United States Patent [19]

Dunlap et al.

[11] **3,728,985**

[45] **Apr. 24, 1973**

[54] **ADHESIVE APPLICATOR FOR LASTING MACHINE**

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[73] Assignee: **Compo Industries, Inc.,** Waltham, Mass.

[22] Filed: **July 6, 1970**

[21] Appl. No.: **60,975**

Related U.S. Application Data

[62] Division of Ser. No. 808,286, March 18, 1969, Pat. No. 3,561,027.

[52] **U.S. Cl.**.....**118/2,** 118/410

[51] **Int. Cl.**.....**B05c 5/02**

[58] **Field of Search**.....118/2, 410, 411

[56] **References Cited**

UNITED STATES PATENTS

2,113,244	4/1938	Shevlin	118/2
2,727,488	12/1955	Nerim	118/410
2,843,863	7/1958	Weisz	118/2 X
3,155,538	11/1964	Schneider et al.	118/2
3,246,625	4/1966	Beaman	118/2
3,327,680	6/1967	Talbot	118/2
3,398,717	8/1968	Paulsen	118/410 X

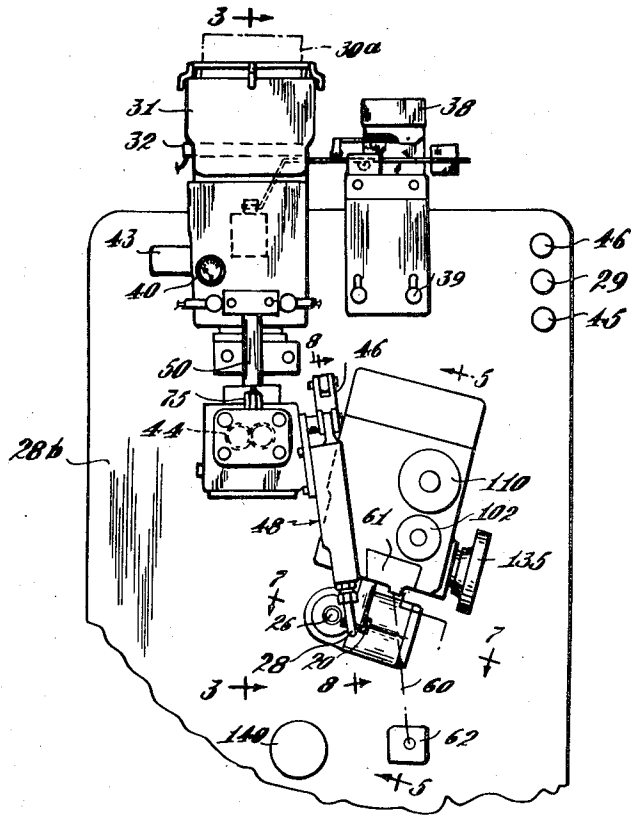
Primary Examiner—John P. McIntosh

Attorney—G. Eugene Dacey and Dike, Thompson and Bronstein

[57] **ABSTRACT**

In a lasting machine of the kind in which a pair of rolls turning in opposite directions apply lasting and feeding stresses to the lasting margin of a shoe, improvements in means for adjusting the spacing between the axes of said rolls, means for controlling the adhesive flow from the adhesive nozzle, the adhesive delivery system, means for adjusting the position of the nozzle relative to the lasting margin, means for adjusting the axis of a rotary wiper at right angles to the axes of said rolls and means for resiliently urging the operative surface of a wiper blade towards the bite of said rolls whereby it is self-adjusting to accommodate different thicknesses of the last margin.

5 Claims, 14 Drawing Figures



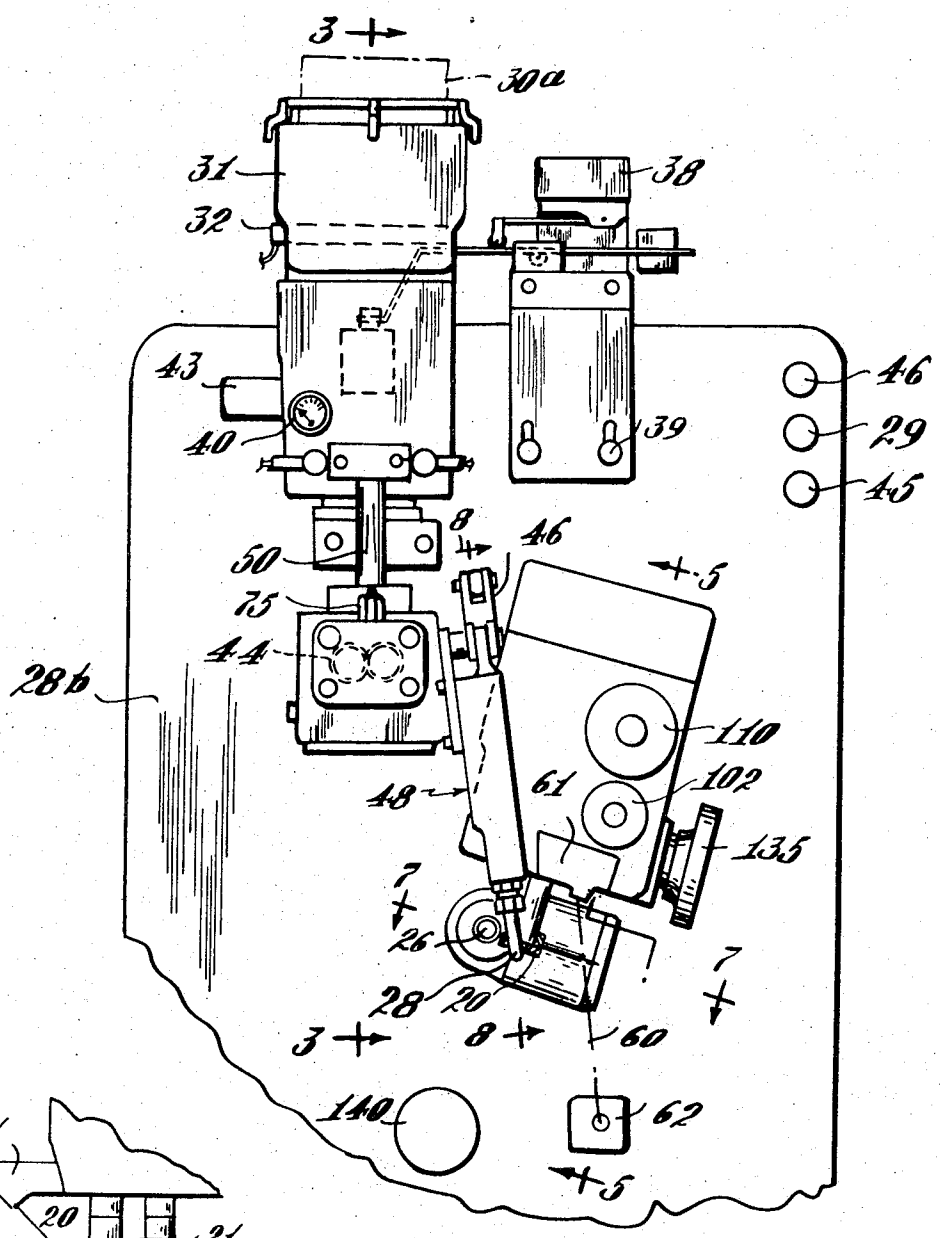

3
30a
31
32
38
43
40
39
46
29
45
8
46
50
5
75
44
28b
110
61
102
48
135
7
26
28
20
7
3
8
60
140
62
5

