MACHINE FOR ROUGHENING THE MARGIN OF THE BOTTOM OF A SHOE

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FIG. 5

FIG. 6

FIG. 7

FIG. 8
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Mieczyslaw Dzik, Boston, and George Schultz, Newton, Mass., assignors to Industrial Shoe Machinery Corp., Roxbury, Mass., a corporation of Massachusetts

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14 Claims. (Cl. 12—17)

This invention relates to a machine having a tool operable on a work-piece, wherein the work-piece causes the tool to move in accordance with the change in width of the work-piece. More particularly, it relates to a machine wherein there is a horizontally movable tool, a horizontally movable sensing member actuable by the edge of a work-piece moving towards the tool and a means for causing the tool to move horizontally in response to the horizontal motion of the sensing member.

This invention has particular application to a machine for roughening the overlaid margin portion of an upper lying on a shoe bottom. Roughing of this folded-over marginal portion of the upper leather is necessary to smooth the wrinkles and in order to have a suitable surface for cementing the outer sole.

Prior to the present invention, roughening of the margin of the bottom of the shoe prior to cementing consisted generally of the operator holding the shoe in his hand and facing the margin to be roughened against a rotating wire brush. Such a method requires great skill in order to control the width of the margin to be roughened and in order to avoid scoring or scarring any of the upper leather of the shoe.

One object of this invention is to provide a machine which will roughen the margin of the bottom of the shoe, permit accurate control of the margin width and avoid scoring the upper leather.

Another object of this invention is to provide such a machine which can be operated with a minimum of skill and which will be rapid and reproducible.

Other objects and advantages of this invention will be apparent from the following description which, in conjunction with the appended drawings, is a perspective view of a machine made in accordance with this invention.

FIG. 1 is a front view of the top portion of the machine, with the casing removed.

FIG. 2 is a front view along line 3—3 of FIG. 1.

FIG. 3 is a side view along line 4—4 of FIG. 2.

FIG. 4 is a section view along line 5—5 of FIG. 2.

FIG. 5 is a schematic diagram showing the air-oil cycle.

FIG. 6 is a section view along line 6—6 of FIG. 5.

The invention comprises in one form a horizontally movable tool which is constantly rotating but is movable horizontally, a horizontally movable sensing member which is actuable by the motion of the edge of a work-piece as it is fed to the tool, and a means which causes the tool to move horizontally in response to the horizontal motion of the sensing member. In particular the invention comprises a rotatable wire brush which is movable horizontally, a rotating horizontal feed screw which is in a fixed position in front of said brush, a sensing member which is slideable on the feed screw, and means for causing the wire brush to follow the motion of the sensing member. A horizontal extension of the sensing member is positioned below the feed screw and is arranged so that when an operator pushes the shoe against and past the bottom of the feed screw and towards the brush, the sensing member will move laterally in accordance with the change in width of the shoe bottom. As the sensing member, for example, moves to the left, so does the wire wheel which is directly behind the feed screw move to the left so that there is automatic control of where the wire brush will contact the bottom of the shoe.

One feature of this invention is the provision of a shoe roughening machine where a rotatable wire brush is movable vertically, with means for limiting the downward motion of the brush and resilient means for restoring the brush to its downward limiting position. Another feature of this invention is a shoe roughening machine comprising a rotatable wire brush capable of moving both horizontally and vertically and having means for limiting the downward motion of the brush and resilient means for restoring the brush to its downward limiting position, a horizontally movable sensing member actuable by the edge of a work-piece moving towards the brush and means for causing the brush to move horizontally in response to the horizontal motion of the sensing member.

A further feature of this invention is a control mechanism comprising in combination an air chamber provided with an inward flow of air at a selected pressure and having one thin flexible wall. There is an outlet conduit leading from the chamber and having an orifice open to the atmosphere. The mechanism includes a closing member capable of blocking the orifice so as to reduce the flow of air from the orifice. There is also provided means connecting the thin flexible wall to a directional control valve. This valve operates a fluid pressure means which includes means for a desired operation and also means for restoring the relative original position of the closing member and the orifice. As used in the roughening machine of this invention this control mechanism provides a sensitive control for adjusting the position of the wire brush to the change in width of a shoe bottom as it is fed to the brush, thus providing a constant width marginal roughening by the brush.

Another feature of this invention is the provision of means for independently moving the wire brush horizontally during the actual roughening operation. The purpose of this is to allow a change in the width of a margin which may be required by a certain shape of shoe. This is preferably accomplished by foot pedal operated air pressure means which causes the rotating wire brush support to move in a horizontal direction.

