April 2, 1935. J. B. HADAWAY 1,996,067

COATING APPARATUS

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Fig.1.

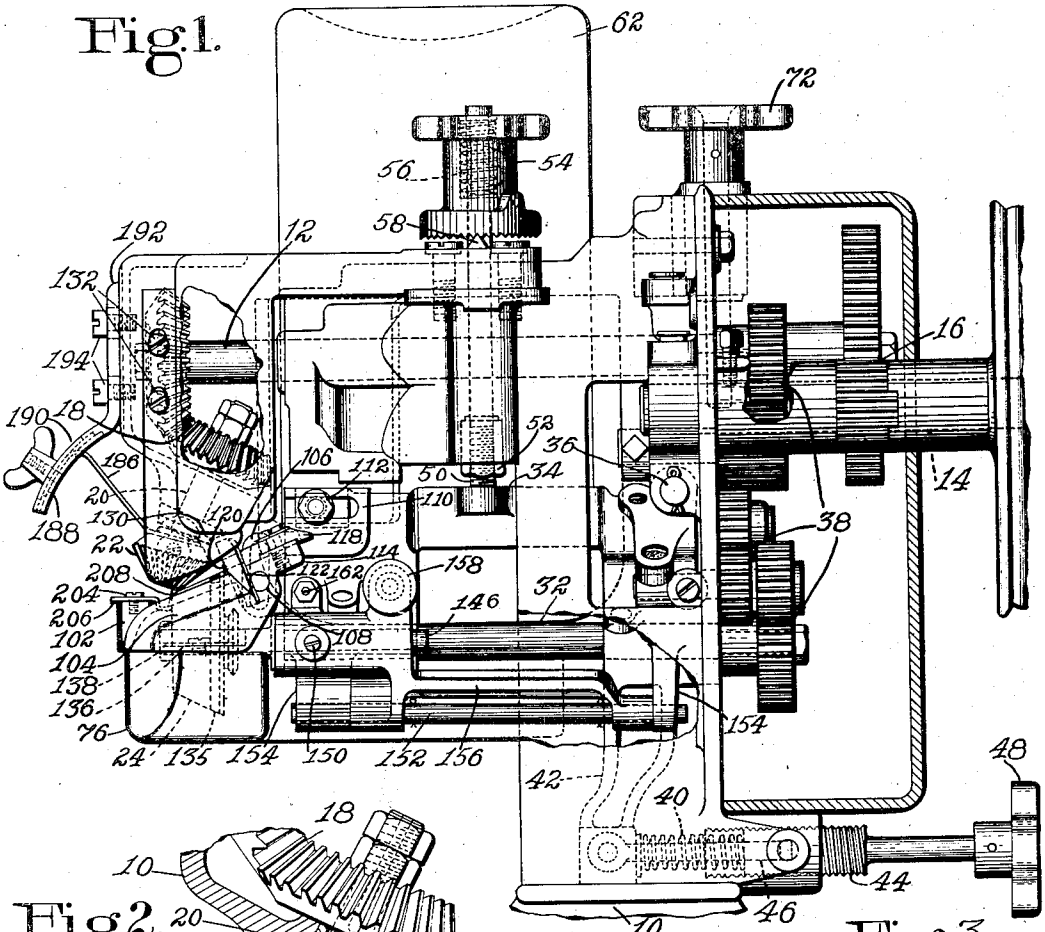


Fig.2.

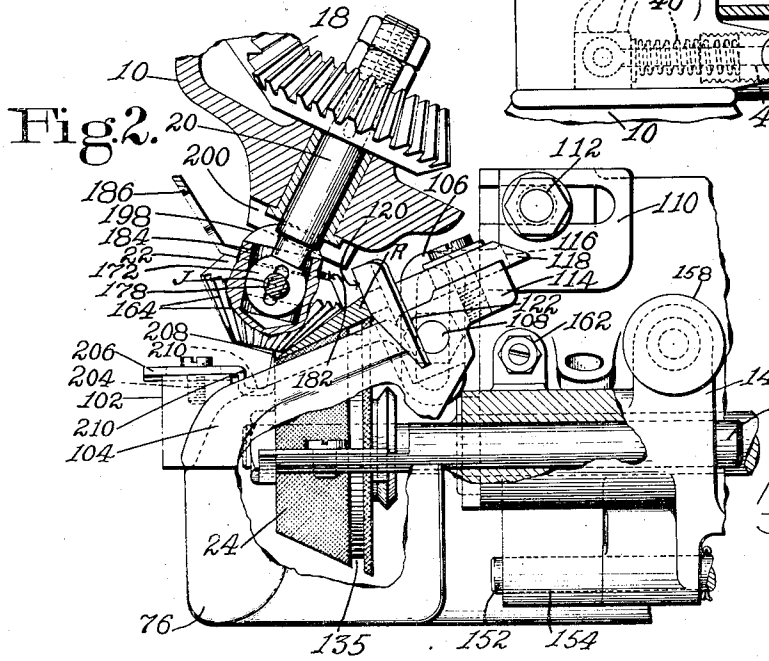
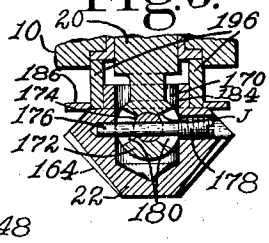


Fig.3.



INVENTOR

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April 2, 1935. J. B. HADAWAY 1,996,067

COATING APPARATUS

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Fig. 4.