Fig. 1

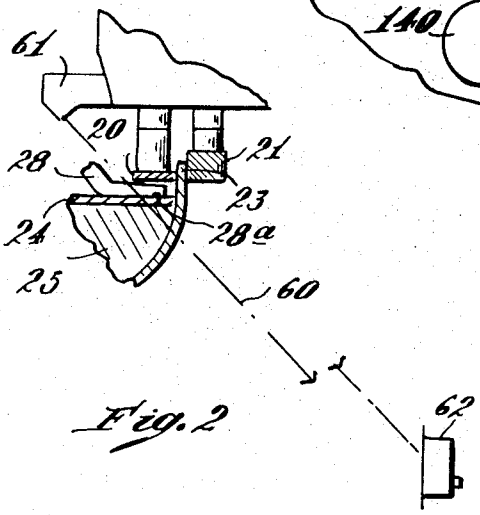

61
20
21
28
23
24
28a
25
60
62

Fig. 2

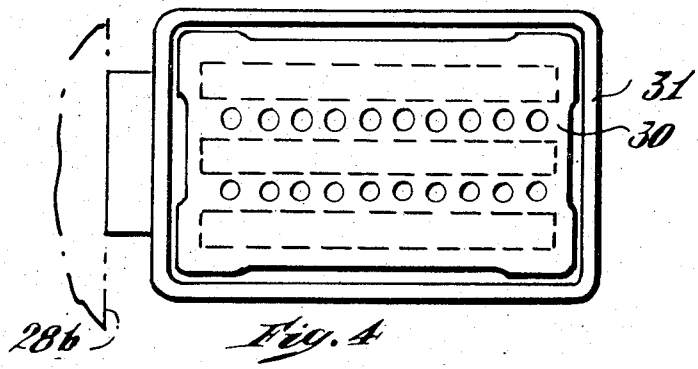

31
30
28b

Fig. 4

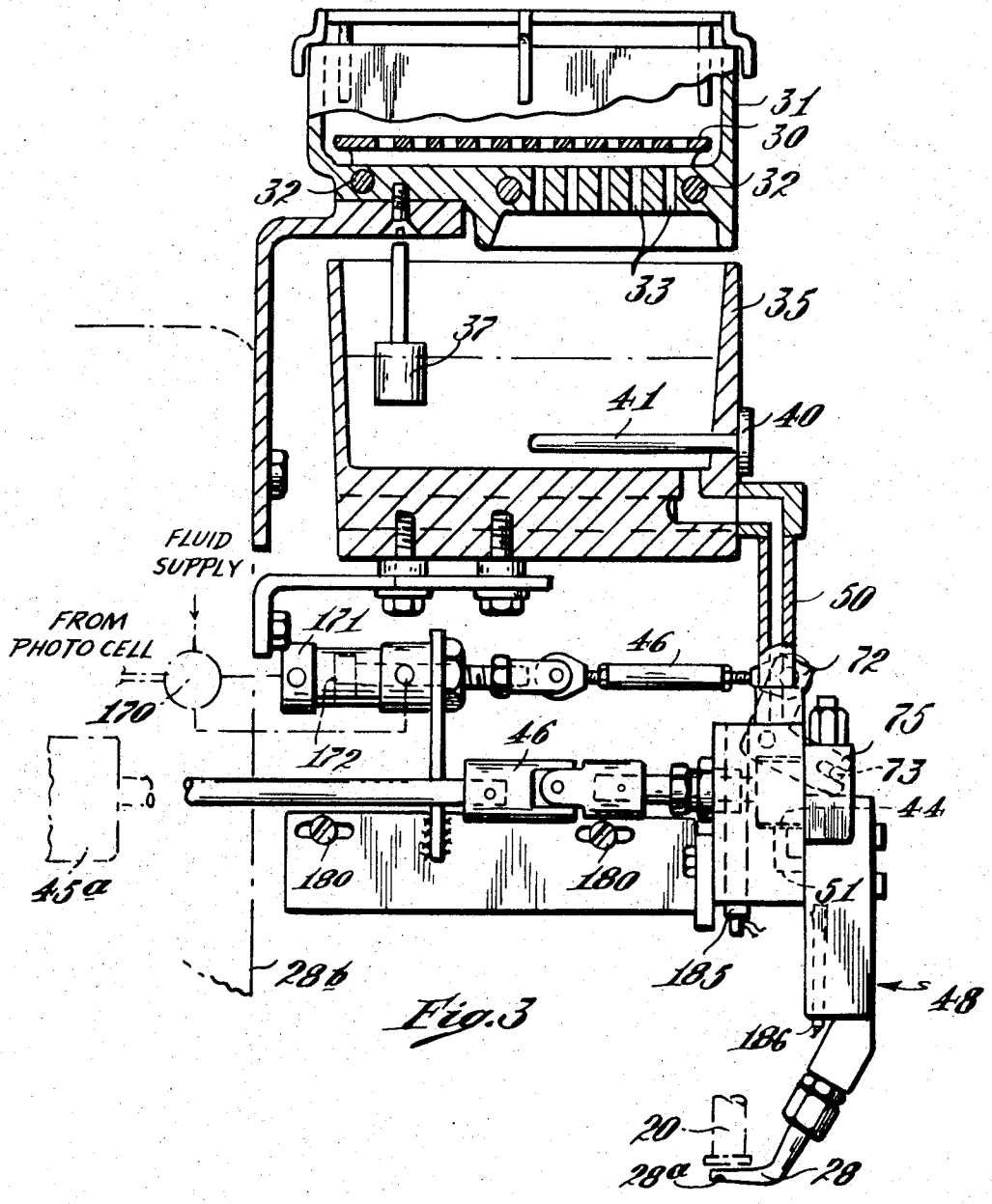

31
30
32
32
33
35
37
41
40
FLUID SUPPLY
FROM PHOTO CELL
50
171
46
72
170
75
172
46
73
44
180
180
51
45a
28b
185
48
186
20
28a
28

