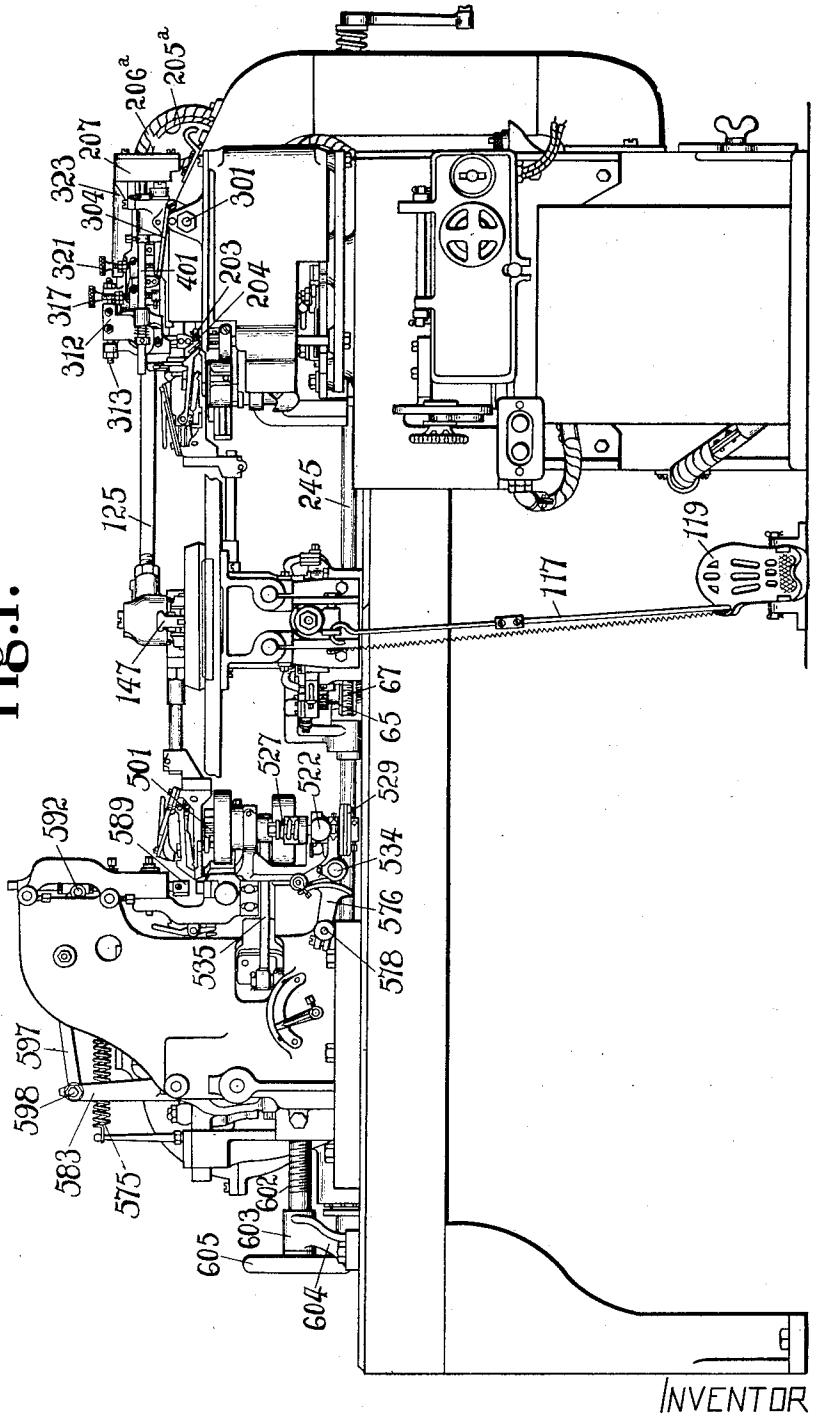
May 15, 1934. J. FOSSA 1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

Filed May 14, 1930 14 Sheets-Sheet 1

Fig.1.



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Nelson H. Townsend

May 15, 1934. J. FOSSA 1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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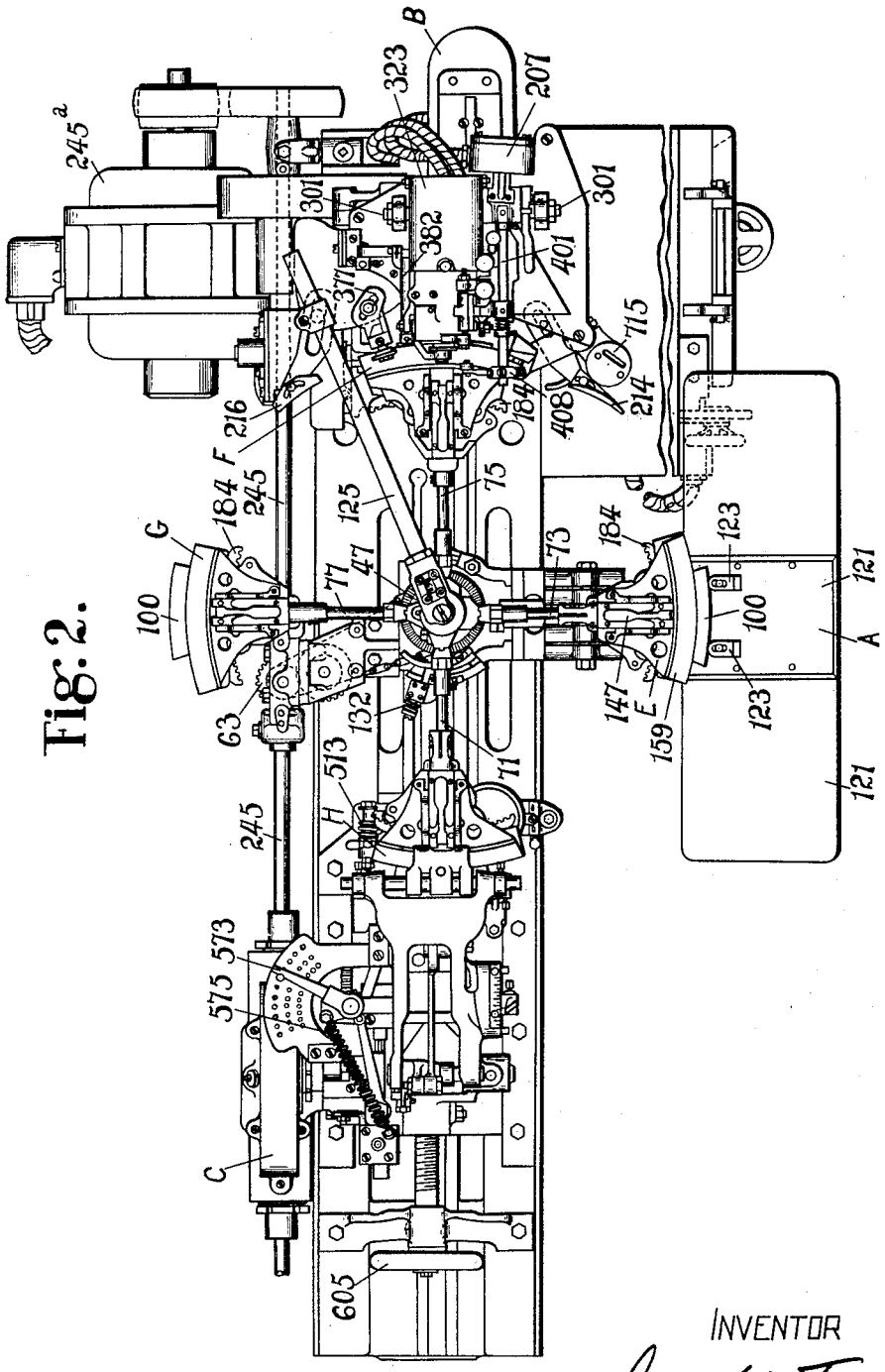


Fig. 2.