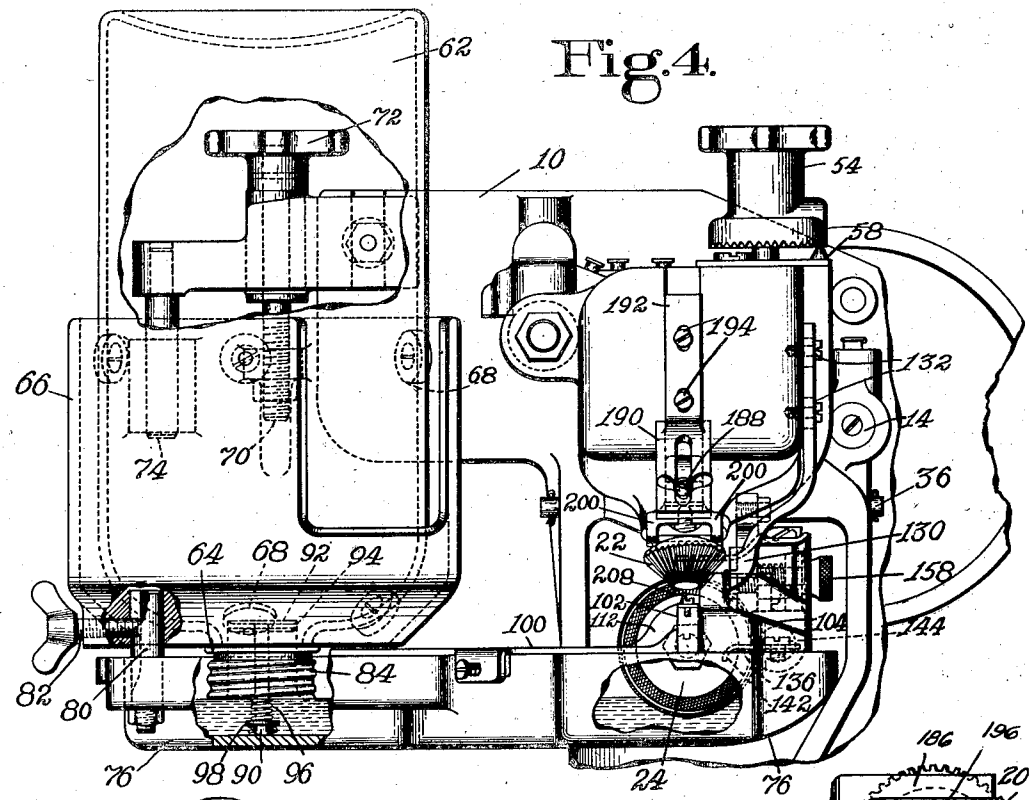


Fig. 5.

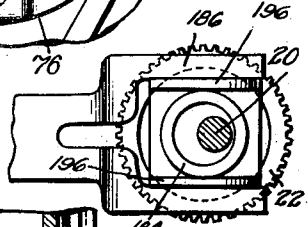
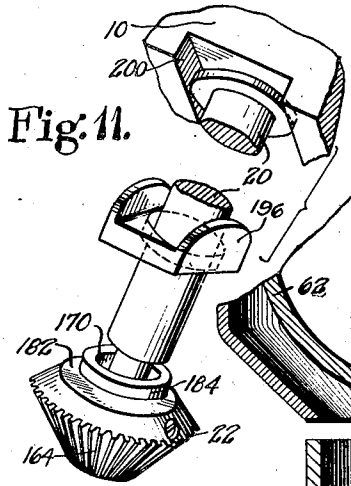


Fig. 12.

Fig. 11.



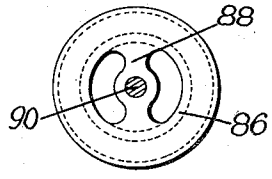
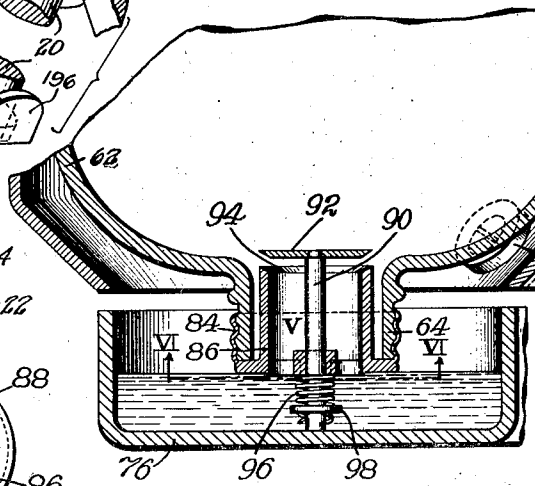


Fig. 6.



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COATING APPARATUS

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Fig. 7.

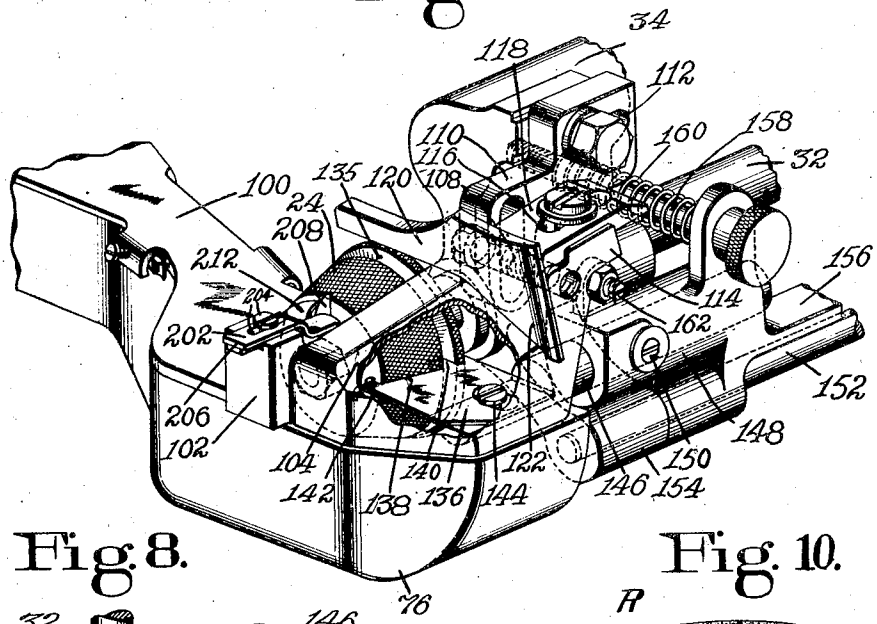


Fig. 8.

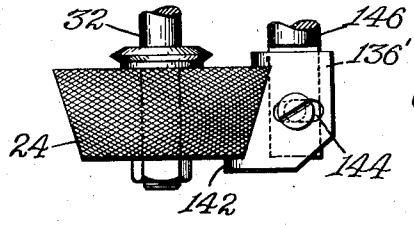


Fig. 10.

