March 16, 1943. G. L. WHITE 2,314,114

FABRIC FINISHING MACHINE

Filed Dec. 3, 1940 4 Sheets-Sheet 1

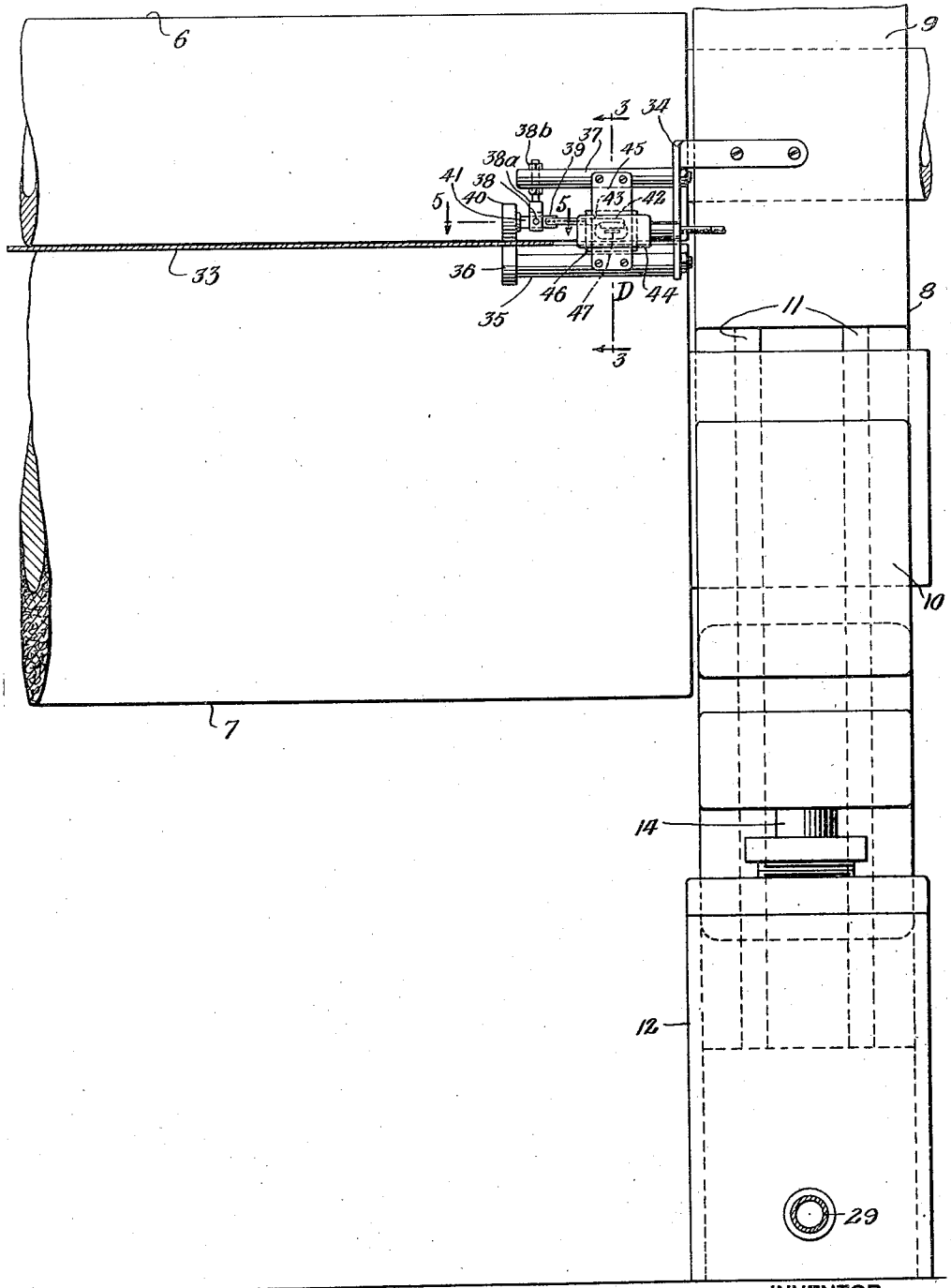


Fig. 1.

