch the stocking sufficiently for inspection purposes, power driven mechanism, usually a compressed air motor, has been employed to actuate the expansible form parts under control of the pedal device, although in some instances the pedal device has functioned directly through manual pressure.

With the prior machine just described the operator first drew the stocking over the inspection form with both hands, and then pressed the pedal with her foot to produce expansion, holding the pedal depressed until inspection was completed. Through release of the pedal the expansible parts were collapsed, the operator then drew the stocking off the form by hand, and following this applied the next stocking to be inspected.

The time for the several operations just described is extremely short, and while an operator with experience requires coordination in the movements of her hands in manipulating the stocking and of her foot in operating the pedal, there is nevertheless required a considerable amount of conscious mental effort in coordinating these movements which produces fatigue and slows down the inspection operation to some extent.

According to the present invention the mental factor is eliminated by automatically effecting expansion of the stretching parts as soon as the stocking is in proper position on the form and similarly collapsing such parts following completion of inspection when the stocking is to be removed from the form. Foot operation is com-

pletely eliminated and expansion and collapse of the form parts is obtained without conscious effort on the part of the operator.

The objects and advantages referred to are obtained by locating a control member at a point to be contacted by the hand of the operator without conscious or physical effort as she draws a stocking to inspecting position on the form. Such member will remain in contact with the operator's hand during the normal course of inspection, and will be released as the operator starts to draw the stocking off the form after inspection.

In the preferred embodiment of the invention the control member will be mounted on the body of the inspection form adjacent the welt end, and both it and its cooperating parts are designed to operate extremely easily so as to be sensitive to a light touch by the hand of the operator. In the course of inspection the form must be capable of partial rotation to give a better view of different circumferential areas of the stocking, and the control mechanism is so designed as to make this possible. While various specific arrangements of the control mechanism may be used within the scope of the invention, it has been found from experiment that many of such arrangements required an objectionable amount of physical pressure by the operator, and the specific arrangement herein shown and described is now considered preferable in avoiding this condition.

The hand controlled member as described will for practical reasons, as in the case of the former foot control, operate to effect movement of the expanding parts of the form through a motor mechanism, and such application of the invention is shown in the illustrative embodiment of the invention in the accompanying drawings hereafter to be described.

In the drawings:

Fig. 1 is a view in front elevation of a hosiery inspecting machine incorporating the improvements of the present invention, such view showing the supporting table, inspection form, and the operating and control mechanism;

Fig. 2 is a top plan view corresponding to Fig. 1;

Fig. 3 is an enlarged face view of the motor control valve appearing in Fig. 1;

Figs. 4 and 5 are side and top fragmentary views respectively of one of the control parts;

Fig. 6 is an enlarged fragmentary view in front elevation of a portion of the inspection form

together with the associated parts of the control mechanism; and

Fig. 7 is a transverse view looking from the right of Fig. 6.

A table structure generally indicated by reference numeral 10 is shown in Figs. 1 and 2, the same being formed of sheet metal and having a series of pockets at its top in which stockings may be placed. Secured to and outstanding from the front of the table near its right end is a bracket member 11 which supports the hosiery inspecting form 12 by securing connection with bearing member 13. (See Fig. 7.) Such bearing member supports the form for rotation so that the form may be partially turned during inspection.

The form 12 includes a plurality of relatively movable stocking stretching parts mounted for projection outwardly from the body of the form. In the illustrative form are shown toe stretchers 14, heel stretcher 15, calf stretcher 16 and circumferentially arranged welt stretchers 17. These parts are expanded by an actuating rod 18 located axially of the form through suitable cam or other operating elements which need not be dealt with here since they are shown and explained in my prior patents above referred to.

Mounted inside the table above shelf 19 is a power actuating means comprising an air motor 20. The piston rod 21 of the motor through suitable linkage including bell crank 22, cross arm 23, rod 24 and cross arm 25 connect with actuating rod 18 of the form. Admission of air to the air motor 20 forces piston rod 21 upwardly and through the described linkage serves to drive actuating rod 18 inwardly axially of the form to effect progressive expansion of the stocking stretching parts located at different longitudinal areas of the form.

