

June 2, 1936.

C. A. NEWHALL

2,042,479

MACHINE FOR APPLYING ACTIVATING LIQUIDS TO CEMENTED SHOE PARTS

Filed Oct. 5, 1933

5 Sheets-Sheet 1

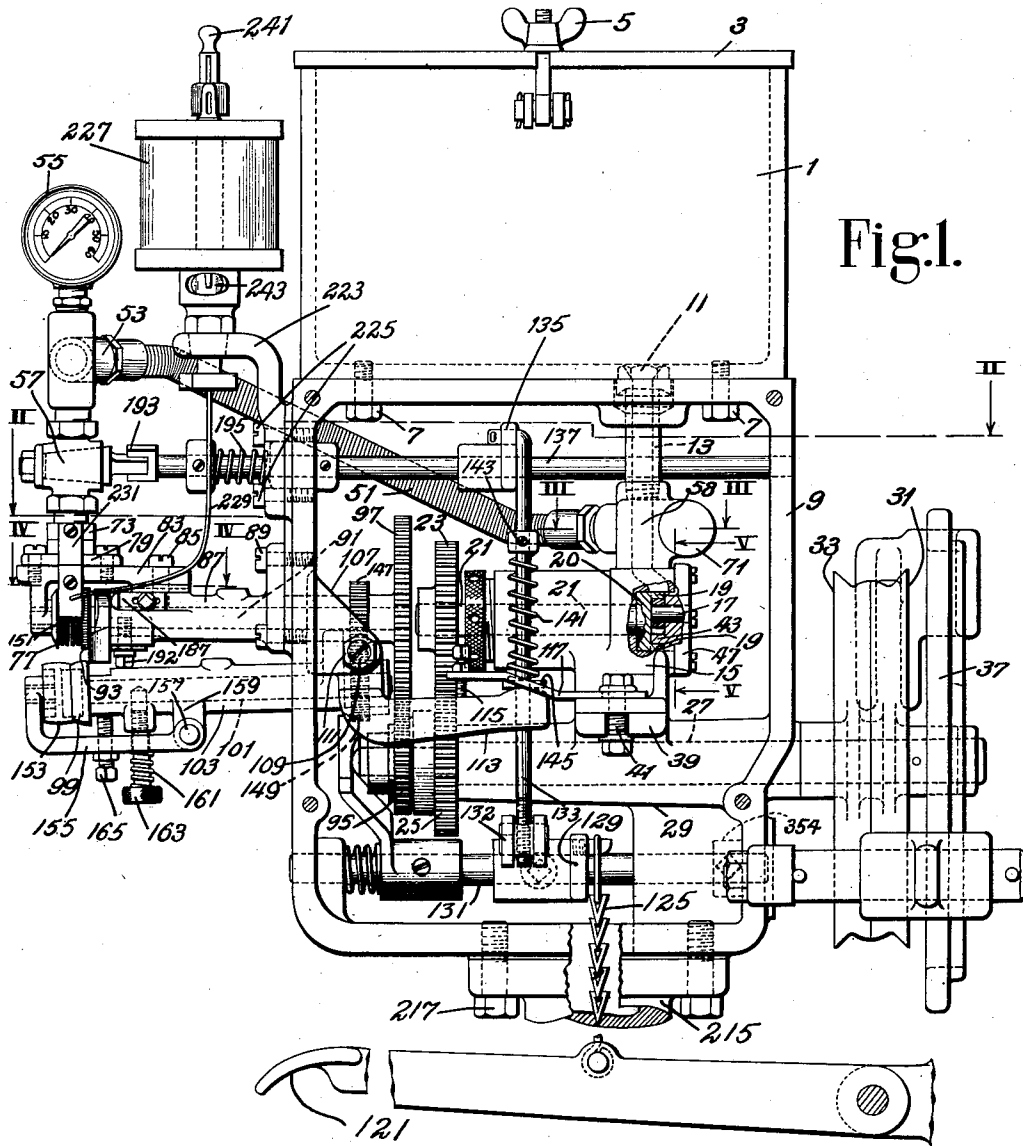


Fig.1.

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Fig. 2.

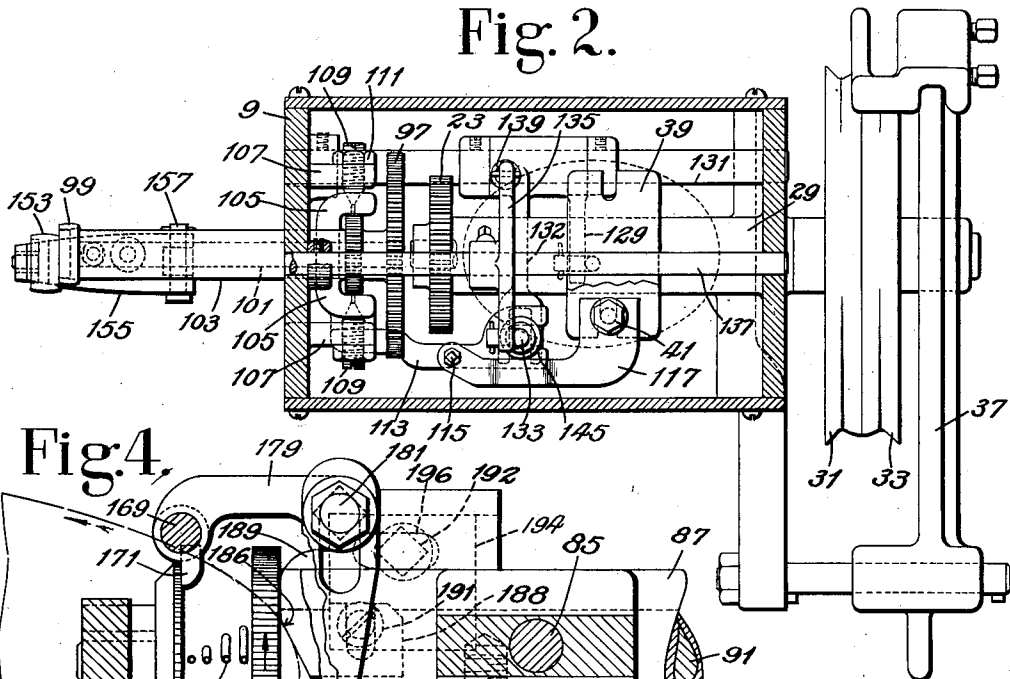


Fig. 4.

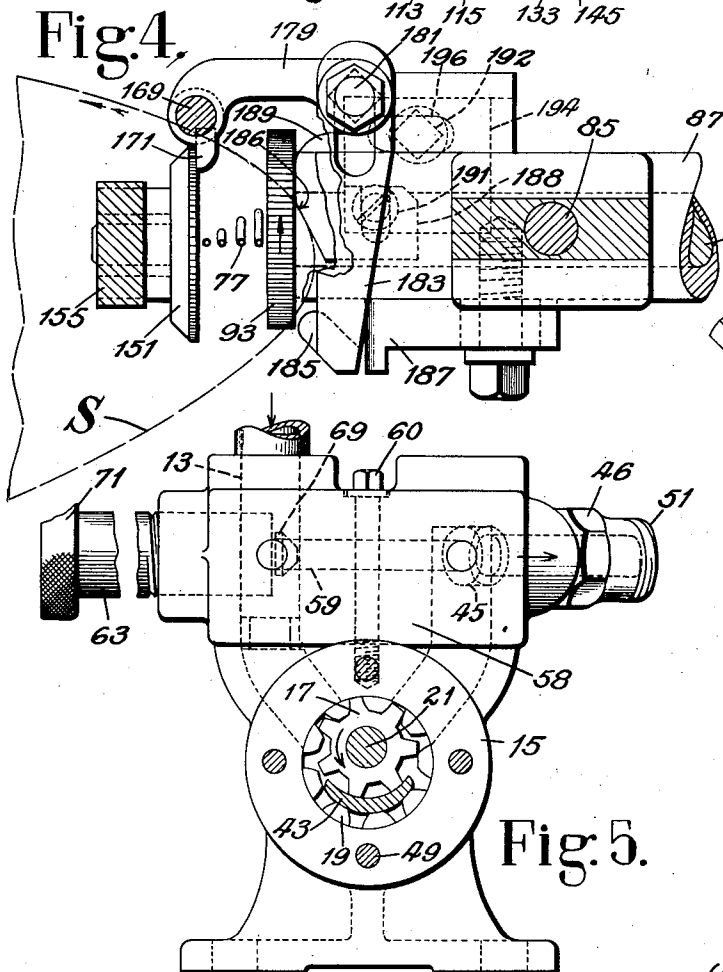
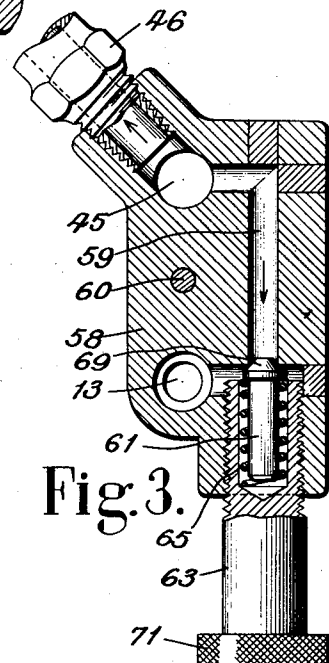


Fig. 5.