INVENTOR

Joseph Fossa

By Smith & Howard

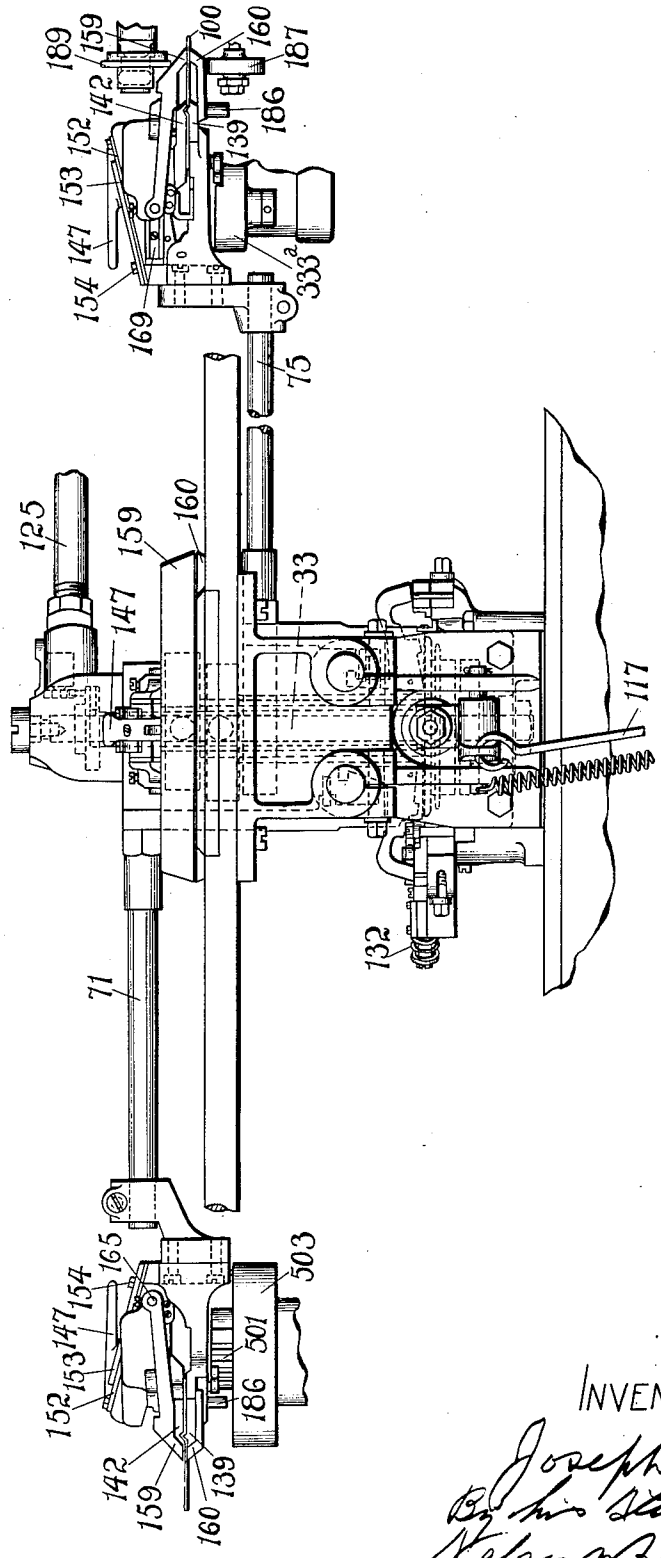
Nelson W. Howard

May 15, 1934. J. FOSSA 1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig. 3.



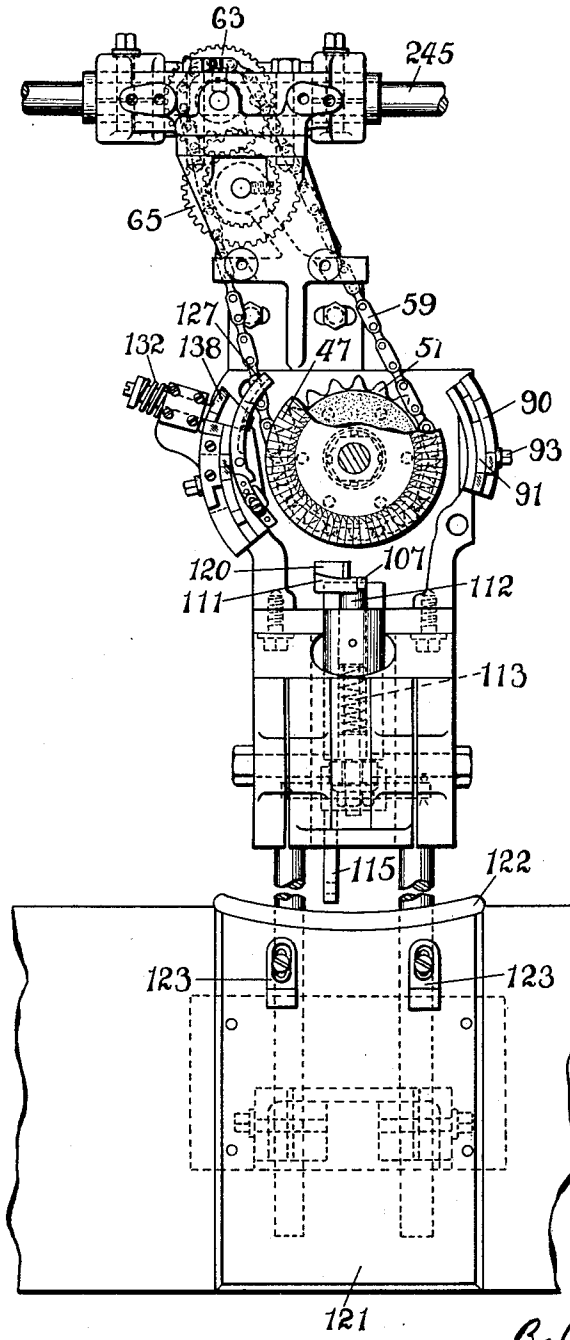
INVENTOR
Joseph Fossa
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May 15, 1934. J. FOSSA 1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig:4.



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Fig. 5.

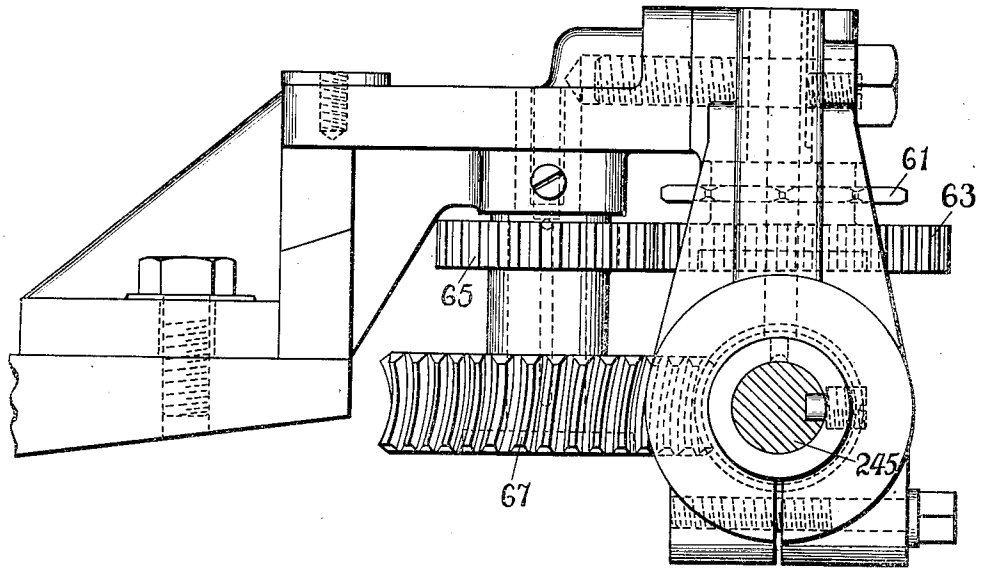


Fig. 6.