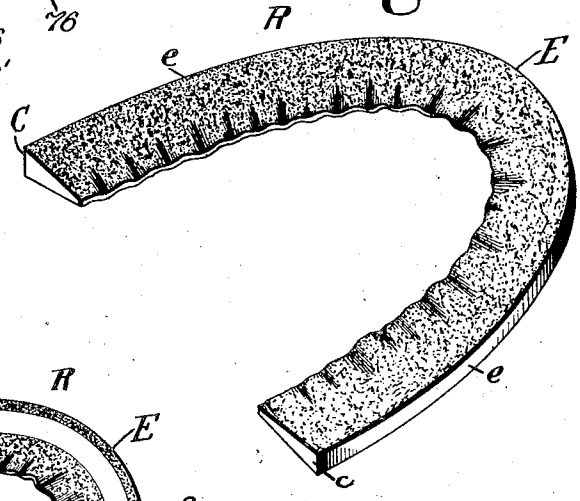
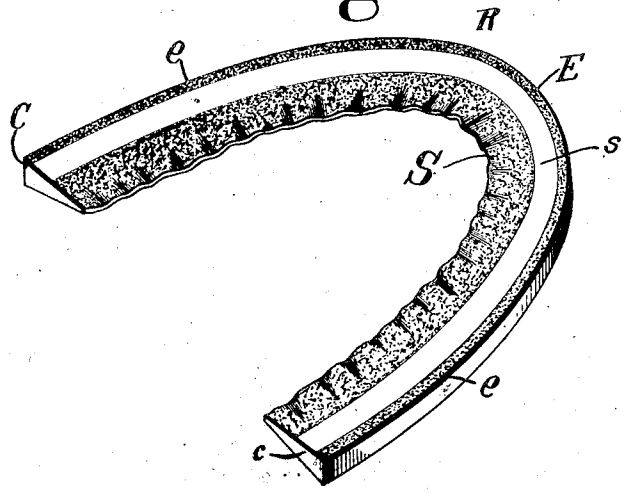


Fig. 9.



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Patented Apr. 2, 1935 1,996,067

UNITED STATES PATENT OFFICE

1,996,067

COATING APPARATUS

John B. Hadaway, Swampscott, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application January 14, 1931, Serial No. 508,716

68 Claims. (Cl. 12—67.1)

This invention relates to apparatus for effecting the application of a coating, which may be such an adhesive as latex, to various articles, being especially adapted, though by no means limited to this use, for operating upon rands or other portions of shoe-heels having curved peripheries. A somewhat similar arrangement to that of the present invention, particularly designed for operating upon heel-lifts or the like, is disclosed and claimed in an application Serial No. 508,717, in my name filed in the United States Patent Office of even date herewith.

An object of the invention herein disclosed is to generally improve the efficiency and convenience of such apparatus as above indicated. To this end, I have provided a novel arrangement of receptacle for the coating substance, and rolls which cause the advance of the work in a curved path as the coating is applied; an improved organization by which a work-engaging roll may effectively adapt itself to varying inclinations of the surface acted upon; and novel means for supporting and determining the position of the work during the operation upon it, for mounting and adjusting a scraper by which the excess of the coating substance is removed from the applying roll, and for supplying and controlling the delivery of said coating substance. Further, this invention includes an arrangement whereby there is prevented the application of the coating to a portion of the area acted upon by the applying roll and traveling in a curved path, and a means for trimming the work, this last preferably acting during the advance of said work for the coating.

A single embodiment of the invention, modified in one particular, appears in the accompanying drawings. There,

Fig. 1 shows my improved coating apparatus in broken side elevation;

Fig. 2 is an enlarged side elevation of the work-engaging rolls and certain associated elements, with parts in section;

Fig. 3 is a sectional detail through the universal mounting of the feed-roll;

Fig. 4 is a broken end elevation looking from the left in Fig. 1;

Fig. 5 is a central vertical section through the lower portion of the adhesive-container and directly associated elements;

Fig. 6 is a horizontal section upon the line VI—VI of Fig. 5;

Fig. 7 shows the applying roll and immediately associated elements in perspective;

Fig. 8 is a top plan view of a modified form of applying roll and its scraper;

Figs. 9 and 10 illustrate in perspective rands coated, respectively, by the applying rolls of Figs. 7 and 8;

Fig. 11 is an exploded view in perspective showing a mechanism for controlling the tipping movement of the feed roll; and

Fig. 12 is a plan view of this mechanism and of the feed roll and also showing a spring which further controls the tilting movement of the feed roll.

In the upper portion of a frame **10** adapted, as illustrated, to be supported upon a bench, is journaled a horizontal shaft **12** rotated from a main driving shaft **14** by spur-gearing **16**. At its forward extremity, the shaft **12** acts through bevel-gearing **18** to rotate in the frame a downwardly and outwardly inclined shaft **20** carrying, at its lower end, a roll **22**. This roll is generally conical in form, decreasing in diameter outwardly, but preferably with its apex omitted and with a portion of the base cut away upon a reducing taper, being generally frusto-conical. It is shown as connected for gyration upon its shaft **20** by a universal joint J. This arrangement will later be described in detail. The roll **22** is one of a pair of work-feeding and pressure-rolls, the companion roll **24** of the pair being also frusto-conical, converging outwardly, but with a less taper, its periphery being more nearly cylindrical than that of the roll **22**. It is secured upon the outer extremity of a shaft **32** turning in an arm **34** pivoted at **36** upon the frame. A chain of spur-gears **38** connects the shaft **32** to the shaft **12**, so the rolls **22** and **24** are rotated in opposite directions to advance the engaged work from right to left (Fig. 4). The driving connections and diameters of the conical surfaces are such that the largest work-engaging portion of the roll **22** and opposite peripheral points of the roll **24** travel at approximately the same speed. The roll **22** acts particularly as an abutment- and feed-roll capable of adapting itself to the transverse inclination of the work by virtue of its universal mounting, while the lower roll **24** serves to support and advance the work and to apply a coating substance thereto, and may yield as a result of the movement of the arm **34** about its pivotal mounting. This yield is, in the present instance, against the resistance of a spring **40** interposed between a depending portion **42** of the arm **34** and a screw **44** threaded horizontally into the frame. The spring surrounds and is retained against lateral displacement by a rod **46**

pivoted to the arm-portion 42 and guided in a bore in the screw. Said screw is adjustable in position, to allow the expansive force of the spring to be varied, by a hand-wheel 48. The normal space between the work-engaging surfaces of the rolls 22 and 24 may be altered by an adjustable stop-screw 50 mounted for vertical movement in the frame, and against which the spring 40 urges the arm 34. As illustrated, the screw 50 is threaded into a bushing 52 in the frame and may be turned by a hand-wheel 54 splined upon the upper end of the screw and with its notched under side normally held by a spring 56 against a retaining projection 58 upon the frame.