Fig. 3.



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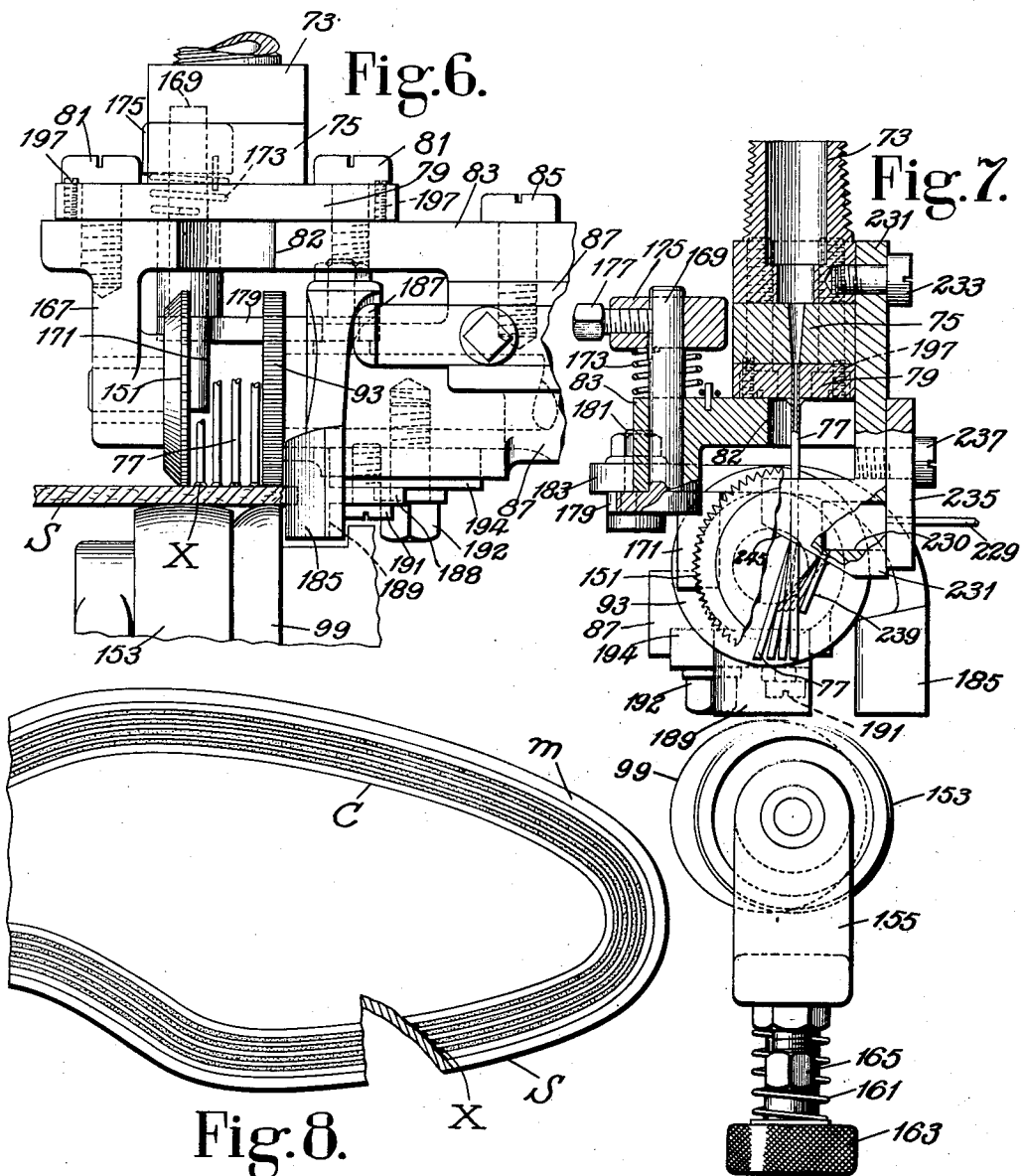


Fig. 8.

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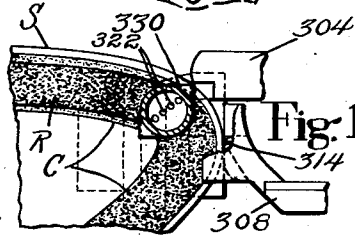
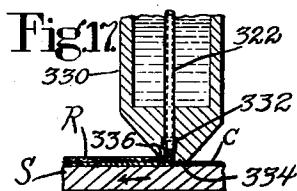
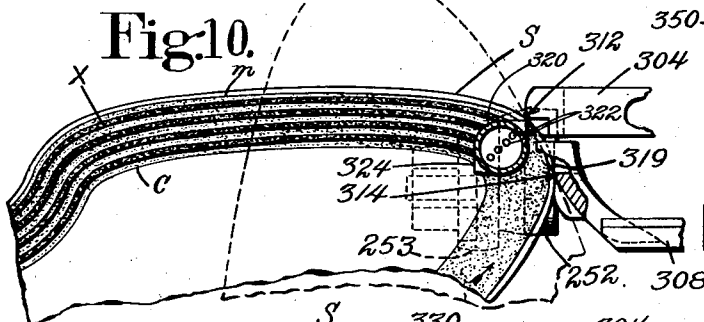
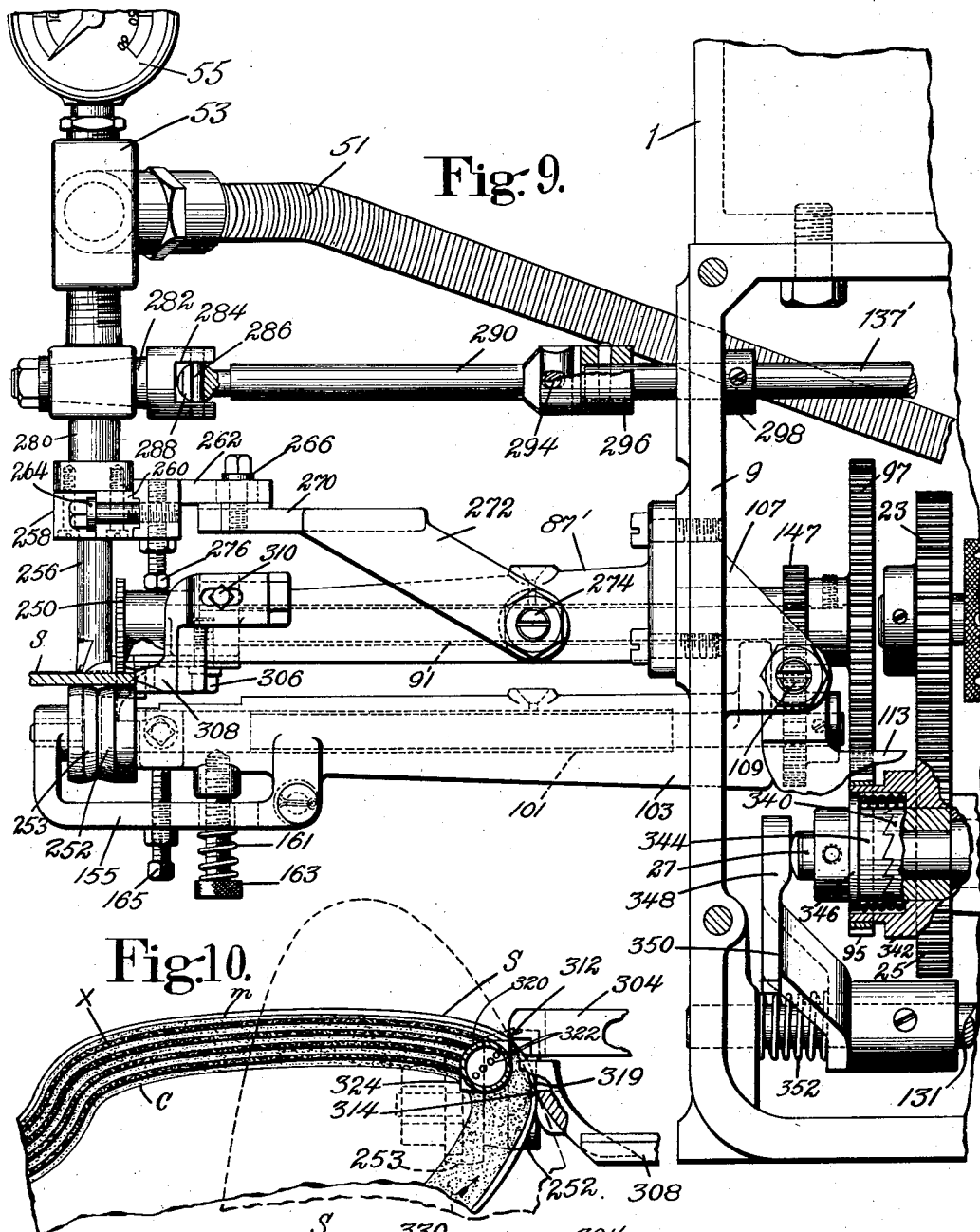
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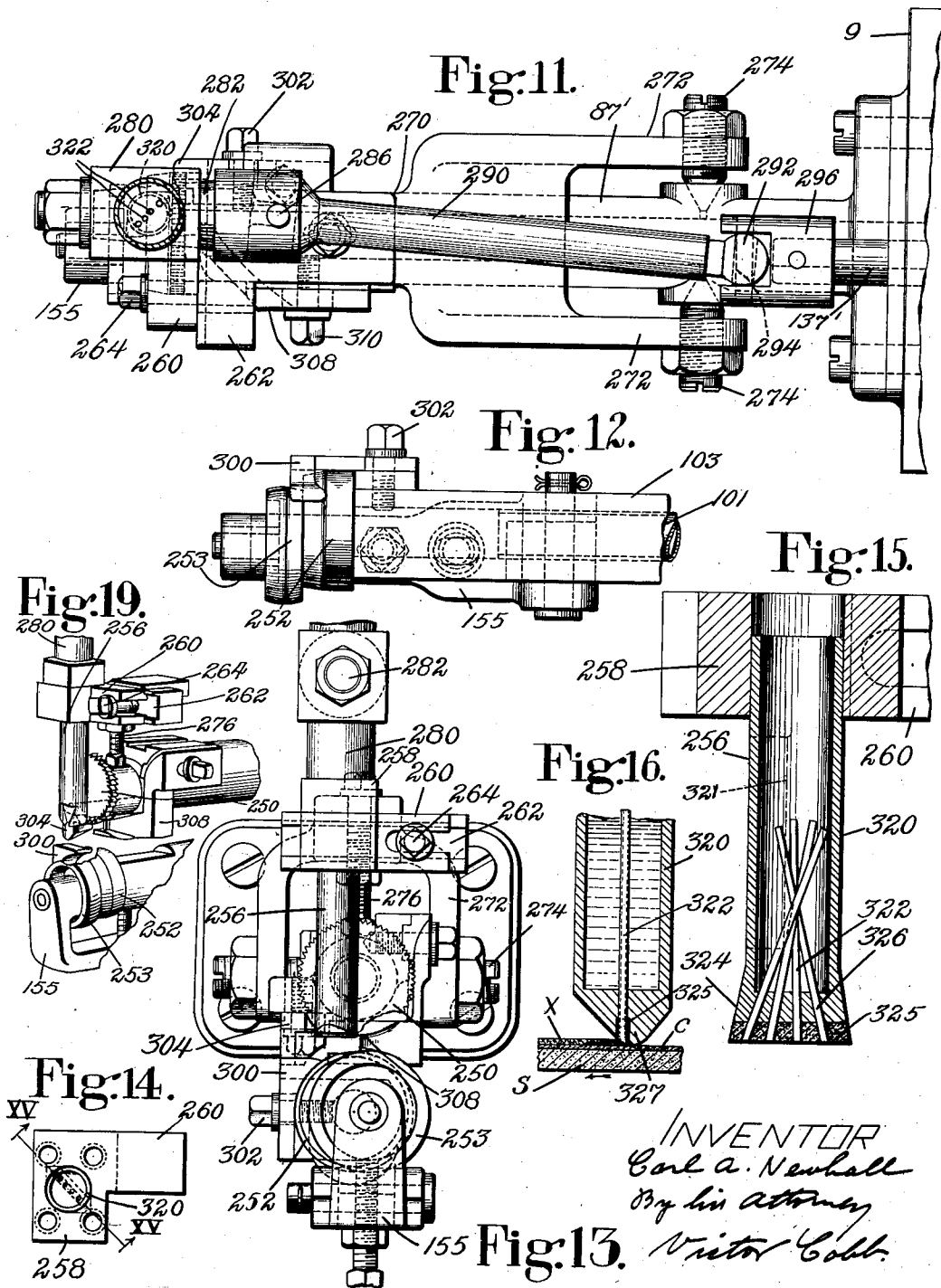
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MACHINE FOR APPLYING ACTIVATING LIQUIDS TO CEMENTED SHOE PARTS

