Oct. 25, 1960 F. AUTEM 2,957,613

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Filed April 11, 1955 11 Sheets-Sheet 1

Fig. 1.

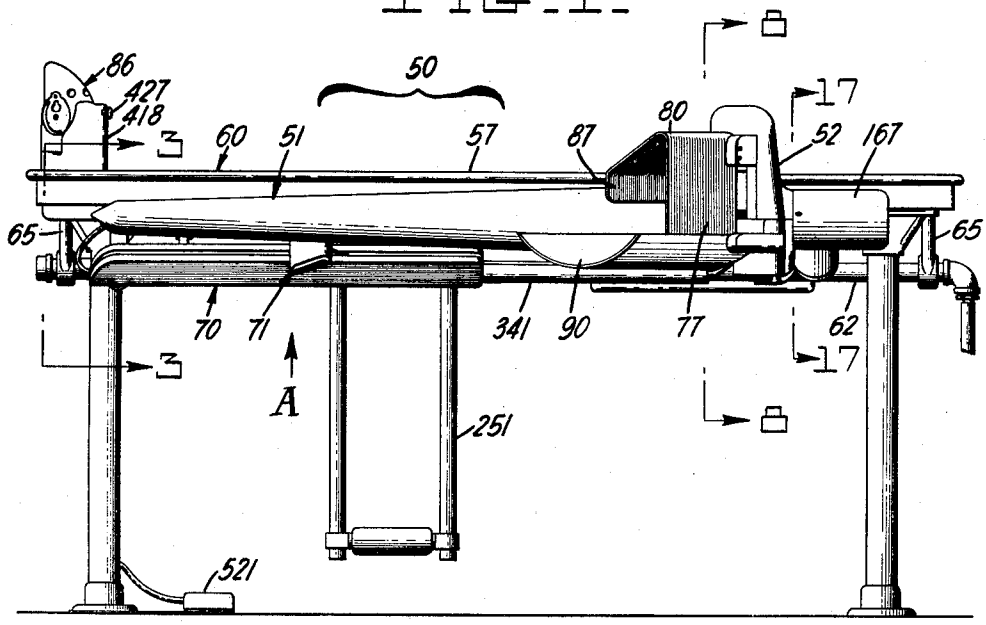


Fig. 2.

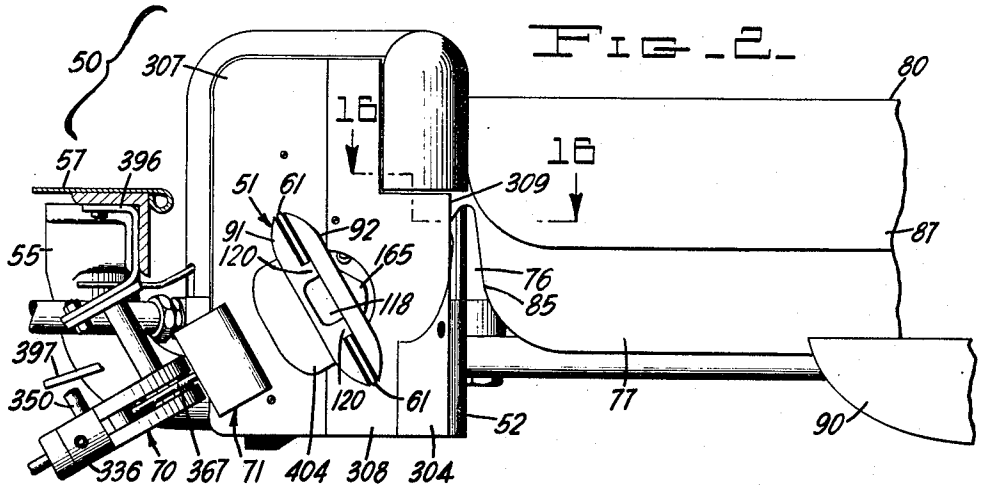
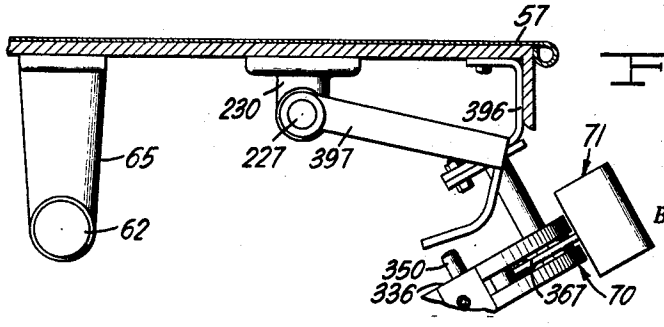


Fig. 3.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 2

FIG. 4.

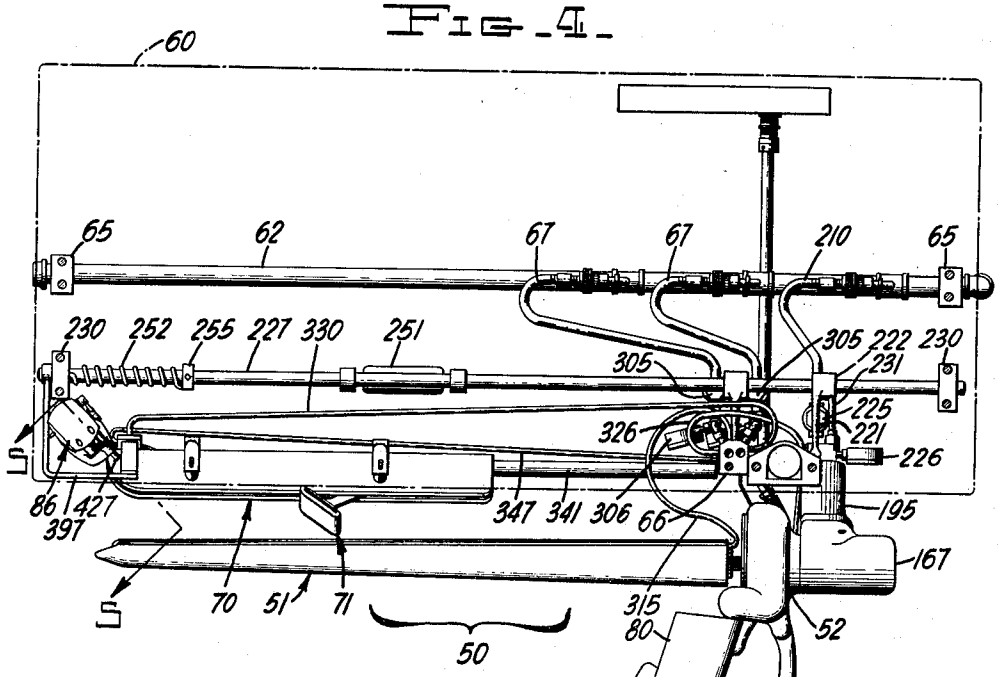


FIG. 5.

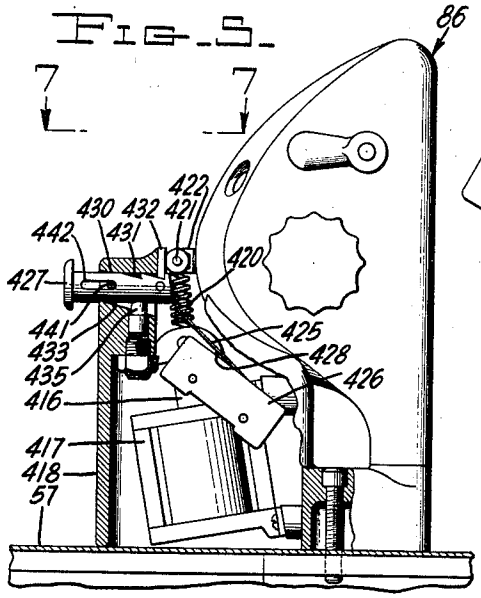


FIG. 6.

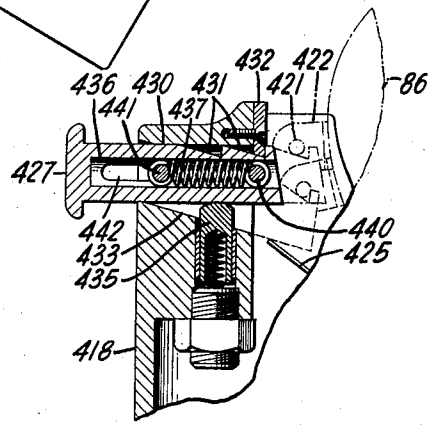
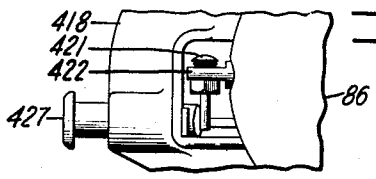


FIG. 7.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 3

Fig. 8.

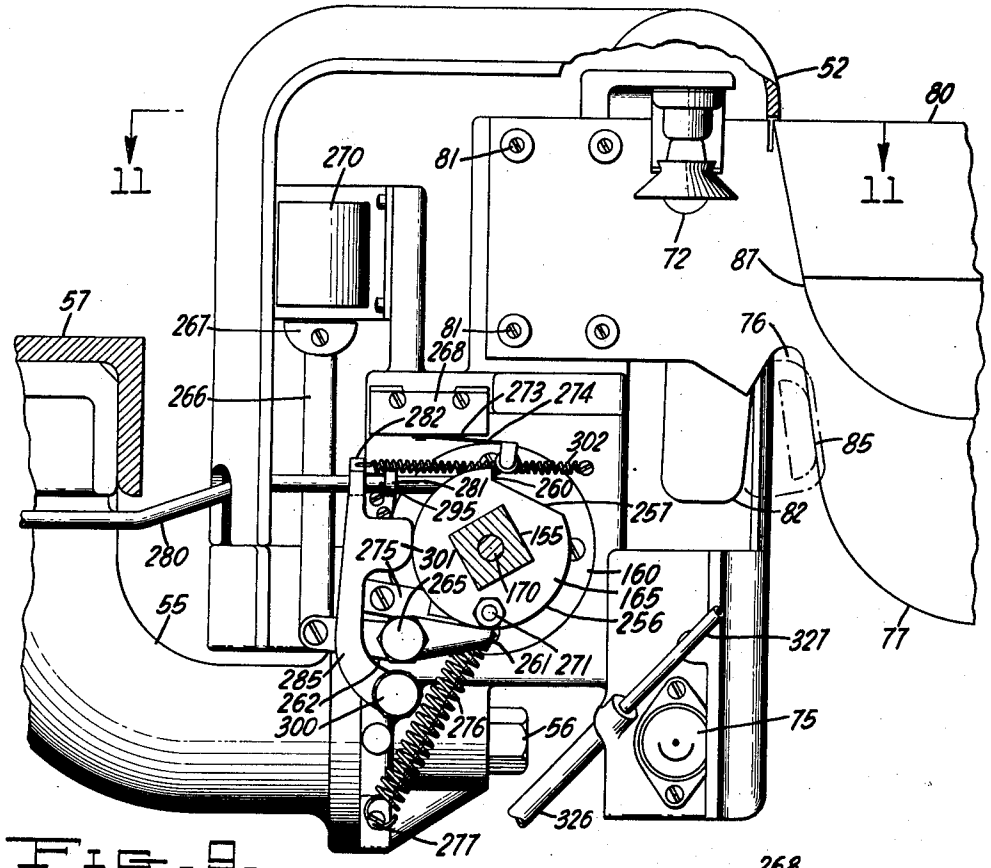


Fig. 9.

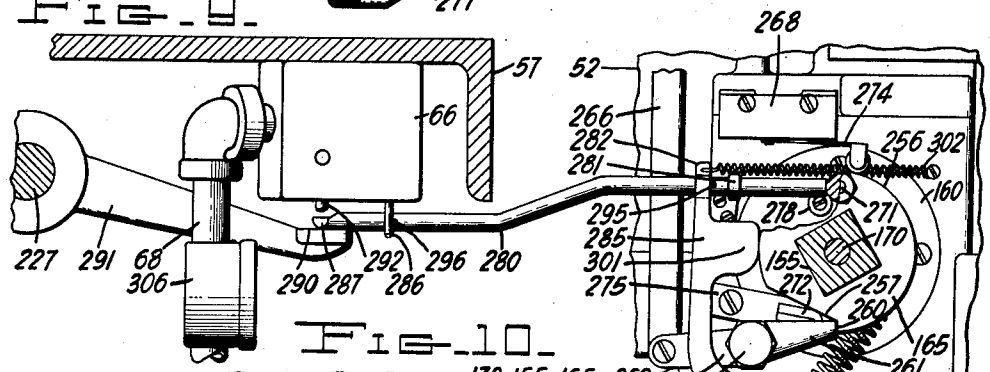
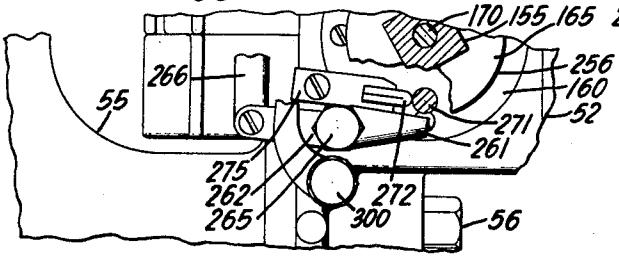


Fig. 10.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 4

Fig. 11.

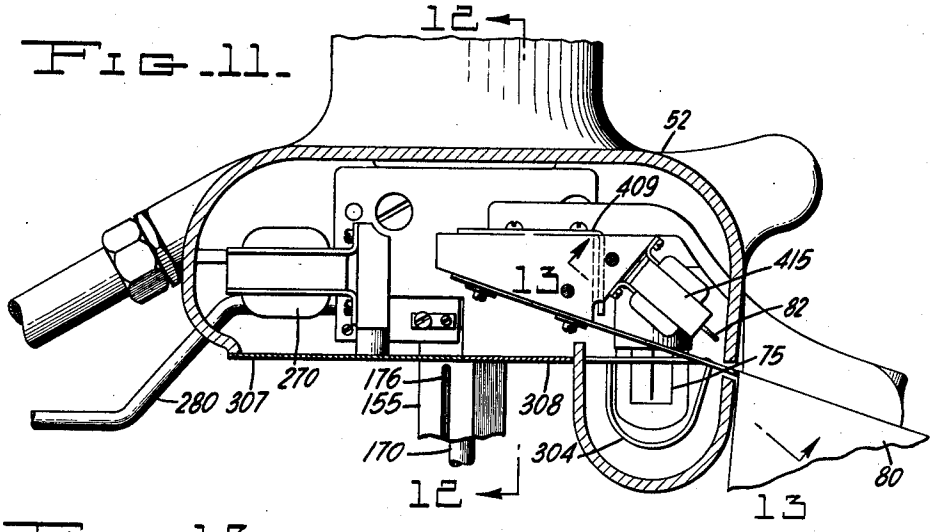


Fig. 13.