Referring now to the drawings, the frame of the machine illustrated therein comprises a hinged upper portion 11 mounted on a base 12. The depending frame extension 13 supports a horizontal rotatable feed rod, 111, which terminates in a threaded end, 112. The rod 111 held by socket 13 is coupled to a double-universal jointed drive shaft 114 which is in turn connected to the shaft of a pulley, 206. The pulley 206 is driven by chain 207 connected to a double pulley 115 on the shaft of motor 118. A circular wire brush 201 is mounted on a shaft 202 supported by a brush holder member, 203. The shaft 202 is connected by a universal joint to a shaft 205 which in turn is connected to another universal joint coupled to the shaft of a pulley (not shown) connected by chain 116 to pulley 115. Because of these universal joints, the wire brush 201 can be moved in various horizontal and vertical positions without affecting the rotation of the wire brush.

Mounted on the rod 111 is a sensing member 300. The sensing member has a body portion which is slideable on the smooth portion of rod 111 and also has a horizontal extension below the rod and extending to a point below the approximate center portion of the threaded portion 112 of the feed rod 111. This horizontally extending portion 301 has at its terminus a steel roller 302. The threaded portion 112 acts as the upper guide while the steel roller 302 acts as the left lateral guide for the operator who is inserting the bottom of the shoe for roughening. The body portion of the sensing member 300 has vertical slots 303 which are cooperable with rods 304a and 304b.
of yoke 304. To the inner side of yoke 304 is attached a transverse horizontal bar 305 which terminates in a vertical fixed rod 306. Rod 306 is pivotally supported by pin 308 which is held by the forked depending projection of the frame extension 14. The upper end of the vertical rod 306 has a rubber facing 307 on one side. The rubber facing 307 of the rod 306 is engagable with the orifice of air jet 312 surrounded by spring 313 and supported by a depending projection 311 of a horizontal, elongated member 309.

Member 309 has a terminal depending portion 315 which has a smooth bottom plate slidably supported on the flat upper surface 15 of the frame extension 14. The other end of the horizontal member 309 is pivotally supported by pin 310 mounted on vertical member 209. Extending from the depending portion 315 is a horizontal rod 316 which acts as a stop for the face of the vertical rod 306 opposite to that of the rubber section.

Vertical member 504 is pivotally connected to the frame of the machine at 210. The bottom end of member 504 has a transverse rod 211 extending through a slot 208 in horizontal member 203, and terminating in a head 212. The frame 203 which supports the wire brush 201 has an extension rod 213 connected to the piston of an air cylinder 215 which in turn is actuable and releasable by a foot pedal 221 connected to the cylinder 215 by an air line.

The brush holder member 203 has a double bent arm 502-501 terminating in a sleeve 525 surrounding shaft 202. Air cylinder 215 has a spring 511 acting on a piston rod 510 which is threadably horizontally inserted through 203 into the slot portion 208 so as to abut rod 211. Abutting the other side of the rod 211 and in line with the shaft of the piston 510 is a rod 508 backed by a spring 507 within a hollow rod 527 threadably horizontally inserted through 203 into the other side of the slot 208. Pressure of said air 521 causes air to be admitted to cylinder 215 causing piston rod 510 to pull frame 203 (and brush 201) to the right, sliding on rod 211. This pushes rod 508 against rod 211 and compresses spring 507. Release of the pedal allows the air to exhaust from the cylinder 215 permitting spring 507 and cylinder spring 511 to restore 203 and brush 201 to the position prior to applying the foot pedal. Thus, independently controlled horizontal motion of the rotating wire brush is provided.

When the bottom of the shoe is placed against the bottom of the threaded feed rod 112, and against the roller 302 of the feed mechanism, the shoe, in this position, carrier to the wire brush provides controlled width roughening of the margin of the bottom of the shoe. If, for example, the toe end is fed first, as the toe widens, the sensor 300 is slid somewhat to the left. Instantaneously this causes the vertical rod 306 to pivot and cause the resilient section 307 to block the opening of air jet 312. When the opening of air jet 312 is blocked, this causes a temporary increase in pressure which is transmitted through air line 314 to chamber 317. A constant air supply of about 5 to 10 lbs. pressure is normally being fed into chamber 317 by air supply line 315 from regulator 316. The increase in pressure in the chamber 317 acts to move the diaphragm 319. Diaphragm 319 is connected by a rod 320 to the spool 321 of a 4-way oil valve 322. This oil valve 322 normally maintains the piston 401 to the left in oil cylinder 400. When the diaphragm 319 is expanded by the increase in air pressure caused by blocking the orifice of jet 312, it causes the rod 320 to move spool 321 to the right. Thus, the oil flow which normally goes into port 324, out through port 326, into line 220 and then to the right side of the piston 401, is reversed. The oil now momentarily flows out through port 325 into line 219 to the left side of piston 401, and the exhaust port 323 is connected to the port 326 rather than to port 325. This causes piston 401 to move to the right. Piston 401 is coupled to bar 216 which, being pivotally connected to vertical bar 209 causes the top end of bar 209 to move to the right. The lower end of bar 209, pivoting on pin 210 moves assembly 205, and hence wire brush 201 to the left. At the same time, horizontal member 309, pivoting on pin 310, moves to the right so as to 313 and restore their relative original positions. This in turn restores the air-oil control system to its original position.