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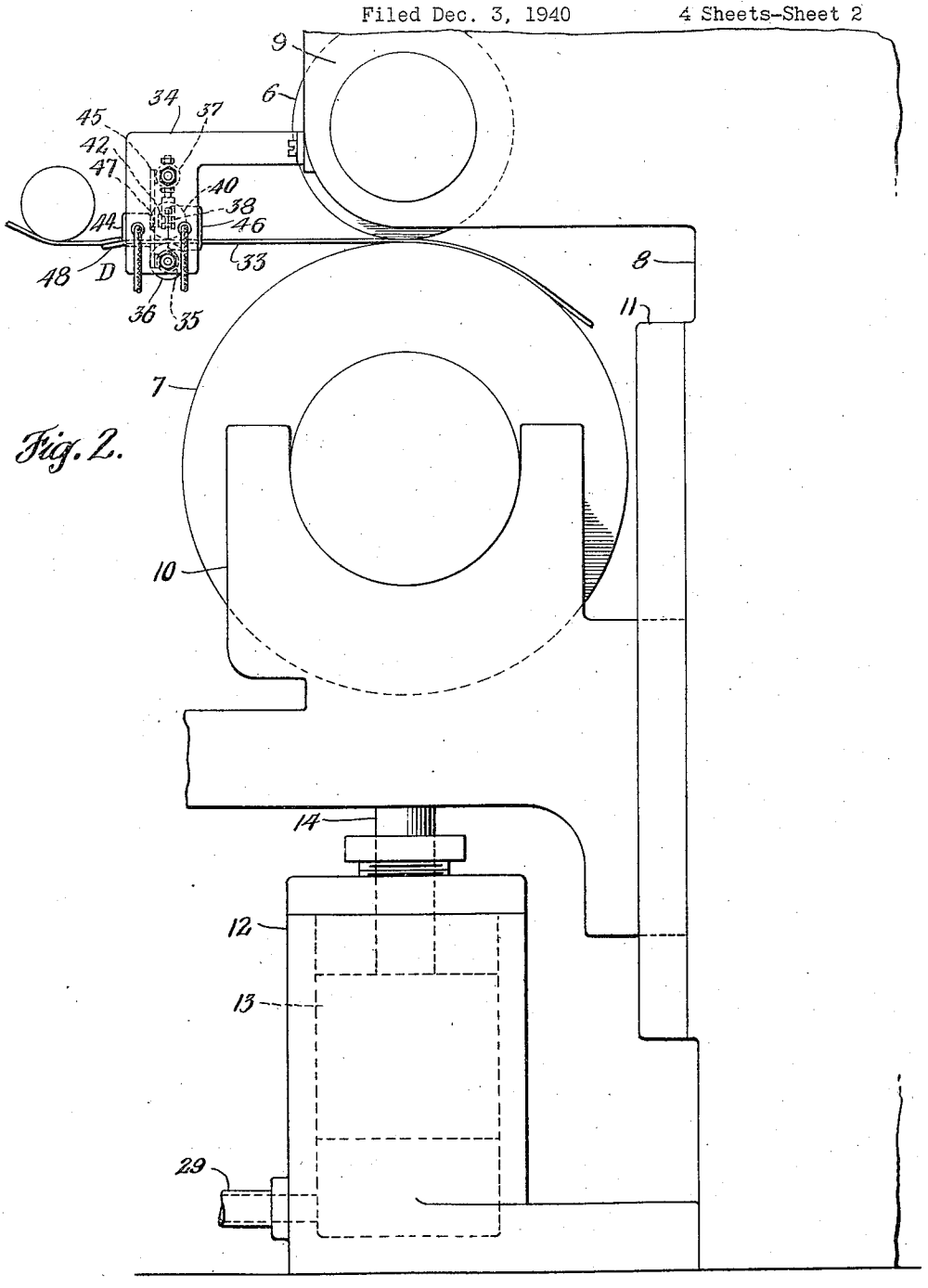


Fig. 2.

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FABRIC FINISHING MACHINE

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Fig. 3.

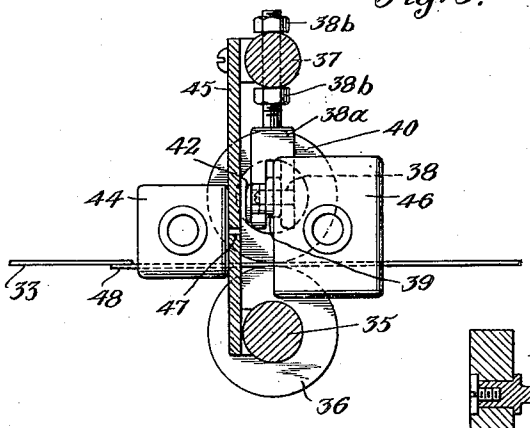


Fig. 5.

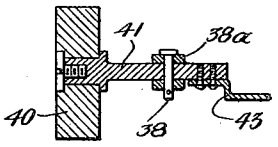


Fig. 4.