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,042,479

MACHINE FOR APPLYING ACTIVATING LIQUIDS TO CEMENTED SHOE PARTS

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Application October 5, 1933, Serial No. 692,307
In Great Britain October 10, 1932

27 Claims. (Cl. 12—80)

This invention relates to machines for preparing soles for incorporation in shoes, especially by the application of a solvent to activate a dry coating of cement upon a sole which is to be attached to a shoe permanently by means of cement.

In the manufacture of compo shoes in which the outsole is secured to the shoe bottom by cement a common practice is to apply a coating of cement containing pyroxylin or other cellulose derivative to the flesh surface or attaching face of an outsole. Frequently this is applied in the form of a marginal stripe which may not extend fully to the edge of the sole and this coating is usually allowed to dry as the soles are accumulated prior to the time when they are needed for incorporation in shoes. Usually the shoe bottom is also provided with a stripe of cement which is allowed to dry. Just before the outsole is to be applied to the shoe bottom the cement coating on the outsole is activated by applying thereto a solvent for the cement, whereupon the shoe and outsole are brought into close contact in a press, such, for example, as that described in the application for Letters Patent of the United States of Milton H. Ballard et al., Serial No. 636,202, filed October 4, 1932, until the cement has dried sufficiently to secure the outsole properly in place on the shoe.

It has been a common practice hitherto to apply a liquid solvent to the cement coating on the sole and to put it on manually by means of a brush. This practice is, however, disadvantageous from many points of view since, for example, the application may be uneven and the cement may be displaced by the dragging action of the brush, and the solvent, unless great care is taken, may spread over the mid-portion of the sole where it is not needed or get on the edge and tread surface of the sole with a consequent danger of staining. More recently there has been used with great satisfaction an activator in the form of a highly viscous solvent. One form of such a softener is described in Letters Patent of the United States No. 1,959,321, granted May 15, 1934 upon an application filed in the name of Walter H. Wedger, wherein there is set forth certain desirable results which accrue from the use of such a solvent, such as the ability to apply the solvent in a predetermined position from which it is not readily displaced, the greater ease with which the sole thus coated may be handled and the reduction in the length of time during which the shoe must remain in the press. A lessened danger of squeeze-out, when pressure is applied, is another important advantage.

The application of viscous solvent of this type is facilitated by the use, in a machine of the extrusion type, of a nozzle having a plurality of capillary tubes by which the solvent may be applied uniformly in ridge-like threads, in just the desired quantities. This is not claimed broadly herein, however, since it forms the subject-matter of an application of J. W. Johnson, Serial No. 692,043, filed October 3, 1933.

An object of the present invention is to provide an improved machine by means of which a uniform coating may be applied quickly and in just the desired location.

In the illustrated machine, a nozzle having capillary delivery tubes is employed and the outlet openings of the tubes in the nozzle are arranged along a line approximately as long as the width of the marginal band to be coated. An important feature of the invention resides in an arrangement of this nozzle with respect to the guiding means such that the clean margin between the outer extremity of the nozzle and the edge of the sole is maintained constant and such that the width of the band over which the activating fluid is to be applied is also maintained constant. As illustrated one extremity of the nozzle is positioned closely adjacent to one of the sole edge gaging members thus keeping the clean edge margin constant. Also as illustrated, and in order to apply a series of stripes or a band of solvent of uniform width, the line of the tubes in the illustrated construction makes an acute angle with the line of feed and converges toward that line in the direction of movement of the sole. Preferably the line of the tubes extends approximately between the point of contact with the forward gaging member and the center of turning movement for radically curved convex portions of the sole.

The ease with which the machine may be operated and the production obtainable with the machine are both greatly improved by the provision, in accordance with another feature of the invention, of improved work-feeding mechanism enabling the margin of a piece of work presented to the machine to be fed automatically at a substantial uniform speed past the outlet of the nozzle with its capillary tubes. The line of feed is preferably determined by means of spaced edge gages which, in the illustrated construction, are separated sufficiently to allow sharply curved portions of a sole, such as the toe ends thereof, to enter the space between the contact points of the gage and thus to facilitate keeping the feeding mechanism in operative engagement with the

work instead of having it run off the edge thereof. The spacing, however, is limited to a distance such that with respect to that portion of the gage which is last encountered during the movement of a sole there is no substantial variation in the point of contact between the sole and this gage as between straight portions of the sole and the curved portions thereof, thus enabling the production of a uniform margin between the outer edge of the coated area and the edge of the sole. Automatic feeding of the work and hence maintenance of contact between the sole and the edge gage is provided in accordance with another feature of the invention by novel feeding mechanism operating both to cause progressive forward movement of the work and to exert a force transversely of the direction of feeding movement to maintain contact between the sole and the edge gage. This is accomplished in one illustrated form of the invention by means of two pairs of rotatable gripping members, one of which is driven, which engage the margin of the sole at points spaced transversely of the line of feed and in which, as illustrated, one of the rolls away from the gage is braked intermittently to set up a couple operating to force the edge of the sole constantly into engagement with the edge gage. In another illustrated form of the invention coacting feed rolls engaging opposite faces of the sole are constructed and arranged to impart a feeding force in a direction angularly related to the line of feed and which, as shown, converges therewith in the forward direction whereby the feeding force may be resolved into two components, one of which causes forward movement of the sole and the other of which urges the sole into contact with the guiding means.

