Jan. 24, 1939. F. E. HOOPER 2,144,722

APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

Filed Sept. 10, 1937 8 Sheets-Sheet 1

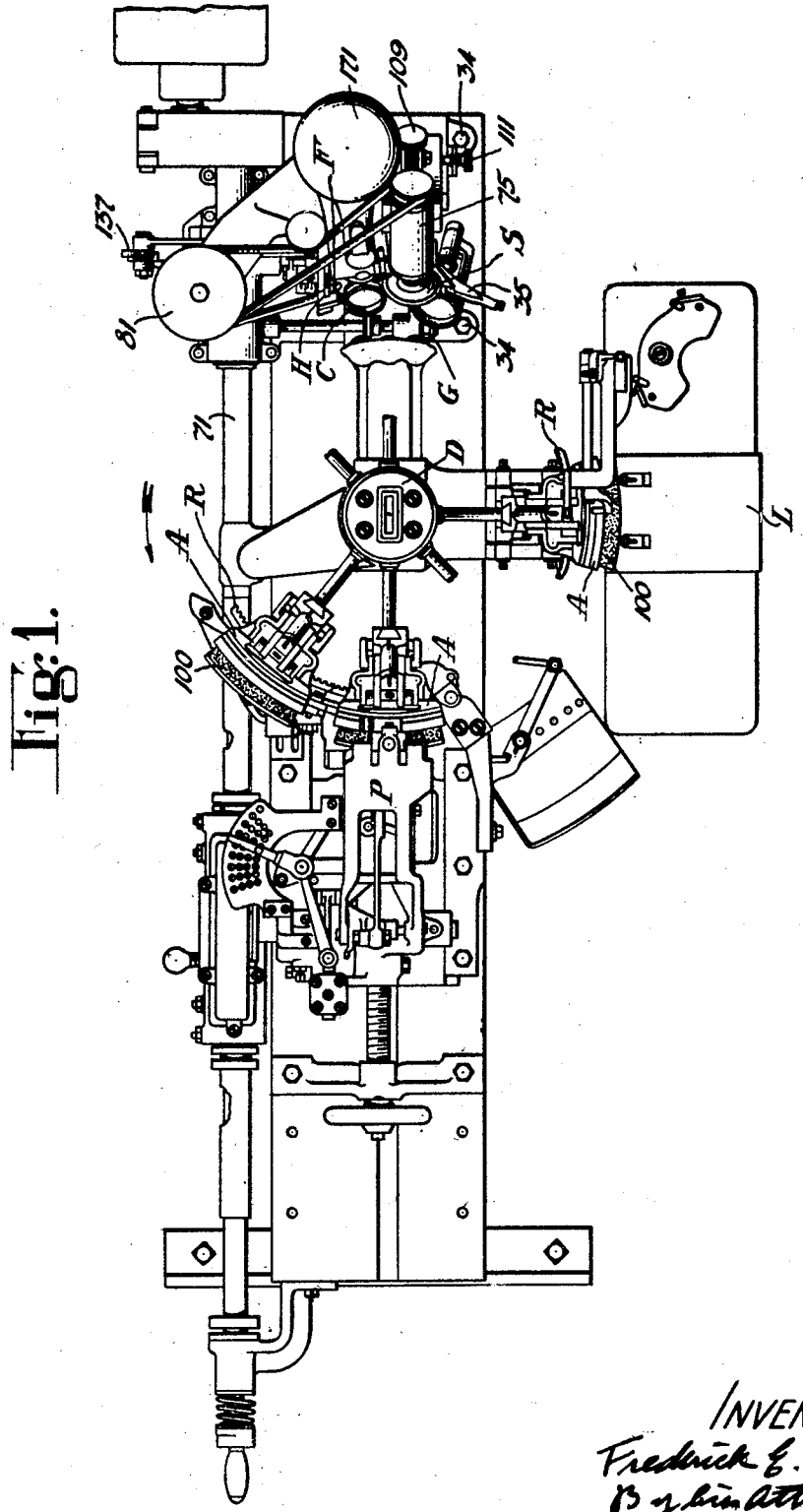


Fig. 1.

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APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

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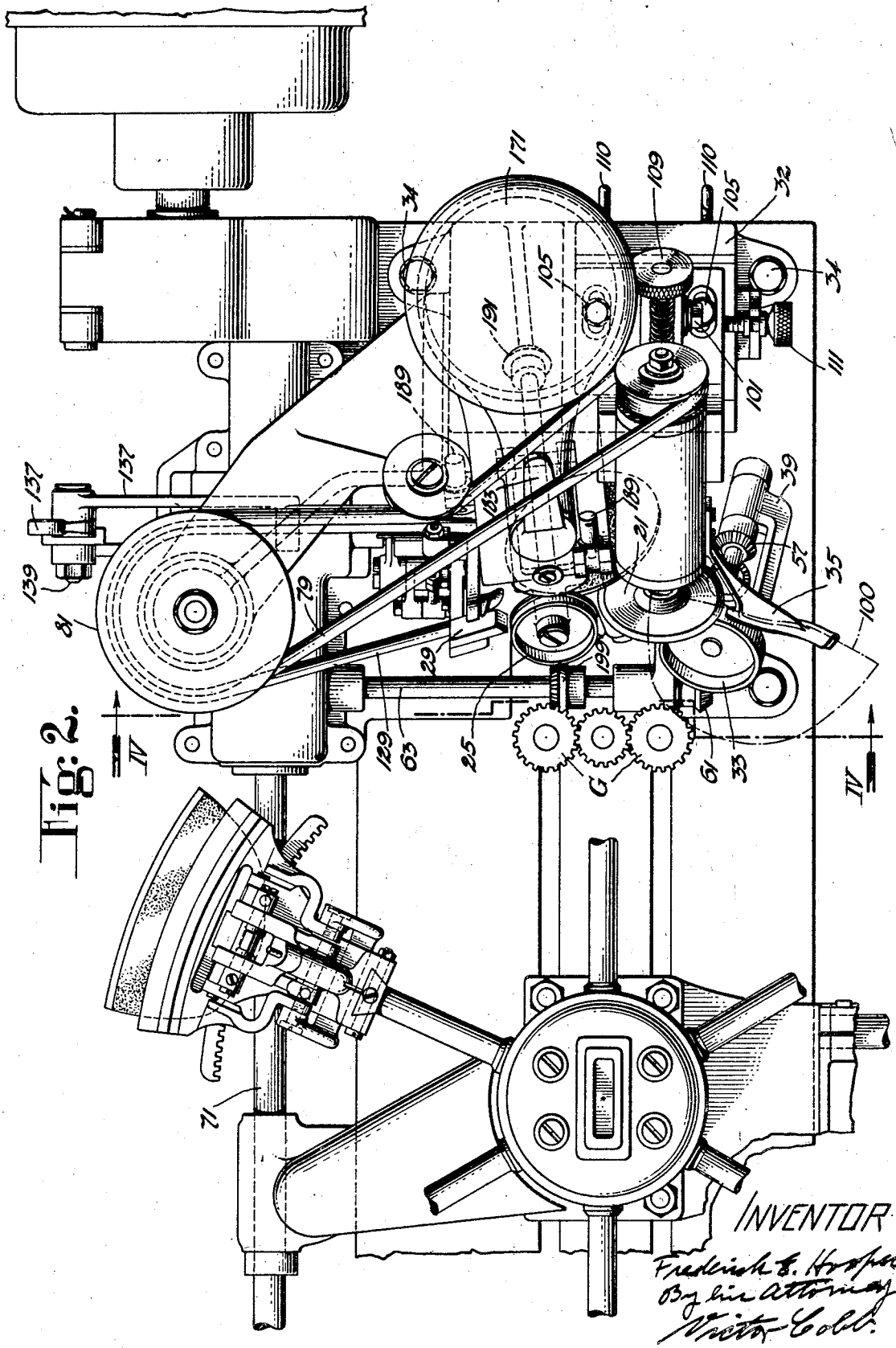


Fig. 2.