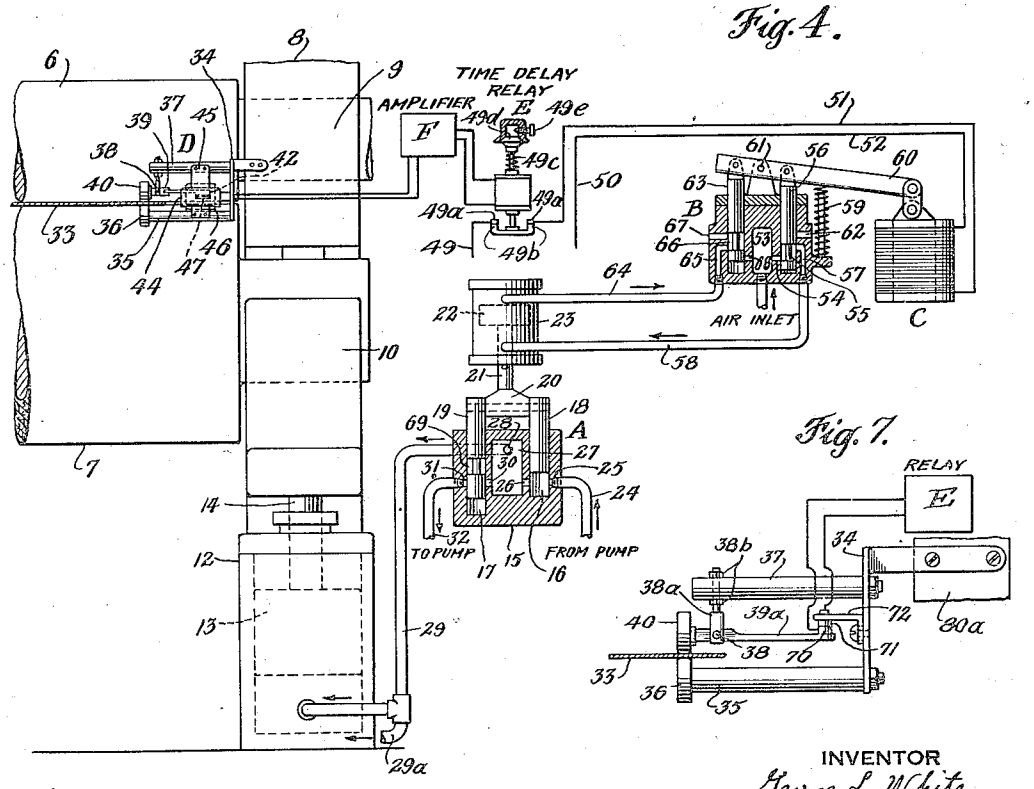


Fig. 7.

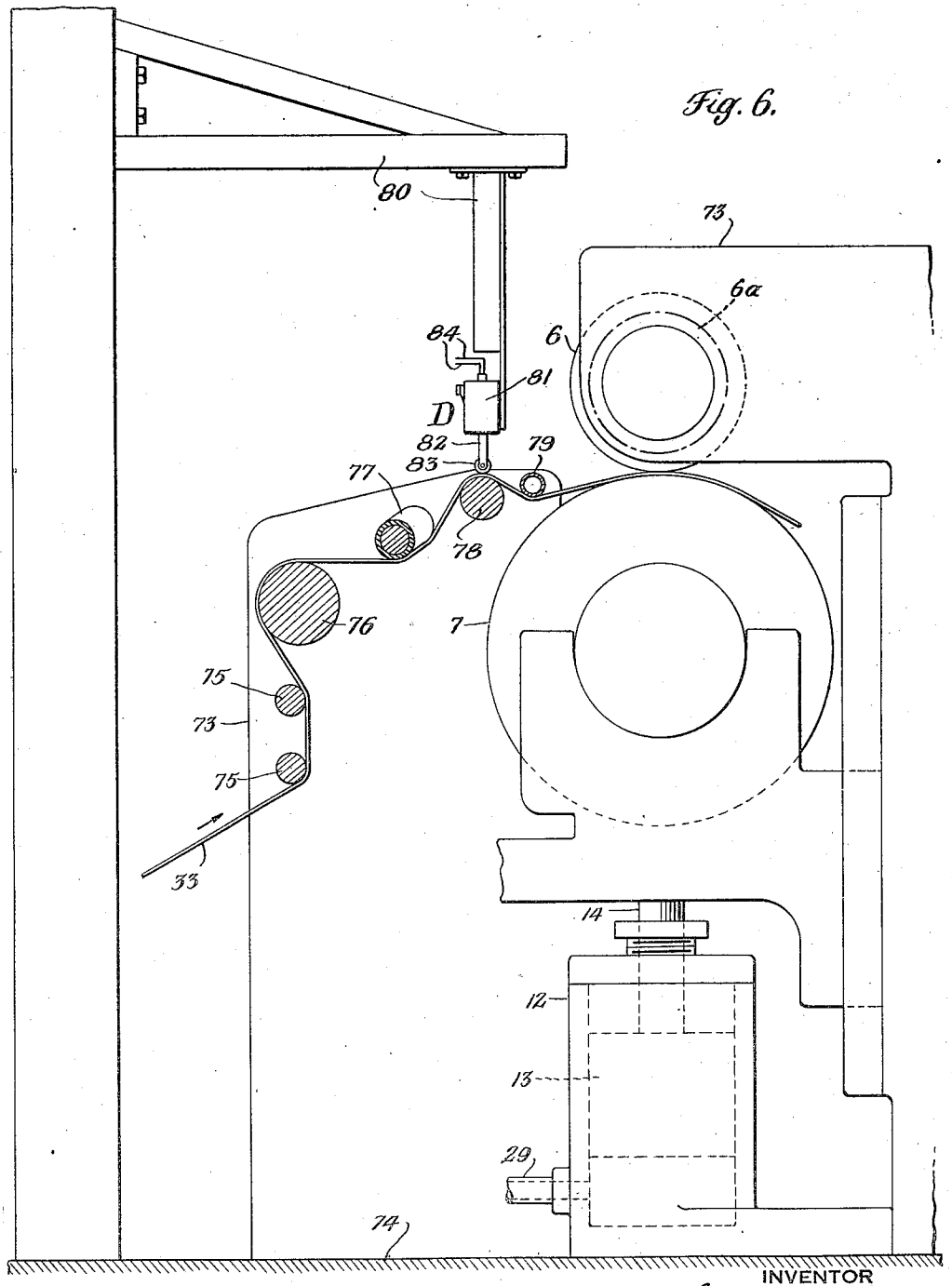
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Fig. 6.



