United States Patent

Brastow

[15] **3,653,356**

[45] **Apr. 4, 1972**

[54] COATING MACHINE

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[73] Assignee: **Jacob S. Kamborian,** West Newton, Mass.

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[21] Appl. No.: **69,069**

[52] **U.S. Cl.**.....**118/7,** 118/202, 118/204, 118/238, 118/241, 118/261

[51] **Int. Cl.**.....**B05c 11/00**

[58] **Field of Search**.....118/7, 6, 202, 238, 241, 261, 118/204

[56] **References Cited**

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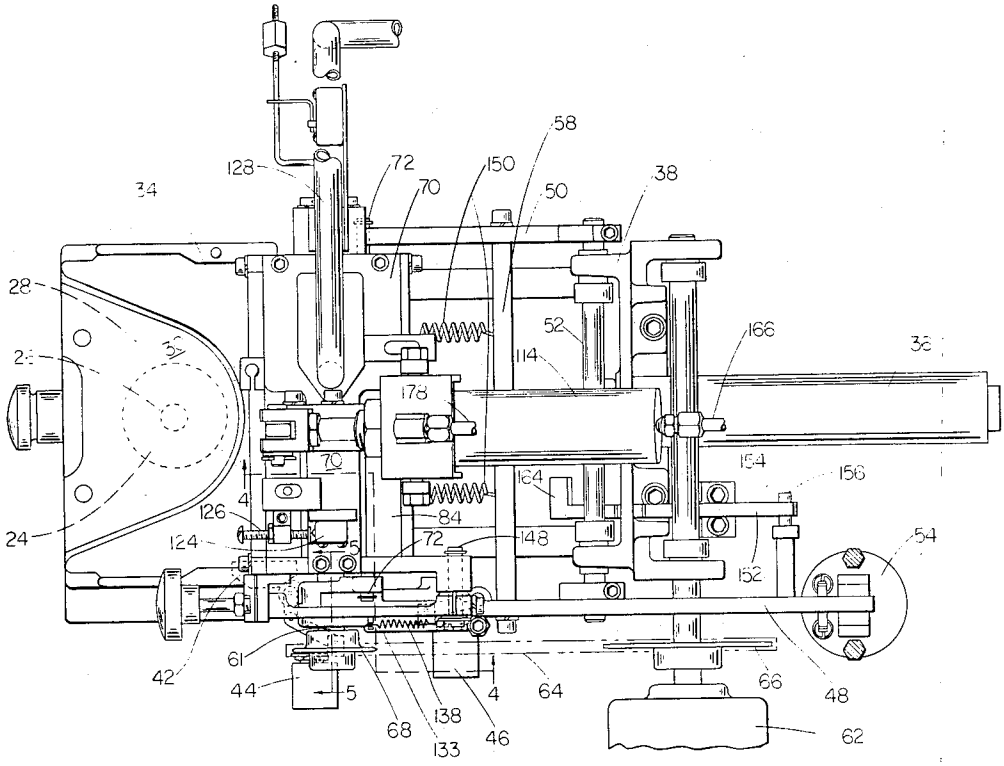
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Primary Examiner—Mervin Stein
Assistant Examiner—Leo Millstein
Attorney—Albert Gordon

[57] **ABSTRACT**

A machine, that incorporates an applicating mechanism, for applying coating material to a portion of the vamp of a shoe upper to form a box toe. The applicating mechanism includes a roll rotatable within a housing between a pair of walls, the bottom of one of the walls constituting a scraper blade. The movement of the vamp beneath the applicating mechanism causes the roll to apply the coating material to the vamp to a thickness determined by the scraper blade.