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APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

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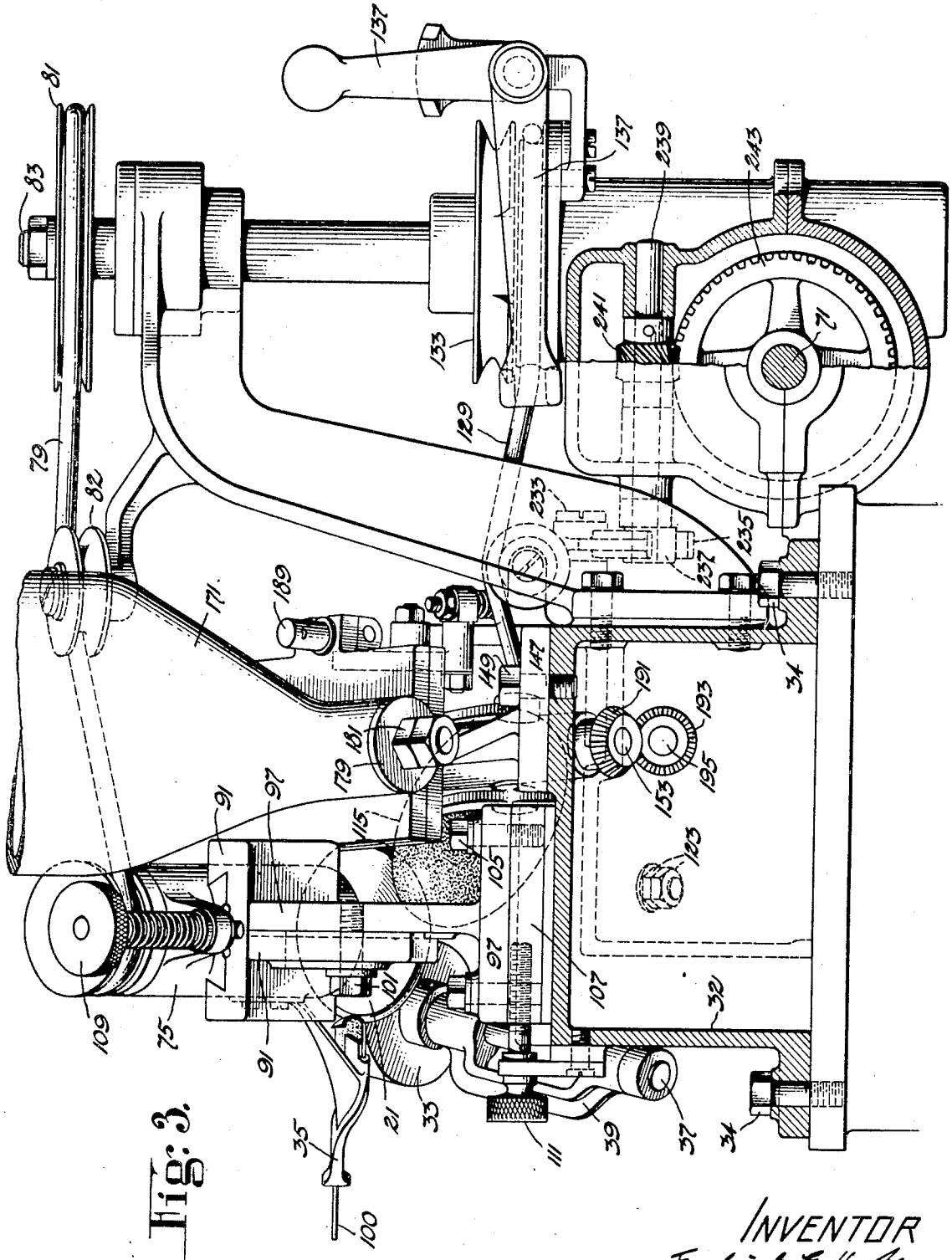


Fig. 3.

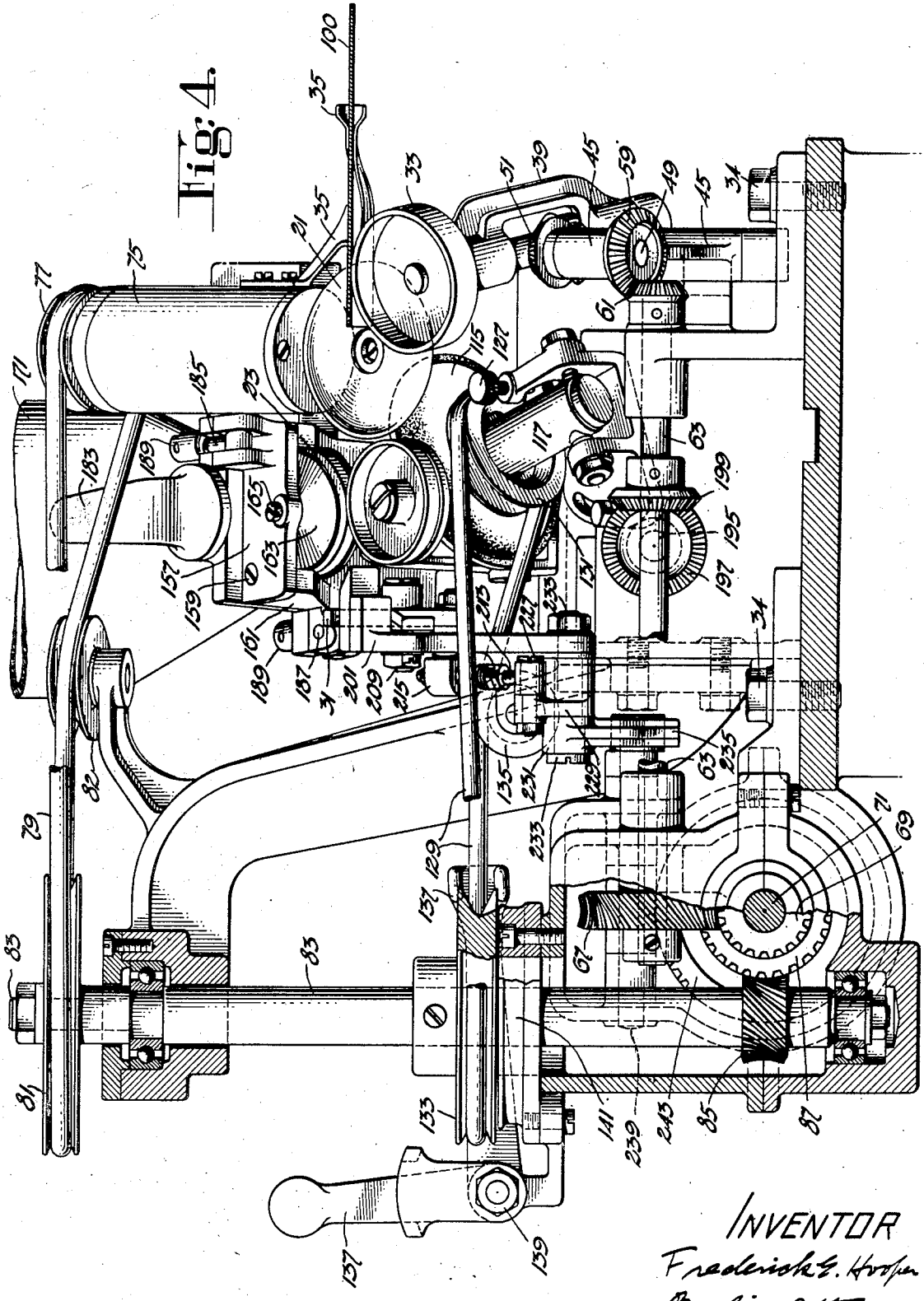
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Jan. 24, 1939. F. E. HOOPER 2,144,722

APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

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Fig. 4.