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Patented Mar. 16, 1943 2,314,114

UNITED STATES PATENT OFFICE

2,314,114

FABRIC FINISHING MACHINE

George L. White, Wilmington, Del., assignor to Joseph Bancroft & Sons Co., Wilmington, Del., a corporation of Delaware

Application December 3, 1940, Serial No. 368,289

9 Claims. (Cl. 38—52)

This invention relates to a device for automatically preventing the marring or defacing of finishing rolls of fabric finishing machines by transverse seams in the fabric being finished. The present application is in part a continuation of my copending application Serial No. 277,961, filed June 7, 1939, now Patent No. 2,229,782, issued January 28, 1941.

The seams referred to are present in the fabric due to the fact that a roll of fabric is made up of a plurality of lengths of fabric seamed together so that in a large roll numerous seams are present. Without provision to the contrary, each time a seam would pass through the pair of rolls of the finishing machine an imprint of the seam would be made on the soft roll, it being pointed out that usually at least one of said rolls, preferably the upper one, is made of metal, while the other or lower one is softer, being made for instance of fibrous material, and that they are pressed together under enormous pressure.

In order to obtain an even finish on the fabric these rolls must be kept in good condition, i. e., without mars on the surfaces thereof such as the impression that would be caused by the seam being pressed into the soft roll under the heavy pressure. With each revolution of the roll a blemish would appear in the finish of the fabric because of the improper contact between the rolls and fabric each time the impression came around.

Heretofore the above difficulty has been overcome by manual control of the rolls by a skilled operator, but this is not only expensive because an operator is required for each machine, but also because prevention of the difficulty depended entirely on the watchfulness of the operator in detecting each seam in the fabric and then acting quickly in relieving the pressure on the rolls to move them apart. In this method the operator would relieve the pressure just before the seam entered the roll and then reapply the pressure just after the seam passed the roll. The unfinished sections are then cut out of the length of fabric and discarded as waste. It will be seen that the length of the unfinished section depended entirely on the judgment of the operator. If he waited too long in relieving the pressure, or, if he re-applied the pressure too soon, then the roll would be marred and, if he relieved the pressure too soon or re-applied it too late, then the section to be discarded would be longer than necessary and wasteful of material, particularly in high speed machines.

In other instances the seams are removed by what is known as the pasting operation in order to prevent the seam from making an imprint on the soft roll in the event that it is allowed to go through the rolls or calender. It is also necessary at times to tear out seams known as three stitch flat seams, or merrow seams, and to replace them with a large seam with quite a burr on it. This type of seam is very destructive to the soft roll in the calender.

One of the primary objects of my invention is the provision of fabric actuated mechanism for automatically relieving and re-applying the pressure on the finishing rolls in such timing as to not only avoid marring of the rolls but also to minimize the waste.