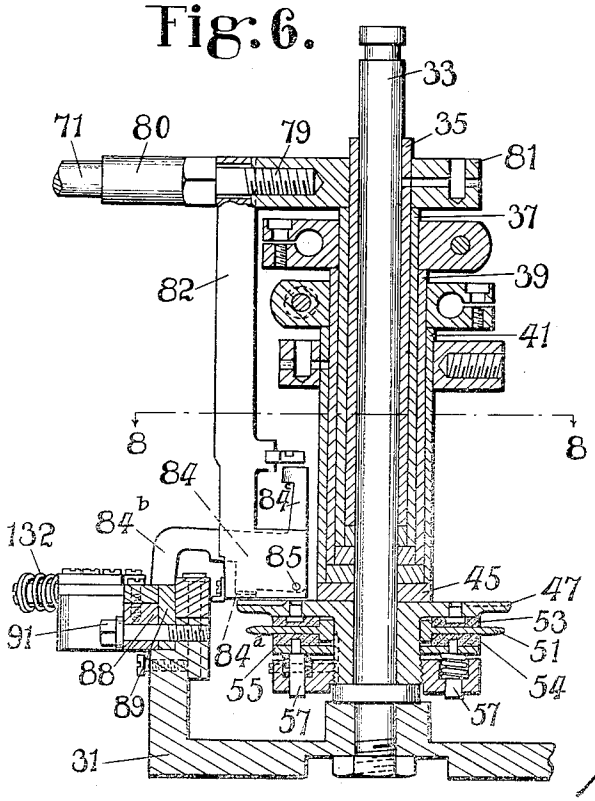
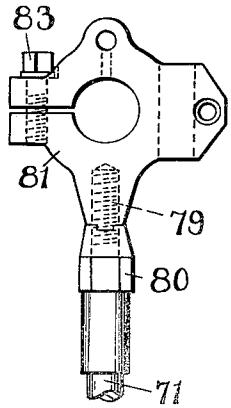


Fig. 7.



INVENTOR

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By his Attorney,

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APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig. 8.

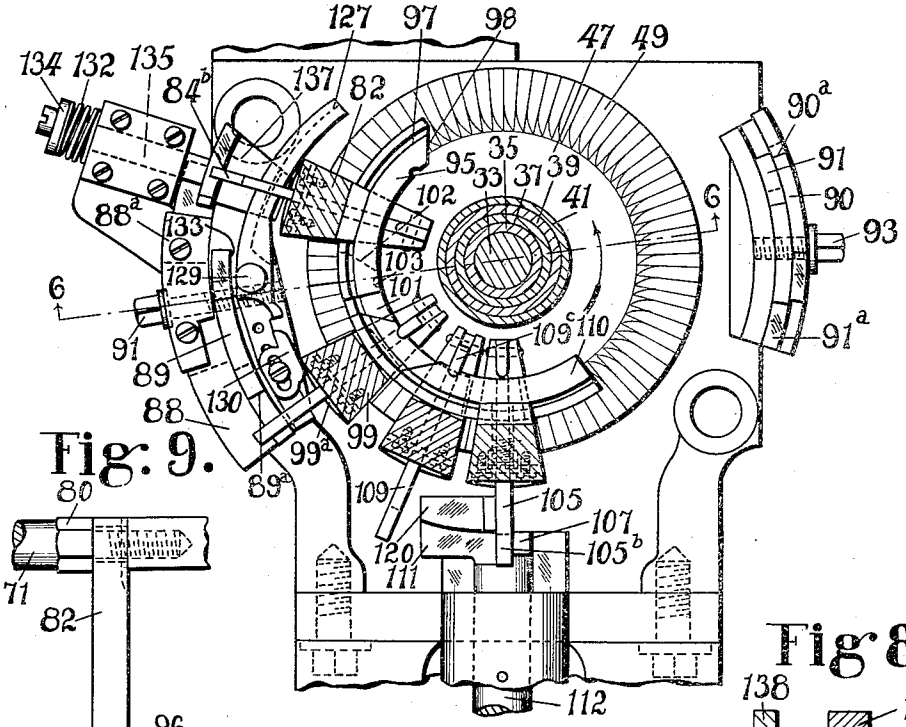


Fig. 9.

Fig 8a

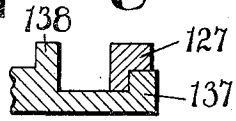


Fig. 10.

INVENTOR

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APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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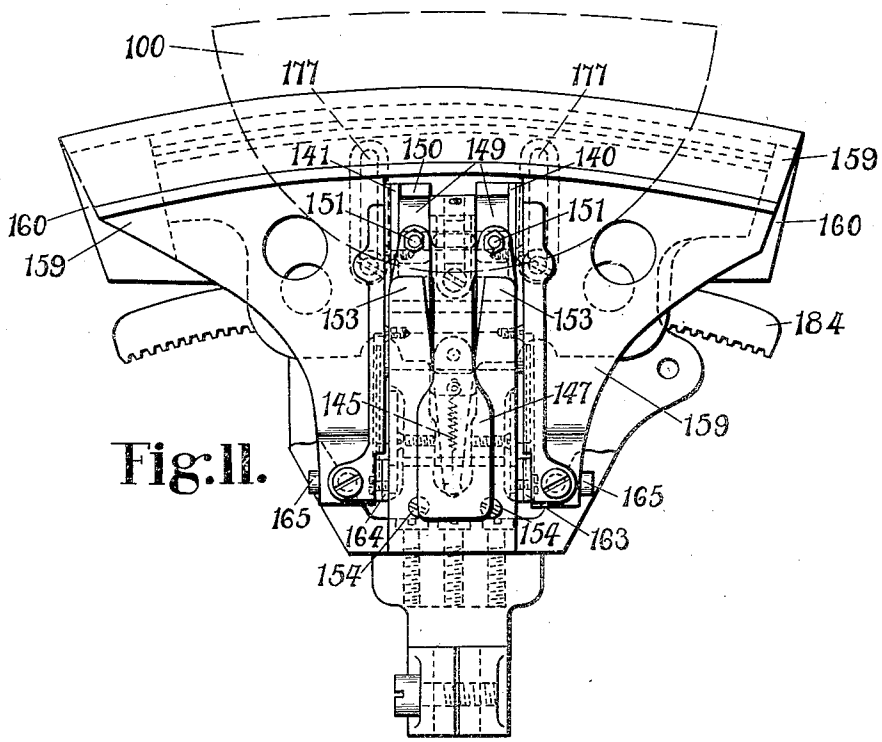


Fig. 11.

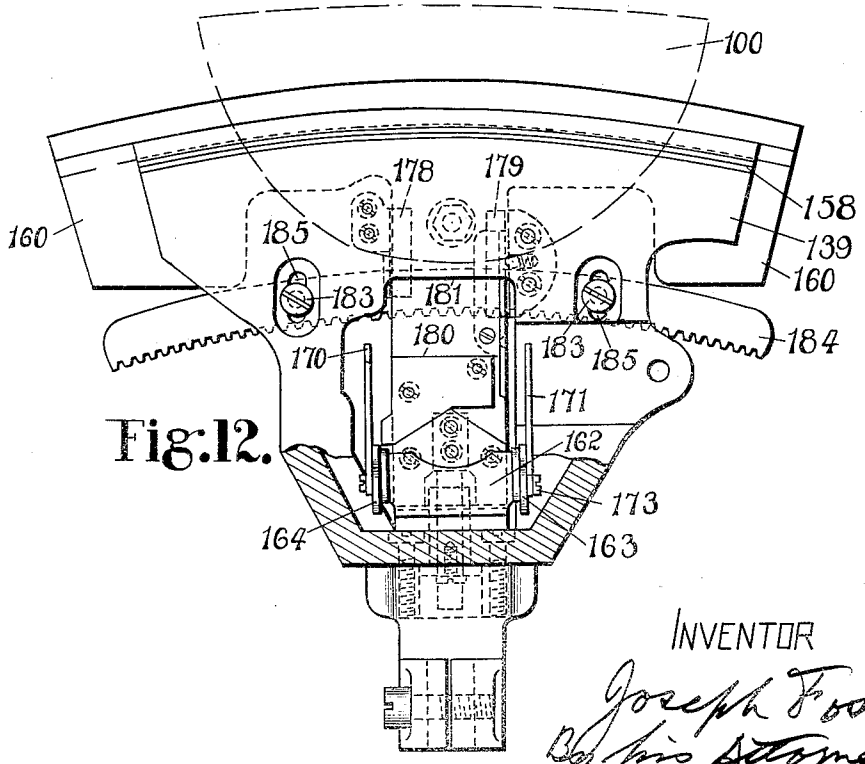


Fig. 12.