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APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

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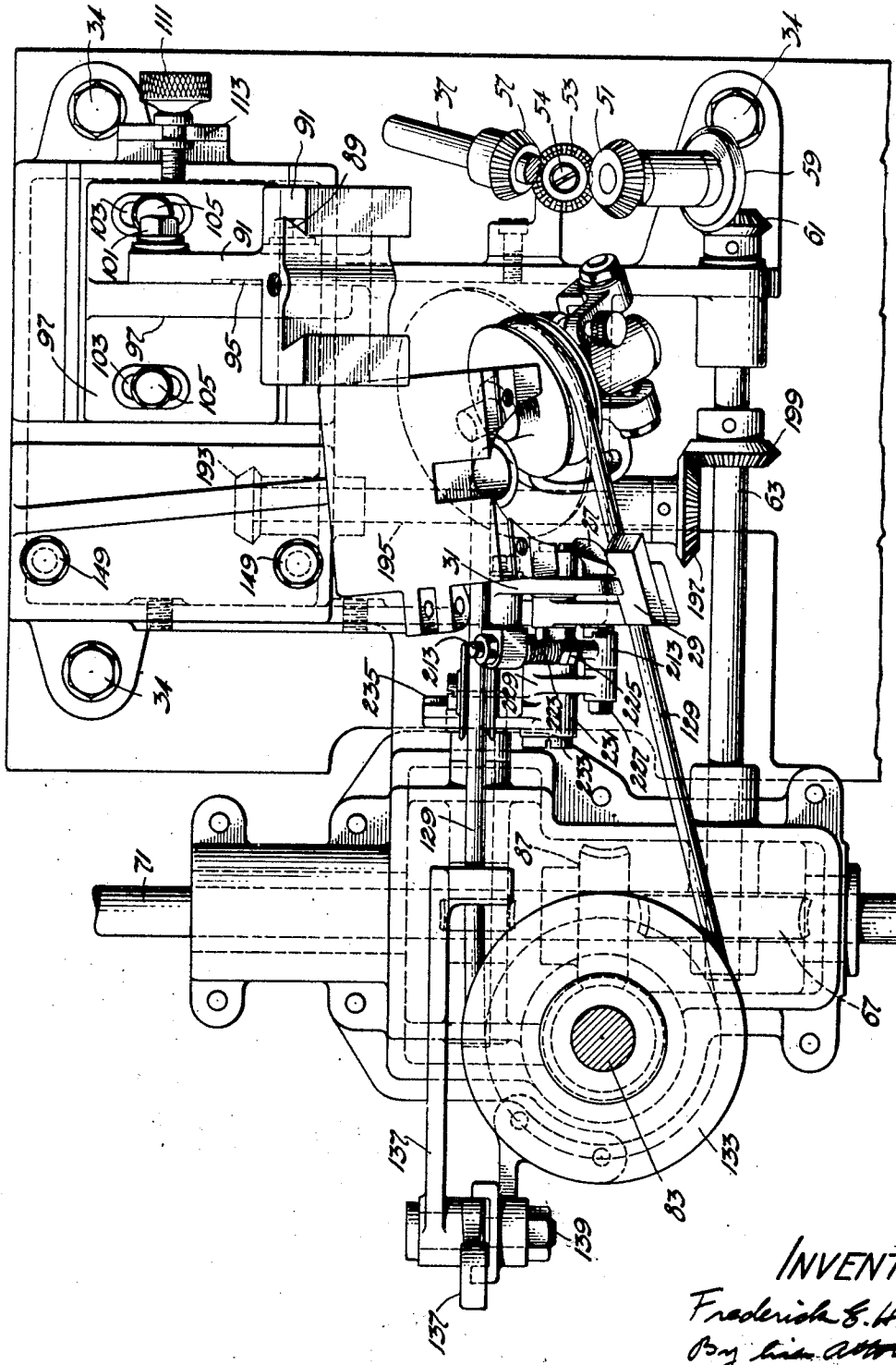


Fig. 5.

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APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

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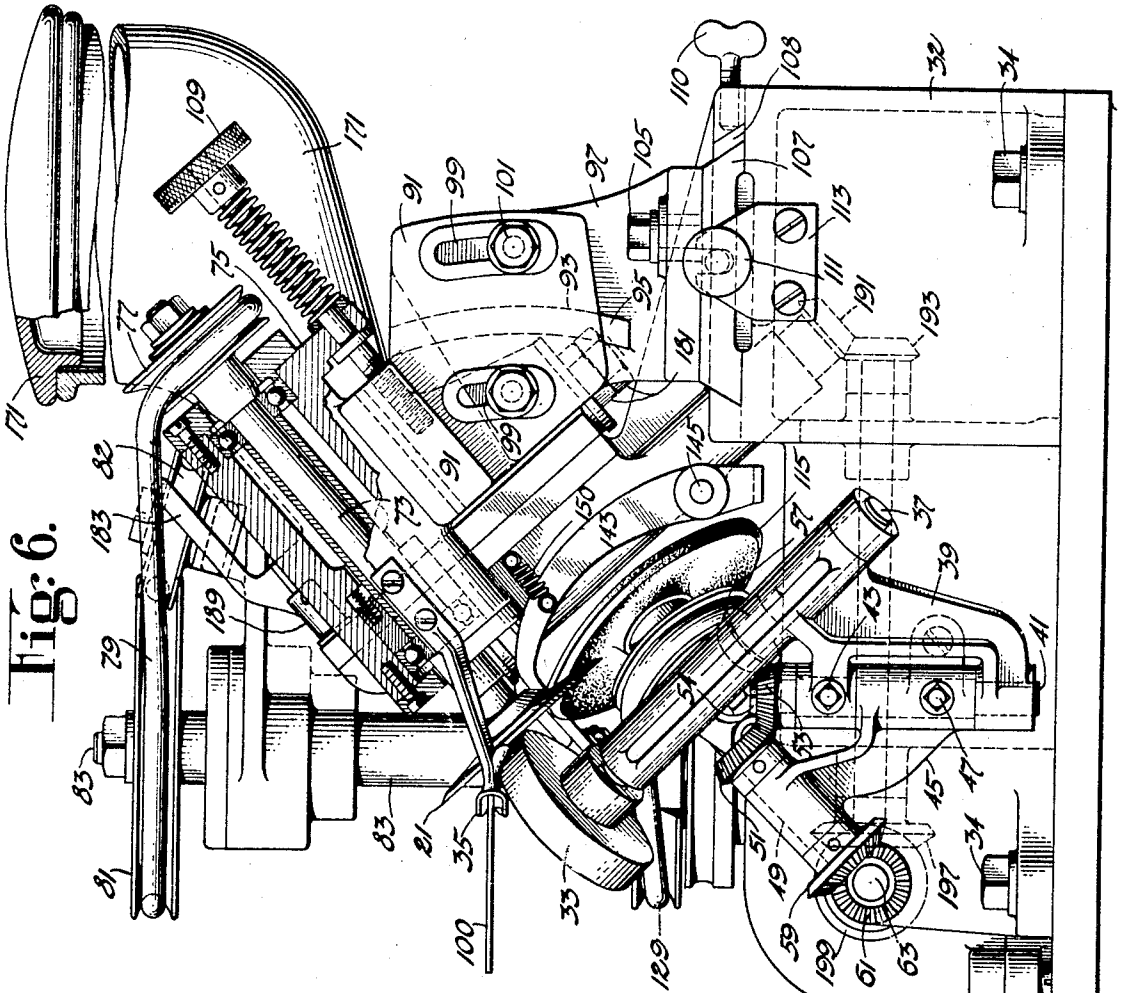