Another object of my invention resides in the provision of a device operating to automatically skip every seam in the fabric being finished whereby pasting operations such as mentioned above are eliminated.

A more specific object of my invention resides in the provision of automatic mechanism for the above purpose having a member actuated by the seams in the fabric to effect a relieving of the pressure on the finishing rolls immediately before a seam enters the rolls and to re-apply the pressure immediately after the seam passes the rolls.

In considering another aspect of the invention, attention is called to the fact that certain finishing machines, particularly the gear driven type, have a tendency to develop vibrations which cause unintentional actuation of the mechanism for relieving the roll pressure. With this in mind the invention contemplates special arrangement and mounting of certain of the devices, so as to provide reliable operation thereof to relieve the roll pressure only when fabric seams approach the finishing rolls.

How the foregoing, together with such other objects and advantages as may hereinafter appear or are incident to my invention, are realized is illustrated in preferred form in the accompanying drawings, wherein—

Figure 1 is a fragmentary front elevational view of certain parts of a fabric finishing machine necessary to an understanding of my invention with the fabric actuated mechanism of my invention applied thereto;

Figure 2 is an end elevational view looking toward the left in Figure 1;

Figure 3 is an enlarged sectional view taken on the line 3—3 of Figure 1;

Figure 4 is a more or less diagrammatic view illustrating a typical installation in accordance with my invention;

Figure 5 is an enlarged fragmentary plan section taken on the line 5—5 of Figure 1;

Figure 6 illustrates a modified application of the invention to a finishing machine, this arrangement being particularly suited to the gear driven type of finishing machine; and

Figure 7 is a further modification incorporating another type of control unit.

In the drawings I have indicated only those parts of a fabric finishing machine which are necessary to an understanding of my invention.

The machine of Figures 1–5 includes an upper steel roll 6 having a smoothly finished surface, and a lower roll 7 which is known as a soft roll, driven by the upper roll 6. The frame 8 at one end of the rolls has a stationary bearing 9 for the upper roll 6 and carries a movable bearing 10 for the lower roll.

The bearing 10 is mounted for up and down movement in the vertical guides 11 carried by the frame 8, and such movement is imparted thereto by means of a hydraulic cylinder 12 having a piston 13 therein connected to the bearing 10 by means of a piston rod 14.

A suitable valve mechanism, such as illustrated at A in Figure 4, is provided for controlling the supply of fluid under pressure to the cylinder 12, and this valve mechanism is under control of a valve actuating mechanism B. The mechanism B is actuated by a solenoid C which is controlled by a fabric actuated device D operating to energize and de-energize the solenoid C, as will hereinafter fully appear.

The valve device A comprises a casing 15 having bores 16 and 17 for the valve members 18 and 19 connected together by means of a member 20 having a rod 21 extending therefrom to which a piston 22 is connected, the piston operating in a cylinder 23.

In the position of the parts illustrated in Figure 4 fluid under pressure is led to the bore 16 from a high pressure pump (not shown), by means of a pipe 24 and port 25, and with the valve 18 in its upper position, as illustrated, the fluid passes through a port 26 into a cavity 27 having an outlet port 28 through which the fluid then passes to a pipe 29 connected into the lower portion of the cylinder 12. The valve 19 controls a pair of aligned ports 30 and 31 from the latter of which a pipe 32 leads back to the pump, it being noted that in the position illustrated the valve 19 covers the ports 30 and 31 so that there is no return flow to the pump.

The fluid under pressure which is thus led to the cylinder 12 moves the piston 13 upwardly, causing the lower roll 7 to be moved upwardly under heavy pressure against the upper roll 6 with the fabric 33 located between the rolls. While I have only shown the right-hand frame member and associated bearings and cylinder of the machine, it is to be understood that a similar arrangement is employed at the left-hand end of the rolls, the cylinder of which is supplied with fluid under pressure by means of a branch pipe 29*a*.

As shown in Figures 1–5, the fabric actuated device D comprises a support 34 secured to the frame 8, a lower bar 35 extending underneath the edge portion of the fabric 33 and carrying a roller 36 in contact with the bottom face of the fabric, a parallel upper bar 37 extending above said edge portion of the fabric and carrying a pivot 38 for a lever 39. The pivoted lever 39 carries a roller 40 at its free end 41 which rides on the upper face of the fabric directly above the roller 36. In order to take care of different thicknesses of cloth and of the seams the support 38*a* which carries the pivot 38 is adjustable as by means of the nuts 38*b*. In the form of my invention illustrated in Figures 1 to 5, inclusive, this lever 39 is provided with a plate-like portion or shutter 42 at its free end 43 adapted, when in the position shown, to be out of the path of the light beam of a light sensitive device comprising a photo-electric cell 44 mounted on a plate 45, and a device 46 constituting a source of light mounted opposite to the electric cell and supported by the support 34. The plate 45 is provided with a slot 47 through which the light from the device 46 passes to the electric cell 44.