Compressed air of about thirty pounds pressure is supplied to the air motor under control of valve 26 supported inside the left end wall of the table 10. Connecting with the valve structure is a compressed air supply line 27 controlled by a suitable valve so as to be closed when valve arm 28 is in its upper position as shown in Figure 3. Downward movement of arm 28 will permit the passage of air from supply line 27 through line 29 to the air motor 20 and produce expansion of the form as above explained. The return of arm 28 to its upper position will effect closing of line 27 and permit the air from the expansion motor to flow backwardly through line 29 and exhaust to the atmosphere through outlet 30. The valve structure 26 is not shown in detail as it is well known to those familiar with my prior inspection machines. Suffice it to say that separate valves are provided to control the air supply line 27 and the exhaust outlet 30 which are alternately operated by arm 28, one valve being open while the other is closed. As also known to those skilled in the art, it is preferable to reduce the discharge opening after a portion of the air has exhausted from the air motor so that the residual air in the motor will exhaust more slowly and prevent the stretching parts of the form from reaching their collapsed position with a shock. Any suitable pressure responsive auxiliary valve may be employed for this purpose and, as in the case of my prior machines, will be located in coupling member 31 positioned between the main valve structure 26 and the outlet 30.

In my prior machines the valve arm 28 was operated by a foot pedal mounted in the table

beneath shelf 19. The present invention utilizes a different arrangement for operating the stretching parts of the inspection form, and preferably utilizes the old control valve 26 and air motor 20 although not necessarily limited to operation through such arrangement.

As above explained the present invention is designed to enable the inspection machine operator to effect expansion of the stocking stretching parts of an inspection form at the appropriate time without conscious effort. For this purpose use is made of a control plate so positioned as to be contacted by the hand of the operator, and caused to effect expansion of the stocking stretchers, when the welt of a stocking is drawn by the hand to its proper inspecting position adjacent the right end of the form over welt stretchers 17. The control plate is so arranged that the hand of the operator may conveniently remain in contact therewith without effort during inspection of the stocking, including partial rotation of the inspection form, and will be released at the time the operator is ready to start removing the stocking from the form to effect collapse of the stocking stretchers prior to such removal.

In the preferred embodiment of the invention the control member takes the form of a plate 32 mounted on the form 12 itself at the welt end. As best shown in Figs. 6 and 7, control plate 32 is mounted on a stud 33 at its left end seating in an aperture 34 in the body of form 12 and normally held in its inclined raised position as shown by a light leaf spring 35 which yields readily to permit plate 32 to be depressed against the form body with a relatively light contact by the hand of the operator. A stud bolt 36 extending through opening 37 in the form body maintains plate 32 in alignment with the form and is adjustable to determine the outer position of plate 32 relative to the form body.

An arm 38 is pivotally mounted at 39 on the form supporting bracket 11 as best shown in Fig. 2 carrying a cam portion 40 having an inclined face which coacts with a small roller 41 mounted at the outer end of control plate 32. As best shown in Fig. 4, the cam 40 has an elongated arc-shaped contour so that roller 41 may contact the same in different rotative positions of the inspection form 12. Since in actual practice the form is turned through only a relatively small angle during a complete inspection operation, somewhat less than 90°, cam 40 is not unduly long. Its shape will conform to the arcuate path of travel of roller 41 as the form rotates about its central axis.

The cam-carrying arm 38 at its inner end connects with rod 42, and the latter connects with bell crank 43 mounted on the front of the table 10 near its left end. The bell crank in turn connects with vertical rod 44 which operates arm 28 of the control valve 26 previously described.