Fig. 3

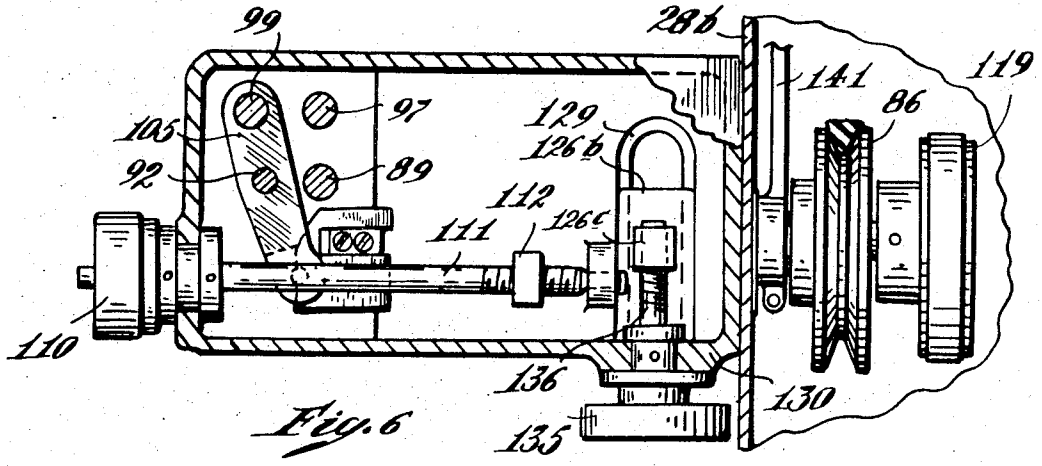

99
28b
141
119
86
97
129
126b
105
92
89
112
111
126c
110
136
130
135

Fig. 6

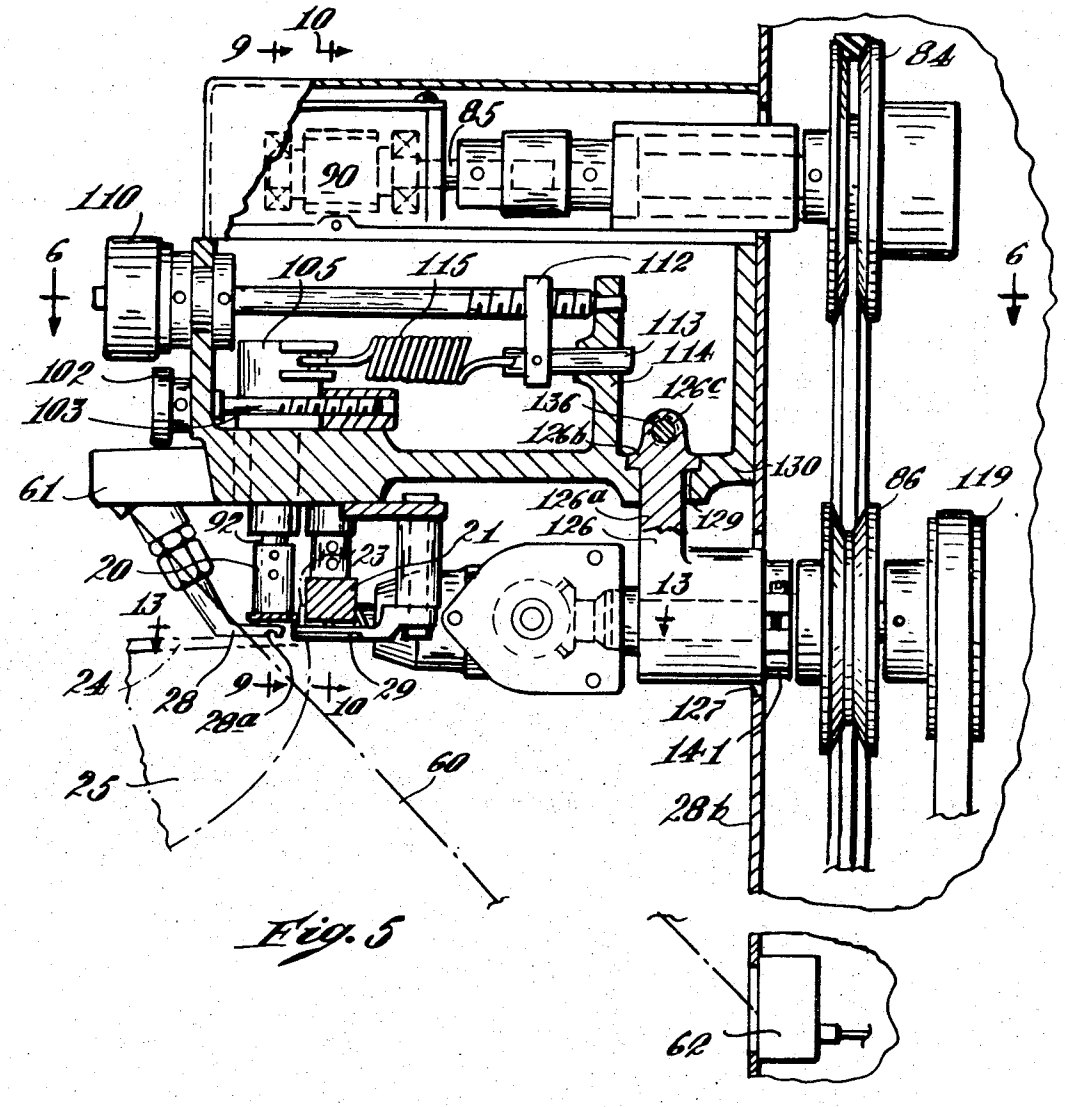

10
9
4
84
85
90
110
6
105
115
112
113
114
102
103
126c
136
126b
130
86
119
61
126a
126
129
92
21
20
23
13
24
28
28a
29
127
141
28b
25
60
62