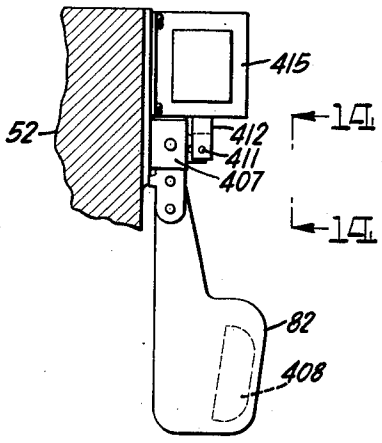


Fig. 12.

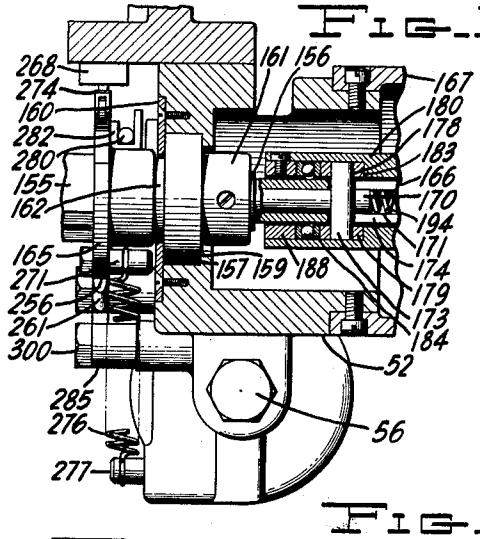


Fig. 14.

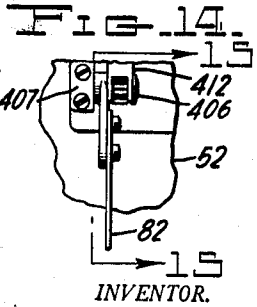


Fig. 15.

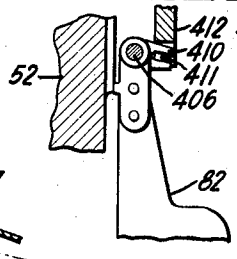
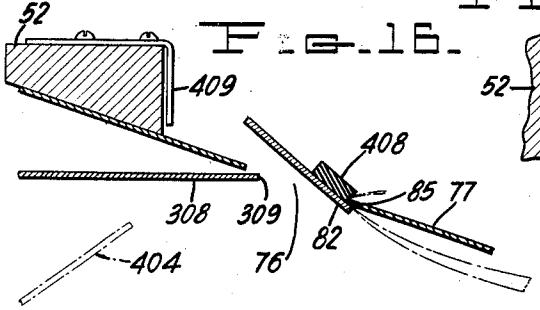


Fig. 16.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 5

Fig. 17.

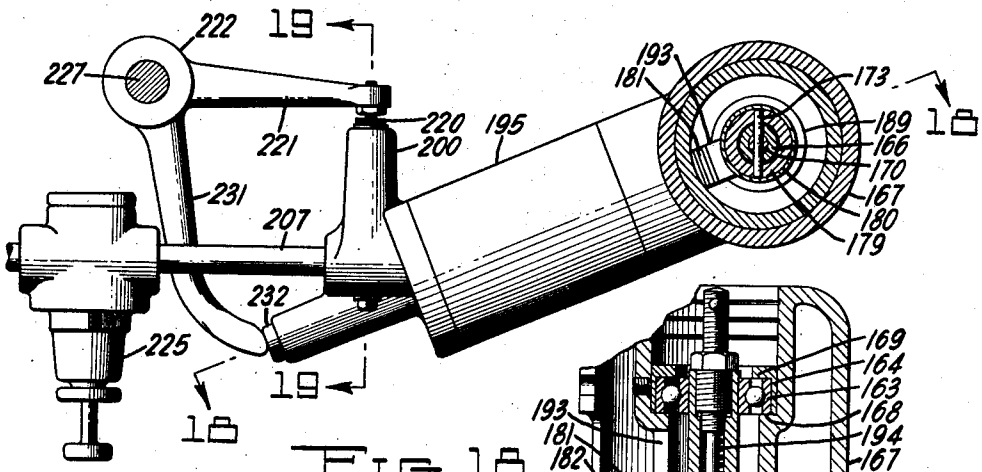


Fig. 18.

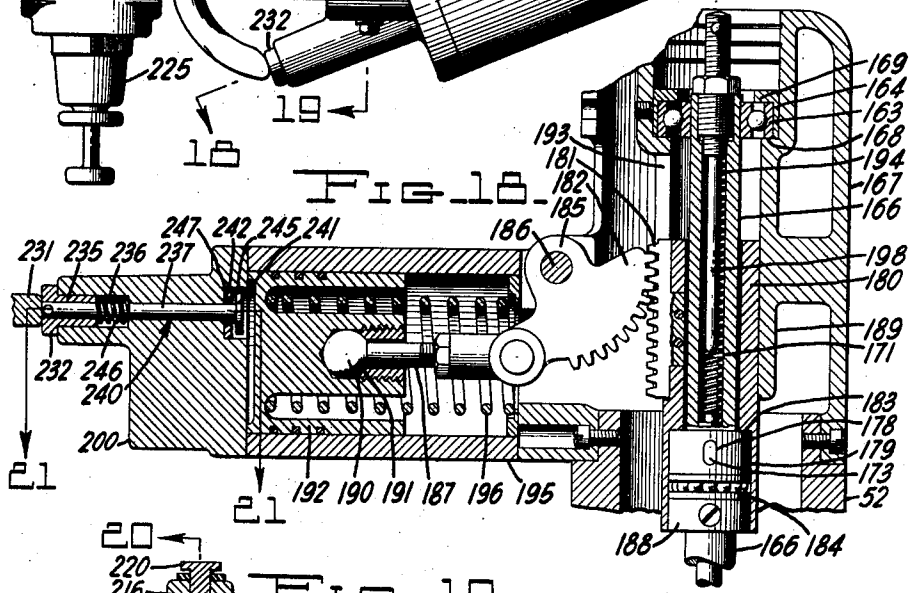


Fig. 19.

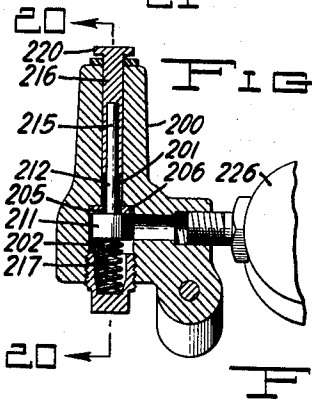


Fig. 20.

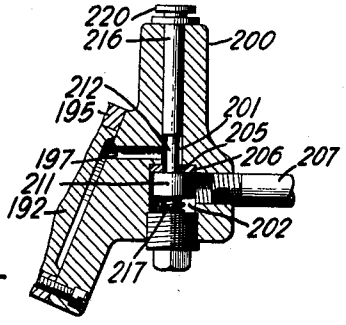
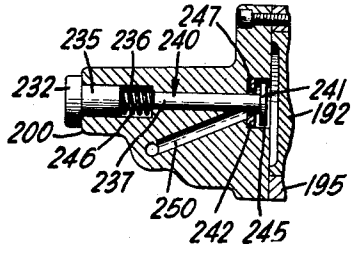


Fig. 21.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 6

Fig. 22.

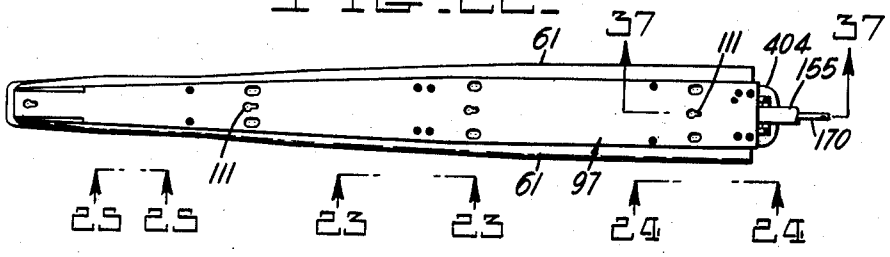


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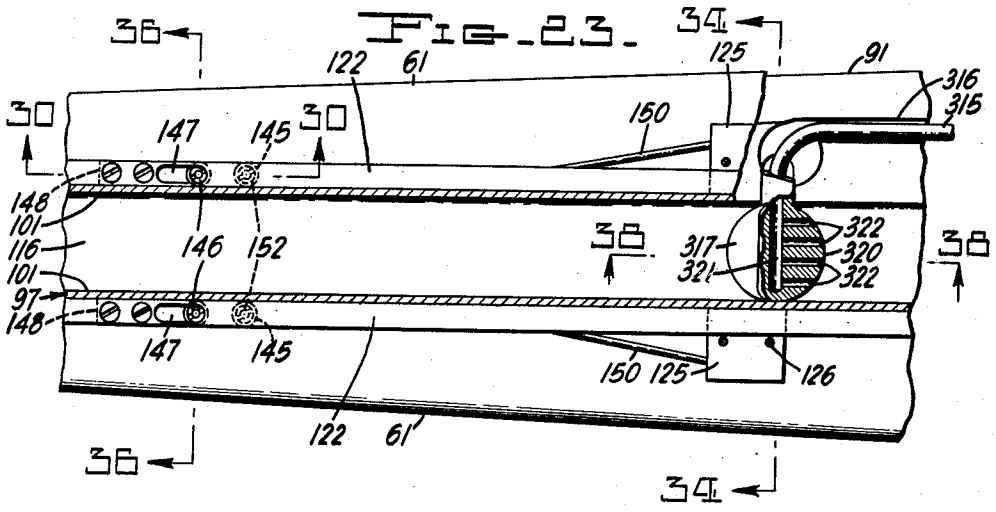


Fig. 24.

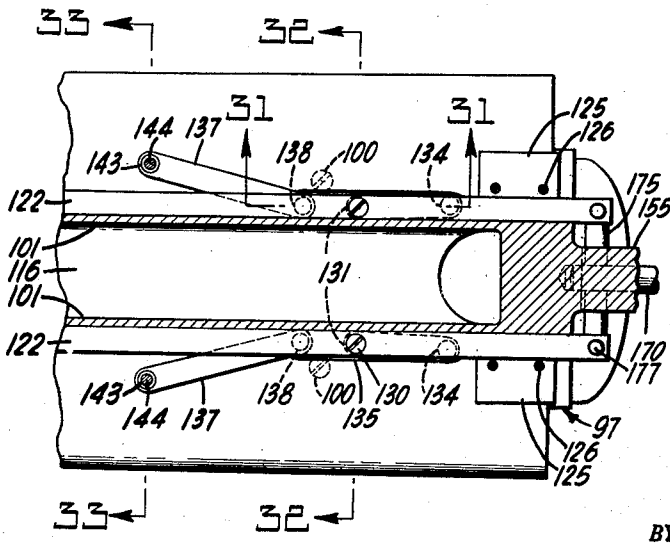
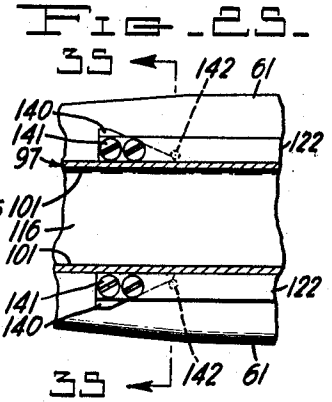


Fig. 25.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 7

Fig. 26.

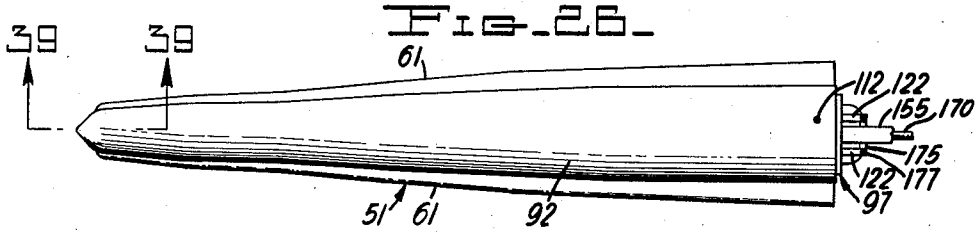


Fig. 27.