6 Claims, 9 Drawing Figures



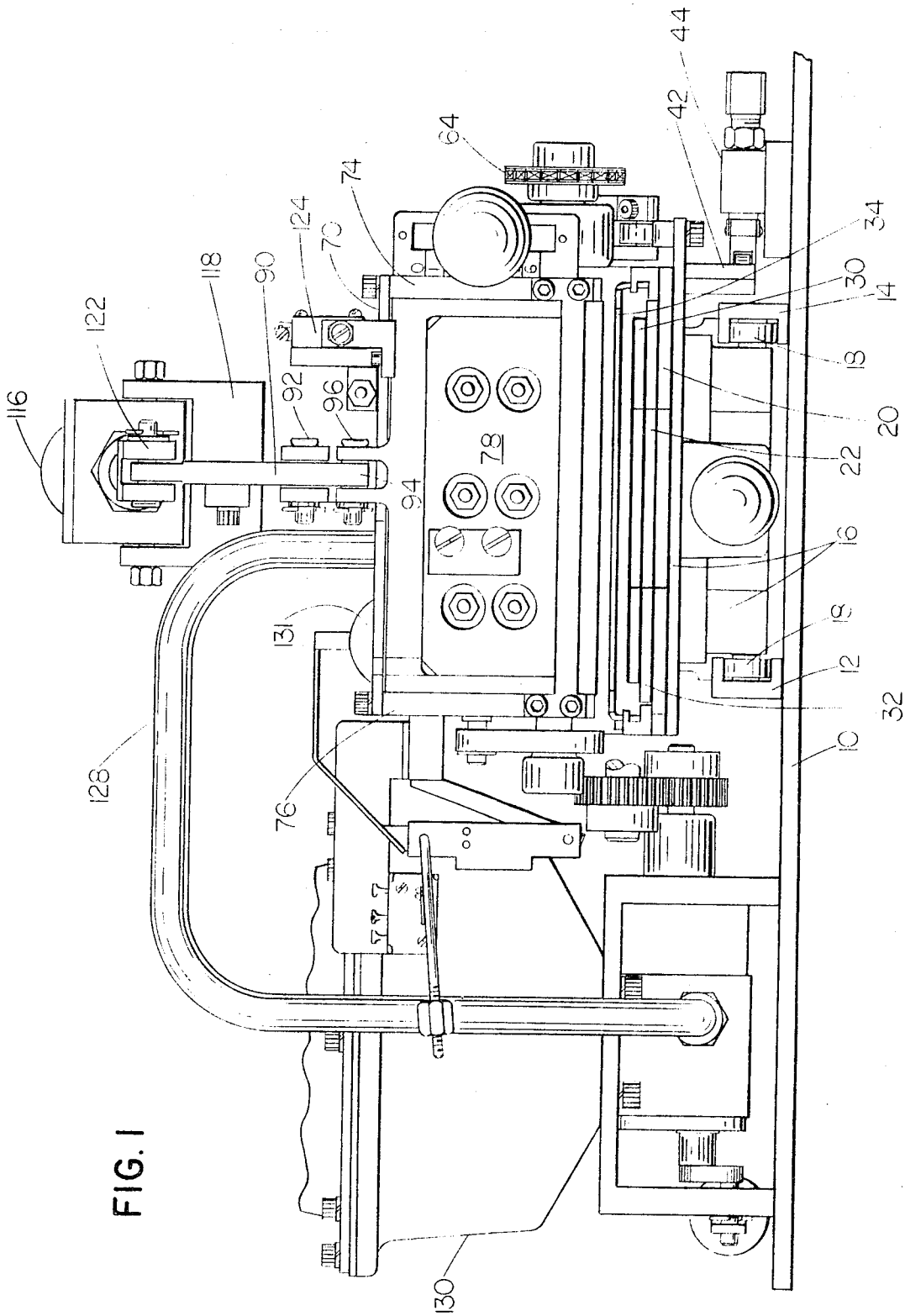

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FIG. 1

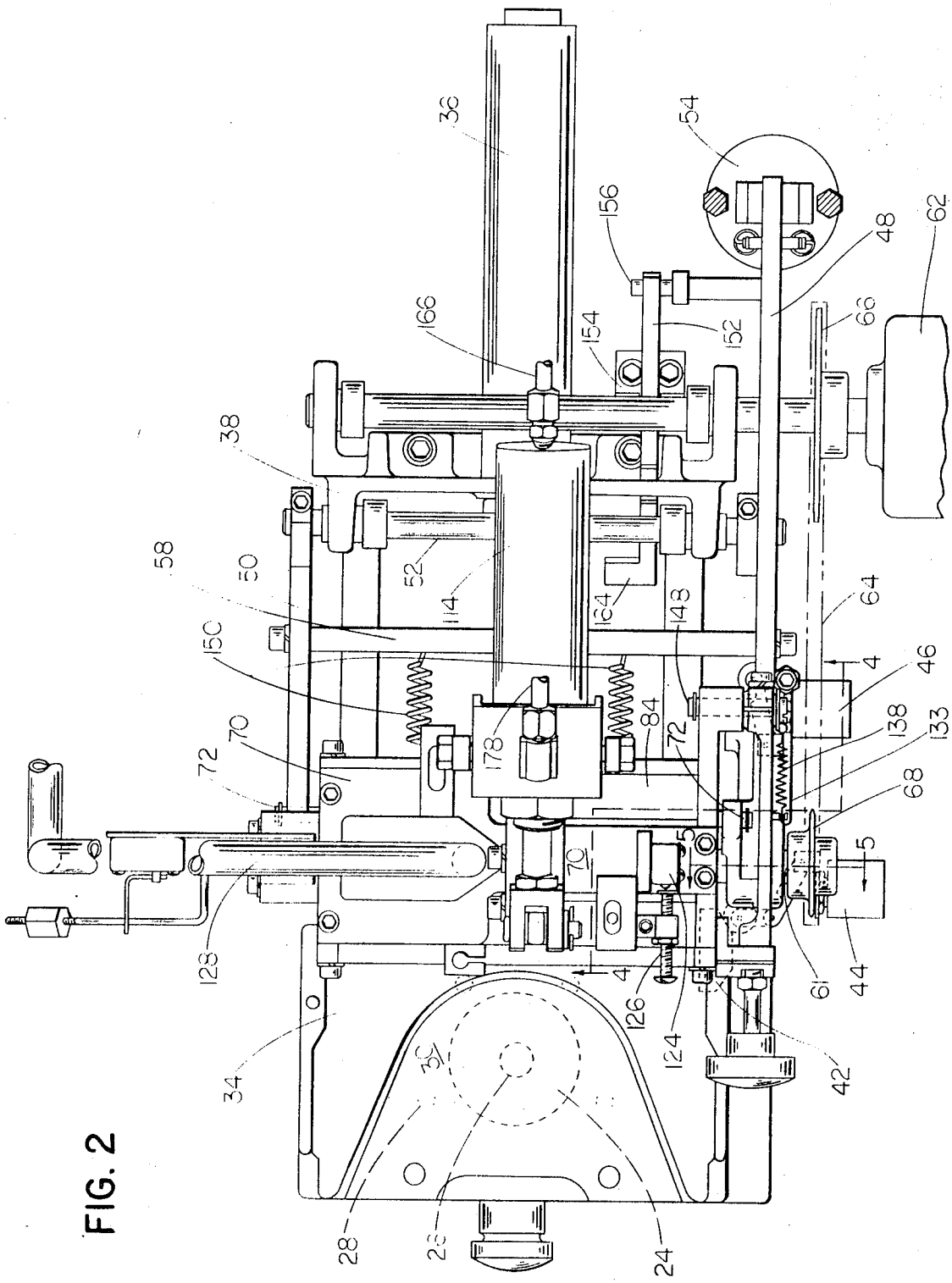

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FIG. 2

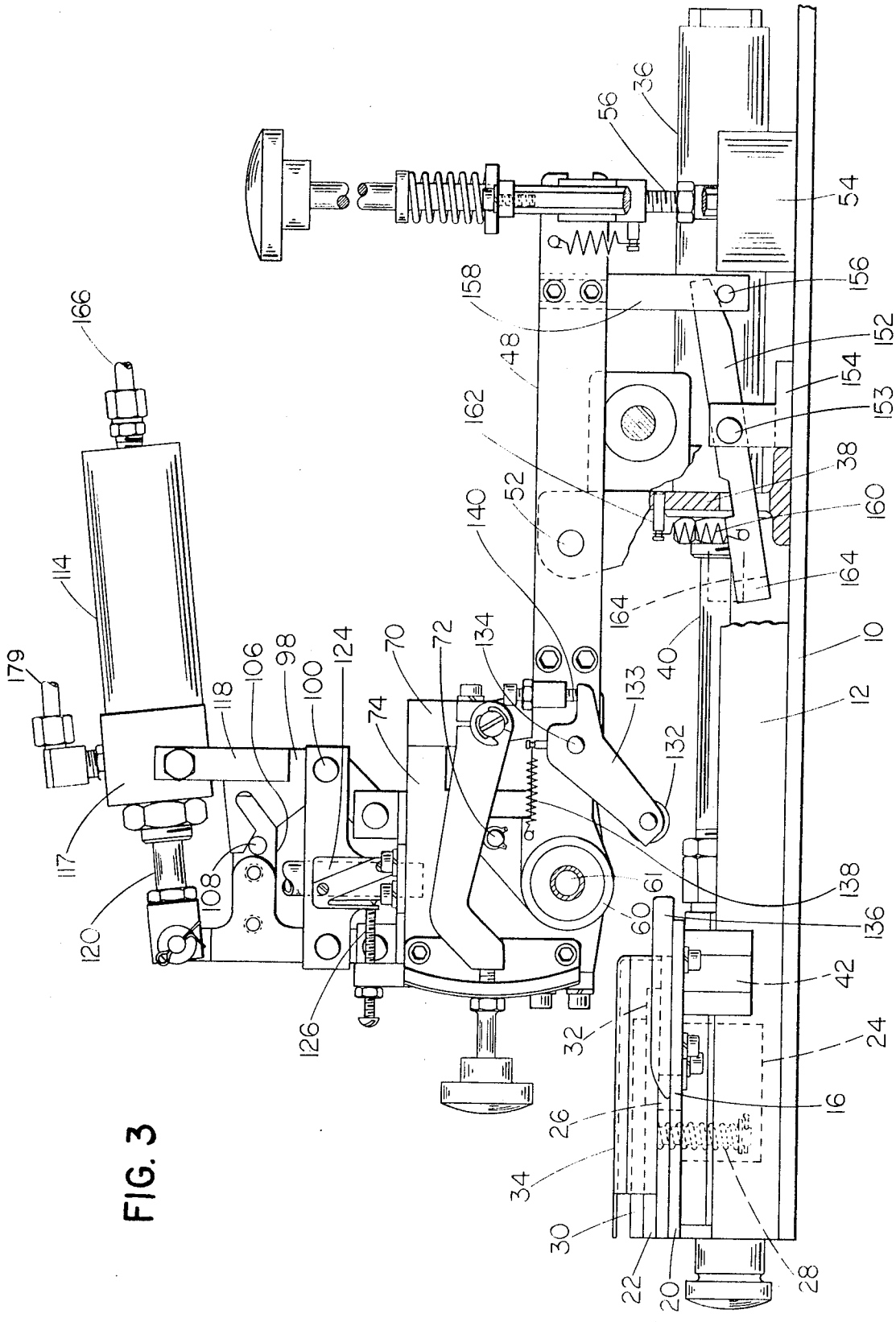

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FIG. 3

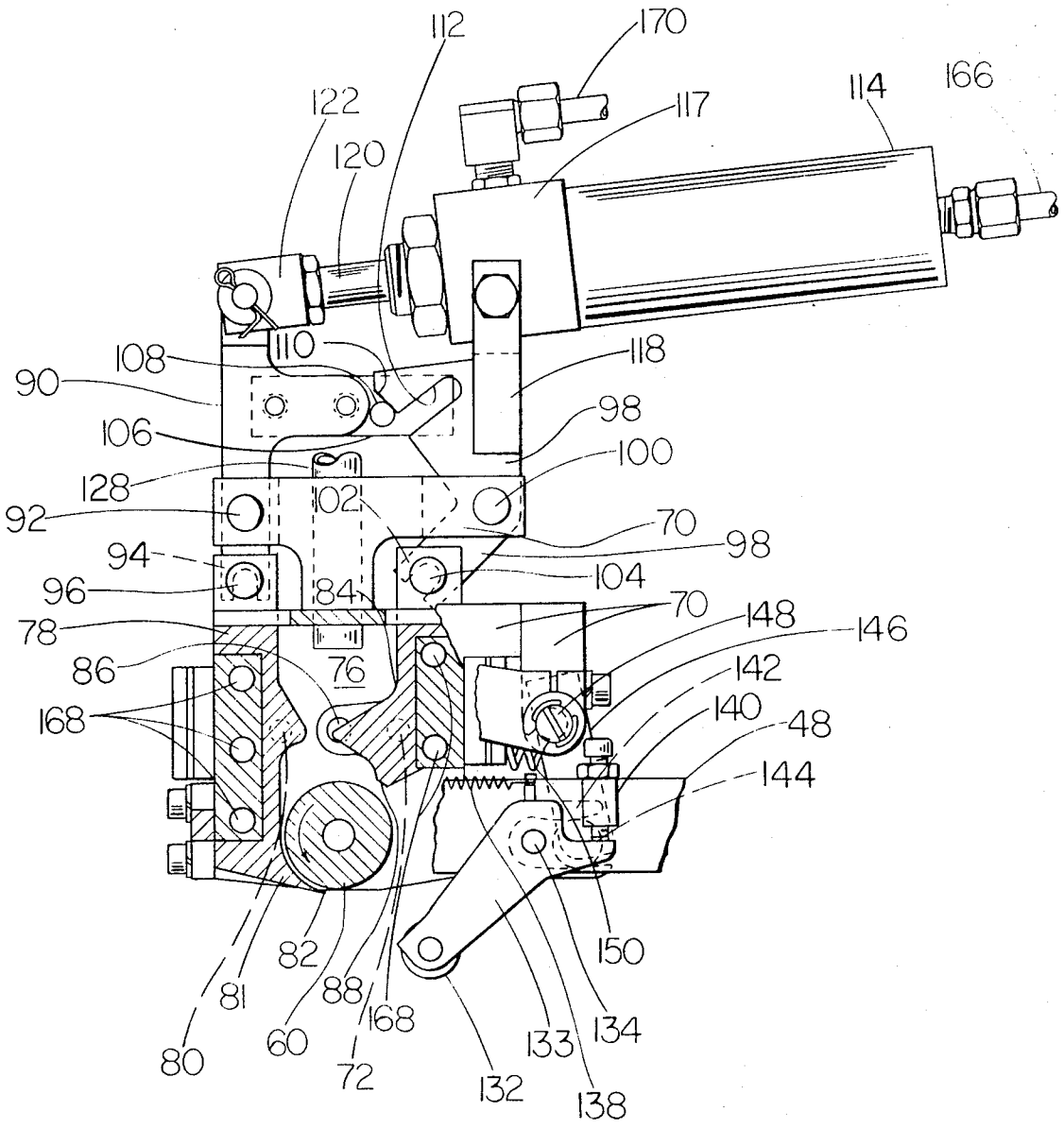

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FIG. 4

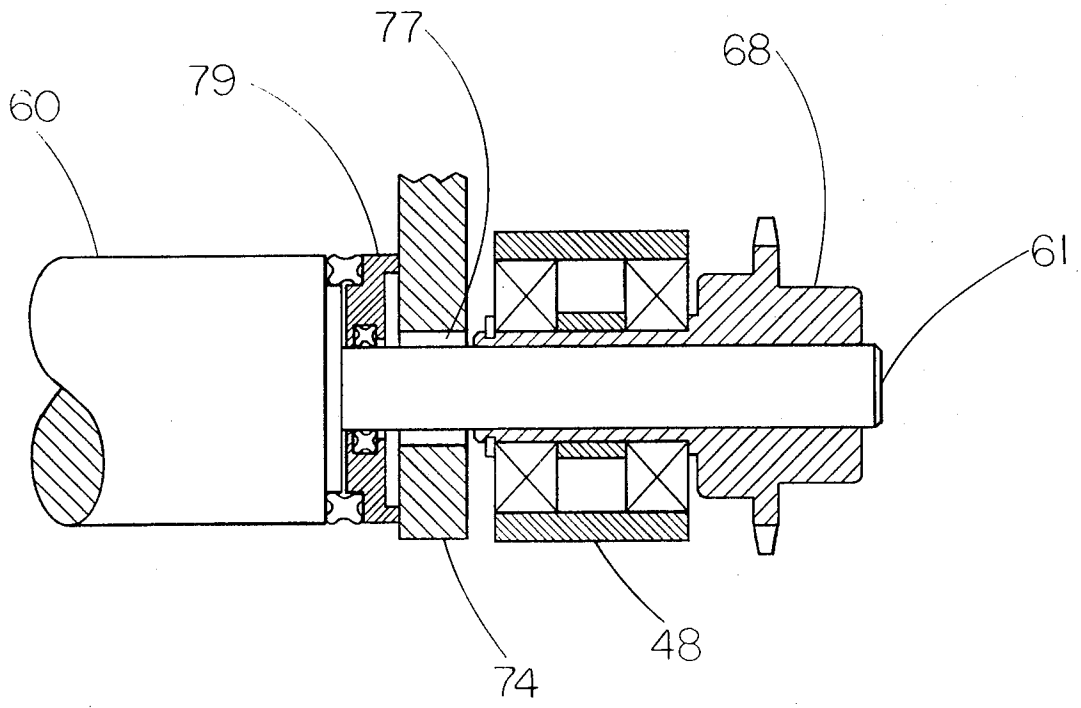


FIG. 5

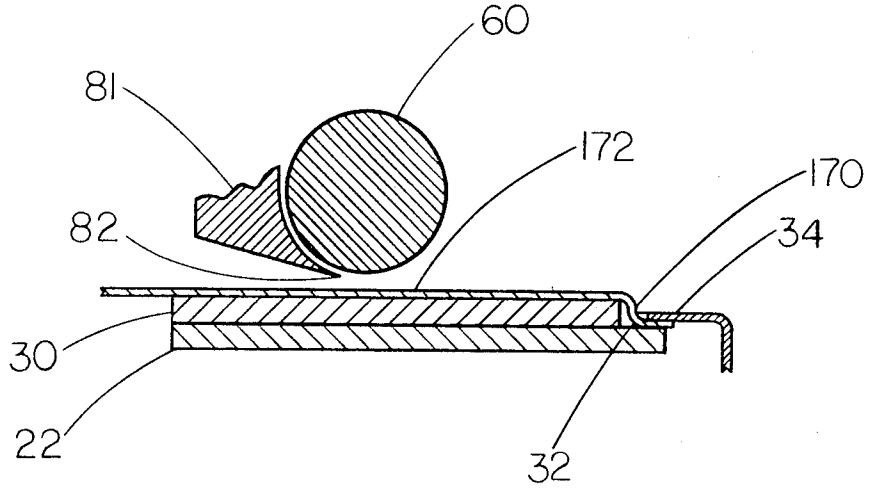


FIG. 6

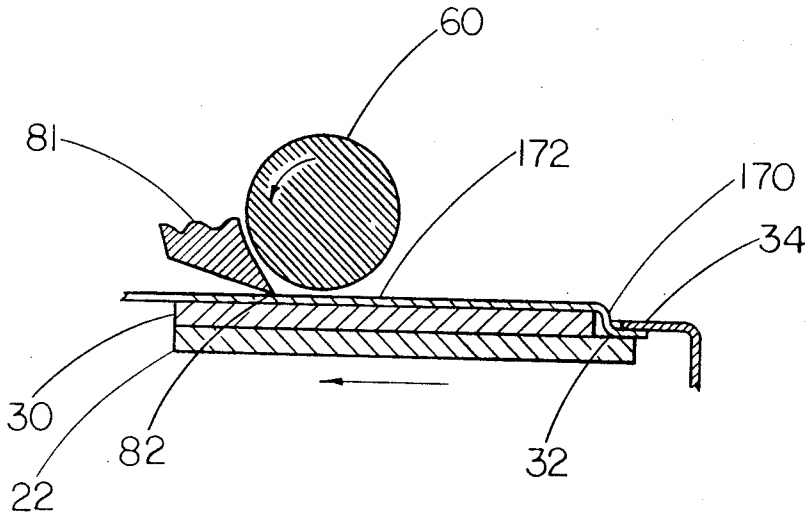


FIG. 7

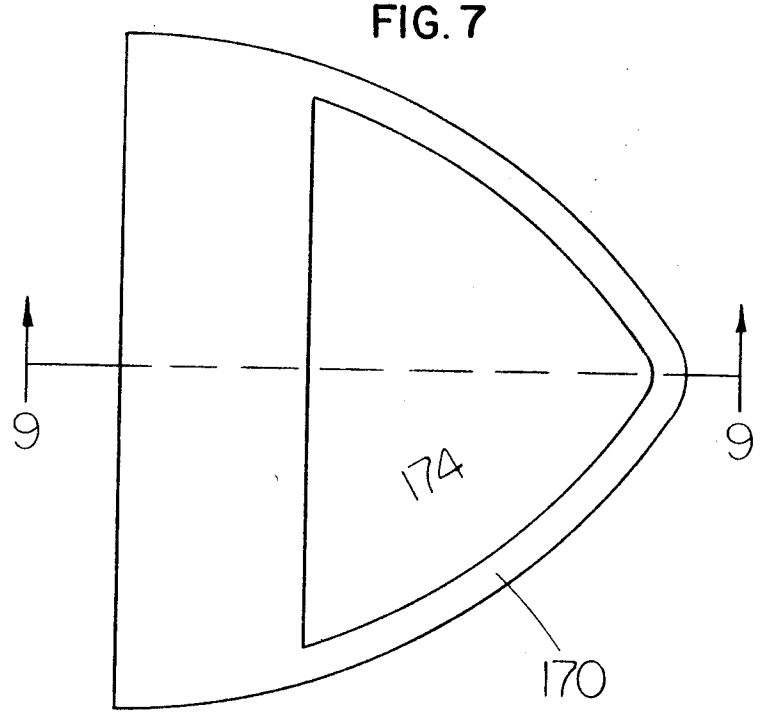


FIG. 8

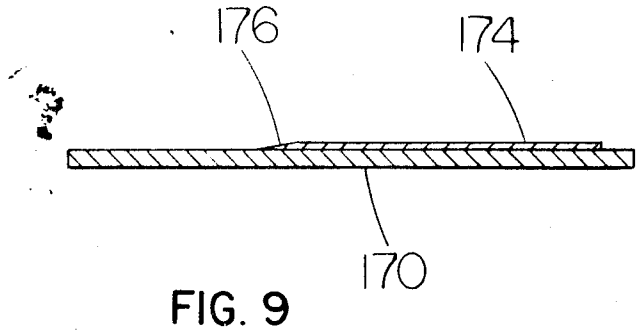


FIG. 9

COATING MACHINE

This invention is concerned with the application of a coating to a portion of a workpiece. The workpiece is disclosed as being the vamp or toe portion of a shoe upper whose coating is intended to form a box toe or stiffener.

A machine for applying the coating to the workpiece includes an applicating assembly, constituted by an applicator member and a scraper member that is located forwardly of the applicator member. The workpiece is mounted on a carriage below the applicating assembly for forward-rearward movement