Fig. 5

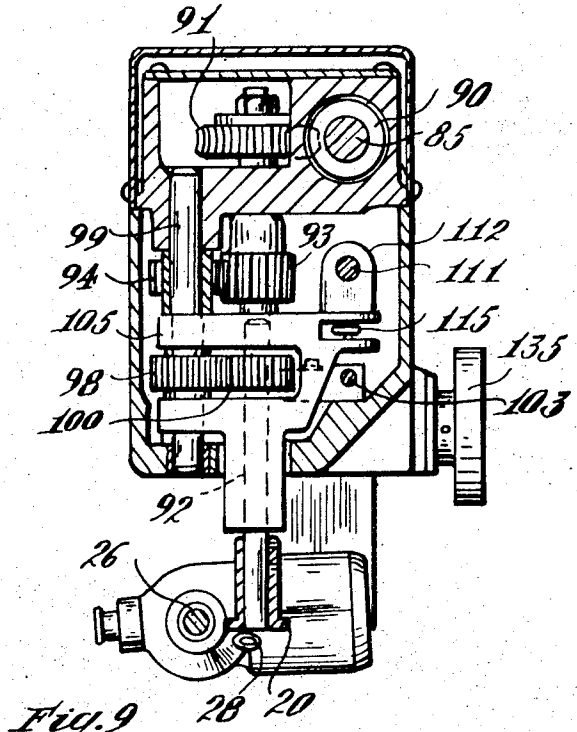


Fig. 9

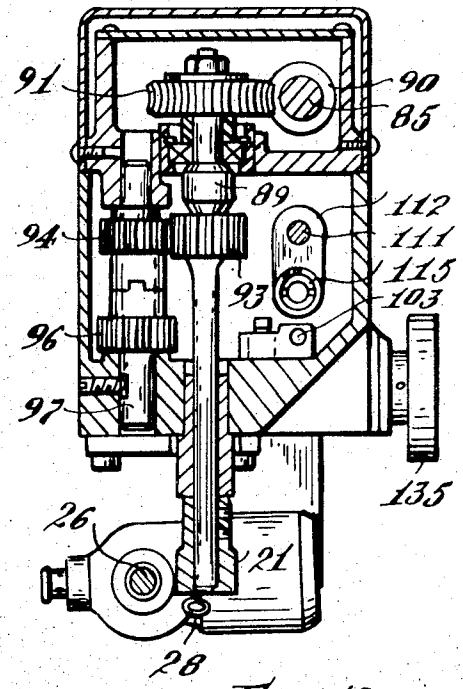


Fig. 10

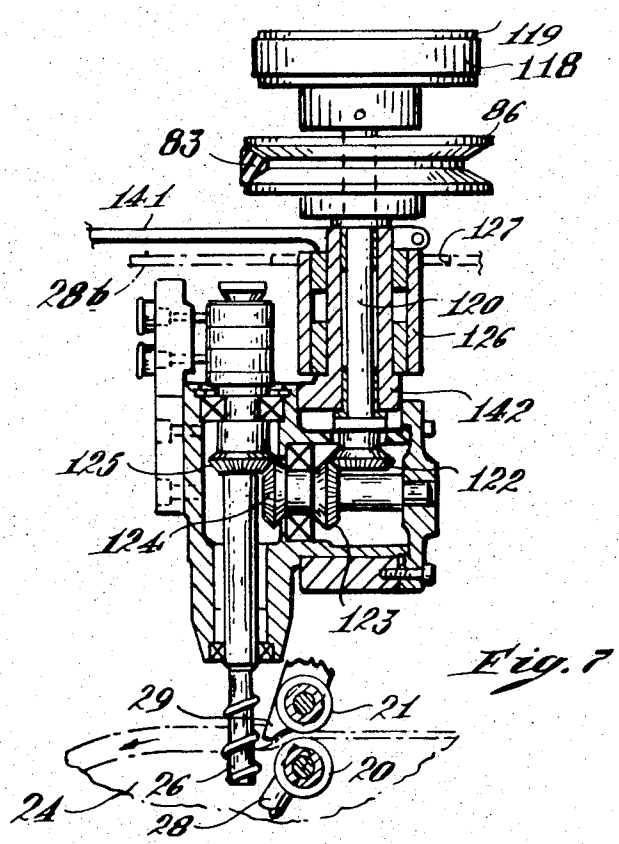


Fig. 7

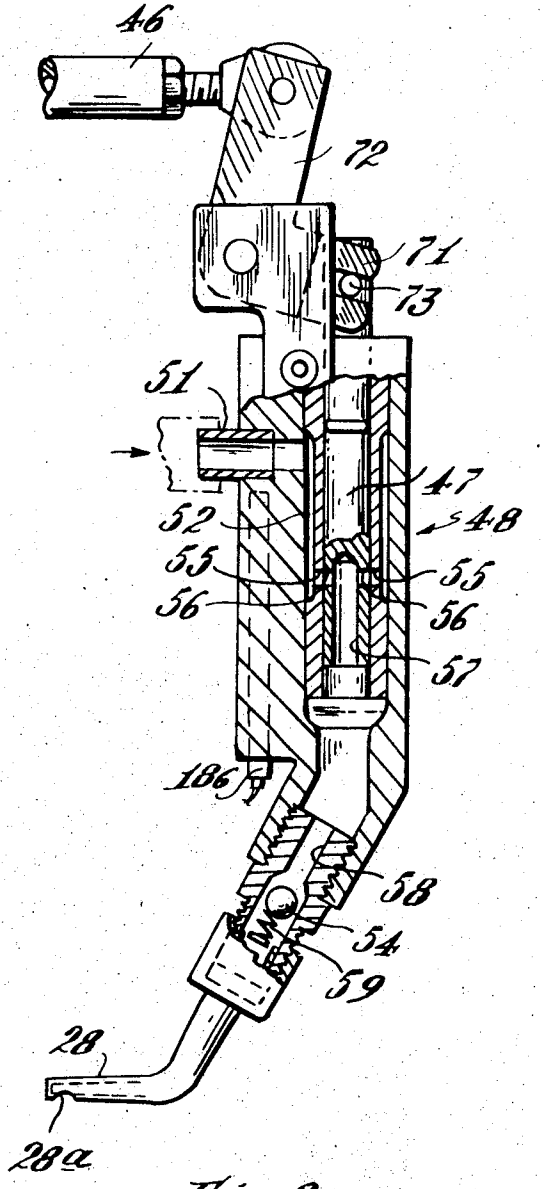


Fig. 8

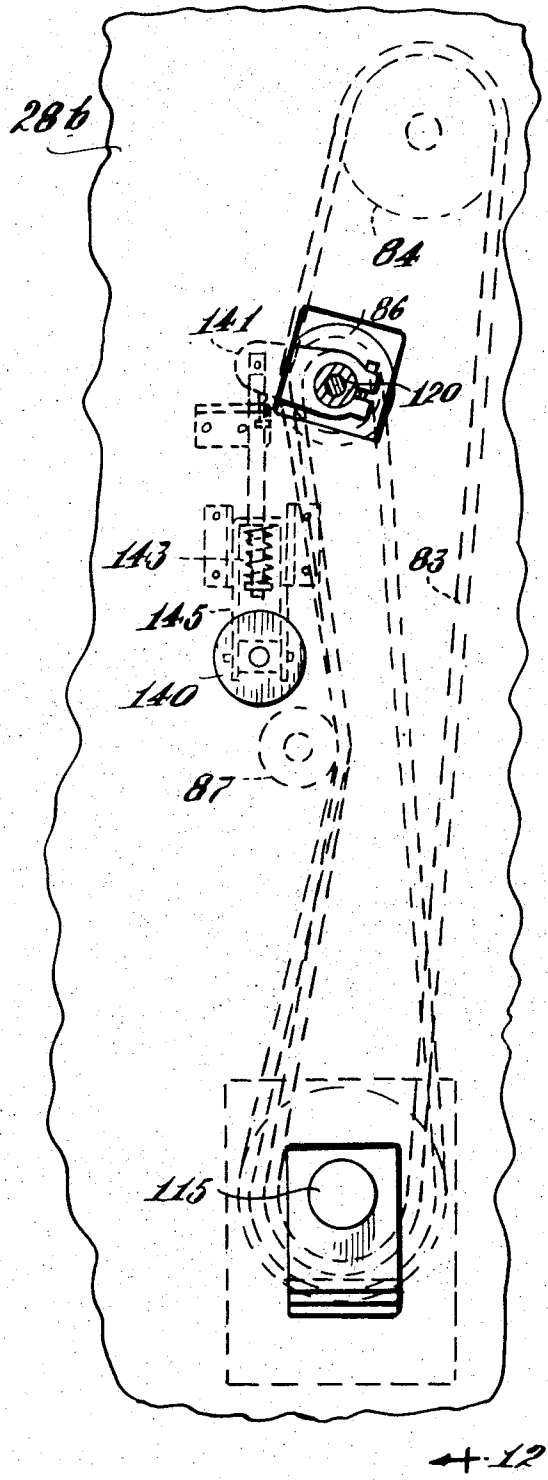

28b
84
141
86
120
143
83
145
140
87
115
12

Fig. 11

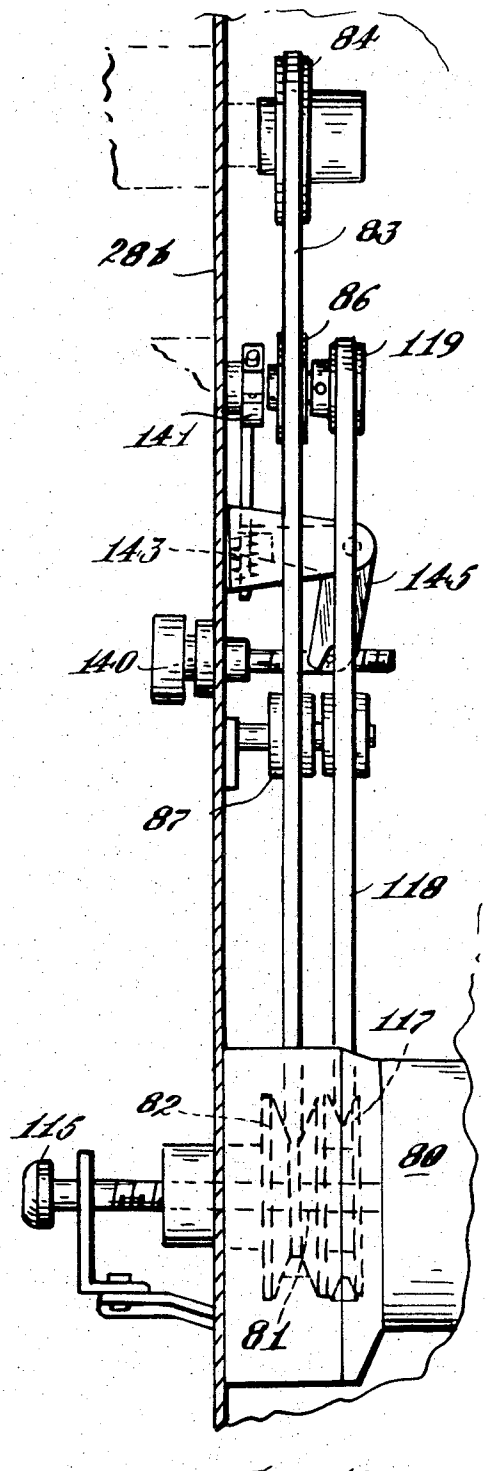

84
83
28b
86
119
141
143
145
140
87
118