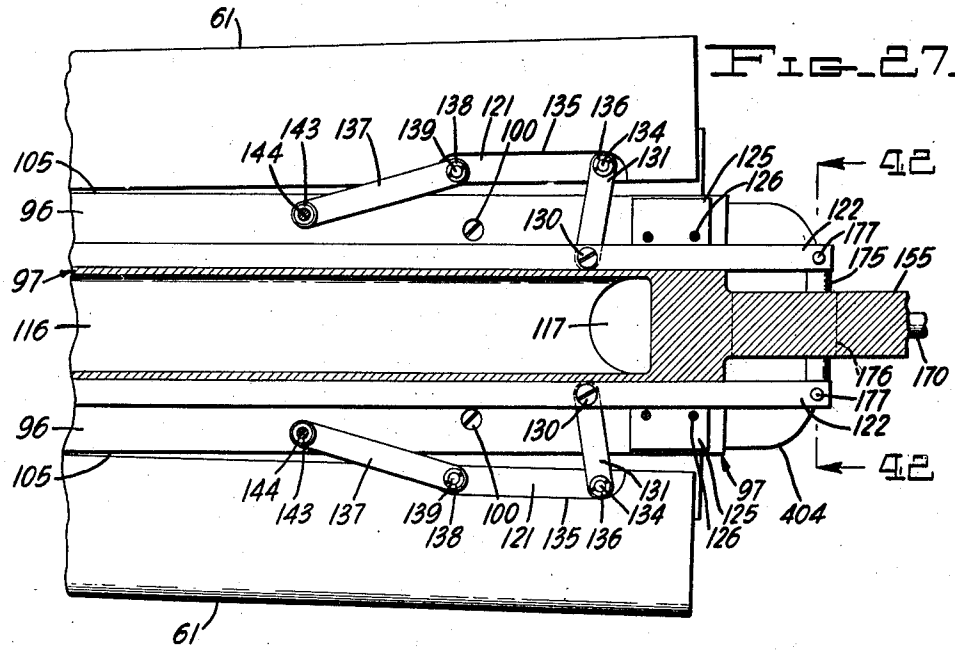
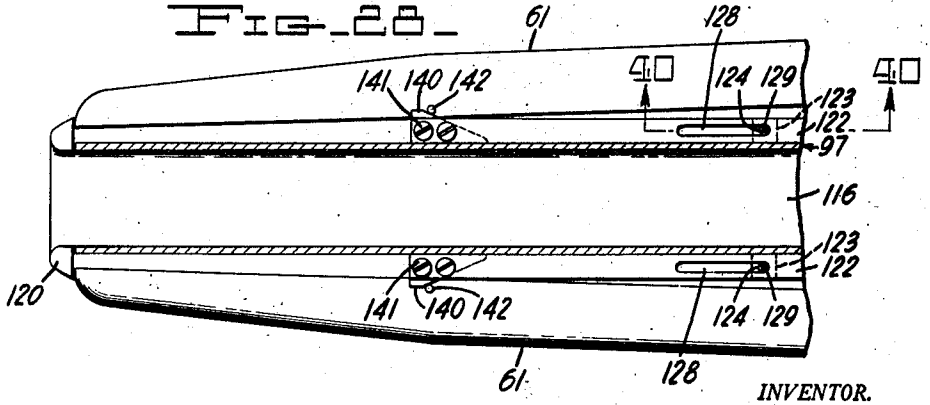


Fig. 28.



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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 8

Fig. 29.

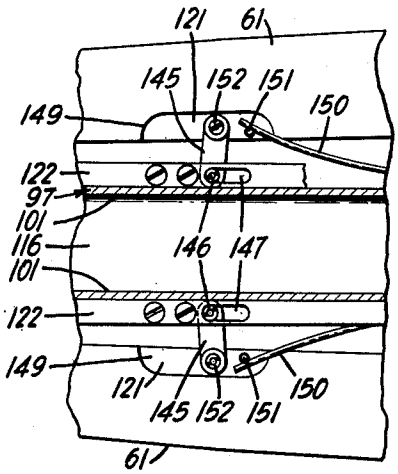


Fig. 30.

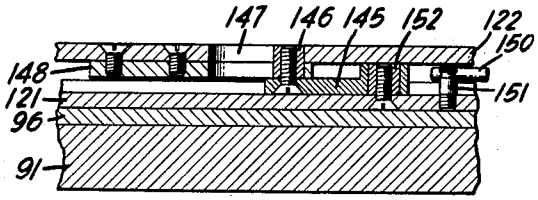


Fig. 31.

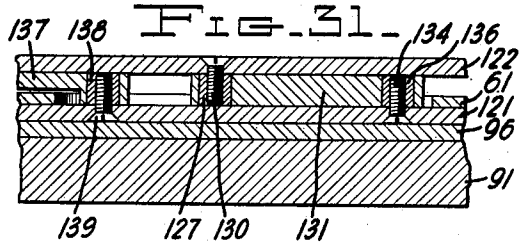


Fig. 32.

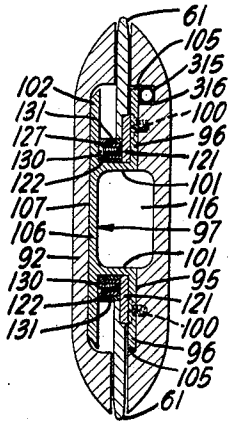


Fig. 33.

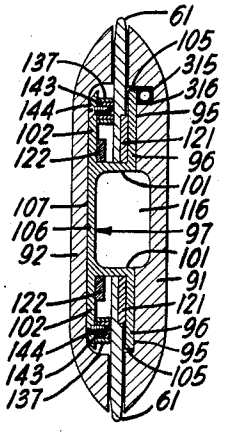


Fig. 34.

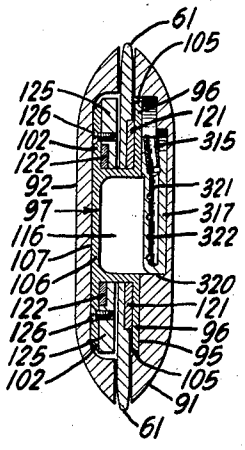
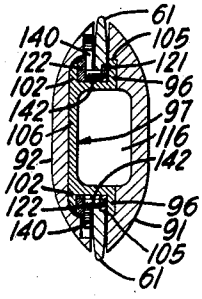


Fig. 35.



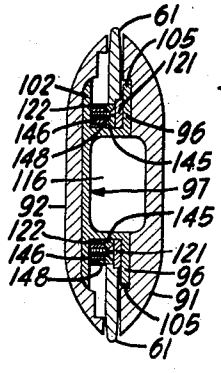


Fig. 36.

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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 9

Fig. 37.

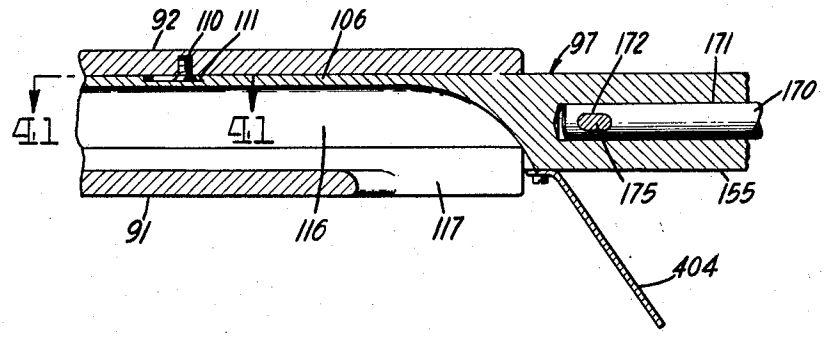


Fig. 38.

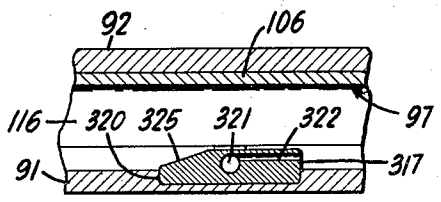


Fig. 39.

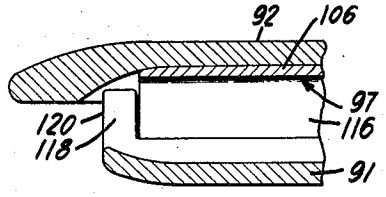


Fig. 40.

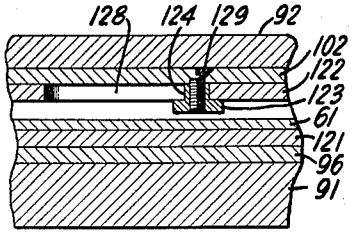


Fig. 41.

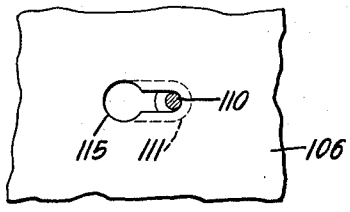
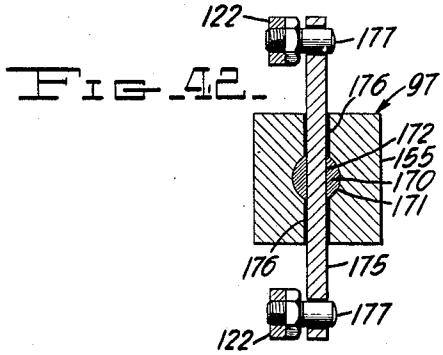


Fig. 42.



INVENTOR.
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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 10

Fig. 43.

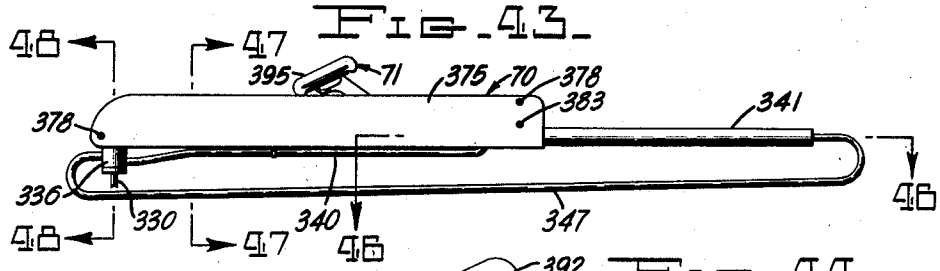


Fig. 44.

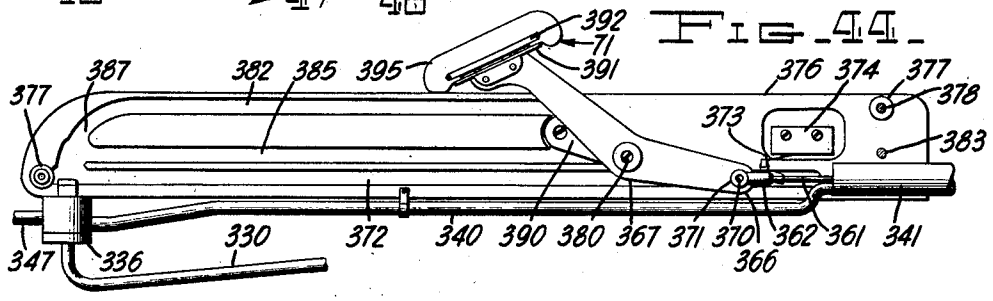


Fig. 46.

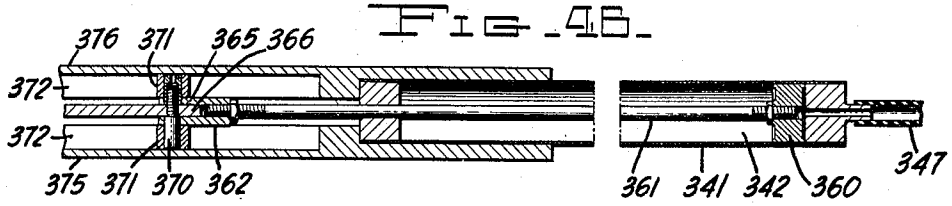


Fig. 45.

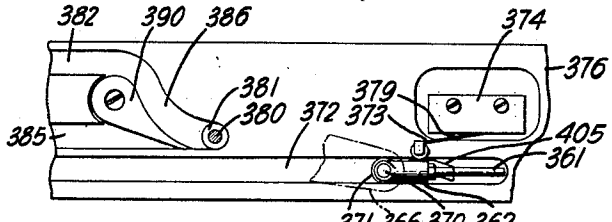


Fig. 47.

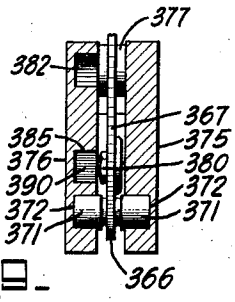


Fig. 48.

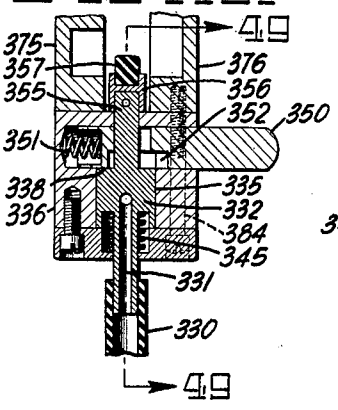
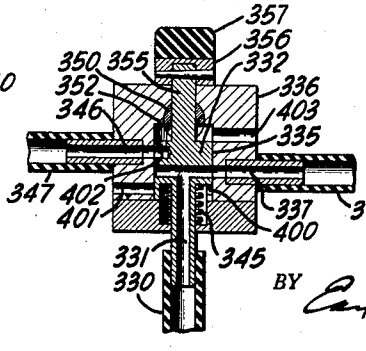


Fig. 49.



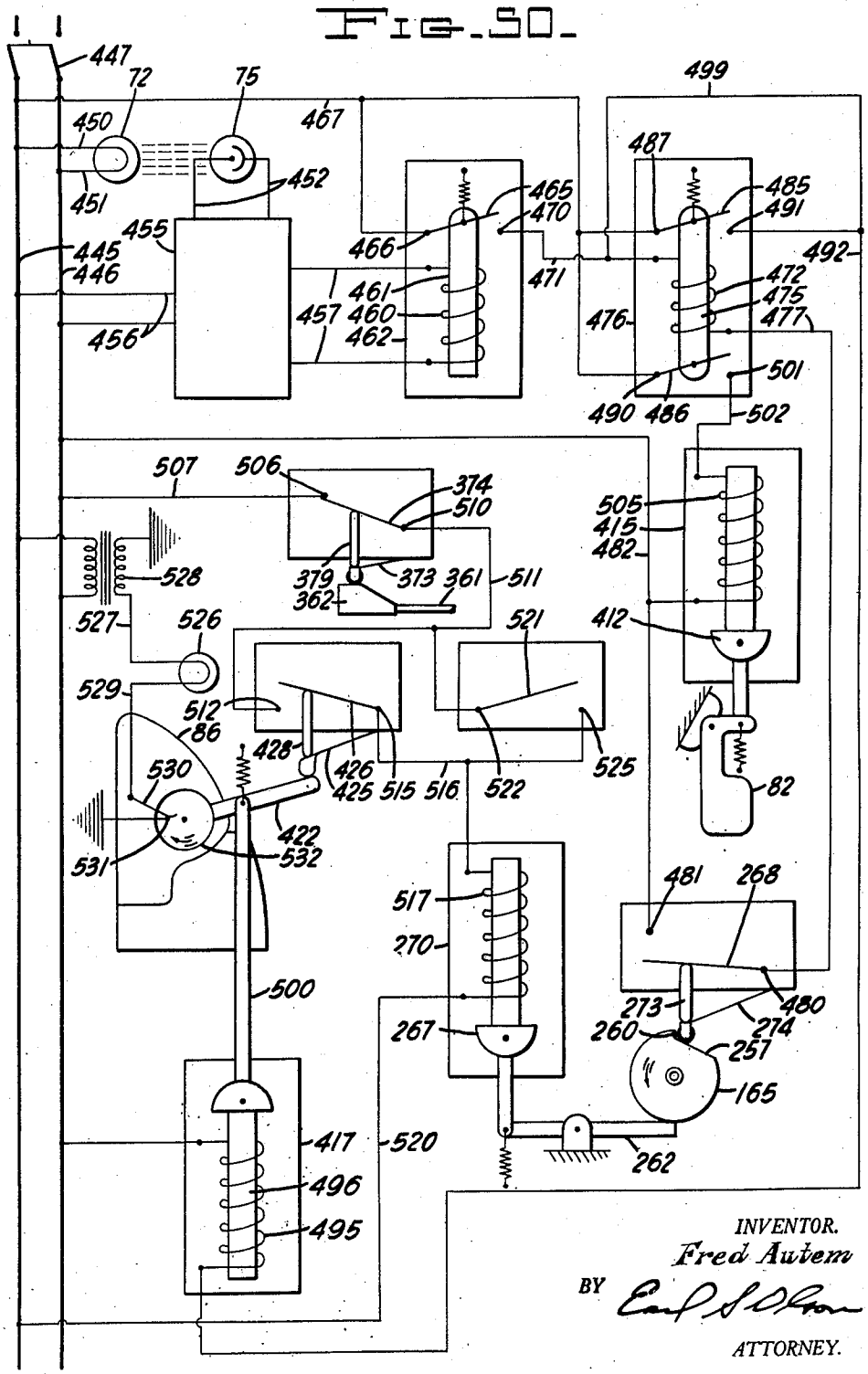
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Oct. 25, 1960 F. AUTEM 2,957,613

HOSIERY INSPECTING APPARATUS

Filed April 11, 1955 11 Sheets-Sheet 11

Fig. 50.