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Fig:13

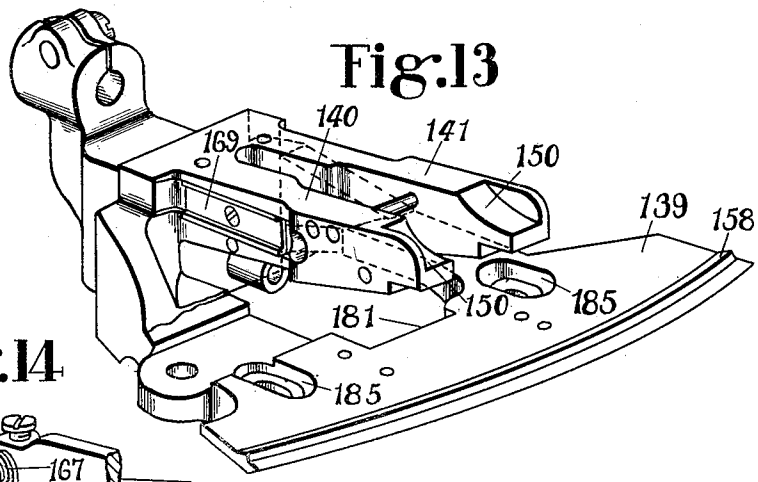


Fig:14

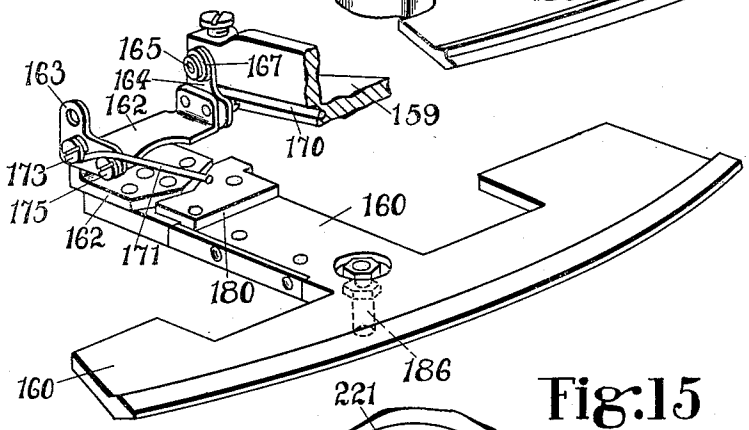
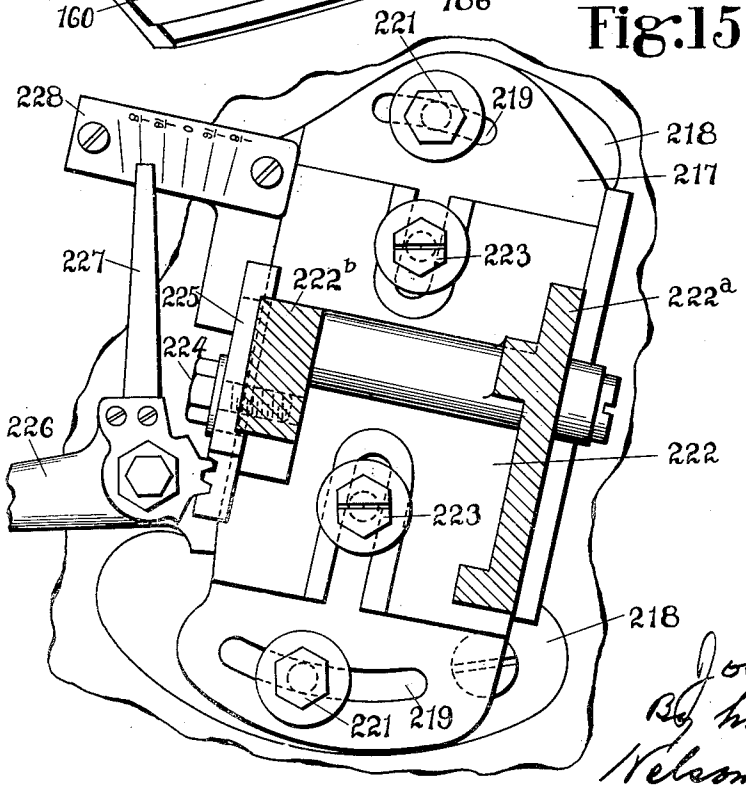


Fig:15



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APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig:16.