and the applicating assembly is mounted for heightwise movement. While the applicating assembly is in an upper position, the carriage, with the workpiece mounted thereon, is moved rearwardly from a front position to a back position. The applicating assembly is then lowered and the carriage is moved from the back position to the front position to enable the applicator member to apply a coating to the workpiece to a thickness determined by the spacing between the scraper member and the workpiece.

It has been found that, in the operation of this machine, blobs of coating material tend to be formed on the scraper member in a machine cycle. If this blob is not wiped off before the commencement of the coating operation in the next machine cycle, the blob can transfer onto the workpiece and adhere to a portion of the workpiece that it is not intended to coat. One aspect of this invention is concerned with an improvement of the machine that enables the blob formed on the scraper member during a coating operation on one workpiece to be wiped off before a coating operation is performed on the next workpiece. This is achieved by incorporating in the machine a mechanism for lowering the applicating assembly after the carriage has commenced its rearward movement and is in an intermediate position between the front and back positions so that any blob on the scraper member is wiped onto a portion of the workpiece that will subsequently be coated.

An applicating mechanism for applying the coating material to the workpiece comprises a housing having a hollow interior defined by a front wall and a back wall. An applicator roll is rotatably mounted in the housing between the walls and is driven in such a manner that its front, which faces the front wall, moves downwardly and its back, which faces the back wall, moves upwardly. With the walls spaced from the roll, coating material supplied to the top of the rotating roll is transferred by the portion of the bottom of the roll that is located between the bottoms of the walls onto a workpiece. When the applicating mechanism is shut off, the roll is caused to cease its rotation and the walls are manually moved into engagement with the roll to thereby trap the coating material in the housing interior above the roll. There is a tendency, with this arrangement, for the coating material to leak from between the walls and the roll when the mechanism is being shut off and to leak downwardly of the roll after the mechanism has been shut off.

A second aspect of the invention is concerned with an improvement in the applicating mechanism which eliminates the leakage of coating material during and after the shutting off of the mechanism. This is accomplished by providing an operating member that is operative firstly to move the front wall into engagement with the front of the roll, then to stop the rotation of the roll, and then to move the back wall into engagement with the back of the roll.

In the drawings:

FIG. 1 is a front elevation of the machine;

FIG. 2 is a plan view of the machine;

FIG. 3 is a partially sectional side elevation of the machine;

FIG. 4 is a section taken on the line 4—4 of FIG. 2;

FIG. 5 is a section taken on the line 5—5 of FIG. 2;

FIG. 6 is a representation of the workpiece and the applicating assembly after the carriage has commenced its rearward movement and before the applicating assembly is lowered;

FIG. 7 is a representation of the workpiece and the applicating assembly when the carriage is in its back position at the completion of its rearward movement;

FIG. 8 is a plan view of the workpiece with the coating applied thereto; and

FIG. 9 is a view taken on the line 9—9 of FIG. 8.