The adhesive to be applied to the work, as latex, is contained in a bottle 62 or the like, this resting, with its contracted neck 64 (Figs. 4 and 5) down, in a generally cylindrical holder or seat 66, yieldable projections or cushions 68 being mounted upon the latter to protect the bottle against breakage. The holder is supported upon the frame 10 by a vertical screw 70 rotatable in said frame and threaded into a lug projecting from the side of the holder. Upon turning the screw by a hand-wheel 72 on its upper extremity, the holder and container may be adjusted vertically, being held against rotation about the screw by a projection or guide-rod 74 depending from the frame and entering an opening in a lug upon the holder. Mounted upon the holder, and therefore adjustable with it, is a shallow trough or receptacle 76, which at its rear extremity receives the neck of the container and at the forward end the applying roll 24. There is thus furnished a barometric-feed device, which maintains the adhesive in the trough at a definite level to receive the lower portion of the applying roll. The extent of immersion of the roll, and therefore the amount of the adhesive which it takes up for application to the work, may be varied by raising and lowering the holder, container and trough together by the screw 70. Since the adhesive may differ in viscosity, and consequently in the freedom with which it flows, I prefer to provide means for altering the normal distance between the outlet of the bottle-neck and the bottom of the trough beneath it, the latter being lowered if the substance is thick. For this purpose, the trough is shown as carried upon a stud 80 rising from it and lying within a vertical opening in the holder, where it is adjustably clamped by a set-screw 82. The bottle is normally closed, against the entrance of air and the escape of the adhesive upon inversion, by a valve mechanism V (Fig. 5). The exterior of the bottle-neck is threaded, and upon this screws an external flange 84 of a cylindrical casing 86 lying within the neck. A cross-bar 88 spans the outer extremity of the casing, leaving at each side openings ample for the passage of the adhesive, these openings being best shown in Fig. 6 of the drawings. The bar has an axial opening, in which is mounted to reciprocate a stem 90 having at its inner end a valve 92 arranged to contact with a seat 94 formed upon the inner extremity of the casing. Against this seat the valve is normally forced by a spring 96 located betwen the bar 88 and a washer or other separable member 98 held by a cotter pin at the outer portion of the stem. When, upon inserting the bottle in the holder, the neck enters the trough, the outer end of the stem 90 strikes the bottom of said trough, raising the valve from its seat and permitting the adhesive to flow until it rises to the lower extremity of the casing, when a balance is established between the weight of the adhesive in the bottle and atmospheric pressure. This controlling means for the adhesive allows free delivery of even a thick substance, is easily applied to and removed from the bottle, and its parts are readily accessible for cleaning. After removal, the valve may readily be disassembled by taking out the cotter pin. If latex has been used, a bath of water is sufficient to clean the parts.

At the outgoing side of the rolls 22 and 24, the trough 76 is provided with a cover 100 (Figs. 4 and 7), which protects the contents from dirt, this cover extending upwardly at 102 at the outer end of the roll 24 for a purpose which will be later developed. At the incoming side of the rolls, a rearwardly curved and inwardly, upwardly inclined member 104 (Fig. 2), extending into proximity to the bite, supports the work as it is presented to the rolls, guards the lower roll and covers this end of the trough. It has an upstanding wall vertically movable for adjustment by a slot-and-screw connection 108 upon the front surface 106 of a depending arm of a bracket 110, which is, in turn, attached to the arm 34 by a screw 112 situated in a horizontal slot in the bracket. The support 104 is provided with an inward extension 114, on which is clamped, by a slot-and-screw connection 116, the shank 118 of a gage member 120. The work-contacting surface of the gage lies substantially at right angles to a line at the bite of the rolls and to the adjacent surface of the member 104 to correctly position the work with respect to said rolls, while an inclined outward extension 122 serves to guide the work as it is introduced. The connection 108 allows the work-support 104 to be positioned in the desired vertical relation to the top of the applying roll 24, and the angular relation of both the support and gage to be changed. The connection 112 provides for the adjustment of the support across the face of said roll. The connection at 116, by varying the location of the gage toward or from the roll 22, determines the position of the thin edge of the work, this position being substantially constant for all widths of rands. The rand R illustrated in Fig. 2 is of maximum width, the gage being carried in across the support and the roll 24 when the work is narrower. The upper roll 22 is protected by a curved guard 130 (Fig. 4) having a vertical stem joined to the frame by slot-and-screw connections 132, by which the distance of the guard from the support 104 may be varied. This upper guard, with the curved surface of the member 104 and the gage-extension 122, furnishes a throat which facilitates the presentation of work-pieces to the rolls.

The applying surface of the roll 24 preferably has closely placed small pockets or depressions, as appears in Figs. 7 and 8, to receive the adhesive, which is transferred therefrom to the work when the roll is pressed against it. This surface is sufficiently close to a cylinder so the extent to which it dips into the adhesive in the trough 76 is not very different at its ends, and, therefore, the supplying of the adhesive to the entire applying surface of the roll is made possible without the necessity for maintaining any considerable body in the trough. The inclination or taper of the roll is sufficient, however, to assist in feeding the work in a curved path, as will be described. In operating upon rands R, for example, which are to be assembled with heel-

lifts, one may wish to apply, as illustrated in Fig. 9, a coating S of the adhesive, this being interrupted near its outer edge by an uncoated band *s* corresponding in curvature to the periphery of the article. This arrangement causes the assembled heel-portions to be held firmly together at the periphery, so there will be to the purchaser of such heels no appearance of checking or tendency to separation between the layers. Yet, when the heel is trimmed after attachment to a depth entering the uncoated band *s*, no adhesive will appear at the surface to impair the finish, and there will be no evidence of separation between the lift and rand, on account of the compressing operation to which the heel has been subjected. This effect is obtained by providing in the applying surface of the roll **24** a groove **135**, from which the adhesive is removed before the work is reached by the side of the roll rising from the trough **76**.

To dispose of the excess of the adhesive substance which is brought up by the roll **24** from the trough, and to clean the groove **135**, a scraper is provided. This is shown in Fig. 7 as consisting of a plate **136** lying in a generally horizontal plane and substantially opposite to the axis of the roll. The plate has an inclined edge **138** parallel and in close proximity to the pocketed applying surface, and an angular projection **140** from said edge entering the groove. The portion **138** may remove from the periphery of the roll practically all the adhesive except what is contained in the pockets, while the portion **140** so cleans the groove that it will lay no coating upon the work. From the plate, at each side of the edge **138**, is a curved projection **142** (Figs. 4 and 7) lying close to the end of the roll. These projections prevent the adhesive from working along the ends of the roll to the shaft. The curvature of the projections causes the adhesive to be deflected outwardly, so it falls clear of the ends of the roll. The plate **136** is adjustably secured by a slot-and-screw connection **144** to the flattened surface of a carrier rod **146** extending through a horizontal bore in a pivoted holder or support **148**, being normally fixed against movement in the bore by a set-screw **150**. This permits adjustment of the scraper **136** with respect to the support **148** in a plurality of directions. A pivotal mounting of the holder is furnished by a horizontal spindle **152** supported in lugs **154**, **154** (Fig. 1) upon the arm **34**, this spindle passing through depending portions of the holder and of a horizontal extension **156** thereof. A screw **158** extends through an opening in an upwardly projecting lug of the holder **148**, and is threaded into the arm **34**. A spring **160**, interposed between the arm and holder-lug, urges said lug against the head of the screw, the adjustment of the latter determining the approach of the edge **138** of the scraper to the roll **24**, and therefore the extent to which the adhesive is removed from the applying surface. A stop-screw **162** (Fig. 7), threaded through the holder and contacting with the arm, fixes the minimum spacing between the roll and scraper. The alteration in the position of the rod **146** and of the scraper upon said rod provides initial adjustments of the scraper transversely of and toward and from the roll. If the application of an uninterrupted band of adhesive is desired, as appears in Fig. 10, the applying roll **24** will have a continuous pocketed peripheral surface, and the edge **138** of the scraper-plate **136'** will be unbroken, this arrangement being illustrated in Fig. **8**.