117
82
116
80
81

Fig. 12

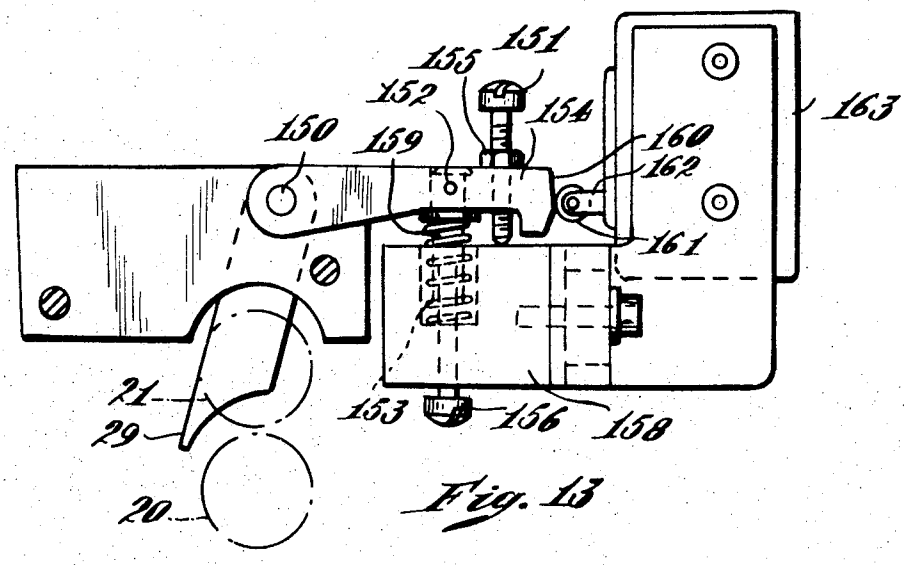

151
155
152
154
150
159
160
162
163
161
21
29
153
156
158
20

Fig. 13

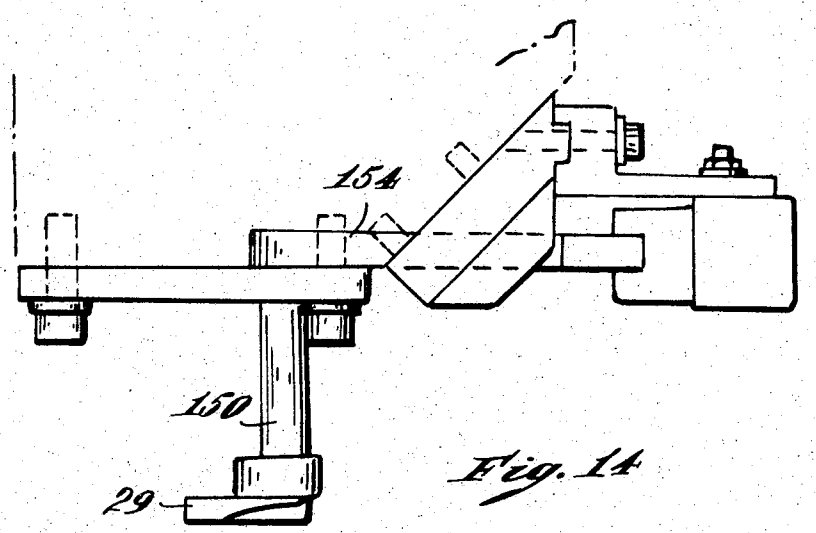

154
150
29

Fig. 14

ADHESIVE APPLICATOR FOR LASTING MACHINE

This is a division of application Ser. No. 808,286 filed by Robert B. Dunlap and Evald O. Peterson, Mar. 18, 1969, now U.S. Pat. No. 3,561,027.