INVENTOR.
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United States Patent Office

2,957,613

Patented Oct. 25, 1960

2,957,613

HOSIERY INSPECTING APPARATUS

Fred Autem, Mount Penn, Pa., assignor, by mesne assignments, to Southern Textile Machinery Co. Inc., Paducah, Ky., a corporation of Kentucky

Filed Apr. 11, 1955, Ser. No. 500,570

29 Claims. (Cl. 223—43)

The instant invention relates to a hosiery inspection device and particularly to improved apparatus of this type providing increased automaticity of operation.

Conventionally, stockings such as women's full-fashioned hosiery, are subjected to visual inspection at an intermediate point in their production prior to boarding, dyeing and other finishing operations for the purpose of discovering and segregating those having defects in the knitted fabric, seams, or otherwise. For this purpose an inspection device has been used consisting of a form of generally stocking shape supported at one end with the other end free. The form is provided with means for expanding a stocking to place the fabric under tension, and is mounted for rotation on its longitudinal axis to permit both sides of the stocking to be presented in turn to the operator. In the operation of the conventional forms the stockings, received from prior operations in an "inside-out" condition, are first everted, this operation being performed by hand but being promoted by special features of the form as disclosed for example in the patent to Kalbach et al., No. 2,092,806, dated September 14, 1937, and then drawn onto the form over the free end with the welt or open end of the stocking first until the stocking toe is in contact with the free end of the form. In more recently developed forms the stockings are drawn on the form in their "inside-out" condition and everted as they are removed from the form. The stockings passing inspection are then piled in predetermined numbers in carriers or trays for transportation to later finishing operations, such as boarding, dyeing and the like.

The principal object of the invention is the provision of an inspection device of the stocking expanding type which automatically performs certain of the operations and in an improved manner over devices known heretofore, the device of the invention greatly accelerating the inspection cycle and reducing handling of the stockings with the result that increased production is obtained and fewer stockings are injured during the inspecting and turning operations.

Another object of the invention is the provision of a stocking inspection device of the expanding type including means for automatically turning the stocking after completion of the inspection and for conveying it through the form to a tray or other receiving means. In accordance with the invention a passageway is provided in the form through which the stocking is conveyed, the passageway having an entrance opening adjacent the free end and an exit opening adjacent the other. As will be understood in the drawing of the stocking into the passageway, the toe end first enters the passageway, the remainder of the stocking following and the entire stocking being everted during this operation.

Another object of the invention is the provision of a stocking inspecting and turning device of the type referred to having counting means the operation of which is controlled by the travel of the stocking to the receiving means.

Another object of the invention is the provision of a stocking inspecting and turning device comprising a stocking form having expander members or fins movable from a retracted position to a stocking expanding position, a stocking passageway as above referred to extending through the form, means for setting up a current of air within the passageway flowing toward the exit opening, and a mechanical device or pusher for urging the stocking toward the entrance opening of the passageway to initiate the stocking removal and everting movement which is completed by the air current.

Inasmuch as the toe of the stocking first enters the passageway through the form it will first issue from the exit opening. A further object of the invention is the provision of means for automatically gripping the toe and holding it momentarily to permit the air stream issuing from the exit opening to carry the remainder of the stocking past the held toe. The gripper means is controlled to release the stocking at this point to permit it to drop in reversed position into the tray or other receiving means. Another object of the invention is the provision of control means, suitably a light source and a light responsive cell on opposite sides of the exit opening, for operating the gripper, the control means also serving to operate a counting device previously referred to.

A further object of the invention is the provision of a stocking inspection and turning device including a stocking form having expander members movable between retracted and stocking expanding positions under the control of the operator, means for supporting the form for rotation on its longitudinal axis between initial and final inspection positions, and means controlled in part by the operator and in part by the movement of the stocking form into its final examining position for initiating the stocking removing and everting operations.

A still further object of the invention is the provision of an improved expandable form for an inspection and turning device of the type described having a longitudinally extending passageway and including a central frame member and relatively flat shell members, one of the shell members being fixed to the frame and the other being readily detachably connected thereto. The passageway is defined in part by the frame member and in part by a recessed portion in one of the shell members. An air current is set up in the passageway moving toward the exit opening through the medium of a nozzle placed intermediate the length of the passageway and having a series of openings directing jets of air longitudinally of the passageway. The expanding function of the form is obtained by expander members or fins adapted for projection into stocking expanding position through openings or slots formed by spacing the shell members. The projection means includes operating members movable longitudinally of the form and having connections with the fins for converting the longitudinal movement of the members to lateral movement of the fins.

A still further object of the invention is the provision of a stocking urging or pusher member of the type referred to and movable in a closed path into contact with the stocking on the form, longitudinally of the form toward the free end thereof, away from the form and back to the starting point, and a cylinder and piston device for moving the pusher member through its closed path.

A still further object of the invention is the provision of latching means for automatically securing the form in its final inspection position, and means for automatically releasing the latching means upon the removal of the stocking from the form and its conveyance to the receiving device. A further object is the provision of a manually operated means for releasing said latching means to permit return of the form to its initial position at an

earlier stage in the event a defective stocking is found and manually removed from the form.

A further object of the invention is the provision of gripper means, as referred to above, including a fixed element and an element movable from a remote position, in which it defines a passage with the fixed element, into contact with the fixed element, and baffle members for directing the current of air issuing from the exit opening, suitably supplemented by an additional air jet, toward said passage.

A still further object of the invention is the provision of an improved driving and control system for the operation of the several parts, said system involving an electrical circuit and including safety means to prevent certain operations in the event of the failure of an earlier operation in the inspection and turning cycle.

My invention will be more fully understood and further objects and advantages of the invention will become apparent when reference is made to the following more detailed description and to the drawings.

In the drawings:

Figure 1 is a front elevational view of a stocking inspecting device including an expanding form and means for counting and turning the stockings inside out in accordance with the invention;

Fig. 2 is an end elevational view on an enlarged scale of a portion of the device as seen from the left of Fig. 1, parts being shown in cross-section;

Fig. 3 is a view partly in end elevation and partly in cross-section taken along the line **3—3** of Fig. 1 and shown enlarged relative to Fig. 1;

Fig. 4 is a plan view of the device of Fig. 1 with the table top indicated in dot-and-dash outline;

Fig. 5 is a view partly in elevation and partly in cross-section of the counting means of the device taken substantially along the line **5—5** of Fig. 4 and shown enlarged relative to Fig. 4;

Fig. 6 is a view on an enlarged scale similar to a portion of Fig. 5 with certain of the parts being shown in different relative positions and other parts being in cross-section to further clarify their construction;

Fig. 7 is a plan view on an enlarged scale of a portion of the mechanism of Fig. 5 taken in the direction of the arrows **7—7** of Fig. 5;

Fig. 8 is a view partly in elevation and partly in cross-section of certain of the control means of the device taken substantially along the line **8—8** of Fig. 1 and shown enlarged with respect to Fig. 1;

Fig. 9 is a view similar to a portion of Fig. 8, the view being extended to include details not shown in Fig. 8 and the parts being shown in different operating positions;

Fig. 10 is a view similar to a portion of Fig. 8, parts being broken away to more clearly show additional details of the control means;

Fig. 11 is a cross-sectional plan view taken substantially along the line **11—11** of Fig. 8;

Fig. 12 is a view partly in cross-section and partly in elevation taken substantially along the line **12—12** of Fig. 11;

Fig. 13 is a cross-sectional view taken substantially along the line **13—13** of Fig. 11;

Fig. 14 is a view of a portion of the mechanism as seen looking in the direction of the arrows **14—14** of Fig. 13;

Fig. 15 is a cross-sectional view taken substantially on the line **15—15** of Fig. 14;

Fig. 16 is a cross-sectional view on an enlarged scale taken substantially along the line **16—16** of Fig. 2, with certain parts being omitted and others shown in different positions relative to Fig. 2;

Fig. 17 is a view of a control means for the expanding form partly in elevation and partly in cross-section taken along the line **17—17** of Fig. 1 and shown enlarged relative to Fig. 1;

Fig. 18 is a cross-sectional view taken along the line **18—18** of Fig. 17;

Fig. 19 is a cross-sectional view taken substantially along the line **19—19** of Fig. 17;

Fig. 20 is a cross-sectional view taken on the line **20—20** of Fig. 19;

Fig. 21 is a cross-sectional view taken substantially on the line **21—21** of Fig. 18;

Fig. 22 is a plan view on a reduced scale of the expanding form with the upper shell half removed;

Fig. 23 is a detailed plan view on an enlarged scale of the portion of the expanding form shown substantially within the arrows **23—23** of Fig. 22, parts being broken away and shown in cross-section in order to illustrate other parts in the background;

Fig. 24 is a detailed plan view similar to Fig. 23 showing the portion of the expanding form substantially within the arrows **24—24** of Fig. 22;

Fig. 25 is a detailed plan view similar to Fig. 23 showing the portion of the expanding form substantially within the arrows **25—25** of Fig. 22;

Fig. 26 is a plan view of the expanding form similar to Fig. 22 but with the upper shell in place and showing the stocking expanders extended;

Fig. 27 is a view similar to Fig. 24 with the parts shown in different positions relative to Fig. 24;

Fig. 28 is a plan view of the left end of the expanding form with the upper shell half removed and parts being broken away and shown in cross-section;

Fig. 29 is a view similar to a portion of Fig. 23 with certain of the parts shown in different positions relative to Fig. 23;

Fig. 30 is a cross-sectional view on an enlarged scale taken substantially along the line **30—30** of Fig. 23;

Fig. 31 is a cross-sectional view on an enlarged scale taken substantially along the line **31—31** of Fig. 24;

Fig. 32 is a cross-sectional view taken substantially along the line **32—32** of Fig. 24;

Fig. 33 is a cross-sectional view similar to Fig. 32 taken on the line **33—33** of Fig. 24;

Fig. 34 is a cross-sectional view similar to Fig. 32 taken substantially on the line **34—34** of Fig. 23;

Fig. 35 is a cross-sectional view similar to Fig. 34 taken substantially along the line **35—35** of Fig. 25;

Fig. 36 is a cross-sectional view similar to Fig. 35 taken on the line **36—36** of Fig. 23;

Fig. 37 is a cross-sectional view on an enlarged scale taken on the line **37—37** of Fig. 22;

Fig. 38 is a cross-sectional view through the expanding form taken on the line **38—38** of Fig. 23;

Fig. 39 is a cross-sectional view on an enlarged scale taken on the line **39—39** of Fig. 26;

Fig. 40 is a cross-sectional view through the expanding form taken substantially along the line **40—40** of Fig. 28;

Fig. 41 is a detailed plan view taken along the line **41—41** of Fig. 37;

Fig. 42 is a cross-sectional view on an enlarged scale taken along the line **42—42** of Fig. 27;

Fig. 43 is a plan view on an enlarged scale of a pusher means for pushing the stocking along the form as seen in the direction of the arrow A on Fig. 1;

Fig. 44 is a view on an enlarged scale of a portion of the mechanism of Fig. 43, with one of the side walls removed to more clearly illustrate the control means for the pusher;

Fig. 45 is a view similar to a portion of Fig. 44 with parts being omitted in order to more clearly show others, Fig. 45 being shown enlarged relative to Fig. 44;

Fig. 46 is a cross-sectional view on an enlarged scale of the air cylinder for operating the pusher, taken on the line **46—46** of Fig. 43;

Fig. 47 is a cross-sectional view taken along the line **47—47** of Fig. 43 and shown greatly enlarged relative to Fig. 43;

Fig. 48 is a cross-sectional view on an enlarged scale through the control valve for the air cylinder, taken on the line 48—48 of Fig. 43;

Fig. 49 is a cross-sectional view taken along the line 49—49 of Fig. 48; and

Fig. 50 is a diagrammatic view illustrating the electrical circuit for automatically controlling the operation of the stocking inspecting device.

Referring to the drawings and particularly Figs. 1 and 4, an apparatus according to the instant invention for inspecting and turning stockings is indicated generally at **50** and includes a flat form **51** having a free end over which a stocking blank is drawn welt end first until the toe of the stocking is against the free end of the form. The stocking is placed on the form with the wrong side outside as it comes from a previous operation. The form is rotatably mounted in a housing **52**, as hereinafter set forth, which is secured to a bracket **55** by means of a bolt **56** (Figs. 8 and 12). The bracket **55** is secured to the underside of a top portion **57** of a table **60** to support the form **51** in a position extending along the front of the table. The form **51** is provided with expander members or fins **61** which are adapted to be projected outwardly to stretch the stocking, by mechanical means operated by compressed air or other fluid under pressure from a supply pipe or conduit **62** supported in brackets **65** secured to the underside of the table (Figs. 3 and 4).