The operator is intended to stand to the left of the machine as seen in FIG. 3. The parts and positions closest to the operator will be designated "front" and the parts and positions furthermost from the operator will be designated "back." Movements toward the operator will be designated as "forward" and movements away from the operator will be designated as "rearward."

Referring to FIGS. 1–3, the machine comprises a mount **10** to which are secured a pair of spaced channels **12, 14**. A carriage **16** is mounted to the mount **10** for forward-rearward movement by means of rollers **18** that are rotatably mounted to the carriage and are received in the channels **12, 14**.

A base **20** is rigidly secured to the carriage **16**, and a plate **22** is mounted to the base **20** for heightwise movement. An air-operated motor **24**, mounted in the carriage **16**, has an upwardly extending piston rod **26** that is adapted to abut against the plate **22** so as to raise it against the force of a plurality of tension springs **28** that are interposed between the plate **22** and the carriage **16**. The plate **22** is so constructed that its sides are rearwardly convergent. A block **30** is secured to the top of the plate **22**. The sides of the block **30** converge rearwardly similarly to the sides of the plate **22** but are located inwardly of the sides of the plate **22** so as to form a step **32** on the sides of the plate **22**. A clamp **34** is secured to the base **20**. The sides of the clamp **34**, which are located outwardly of the sides of the block **30** and converge rearwardly similarly to the sides of the plate **22** and the block **30**, are located above the step **32**.

An air-operated motor **36**, mounted to a bracket **38** that is secured to and extends upwardly of the mount **10**, has a piston rod **40** that is secured to the carriage **16** so as to effect forward-rearward movement of the carriage. A cam **42**, mounted to the carriage **16**, is in intersecting relationship with a front valve **44** and a back valve **46**. The valves **44** and **46** are mounted on the mount **10**.

A pair of arms **48** and **50** are pivoted to a rod **52** that is mounted to the bracket **38**. An air-operated motor **54** is mounted to the mount **10**. The piston rod **56** of the motor **54** is connected to the back of the arm **48**. The arms **48** and **50** are connected by a tie rod **58** so that the motor **54** can effect swinging movement of the arms **48** and **50** in unison about the axis of the rod **52**.

An applicator roll **60** (see FIGS. **4** and **5**) is rotatably mounted to and extends between the arms **48, 50** by means of extensions **61** of the roll that are rotatably mounted in the arms. An electric motor **62** (FIG. **2**) is drivingly connected to one of the extensions **61** by a chain **64** and sprockets **66** and **68** to rotate the roll counterclockwise (FIG. **4**).

A housing **70** extends between the arms **48, 50** and is pivotally mounted to the arms by pintles **72**. The housing **70** has a hollow interior to accommodate the roll **60** which extends between its side walls **74** and **76**. The extensions **61** extend through slots **77** (FIG. **5**) in the side walls **74** and **76** and seals **79** are interposed between the ends of the roll **60** and the side walls. The front wall **78** of the housing is pivoted to the side walls **74, 76** by pins **80** (FIG. **4**). The bottom **81** of the front wall **78** extends downwardly and circumferentially about the roll **60** and terminates in a scraper blade **82**. The back wall **84** of the housing **70** is pivoted to the side walls **74, 76** by pins **86**. The bottom **88** of the back wall **84** extends towards the roll **60**.

The applicator roll **60** and the scraper blade **82** constitute an applicating assembly.

A link **90** (FIG. **4**) is pivoted to the housing **70** by a pin **92**. The bottom of the link **90** is formed as a clevis **94** that embraces a pin **96** on the front wall **78**. A link **98** is pivoted to the housing **70** by a pin **100**. The bottom of the link **98** is formed as a clevis **102** that embraces a pin **104** on the back wall **84**. A bar **106** is rigidly secured to the link **90** and extends rearwardly thereof alongside the link **98**. A pin **108**, secured to the bar **106**, is in intersecting relationship with the link **98**. The front of the link **98** is formed into an abutment surface **110** that lies on an arc whose center of curvature coincides with

the axis of the pin **92** and into a slot **112** wide enough to receive the pin **108**. The upper and lower surfaces of the slot **112** are located on arcs whose centers of curvature coincide with the axis of the pin **100**. The cylinder **114** of an air-operated motor **116** has a block **117** rigidly secured thereto that is pivoted to a clevis **118**, and the clevis **118** is rigidly secured to the link **98**. The piston rod **120** of the motor **116** is secured to a clevis **122** that is pivoted to the link **90**. An electric switch **124**, that controls the operation of the motor **62**, is mounted to the top of the housing **70** and is in intersecting relationship with a switch actuator **126** that is mounted to the front wall **78**. A tube **128**, extending into the interior of the housing, is in communication with a coating material melting and pumping unit **130** (FIG. 1). A float **131** controls the operation of the unit **130** so as to enable the unit **130** to pump coating material, as needed, into the housing interior.

A cam follower **132** is mounted on a lever **133**, and the lever **133** is pivoted to the arm **48** by a pin **134**. The cam follower **133** is in intersecting relationship with respect to a cam **136** that is mounted to the carriage **16**. A tension spring **138**, extending between the arm **48** and the lever **133**, acts to yieldably urge the lever **133** clockwise (FIG. 3) against a stop **140** that is mounted to the arm **48**. A clevis **142** (FIG. 4) formed on the lever **133** inwardly of the arm **48** embraces a pin **144** that is mounted to the bottom of a link **146**. The top of the link **146** is rigidly connected to the housing **70** by a pin **148**. A pair of tension springs **150** (FIGS. 2 and 4) extend between the tie rod **58** and the housing **70** and yieldably urge the housing clockwise (FIG. 4) about the axes of the pintles **72** with the link **146** being urged upwardly and the lever **133** being urged clockwise (FIG. 4) to a position wherein the lever **133** engages the stop **140**, the springs **150** thus augmenting the spring **138**.