BACKGROUND OF THE INVENTION

The invention relates to lasting machines of the kind in which a pair of feed rolls turning in opposite directions apply lasting and feeding stresses to the lasting margin of a shoe. United States Pat. No. 2,251,284 to Jacob S. Kamborian dated Aug. 5, 1941 discloses such a machine.

Such lasting machines usually include an adhesive application nozzle situated at the delivery side of the feed rolls, means for supplying adhesive to the nozzle, means for controlling the flow of adhesive from the nozzle, means for adjusting the position of the nozzle relative to the lasting margin, a wiper blade which guides the lasting margin downwardly towards the insole as it emerges from the feed rolls and a rotary wiper which forces the margin into final contact with the insole.

However most of these prior art elements have exhibited some disadvantages in practice which the present invention is designed to overcome.

SUMMARY OF THE INVENTION

One object of this invention is to provide an improved lasting machine of the foregoing type which is economical to manufacture, easy to use, easy to adjust by the user, performs an excellent lasting job and is economical in the amount of adhesive which is used.

Another object of this invention is to provide improved apparatus which insures that adhesive will be delivered from the nozzle while the insole and last are in lasting position in the machine and that delivery of adhesive from the nozzle will be terminated when the insole and last are removed from lasting position, thereby preventing waste of adhesive.

A further object is to provide improved means for closing the adhesive delivery passage of the nozzle to prevent dripping of adhesive from the nozzle after the last and insole have been removed from the machine.

Yet another object is to provide improved adhesive control valve means which controls both the opening and the closing of the adhesive delivery passage of the nozzle.

A still further object is to provide improved means for supplying adhesive under pressure to the nozzle.

Another object is to provide improved means for moving the nozzle towards and away from the lasting margin.

Other objects and advantages will be apparent to persons skilled in the art from a consideration of the drawings and the following specification and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a lasting machine embodying the invention;

FIG. 2 is an enlarged side elevation looking from right to left at FIG. 1 showing the photocell and mating light of an electric eye for initiating, maintaining and terminating the delivery of adhesive from the end of the nozzle; a last, insole and lasting margin of a shoe being shown in phantom;

FIG. 3 is an enlarged section taken on the line 3—3 of FIG. 1 showing the adhesive heating and delivery mechanism;

FIG. 4 is a plan view of the melting pot shown in FIG. 3;

FIG. 5 is an enlarged section taken on the line 5—5 of FIG. 1;

FIG. 6 is a section taken on the line 6—6 of FIG. 5;

FIG. 7 is an enlarged section taken on the line 7—7 of FIG. 1 showing the feed rolls and rotary wiper with an insole and lasting margin in phantom;

FIG. 8 is an enlarged section taken on the line 8—8 of FIG. 1 showing the adhesive delivery valve and the nozzle;

FIG. 9 is an enlarged section taken on the line 9—9 of FIG. 5 showing the means for driving the front feed roll;

FIG. 10 is an enlarged section taken on the line 10—10 of FIG. 5 showing the means for driving the rear feed roll

FIG. 11 is a partial front elevation showing the motor, drive pulleys and belts;

FIG. 12 is a section taken on the lines 12—12 of FIG. 11;

FIG. 13 is an enlarged section taken on the line 13—13 of FIG. 5 showing the wiper blade and a modified arrangement for initiating, maintaining and terminating the delivery of adhesive from the end of the nozzle; and

FIG. 14 is a side elevation of FIG. 13.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 2, 5 and 7 of the drawings, the front feed roll 20 and rear feed roll 21 are supported for rotation in opposite directions and they engage opposite sides of the lasting margin 23 of an upper which projects upwardly from the insole 24 and last 25. These feed rolls apply both lasting and feeding stresses to the margin thereby pulling the upper snuggly about the last and permitting the margin, last and insole to move forwardly from the feed rolls towards the rotary wiper 26 (FIG. 7).

Adhesive is fed from the orifice 28*a* of the nozzle 28 to the marginal surface of the insole, as best shown in FIGS. 1, 2, 5 and 8.

The wiper blade 29 (FIGS. 5, 7 and 13 and 14) guides the margin downwardly towards the insole as it emerges from the feed rolls. The rotary wiper 26 forces the margin into final contact with the insole.

In practice, the toe and heel of the shoe are usually lasted before the sides of the margin are lasted and the machine is preferably used only to last the sides. However, the machine may be used to last the sides and the toe if the shoe has been previously heel-seat lasted or to last the sides and the heel if the shoe has been previously toe lasted.

THE ADHESIVE MELTING AND FEEDING APPARATUS

While the adhesive may be cold as delivered to the insole, we have shown an apparatus capable of delivering hot adhesive.

Referring to FIGS. 1, 3 and 4 of the drawings, a block of solid adhesive 30*a* (FIG. 1) is placed on the grid 30 of the melting pot 31 which is heated by means of heating elements 32. These heating elements are initially

activated by turning the pre-melt knob **29** located on the front panel **28***b* of the machine. As the adhesive melts, it flows downwardly through the perforations in the grid, the passages **33** in the bottom of the melting pot and into the reservoir **35**.

A float **37** positioned in the reservoir is operatively connected to the switch **38** to cause the switch to open the circuit which is activating the heating elements **32** when the level of the molten adhesive in the reservoir **35** reaches a predetermined level and to cause it to close this circuit when it falls below a predetermined level. As shown in FIG. **1**, the height of the switch may be adjusted by the elements **39**.

The dial **40** (FIG. **1**) indicates the temperature of the adhesive in the reservoir. The element **41** which projects into the reservoir controls the pointer on this dial.

Thermostatic control switch **43** (FIG. **1**) is in the line which supplies current to the motor **45***a* (FIG. **3**) which drives the gear pump **44** and to the means for actuating the valve **170** which controls the supply of fluid to the cylinder **171** and piston **172** (FIG. **3**) which reciprocates the plunger **47** of the adhesive control valve **48** (FIG. **8**). The switch **43** does not close until the adhesive in the reservoir **35** has reached a predetermined temperature.

When the adhesive has reached the predetermined operative temperature and the switch **43** has closed, the operator turns the control knob **45** (FIG. **1**) to close the circuits to the motor **45***a* and to the means for actuating the fluid supply valve **170**.

The adhesive may also be melted directly in the reservoir **35** in block form without providing the melting pot **31**. The float control **37** may then also be omitted.