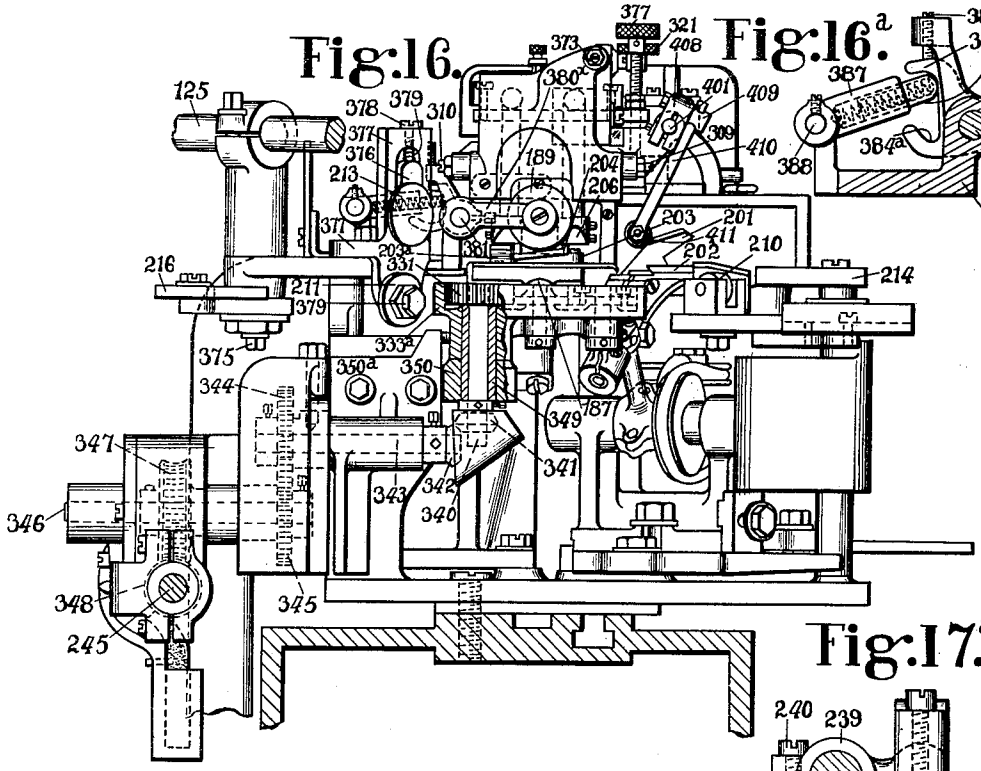


Fig:16.a

Fig:17.a

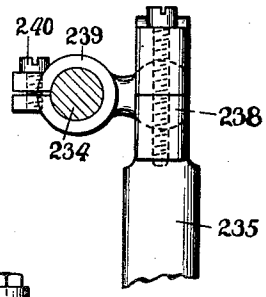
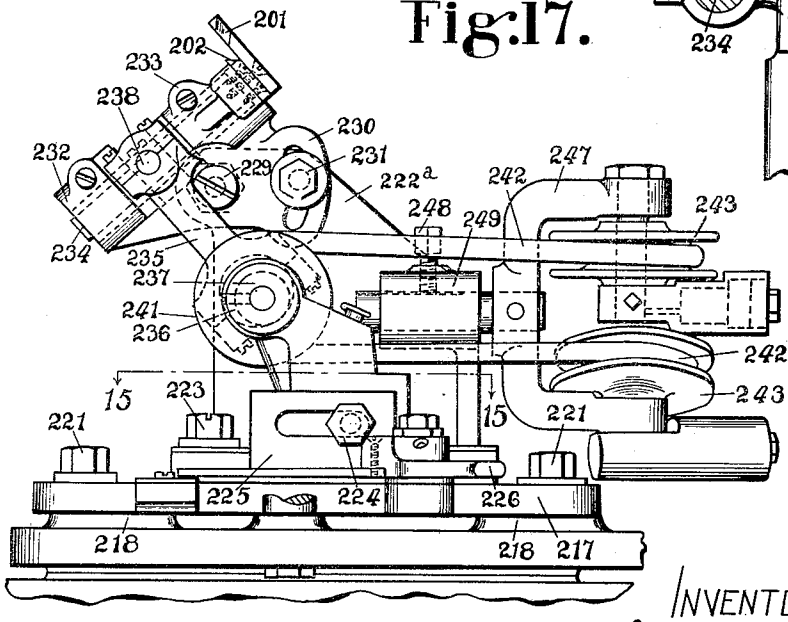


Fig:17.



INVENTOR

Joseph Fossa

By his Attorney,

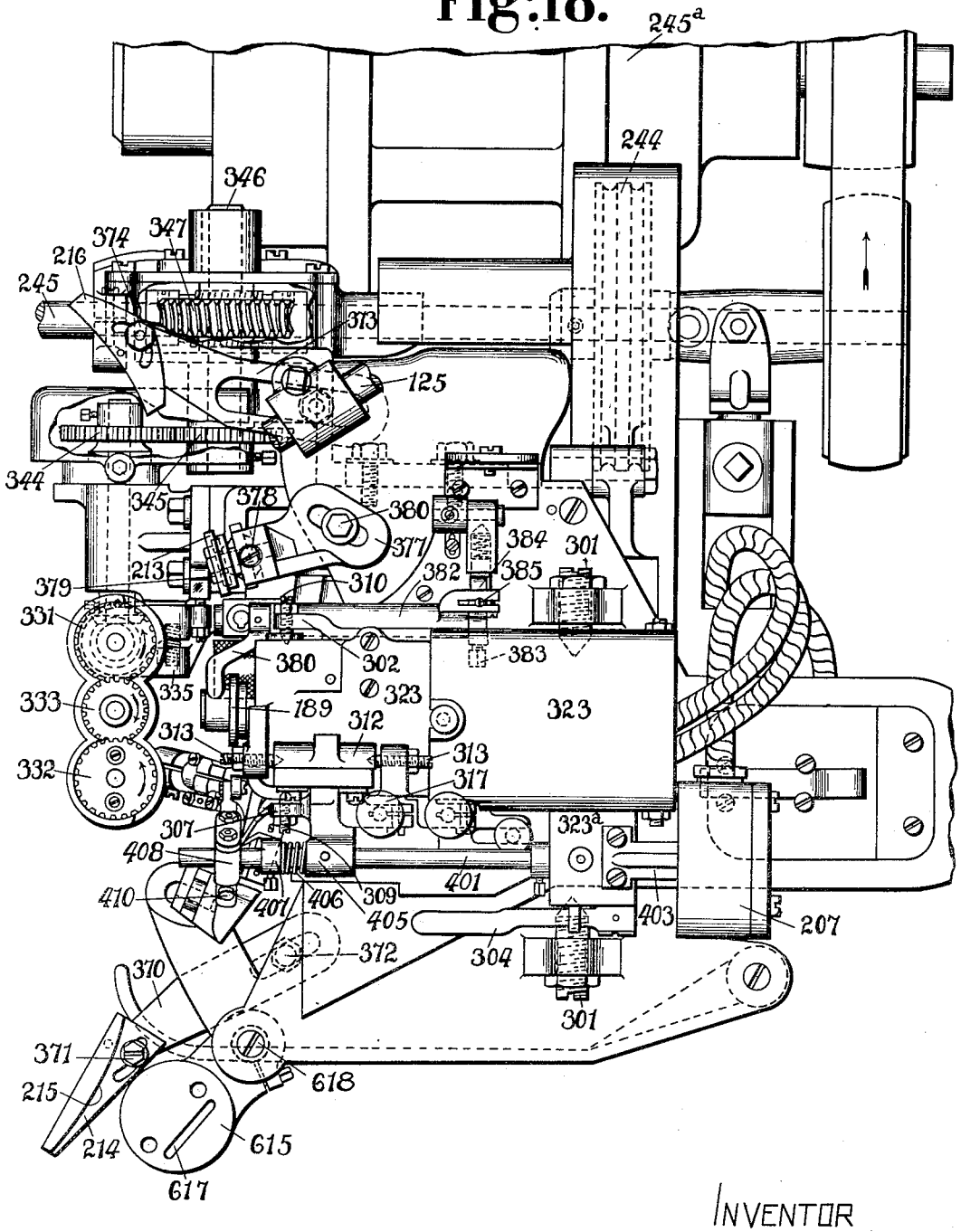
Nelson Stoddard

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APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig:18.



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By his Attorney-

Nelson W. Howard

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Fig:19.