By referring particularly to Figures 2 and 3, it will be seen that normally the device D is in the position above described because as long as the run of fabric is without seams the lever 39 remains as shown. However, when a seam, such as indicated at 48, contacts the roller 40, it will be moved upwardly, thus swinging the lever on its pivot and causing the plate-like portion 42 thereof to be moved downwardly into the beam of light, thus cutting off the light source to the photo-electric cell.

Referring to Figure 4, I have shown the electric supply lines 49 and 50 connected to a time delay relay, indicated at E, which is energized by the output of an amplifier indicated at F. The photo-electric cell 44 is located in the input circuit of the amplifier F. Wires 51 and 52 lead from the relay E to the solenoid C and the relay operates to connect the solenoid C to the supply lines 49 and 50 when the light beam is uninterrupted and to disconnect it when the light beam is interrupted.

Assuming now that the device D is in normal position, i. e., in the position shown in the drawings wherein the rollers 36 and 40 are not being contacted by a seam in the fabric, then the plate 42 is out of the path of the light beam and the relay E is operated to energize the solenoid C and move the valve actuating mechanism B into the position shown in Figure 4. Stated more fully, when the light beam is uninterrupted by the plate 42, i. e., when the run of cloth does not present a seam or the like to the roller 40 which will cause operation of the lever 39 of the device D to cut off the light source to the photo-electric cell 44, the relay E is energized so that the contacts 49*a* are engaged by the contacts 49*b*, thus closing the circuit which energizes the solenoid C. This moves lever 60 to the position shown in Figure 4. In this position air under pressure from the air supply chamber 53 passes through port 54, valve cavity 55 of the valve 56, port 57, and pipe 58 to the lower end of the cylinder 23, thus raising the piston 22 and moving the valves 18 and 19 of the valve mechanism A to the positions shown. As above described, this admits high pressure fluid into the cylinders 12 to raise the pistons 13 and bring the lower roll 7 into tight contact with the fabric and the upper roll.

The parts remain as above described until a seam contacts the rollers 36 and 40 of the device D, and this causes the lever 39 to swing on its pivot so that the end 43 moves downwardly to move the shutter 42 into the path of the light beam to interrupt it.

This cutting off of the light source from the photo-electric cell actuates the relay E so as to disconnect the solenoid C from the electric supply lines. Stated more fully, when the shutter 42 is in the path of the light beam the output of the

amplifier F is cut off so that no electric current is supplied to the relay E. This causes the contacts 49b to move out of engagement with the contacts 49a and breaks the circuit to the solenoid C. The spring 59 then causes the lever 60 to swing on its pivot 61 to lift the valve 56 into its position of closing the port 54 and connecting the port 57 and cavity 55 to the atmosphere through the port 62. The valve 63 which had previously been in position to connect the pipe 64, port 65 and valve cavity 66 to the atmosphere through the medium of the port 67, as shown in Figure 4, is at the same time moved downwardly to cut off the outlet port 67 and to establish communication from the air supply chamber 53 to the upper end of the cylinder 23 by means of the port 68, valve cavity 66, port 65 and pipe 64. This moves the valves 18 and 19 downwardly, causing the supply port 25 to be covered and the discharge port 31 to be uncovered, thus allowing pressure fluid to flow from the cylinders 12 through the pipes 29 and 29a, port 28, chamber 27, port 30, valve cavity 69, and port 31 into the pipe 32 for return to the pump.

Thus, the pressure on the lower roll 7 is relieved and it moves downwardly away from the fabric, permitting the seam to pass between the rolls 6 and 7 without leaving an imprint on the lower roll which otherwise would mar or deface its surface.

It is pointed out that as soon as the seam passes the rollers 36 and 40 of the device D the shutter 42 again moves out of the path of the light beam, but since the relay device E is a time delay relay, such as diagrammatically illustrated in Figure 4, this does not immediately cause a re-application of the pressure on the rolls 6 and 7 because the amount of time delay of the relay is so calculated that sufficient time elapses before the solenoid C is actuated to ensure that the seam has passed through the rolls. The time delay of the relay is effected by means of the spring 49c, bellows 49d and air valve 49e of well-known construction, it being noted that when the relay is energized the spring 49c is first compressed but the contacts 49a and 49b do not close until sufficient time has elapsed for the air to be forced from the bellows 49d through the adjustable air valve 49e. However, since that portion of the material which passes the rolls when they are out of contact is not finished and, therefore, becomes waste I adjust the time delay of the relay so that the rolls will be brought into contact as quickly as possible after the seam has passed through the rolls.