Fig. 6.

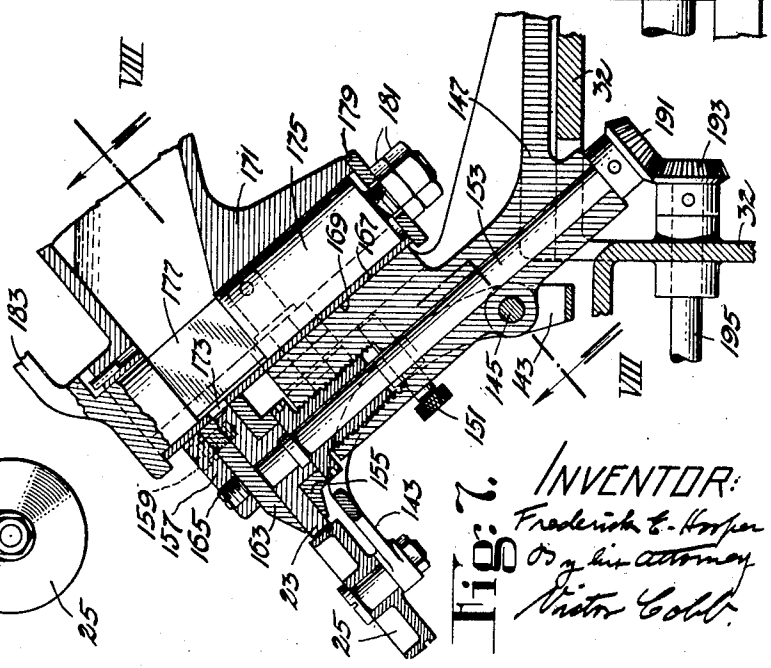


Fig. 7.

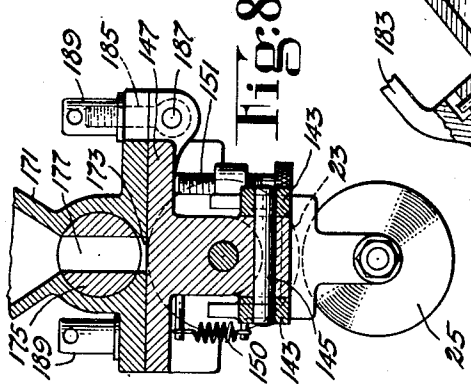


Fig. 8.

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APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

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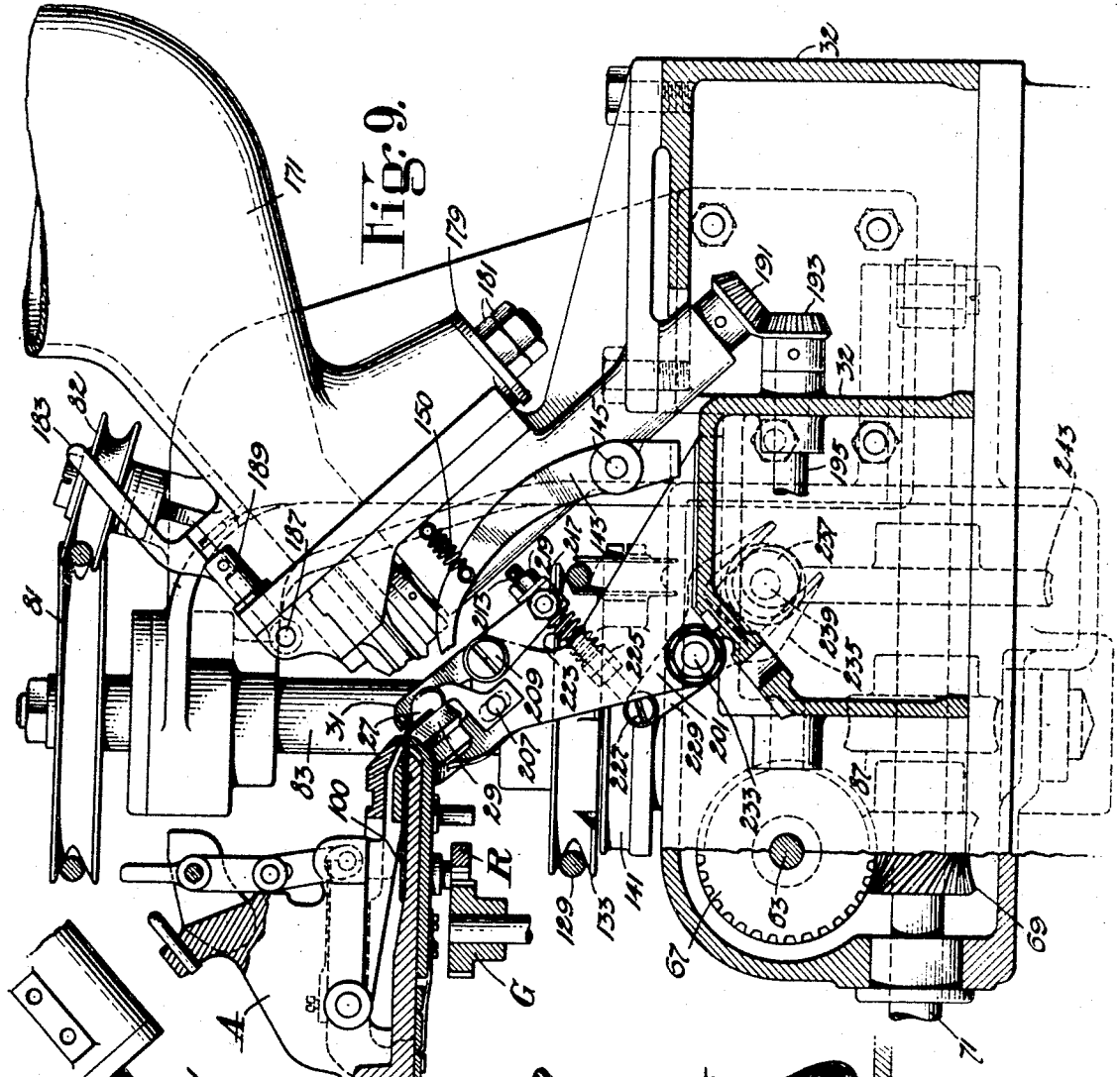


Fig. 9.