After inspecting the side of the stocking on the flat side of the form **51** facing the operator, the form is partially rotated from its initial inspecting position to bring the other side of the form into its final inspecting position and the form is then latched in this latter position. After the final inspection of the stocking, the expander members **61** are retracted, which institutes a cycle of operations including the drawing of the stocking through the interior of the form to turn the stocking right side out, counting the stocking, placing the stocking in a tray or other container and returning the form to its initial position for the start of another inspecting and turning cycle. For this purpose the apparatus **50** also includes a control valve **66** which is carried on the underside of the top portion **57** of the table **60**, the valve being connected to the compressed air conduit **62** by air line **68** (Fig. 9) including sections of flexible hose **67** or the like. The control valve **66** is connected to the interior of the form **51** to direct a current of air toward the back or welt end of the form and is connected to the motive means for a pushing unit indicated generally at **70** having a pushing member **71** which is constructed and operated, as hereinafter set forth, to engage and push the stocking toward the free or toe end of the form to assist the current of air to draw the stocking off the form and through the interior thereof.

As the toe end of the stocking emerges or is ejected by the air from the exit opening at the back end of the form **51** it is deflected through a light beam of a photoelectric device including a light tube **72** and a photo-tube or cell **75** into an opening or passage **76** formed between one wall **77** of a channel-shaped member **80** secured to the housing **52** by screws **81** (Fig. 8) and a portion of the housing (Fig. 2) as hereinafter set forth. The toe portion of the stocking in passing through the light beam energizes an electrical circuit which causes a member **82** to be actuated to clamp the toe portion against an edge surface **85** of the wall **77** forming one side of the opening **76**, as shown in Fig. 16, as hereinafter more fully set forth.

As the welt portion of the stocking emerges from the interior of the form it is carried past the toe portion between the wall **77** and a second wall **87** of the member **80**, the walls **77** and **87** serving to guide the welt end of the stocking over a tray **90** on which the stocking is subsequently deposited. Energization of the electrical circuit also causes operation of a counting device **86** (Fig. 5) which registers the number of stocking inspecting cycles, and causes release of the form **51** for return to its position for the start of a subsequent inspecting cycle. As the form **51** is returned to starting position, the valve **66** is closed to shut off the air currents and the electrical circuit is deenergized which causes actuation of the member **82** to release the toe of the stocking and the stocking thereupon drops onto the tray **90**.

As hereinbefore described, the form **51** is of the flat type having expander members or fins **61** which are projected or expanded outwardly from the form to stretch a stocking on the form. The form **51** compirses outer shell halves **91** and **92** (Figs. 32 to 36) preferably formed of "Bakelite" or other plastic material which may be highly polished to provide a smooth friction free surface to permit the stockings to be readily drawn thereover. In plan view (Fig. 22) the form has a symmetrical outline which will extend the various portions of the stocking without exerting excessive initial tension in the stocking fabric. The shell half **91** is recessed as at **95** to receive side wall portions **96** of a central shaft or frame member **97**, the frame member extending along substantially the full length of the shell half **91** and being secured thereto by screws such as indicated at **100** (Fig. 32). As shown in Figs. 32 to 36, inclusive, the side walls **96** of the frame member **97** are connected by end walls **101** to side wall portions **102**, the side and end walls forming channel sections **105** opening toward the side edges of the form **51**. The channel sections are joined by a center web **106** which is aligned with the walls **102**, the web and walls **102** engaging the bottom surface of a recess **107** in the shell half **92** and acting to space the shell halves from each other. The tapered heads of screws **110** secured in the shell half **92** interfit in rabbeted slots **111** in the web **106** of the frame member **97** (Figs. 37 and 41) to removably attach the shell half **92** to the frame member **97**. A screw **112** passing through the shell half **92** and secured in the frame member **97** maintains the shell half **92** in correct position with respect to the shell half **91**. To remove the shell half **92** from the frame member **97**, the screw **112** is removed and the shell half shifted toward the left, as viewed in Figs. 37 and 41, to align the heads of the screws **110** with enlarged apertures **115** at the left ends of the slots **111** which permit the heads of the screws **110** to be removed from the slots.

As shown in Figs. 32 to 36, the end walls **101** and web **106** of the frame member **97** define an aperture which is in register with a recessed portion in the shell half **91** to form an unobstructed passageway **116** extending through the form **51** from an entrance opening **118** at the forward or toe end (Fig. 39) to an exit opening **117** formed in the shell half **91** at the rear or welt end of the form (Fig. 37). The end of the shell half **92** of the form **51** is shaped to fit the toe tip of the stocking and extends beyond the end of the shell half **91** (Fig. 39) to facilitate entry of the stock into the opening **118** of the passageway **116**, as hereinafter set forth. As shown in Figs. 2 and 28, the toe end of the shell half **91** has rounded top portions **120** formed thereon to cover the end edges of the walls **101** of the frame member **97** and to define the entrance opening **118**.

As previously mentioned, the shell halves **91** and **92** are spaced from each other to provide elongated openings through which the expander members or fins **61** extend. The fins **61** are preferably of the same or similar material as the shell halves **91** and **92** and are provided with stiffening plates **121** preferably of metal, which engage the inner surfaces of the walls **96** in the frame member **97** to guide the fins for movement in the channel sections **105**. The fins **61** are normally in retracted positions in which they engage the wall portions **101** of the frame member **97**. For projecting the fins **61** outwardly from the side edges of the form **51** actuating rods **122** are provided, one being assocated with each of the fins. The

actuating rods 122 extend along the channel sections 105 of the frame member 97 and are guided for sliding movement in the channel sections between the walls 102 and blocks 125 secured to the side walls adjacent the rear end and center of the form 51, respectively, by screws 126 (Figs. 23, 24 and 34). Each actuating rod 122, adjacent the toe end of the form 51, is also guided between an enlarged head 123 of a member 124 which extends through a slot 128 in the actuating rod and is secured to the side wall 102 by a screw 129 (Figs. 28 and 40).

The actuator rod 122 for each fin 61 adjacent to the rear end of the form 51 has a bushing or nut 127 secured thereto, as by screw 130, the bushing providing a bearing for pivotally mounting one end of a link 131 (Figs. 31 and 32). The link 131 lies in a cutout 135 in the fin 61 with its other end in engagement with the stiffening plate 121 and pivoted on a bushing or nut 136 secured to the stiffening plate by means of a screw 134. One end of a stabilizer link 137 is pivotally mounted on a nut 138 secured by a screw 139 to the stiffening plate 121 on each fin 61 and the other end of the link is pivotally mounted on a nut 143 secured to the side wall 102 of the frame member 97 by a screw 144 (Fig. 33), the stabilizer link acting to maintain the fins in predetermined lengthwise position between the shell halves 91 and 92 during the movement of the fins between retracted and projected or stocking expanding positions.

Adjacent to the forward or toe end of the form 51 each actuator rod 122 has a cam block 140 secured thereto by screws 141 the cam block being adapted to engage a pin or follower 142 carried in the stiffening plate 121 of the adjacent expander member 61 (Figs. 25, 28 and 35). A further link 145 lies in a cutout 149 in each expander member or fin 61 and has one end pivotally mounted on a bearing member 152 secured to the stiffening plate 121 (Fig. 30). The other end of the link 145 carries a bushing or bearing member 146 which extends into and has sliding engagement in a slot 147 formed in the actuator rod 122 and a stiffening plate 148 secured to the actuator rod at this point (Fig. 30). Wire springs 150 having one end fixed in the blocks 125 adjacent the center of the form 51, are adapted to engage pins 151 carried in the stiffening plates 121 (Figs. 23 and 29) to bias the fins toward their retracted positions.

As shown in Figs. 23, 24 and 25, with the actuator rods 122 in their left position, the fins 61 are in retracted position, the links 131 and 145 lie substantially parallel to the end walls 101 of the frame member 97 with the bearing portions 146 of the links 145 against the right ends of the slots 147 in the actuator rods and the pins 142 in the fins are on the low parts of the cam blocks 140. Upon movement of the actuator rods 122 toward the right the links 131 and 145 swing outwardly about the bearing members 127 and 146, respectively, and the pins 142 ride up the inclined portions of the cam blocks 140 to project the fins 61 outwardly against the pressure of the springs 150 (Figs. 26, 27, 28 and 29). As the actuator rods 122 near the ends of their movement to the right, the left ends of the slots 147 engage the bearing members 146 to complete the outward swing of the links 145.

As hereinbefore set forth, the form 51 is rotatable to permit inspection of both sides of a stocking on the form. For this purpose the frame member 97 has a square extension 155 having a round portion 156 which is rotatably carried in a ball bearing 157 mounted in a portion of the housing 52, as shown in Fig. 12. The bearing 157 is maintained in fixed position in the housing 52 between a shoulder 159 of the housing and a plate 160 secured to the housing (Fig. 12). The shaft 156 is held in fixed axial position between a collar 161 fixed on the shaft in abutting relation with the bearing 157 and a thrust washer 162 carried on the shaft between the bearing and the hub portion of a disk 165 secured to the extension 155, the purpose of the disk being hereinafter set forth. The shaft 156 has a portion 166 of reduced diameter which extends through and is supported in a second ball bearing 163 carried in a sleeve 164 fixed in a portion 167 of the housing 52. The bearing 163 is held in fixed position between a shoulder 168 in the housing portion 167 and a flange 169 on the sleeve 164, as shown in Fig. 18.

The actuator rods 122 are moved along the channel sections 105 of the frame member 97 to retract and project the fins 61 by a rod 170 which is slidable in the hollow interior 171 of the extension 155 and the shaft portions 156 and 166 of the frame member 97. The rod 170 is provided with an aperture 172 for a cross member 175, the ends of the cross member extending from opposite sides of the rod through slots 176 in the extension 155 for engagement with a stud 177 carried in each of the actuator rods (Fig. 42).

The rod 170 carries a cross pin 173 which extends from opposite sides of the rod through a slot 174 in the shaft portion 166 into apertures 178 in a collar 179 (Figs. 12 and 18). The collar 179 is rotatably carried in a sleeve 180 between a shoulder 183 of the sleeve and a thrust bearing 184 which is held in position in the sleeve by a collar 188. The sleeve 180 is axially slidable in a bearing 189 formed in the portion 167 of the housing and carries a rack member 181, the rack member extending through and interfitting in a slot 193 in the bearing (Fig. 17) to prevent rotative movement of the sleeve in the bearing. The rod 170 and sleeve 180 are biased downwardly, as viewed in Fig. 18 or to the left as viewed in Fig. 12, by a spring 194 which is positioned in the hollow interior 171 in the shaft portion 166 between the end of the rod and a pin 198 adjustably carried in the end of the shaft portion. It will be obvious from the foregoing that the shaft portions 156 and 166 have rotative but no axial movement in the housing 52, that the sleeve 180 has sliding movement but no rotative movement in the housing and that the rod 170 has rotative movement relatively to the sleeve and is axially slidable with the sleeve relatively to the shaft portions.

The sleeve 180 and rod 170 are slidably moved by engagement of the teeth of the rack member 181 with the teeth of a segmental gear portion 182 of a lever 185 pivotally mounted on a pin or shaft 186 carried in the portion 167 of the housing 52. The lever 185 is pivotally connected to one end of a link 187, the other end of the link having a ball end 190 for engagement in a socket 191 formed in a piston 192 which is slidably mounted in a cylinder housing 195 forming part of the portion 167. Normally, the piston 192, lever 185 and rack member 181 are positioned as in Fig. 18, to which position they are biased by a spring 196.

The piston 192 is moved toward the right against the action of the spring 196 to rotate the lever 185 counterclockwise and move the rack member 181 and rod 170 upwardly as viewed in Fig. 18 or to the right, as viewed in Figs. 26 and 27, to move the actuator rods 122 and project the fins 61, by compressed air which is introduced against the back of the piston 192 through an opening 197 in a valve housing 200 (Figs. 18 and 20) forming the cap or cover for the cylinder housing 195 (Figs. 17 and 18). The opening 197 is connected to an upper chamber 201 in the valve housing 200 which in turn is connected to a lower chamber 202 through an enlarged opening 205 in a washer 206 (Figs. 19 and 20) of a plastic material such as rubber or the like. The lower chamber 202 is connected by a pipe or conduit 207 having a flexible portion 210 releasably connected to the air conduit 62 (Fig. 4). The opening 205 in the washer is sealed by a head 211 of a valve 212 having a stem portion 215 extending into and engaging the end of a recess in a tappet 216 slidable in the valve housing 200. The head 211 is normally seated against the washer 206 to seal the opening 205, by a spring 217.

The tappet 216 has a head 220 which is engaged and depressed by one arm 221 of a lever 222 to disengage the head 211 from the washer 206 to thereby permit the air to pass from the lower chamber 202 through the opening 205 in the washer and into the upper chamber 201 and opening 197 to actuate the piston 192. An adjusting valve 225 is provided in the conduit 207 (Fig. 17) to regulate the flow of air from the supply conduit 62 to the piston 192 and the pressure of the air flow is indicated by a gauge 226 carried in the valve housing 200 in communication with the lower chamber 202 (Figs. 4 and 19).

The lever 222 is secured to a shaft 227 which is pivotally supported in brackets 230 secured to the underside of the table top 57 (Figs. 3 and 4). The lever 222 has a second arm 231 which is adapted to engage an enlarged head 232 of a bushing 235 slidably mounted in an aperture 236 in the valve housing 200. The bushing 235 is secured to a stem portion 237 of a relief valve 240 slidably carried in the valve housing 200, and having a head 241 which is adapted to be seated against a pliable washer 242 in an aperture 245 communicating with the back of the piston 192, as shown in Fig. 18. A spring 246 in the aperture 236 between the bottom surface thereof and the bushing 235 biases the head 241 of the valve 240 against the washer 242 to close an enlarged opening 247 in the washer which communicates with a passageway 250 extending through the valve housing 200 and opening to the outside atmosphere (Fig. 21). When the arm 221 is turned clockwise to depress the valve 212 to open the air line to the back of the piston 192, the arm 231 is also moved to permit the spring 246 to seat the valve head 241 against the washer 242 to close the passageway 250. Movement of the arms 221 and 231 counterclockwise permits the spring 217 to seat the valve head 211 against the washer 206 and depresses the valve 240 to open the passageway 250 to exhaust the air in the cylinder housing as the spring 196 returns the piston 192 to its position of Fig. 18. A foot treadle 251 on the shaft 227 serves as the means for turning the arms 221 and 231 in the clockwise direction. A torsion spring 252 surrounding the shaft 227 and having its ends anchored in one of the brackets 230 and a collar 255 fixed on the shaft (Fig. 4) tends to turn the shaft and arms to their counterclockwise position (Fig. 17) which position is determined by engagement of the head 232 of the bushing 235 with the valve housing 200.