Referring to FIGS. 2 and 3, a lever **152** is pivoted by a pin **153** to a post **154**, the post **154** being bolted to the mount **10**. The back of the lever **152** extends above a pin **156**, the pin **156** being secured to a bracket **158** that depends from the arm **48**. A tension spring **160**, extending between the lever **152** and a pin **162** secured to the bracket **38**, yieldably urges the back of the lever against the pin **156**. A flange **164** on the front of the lever **152** acts as a carriage stop in the manner set forth below.

When the machine is running in its idle condition: the piston rod **26** is retracted into the motor **24** so that the plate **22** and the block **30** are in a lower position with the step **32** spaced from the clamp **34**; the piston rod **40** is projected out of the motor **36** so that the carriage **16** is in a forward position; the piston rod **56** is retracted into the motor **54** so that the front ends of the arms **48**, **50** together with the roll **60**, the housing **70** and the cam follower **132** are in a raised position and the flange **164** is in the raised position, shown in phantom in FIG. **3**, in intersecting relationship with the back of the carriage **16**; the motor **62** is rotating the roll **60** counterclockwise (FIG. **4**); pressurized air is entering the motor **116** through a line **166** (FIG. **4**) in such a manner as to urge the block **117** and the clevis **122** away from each other and thus locate the wall bottoms **81** and **88** in the FIG. 4 position wherein they are spaced from the periphery of the roll **60**; the switch actuator **126** is disengaged from the switch **124**; the springs **138** and **150** urge the housing **70** clockwise (FIGS. **3** and **4**) about the pintles **72** to a position wherein the lever **133** engages the stop **140**; and molten thermoplastic coating material is supplied from the unit **130** into the interior of the housing **70**. The coating material, which is maintained in a molten viscous state in the housing **70** by electric cartridge heaters **168** (FIG. **4**) in the walls **78**, **84**, adheres to the rotating roll **60** and forms a film on the periphery of the roll whose thickness is determined by the spacing between the wall bottom **81** and the roll periphery.

Referring to FIGS. **6** and **7**, the vamp **170** of a shoe upper is placed on the block **30** in such a manner that its convergent sides are draped on the step **32** of the plate **22** below and spaced from the clamp **34**. The motor **24** is now actuated to raise the piston rod **26** together with the plate **22** and the block **30** to clamp the sides of the vamp between the step **32** and the clamp **34**, as seen in FIG. **6**, with an exposed portion **172** of the vamp **170** which is to be coated situated above the clamp **34**.

Now the motor **36** is actuated to move the carriage **16**, together with the clamped vamp **170**, rearwardly under the yieldable force of pressurized air until the back of the carriage engages the flange **164** to stop the carriage in a location wherein the exposed portion of the vamp is beneath the roll **60** as indicated in FIG. **6**. When the carriage **16** is stopped by the flange **164**, the cam **42** is in position to shift the valve **46**. The shifting of the valve **46** causes pressurized air to enter the motor **54** so as to raise the piston rod **56** and thus swing the arms **48**, **50** counterclockwise (FIG. **3**). The swinging of the arms **48**, **50** causes the roll **60** and the wall bottom **81** to be lowered into a position proximate to the exposed portion of the vamp **170** and causes the flange **164** to be lowered to the solid line position shown in FIG. **3** wherein it is out of intersecting relationship with the carriage **16**. The lowering of the flange **16** enables the carriage **16** and the clamped vamp **170** to resume their rearward movement under the force of the motor **36** until the carriage and vamp reach the position shown in FIG. **7** with the roll **60** and the wall bottom **81** still in a position proximate to the exposed vamp portion **172**. When the parts are in the FIG. **7** position, the cam follower **132** is located forwardly (leftwardly in FIG. **3**) of the cam **136** so that the scraper blade **82** is in a relatively low position spaced close to or in contact with the top of the vamp portion **172**.

Now the motor **36** is actuated to move the carriage forwardly to its starting position. During this movement, the film of thermoplastic coating material on the periphery of the roll **60** is transferred onto the exposed vamp portion **172** to form a coating **174** (FIGS. **8** and **9**) on the vamp. The thickness of the coating is determined by the spacing between the scraper blade **82** and the vamp portion **172** with the scraper blade scraping off that portion of the coating material that intersects it. The scraped off coating material is returned upwardly to the interior of the housing **70** by the rotating roll **60**. As the carriage **16** commences its forward movement, the cam follower **132** is moved upwardly by the cam **136** to thereby, by means of the members **142**, **144**, **146** and **148**, swing the housing **70** clockwise (FIG. **4**) about the axis of the pintles **72** and thus move the scraper blade **82** upwardly and further away from the vamp portion **172**. The coating **174**, as indicated in FIG. **9**, therefore is of graduated thickness at one end, as indicated by the number **176**.

The return of the carriage **16** to its starting position causes the cam **42** to shift the valve **44**. In response to the shifting of the valve **44**, the piston rod **26** is retracted into the motor **24** so as to lower the plate **22** and the block **30** and thus release the vamp **170** from the clamp **34**. The shifting of the valve **44** also causes the piston rod **56** to be retracted into the motor **54**, thus raising the roll **60**, the housing **70**, the cam follower **132** and the flange **164** to their idle positions.

The coating **174** rigidifies into a stiffener or box toe on the vamp **170** which, in a completed shoe, stiffens the toe portion of the shoe. The graduated portion **176** of the coating **174** forms the feathered edge which is desirable in box toes.

It has been found that at the end of a machine cycle a residue of coating material tends to adhere to and form a blob on the scraper blade **82**. If this blob is not wiped off before the commencement of the coating operation during the forward movement of the carriage **16** in the next machine cycle, the blob can be transferred onto the vamp portion **172** forwardly (leftwardly in FIG. **8**) of the front of the coating to the left (FIG. **8**) of the graduated portion **176**. The lowering of the scraper blade **82** by the motor **54** when the carriage **16** is in the intermediate position determined by its engagement with the flange **164** causes the blob to be wiped off the scraper blade onto the vamp portion **172** when the carriage resumes its rearward movement. Since the blob thus wiped onto the vamp portion **172** forms a part of the coating **174** that is applied to the vamp portion **172** during the subsequent forward

movement of the carriage **16**, the wiping off of the blob from the scraper blade **82** onto the vamp portion **172** does not adversely affect the coating operation.