Considering now the engagement of the rolls **22** and **24** with the work, the first-mentioned roll is shown as having about its periphery, lying along elements of the conical surface, a series of elongated teeth **164** (Figs. 2 and 3), which effectively engage the work to feed it forward. The normal angle between the adjacent contact-peripheries of the rolls, or at the bite, is substantially equal to that between the opposite faces of the article upon which they are to operate, as a beveled rand. For variations in the thickness of the work, considered from point to point longitudinally, the applying roll **24** may yield against the resistance of its spring **40**. Differences in the transverse angle or bevel as the work advances between the rolls are compensated for by the tilting of the feed-roll **22** upon its joint J. This joint may be arranged as follows: The roll **22** has, extending partially through it from above, an axial bore **170** (Fig. 3), within which is located the lower extremity of the shaft **20**. The shaft-end **172** is spherical, with a reduced neck between it and the body of the shaft, to provide clearance for the gyration or tilting of the roll. Arranged to turn in a transverse bore in the shaft-portion **172** is a cylindrical pin **174**, which is capable of angular movement about the cylindrical body-portion **176** of a screw **178**. This screw is threaded into the roll **22** at one side, and, after passing through the pin **174** at right angles to the axis of said pin, enters a bore in the roll at the opposite side of the shaft-end **172**. Segmental slots **180**, **180** in the shaft-end receive the ends of the portion **176** of the screw. Since there is a capacity for tilting of the roll about the axis of the screw **178** and about the axis of the pin **174**, said roll is mounted for universal movement and can be caused to maintain full contact with work of different transverse inclinations as the shaft **20** rotates.

To yieldably maintain the roll **22** in a definite position generally corresponding to the normal or average bevel of the work, said roll has at its upper end, at right angles to the axis, a finished surface **182** (Fig. 11) surrounding an annular flange or neck **184** upon the roll. On this surface **182**, at opposite sides of the flange, bears the forked end of a leaf-spring **186** (Fig. 1) adjustably secured by a slot-and-screw connection **188** to a curved portion **190** of a bracket **192**. The center of curvature of the bracket-portion **190** preferably lies approximately at the center of the joint J. The bracket is fixed to the frame **10** for vertical adjustment by slot-and-screw connections **194**. The roll **22** will be held upon its universal mounting by the pressure of the spring **186** at a predetermined normal position, which depends upon the angle of the spring, yet it can yield against the resistance of the spring to conform to the bevels of different pieces of work or variations in the bevel of a single piece. By adjusting the angle of the spring at the connection **188**, the roll may be initially positioned about its tilting axis to correspond to the general bevel of the work. If, however, this adjustment is such that the angle of the roll-periphery is different from that of the upper face of the work presented to it, the transverse pressure upon the latter may be altered and thereby the amount of the adhesive controlled which may be retained upon one margin of the work or the other and squeezed out from the opposite margin under the action of the rolls **22** and **24**. That is, the transverse distribution of the adhesive is thus varied. Vertical adjustment of the bracket at **194** increases or diminishes the pressure of the spring **186**, and therefore the resistance of the

feed-roll to displacement. The force exerted by the spring also has some effect in confining the tilting movement of the roll to a vertical plane, as must be the case to enable it to produce the proper feeding action, rather than in the direction of advance of the work. This is due to the manner of engagement of the outwardly inclined forked end of the spring, which spans the roll-flange **184** and bears upon the flat surface **182**. To make this limited movement of the roll certain, there rests upon the surface **182**, between the flange **184** and the divided ends of the spring **186**, the spaced walls of a retaining member **196** (Fig. 12). The upper edges of these walls are curved at **198** (Fig. 2), to give clearance for the tilting of the roll, and the sides of the walls move in contact with spaced depending portions **200**, **200** of the frame **10**. This retaining member, being non-yielding, by its contact with the surface **182** and frame-portions **200**, **200** positively prevents tilting of the roll along the line of travel of the work, yet, by its capacity to rock between the portions **200**, leaves said roll free at all times during the rotation of the shaft **20** for vertical displacement about a substantially fixed horizontal axis toward and from the applying roll. No material resistance is offered to this vertical movement because of the retention against yield in other directions.

Some classes of work, of which welting furnishes an example, may have a thin, irregular edge which it is desirable to remove. This invention provides for the performance of this trimming operation simultaneously with the coating, avoiding separate manipulation. Formed with the cover **100**, adjacent to the outer end of the roll **24**, is the boss or support **102**, previously mentioned, having a horizontal upper surface. Upon this surface there is mounted, by a slot-and-screw connection **204** (Fig. 7), the shank **206** of a knife **208**, the cutting edge of which lies close to the outer end of the roll substantially in the vertical plane of its axis and extending above the adjacent work-engaging periphery. An angular portion **210** (Fig. 2), joining the shank and blade, lies below the work-supporting surface of the member **104**. As the work is being pressed between, coated and fed forward by the rolls **22** and **24**, its thin margin is continuously forced against the edge of the knife and cut off, falling upon a curved deflecting extension **212** (Fig. 7) of the cover **100** at the inner side of the support **102**. By this extension the scrap is directed to one side of the roll **24** over the cover and falls from the apparatus. The adjustment at **204** enables the operator to determine the width of margin which shall be removed by the knife.