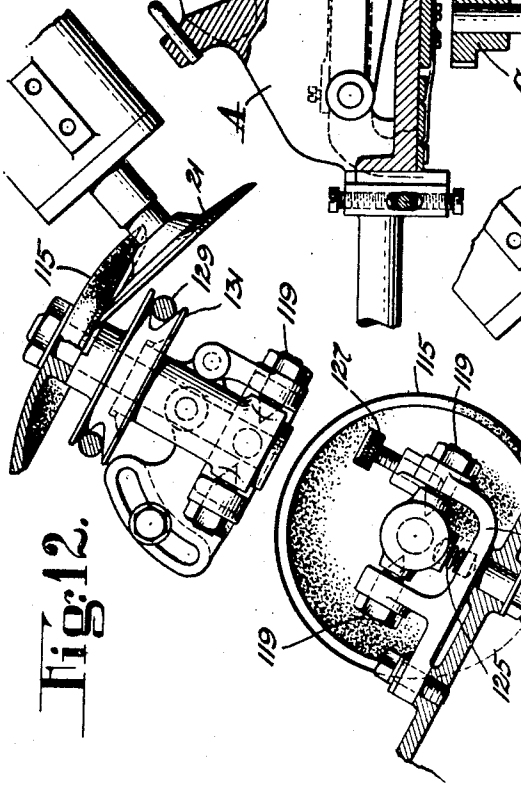


Fig. 12.

Fig. 11.

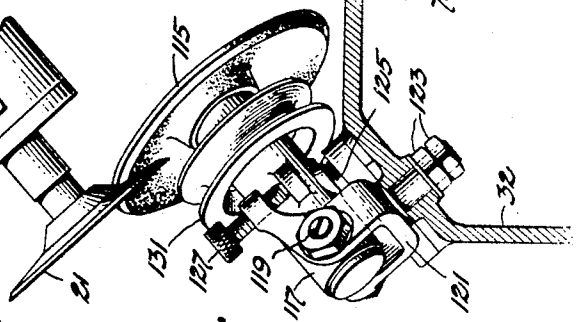


Fig. 10.

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APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

Filed Sept. 10, 1937 8 Sheets-Sheet 8

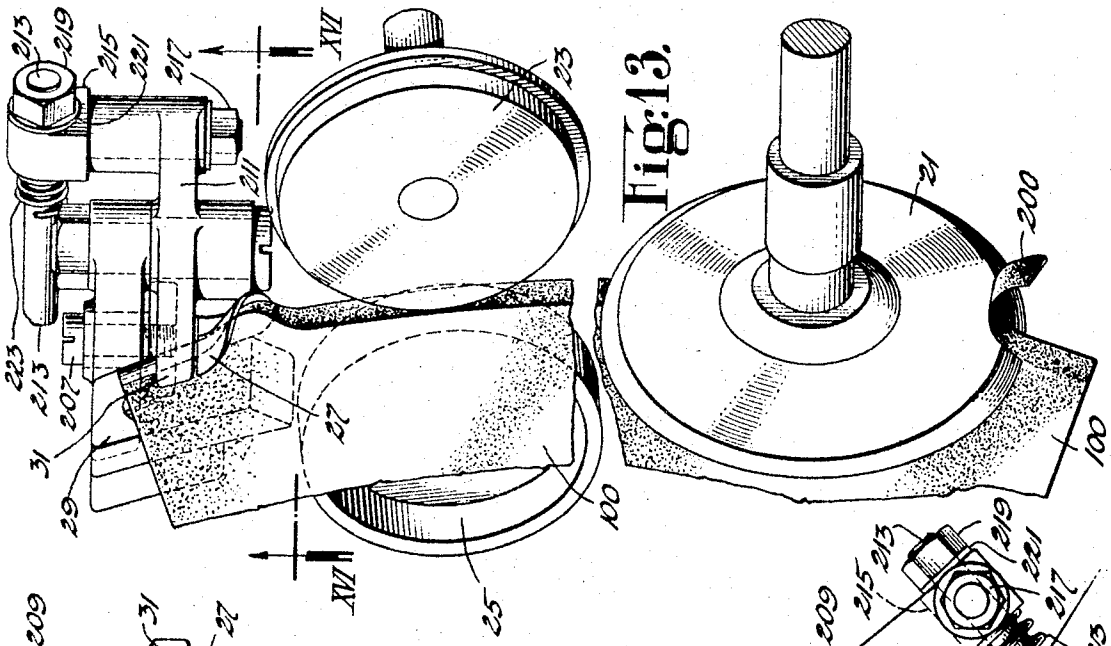


Fig:13.

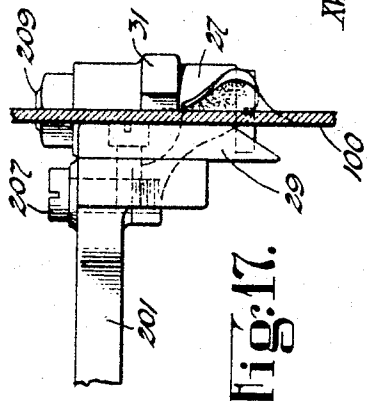


Fig:17.

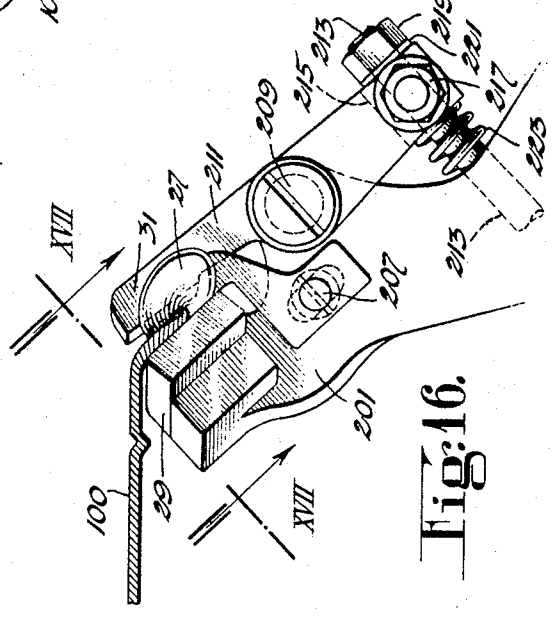


Fig:16.

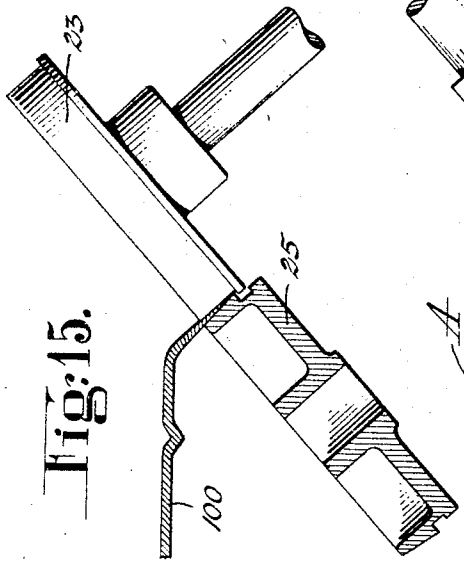


Fig:15.