As hereinbefore set forth, after inspecting the stocking on one flat side of the form 51, the form is rotated to present the other face thereof for inspection and the form latched in the latter position. Referring now particularly to Figs. 8, 9 and 10, for so latching the form 51, an outer peripheral edge 256 of the disk 156 has a notch 257 formed therein, one wall or surface 260 of which extends along a radial line passing through the center of the rod 170. The wall 260 is adapted to be engaged by a free end portion or latch element 261 of a lever 262 which is pivotally mounted on a stud 265 carried in the housing 52 (Figs. 8 and 9). The other end of the lever 262 is pivotally connected to one end of a link 266, the other end of which is pivotally connected to a core member 267 of a solenoid 270 carried in the housing 52. A limit switch 268 secured to the housing 52 has a button 273 which is actuated by a spring blade 274 secured to the switch, the blade acting when in engagement with the outer edge 256 of the disk 165 to close the switch and acting to release the button and open the switch when the blade drops into the notch 257 of the disk. The solenoid 270 and limit switch 268 are connected in the electrical circuit of the apparatus as and for the purpose hereinafter set forth. A pin 271 carried in and extending from a side face of the disk 165 engages a bumper member 272 of leather or rubber or other resilient material carried in a bracket 275 secured to the housing 52 (Figs. 8 and 10) to determine the clockwise position of the form 51. The counterclockwise movement of the form 51 to final inspecting position is limited by engagement of the pin 271 with a bumper member 278 secured to the plate 160. The disk 165 and form 51 are biased clockwise to the initial inspecting position of the form when the end portion 261 is released from the wall 260 in the disk by a spring 276 which is connected between the pin 271 and a pin 277 in the housing 52 (Fig. 12).

The pin 271 in the disk 165 is also adapted to engage one end of a rod 280 which is guided for sliding movement in a bracket 281 secured to the housing (Figs. 8 and 9). The rod 280 extends to the left through a forked end portion 282 of a lever 285 (Figs. 9 and 12) and between a pair of guide pins in the control valve 66, one of which is shown at 286. A left end portion 287 of the rod 280 is supported for sliding movement on a flat portion 290 of a lever 291 secured to the shaft 227. The rod 280 is shifted to the left by the pin 271 to position the end 287 beneath buttons 292 in the control valve 66 for purposes hereinafter set forth. The rod 280 carries a pin 295 for engagement with the bracket 281 to limit the movement of the rod toward the right (Fig. 8) and carries a second pin 296 for engagement with the guide pins 26 to limit the movement of the rod toward the left (Fig. 9). The lever 25 is pivotally mounted on a stud 300 carried in the housing 52 and is provided with a follower portion 301 for engagement with the edge 256 of the disk 165. A spring 302 connected between the forked end 282 of the lever 285 and the housing 52 biases the lever toward the disk 165. As shown in Figs. 2 and 11, the disk 165 and associated parts are enclosed within the housing 52 by cover plates 307 and 308, the plate 308 also having a portion 304 curved to cover the photo-cell 75 and an edge 309 which together with the edge 85 of the member 80 defines the opening or passage 76.

At the start of an inspecting and turning cycle, the disk 165 is in its position of Fig. 8, the rod 280 is in its position to the right with the end 287 of the rod withdrawn from beneath the buttons 292 of the control valve 66, and the foot treadle shaft 227 and lever 291 are in their counterclockwise positions. With a stocking on the form 51, the foot treadle 251 is actuated to rotate the shaft 227 to project the fins 61, as hereinbefore set forth, and to move the lever 291 clockwise to the position of Fig. 9. After inspecting the stocking on one side of the form 51, the form and disk 165 are rotated counterclockwise to engage the end portion 261 of the lever 262 with the wall 260 in the notch 257 of the disk. During rotation of the disk 165 the pin 271 engages and moves the rod 280 to the left to position the end portion 287 beneath the buttons 292. When the foot treadle is released and turned counterclockwise to starting position, the lever 291 moves the end portion 287 to engage and depress the buttons 292 to open the air lines to the form 51 and pushing unit 70 as hereinbefore described. When the inspecting cycle is completed, the lever 262 is actuated by the solenoid 270 to release the disk 165 which is returned clockwise to initial position (Figs. 8 and 10) by the spring 276. As the disk 165 is turned clockwise, the follower portion 301 of the lever 285 enters the notch 257 in the disk and the lever is biased clockwise by the spring 302 to engage the pin 295 and move the rod 280 to the right. Movement of the rod 280 to the right thereby withdraws the end 287 from beneath the buttons 292 to close the air lines to the form 51 and pushing unit 70.

The valve 66 is provided with two buttons 292 each of which actuates or forms a part of a valve member (not shown) for opening and closing the air lines 68 from the conduit 62 to the form 51 and the pushing means 70. Each of the air lines 68 has an adjusting valve 305 similar to the valve 225 and a gauge 306 for controlling and indicating the air pressure to the form 51 and pushing

unit 70. The portion of the valve 66 controlled by one of the buttons 292 is connected to one end of flexible tube 315, the other end of which enters the back end of the form (Fig. 4) and extends along the interior of the form through a slot 316 and is connected to a jet nozzle 317 carried in a recess 320 in the shell half 92 of the form (Figs. 23, 32, 33 and 34). As shown in Figs. 23 and 38, the tube 315 communicates with a main opening 321 in the jet nozzle which in turn connects a series of smaller apertures 322 which are directed longitudinally of the passageway toward the rear end of the form. The nozzle has an inclined surface 325 which extends upwardly and toward the rear end of the form 50 from the bottom wall of the recess 116 to the top of the jet to facilitate the passage of the stocking over the jet as it passes through the interior of the form. A second flexible tube 326 is connected between this part of the valve and a nozzle 327 which is mounted in the housing 52 in a manner to direct a stream of air upwardly against the wall 87 of the member 80 (Fig. 8) to supplement the air current flowing out at the exit end of the passageway.

The part of the valve 66 controlled by the second button 292 is connected to one end of a flexible tube 330 the other end of which is connected to communicate with a T-shaped opening 331 in a three-way valve 332 slidably mounted in an aperture 335 in a valve housing 336 (Figs. 48 and 49). The valve 332 is adapted to be positioned to align the opening 331 with an opening 337 in the valve housing 336 which is connected by a tube 340 to the left end of a cylinder 341 to communicate with a chamber 342 (Figs. 44 and 46). The valve 332 is adapted to be biased by a spring 345 to an upper position in which the opening 331 is positioned to communicate with an opening 346 in the valve housing 336 that is connected by a tube 347 to the chamber 342 at the right end of the cylinder 341 (Fig. 43). The valve 332 is held in position to align the opening 331 with the opening 337 by a latch pin 350 which is slidably mounted in the valve housing 336. The pin has a recess 352 of the diameter of the valve and is biased to latching position as shown in Fig. 48, with a portion 338 at the edge of recess 352 overlying an edge of the valve, by a spring 351. The latch pin 350 is depressed by means hereinafter set forth, against the action of the spring 351 to align recess 352 in the latch pin with the valve 332 to permit the spring 345 to raise the valve and align the opening 331 therein with the opening 346 in the valve housing 336. A stem portion 355 of the valve 332 extends through an aperture in the upper portion of the valve housing 336 and carries a member 356 having a bumper 357 by means of which the valve is depressed to align the opening 331 with the opening 337 in the valve housing as hereinafter set forth.

Air under pressure is alternately introduced into opposite ends of the chamber 342 in the cylinder through the medium of the valve 332 to reciprocate a piston 360 (Fig. 46) in opposite directions in the chamber. The piston 360 is adjustably connected by a rod 361 to a sleeve 362 having a slot 365 in which one end 366 of a lever 367 forming a part of the pushing member 71 is pivotally mounted on a pin 370 carried in the sleeve. The pin 370 extends from opposite sides of the sleeve 362 and provides mountings for rollers or followers 371 provided for engagement in guide tracks or slots 372 in the facing walls of side plates 375 and 376 (Fig. 47) of the pusher unit 70. The side plates 375 and 376 are spaced from each other by collars 377 and screws 378 passing through one of the plates and collars and threaded into the other plate to secure the plates and collars to each other. The cylinder 341 extends between and is clamped between the plates 375 and 376 by a screw 383 (Figs. 44 and 46) and the valve housing 336 is secured to the plate 376 adjacent to the left end thereof by screws, one of which is shown in dotted outline at 384, in Fig. 48. As shown in the position of Fig. 45, the sleeve 362 engages a spring blade 373 to actuate a button 379 and close a limit switch 374 which is secured to the plate 376 and which is connected in the electrical circuit as and for the purpose hereinafter set forth.

The lever 367 carries a pin 380 for rotatably mounting a roller or follower 381 which is similar to the rollers 371 and which extends into and is guided for movement in a path defined by upper and lower tracks or slots 382 and 385 in the inner wall of the side plate 376. The right end of the upper slot 382 has a portion 386 which is curved downwardly to meet the lower slot 385, as shown in Fig. 45, and the left end of the upper slot is curved as at 387 for a purpose hereinafter set forth. A switch member 390 is pivotally mounted in the side plate 376 to normally close the right end of the lower slot 385, the switch member having a curved surface forming one wall of the curved slot portion 386.

The upper end of the lever 367 carries plates 391 and 392 which are adjustable toward each other to clamp between them the ends of a pad 395 of a yieldable material such as sponge rubber or the like. As shown in Fig. 3, the pushing unit 70 is supported at right angles to the flat faces of the form 51 by brackets 396 which are secured to the underside of the top portion 57.

As heretofore set forth, after a stocking is placed on the form 51, the foot treadle 251 and shaft 227 are turned clockwise to open the air line from the conduit 62 to the cylinder housing 195 to project the fins 61. As the shaft 227 is turned clockwise, a lever 397 secured to the shaft (Fig. 3) engages and depresses the latch pin 350 to permit the spring 345 to raise the valve 332 into the notch 352 in the latch pin and the opening 331 into register with the opening 346 to open the air line from the valve 66 to the right end of the cylinder 341. However, no air passes through the valve at this time as valve 66 remains closed. After rotating the form 51 to complete the inspection of the stocking, at which time the end portion 287 of the rod 280 is moved beneath the buttons 292 in the valve 66, the foot treadle 251 is released. Release of the foot treadle depresses the buttons 292 to open and introduce air into the tubes 315 and 326 to the nozzles 317 and 327, respectively and into the tube 330 and through the valve 332 and tube 347 to the right end of the cylinder 341 to move the piston 360 toward the left (Fig. 46). As the piston 360 and rod 361 are moved to the left, the sleeve 362 disengages the spring blade 373 to permit the switch 374 to open, the roller 381 rides up the curved slot portion 386 to the upper slot 382 and the rollers 371 ride along the guide slot 372 to swing the lever 367 upwardly to engage the pad or stocking contact member 395 against the stocking on the form 51. Also, as the piston 360 moves toward the left, the air trapped in the chamber 342 to the left of the piston is exhausted through the tube 340, through an opening 400 in the valve 332 and an opening 401 in the valve housing 336 into the surrounding atmosphere (Fig. 49). During continued movement of the piston 360 to the left the lever 367 is moved along the upper and lower slots 382 and 385 to push the stocking toward the toe end of the form 51 and the toe end of the stocking is drawn into and through the passageway 116 in the form by the air current generated therein by nozzle 317. As will be noted from Fig. 4, the member 395 engages the stocking near the left end of the form 51 and the pushing action of the member is only of such extent as to facilitate the action of the air current to draw the toe of the stocking into the passageway 116.

When the roller 381 reaches and rides down the curved portion 387 of the slot, the lever 367 is turned counterclockwise about the roller 371 as a center to disengage the pad 395 from the stocking on the form. During this counterclockwise movement, the lever 367 engages bumper 357 to depress the valve 322 and cause it to register the opening 331 in the valve with the opening

337 and introduce air through the tube 340 into the left end of the cylinder 341. When the valve 332 is in the depressed position (Figs. 48 and 49), the spring 351 moves the latch pin 350 outwardly to move shoulder 338 to overlie the valve as shown in Fig. 48 to hold the valve in such position. At the same time the bumper 357 acts to position the lever 367 to align the roller 381 with the lower slot 385 in the plate 376. As the piston 360 and lever 367 are moved toward the right, the air trapped in the chamber 342 to the right of the piston is exhausted through the tube 347, through an opening 402 in the valve 332 into the upper end of the aperture 335 and through an opening 403 in the valve housing to the outside atmosphere. When the piston 360 nears its right hand position (Fig. 46) the roller 381 engages and raises the switch member 390 to pass beneath it, the switch member dropping by gravity to the position of Fig. 45 as the roller reaches the end of its movement at its starting point. Also, as the piston approaches the end of its movement to the right, the spring blade 373 is engaged by a camming member 405 on the sleeve 362 which raises it to the top edge of the sleeve (Fig. 45) to again close the switch 374.

As hereinbefore described, when the toe of the stocking blank is ejected from the passageway 116 in the form 51 by air from the nozzle 317 it is deflected through and breaks the light beam passing between the light tube 72 and the photo-cell 75. For this purpose the frame member 97 carries a deflector plate 404 (Figs. 16 and 37) which directs the toe of the stocking through the light beam, against the cover plate 308 and into the opening or passage 76 to thereby cause operation of member 82. As shown in Figs. 11 and 16, the member 82 is mounted for movement into the passage or opening 76 along a path which is diagonal to the vertical plane of both the plate 308 and the wall 77 of the member 80 to move a pad 408 of pliable material, such as sponge rubber, carried on the member 82 into engagement with the edge 85 to clamp the toe of the stocking therebetween as shown in full line in Fig. 16 and in dot-and-dash outline in Fig. 8. For so moving the member 82 it is pivotally mounted for swinging movement on a pin 406 which is carried in a bracket 407 secured to the housing 52 (Figs. 13 and 14). The member 82 has a forked portion 410 which engages a pin 411 carried in a core member 412 of a solenoid 415 (Figs. 13 and 15) secured to the housing 52. The solenoid is connected in the electrical circuit of the apparatus and is energized and actuated as hereinafter set forth when the toe of the stocking passes through and breaks the light beam. As shown in Fig. 16, when the member 82 is in position to clamp the toe end of the stocking the member substantially closes the opening or passage 76 to thereby deflect the stream of air emerging from the form 51 and with it the remainder of the stocking between the walls of the channel-shaped member 80. The member 82 may also be held in its position of Fig. 16 to permanently block the opening 76 so that the stockings will be carried through the channel-shaped member 80 with the stream of air and placed in a container other than the tray 90. For this purpose there is provided an angle member 409 which is adjustably carried on a portion of the housing 52 for movement from the position of Fig. 16 to a position in engagement with the member 82 when it is in blocking position in the opening 76.