Referring to FIGS. **3** and **8**, when the gear pump **44** is operating, it draws molten adhesive from the reservoir **35** through the heated flexible conduit **50** into the chamber of the pump and forces it through the heated conduit **51** and into the valve chamber **52** which is located in the housing of the adhesive valve **48**. As shown in FIG. **8**, the plunger **47** of the valve **48** is at the lower extremity of its stroke and the ball check valve **54** is open permitting adhesive to flow from the chamber **52** through the passages **55**, **56**, **57**, **58** and **59** to the nozzle and thence through the orifice **28***a* to the marginal surface of the insole.

The conduit **50** is made of flexible stainless steel and it is heated by a wire (not shown) which is wound about it. The gear pump housing is heated by element **185** (FIG. **3**) and the valve **48** and nozzle **28** are heated by the element **186** (FIGS. **3** and **8**). Consequently, the adhesive remains melted at all times.

By loosening the screws **180** (FIG. **3**) the gear pump **44**, valve **48** and nozzle can be moved laterally as a unit to adjust the position of nozzle orifice **28***a* relative to the insole and the lasting margin.

During the lasting process, the last and insole are in the position shown in FIGS. **2** and **5** or in a corresponding position where the insole interrupts the electric eye beam **60** which otherwise would extend from the light **61** to the photocell **62**. When the beam of the electric eye is thus interrupted, the electric eye closes a circuit to a switch (not shown) which closes a circuit causing the valve **170** to be actuated to admit fluid to the cylinder **171**. At that time, the plunger **47** is in its elevated position wherein the passages **56** do not register with the passages **55** of the valve **48**. However, as soon as said circuit is closed, fluid is admitted to the adjacent end of the cylinder **171** and the double acting piston **172** is moved from left to right looking at FIG. **3**. This causes the linkage **46** to be moved from left to right looking at FIGS. **3** and **8** and the cleft end **71** of the pivoted link **72** operating on the pin **73** of the valve plunger **47** moves this plunger downwardly to the position shown in FIG. **8** so that the passages **56** register with the passages **55**. During the initial part of this downward movement, the plunger forces the charge of adhesive which remained in the passages **57**, **58** and **59** after the previous cycle downwardly, thereby unseating the check valve **54** and forcing this charge of adhesive to and through the orifice of the nozzle.

Interruption of the beam of the electric eye also causes a switch (not shown) to close the circuit to the motor **45***a* for the gear pump **44** which then commences to force molten adhesive through heated passage **51**. As soon as the passages **56** register with the passages **55**, this molten adhesive is forced by the pump through the passages **57**, **58** and **59** into the nozzle and outwardly thereof to the insole.

As soon as the lasting of one side of the margin has been completed, the last, insole and upper assembly are removed from the machine and interruption of the electric eye beam is terminated. The electric eye then opens the switch to the motor for the gear pump and it ceases to function. The electric eye also causes the switch which controls the valve **170** to move to a position in which the supply of fluid to the adjacent end of cylinder **171** is shut off, and fluid under pressure is supplied to the other end of the cylinder. This causes the piston **172** to be moved from right to left looking at FIGS. **3** and **8** and the plunger **47** is elevated from the position shown in FIG. **8** to its uppermost position. When the plunger is moved upwardly, a vacuum is created in the bore of the valve **48**, check valve **54** is closed and dripping of adhesive from the nozzle is prevented.

Relief valve **75** (FIG. **3**) relieves the pressure on the adhesive if the electric eye or the switch **163** fail to stop the gear pump or to operate the valve **170**.

OPERATION OF THE WIPER BLADE

The wiper blade **29** shown in FIGS. **5**, **7**, **13** and **14** is located below the end of the rear feed roll **21** and its outer end is between the feed rolls **20** and **21** and the rotary wiper **26**. It is supported for rotary movement on the shaft **150**.

The spring **153** permits the blade **29** to yield and move clockwise about shaft **150** (looking at FIG. **13**) when the lasting margin is introduced. It also permits the wiper blade to yield to any differences in thickness of the lasting margin.

The initial or maximum counterclockwise position of the blade is controlled by engagement of the head of the limit screw **156** with the member **158**. The threaded end of screw **156** is received in an interiorly threaded passage in rod **159** the upper end of which is secured to arm **154** by pin **152**. Consequently the space between the head of screw **156** and member **158** may be adjusted.

The amount of clockwise movement of the wiper blade is limited by engagement of the lower end of the screw **151** with member **158**. The screw **151** secured by the lock nut **155** may be adjusted to control the point at which such clockwise movement will be limited.

ALTERNATE EMBODIMENT FOR CONTROLLING THE INITIATION AND TERMINATION OF THE FLOW OF ADHESIVE

This embodiment may be used instead of the electric eye shown in FIGS. **1** and **2**.

The free end of the arm **154** constitutes a cam surface **160**, FIGS. **13** and **14**. The follower roller **161** attached to bifurcated arm **162** engages this cam surface. Arm **162** is connected to switch **163** which controls operation of the motor **45***a* for the gear pump and the operation of the valve **170** for the fluid supply to the cylinder **171**.

When the lasting margin of the upper first engages the wiper blade **29**, it moves the blade clockwise looking at FIG. **13** and the vertical part of the cam surface **160** moves the roller **161** and arm **162** from left to right looking at FIG. **13**. This movement closes the switch **163** which causes the valve **170** to supply fluid to move the piston **172** in a direction whereby the linkage **46** moves the plunger **47** of the adhesive valve **48** downwardly, thereby opening the check valve **54** and adhesive is ejected from the orifice **28***a* of nozzle **28**. When the margin has been lasted and removed, the spring **153** causes the wiper blade to be moved counterclockwise and the inclined part of the cam surface **160** engages the roller so that the roller and arm **162** move from right to left looking at FIG. **13**, the switch **163** is opened and this causes the valve **170** to be moved to a position in which fluid is supplied to the other end of the cylinder, piston **172** and linkage **46** are moved from right to left looking at FIGS. **3** and **8** and this causes the plunger **47** to be moved upwardly closing the check valve **54** and terminating the flow of adhesive from the nozzle.

The cam surface **160**, roller **161** and switch **163** also cause the operation of the gear pump to be started when the lasting margin first engages the wiper blade and to be stopped when the lasting of the margin has been completed and the wiper blade has been returned to the position in which the head of limit screw **156** engages member **158**.

Consequently, each of the embodiments of the apparatus disclosed herein insures that adhesive will be delivered from the nozzle while the insole and last are in lasting position in the machine and that delivery of adhesive from the nozzle will be terminated when the insole and last are removed from lasting position, thereby both preventing the waste of adhesive and insuring that adhesive will be delivered to the marginal surface of the insole throughout the lasting step.

THE MEANS FOR OPERATING AND CONTROLLING THE FEED ROLLS

When the operator turns the control knob **46** (FIG. **1**), this closes a circuit to the motor **80** (FIG. **11**) which rotates the shaft **81**. The pulley **82** on this shaft through belt **83** and pulley **84** drives the main shaft **85** (FIGS. **11** and **12**). Belt **83** engages idler pulleys **86** and **87**.