These and other features of the invention will become clear to those skilled in the art from the following description taken in connection with the accompanying drawings, in which

Fig. 1 is a front elevational view of the head portion of the machine, a cover plate being removed to show the construction and arrangement of parts normally hidden from view thereby and showing a treadle which is at the base of a supporting column;

Fig. 2 is a plan view, partly in section on the line II—II of Fig. 1, of the driving mechanism, the pump having been removed;

Fig. 3 is a sectional view on an enlarged scale of a by-pass valve taken along the line III—III of Fig. 1;

Fig. 4 is a horizontal section on an enlarged scale taken along the line IV—IV of Fig. 1 of the sole feeding and guiding instrumentalities of the machine, certain parts being broken away;

Fig. 5 is an end view partly in elevation and partly in section on the line V—V of Fig. 1, on a larger scale than Fig. 1, of a pump with which the machine is equipped;

Fig. 6 is a front elevational view on an enlarged scale of certain work-feeding and guiding instrumentalities of the machine, with parts broken away;

Fig. 7 is an end elevational view, partly in section, of the parts shown in Fig. 6 and on the same scale and showing also the lower feed rolls;

Fig. 8 is a plan view of a sole diagrammatically indicating the narrow threads or stripes of solvent applied by the machine;

Fig. 9 is a side elevation of a modified form of machine taken from the right side, as is Fig. 1, but on a larger scale and showing primarily those

parts of the machine which are outside of the frame;

Fig. 10 is a plan view showing a sole supported upon the lower feed rolls and to a portion of which parallel threads of solvent have been applied;

Fig. 11 is a plan view of the parts shown in Fig. 9 with the gage and delivery conduit removed, showing the valve-actuating mechanism;

Fig. 12 is a fragmentary plan view of the work-supporting rolls and table;

Fig. 13 is an end elevation of the work-feeding mechanism and the nozzle-supporting mechanism;

Fig. 14 is a detail in plan of the upper face of the nozzle support removed from the machine;

Fig. 15 is a vertical section on the line XV—XV of Fig. 14 of another form of nozzle adapted to do the work of the nozzle shown in Fig. 1;

Fig. 16 is a fragmentary section through the lower end of the nozzle shown in Fig. 15 in a plane normal to the plane of that section;

Fig. 17 is a similar section of still another form of nozzle to be used with less viscous solvents when it is desired to apply the solvent in a continuous ribbon instead of in separated stripes;

Fig. 18 is a plan view of the work showing the ribbon of solvent which is applied by the nozzle of Fig. 17 to a sole; and

Fig. 19 is a fragmentary angular view of the feed rolls, edge gages, and the nozzle.

The machine comprises a rectangular container 1 for holding a supply of viscous cement-softening solvent which commonly contains a cellulose derivative. This container is normally closed by a lid 3 held thereon by two wing nuts 5, one at each side. The container is secured by bolts 7 to the top surface of a rectangular casing 9. In the bottom of the container 1 is an aperture 11 from which an inlet passage 13 conducts solvent to the inlet side of a rotary gear pump 15 which comprises (Figs. 1 and 5) a central pinion 17 which meshes in the manner shown in Fig. 5 with teeth 19 projecting from a ring 20 (Fig. 1) rotatably mounted within the pump. The pinion 17 is mounted on a shaft 21 which is driven through gears 23, 25 from a shaft 27 journaled in a bearing 29 formed integrally with the casing 9. The shaft 27 has fast and loose pulleys 31, 33 mounted thereon and is driven by a belt (not shown) when the belt is on the fast pulley. A belt shifter 37 is provided. The bearing 29 has formed at its upper surface a step 39 upon which the pump 15 is carried, being held in position by bolts 41. As may be seen from Figs. 1 and 5, the teeth of the pinion 17 and the teeth 19 on the ring 20 are tightly in mesh at their upper portions but, when rotated counterclockwise as seen in Fig. 5, begin to separate as they pass the inlet passage 13 and permit solvent to flow into the space between the gears to fill it. Continued rotation of these members carries small quantities of solvent filling the spaces between the teeth around to a point near the outlet passage 45, through which passage the solvent is forced by the coming together of the teeth. It cannot return to the left side of the pump in Fig. 5 because of the interposed flange 43.

The outlet passage 45 extending vertically and then laterally through a block 58 is connected to the terminal fitting 46 of a piece of flexible pressure tubing 51. The other end of this tubing 51 is joined to a T-piece 53 at the front of the machine the upper side of this T-piece being con-

connected to a pressure gage 55 and the lower side being connected to a shut-off valve 57. The by-pass valve block 58, mounted directly on the pump by a screw 60 (see Fig. 3), is provided with a passageway 59 which extends between vertical passages communicating with the inlet and outlet sides of the pump 15. This passage 59 is normally closed by a plunger 61 mounted in a recess cut in a valve control 63 which is in threaded relation with the pump casing. A compression spring 65, of which one end bears against the end of the recess in the valve control 63 and the other bears against a shoulder formed on the plunger, tends to maintain the plunger 61 in a position in which it closes the passageway 59. The arrangement is such, however, that the pressure of solvent built up by the pump 15 will not exceed a certain value, for should this tend to take place the spring 65 will not be strong enough to maintain the plunger in position closing the passageway 59 and solvent will flow through this by-pass from the outlet to the inlet side of the pump. The pressure which the pump is allowed to build up may be adjusted by turning the valve control 63, which is provided with a knurled head 71, thereby altering the compression of the spring 65.

Solvent is thus delivered under pressure controlled by adjustment of the by-pass valve to a nozzle comprising four capillary tubes 77 from which it is extruded upon the work. To this end, the lower side of the valve 57 is connected to a member 73 (Figs. 6 and 7) through suitable passages in which and in a block 75 the solvent has access to the capillary tubes 77. The upper ends of these tubes are soldered in a plate 79 which is secured, by screws 81 (Fig. 6) engaging in open-ended slots in the plate 79, to a bracket 83. The bracket 83 is itself secured by a screw 85 to a frame arm 87 which projects outwardly from the end of the casing 9 (Fig. 1), being fixed thereby by screws 89. As seen in Fig. 7, the capillary tubes 77 pass through a recess 82 in the bracket 83 and do not all lie in one plane, the outer capillary tube (at the left in Fig. 6) being straight; but the others being bent at gradually increasing angles to the vertical so that their lower ends assume a position advantageous in determining a uniform position of the deposited solvent as will be later explained.

To insure good operation of the machine it is desirable that the ends of the capillary tubes shall be kept as close to the work as can be conveniently done without having them drag on the work. An adjustment is provided whereby their distance from the work may be altered. The plate 79 has a number of small screws 197 in threaded relation therewith the lower ends of which bear against the top surface of the bracket 83. By adjusting these screws the plate 79 carrying the tubes 77 may be raised or lowered with respect to the bracket 83 and so the distance of the ends of the capillary tubes from the surface of the work varied.

As has been already mentioned, the solvent commonly used in the machine contains a dissolved cellulose derivative. If the machine is left standing for some time the solvent at the tips of the capillary tubes 77 will harden but the machine is supplied with a convenient arrangement whereby such hardening may be minimized and the ends of the tubes readily wiped clean. On a bracket 223 (Fig. 1), secured by screws 225 to the front of the casing 9, is mounted a sight feed cup 227 which is filled with acetone or other

solvent. This cup is connected by a tube 229 with an aperture 230 in a member 231 (Fig. 7) secured to the member 73 by a screw 233. The end of the tube 229 is held in place by a block 235 mounted on the member 231 by a screw 237. From the aperture in the member 231 four capillary tubes 239 are mounted in the member 231 lead respectively to points just adjacent the outside surface of each of the tubes 77, but spaced upwardly from the ends of the tubes 77. The flow of acetone (or other solvent) to the tubes 239 is controlled by a valve in the sight feed cup 227, which valve is controlled by a lever 241. It may be convenient to adjust the valve so that even when the machine is running occasional drops of acetone are allowed to flow down the outside surface of the tubes 77. The number of drops issuing from the cup 227 can be counted at an opening 243. The member 231, as shown in Fig. 7, is provided with a projecting portion 245 through small holes in which the tubes 77 also pass to give them added rigidity.