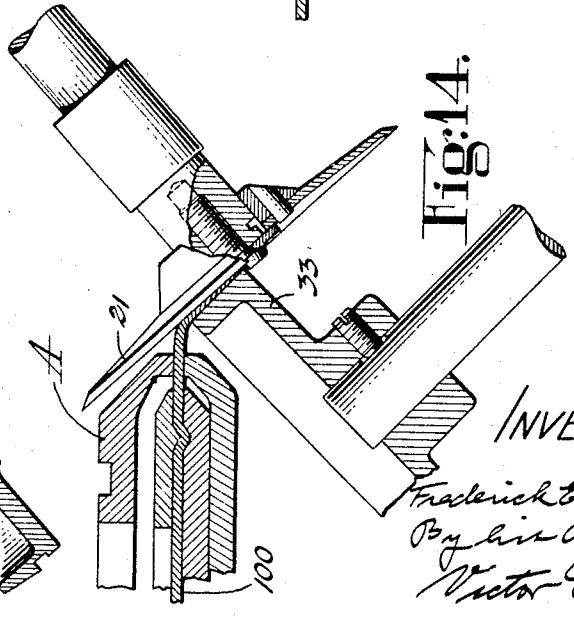


Fig:14.

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Patented Jan. 24, 1939

2,144,722

UNITED STATES PATENT OFFICE

2,144,722

APPARATUS FOR OPERATING UPON PARTS OF SHOE UPPERS

Frederick E. Hooper, Marblehead, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application September 10, 1937, Serial No. 163,266

14 Claims. (Cl. 12—51)

This invention relates to an apparatus for operating upon blanks of sheet material and is herein illustrated as embodied in an apparatus designed particularly for operation upon the rear margins of toe tip blanks which are to be incorporated in boots and shoes.

In certain classes of shoes, notably in the finer grades, the rear edges of the toe tips are commonly finished by skiving the rear margins on the flesh side of the tip, applying cement to the skived margins, folding these margins and pressing the fold. In this way the rear edges of the toe tips, which are the only edges exposed in the finished shoe, are given an extremely attractive appearance. Commonly too, a row of ornamental perforations is provided along the finished edge of each tip.

In order to speed up the production of these and similar articles, the general object of the invention is to provide an apparatus in which the margin of a blank is presented and fed past one or more of a plurality of mechanisms designed to skive the margin of the blank, to apply cement to the skived margin, to fold the cement-coated margin, to press the fold and to form perforations in the blank. In the illustrated apparatus the blanks are clamped between the jaws of carriers with the rear margins of the blanks projecting from the jaws; the carriers are caused to revolve in a circular path the plane of which is horizontal and coincides with the planes of the toe tips, and along this path are located mechanisms for performing upon the projecting margins of the toe tip blanks the operations named above.

Referring now to the accompanying drawings,

Fig. 1 is a plan of an apparatus in which the present invention is embodied;

Fig. 2 is a plan of a portion of the apparatus showing more particularly the skiving, cementing, folding and fold pressing mechanisms;

Fig. 3 is a view principally in end elevation looking from the right of Fig. 1, certain parts being shown in section;

Fig. 4 is a vertical section on the line IV—IV of Fig. 2, the gears which drive the tip carriers being omitted;

Fig. 5 is a plan view of a portion of the apparatus with the skiving mechanism and the cementing mechanism removed;

Fig. 6 is a view, partly in front elevation and partly in section, showing more particularly the skiving mechanism;

Fig. 7 is a vertical longitudinal section of the cementing mechanism;

Fig. 8 is a section on the line VIII—VIII of Fig. 7;

Fig. 9 is a view, partly in section and partly in elevation, showing more particularly the folding and the hammering or fold pressing mechanism;

Fig. 10 is a perspective of the knife grinding mechanism;

Fig. 11 is an end view of the grinding mechanism, the driving pulley having been removed;

Fig. 12 is a perspective of the knife grinding mechanism taken at a different angle from that of Fig. 10;

Fig. 13 is a plan of parts of the skiving mechanism, the cementing mechanism, the folding mechanism and the fold pressing mechanism, a piece of work being shown in process of being operated upon;

Fig. 14 is a detail, principally in section, of the skiving mechanism showing the formation of a comparatively wide scarf of gradual inclination suitable for subsequent folding;

Fig. 15 is a detail, partly in section and partly in elevation, of the cementing mechanism;

Fig. 16 is a section on the line XVI—XVI of Fig. 13, and

Fig. 17 is an end view of the folding and fold pressing mechanism looking in the direction of the arrows in Fig. 16, the toe tip being in section on the line XVII—XVII.

The illustrated apparatus in its general arrangement is similar to that disclosed in United States Letters Patent No. 1,989,682, granted February 5, 1935, on an application filed in the name of John B. Coffey, in that the toe tips are clamped by jaws of carriers moved in a circular path along which are located mechanisms for operating successively upon the margins of the toe tips. Referring to Fig. 1, the tip carriers A, as in the patented machine, are rotated by friction driving means about a vertical post the axis of which contains the center of curvature of the outer edges of the rear margins of the toe tips 100, said toe tips being so held that they project from the jaws of the carriers. Each tip carrier is brought to rest with the jaws open at a loading station L where it is supplied with a toe tip by the operator who then depresses a treadle whereupon the jaws close upon the toe tip, and the carrier makes a complete revolution. During parts of this revolution it is driven by the friction driving means but at such times as it is feeding a toe tip past an operating mechanism it is positively driven by gears G which engage a segmental rack R fast to the carrier. After the last operation has been completed the

jaws of the clamp are opened, and, as has been stated, the carrier comes to rest at the loading station ready to receive another toe tip. The radii of curvature of toe tips vary according to size and style from 8 inches up to 20 inches or more, and it is necessary to fit and adjust the machine for the particular radius of curvature of the rear edges of the toe tips which are to be operated upon in any given instance. To this end, the carrier sustaining and driving mechanism D including the vertical post about which the carriers are rotated, and the perforating mechanism P are adjusted to the right or left, as viewed in Fig. 1, as may be necessary, and the radius arms at the outer ends on which the tip carriers are mounted are removed and replaced by shorter or longer arms. The work table at the loading station L is adjusted to the right or left with the carrier driving mechanism and is also adjusted toward or from the axis about which the tip carriers rotate. In the patented machine the rear edges of the toe tips are finished prior to the perforating operation by skiving their edges on an abrupt bevel and then subjecting said edges to a shrinking heat on the skived side (usually the flesh side) in such manner as to cause the unshrunken side (usually the grain side) to curl toward the shrunken side. In the present machine the rear edges of the toe tips are finished prior to the perforating operation by skiving their margins on a gradual bevel, then applying cement to the skived portion, and finally folding the margin and pressing the fold. No further description of the tip carriers, the perforating mechanism and the means for operating said carriers and mechanism will be given, reference being made to the patent for details not herein shown or described.

The skiving, cementing, folding and fold pressing or hammering mechanisms are indicated, respectively, each as a whole in Fig. 1 by the letters S, C, F and H, said mechanisms being arranged successively along the right-hand part of the circular path of the carriers. Referring now to Fig. 13, the general mode of operation of these mechanisms will be described. In this figure a portion of a toe tip 100 is shown in process of being operated upon. The tip first encounters a skiving mechanism, of which only the rotating disk knife 21 is shown, said knife acting to skive the margin of the toe tip on a gradual bevel by removing a chip 200. The skived margin then passes between rolls 23, 25 the upper one of which applies a coat of cement to the skived margin of the toe tip. The skived and cemented margin then passes through a stationary folder 27 whereby the cement-coated margin is folded over; and finally the folded portion passes over an anvil 29 against which it is pressed by a hammer or fold presser 31. It will be understood that these various operations take place in close proximity to one another and that all four may be taking place at the same time upon different parts of the same toe tip. The four mechanisms are all mounted upon a hollow base 32 (Figs. 2 and 6) which is fastened to the frame of the apparatus by cap screws 34.