Breaking the light beam between the light tube 72 and the photo-cell 75 also causes operation of a core member 416 of a solenoid 417 which is connected in the aforementioned electrical circuit of the device and is carried in a housing 418 secured to the top portion 57 of the table 60 (Fig. 5). The core member 416 is connected by a spring 420 to a pin 421 carried in the free end of an operating lever 422 of the counting device 86 (Figs. 5 and 7). The counting device 86 is carried in the housing 418 and is suitably of the type shown and described in U.S. Patent No. 2,679,358, issued to F. Autem, May 25, 1954. The lever 422 is adapted to engage and operate a spring plate 425 to actuate a button 428 and close a normally open limit switch 426, in the housing 418, during each counting movement of the lever 422.

At times it is desirable that the movement of the lever 422 by the solenoid 417 be limited to prevent a counting operation of the device 86 but to be sufficient to engage and operate the spring plate 425 to close the limit switch 426. For this purpose there is provided a push pin 427 which is mounted for horizontal sliding movement in an aperture 430 in the housing 418, the aperture having a tapered lower surface 433 to also permit vertical rocking movements of the pin, as viewed in Figs. 5 and 6. The push pin 427 has two notches 431 in its upper surface for engagement with a plate 432 secured to the housing 418, the notches determining the inactive position of the push pin, shown in full lines, and the active position, shown in dot-and-dash outline, in Fig. 6, in which latter position the push pin is in the path of the pin 421 in the lever 422. The push pin 427 is releasably held in position to engage the plate 432 in either notch 431 by a spring pressed detent pin 435 carried in a portion of the housing 418, the detent pin being readily depressible to permit movement of the push pin to either its active or inactive position. The push pin 427 has a central aperture 436 to receive a spring 437 which is connected between a pin 440 in the push pin and a pin 441 which extends through a slot 442 in the push pin into the housing 418. The spring 437 tends to bias the push pin 427 toward its inactive position of Fig. 6. When the push pin 427 is in the active position, shown in dot-and-dash outline, and the solenoid 417 is actuated to move the lever 422 through a counting cycle, the pin 421 engages in the forward notch 431 in the push pin and rotates the push pin around the pin 441 against the action of the detent pin 435. Rotation of the push pin 427 is arrested when it engages the tapered surface 433 (as indicated in dotted outline in Fig. 6) and the movement of the lever 422 is likewise arrested before completing its full counting stroke. In this position the other notch 431 in the push pin 427 is disengaged from the plate 432 and the push pin is maintained in active position by engagement of the pin 421 in the forward notch 431. Also at this time the push pin 427 engages the spring plate 425 to close the limit switch 426. As the lever 422 is returned to its position of Fig. 5, the spring 437 draws the push pin 427 to its left or inactive position and detent pin 435 presses the push pin upwardly to engage the plate 432 in the forward notch 431.

The electrical circuit hereinbefore referred to and diagrammatically shown in Fig. 50 includes main conductors 445 and 446 which are connected by a switch 447 to the main source of electrical energy. The light tube 72 is connected by leads 450 and 451 to the conductors 445 and 446, respectively, and the rays from the light tube are intercepted by the photocell 75 which is connected by leads 452 to a photo-electric or light operated relay 455 of known type. The photo-electric relay 455 is connected by leads 456 to the main conductors 445 and 446 and is connected by a lead 457 through a coil 460 for a core member 461 of a low voltage relay 462. The core member 461 is connected to and operates a normally open switch 465 having one contact 466 connected by a lead 467 to the conductor 445. A contact 470 at the other side of the switch 465 is connected by a lead 471 to one end of a winding or coil 472 for a core member 475 of a relay 476. The other end of the coil 472 is connected by a lead 477 to a contact 480 at one side of the limit switch 268. A contact 481 at the other side of the switch 268 is connected by a lead 482 to the main conductor 446 to complete the circuit through the coil 475.

The core member 475 of the relay 476 is connected to and operates normally open switches 485 and 486 having contacts 487 and 490, respectively, at one side

of the switches connected by the lead 467 to the main conductor 445. A contact 491 at the other side of the switch 485 is connected by a lead 492 through a winding or coil 495 for a core member 496 of the solenoid 417 to the main conductor 446. The core member 496 of the solenoid 417 is connected to lever 422 of the counting device 86 by a link 500 which diagrammatically represents the spring 420 hereinbefore set forth. The lead 471 from the switch 465 to coil 472 is connected by a lead 499 to the lead 492 which acts as a holding circuit for the coil 472 as hereinafter set forth. A contact 501 at the other side of the switch 486 is connected by a lead 502 through a winding or coil 505, for the core member 412 of the solenoid 415 associated with the member 82, to the lead 482. One contact 506 of the limit switch 374 associated with the pushing means 70 is connected by a lead 507 to the main conductor 446. A contact 510 at the other side of the switch 374 is connected by a lead 511 to a contact 512 at one side of the normally open limit switch 426 associated with the counting device 86. A contact 515 at the other side of the switch 426 is connected by a lead 516 to one end of a winding or coil 517 for the core member 267 of the solenoid 270 which is associated with the lever 262 for latching the form 51 as hereinbefore set forth. The other end of the coil 517 is connected by a lead 520 to the main conductor 445.

The electrical circuit also includes a normally open manually operated switch 521 having a contact 522 at one side thereof connected to the lead 511 and a contact 525 at the other side of the switch connected to the lead 516. Also included in the circuit is a warning light 526 which is connected by a lead 527 to a transformer 528 which is in turn connected to the main conductors 445 and 446. The light 526 is connected by a lead 529 to a contact 530 which is carried in and insulated from the housing of the counting device 86. The contact 530 is adapted to be engaged by a pin or similar means 531 carried on a wheel 532 which diagrammatically represents the units counting wheel of the counting device 86 as indicated at 69 in the aforementioned Patent No. 2,679,358, at the end of each unit counting cycle or rotation of the wheel 532. The transformer 528 and the pin 531 are shown grounded to close the circuit through the light 526 when the pin 531 engages the contact 530.

From the foregoing it is believed that the structure and operation of the apparatus 50 will be obvious to those skilled in the art. However, for the purpose of clarity the operation of the apparatus through a stocking inspecting and turning cycle is hereinafter summarized as follows:

With the form 51 in its initial positions of Figs. 1 and 2, a stocking with the wrong side out is drawn onto the form and the foot treadle 251 is then manually operated to turn the shaft 227 clockwise, as viewed in Fig. 17 to depress the valve 212 against the action of the spring 217 and open the air line from the conduit 62 to the cylinder housing 195. Clockwise movement of the shaft 227 also moves the lever 397 to engage and depress the latch pin 350 to align the aperture 352 with the valve 32 and permit the spring 345 to raise the valve to register the opening 331 with the tube 347 connected to the right end of the cylinder 341. As air is introduced into the housing 195 the piston 192 is operated to move the actuating rods 122 to project the expander members 61 (Fig. 26) and stretch the stocking on the form. At this time the lever 291 is in its clockwise position of Fig. 9 and the various switches and solenoids are conditioned as shown in Fig. 50. After inspecting the stocking on the side of the form facing the operator, the form is manually rotated approximately 180 degrees to bring the other side of the form facing the operator. Rotation of the form 51 to this final inspecting position permits the end 261 of the lever 262 to engage the surface 260 of the notch 257 in the disk 165 to hold the form in this latter position. Also during rotation of the disk the edge 256 of the disk actuates the button 273 to close the switch 268 and the rod 280 is moved to the left as viewed in Fig. 9 to position the end 287 of the rod beneath the buttons 292 of the control valve.

Following the final inspection of the stocking, the foot treadle 251 is released and the shaft 227 and lever 222 is turned counterclockwise by the spring 252 to release the valve 212 which is closed by the spring 217 to shut off the air to the cylinder housing 195 and to open the valve 240. The spring 196 thereupon operates the piston 192 to move the actuating rods 122 to the left from the position of Fig. 27 to the position of Fig. 24 to retract the expander members 61 the action of spring 196 being supplemented by the action of springs 150 acting on the fins. Counterclockwise movement of the shaft 227 also operates the lever 291 to engage the end 287 of the rod 280 with and depress the buttons 292 of the control valve 66 to open the air lines to the nozzle 317 in the form 51, and to the nozzle 327 and through the valve 332 to right end of the cylinder 341. As air is introduced into the cylinder 341, the piston 360 moves the lever 367 toward the left (Figs. 43 and 44), the switch 374 is opened and the roller or follower 381 is directed into the upper slot 382 in the plate 376 to raise the lever to engage the pad 395 with the stocking fabric on the form 51 and as the piston continues to the left the stocking is pushed toward the toe end of the form. The toe of the stocking is immediately drawn beneath the tip of the shell half 92 into the opening 118 and through the passageway 116 toward the rear or welt end of the form by the suction created by the current of air from the nozzle 317 and as the stocking toe continues through the passageway 116 toward the rear end of the form the stocking is turned right side out. As will be appreciated, travel of the pusher member only partially of the length of the form, as illustrated, to initiate the withdrawal of the stocking from the form is all that is necessary, the air stream in the passageway completing the stripping and turning action. During continued movement of the lever 367 to the left, the roller 381 rides down the curve 387 to disengage the pad 395 from the stocking fabric and the lever 367 engages and depresses the valve to register the opening 331 with the opening 337. Air is thereby directed through the tube 340 to the left end of the cylinder to return the piston 360 and lever 367 to the position of Figs. 39 and 41 and to close the switch 374.

After the pad 395 is disengaged from the stocking and the toe end of the stocking passes the nozzle 317, the air from the nozzle is directed against the toe end to blow it toward the rear end of the passageway 116 to pull the welt end of the stocking over the toe end of the form and into the passageway to complete the turning action as previously mentioned. As the stocking continues through the passageway 116, the toe end is blown out through the aperture 117 in the form 51 and is guided by the deflector plate 404 through the light beam passing from the light tube 72 to the photo-tube 75 to break the beam, and is then carried against the surface of the cover plate 308 and into the opening or passage 76 between the cover plate 308 and the edge 85 of the member 80. Breaking of the light beam causes actuation of the light operated relay 455 (Fig. 50) to close the circuit through the leads 457 to energize the coil 460 of the low voltage relay 462 to close the switch 465. Closing of the switch 465 closes and energizes the circuit from the main conductors 445 and 446 through the coil 472 of the relay 476 and the switch 268 to close the switches 485 and 486. Closing the switch 386 closes and energizes the circuit through the coil 505 of the solenoid 415 to swing the member 82 across the opening 76 and to engage the pad 408 with and clamp the toe end of the stocking against the edge 85 (Fig. 16) of the member 80. With the toe end of the stocking so held, the welt end is blown from

the passageway 116 and carried past the toe end by the air streams from the form and nozzle 327 between the walls 77 and 87 of the member 80 to overlie the tray 90 (Figs. 1 and 4). When the welt of the stocking is past the photo-cell 75, the photo cell 75 again receives the light rays from the tube 72 which causes the relay 455 to deenergize coil 460 and open the switch 465. At this time the lead 499 acts to close the circuit between the leads 471 and 492 to energize the coil 472 to maintain the switches 485 and 486 closed.

Closing the switch 485 energizes the circuit through the lead 492 and the coil 495 of the solenoid 417 to actuate the lever 422 of the counting device 86 to advance the counting wheel 532. Operation of the lever 422 closes the switch 426 to close and energize the circuit through the switches 374 and 426 to the coil 517 to operate the solenoid 217 and disengage the lever 262 from the notch 257 in the disk 165 following which the form 51 is rotated clockwise from the final inspecting position of Fig. 9 to its initial position of Fig. 8 by the spring 276. As the disk 165 and form 51 are rotated, the notch 257 in the disk 165 passes beneath the follower portion 301 of the lever 285 to permit the spring 302 to operate the lever to move the rod 280 to the right (Fig. 8) to remove the end 287 of the rod from beneath the buttons 292 to close the air lines to the nozzles 317 and 327 and to the cylinder 341. With the air streams shut off the welt end of the stocking drops onto the tray 90. As the disk and form continue to rotate, the notch 257 is positioned beneath the spring blade 274 to open the switch 268 and deenergize the circuit through the coil 472 to open the switches 485 and 486. Opening switch 486 deenergizes the circuit through the coil 505 of the solenoid 415 which operates the member 82 to release the toe end of the stocking and opening the switch 485 deenergizes the circuit through the coil 495 which permits movement of the lever 422 of the counting device 86 to its starting position of Fig. 50 and opens the switch 426 as hereinbefore set forth.

When the form 51 is in the final inspecting position and it is found that the stocking on the form is defective, the form may be released for return to its initial position before releasing the foot treadle 251 by manually closing the switch 521. Closing the switch 521 closes the circuit through the switch 374 to energize the coil 517 and operate the solenoid 270 to disengage the lever 262 from the notch 257 in the disk 165. The foot treadle 251 is then released and the defective stocking manually removed from the form without turning it. When, however, it is desired to turn the defective stocking, the operator grips the welt end of the stocking and then releases the foot treadle 251 to open the air lines to the nozzles 317 and 327 and the cylinder 341 to operate the pushing means 71 and the stocking is drawn into passage 116 in the form, as hereinbefore set forth, while the operator still maintains a grip on the stocking. The switch 521 may then be closed and the circuit through the coil 517 will be closed and energized to release the form when the switch 374 is closed as the piston 360 is returned to its starting position. The turned stocking may then be withdrawn manually from the passageway 116 in the form.

Sometimes, it occurs that a defective stocking is inadvertently permitted to pass through the complete cycle including the advancing of the count. When this occurs, the defective stocking is removed from the tray 90 and the push pin 427 is moved to the dot-and-dash position (Fig. 6) before starting the next inspecting and turning cycle. Therefore, during the next cycle the stocking is turned and placed in the tray 90 but the push pin 427 blocks the movement of the lever 422 to prevent advance of the count as hereinbefore set forth, to thereby correct the count in relation to the actual number of stockings in the tray 90.