Assuming that there is to be applied by the apparatus a coating to such an article as a rand R for a heel (Figs. 9 and 10), said rand having a curved rear edge E and side edges *e*, *e* of comparatively slight curvature, the roll **22** for such an operation will have a slant-height, or distance along an element of the full cone from its apex to the base of the toothed work-engaged portion, less than the radius of curvature of the edge E of the rand. Under these conditions, the roll will not only feed the work in a curved path, because of the varying speed of rotation of the rolls longitudinally of the peripheries, which speed increases toward the bases, but the roll **22** will have a tendency to hold the work against the gage **120** and, due to the more effective engagement of its toothed surface, will overcome any oposite tendency of the roll **24**. The operator advances the end C of the rand over the support **104**, along the gage and between the rolls **22** and **24**, the latter roll being depressed against the action of the spring **40**. The feed-roll **22**, presenting to the transversely inclined surface of the work an engaging surface adjustable to approximately conform to it, yields upon its universal mounting J to compensate for irregularities, this movement being limited by its retaining means to a vertical direction, which will not impair the feeding action. The rands operated upon may be more or less formed initially to their final horseshoe-shape, but, as they are flexible, the difference in the peripheral speed of the conical rolls, which tends to advance the outer marginal area more rapidly than the inner, will cause no ill effects as the relatively straight entering portion *e* or the similar opposite portion passes between them. These portions merely bend under this influence. In fact, the action is beneficial, since its tendency is to bring the work more nearly to the desired form. At the rear portion E of a preformed rand, the rolls turn the work in a path generally corresponding to its curvature and hold it to the gage, without any material bending. At the opposite end *c*, the rand is ejected from the rolls. During this passage between the rolls, the applying surface of the roll **24**, cleaned of the excess of adhesive by the scraper **136**, presses upon the under surface of the rand such of said adhesive as may be contained in the roll-pockets. Depending upon the absence or presence of the groove **135** in the roll **24** and the corresponding conformity of the scraper-edge, the area operated upon by the applying surface will or will not be fully coated. When the inner portion of a rand is to be trimmed, the knife **208** is placed upon its support **102** and adjusted in the correct relation to the end of the roll **24**. The rand-edge, extending outside the end of the roll **22** and over the end of the roll **24**, is forced against the knife, and the thin portion is trimmed while the body is held firmly between the rolls.

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

1. In a coating apparatus, a receptacle for a coating substance, a coating-applying and work-supporting roll rotatable in the receptacle, and a rotatable conical feed-roll mounted for rotation and for angular movement with respect to its axis and arranged for contact with the work above the applying roll whereby said rolls may grip wedge-shaped pieces of work for varying characteristics.

2. In a coating apparatus, a receptacle for a coating substance, a coating-applying and work-supporting roll rotatable in the receptacle about a substantially horizontal axis, and a conical feed-roll rotatable about an axis inclined to the horizontal and angularly adjustable with respect to said axis and arranged for contact with the work above the applying roll.

3. In a coating apparatus, a receptacle for a coating substance, a conical coating-applying and work-supporting roll having a work-contacting surface with a relatively slight taper between its ends and rotatable in the receptacle about a substantially horizontal axis, and a conical feed-roll hving a relatively great taper, said feed-roll being rotatable about an axis inclined to the horizontal and arranged for contact with the work above the applying roll.

4. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement

upon the member, means for limiting the movement of the roll upon the driving member to tilting about a substantially fixed axis, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

5. In a coating apparatus, a rotatable coating-applying roll, a rotatable driving member, a feed-roll tiltably mounted upon the driving member and co-operating with the applying roll, and means for limiting the tilting movement of the feed-roll upon the driving member to tilting toward and from the applying roll.

6. In a coating apparatus, a rotatable coating-applying roll, a rotatable driving member, a feed-roll tiltably mounted upon the driving member and co-operating with the applying roll, and means contacting with the feed-roll and maintained against rotation therewith for limiting the tilting movement of said feed-roll upon the driving member to tilting toward and from the applying roll.

7. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, yieldable means for limiting the tilting movement of the roll upon the driving member to tilting about a substantially fixed axis, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

8. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, means for limiting the tilting movement of the roll upon the driving member to tilting about a substantially fixed axis, said means exerting upon the member a force tending to maintain the axis of the roll in a definite normal angular position, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

9. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, means for limiting the tilting movement of the roll upon the driving member to tilting about a substantially fixed axis, other means contacting with the roll and maintained against rotation therewith for similarly limiting its tilting, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

10. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, means arranged to vary the normal position of the roll upon the driving member, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

11. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, yieldable means arranged to vary the normal position of the roll upon the driving member, a rotatable roll co-operating ing with the universally mounted roll, and means for supplying a coating substance for application to the work.

12. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, means arranged to vary the normal angular relation between the axes of the roll and driving member, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

13. In a coating apparatus, a rotatable driving member, a roll mounted for universal movement upon the member, means for limiting the tilting movement of the roll upon the driving member to tilting about a substantially fixed axis, means arranged to adjust the limiting means and thereby vary the normal angular position of the roll, a rotatable roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

14. In a coating apparatus, a rotatable coating-applying roll, a rotatable driving member, a feed-roll tiltably mounted upon the driving member and co-operating with the applying roll, means for limiting the tilting movement of the feed-roll upon the driving member to tilting toward and from the applying roll, and means arranged to vary the normal angular position of the feed-roll upon the driving member.

15. In a coating apparatus, a driving shaft, a work-engaging roll, a universal joint connecting the roll and shaft, means engaging the roll to limit its tilting upon the shaft to a definite direction, a work-engaging roll co-operating with the tilting roll, and means for supplying a coating substance for application to the work.

16. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, and means engaging one extremity of the feed-roll to limit its tilting upon the shaft to a definite direction.

17. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, and a spring attached to the frame and engaging the feed-roll.

18. In a coating apparatus, a driving shaft, a work-engaging roll, a universal joint connecting the roll and shaft, a spring fixed at one extremity relatively to the roll and divided to engage opposite sides of said roll, a work-engaging roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

19. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, a spring attached to the frame and engaging the feed-roll, and means arranged to vary the angle at which the spring engages said roll.

20. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, a spring attached to the frame and engaging the feed-roll, and means arranged to vary the pressure of the spring upon the roll.

21. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, a spring attached to the frame and engaging the feed-roll, means arranged to vary the angle at which the spring engages said roll, and means arranged to vary the pressure of the spring upon the roll.

22. In a coating apparatus, a driving shaft, a

work-engaging roll, a universal joint connecting the roll and shaft, a spring secured at one extremity relatively to the roll and at its opposite extremity engaging said roll, means arranged to vary the angle at which the spring is secured, a work-engaging roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

23. In a coating apparatus, a driving shaft, a work-engaging roll, a universal joint connecting the roll and shaft, a spring secured at one extremity relatively to the roll and at its opposite extremity engaging said roll, means arranged to vary the angle at which the spring is secured, means arranged to adjust the spring bodily toward and from the roll, a work-engaging roll co-operating with the universally mounted roll, and means for supplying a coating substance for application to the work.