In order that the stripes of solvent may be laid uniformly along the margin of a piece of work, provision is made for feeding a piece of work, such as a sole S (Fig. 8), at substantially uniform linear speed beneath the tubes or nozzles 77. For this purpose there is provided a knurled feed roll 93 (Figs. 4, 6 and 7) adapted to engage the top surface of the sole being operated upon. The frame arm 87 has journaled in a bore therein a shaft 91 at the outer end of which is mounted this feed roll 93. The shaft 91 is driven from the shaft 27 by gears 95 and 97 (Fig. 1). Mounted below the knurled feed roll 93 and adapted to cooperate therewith to grip the work is a driven, smooth, feed roll 99 which is mounted on a shaft 101 which is journaled in a tiltable bracket 103. This bracket projects through a suitable aperture in the end wall of the casing 9 and is forked within the casing, as shown in Fig. 2, to provide lateral arms 105. The end wall of the casing has two lugs 107 projecting therefrom toward the inside. Two coaxial set-screws 109 with conical ends and threaded in these lugs are normally held in adjusted position by lock-nuts 111 and engage in recesses in the arms 105, thereby forming a pivot about which the bracket 103 may tilt. The bracket 103 has also an inwardly extending arm 113. The outer end of the bracket 103 is normally in a lowered position determined by engagement of the arm 113 with an adjustable stop screw 115 within the casing which is carried by an arm 117 secured to the step 39 by one of the bolts 41. Treadle means is, however, provided whereby the bracket 103 may be tilted when work is introduced into the machine so that the work may be gripped between the rolls 93 and 99. Pivoted to the base of a column (not shown) is a treadle 121 which is normally held in a raised position by a spring (not shown). This treadle 121 is connected to a lever 129 by a chain 125, which passes centrally upwardly through a sleeve 215 carried at the head of the column and upon which sleeve the machine is secured by screws 217. The lever 129 is secured to a pivot shaft 131 (Fig. 1) mounted at its opposite ends in the casing 9. The lever 129 has an arm 132 from the end of which a rod 133 projects upwardly and at its upper end is connected to one end of a second lever 135 which is fixedly secured near its middle to a rockshaft 137. The back end of the lever 135 is connected to a tension spring 139 (Fig. 2) which normally pulls it downwardly and so pulls the rod 133 upwardly. Upon depression of the

treadle 121, however, the rod 133 is drawn downwardly. This causes depression of the arm 113, which is forked at its inner end to receive the rod 133, by force transmitted through a spring 141 which surrounds the rod 133 and is confined at its upper end by a fixed collar 143 and which bears at its lower end against a washer 145 which rests on the arm 113. This yielding depression of the arm 113 causes yielding upward movement of the outer end of the tiltable bracket 103 and so movement of the feed roll 99 toward the feed roll 93 to grip the work. The shaft 101 which carries the feed roll 99 is driven from the shaft 91 by gears 147 and 149.

Besides causing the outer portion of the tiltable bracket 103 to rise and grip the sole, depression of the treadle 121 is also effective to open the valve 57 to allow solvent to be extruded through the capillary tubes 77. For this purpose the rockshaft 137 is provided with a forked end 193 which embraces the head of the valve 57 and is spring-pressed thereagainst by a spring 195. The arrangement is such that when it is desired to disassemble the machine and remove the nozzle, the rockshaft 137 may be pushed to the right against the tension of the spring 195 thereby disengaging the forked end 193 from the valve 57. When the treadle is depressed the valve 57 is turned from its closed into its open position.

The speed of operation upon the work is increased by an automatic feed mechanism which eliminates the necessity for guiding each piece of work by hand after it has been started through the machine, by mechanically urging the work into contact with gages 185 and 189 which determine the line of feed. Accordingly, in addition to the feed rolls 93 and 99, the machine is provided with a pair of idle rolls 151 and 153 adapted to grip a sole S being operated upon along a line parallel with the edge of the sole but spaced inwardly half an inch or more from the edge. The lower roll 153 has a smooth surface and is freely rotatable in a bracket 155 pivoted by a pin 157 to a lug 159 projecting downwardly from the tiltable bracket 103. The bracket 155 is yieldably upheld by a spring 161 which is enclosed between the lower surface of the bracket and the head of a screw 163 threaded into the tiltable bracket 103 and passing through an aperture in the bracket 155. Upward movement of the bracket 155 is limited by an adjusting screw 165 threaded in the bracket 155, the end of which screw bears against the lower surface of the bracket 103. The upper roll 151 has a knurled peripheral surface and is mounted in a lug 167 depending from the forward end of the bracket 83. Mounted also in the bracket 83 is a vertical pin 169 on the lower end of which is fixedly mounted a short arm carrying a depending brake 171 (Figs. 4 and 6). Surrounding the upper portion of the pin 169 is a torsion spring 173 (Fig. 7) one end of which is fixed to the bracket 83 and the other to a collar 175 fixed to the pin by a setscrew 177. This spring normally tends to turn the pin so that the brake 171 is forced against the inner surface of the roll 151 to resist rotation thereof. Extending inwardly from the brake and also integral with the pin 169 is a lever 179 (Fig. 4) to which is secured an extension 183 substantially at right angles thereto. A bolt 181 with a squared portion received in a square opening in the lever 179 passes through a slot in the extension 183 and is clamped thereto by a nut on the bolt. The extension 183 of the lever 179 curves downwardly to the front (Fig. 7) and car-

ries at its lower end a contact plate 185 adapted to contact with the edge of the sole being operated upon and serving as a gage member which, together with the rear gage 189, will determine the line of feed.

Contact of the sole edge with this gage plate 185 will cause inward motion of the plate to the right in Fig. 4 which will cause a counterclockwise turning movement of the lever arm 179 about the axis of the pin 169 (as looked at from above). This will cause the brake 171 to move out of contact with and to release the roll 151. Such inward motion of the plate 185 under the pressure of a sole is limited by an adjustable stop 187. The normally fixed back edge gage 189 has an upright portion for contact with the edge of the work and a horizontal flange 188 having a slot extending from the rear edge toward the front. Through this slot extends a screw 191 into a square plate 194. This plate 194 has a slot 196 (Fig. 4) through which passes a screw 192 into the frame arm 87. By loosening the screw 192, the gage may be adjusted toward and away from the feed roll 93 while by loosening the screw 191, the gage may be adjusted from front to rear. The arrangement just described is such that when a sole to be operated upon is inserted between the feed rolls 93 and 99 located beside and between the gages 185 and 189, the work being pressed manually against the gages and the treadle 121 being then depressed to cause the work to be gripped between the feed rolls, the roll 151 will be capable of free rotation as the sole is fed so long as the sole contacts with the plate 185 to press it rearwardly and so prevent the friction brake 171 bearing against the roll 151.

When, on account of the changing contour of the sole, it fails to touch the plate 185 (the condition illustrated in Fig. 4), the brake 171 is pressed impositively by the spring 173 against the roll 151 and, varying its speed of rotation, tends to stop it. A force or couple is then set up on the sole between the braked roll 151 and the positively driven feed roll 93 which swings the sole once more into contact with the plate 185, thereby relieving this intermittent braking action. The arrangement just described provides an automatic mechanism for causing proper feed of the sole which carries the entire marginal portion of the sole to be treated beneath the nozzle made up of the capillary tubes 77.

It will be seen from Figs. 4 and 7 that the axis of the roll 151 is offset rearwardly with respect to the axis of the feed roll 93. The axis of the roll 153 is also offset rearwardly with respect to the axis of the feed roll 99 by a similar amount (Fig. 2). This has been done to get a minimum dragging of the roll 151 across the surface of a sole as the latter is turned sharply as at the toe. The point of contact of the roll 151 with the sole lies approximately in the perpendicular bisector of a line connecting the point of contact 186 of the sole with the edge gage 189 and the point of contact with the gage plate 185. This would be the best position at least if the piece of work to be handled were circular. Though the work will not be circular, the position just mentioned is the one best adapted to handle the pointed toes of soles to be treated. If this position were changed in one direction it would cause the roll 151 to drag over the sole just before the latter gets to the turning point, and if it were offset in the other direction it would cause the slippage to occur upon the other side of the turning point. The plate 185 is preferably offset slightly to the right, 75

as seen in Fig. 4, of a line perpendicular to the shaft 91 and passing through the point of contact of the sole with the edge gage 189.

In the arrangement of the machine shown in Figs. 9 to 13, parts corresponding to those in the form shown in Fig. 1 have been given the same reference numerals. This arrangement embodies another form of automatic sole feeding mechanism, a specifically different nozzle and another arrangement for supporting the nozzle. Here the sole S is engaged by a thin disk-like feed roll 250 which is mounted on the driven shaft 91 extending through an arm 87' essentially like the arm 87 of the first form. Coacting with this feed roll 250 is a driven supporting roll 252 mounted on the driven shaft 101 and of combined cylindrical and frusto-conical cross-section. The sole is also supported by an idle roll 253 corresponding to the idle roll 153 of the machine of Fig. 1 but of slightly different shape. Disposed adjacent to the upper feed roll 250 is a nozzle 256, to be later described, provided at its upper end with a block 258 having a laterally projecting portion 260 (Fig. 14). This block 258 is adjustably clamped to a bracket 262 by means of a screw 264 passing through a horizontal slot in the extension 260. The coacting faces of the block 258 and the bracket 262 are provided with a rib and groove, respectively, to facilitate locating the nozzle upon the bracket. This bracket has a slot extending parallel to the shaft 91 through which passes a screw 266 to attach the bracket adjustably to a forked support 270 having legs 272 (Fig. 11) by means of which the support and bracket are swingingly mounted upon the rigid arm 87' which is attached to the frame of the machine. Conical pivot screws 274 held in adjusted position by lock nuts form a bearing between the support 270 and the arm 87'. This provides a swinging mounting for the nozzle 256 which permits it to ride over inequalities in the work and facilitates adjustment of the lowest position of the nozzle, which is determined by a stop-screw 276 extending downwardly from the bracket 262 and abutting the upper surface of the arm 87'.