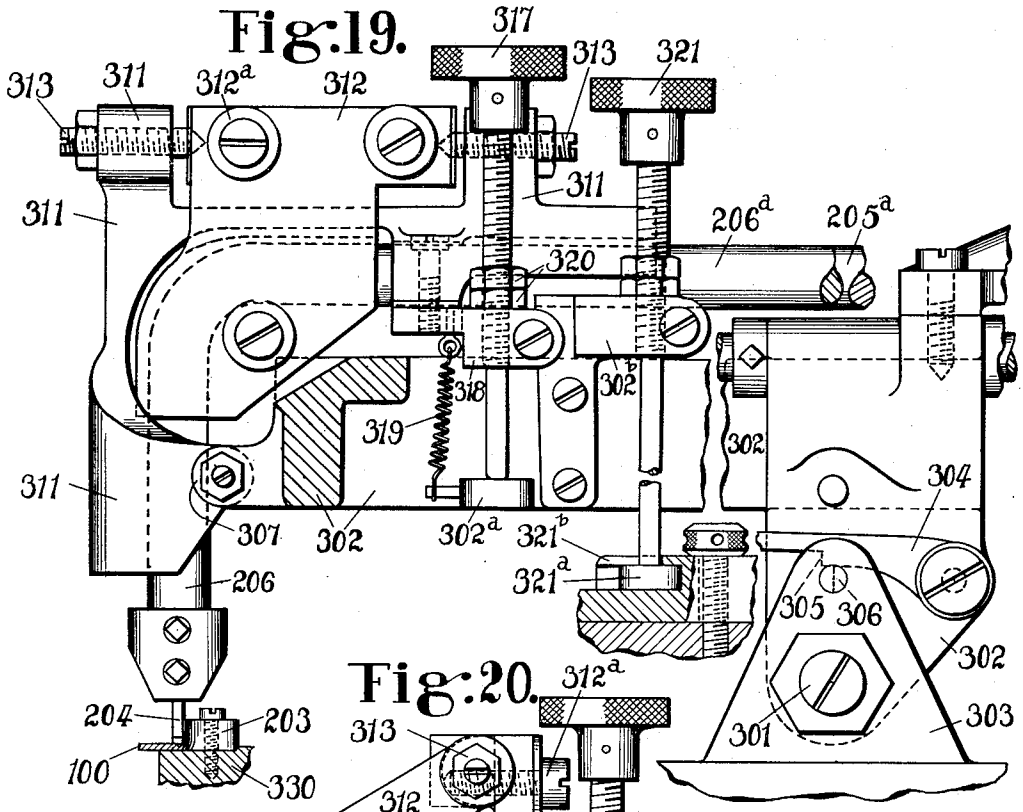
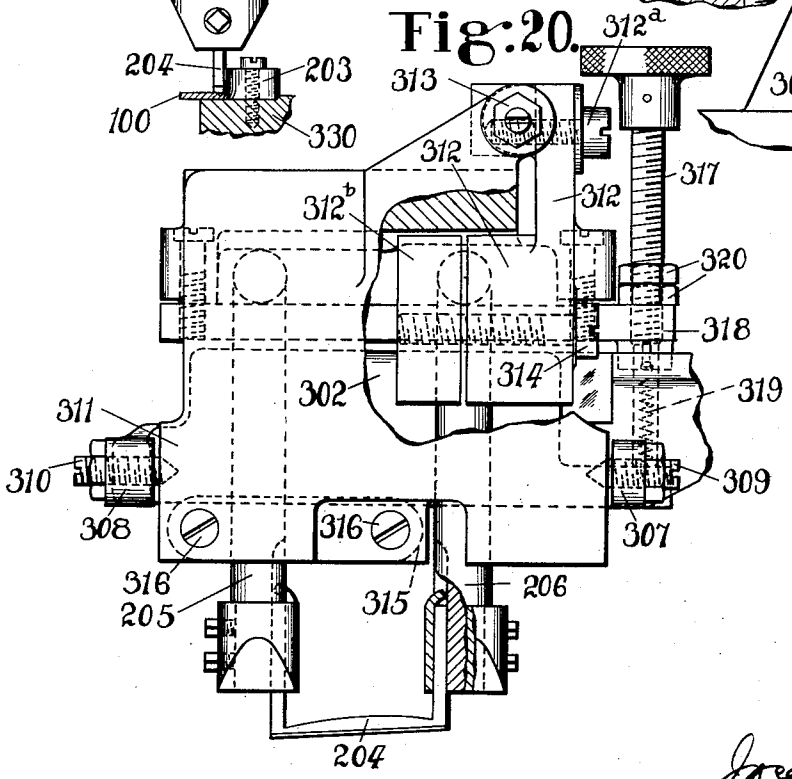


Fig:20.



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By his Attorney,

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APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig. 21.

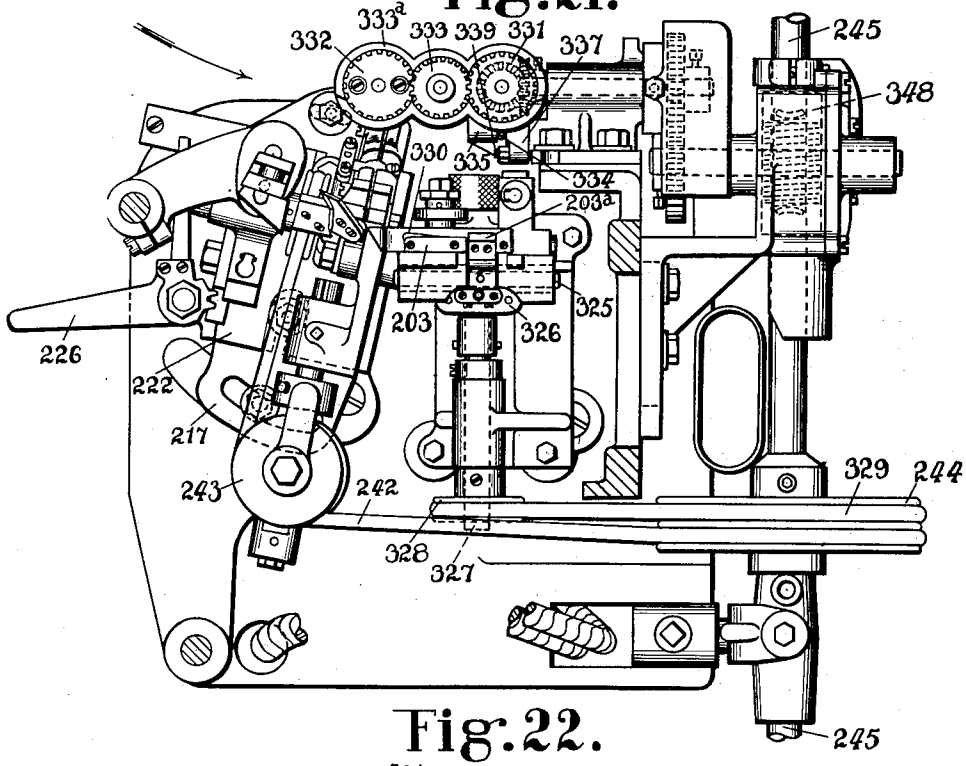
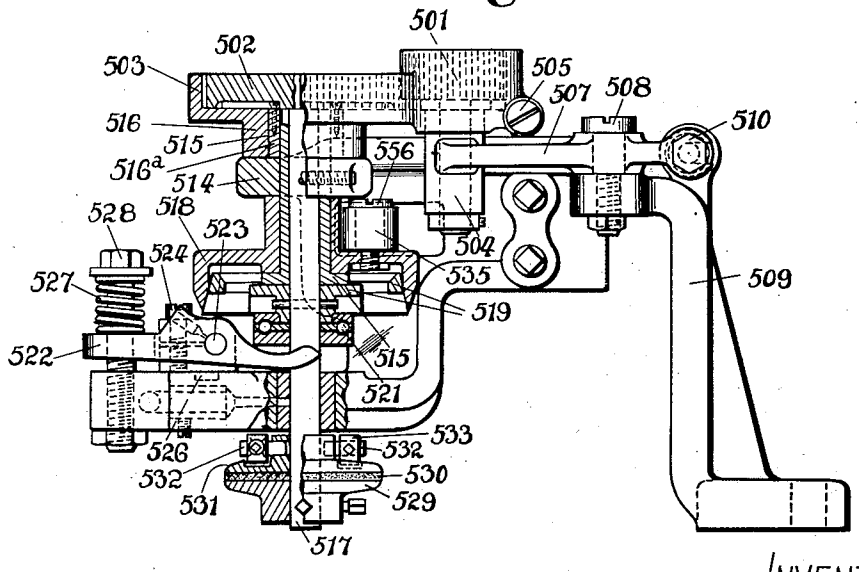


Fig. 22.



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May 15, 1934. J. FOSSA 1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig. 23.