24. In a coating apparatus, a receptacle for a coating substance, a coating-applying roll movable therein, a shaft journaled above the receptacle, and a conical feed-roll mounted to gyrate upon the shaft and co-operating with the applying roll.

25. In a coating apparatus, a receptacle for a coating substance, a coating-applying roll movable therein, a shaft journaled above the receptacle, a conical feed-roll mounted to gyrate upon the shaft and co-operating with the applying roll, and a leaf-spring secured at one extremity relatively to the feed-roll and at the opposite extremity engaging said roll.

26. In a coating apparatus, a frame, a receptacle for a coating substance carried by the frame, a coating-applying roll rotatable in the receptacle, a shaft journaled in the frame above the receptacle, a conical feed-roll mounted to gyrate upon the shaft and co-operating with the applying roll, a bracket adjustable upon the frame, and a spring adjustable upon the bracket and engaging the feed-roll.

27. In a coating apparatus, a frame, a receptacle for a coating substance carried by the frame, a coating-applying roll rotatable in the receptacle, a shaft journaled in the frame above the receptacle, a conical feed-roll mounted to gyrate upon the shaft and co-operating with the applying roll, a bracket having a curved portion, and a leaf-spring variable in position upon the curved portion and engaging the feed-roll.

28. In a coating apparatus, a frame, a receptacle for a coating substance carried by the frame, a coating-applying roll rotatable in the receptacle, a shaft journaled in the frame above the receptacle, a conical feed-roll mounted to gyrate upon the shaft and co-operating with the applying roll, a bracket having a curved portion, a leaf-spring variable in position upon the curved portion and engaging the feed-roll, and means arranged to vary the relation of the bracket to said feed-roll.

29. In a coating apparatus, a driving shaft, a work-engaging roll, a universal joint connecting the roll and shaft, a retaining member for the work-engaging roll contacting and free to tilt with said roll, means for holding the member against rotation with the work-engaging roll, a work-engaging roll co-operating with the tilting roll, and means for supplying a coating substance for application to the work.

30. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, and a retaining member contacting with the end of the feed-roll and extending between portions of the frame.

31. In a coating apparatus, a frame, a coating-applying roll rotatable thereon, a driving shaft journaled in the frame, a feed-roll co-operating with the applying roll, a universal joint connecting the feed-roll and shaft, a spring attached to the frame and engaging the feed-roll, and a retaining member contacting with the end of the feed-roll and held against rotation by engagement with the frame.

32. In a coating apparatus, lower and upper rotatable work-engaging rolls, a receptacle for a coating substance in which the lower roll operates, and a work-support inclined upwardly from the edge of the receptacle at the incoming side of the rolls and extending in proximity to the bite of the rolls.

33. In a coating aparatus, lower and upper rotatable work-engaging rolls, a receptacle for a coating substance in which the lower roll operates, a work-support curved upwardly from the edge of the receptacle at the incoming side of the rolls and extending in proximity to the bite of the rolls, and means arranged to vary the relation of the support to the rolls.

34. In a coating apparatus, lower and upper rotatable work-engaging rolls, a receptacle for a coating substance in which the lower roll operates, a work-support inclined upwardly from the edge of the receptacle at the incoming side of the rolls and extending in proximity to the bite of the rolls, there being a gage-surface for contact with the work rising from the support at one extremity of the rolls, and means arranged to vary the relation of the support to the rolls.

35. In a coating apparatus, lower and upper rotatable work-engaging rolls, a receptacle for a coating substance in which the lower roll operates, a work-support curved upwardly from the edge of the receptacle at the incoming side of the rolls and extending in proximity to the bite of the rolls, there being a gage for contact with the work rising from the support at one extremity of the rolls, means arranged to vary the position of the gage upon the support, and means arranged to vary the relation of the support to the rolls.

36. In a coating apparatus, lower and upper rotatable work-engaging rolls, a receptacle for a coating substance in which the lower roll operates, a work-support inclined upwardly from the edge of the receptacle at the incoming side of the rolls and extending in proximity to the bite of the rolls, and a cover for the receptacle extending rearwardly from the rolls at their outgoing side.

37. In a coating apparatus, a rotatable coating-applying roll, a support pivoted adjacent to the roll, a scraper for the roll carried by the support and adjustable with respect to the support in a plurality of planes, and means acting upon the support and arranged to force the scraper toward the roll.

38. In a coating apparatus, a rotatable coating-applying roll, a support movably mounted adjacent to the roll, a carrier variable in position upon the support, a scraper for the roll secured to the carrier, and means acting upon the support to move it and arranged thereby to force the scraper toward the roll.

39. In a coating apparatus, a rotatable coating-applying roll, a support movably mounted ad-

jacent to the roll, a carrier variable in position upon the support along the face of the roll, a scraper secured to the carrier and extending in proximity to the peripheral applying surface of the roll and to the ends of said roll, and means acting upon the support and arranged to force the scraper toward the roll.

40. In a coating apparatus, a rotatable coating-applying roll, a support movably mounted adjacent to the roll, a carrier variable in position upon the support transversely of the face of the roll, a scraper for the roll variable in position upon the carrier toward and from said roll, and means acting upon the support to move it and arranged thereby to force the scraper toward the roll.

41. In a coating apparatus, a rotatable coating-applying roll, a holder pivoted adjacent to the roll and having an opening, a rod adjustable through the opening, and a plate mounted upon the rod and extending in proximity to the applying surface of the roll, there being a slot-and-screw connection between the plate and rod.

42. In a coating apparatus, a receptacle for a coating substance, a coating-applying member operating in the receptacle, a container for a coating substance arranged to deliver to the receptacle by barometric feed, and means arranged to adjust simultaneously the height of the container and the vertical relation of the receptacle to the roll.

43. In a coating apparatus, a receptacle for a coating substance, a coating-applying member operating in the receptacle, a container for a coating substance arranged to deliver to the receptacle by barometric feed, means arranged to adjust simultaneously the height of the container and the vertical relation of the receptacle to the roll, and means independent of said adjusting means for varying the vertical position of the receptacle.

44. In a coating apparatus, a support, a holder mounted upon the support and arranged to receive a container for a coating substance, means arranged to vary the position of the holder upon the support, a receptacle carried by the holder, and a coating-applying roll rotatable upon the support and operating in the receptacle.

45. In a coating apparatus, a support, a holder mounted upon the support and arranged to receive a container for a coating substance, means arranged to vary the position of the holder upon the support, a receptacle carried by the holder, means arranged to vary the position of the receptacle upon the holder, and a coating-applying roll rotatable upon the support and operating in the receptacle.