The nozzle block 258 is attached by screws to a valve block 280 having a movable valve member 282 and threaded at its upper end into the T-piece 53 providing connection to the flexible pressure tube 51 and to the gage 55. One end of the valve member 282 is cylindrical and provided with a squared recess 284 across which extends a pin 285. Engaging this pin is a forked end 288 of a valve-operating rod 290. This forked end is made partially cylindrical, as indicated in Fig. 9, thereby to provide with the pin 286 a universal joint between the valve member and the rod 290. The other end 292 (Fig. 11) of the rod 290 is made partially cylindrical about an axis normal to the axis of the end 288 and is forked to engage a transverse pin 294 in a cylindrical block 296 pinned to a rockshaft 137' operating substantially like the rockshaft 137 of Fig. 1 but having the location of the spring 195 changed to a point (not shown) near the far end of the rockshaft. This spring urges the rockshaft to the left to hold the forked member 288 in operative engagement with the pin 286, the limit of movement being determined by a collar 298. As in Fig. 1, this rockshaft is connected to an operator-controlled treadle so that the valve is opened whenever the arm 103 is raised to grip the sole S between the feed rolls 250 and 252.

Mounted on the lower arm 103 which carries

the lower feed roll is a work-supporting table 300 (Fig. 19) the upper surface of which is approximately at the level of the top of the lower feed roll 252. This is held in position by a clamp screw 302 and, for facility in setting up the machine, is adjustable horizontally in a path parallel to the axis of the feed roll shaft 101. The edge of the table which is approached by a sole passing through the machine is somewhat relieved or depressed, as shown in Fig. 13, to avoid any danger of the sole catching thereon. This table serves the purpose of keeping the sole from tipping to such an extent that it no longer contacts with the lower end of the nozzle 256 (Fig. 13) especially at those times when the major axis of the sole is at right angles to the axes of the feed rolls.

Coacting with the feed rolls and contacting with the edge of a sole to determine its line of feed are spaced edge gages. A back gage 304 is clamped in position on the arm 87' by a screw 306 (Fig. 9) coming up from beneath the gage and a front edge gage 308 is clamped on the arm 87' by a screw 310. Horizontal slots in each of these gages provide for their adjustment, primarily in setting up the machine. The front edge gage 308 is grooved to receive the edge of the sole, as is shown in Figs. 10 and 19, for a purpose to be later described, and has an overhanging upper flange extending a substantial distance to the rear. The bottom flange of the grooved portion comprises only a triangular member the edge of which extends from the point of contact 314 with the sole directly toward the front of the machine and then to the right. To the rear of the point of contact 314, the gage is grooved inwardly, providing upper and lower flanges between which curved portions such as the toe of the sole will be received and guided. The back edge gage 304 has a sharp corner forming a contact point 312. In front of this corner the gage is partially notched, leaving an underlying portion which is not cut away and which serves to support the toe end of the sole. Less sharply curved portions of the sole will not be received to any substantial extent between the back flanges of the front gage nor will they overlie to any extent this uncut-away portion of the back gage.

The line of feed is determined by the contact points 312, 314 of the gages and, as in the form of the machine shown in Fig. 1, a sole when gripped by the feed rolls will have its periphery automatically presented to the nozzle to receive solvent upon the stripe of cement which usually extends along the sides and around the toe. While in the machine of Fig. 1 the coacting feed rolls 93 and 99 are depended upon primarily to cause the sole to move forwardly, the action is such in the arrangement shown in Fig. 9 that the coacting feed rolls 250 and 252, which are positioned opposite the first sole-engaging contact point 314 to be encountered by the sole, operate not only to apply a force which will cause forward movement of the sole but which will also have a lateral component urging the sole into contact with the guiding means. In the machine of Fig. 1 these feed rolls which coact with the outer marginal portion of the sole are substantially parallel to the line of feed, whereas in the machine of Fig. 9, as will be clear from an inspection of Figs. 10 and 11, the feeding force is imparted in a direction (as determined for example by the intersection of the plane of the end face of the feed disk 250 and

the surface of the work) which is angularly related to the line of feed and forms an acute angle converging forwardly in the direction of feed. By reason of this relation, the feed roll or disk 250 not only causes forward progression of the work but is also effective to turn the sole at sharply curved portions thereof, thereby to maintain the sole in contact with the edge gages and to exert a drag upon it for that purpose.

The nozzles shown in Figs. 15 and 17 embody all the advantages of the separate tubes shown in Fig. 1 and at the same time provide certain additional advantages. It has been found that the separate tubes of Fig. 1, being of very small size, are quite readily bent by accidental impact therewith as, for example, when cleaning the machine and, accordingly, one substantial advantage is attained by mounting these tubes in a rigid casing 320 in which individual tubes 322 are inserted through holes drilled in the end of the nozzle casing. The casing 320 is made hollow and is dented at 321 adjacent the feed roll 250 to give greater clearance. Its lower end is flared at 324 to correspond with the width of the stripe of cement which is to be activated. A transverse groove in the lower end of the casing is flooded with solder 325 to seal the tubes to the casing. In this casing the tubes may be set either in an upright position, or inclined as at 326, without affecting the resultant operation except, of course, that the inclined tubes will have a lateral directional effect upon the thread of extruded solvent which is of no consequence when the nozzle is close to the work. The lower end or toe 327 of the casing drags or floats on the sole S (Fig. 16) and therefore maintains the upper edges of the inclined ends of the tubes at a uniform distance above the work as the sole moves in the direction of the arrow. On its leaving or forward side, the casing and the ends of the tubes are cut off at an acute angle with the work. The nozzle therefore deposits threads of solvent X having a curved or ridge-like cross-section which may be semi-circular.

Partly by virtue of the rigidity of the casing in which the tubes are supported, it is possible to bring the lower end 327 of the nozzle closer to the work than would be done with the single tubes without danger of damage to the machine by accidental contact. It will be noted also that the nozzle in this form of the machine is allowed to float upon the surface of the work by reason of the pivotal mounting of the bracket arm 270 already described. Furthermore, as will be noted from Fig. 16, the nozzle may be brought into very close relation to the work without interfering with the deposition thereon of ridge-like threads of solvent the position of which will be accurately controlled by the position of the outlets of the tubes at the lower end of the nozzle.

When it is desired to use solvent of rather light viscosity so that separated stripes or threads would tend to flatten out and perhaps merge very quickly before pressure is applied, it is found desirable to employ a construction shown in section in Fig. 17, in which a casing 330 is provided with a deeper slot 332 across the lower end drilled for the insertion of tubes 322 or 326 and in which only a portion of this slot is filled with solder, leaving a space between the ends of the tubes and the work determined by the distance between the ends of the tubes and the work-contacting end 334 of the nozzle. On its forward and, hence, the leaving side (note the arrow in Fig. 17), the tip of the nozzle is cut back to

form a shoulder or ledge 336 which extends across the whole width of the nozzle along the line of tubes. With this arrangement the solvent extruded from the tubes is controlled as to dripping and speed and velocity of extrusion exactly as in the other forms, but will be permitted to merge or coalesce into a single band or ribbon R. This band or ribbon R will be more or less smooth, due to contact of the ledge 336 with the top surface of the band, and it cannot be substantially thicker than the distance between this ledge 336 and the upper surface of the work. The edges of the ribbon R will lie substantially parallel to the edge of the sole, and the width of this ribbon may be exactly the same as that of the stripe of dry cement or it may be narrower than said stripe, and may be spaced inwardly from the outer edge thereof to avoid squeeze-out.

It may be desired, in order to avoid wear of the operating parts of the machine and of the pump, to provide a clutch between the drive shaft 27 and the gears 25, 95. To this end, there is illustrated in Figs. 1 and 9 a clutch mechanism which is embodied in said gears and which is closed whenever the operator depresses the treadle to grip the work between the feed rolls. In this arrangement, the gear 25 is recessed to receive a clutch sleeve 340. This sleeve is held to the gear by a drive fit and is provided upon its outer end with ratchet teeth. The gear 25 has an extended hub 342 upon which a ring gear 95 is secured in gripping relation. An outer clutch part 344 is pinned to the drive shaft 27 and has a flange 346 coacting with a spring positioned in an enlarged portion of the recess in the hub 342. This spring tends normally to separate the clutch parts. In order to close the clutch, the shaft 27 is moved axially by a cam surface 348 upon an arm 350 pinned to the pivot shaft 131 to which is secured the lever 129 (Fig. 1) directly connected to the treadle. Thus, when the treadle is depressed, the shaft 27 is moved axially a short distance to push the clutch part 344 into engagement with the inner clutch part 340 thereby to drive the gears 25, 95 and hence the machine from said shaft. If this cam action were positive and the teeth of the clutch did not immediately slide into mesh, as illustrated in Fig. 9, there might be danger of breaking these teeth. This danger is overcome by a spring 352 surrounding the pivot shaft 131 and placed between the casing 9 and the hub of the arm 350, thus permitting the slight axial displacement of this pivot shaft which may be required if the teeth of the clutch do not immediately engage. When the machine is arranged thus, the shaft 131 is provided with a collar 354 (Fig. 1) adjacent to the inner side of the right-hand portion of the casing 9 to prevent the spring 352 from pushing said pivot shaft out of proper relation to the other parts of the machine.