In connection with the foregoing, attention is called to the fact that the control device D which engages the fabric is mounted in common with the finishing rolls and other parts of the machine. This is satisfactory in machines of certain types, but in machines of other types, notably that type in which at least one of the finishing rolls is gear driven, there is a tendency to build up vibrations as a result of the gear drive. At certain speeds of operation resonance conditions are established, in consequence of which the vibrations attain considerable magnitude.

I have found that in installations where these vibration problems are encountered, a different arrangement and mounting of the control device is necessary. An example of such a modified arrangement is shown in Figure 6, wherein the upper and lower finishing rolls are again indicated at 6 and 7, these rolls being mounted in a framing 73 providing support on the floor or foundation structure 74. Here the upper or hard roll 6 is adapted to be driven by gearing, including gear 6a. It will be understood that the rolls are also mounted to provide for pressure interengagement under the influence of hydraulic rams, in accordance with the description above of the arrangement shown in Figures 1 to 5.

In this machine the fabric 33 travels in the direction indicated by the arrow, first engaging guide rails 75 and then passing over a measuring roll 76, beyond which is a rubber expander roll 77 of known construction adapted to spread or laterally stretch the web so as to ensure elimination of folds or creases in the run of fabric to the finishing rolls 6 and 7. Following the expander is a rail 78, also mounted in the framing 73 of the machine, after which the fabric passes under a rail 79 to the finishing rolls 6 and 7.

The control unit in this arrangement is again generally designated by the letter D, although in this instance the unit is mounted on the foundation 74 by means of an independent framing or support 80, so as to dissociate this unit from the vibrations of the framing 73 set up as a result of the gear drive.

Unit D incorporates an electric switch 81, desirably of the "Mercoid" type, comprising a tiltable mercury-containing tube with appropriate contacts, which switch takes the place of the photo-electric device of the arrangement first described, the switch being adapted to be directly actuated by a projecting stem 82 carrying a roller 83 riding on the web at a point adjacent the rail 78. Although the connections 84 may be coupled with an amplifier, as in the arrangement previously described, in this type of installation, the Mercoid switch may be coupled directly to the relay E.

Considering the operation, I have found that unintentional actuation of the control unit, as a result of the building up of vibrations is substantially completely eliminated, notwithstanding the fact that in the arrangement shown in Figure 6 the actuating roller 83 bears against rail 78 which is mounted in common with the rolls 6 and 7 and other parts of the finishing machine. Moreover, the position of the contact roller 83 to engage the fabric at a point adjacent the rail 78 is of advantage because of the relation of that rail to other parts of the finishing machine. Note especially that the fabric is delivered to rail 78 directly from the expander 77, so that there is maximum assurance that folds or creases will not be engaged by the contact roller 83. This is also of importance in eliminating undesired tripping of the control mechanism.

In the modification of Figure 7, the control unit D takes still another form, although the unit is again mounted on framing 80a independent of the framing for the major elements of the machine.

With further reference to Figure 7, the arm lever 39a is provided with a contact member 70 adapted to engage a contact 71 when the rollers 36 and 40 are in normal position, as shown, and to be separated from the contact 71 when a seam passes through the rollers. When the contacts are in engagement the time delay relay operates to connect the solenoid C with the supply lines 49 and 50, thus energizing the solenoid and causing operation of the mechanisms A and B into the positions shown in Figure 4. When the contacts are separated by a seam, the solenoid C and mechanisms A and B are actu-

ated to relieve the pressure on the rolls in the same manner as above described in connection with the first form of my invention. In this form, as in the first form of my invention, the support 38*a* is adjustable by means of the nuts 38*b* and in addition the contact 71 is carried by an adjustable bracket 72 whereby it may be adjusted in accordance with the thickness of the run of fabric.

Although the control unit of the arrangement of Figure 7 is mounted on framing independent of the main framing of the machine, the contact rollers 36 and 40 are arranged to engage the fabric in the run thereof intermediate the expander (shown at 77 in Figure 6) and the finishing rolls themselves.

While I have described my invention in connection with a finishing machine having a hard and a soft finishing roll, it is to be understood that advantages of the invention may also be realized in finishing machines in which both of the finishing rolls are either hard or soft. Also marring of the surfaces of the finishing rolls from other causes such as transverse folds in the fabric is also prevented because such folds would cause actuation of the device D.