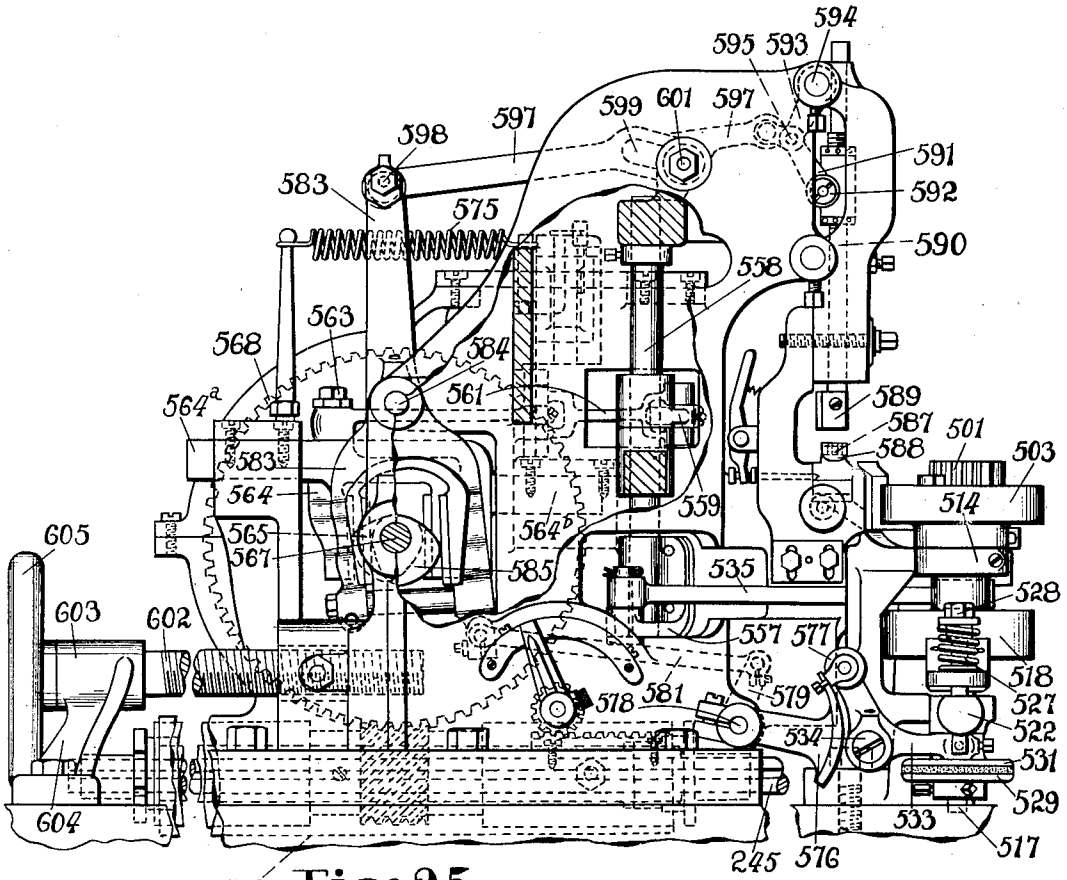
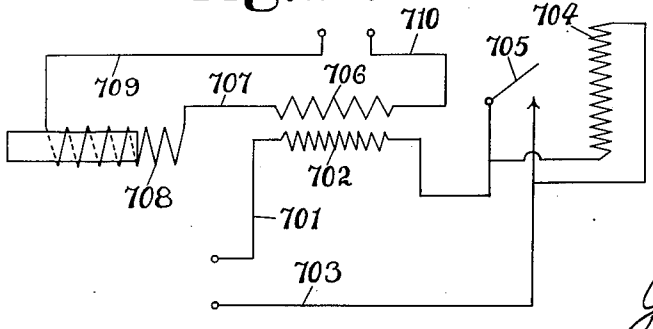


Fig. 25.



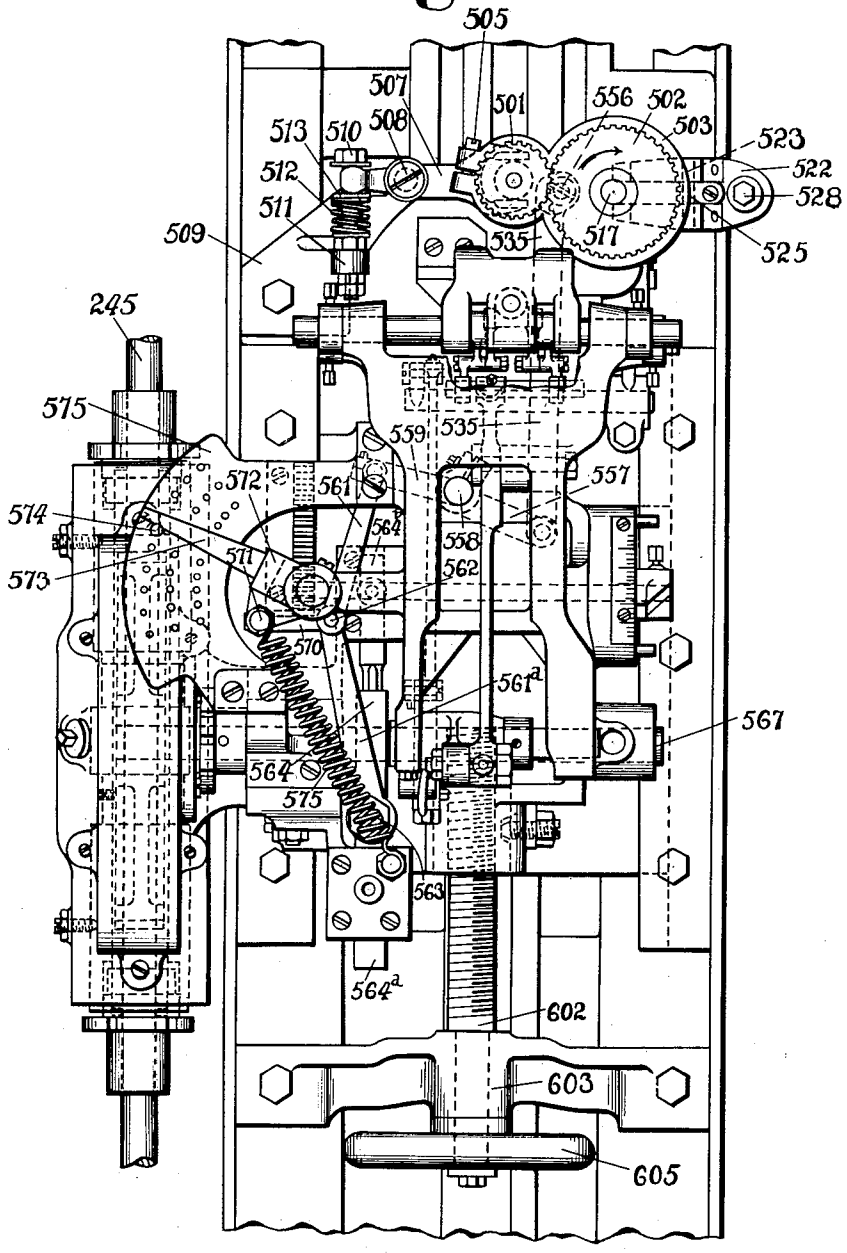
INVENTOR
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By his Attorney,
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May 15, 1934. J. FOSSA 1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

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Fig. 24.



INVENTOR

Joseph Fossa

By his Attorney,

Nelson M. Howard

Patented May 15, 1934

1,958,536

UNITED STATES PATENT OFFICE

1,958,536

APPARATUS FOR OPERATING UPON PARTS OF UPPERS OF SHOES

Joseph Fossa, Danvers, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Application May 14, 1930, Serial No. 452,391

106 Claims. (Cl. 12—51)

This invention relates to apparatus for operating upon shoe parts and is herein illustrated as embodied in an apparatus of the general type shown in U. S. Letters Patent No. 1,754,464, granted April 15, 1930 upon an application filed in my name for finishing the rear edges of toe tips of boots and shoes.

In apparatus of this general type there is provided mechanism for skiving the edge of a toe tip, mechanism for shrinking one side (usually the flesh side) of the tip along the edge thereof to cause the unskrunken side (usually the grain side) to curl toward the shrunken side so that the edge presents a surface which is all grain, and a punching mechanism for making a row of ornamental perforations along the finished edge. A plurality of carriers comprising clamps are successively supplied with toe tip blanks at a loading station; and these carriers are then moved in a closed path such that the blanks are presented successively to the action of the skiving, the shrinking, and the punching mechanisms, each carrier finally coming to rest temporarily at the loading station where the operator removes the finished toe tip blank and replaces it by a new one.

It is very desirable that the feeding of the blanks past the operating mechanisms be accurately controlled, and to this end, according to one feature of the invention, each carrier, as it approaches a mechanism for operating upon the blank held by the carrier, is engaged and fed past the operating mechanism by carrier-feeding means associated with that mechanism. In the illustrated construction each carrier is provided with a segmental rack, which is engaged by gears associated with the operating mechanism and these gears feed the carrier with the blank past the operating mechanism, after which the rack passes out of engagement with the gears. By thus providing feeding means for the carrier associated with the operating mechanism, the feeding of the blank past the operating mechanism may be very accurately controlled.