46. In a coating apparatus, a frame, a holder movable upon the frame and arranged to receive a container for a coating substance, a screw rotatable in the frame and threaded into the holder constructed and arranged to raise or lower the holder upon rotation of the screw, a receptacle carried by the holder, and a coating-applying member operating in the receptacle

47. In a coating apparatus, a frame, a holder movable upon the frame and arranged to receive a container for a coating substance, a screw rotatable in the frame and threaded into the holder, a receptacle carried by the holder, means arranged to vary the vertical position of the receptacle upon the holder, and a rotatable coating-applying roll operating in the receptacle.

48. In a coating apparatus, a coating-applying member, a receptacle in which the member operates, a holder associated with the receptacle, a container provided with a threaded neck and seated in the holder, a casing situated within the container-neck and having a threaded flange engaging said neck, said casing being provided at its inner extremity with a seat, and a valve co-operating with the seat and having a stem extending through the casing for contact with the bottom of the receptacle.

49. In a coating apparatus, a coating-applying member, a receptacle in which the member operates, a holder associated with the receptacle, a container seated in the holder and provided with a neck threaded upon its exterior, a casing situated within the container neck and having a threaded flange engaging the neck-thread, said casing being provided at its inner extremity with a seat and at its outer extremity with a cross-bar, and a valve co-operating with the seat and having a stem guided in the cross-bar for contact with the bottom of the receptacle.

50. In a coating apparatus, a rotatable coating-applying roll, a receptacle in which the roll operates, a holder associated with the receptacle, a container seated in the holder and provided with a neck threaded upon its exterior, a casing situated within the container-neck and having a threaded flange engaging the neck-thread, said casing being provided at its inner extremity with a seat and at its outer extremity with a cross-bar, a valve co-operating with the seat and having a stem guided in the cross-bar for contact with the bottom of the receptacle, and a spring surrounding the stem and confined between the bar and the lower end of said stem.

51. In an apparatus for coating surfaces of articles, rolls constructed and arranged to advance articles in a curved path, and means for supplying a coating substance to one of the rolls, there being means for preventing the application of the substance by said roll to the surface operated upon over an area separated by a coated area from the edge of the work.

52. In an apparatus for coating surfaces of articles having curved peripheries, rolls constructed and arranged to move an article in a curved path, and means for supplying a coating substance to one of the rolls, there being means for preventing the application of the substance to the surface operated upon over a narrow band of said surface corresponding in curvature to the periphery of the article.

53. In an apparatus for coating the surfaces of heel-portions, a coating-applying roll having a groove in its applying surface, means for supplying a coating substance to the applying surface, means for removing said substance from the groove of the applying roll, and a conical feed-roll co-operating with the applying roll.

54. In an apparatus for coating the surfaces of heel-portions, a co-operating coating-applying roll and conical feed-roll, a gage at one extremity of the rolls toward which said rolls urge the heel-portions during the coating, the applying roll having a groove in the end of its applying surface near the gage, and a scraper arranged to remove the coating substance from the groove.

55. In a coating apparatus, co-operating coating-applying and feed-rolls gripping an interposed piece of work, means for rotating the rolls, and a cutter at the ends of the rolls and separate therefrom with a cutting edge extending radially of one roll and acting upon the edge of the coated work which overhangs the end of one roll.

56. In a coating apparatus, co-operating coat-

ing-applying and feed-rolls gripping the work, means for rotating the rolls, a cutter adjacent the gripping point of the rolls and acting to trim off that margin of the coated work which projects beyond an end of one of the rolls while it is gripped thereby, and means arranged to vary the relation of the cutter to the path of the work.

57. In a coating apparatus, co-operating coating-applying and feed-rolls, means for rotating the rolls, and a knife lying against the end of one of the rolls and extending into the path of the work to trim the edge of the work substantially at the point of application of the coating.

58. In a coating apparatus, co-operating coating-applying and feed-rolls, means for rotating the rolls, a relatively fixed knife supported in proximity to the end of one of the rolls and extending into the path of the edge of the work which overhangs the roll end, and means arranged to vary the relation of the knife to said roll.

59. In a coating apparatus, means for advancing work in a curved path lying in substantially a single plane and applying a coating thereto, and means arranged to trim a curved edge of the work as it is coated.

60. In an apparatus for coating beveled rands, means for advancing a rand and for applying a coating thereto, and means associated with the advancing and applying means for trimming the thin edge of the rand.

61. In an apparatus for operating upon articles having curved peripheries, co-operating conical rolls, means for rotating the rolls, and article-trimming means co-operating with the smaller extremities of the rolls.

62. In an apparatus for trimming beveled rands, co-operating frusto-conical rolls, means for rotating the rolls, and a trimming knife arranged in proximity to the smaller end of one of the rolls.

63. In an apparatus for coating and trimming rands, a conical coating-applying roll, a conical feed-roll co-operating therewith, means for rotating the rolls, and a rand-trimming knife co-operating with the smaller extremity of the applying roll.

64. In a coating apparatus, a receptacle for a coating substance, a coating applying roll operating in the receptacle, a cover for the receptacle extending in proximity to the roll, and a trimming knife mounted upon the cover.

65. In a coating apparatus, a receptacle for a coating substance, a coating-applying roll operating in the receptacle, a cover for the receptacle extending in proximity to the roll, a trimming knife mounted upon the cover, and means arranged to vary the position of the knife upon the cover.

66. In a coating apparatus, cooperating rolls for coating and feeding a shoe part, and a cutter separate from the rolls adjacent to the ends thereof and acting upon the shoe part throughout substantially its entire length to trim the shoe part substantially simultaneously with the coating operation.

67. In a coating apparatus, a driven shaft, a frusto-conical work-supporting roll mounted at the end of said shaft with its smaller end outward from the major portion of the shaft, a shaft the axis of which is inclined to the vertical and intersects the axis of the other shaft, a frusto-conical work-engaging roll above the first roll and mounted on the lower end of said inclined shaft, said latter roll having its smaller portion outward from the major portion of the shaft, means for supplying coating material to one of said rolls, and means for urging one of said rolls toward the other roll, thereby to grip a piece of work interposed between the rolls.

68. In a coating apparatus, superposed frusto-conical work-engaging rolls, means for supplying coating substance to one of said rolls, a work gage mounted inwardly of said rolls adjacent to the larger end of each roll, a driven shaft inclined to the vertical upon which the upper of said rolls is supported, a substantially horizontal shaft upon which said coating roll is mounted, the axes of said shafts intersecting each other, and driving means interconnecting said roll shaft and said horizontal shaft arranged to rotate the portions of the rolls on the work-entering side toward each other thereby to carry a piece of work having a convex periphery substantially automatically through the machine and to hold it in engagement with the edge gage.

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