Another feature of this invention is the ability of the machine to adjust to the change in contour of the bottom of the shoe as it passes under the wire brush. Thus, the pressure of the shoe contact may be increased or decreased slightly and then be restored as the contour recedes. This is accomplished by means of the double-acting air cylinder 223 which is regulated so as to provide a constant upward pull on the extension 504 of the member 203. The bolt 530 acts as a stop. Thus, if the contour of the shoe causes the brush to rise, the pull of the piston in cylinder 223 acts as a resilient means for pushing the brush down to the limiting position of the stop 530.

Inasmuch as the operation of roughing with a rotating wire brush or the like causes the formation of flying particles of upper material, means for shielding and removal of the particles is recommended. Thus, in FIG. 1 a casing 526 is shown providing a pocket for approximately the upper half of the brush 201 and leading to a conduit (shown partially) which is provided with suction means (not shown) for removing the particles.

While a preferred embodiment of our invention has been described in detail, it will be understood that we do not wish to be limited to the particular construction set forth, since various changes in the form, proportions and arrangement of parts, and in the detail of construction may be resorted to without departing from the spirit and scope of the invention, or destroying any of the advantages contained in the same, heretofore described and defined in the following claims.

We claim:

1. A machine comprising in combination: a horizontally movable tool; a fixed guide member spaced in front of said tool; a horizontally movable flow member adjacent to said guide member and actuable by the edge of a work piece moving in contact with said guide member towards said tool; and means causing said tool to move horizontally in response to the horizontal motion of said sensing member.

2. The machine of claim 1 wherein said guide member is a horizontal, rotatable rod.

3. The machine of claim 1 wherein said guide member is a horizontal, rotatable rod and said sensing member is slideably mounted on said rod.

4. A roughening machine comprising in combination: a fixed horizontal rotatable rod; a horizontally movable rotatable roughing tool spaced to the rear of said rod; a horizontally movable sensing member adjacent said rod and actuable by the edge of a work piece moving in contact with said rod towards said tool; and means causing said tool to move horizontally in response to the horizontal motion of said sensing member.

5. The machine of claim 4 wherein said sensing member is slideably mounted on said rod.

6. A control mechanism comprising in combination: an air chamber provided with an inward flow spool and having one thin flexible wall; an outlet conduit leading from said chamber and having an orifice open to the atmosphere; sensing means including a closing member capable of blocking said orifice so as to reduce the flow of air from said orifice; means connecting said wall to the spool of a directional control valve; a fluid pressure means operable by said valve; and means actuable by said fluid pressure means including operating means and means to restore the relative original position of said closing member and said orifice.
7. A roughening machine, comprising in combination: a vertically movable, rotatable wire brush, means for limiting the downward motion of said brush, and resilient means for restoring said brush to its downward limiting position.

8. A roughening machine comprising in combination: a rotatable wire brush capable of moving both horizontally and vertically; means for limiting the downward motion of said brush, and resilient means for restoring said brush to its downward limiting position; a horizontally-movable sensing member actuable by the edge of a work piece moving towards said brush; and means causing said brush to move horizontally in response to the horizontal motion of said sensing member.

9. The machine of claim 8 wherein additional means are provided to cause horizontal motion of said brush independently of said sensing member.

10. A roughening machine comprising in combination: a rotatable wire brush capable of moving both horizontally and vertically, means for limiting the downward motion of said brush, resilient means for restoring said brush to its downward limiting position, a fixed horizontal rotatable rod spaced in front of said brush, a horizontally movable sensing member slideably mounted on said rod and actuable by the edge of a work piece moving in contact with said rod towards said brush, and means causing said brush to move horizontally in response to the horizontal motion of said sensing member.

11. The machine of claim 10 wherein said latter means comprises fluid pressure means.

12. The machine of claim 10 wherein said rod has threading normally feeding a work piece towards said brush when said work piece is pressed up against said rod.

13. The machine of claim 10 wherein additional means are provided to cause horizontal motion of said brush independently of said sensing member.

14. The machine of claim 10 wherein said brush moving means comprises: an air chamber provided with an inward flow of air at a selected pressure and having one thin, flexible wall; an outlet conduit leading from said chamber and having an orifice open to the atmosphere; a closing member actuable by said sensing member and capable of blocking said orifice so as to reduce the flow of air from said orifice; means connecting said wall to the spool of a directional control valve; a fluid pressure means operable by said valve; and means operable by said fluid pressure means including means causing said brush to move horizontally and means to restore the relative original position of said closing member and said orifice.

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PATRICK D. LAWSON, Primary Examiner.