In Figs. 10 and 11, the positions of the outlet openings of the tubes are indicated by a row of small circles and the disposition of this row with respect to the gages and the feed rolls is of importance in securing satisfactory operation of the machine. In Fig. 4 the ends of the tubes are also apparent, being disposed along a line inclined to the axis of the shaft 91. Where it is not important to deposit the solvent in such a fashion that the outer thread of solvent is very close to the edge of the sole, then the construction shown in Figs. 1 and 4 is eminently satisfactory. If, on the other hand, because of the desire to make shoes with close edges, the manufacturer wishes to de-

posit the solvent very near the edge of the sole, the construction shown in Figs. 9 and 10 is advantageous. With the latter construction it is possible to get the outer end of the nozzle closer to the edge of the sole without interference between the nozzle and the upper feed disk 250 because of the angular relation between the line of feed and this disk. In order to obtain a uniform width of clean margin m (Fig. 8) between the outer edge of the applied solvent and the edge of the sole, it is important, with either the arrangement of Fig. 4 or that of Fig. 10, to locate the end applying tube rather close to the contact point between the sole and the back edge gage 304, indicated in Fig. 10 as the point 312. With that arrangement there will be no substantial variation in the distance between the tube and the contact point, regardless of whether a straight side of the sole or a curved portion, such as the toe end, is being treated. Location of this end tube either beyond the gage in the direction of feed or between the two gages, if that were possible, would result in very substantial variations in the width of the clean margin m .

Furthermore, in order to get a uniform distance between the opposite edges of the applied stripes X of solvent or of the applied ribbon R, as shown in Fig. 18, it is important to locate the line of tube openings of the nozzle in a particular relation to the line of feed. The position which best serves this purpose is one in which the line of tube openings substantially coincides with a line drawn from the point of contact 312 of the sole with the back gage to a point which represents approximately the center of turning movement of sharply convexly curved portions of a particular average sole. This will usually lie approximately in a perpendicular bisector of a line interconnecting the contact points 312 and 314, for example, and in Fig. 4 will fall approximately at the point where the braked roll 151 contacts with the work. If, on the other hand, this line of tube openings and hence the elongated outlet of the nozzle should be located along a line normal to the line of feed, then the inner edge of the applied solvent would not be parallel to the outer edge of the sole, and in some portions, especially at the toe end thereof, the coated band would be reduced to a width which might be only twenty-five per cent of the width obtained at points along relatively straight sides of the sole. Capillary tubes as employed in this machine can be manufactured with considerable precision without undue cost, and the size of tubes selected depends upon the viscosity of the particular material which is to be handled. If the solvent is heavy and viscous, larger tubes are needed in order to extrude the same amount at a selected pressure than will be the case if the solvent is relatively light and less viscous. The bores of tubes which have been found to be satisfactory with commercial solvents are of the order of .018 of an inch and .025 of an inch, although with some particularly heavy solvents the bore may be, for example, of the order of .044 of an inch. One essential feature of the selection is that the bore shall have such a relation to the viscosity of the solvent that when the shut-off valve 57 is closed, the solvent remaining in the tubes will be retained therein by the capillary action of the tubes upon the solvent. This avoids dripping from the nozzle, with the consequent disadvantageous soiling of the lower feed rolls and eventually of the work and is of great importance in the application of materials having a cellulose derivative

because of the difficulty in removing accidental deposits from the work. It is important also that the tubes shall be of sufficient length to provide a frictional resistance to the passage of the solvent which is in contact with the inner walls of the tubes, to the end that any relatively large momentary variations in pressure will be smoothed out or absorbed and a uniform thread of solvent deposited upon the work. This frictional resistance varies with the square of the velocity of the solvent and hence increases very fast with increasing pressure. The particular pump selected is commercially satisfactory and tends to produce a reasonably steady pressure. It is found, however, that there are momentary fluctuations in the pressure which are of sufficient magnitude to apply a thoroughly unsatisfactory deposit of solvent were it not for the action of the tubes in eliminating this difficulty. This nozzle construction has not been claimed broadly herein, however, since it forms the subject matter of an application Serial No. 759,915, filed December 31, 1934, in the name of J. W. Johnson. The method, broadly, of applying solvent by means of such a nozzle is claimed in an application Serial No. 692,043, filed October 3, 1933, in the name of J. W. Johnson.

In view of the fact that the sole-feeding mechanisms are arranged to urge the sole forcibly against the front edge gage to maintain the line of feed and enable the feeding operation to be automatic, there arises a difficulty because of the thin edges of the reduced shank portions of the sole. If the sole is pushed against the edge gage too hard, this thin edge may be rolled up. By having the gage grooved, however, the rolling-up tendency is either entirely prevented or minimized to a point where it is of no effect. This effect is particularly noticeable in a molded sole where, near the end of the traversing movement of the sole, the feed roll passes from the forepart of the sole on to the shank. The forepart of the sole will have been traveling in a substantially horizontal plane whereas the shank portion will be bent upwardly. If this shank portion, which is thin and therefore somewhat flexible, should be forced against an edge gage having only an upright plane surface, there would be a double tendency to curl the edge of the sole and to prevent the gage from properly positioning the sole with respect to the nozzle.

It will be observed from Fig. 10, that the sole contacts with the back edge gage 304 at a sharp corner 312, and that the sole contacts with the front edge gage 308 along a narrow curved portion 314. These gages 304 and 308, although they are actually separate members as described, could be made integral. It is of importance, however, that the contact points 312 and 314 shall be spaced from one another and separated by a recess in order that the sharply curved portions of a sole such as the toe end 319 may project inwardly of the line of feed slightly in order to give a better opportunity for the feed rolls to grip the work and to minimize the danger of the sole passing out of engagement with the feed rolls before the turning force imparted to the sole to hold it against the edge gages has time to act. If the contact points 312 and 314 were connected by a straight surface so that the toe end 319 could not project inwardly thereof, then the grip of the feed rolls upon the toe end would be very slight. It is important, however, that the spacing between the contact points 312, 314 shall not be great

enough to vary substantially the location of the point 312 at which the sole contacts with the back or last encountered gage 304. Such a variation would occur if the sharply curved end of the sole, as the toe end, were allowed to protrude into the space between the gages and would cause a variation in the distance between the end of the nozzle and the edge of the sole. It would therefore cause a variation in the width of the clean margin between the applied solvent and the edge of the sole.

In the use of the machine, assuming that the machine parts have been properly adjusted, the operator will introduce a cement-coated sole to which solvent is to be applied, flesh (i. e., cement-coated) side upward, between the feed rolls 93 and 99 or 250 and 252, at that locality on the sole at which it is desired to start applying solvent. This locality will usually be near or back of the heel breast line at one side of the sole and it will be desired to apply the stripes X of solvent all the way around the marginal portion of the forepart of the sole to the heel end of the sole at the other side. The operator will now depress the treadle 121 which will cause the feed roll 99 or 252 to be raised to grip the work and feed of the sole in the manner already described will begin. Depression of the treadle 121 also opens the valve 57 to allow solvent to be extruded from the capillary tubes 77 or the nozzle 256 on to the work. The by-pass-control 63 will have previously been adjusted by turning its head 71 so that the pump 15 builds up a suitable but not excessive pressure. This pressure is visually indicated on the gage 55 and will generally be in the neighborhood of twenty pounds per square inch. The solvent extruded through the nozzle will be applied in a plurality of separated threads of ridge-like formation in such a way that the inner and outer threads X are parallel with one another and the edge of the sole S (Fig. 8). This application of solvent will be superposed upon a stripe of dried cement C and it is possible to arrange the threads in any desired location upon the cement where they remain substantially in position without danger of coating the mid-portion of the forepart of the sole or spreading over on to the clean margin *m* between the cement C and the edge of the sole. After the application of solvent, the sole will be applied to a shoe and the two pressed together to cause the threads X of viscous solvent to be spread slightly so as to mingle with one another and thoroughly activate the whole band of cement C upon the sole as well as that found upon the shoe. By reason of the use of viscous solvent and because of its application in separated threads, the drying time is reduced to a minimum and the machinery for attaching the soles to the shoes is rendered capable of large production. If the nozzle of Figs. 17 and 18 is used, the solvent will be applied in a ribbon R. Although the machine has been particularly described with reference to its use in applying solvent, it will be understood that it is also applicable for use in applying cement.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a solvent-extruding machine, a receptacle, a nozzle connected thereto, means for applying pressure to the solvent to force it through the nozzle, said nozzle comprising a casing closed at its outer end except that it is provided with spaced perforations, the inner end of said casing

being connected to said pressure applying means and capillary tubes within said nozzle having their outer ends extending through and sealed in said perforations, said capillary tubes extending back into the nozzle unsupported other than by the thickness of the nozzle wall for a distance sufficient to reduce to a minimum variations in applied pressure whereby a uniform quantity of solvent is deposited upon each part of the work.

2. In a solvent-extruding machine, means for feeding a piece of work, a receptacle for solvent, a nozzle connected to the receptacle for depositing solvent upon the margin of the work as it is moved by said feeding means, means for applying pressure to the solvent to force it through the nozzle, said nozzle being provided with a plurality of capillary tubes through which the solvent is extruded and having a work-contacting surface rearward of the tubes and extending beyond the tubes, and means for movably supporting said nozzle to float on the work.