The skiving mechanism

The skiving mechanism (Fig. 6) comprises the rotary disk knife 21, a feed roll 33, and an edge guide 35. The feed roll is fast to the upper end of an inclined shaft 37 rotatably mounted in a bracket 39 which is angularly adjustable about an upright stud 41 and is held in adjusted angular position by a set screw 43, said stud being located in a bore in a stationary bracket 45, which is rigid with the base 32, and being held in place by a set screw 47. The bracket 45 carries an inclined bearing in which is rotatably mounted a short shaft 49 to the upper end of which is fastened a bevel gear 51 which meshes with a second bevel gear 53 rotatably mounted on the stem of a screw 54 which is threaded into the upper end of the vertical stud 41. A third bevel gear 57 fast to the shaft 37 meshes with the bevel gear 53. The inclined shaft 49 has at its lower end a bevel gear 59 which meshes with a bevel gear 61 on one end of a cross-shaft 63 mounted in bearings in the base 32, said cross-shaft having at its other end (Fig. 4) a spiral gear 67 which meshes with a spiral gear 69 on the driving shaft 71 of the apparatus, said shaft being the same as that of the machine of the patent. It will be noted that the position of the feed roll 33 may be varied by adjusting the bracket 39 around the axis of the stud 41. The purpose of this is to change the position of the roll when a lot of toe tips having a different radius of curvature are to be operated upon. In such case the principal adjustments and changes, as has been explained above, are (1) the adjustment of the carrier driving mechanism as well as the perforating mechanism to the right or left, as viewed in Fig. 1, and (2) the substitution for the radius arms at the end of which the tip carriers are mounted of short or longer arms. There still remains to be made, however, the angular adjustment of the feed roll 33 which has just been described.

The rotary disk knife 21 (Fig. 6) is fast to the lower end of an inclined shaft 73 which is rotatably mounted in ball bearings in a slide block 75, said shaft having at its upper end a pulley 77 driven by a belt 79 from a pulley 81 fast to the upper end of an upright shaft 83, the lower end of which (Fig. 4) has a spiral gear 85 meshing with a spiral gear 87 on the driving shaft 71. An idle pulley 82 guides one run of the belt 79. Returning now to Fig. 6 with occasional reference to Fig. 5, the block 75 is slidable in a path which is parallel to the axis of the knife shaft 73 in a dovetailed inclined guideway 89 formed in a casting 91 having a rearwardly projecting flange provided on one side with a segmental guideway 93 in which is received a segmental rib 95 formed on the upwardly extending flange of a bracket 97. Arcuate slots 99 extending through the flange of the casting 91, and cap screws 101 extending through the slots and threaded into the flange of the bracket 97 hold the casting 91 in adjusted angular position. The base of the bracket 97 is provided with slots 103, and cap screws 105 extending through said slots fasten the bracket 97 to a dovetailed slide 107 (Fig. 6) which is fitted into a dovetailed guideway in the base 32. A gib 108 of hardened steel held in place by thumb screws 110 forms one wall of the dovetailed guideway. With the construction described above various adjustments of the knife are possible. The knife may be adjusted up and down in an inclined path parallel to its shaft 73 by turning a screw 109 which is held from longitudinal movement with respect to the block 75 and is threaded into the casting 91. The knife may be tilted angularly approximately about an axis which is at right angles to the axis of the knife shaft and passes through a point on the upper

inner corner of the feed roll 33, since the segmental guideway 93 and rib 95 have this point as their center of curvature. The knife may be adjusted toward or from the path of the tip carriers by loosening the cap screws 105 and sliding the bracket 97 on the dovetailed slide 107. And finally the knife may be adjusted forward and back substantially in the line of feed movement of the work by turning a thumb screw 111 which is held from longitudinal movement with respect to a stationary bracket 113 mounted on the base 32 and is threaded into the end of the dovetailed guideway 97.

In order to keep the knife sharp a grinder 115 (Figs. 4 and 10 to 12) is provided. The shaft of the grinder is rotatable in a bearing 117, that end of the bearing which is remote from the grinder being pivotally mounted on the ends of opposed pivot screws 119 carried by the arms of a yoke 121 the stem of which is received in a bore in an inclined portion of the base 32 and is held in position by nuts 123. A coiled spring 125 acts continually to urge the grinder to swing up into contact with the knife. An adjusting screw 127, threaded through an extension of one of the arms of the yoke 121 and bearing against a lug on the bearing 117, limits upward swinging movement of the grinder. The grinder is driven (Fig. 4) by a belt 129 which passes around a pulley 131 on the grinder shaft and around a pulley 133 on the upright shaft 83, an idle pulley 135 serving to guide one run of the belt. Since the grinder is used only intermittently, a belt shifter 137 pivoted at 139 is provided for shifting the belt 129 to a stationary grooved member 141 as desired.

The cementing mechanism

Referring to Figs. 6, 7 and 8, the idle supporting roll 25 of the cement applying mechanism is rotatably mounted on a cross-piece at the outer ends of the curved arms of a yoke 143 pivoted at 145 to a casting 147 which is fastened by cap screws, one of which is shown at 149 in Fig. 3, to the base 32. A tension spring 150 (Fig. 8) fast at its upper end to the casting 147 and at its lower end to one of the curved arms of the yoke 143 urges the roll 25 to swing upward as far as a stop screw 151 will permit, said screw being threaded through a boss on the yoke 143 and abutting the casting 147. The cement applying roll 23 is supplied with cement from a receptacle 171 in a manner presently to be described. This roll is fast to the upper end of an inclined shaft 153 rotatably mounted in bearings in the casting 147, said roll 23 having a small flange at its lower end which runs in a circular groove in the lower portion of the idle roll 25. In order to confine the cement to the periphery of the roll 23 and to expose only the desired portion of the periphery, this roll (Figs. 4 and 7) is mounted in the following manner. The hub of the roll is received in a socket in a disk-like plate 155 against the upper flat face of which the lower face of the roll rests. Above the roll and spaced from it is a plate 157 fastened by screws 159 to side walls 161; and located on top of the roll and beneath the plate 157 is a shield 163 having an arcuate forward edge. Threaded through the plate 157 and abutting against the upper face of the shield is a screw 165 which may be turned to hold the shield closely in contact with the upper face of the roll. The casting 147, in which the shaft of the cement applying roll 23 is mounted, has a flat inclined face 167 (Fig. 7) to which is detachably clamped the flat face 169 of the base of the cement receptacle 171, said base having an opening 173 of a width equal to the thickness of the cement applying roll 23. Located in the base of the cement receptacle is a bore which is parallel to the flat face of the base of the receptacle, and rotatably mounted in this bore is a cylindrical valve 175 having extending diametrically through it at its upper end a port 177. The valve is held from longitudinal movement in its bore by a washer 179 which closes the lower end of the bore and nuts 181 threaded upon a reduced lower end of the valve. A handle 183 on the upper end of the valve provides means for turning it. In the position of the valve shown in Figs. 7 and 8 the port 177 permits cement to flow from the receptacle to the cement applying roll 23. Turning the valve through 90° shuts off such flow, whereupon the receptacle may be removed to be cleaned if it is desired. The receptacle is clamped removably in place by eye-bolts 185 (Fig. 8) pivoted to the casting 147 at 187 and having threaded upon their upper ends thumb nuts 189, the bolts being swung up into the position shown wherein they extend through open ended slots formed in the base of the cement receptacle. To free the receptacle so that it may be removed it is necessary merely to loosen the thumb nuts 189 and swing the eye-bolts 185 down out of the open-ended slots. At the lower end of the shaft 153 of the cement applying roll is fast a bevel gear 191 which meshes with a bevel gear 193 on one end of a horizontal shaft 195 to the other end of which (Fig. 4) is fast a bevel gear 197 which meshes with a bevel gear 199 on the cross-shaft 63.