Depression of control plate 32 towards the form from the position shown in Fig. 6 causes roller 41 thereon to ride downwardly along the inclined surface of cam 40, thereby forcing the cam to the right. This swings the cam-supporting arm 38 to move rod 42 to the left, and through bell crank 43 to move rod 44 and valve arm 28 downwardly. Thereby air pressure is supplied through valve 26 to air motor 20 and the stocking stretchers of the form are expanded through the mechanism previously explained. When control plate

32 is released and raised again roller 41 allows

cam 40 to again move to the right and through the valve operating linkage valve arm 28 is raised to cut off the pressure supply to the air motor and vent the motor through outlet 30.

As above explained leaf spring 35 which supports control plate 32 on the form is relatively light in order that no substantial pressure shall be required from the hand of the operator to depress the same. It is evident, of course, that suitable means must be provided to swing the cam supporting arm 38 to the left as plate 32 is raised in order that the air motor may be exhausted through valve 26. If spring means be provided which constantly urges cam arm 38 to the left, it is obvious that the resistance thereof would have to be overcome by the hand of the operator in depressing control plate 32, thereby decreasing the sensitivity of the plate and requiring more pressure than desirable to effect depression thereof. To avoid this spring means is utilized in association with arm 38 which is operative only intermittently. Such means will be inoperative at the time plate 32 is depressed so that no resistance is offered to movement of cam 40 to the right, and becomes operative only after the plate has been depressed. This feature includes a small rod 45 pivotally connected to arm 38 behind cam 40 upon which is slidably mounted a coil spring 46. The outer end of rod 45 extends through cross arm 25 through which the stretcher actuating rod 18 is operated by the air motor. As arm 25 is moved to the left, it slides inwardly on rod 45, thereby compressing spring 46 against the back of cam 40, and creating a tension which serves to swing arm 38 to the left at the time control plate 32 is released.

The complete operation of the machine will now be briefly summarized. The operator draws a stocking over the toe end of the form, at which time the stocking stretchers are collapsed. As the stocking is drawn to its inspecting position on the form through the grasp of the operator's right hand with the stocking welt, the hand slides along control plate 32 and depresses the same. Such movement through roller 41 and cam 40 swings arm 38 to the right and results in the admission of pressure to the air motor 20 through valve 26. Through the leverage component of arm 38 and the lightness of spring 35, plate 32 can be depressed with only a light contact pressure to operate valve 26. The admission of air to the motor moves arm 25, and therethrough stretcher actuating rod 18 of the form to the left, expanding the stocking stretching parts of the form. The operator then inspects the stocking for defects, and because of the shape of cam 40 is able to partially rotate the form without interfering with the operative engagement of roller 41 with the arcuate cam face. Such roller merely slides lengthwise of the cam. When the stocking has been inspected, the right hand of the operator, which maintains a grasp on the welt of the stocking during the entire time, releases the plate and starts to draw the stocking to the left off the form. Spring 46, which did not act on cam 40 and arm 38 at the time plate 32 was depressed, was tensioned against the cam by arm 25 during the expansion of the form stretching parts. At the time, therefore, plate 32 is released by the hand of the operator, spring 46 acts on cam 40 to move the same to the left. Through the described operating arrangement this cuts off the supply of operating pressure to the air motor and exhausts

the air therefrom so that actuating rod 18 and arm 25 move to the right and allow the stretching parts of the form to collapse. The action of spring 46 on cam 40 further assists in raising the control plate 32, and for this reason the plate supporting leaf spring 35 need be only a light one. In the movement of actuating rod 18 and arm 25 to the right during the collapse of the stretching parts spring 46 is released from compressive engagement with cam 40 so as not to resist movement of the cam to the right when control plate 32 is again depressed when the next stocking is drawn onto the form for inspection.

It has been found in practice that the improved arrangement controlling the inspection form requires no conscious effort on the part of the operator for its operation. The hand which draws the stocking on the form without extra movement operates the control plate because of the position of such plate on the form body, and without physical exertion because of the nature of the mechanism through which the plate operates. The operator is able to carry out the inspecting operation more expeditiously and with less fatigue. The invention offers definite advantages over the old machine utilizing a pedal control which was operated by the foot of the operator.