3. In a solvent-extruding machine, a receptacle, a nozzle connected thereto, means for applying pressure to the solvent to force it through the nozzle, said nozzle comprising a casing closed at its outer end and provided with a transverse groove connected to the inside of the casing by spaced perforations, capillary tubes passing through said perforations a substantial distance inside the nozzle and secured therein in tight relation, and a toe rearward of said groove adapted to rest on the work.

4. In a solvent-extruding machine, a receptacle, a nozzle connected thereto, means for applying pressure to the solvent to force it through the nozzle, said nozzle comprising a casing closed at its lower end and provided with a transverse groove connected to the inside of the casing by spaced perforations, capillary tubes passing through said perforations a substantial distance inside the nozzle and secured therein in tight relation, a toe rearward of said groove adapted to rest on the work, and a ledge forward of said groove and spaced from the work for smoothing out the applied solvent.

5. A machine for applying a stripe of solvent to the margin of a sole, spaced gaging contact points for determining the direction of feed, co-operating feeding members for gripping the margin of the sole close to the gaging points, said feeding means being constructed and arranged to maintain the engagement of the edge of the sole with said gaging points along both straight and curved portions of the sole, and a solvent-applying nozzle fixed against forward movement with the sole and adapted to apply solvent to the sole within a band spaced from the edge, one extremity of said nozzle widthwise of the band being positioned closely adjacent to one of said gaging points whereby the clean margin between the stripe of solvent and the edge of the sole is maintained uniform around the periphery of the sole.

6. A machine for applying a stripe of solvent to the margin of a sole, spaced sole-gaging members, feeding members for gripping the sole, said feeding members being constructed and arranged to maintain the edge of the sole in contact with both gaging members and to turn radically convexly curved portions of the sole such as the toe end thereof about a center located approximately upon the perpendicular bisector of a line connecting said gaging points, and a solvent-applying nozzle fixed against movement along the sur-

face being operated upon and having its outlet extended substantially along a line including the point of contact of one gaging member with the work and said turning point whereby the width of the coated area is maintained substantially uniform about the periphery of the sole.

7. In a machine for applying a stripe of solvent to the margin of a sole, means for feeding said sole, gaging means spaced from one another for jointly determining a line of feed, and a solvent-applying nozzle the elongated outlet opening of which extends along a line making an angle less than a right angle with said line of feed.

8. In a machine for applying a stripe of solvent to the margin of a sole, successively contacted spaced gaging means for determining a line of feed, means for feeding said sole and holding it against said gaging means, and a solvent-applying nozzle having its elongated outlet extending along a line making an acute angle with the line of feed and converging toward said line of feed in the direction of movement of the sole.

9. In a machine for applying a stripe of solvent to the margin of the sole, successively contacted spaced gaging members for determining a line of feed, means for feeding said sole and holding it against said gaging members, and a solvent-applying nozzle having an elongated outlet one end of which is adjacent to the last encountered gage member and which lies along a line converging with the line of feed in the direction of movement of the sole.

10. In a machine for applying a stripe of solvent to the margin of a sole, spaced edge gages of which the one last encountered has a projecting portion of limited area for contact with the sole, a solvent-applying nozzle, and sole-feeding mechanism, the spacing between said gages being limited to a distance such that the point of contact between the sole and the projecting portion of that gage which is last encountered during progress of the sole does not vary substantially between straight portions of the sole and curved portions thereof.

11. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising a pair of feed rolls for gripping the outer margin of the work adjacent to the edge, means for driving one of said rolls, means for engaging the sole at a point separated from the edge thereof more widely than the feed rolls and adapted to drag thereon intermittently, and means responsive to the position of the edge of the work which is approaching the edge gage for controlling the dragging action of said engaging means.

12. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising a pair of feed rolls for gripping the outer margin of the work adjacent to the edge, one of said rolls being driven, means for gripping the sole at a point more widely separated from the edge thereof including a roll engaging one surface of the work and adapted to drag thereon, and frictional means for controlling the dragging action of said latter roll.

13. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising means engaging the margin of the work and feeding it to the tool, means for swinging said work to hold it against the edge gage comprising a roll engaging the

surface of the work along a path spaced from the edge thereof, and means for controlling the operation of said roll constructed and arranged to vary its speed of rotation with respect to the first-mentioned feeding means.

14. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising feeding means engaging the edge of the work, means for exerting a drag upon the work at a point spaced inwardly of the work from the feeding means comprising a roll engaging the surface of the work, and means impositively connected to said roll for controlling its effect upon the work thereby to twist the work and hold it in engagement with the edge gage.

15. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising a pair of feed rolls, one of which is driven, for gripping the outer margin of the work adjacent to the edge, means for gripping the sole at a point more widely separated from the edge including a roll engaging one surface of the work and adapted to drag thereon, and work-controlled frictional means to vary the dragging action of the latter roll.

16. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising means engaging the margin of the work and feeding it to the tool, and means for swinging said work to hold it against the edge gage comprising an intermittently applied drag member engaging the surface of the work along a path spaced from the edge thereof.

17. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising a pair of feed rolls for gripping the work, means for driving one of said rolls, another pair of rolls for gripping the work along a parallel path, and means for intermittently resisting the progressive movement of one of said second pair of rolls along the surface of the work constructed and arranged to urge the work against the edge gage.

18. In a machine for operating upon shoe parts, an operating tool, an edge gage, and means for automatically presenting the periphery of a shoe part to said tool comprising feeding means adjacent to the edge gage cooperating with the outer margin of the work, and means for exerting a drag upon a portion of the work separated from the edge including a roll for engaging the surface of the work and impositive means for controlling the effect of said roll on the work.

19. In a machine for coating progressively the peripheral portions of detached soles, a coating tool, a gage located adjacent to the coating tool to engage the edge of the sole, pairs of cooperating rolls for gripping the sole at points spaced transversely of the line of feed, one of said rolls nearer the gage being driven to effect a feeding movement of the sole, and means for intermittently braking one of said rolls away from the gage to set up a couple operating to force the edge of the sole persistently into engagement with said edge gage thereby to render automatic the feeding of the sole.

20. In a machine for coating progressively the peripheral portions of detached soles, a coating tool, an edge gage located adjacent to the coating tool, and means including two pairs of rotatable gripping members, one of which is driven, for

gripping the margin of the sole at points spaced transversely of the line of feed and constructed and arranged automatically to maintain the sole in engagement with the edge gage thereby to feed a sole around its periphery without guidance by the operator.

21. In a machine for coating progressively the peripheral portions of detached soles, a coating tool, spaced edge gages located adjacent to the coating tool to engage the edge of the sole at points spaced along the line of feed, and rolls beside and between said gages engaging the top and bottom of the sole to grip it, one of said rolls being driven to feed the work, said rolls being arranged to set up a force operating transversely of the line of feed thereby to maintain the edge of the sole automatically in contact with the edge gages.

22. In a machine for coating progressively the peripheral portions of detached soles, a coating tool, spaced edge gages located adjacent to the coating tool to engage the edge of the sole at points along the line of feed, and rolls, at least one of which is driven, for engaging the top and bottom surfaces of the sole to grip it, said rolls operating to exert a force transversely of the direction of feed of the sole to hold the edge of the sole automatically in contact with the edge gages as the sole is fed thereby mechanically to guide the sole for the treatment of a substantial portion of its periphery.

23. In a machine for applying a stripe of cement to the margin of a sole, a cement-applying device, means arranged for contact with the edge of the sole for guiding said sole in a predetermined direction, and feed rolls coacting with one another to engage the opposite faces of said sole constructed and arranged to impart a feeding force in a direction angularly related to the predetermined line of feed which force may be resolved into two components one of which causes forward movement of the sole and the other of which urges the sole into contact with said guiding means.

24. In a machine for applying a stripe of cement to the margin of one face of a sole, a cement-applying device cooperating with said margin, an edge gage adjacent to said cement-applying device, a sole-supporting roll, and a narrow feed roll having an end face disposed in a plane forming an acute angle with the line of feed as determined by the edge gage whereby the force imparted by the feed roll, resulting in a forward component and a lateral component, tends to hold the sole against the edge gage.

25. In a machine for applying a stripe of cement to the margin of a sole, a cement-applying device coacting with the upper face of the sole, an edge gage comprising spaced sole-contacting elements together defining the line of feed, and sole-feeding means including a driven feed disk disposed at an acute angle to the line of feed so that the plane of said disk converges forwardly with the direction of feed, said disk contacting with the work opposite the first encountered gage element.

26. In a machine for applying a stripe of solvent to the margin of a sole, a solvent-applying nozzle, cooperating gripping members one of which is driven to feed the sole, and spaced sole-edge-gaging members to determine the line of feed, that gaging member which is first encountered being provided with a groove to receive the edge of the sole.

27. In a machine for extruding coating material, means for feeding a piece of work, a receptacle for coating material, a nozzle connected to the receptacle for depositing coating material upon the margin of the work as it is moved by said feeding means, and means for applying pressure to the coating material to force it through the nozzle, said nozzle being provided with a plurality of capillary passages through which the coating material is extruded and having a work contacting surface rearward of the outlets of the passages whereby the passages are not blocked by contact with the work.

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