I claim:

1. In textile finishing machinery, a hard roll and a soft roll between which fabric having transverse seams is passed for finishing, hydraulic ram means for pressing one roll toward the other, valve means controlling said ram means, piston means for actuating said valve means, valve means controlling said piston means, relay controlled means for actuating said second valve means, a movable member in contact with said fabric displaceable in one direction by engagement with a seam to actuate said relay means and thereby effect sequential actuation of said second mentioned valve means, said piston means and said first mentioned valve means to cause said movable roll to move away from the other roll, and said movable member being displaceable in the opposite direction upon passage of said seam to actuate said relay means and thereby effect sequential actuation of said second mentioned valve means, said piston means and said first mentioned valve means to cause said movable roll to be pressed toward the other roll, said relay means including a time delay device whereby said last mentioned movement of the movable roll is delayed until the seam has passed beyond the rolls.

2. In a fabric finishing machine having a pair of finishing rolls, a hydraulic ram for maintaining the rolls in pressure interengagement, a control valve for the ram, and mechanism for relieving the roll pressure during the passage of a fabric seam between the finishing rolls and for re-establishing the roll pressure after passage of a seam through the rolls including a displaceable contact member adapted to engage the fabric in advance of the rolls, operating connections for actuating the control valve upon movement of said member under the influence of engagement with a seam to relieve the roll pressure and for actuating the control valve upon the passage of said seam to re-establish the roll pressure, and a time delay device for delaying actuation of the control valve to re-establish the roll pressure until after said seam has passed the rolls.

3. A construction in accordance with claim 2, in which the operating connections between the displaceable member and the control valve include an electrically operated solenoid.

4. Mounting and control mechanism for fabric finishing machines having a pair of finishing rolls pressure-held together between which fabric having transverse seams therein is passed for finishing, said mechanism including, in combination with a supporting foundation, framing mounting said rolls on the foundation, a device for relieving the roll pressure during the passage of a fabric seam therethrough including a pair of relatively displaceable elements adapted to engage opposite sides of fabric seams in advance of the finishing rolls, one of said elements being mounted in common with the finishing rolls on the framing aforesaid, and a second framing mounting the other of said elements on the foundation independently of the first framing.

5. Mounting and control mechanism for fabric finishing machines having a pair of finishing rolls pressure-held together between which fabric having transverse seams therein is passed for finishing, said mechanism including, in combination with a supporting foundation, framing mounting said rolls on the foundation, a device for relieving the roll pressure during the passage of a fabric seam therethrough including a member adapted to contact the fabric in advance of the finishing rolls and being mounted for displacement by engagement with a fabric seam, and a second framing mounting said contact member on the foundation independently of the first framing.

6. A fabric finishing machine including a pair of cooperating pressure rolls, a spreading or expander roll in advance of the finishing rolls, a tensioning or guide means intermediate the expander rol land the finishing rolls cooperating with the expander roll to maintain the flat and unwrinkled condition of the fabric in passing to the finishing rolls, means normally maintaining high pressure interengagement of the finishing rolls, and mechanism for relieving the roll pressure during the passage of a fabric seam between the finishing rolls and for re-establishing the roll pressure after passage of a seam through the rolls, including a displaceable contact member adapted to engage the fabric at the side thereof opposite to said tensioning or guide means and in the run of the fabric adjacent said guide means, said contact member being displaceable under the influence of the passage of a fabric seam to relieve the roll pressure.

7. A construction in accordance with claim 6, and further incorporating framing supporting said finishing rolls, the expander roll and said tensioning or guide means in common, and substantially independent framing mounting said contact member.

8. In a fabric finishing machine having a pair of finishing rolls at least one of which is gear driven, the rolls being pressure-held together between which fabric having transverse seams therein is passed for finishing, control mechanism operable by said seams to relieve the pressure on said rolls immediately before a seam enters the rolls and to restore said pressure immediately after the seam leaves said rolls, and substantially independent framing or supports for mounting the finishing rolls and for mounting the seam operated means.

9. In a fabric finishing machine having a pair of cooperating pressure rolls and a spreading or expander roll in advance of the finishing rolls, means normally maintaining high pressure interengagement of the finishing rolls, and mechanism for relieving the roll pressure during the

passage of a fabric seam between the finishing rolls and for re-establishing the roll pressure after passage of a seam through the rolls, including a displaceable contact member adapted to engage the fabric and to be displaced upon engagement with a seam, said contact member being associated with the run of fabric intermediate the expander roll and the finishing rolls, whereby the expander roll serves not only to reduce the passage of fabric-folds through the finishing rolls but also to reduce unintentional actuation of said contact member under the influence of engagement with fabric-folds.

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