When it is desired to shut down the machine, pressurized air is admitted into the motor **116**, which constitutes an operating member, through a line **178** (FIG. 4) to urge the block **117** and the clevis **122** towards each other. Since, at this time, the pin **108** is bearing against the abutment surface **110**, the block **117** and the link **98** are initially immobile and the clevis **122** is moved rearwardly so as to swing the link **90** clockwise (FIG. 4) about the pin **92** and thus swing the front wall **78** counterclockwise about the pins **80** until the wall bottom **81** engages the roll **60**. The parts are so dimensioned that when the wall bottom **81** engages the roll **60** the pin **108** has swung downwardly below the abutment surface **110**. Therefore, after the clevis **122** can no longer move rearwardly due to the engagement of the wall bottom **81** with the roll **60**, the block **117** moves forwardly to swing the link **98** clockwise about the pin **100** with the slot **112** moving along the pin **108** and thus swings the back wall **84** clockwise about the pins **86** until the wall bottom **88** engages the roll **60**. During the closing movement of the wall bottom **81** towards the roll **60**, the actuator **126**, which swings with the front wall **78**, engages the switch **124** to shut off the motor **62** and thus stop the rotation of the roll **60**. The motor **62** is so constructed that the roll **60** ceases its rotation between the engagements of the wall bottoms **81** and **88** with the roll **60**.

From the foregoing it can be seen that, when the machine is shut off, first the wall bottom **81** engages the roll **60**, then the roll stops its rotation and then the wall bottom **88** engages the roll. The engagement of the wall bottom with the downwardly rotating side of the roll cuts off the film of coating material on the roll periphery between the interior of the housing **70** above the roll and the wall bottom **81**. The film of coating material that extends counterclockwise (FIG. 4) about the roll periphery from the wall bottom **81** to the wall bottom **88** is carried by the upwardly rotating side of the roll back into the housing interior above the roll **60**. By the time the wall bottom **88** engages the stationary roll **60**, there is no film on the portion of the roll periphery that extends about the bottom of the roll between the wall bottoms **81** and **88**. Therefore, when the wall bottom **88** engages the stationary roll **60**, all of the coating material is trapped above the roll between the wall bottoms **81** and **88** and the undesirable effects created by having coating material dripping downwardly of the stationary roll is avoided.

The seals **79** prevent leaking of the coating material between the roll **60** and the end walls **74**, **76** both when the roll **60** is rotating and when the roll **60** is stationary.

I claim:

1. A machine for applying a coating to a portion of a workpiece comprising: an applicating assembly constituted by an applicator member and a scraper member located forwardly of the applicator member; a carriage, located below the applicator assembly, mounted for forward-rearward movement; means mounting a workpiece on the carriage so that said workpiece portion is exposed for the application thereto of coating material; means mounting the applicating assembly for heightwise movement between an upper position wherein the applicating assembly is remote from said workpiece portion in a heightwise direction and a lower position wherein the applicating assembly is proximate to said workpiece portion in a heightwise direction; means for initially maintaining the carriage in a front position wherein the workpiece may be mounted to the carriage in a location that is forward of the applicating assembly; means for initially maintaining the applicating assembly in its upper position; means for moving the carriage rearwardly from the front position to a back position; means, effective when the carriage is in an intermediate position between the front position and the back position wherein said workpiece portion is below the applicating assembly, for lowering the applicating assembly to the lower position; and means for thereafter moving the carriage forwardly from the back position to the front position with the applicating assembly maintained in its lower position during the forward movement of said workpiece portion past the applicating assembly to enable the applicator member to apply a coating to the workpiece portion to a thickness determined by the spacing between the scraper member and the workpiece portion; the rearward movement of the carriage between the intermediate position and the back position enabling any blob of coating material that had previously been formed on the scraper member to be wiped onto said workpiece portion.

2. The machine as defined in claim **1** further comprising: a carriage stop mounted for heightwise movement between an upper position wherein it is in intersecting relationship with the back of the carriage and a lower position wherein it is out of intersecting relationship with the carriage; means for initially maintaining the carriage stop in its upper position so that the carriage intersects the carriage stop during its rearward movement to place the carriage in said intermediate position; and means for thereafter concomitantly lowering the applicating assembly to its lower position and lowering the carriage stop to its lower position to enable the carriage to resume its rearward movement.

3. The machine as defined in claim **2** further comprising: connections between the applicating assembly and the carriage stop so constructed as to maintain the carriage stop in its upper position when the applicating assembly is in its upper position and to lower the carriage stop to its lower position in response to the movement of the applicating assembly to its lower position.

4. An applicating mechanism comprising: a housing having a hollow interior defined by a front wall and a back wall; an applicator roll mounted for rotation in the housing between said walls with its front facing the front wall and its back facing the back wall; rotating means connected to the roll and operable to rotate it in such a manner that its front moves downwardly and its back moves upwardly; means mounting the front wall for movement towards and away from the front of the roll; means mounting the back wall for movement towards and away from the back of the roll; means for supplying coating material into the housing interior above the roll so that, when both walls are spaced from the roll and the rotating means is operating to rotate the roll, the coating material may be transferred by the bottom of the roll that is located between the bottoms of the walls onto a workpiece; an actuable operating member; and means responsive to actuation of the operating member to first move the front wall into engagement with the front of the roll, then cause the rotating means to stop the rotation of the roll, and then move the back wall into engagement with the back of the roll.

5. The mechanism as defined in claim **4** further comprising: control means, responsive to the engaging movement of the front wall towards the roll, to cause the rotating means to stop the rotation of the roll.

6. The mechanism as defined in claim **5** wherein the control means comprises: a motor control member fixedly mounted to the housing and operatively connected to the rotating means so as to stop the rotation of the roll in response to its actuation; and an actuator so mounted to the front wall as to actuate the motor control member during the movement of the front wall into engagement with the front of the roll.

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