Referring to FIGS. **6**, **9** and **10**, the rear feed roll **21** is driven by main drive shaft **85** which has attached to it gear **90** which drives gear **91** (FIG. **10**) which is attached to shaft **89** to which rear feed roll **21** is attached. Also on shaft **89** is gear **93** which drives gear **94** on shaft **97**. Gear **96** is also driven by gear **93** because it is on the same shaft as gear **94**. Gear **96** drives gear **98** on shaft **99**. Gear **98** drives gear **100** on shaft **92** and shaft **92** drives the front feed roll **20**.

Referring to FIGS. **5** and **6**, the spacing between the feed rolls can be adjusted by turning the knob **102** which is fixed to the threaded shaft **103**. The shaft **92** passes through arm **105** which is pivotally supported on the shaft **99** (FIGS. **6** and **9**). The threaded shaft **103** (FIG. **5**) is operatively connected to the lower end of the arm **105** and by turning knob **102**, the front feed roll can be moved towards and away from the rear feed roll.

The tension of the feed rolls can also be adjusted by the knob **110**. This knob is fixed to the shaft **111**, the threaded portion of which passes through the lug **112** which is attached to the rod **113**, rod **113** being mounted for sliding movement in a passage in frame member **114**. The tension spring **115** has one end attached to the rod **113** and its other end attached to the arm **105**. Consequently, by turning the knob **110**, the amount of force exerted by the spring tending to rotate the arm **105** about the shaft **99** can be varied thus varying the pressure exerted by the front feed roll **20** against the lasting margin which is passing between the feed rolls.

For example, if the margin is of sleazy material which tears easily, the pressure of the front feed roll against the rear feed roll is reduced whereas with a tougher material, the pressure is increased.

The speed of rotation of the feed rolls can be adjusted by manipulation of the knob **115** (FIG. **12**). This adjusts the pulley **82** longitudinally of the driven shaft **81** to increase or decrease the pitch diameter of belt **83** running in the pulley thereby changing the speed of the belt which is driving pulley **84**.

MEANS FOR OPERATING AND CONTROLLING THE ROTARY WIPER

Referring to FIGS. **7**, **11**, and **12**, the rotary wiper **26** is driven by the pulley **117**, belt **118**, pulley **119** and shaft **120** to which pulley **119** is secured. As shown in FIG. **7**, the shaft of the rotary wiper **26** is driven by shaft **120** through gears **122**, **123**, **124** and **125**.

As shown in FIGS. **5**, **6** and **7**, the support **126** for the bearing for the shaft **120** passes through an enlarged opening **127** in the front panel **28***b* and its upwardly extending arm **126***a* is provided with an element **126***b* which is slidable in a groove **129** in the frame member **130**. Wiper adjustment knob **135** (FIG. **6**) is secured to a shaft **136**, the threaded end of which extends into an interiorly threaded passage in the upwardly extending lug **126***c* of element **126***a*. Thus by rotation of the knob **135**, the support **126** is moved longitudinally of the groove **129** and because the shaft **120** and the rotary wiper are supported by **126**, the rotary wiper is moved at right angles to the axes of the feed rolls. This is an important adjustment since the spacing of the rotary wiper from the feed rolls must be adjusted depending upon the characteristics of the uppers of the shoes which are being lasted.

The pressure of the rotary wiper against the margin of the upper can also be adjusted by the knob **140**, FIGS. **1**, **11** and **12**. Referring to FIGS. **7**, **11** and **12**, the upper end of the arm **141** is attached to the sleeve **142** which surrounds the wiper drive shaft **120**. The spring **143** controls the vertical position of the sleeve **142** and thereby controls the downward pressure exerted by the rotary wiper against the lasting margin of the shoe. The bell crank **145** has an upper portion which engages the upper end of this spring and by rotating the knob **140**, the force exerted by the spring against the washer near the lower end of the arm **141** may be adjusted thereby adjusting the downward force exerted by the rotary wiper against the lasting margin.

While certain desirable embodiments have been described in detail, it is to be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

We claim:

1. In a lasting machine of the kind in which a pair of rolls turning in opposite directions apply lasting and feeding stresses to the lasting margin of a shoe, an adhesive applicator nozzle situated at the delivery side of the rolls, operable means for supplying adhesive under pressure to said nozzle comprising gear pump means, and means for controlling the operation of said operable means comprising an electric eye the beam of which is interrupted by the insole when it is present at the intake side of said rolls thereby to cause said operable means to supply adhesive under pressure to said nozzle during the presence of the insole at said position, wherein said means for supplying adhesive under pressure to said nozzle comprises adhesive control valve means, a plunger reciprocable in a passage of said valve means and means for reciprocating the plunger in said passage the operation of which is controlled by said means for controlling the operation of said operable means.

2. In a lasting machine of the kind in which a pair of rolls turning in opposite directions apply lasting and feeding stresses to the lasting margin of a shoe, an adhesive applicator nozzle situated at the delivery side of the rolls and an adhesive control valve which comprises check valve means which is resiliently urged towards closed position, a plunger and means for moving the plunger towards and away from the check valve means thereby to cause it to be opened and closed, wherein said plunger is located in a portion of a longitudinal passage which leads to the check valve means and said plunger includes at least one port which is positioned to afford communication with a source of adhesive under pressure when the plunger is positioned to open said check valve means and said port is positioned to shut off such communication when said plunger is positioned to close said check valve means, and wherein the plunger includes means for shutting off the supply of adhesive under pressure when the plunger is moved in a direction to close the check valve means, whereby a negative pressure is created in the bore of the adhesive control valve which insures complete closing of the check valve means.

3. The combination of claim **2** wherein the plunger includes means for shutting off the supply of adhesive under pressure when the check valve is in closed position, whereby the plunger operates upon the charge of adhesive which remains in the bore of the adhesive control valve after the prevous cycle to open the check valve means.

4. The combination of claim **2** wherein the means for moving the plunger towards and away from the check valve means, comprises reciprocating means operatively connected to the plunger.

5. In a lasting machine of the kind in which a pair of rolls turning in opposite directions apply lasting and feeding stresses to the lasting margin of a shoe, a reservoir of adhesive mounted on the frame of the machine, an adhesive applicator nozzle situated at the delivery side of the rolls, means for supplying adhesive under pressure to said nozzle, said latter means being mounted in a housing which is integral with said nozzle, a flexible conduit extending between said reservoir and said means for supplying adhesive under pressure and releasable means for attaching said housing to the frame of the machine, whereby the nozzle may be moved to adjust the nozzle orifice towards and away from the lasting margin, wherein said releasable means comprises at least a pair of longitudinal slots in one of said frame and said housing and releasable means extending through said slots for releasably securing the housing in adjusted positions relative to said frame.

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