It will be understood that the embodiment of the invention herein described is merely illustrative and is not to be taken as limiting the invention. In particular it will be understood that the inspection form may be of different construction than herein shown, and that other means than an air motor may be used for effecting expansion of the form in association with the inventive structure. The scope of the invention is therefore to be limited only as required by the scope of the appended claims.

I claim:

1. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, motor means for expanding said stocking stretching parts, and control means for said motor means including a depressible hand control plate adapted when depressed to energize the motor means, and a mounting supporting said control plate adjacent the welt end portion of the form so as to be contacted and depressed by the hand of the machine operator moving lengthwise of the form while the hand is engaged in drawing the upper portion of a stocking to inspecting position over the welt end portion of the form.

2. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, motor means for expanding said stocking stretching parts, control means for said motor means including a hand actuatable control member having a motor deenergizing position and a motor energizing position and adapted to be moved from one to the other of such positions through a relatively small movement of the hand, means mounting said control member free from interference with manipulation of a stocking on the form adjacent the welt end portion of the form for movement relative to the form by the hand of the machine operator from one to the other of its motor-controlling positions while said hand is engaged with a portion of a stocking on the welt end portion of the form.

3. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, a manually operable member mounted on the form and disposed closely adjacent the surface of the form so as to be located interiorly

of the stocking when the stocking is drawn onto the form, said control member being actuatable by the hand of the machine operator in manipulating a stocking on the form, and motor means for operating the stocking stretching parts of the form controlled by said manual control member.

4. In a hosiery inspecting machine, a support, a stocking receiving form having movable stocking stretching parts and mounted on said support for rotation, motor means for operating said movable stocking stretching parts of the form, and control means for said motor means including a manually operable member mounted on the form for rotation therewith in a position to be actuated by the hand of the machine operator when engaged in manipulating a stocking on the form, and being so positioned as not to interfere with the manipulation of the stocking on and off the form.

5. In a hosiery inspecting machine, a support, a stocking receiving form having movable stocking stretching parts and mounted on said support for rotation, a control member rotatable with the form mounted on the form adjacent the welt end thereof and adapted to be engaged by the hand of the machine operator in drawing a stocking on the form, a roller on said control member, a cam member mounted independently of the form and actuatable by said roller in different rotative positions of the form, and means operated through said cam member for expanding the stocking stretching form parts.

6. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, a manual control member mounted on the form and adapted to be actuated by the hand of the machine operator while the hand is engaged in drawing a stocking on the form, a movable cam member opposing the control member, a cam engaging part on the control member adapted to actuate the cam member upon movement of the control member, and means operated through said cam member for expanding the stocking stretching form parts.

7. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, a control plate extending lengthwise

of the form having its inner end hinged to the form and having its outer end located adjacent the welt end extremity of the form, spring means yieldingly holding the outer end of said plate away from the form and providing for depression of the plate by the hand of the operator in drawing a stocking on the form, a cam engaging part mounted on the outer end of the plate, a cam member mounted independently of the form coactive with said cam engaging part, and means operative through said cam member for expanding the stocking stretching form parts.

8. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, a manual control member mounted on and projecting outwardly from the form and depressible towards the form by the hand of the machine operator in drawing a stocking on the form, an actuating arm mounted independently of the form opposing said control member and actuatable upon depression of the control member, motor means responsive to said actuation of said actuating arm to effect expansion of the stocking stretching form parts, and means becoming operative through expansion operation of said motor means for reversely moving said actuating arm when the control member is released.

9. In a hosiery inspecting machine, a stocking receiving form having movable stocking stretching parts, a manual control member mounted on the form and positioned adjacent one end of the form, said manually actuated member projecting laterally from the form for engagement and easy movement by the hand of the machine operator while the hand is drawing a stocking on the form, motor means responsive to movement of the control member for expanding the movable stocking stretching form parts, and spring means for urging the control member to return to its starting position upon release by the hand of the operator and rendered operative to act on the control member by the motor means in effecting expansion of the stocking stretching form parts.

EDWARD R. AMMON.