It will be understood that the improvements specifically shown and described, by which the above results are obtained, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. A stocking inspecting and turning device comprising a stocking form having a free end, stocking expander means in said form for movement between retracted and stocking expanding positions, a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, and means operatively connected to said device for setting up a current of air through said passageway in the direction of said exit opening.

2. A stocking inspecting and turning device comprising a stocking form having a free end, stocking expander means in said form for movement between retracted and stocking expanding positions, a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, means in said passageway for setting up a current of air through said passageway in the direction of said exit opening, and means for operating said air current setting up means upon retraction of said expander means.

3. A stocking inspecting and turning device comprising a stocking form having a free end, stocking expander means in said form, means for moving the expander means between stocking expanding and retracted positions, a stocking passageway extending longitudinally through said form and having an entrance opening adjacent the free end and an exit opening remote therefrom, means operatively connected to said device for setting up a current of air through said passageway in the direction of the exit opening, means for gripping a leading end of a stocking issuing from said passageway, and means actuated by the issuance of a stocking from said passageway for actuating said gripping means.

4. In a stocking inspecting and turning device including a stocking form having a free end, a stocking counter operatively connected to said device, a stocking expander means carried by said form and movable between stocking expanding and retracted positions, and means for supporting said form for rotation on its longitudinal axis between initial and final inspection positions, the improvement comprising means for automatically locking said form in its final inspection position, a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, means operatively connected to said device for setting up a current of air through said passageway in the direction of the exit opening, a pusher member operatively connected to said device and adapted to engage a stocking on said form, means for operating said pusher member to move a stocking on said form toward the free end thereof, means operatively connected to said device adjacent said exit opening for gripping a leading end of a stocking issuing from said passageway, and a control and operating system including a manually operated member movable between first and second positions, means for actuating said expander means to stocking expanding position upon movement of the member to its first position, means for actuating said air current setting up means and said pusher member operating means upon movement of the member to its second position and upon rotation of the form to final inspection position, and means controlled by the issuance of a stocking from said passageway for operating said counter and gripping means and for releasing said locking means.

5. In a stocking inspecting and turning device including a stocking form having a free end, a stocking counter operatively connected to said device, a stocking expander means carried by said form and movable between stocking expanding and retracted positions, and means for supporting said form for rotation on its longitudinal axis between initial and final inspection positions, the improve-

ment comprising means for yieldably urging rotation of said form to its initial position, means for automatically locking said form in its final inspection position against the action of said urging means, a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, means for setting up a current of air through said passageway in the direction of the exit opening, means operatively connected to said device for setting up a current of air exteriorly of said form adjacent said exit opening, a pusher member operatively connected to said device and adapted to engage a stocking on said form, means for operating said pusher member to move a stocking on the form toward the free end thereof, means operatively connected to said device adjacent said exit opening for gripping a leading end of a stocking issuing from said passageway, and a control and operating system including a manually operated member movable between first and second positions, means for actuating said expander means to expanding position upon movement of the member to its first position, means for actuating both said air current setting up means and said pusher member operating means upon movement of the member to its second position and upon rotation of the form to final inspection position, and means controlled by the issuance of a stocking from said passageway for operating said counter and gripping means and for releasing said locking means whereby said form is rotated to the initial examining position.

6. In a stocking inspecting and turning device, a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in said form extending longitudinally therethrough from an entrance opening adjacent the free end to an exit opening remote therefrom, means for setting up a current of air in said passageway in the direction of the exit opening, manually controlled means for energizing said air current setting up means, said manually controlled means being disabled when said form is in initial inspecting position, means supporting said form for rotation between said initial and final inspecting positions, and means positioned by movement of said form into final inspecting position for engagement with said manually controlled means and operation thereby to energize said air current setting up means.

7. In a stocking inspecting and turning device, a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in said form extending longitudinally therethrough from an entrance opening adjacent the free end and an exit opening remote therefrom, means for setting up a current of air in said passageway in the direction of the exit opening, manually controlled means for energizing said air current setting up means, said manually controlled means being disabled when said form is in initial inspecting position, means supporting said form for rotation between said initial and final inspecting positions, a member mounted for rotation with the form, latch means cooperating with said member for releasably locking said form in final inspection position, and means positioned by said member for engagement with said manually controlled means and operation thereby to energize said air current setting up means when said form is in final inspecting position.

8. A stocking inspecting and turning device comprising a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in said form having an entrance opening adjacent the free end and an exit opening remote therefrom, means for setting up a current of air in said passageway in the direction of the exit opening, means for moving stockings on said form toward said entrance opening, means for operating said stocking moving means, manually controlled means for energizing said air current setting up means and said operating means, said manually controlled means being disabled when said form is in initial inspecting position, means supporting said form for rotation between said initial and final inspecting positions, and means positioned by movement of said form to final inspection position for engagement with said manually controlled means and operation thereby to energize said air current setting up means and said operating means.

9. A stocking inspecting and turning device comprising a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in said form having an entrance opening adjacent the free end and an exit opening remote therefrom, means for setting up a current of air in said passageway in the direction of said exit opening, means for moving a stocking on said form toward said entrance opening, operating means for said stocking moving means, manually controlled means for energizing said air current setting up means and said operating means, said manually controlled means being disabled when said form is in initial inspecting position, means supporting said form for rotation between said initial and final inspecting positions, a member mounted for rotation with the form, latch means cooperating with said member for releasably locking the form in final inspecting position, and means positioned by said member for engagement with said manually controlled means and for operation thereby to energize said air current setting up means and said operating means when said form is in final inspecting position.

10. A stocking inspecting and turning device comprising a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in said form having an entrance opening adjacent the free end and an exit opening remote therefrom, means for setting up a current of air in said passageway in the direction of said exit opening, means for moving a stocking on said form toward said entrance opening, operating means for said stocking moving means, manually controlled means for energizing said air current setting up means and said operating means, said manually controlled means being disabled when said form is in initial inspecting position, means for supporting said form for rotation between said initial and final inspecting positions, a disc mounted for rotation with said form, a notch in said disc, a latch element, means normally urging said latch element against the periphery of said disc whereby the latch element enters the notch upon alignment therewith when said form is moved to final inspecting position, an abutment carried by the disc, and means positioned by said abutment when said latch element is in the notch for engagement with said manually controlled means and for operation thereby to energize said air current setting up means and said operating means.

11. In a stocking inspecting and turning device, a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in the form having an entrance opening adjacent the free end and an exit opening remote therefrom, means for setting up a current of air within said passageway in the direction of said exit opening, a stocking pusher, means for operating said pusher to engage and move a stocking on the form toward the free end thereof, means for energizing said air current setting up means and said pusher operating means, a control for said energizing means, manually controlled means having a member for operating said control, said manually controlled means being disabled when said form is in initial position, means supporting said form for movement between said initial and final inspecting positions, and means operated by movement of said form into final inspecting position for engagement with said manually controlled means and for operation thereby to operate said control, said last named

means comprising means interposed between said member and said control.

12. In a stocking inspecting and turning device, a stocking form having a free end and movable between initial and final inspecting positions, a stocking passageway in the form having an entrance opening adjacent the free end and an exit opening remote therefrom, means for setting up a current of air within said passageway in the direction of said exit opening, a stocking pusher, means for operating said pusher to engage and move a stocking on the form toward the free end thereof, means for energizing said air current setting up means and said pusher operating means, a control for said energizing means, manually controlled means having a member for operating said control, said manually controlled means being disabled when said form is in initial position, means supporting said form for movement between said initial and final inspecting positions, means operated by movement of said form into final inspecting position for engagement with said manually controlled means and for operation thereby to operate said control, said last named means comprising a second member, means supporting said second member for movement into and out of positions of interposition between said first named member and the control and means rotatable with said form for causing movement of said second member into said interposed position.

13. In a stocking inspecting and turning device, a stocking form having a free end, a stocking passageway extending longitudinally through said form from an entrance opening adjacent said free end to an exit opening remote therefrom, a nozzle mounted in a wall of the passageway intermediate said entrance and exit openings, apertures in said nozzle for directing air jets toward said exit opening and means for supplying air under pressure to said nozzle.

14. In a stocking inspecting and turning device, a stocking form having a free end, a stocking passageway extending longitudinally through said form from an entrance opening adjacent said free end to an exit opening remote therefrom, and a nozzle including a portion recessed in a wall of the passageway and a portion projecting therefrom, said projecting portion having apertures in a side thereof toward said exit opening and having an opposite side tapering toward the adjacent wall of the passageway.

15. A stocking inspecting and turning device comprising a stocking form having a free end and means for moving a stocking longitudinally of the form toward the free end, said stocking moving means comprising a stocking contact member, an arm supporting said contact member, a pair of cam followers spaced longitudinally of the arm and carried thereby, means defining a straight cam track receiving one of said followers and means defining a closed cam track receiving the other of said followers, and means for moving the followers along their tracks.

16. A stocking inspecting and turning device as defined by claim 15 in which said closed cam track is nearer the form than the straight cam track and comprises a section leading from a starting point toward said form, a straight section extending substantially parallel to the form, a section leading away from the form to a return point, and a return section leading from the return point to a juncture with the first section substantially at the starting point and switch means at said juncture.

17. A stocking inspecting device comprising a stocking form having a free end and means for moving a stocking longitudinally of the form toward the free end, said moving means comprising a stocking contact member and means for moving said member in a closed path from a starting point spaced from the form toward said form, longitudinally of the form toward the free end, away from the form to a return point, and from the return point to the starting point, said moving means including a fluid operated piston and cylinder device, means for supplying a fluid under pressure to said cylinder at one side of the piston for movement of the contact member from the starting point to the return point, and means for supplying fluid under pressure to the cylinder at the other side of the piston for movement of the contact member from the return point to the starting point.

18. A stocking inspecting and turning device as defined by claim 17 having a three-way valve, means connecting one side of said valve to a source of fluid under pressure, means connecting another side of said valve to the cylinder at one side of the piston, means connecting the third side of said valve to the cylinder at the other side of the piston, and control means operated by the arrival of said contact member at the return point for opening the connection with the third side and closing the connection with the second side of the valve.

19. In a stocking inspecting and turning device a stocking form having a free end, means supporting said form for rotation between initial and final inspection positions, means for moving a stocking longitudinally of the form toward the free end comprising a stocking contact member, means for moving said member in a closed path from a starting point spaced from said form toward said form, longitudinally of the form toward the free end, away from the form to a return point and from the return point to the starting point, said moving means including a fluid operated piston and cylinder device, means for supplying fluid under pressure, and means controlled in part by the movement of said form into final inspection position for connecting said fluid supply to said cylinder.

20. A stocking inspecting and turning device as defined by claim 19 having a manually operated control means, and in which the means controlled in part by movement of the form into final inspection position is controlled in part by said manually operated control means.

21. A stocking inspecting device comprising a stocking form having a free end, means supporting the form for movement between initial and final inspection positions, means for moving a stocking longitudinally of the form toward the free end, said last named means comprising a stocking contact member, means for moving said member in a closed path from a starting point spaced from said form toward said form, longitudinally of the form toward the free end, away from the form to a return point and from the return point to the starting point, said moving means including a fluid operated piston and cylinder device, means for supplying fluid under pressure to said cylinder including a fluid source, a three-way valve, a main supply line connecting said source and one side of the valve, a normally closed valve in said main supply line, a supply line connecting a second side of the valve to the cylinder at one side of the piston, a supply line connecting a third side of the valve to the cylinder at the other side of the piston, manually controlled means for opening said second side of the valve, means operated by the arrival of the contact member at the return point for closing the second side of the valve and opening the third side, and means including manually controlled means for opening the main supply line valve when said form is in its final inspection position.

22. A stocking inspecting and turning device as defined by claim 21 having means for closing the main supply line valve upon movement of the form to its initial position.

23. A stocking inspecting device comprising a stocking form having a free end, means supporting said form for movement between initial and final inspection positions, means for latching the form in its final inspection position, means including an electrical circuit for unlatching said latching means, means for moving a stocking longitudinally of the form, said last named means comprising a stocking contact member, and means for mov-

ing said member in a closed path from a starting point toward the free end of the form and back to the starting point, a normally open switch in said electrical circuit and means carried by said contact member moving means for holding said switch closed when said contact member is at its starting point.

24. In a stocking turning device, a stocking form having a free end, a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, means operatively connected to said device for setting up a current of air in the passageway in the direction of said exit opening, means for gripping a stocking issuing from said passageway and means for operating said gripping means controlled by the issuance of the stocking from said passageway.

25. A stocking turning device as defined in claim 24 in which the means for operating the gripping means includes a light source and a light responsive cell located at opposite sides of said exit opening.

26. In a stocking turning device, a stocking form having a free end and a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, a light source and a light responsive cell located on opposite sides of said exit opening, a gripping means including a fixed element and an element movable into contact with said fixed element, and means controlled by the breaking of the light beam between the light source and cell for moving said movable element into gripping relationship with the fixed element.

27. In a stocking turning device, a stocking form having a free end, a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, means operatively connected to said device for setting up a current of air moving longitudinally of the passageway and out of the exit opening, a gripping means including a fixed element and an element movable between a retracted position and a position in contact with the fixed element, said elements defining a passage therebetween when the movable element is in retracted position, deflector means for deflecting the current of air issuing from the exit opening toward the passage, and means controlled by the issuance of a stocking from the passageway to cause movement of said movable element against the fixed element to grip the stocking therebetween.

28. A stocking turning device as defined by claim 27 in which the means controlled by the issuance of the stocking from the passageway includes a light source at one side of said exit opening and a light responsive cell at the other side, and means are provided adjacent said exit opening for supplementing the current of air issuing from the opening.

29. In a stocking inspecting and turning device, including a stocking form having a free end and a stocking counter, the improvement comprising a stocking passageway extending longitudinally through said form from an entrance opening adjacent the free end to an exit opening remote therefrom, means operatively connected to said device for setting up a current of air moving through said passageway toward said exit opening, means for gripping a stocking issuing from said exit opening, a light source at one side of the exit opening and a light responsive cell at the other, and means controlled by the breaking of the light beam by the movement of a stocking from said exit opening between said source and cell for operating said stocking counter and said gripping means.

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