The folding and fold pressing mechanism

Referring now to Fig. 9, a toe tip 100 is shown in process of passing through the folding and fold pressing mechanism. The toe tip is held clamped between the jaws of a tip carrier A whose segmental rack R is engaged by one of the driving gears G which acts to feed the carrier past the folding and fold pressing mechanisms, the tip carrier, the segmental rack and the driving gear being like those shown in the patented apparatus. The folding and fold pressing mechanisms are mounted upon a thin flange-like casting 201 which is rigidly fastened to the base 32. This casting has integral with it the anvil 29 and has adjustably fastened to it in position to receive the projecting margin of the toe tip the folder 27, the stem of the folder having a threaded hole to receive the end of a cap screw 207 (see also Figs. 16 and 17) which passes through a slot in the thin casting 201. Pivoted to the casting 201 about the axis of a screw bolt 209 is the hammer or fold presser 31 which hammers the fold made by feeding the margin of the toe tip 100 through the curved stationary folder 27. The hammer is vibrated very rapidly by means of a rod 213 the upper end of which passes loosely through a bore in a block 215 having a stem which passes through a substantially horizontal bore in the tail of the hammer 31 and is held in place by a nut 217. The rod 213 has at its upper end a nut 219 and a washer 221. Below the tail of the hammer and encircling the rod is a coiled compression spring 223. The lower end of the spring (Figs. 5 and 9) rests upon a nut 225 threaded on the rod. By turning the nut the compression of the spring 233, and therefore the force which the hammer exerts on the folded edge of a toe tip, may be varied. The rod 213 has its lower end rotatably mounted on

the stem of a bolt 227 on which is also rotatably mounted one end of a short arm 229 the other end of which is integral with a hub 231 rotatably mounted on the stem of a stationary screw bolt 233 carried by the casting 201. Also integral with this hub is a yoke 235 which straddles an eccentric 237 on a small shaft 239, said shaft carrying a spiral gear 241 (Fig. 3) which meshes with a large spiral gear 243 on the driving shaft 71. Because of the large diameter of the spiral gear 243 with respect to that of the spiral gear 241, the hammer 31 is vibrated with a rapidity relative to the speed at which the work is fed sufficient to permit the work to be fed continuously.

The operation of the apparatus is briefly as follows: The operator stands at the loading station L, places toe tip blanks one by one in the open jaws of carriers A as they come to rest, and steps upon the treadle. As soon as this has been done in any given case, the jaws of the carrier close on the toe tip blank in such manner as to leave its margin exposed, and the carrier begins its movement in a circular path under the action of the friction driving means. As the carrier approaches and moves past the skiving, cementing and folding mechanisms, the segmental rack R of the carrier is engaged first by one of the gears G and then by the other and fed past these mechanisms, after which the friction driving means again becomes effective to move the carrier until it approaches the perforating mechanism. There a gear, which is like the gears G, engages the rack R and feeds the blank past the perforating mechanism which makes a row of ornamental perforations along the rear edge of the blank. After the perforating operation is finished, the friction driving means moves the carrier back to the loading station L where it comes to rest with its jaws open. As the rear margin of the blank is fed past the skiving mechanism, it is bent over upon the periphery of the feed roll 33 and skived on a gradual bevel as shown in Fig. 14. The skived margin then passes between the rolls 23 and 25 and receives a coat of cement, and from these rolls it passes through the stationary folder 27 where the fold is formed and then over the anvil 29 where the rapidly vibrating hammer 21 presses the fold. It is then carried to and past the perforating mechanism which is like that of the machine of the patent.

Although the apparatus has been illustrated as embodied in a particular apparatus, it should be understood that the invention is not limited in the scope of its application to the particular apparatus which has been shown and described. Certain novel features of the machine herein illustrated and relating particularly to the skiving mechanism have not been claimed herein since they form part of the subject matter of a copending application Serial No. 140,684, filed May 4, 1937, in my name.

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

1. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving and cement applying mechanism arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

2. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving and folding mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier, said skiving mechanism being adapted to produce on the margin of the blank a comparatively wide scarf of gradual inclination suitable for folding, and said folding mechanism acting while maintaining the condition of the substance of the margin unchanged to bend said margin inwardly toward the body portion of the blank.

3. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier in a predetermined path and cement applying and folding mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

4. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving, cement applying and folding mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

5. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving, folding and fold pressing mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier, said skiving mechanism being adapted to produce on the margin of the blank a comparatively wide scarf of gradual inclination suitable for folding, and said folding mechanism acting while maintaining the condition of the substance of the margin unchanged to bend said margin inwardly toward the body portion of the blank.

6. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving, folding and perforating mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier, said skiving mechanism being adapted to produce on the margin of the blank a comparatively wide scarf of gradual inclination suitable for folding, and said folding mechanism acting while maintaining the condition of the substance of the margin unchanged to bend said margin inwardly toward the body portion of the blank.

7. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and cement applying, folding and perforating mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

8. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving, folding, fold pressing and perforating mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier, said skiving mechanism being adapted to produce on the margin of the blank a comparatively wide scarf of gradual inclination suitable for folding, and said folding mechanism acting while maintaining the condition of the substance of the margin unchanged to bend said

margin inwardly toward the body portion of the blank.

9. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and cement applying, folding, fold pressing and perforating mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

10. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving, cement applying, folding and perforating mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

11. Apparatus for operating upon a blank of sheet material having, in combination, a carrier for the blank, means for moving the carrier bodily in a predetermined path, and skiving, cement applying, folding, fold pressing and perforating mechanisms arranged along said path in position to operate successively upon the margin of a blank held by the moving carrier.

12. Apparatus for operating upon a blank of sheet material having, in combination, mechanism for skiving a margin of the blank, mechanism for folding the skived margin mechanism for forming perforations in the blank, and means for presenting the blank to and feeding it past said mechanisms, said skiving mechanism being adapted to produce on the margin of the blank a comparatively wide scarf of gradual inclination suitable for folding, and said folding mechanism acting while maintaining the condition of the substance of the margin unchanged to bend said margin inwardly toward the body portion of the blank.

13. Apparatus for operating upon a blank of sheet material having, in combination, mechanism for applying cement to the margin of the blank, mechanism for folding the cement-coated margin, mechanism for forming perforations in the blank, and means for presenting the blank to and feeding it past said mechanisms.

14. Apparatus for operating upon a blank of sheet material having, in combination, mechanism for skiving a margin of the blank, mechanism for applying cement to the skived margin, mechanism for folding the margin and pressing the fold, mechanism for forming perforations in the blank, and means for presenting the blank to and feeding it past said mechanisms.

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