When a blank is subjected to the action of the shrinking mechanism wherein a stationary searing or shrinking tool drags over the blank at the edge thereof, it is desirable that the blank be gripped by its carrier close to said edge so as to leave exposed and protruding from the carrier only a narrow extent of the blank, since otherwise the drag of the shrinking tool upon the moving blank is liable at times more or less to distort and wrinkle the margin. It is also desirable that the blank be gripped close to its edge during the skiving operation. When, however, the blank is operated upon by the punching mechanism, a considerable extent of the blank must be exposed to provide for the formation of the row of ornamental perforations which are produced by the action of the punching mechanism.

Accordingly, there is provided, in accordance with another feature of the invention a carrier for presenting a blank to mechanism for operating upon the blank, said carrier being adapted to expose a given extent of the blank to the mechanism during the operation of the mechanism and to expose a different extent after the operation of the mechanism. In the illustrated construction the carrier comprises a clamp having two sets of clamping jaws. The main jaws engage the blank at all times at a considerable distance from the edge of the blank which is to be operated upon. The auxiliary jaws engage the blank nearer to the edge and only during the operation of the skiving and shrinking mechanism upon it, said auxiliary jaws being slidable, when not in engagement with the blank, toward and from the edge of the blank. These auxiliary jaws may thus occupy either an extended position in which they are close to the edge of the blank so that, when they are closed, only a small extent of the blank will be exposed, or they may occupy a retracted position in which a greater extent is exposed. At the loading station the auxiliary jaws are in retracted position when the operator places a blank in the clamp and closes the main jaws upon it. As the carrier moves along its path and approaches the skiving and shrinking mechanism, the auxiliary jaws are pulled out or extended and closed upon the blank with only a narrow margin of the blank exposed. They remain in this position during the skiving and shrinking operations, at the end of which they are pulled back or retracted and opened. The blank with a considerable extent of its margin exposed is then presented to the punching mechanism. In this way only a narrow extent of the blank is exposed during the skiving and shrinking operations and a wider extent during the punching operation.

As has been explained, each blank carrier, after it has presented a blank first to the skiving and shrinking mechanisms and then to the punching mechanism, comes to rest at the loading station. If the operator does not promptly remove the finished blank from the carrier, put a new blank in and start the carrier on its way, several carriers may come to rest between the punching mech-

anism and the loading station. If enough of them are allowed thus to collect so that that portion of the path of the carrier which lies between the punching mechanism and the loading station is substantially filled with stationary carriers, the rearmost of these stationary carriers may arrest a following carrier which is at the time being operated upon by the punching mechanism.

According, therefore, to another feature of the invention, means is provided for arresting a following carrier before it reaches a mechanism for operating upon the blank held by it whenever a predetermined number of carriers have been brought to rest in that part of the path of the carrier which leads away from the operating mechanism. In the illustrated construction, there is provided a member the forward end of which projects into the path of the carriers shortly after they have left the punching mechanism, this member being moved by the passing carriers temporarily into a position to arrest the next following carrier. If now a group of carriers comes to rest between the punching mechanism and the loading station and the group is large enough so that the rearmost carrier engages this member, a following carrier will be arrested before it reaches the punching mechanism.

The scarf at the rear edge of a toe tip should be made very accurately and in just the right location so that the shrinking mechanism may operate properly upon the edge of the tip; and in order to insure that this result shall be readily attained, the skiving mechanism, according to another feature of the invention is adjustable so that its cutting members may be properly positioned with respect to the edge of the blank. In the illustrated construction the whole skiving mechanism is mounted for angular adjustment on a base plate which in turn is adjustable toward and from the axis about which the toe tip carriers are rotated.

These and other features of the invention including certain details of construction and combinations of parts will be described as embodied in an illustrated apparatus and pointed out in the appended claims.

Referring now to the accompanying drawings,

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

Fig. 2 is a plan view of the apparatus;

Fig. 3 is a front elevation of the toe tip carriers, their driving mechanism, and the table over which the operator presents the toe tip blanks one by one to the carriers at the loading station;

Fig. 4 is a plan view partly in section of the loading station and part of the mechanism for driving the carriers;

Fig. 5 is a detail in elevation of part of the mechanism which drives the carriers;

Fig. 6 is a vertical section showing the mounting of the carriers and part of the mechanism for driving them, this section being taken on the line 6—6 of Fig. 8;

Fig. 7 is a detail in plan showing how the arms, which support the clamps at their outer ends, are mounted;

Fig. 8 is a section on the line 8—8 of Fig. 6;

Fig. 8*a* is a detail in section of the lever 127 and the block 137;

Fig. 9 is a detail in elevation of part of the mechanism for connecting a carrier with and for disconnecting it from its driving mechanism;

Fig. 10 is a vertical longitudinal section through one of the toe tip clamps;

Fig. 11 is a plan view of a clamp;

Fig. 12 is a plan view of a clamp with the upper main and auxiliary jaws removed;

Fig. 13 is a perspective of the frame of a clamp;

Fig. 14 is a perspective of a portion of the jaws of the auxiliary clamp;

Fig. 15 is a section of the skiving mechanism on the line 15—15 of Fig. 17;

Fig. 16 is an end elevation of the skiving and shrinking mechanism;

Fig. 16*a* is a detail in section of part of the mounting of the roll 189 which holds down the auxiliary jaws of the moving clamps;

Fig. 17 is a side elevation of the skiving mechanism;

Fig. 17*a* is a detail in section of the mechanism for oscillating the knife;

Fig. 18 is a plan of the skiving and shrinking mechanism;

Fig. 19 is a side elevation of the shrinking mechanism;

Fig. 20 is an end elevation of the shrinking mechanism;

Fig. 21 is a plan of the skiving and shrinking mechanism with the cover and certain other parts removed;

Fig. 22 is an elevation, partly in section of the means associated with the punching mechanism for feeding the toe tip carriers past the punching mechanism;

Fig. 23 is a front elevation of the punching mechanism;

Fig. 24 is a plan of the punching mechanism; and

Fig. 25 is a diagram of the electrical circuit for the shrinking tool.

The purpose of the illustrated machine, as has been indicated, is to skive and then shrink the margin at the rear edge of a toe tip, so as to produce a finished edge, and then to punch a row of ornamental holes along said rear edge. The skiving and shrinking operations are performed at one station, and the punching operation is performed at another station, the skiving and shrinking mechanism being indicated as a whole in Fig. 2 by the letter B and the punching mechanism by the letter C. Referring now to said figure the work 100 is presented at a loading station A over a work table 121 to one of four carriers including clamps E, F, G, H, which at that time is at rest in position to receive it. The clamp E, as well as the other three, is mounted to be rotated in a counterclockwise direction about a vertical post 33 (Fig. 6) and in so doing to present the tip first to the skiving and shrinking mechanism B and then to the punching mechanism C; and finally to bring the finished piece back to the loading station A so that the operator may remove it from the clamp and replace it with a new piece. The clamps are driven in a manner presently to be described by mechanism which is separate from the mechanism which drives the skiving and shrinking mechanism B and the punching mechanism C; and as a clamp approaches the skiving and shrinking mechanism B it is disconnected from its driving mechanism and is engaged by another driving mechanism consisting of gears (to be described later) which engage a segmental rack 184 of the clamp and move the clamp at a suitable speed past the skiving and shrinking instrumentalities. After the skiving and shrinking operations have been completed, the rack 184 passes out of engagement with the gears which carried it past the skiving and shrinking tools. The clamp is then driven once more by the driving

mechanism associated with the post 33 until it approaches the punching mechanism C where once more it is disconnected from the driving mechanism associated with the post 33, and its segmental rack 184 is engaged by gears associated with the punching mechanism C and fed intermittently by those gears during the punching operation. After that operation has been completed, the driving mechanism associated with the post 33 carries the clamp back to the loading station A where it comes to rest to permit the finished blank to be removed from the clamp and a new one inserted. In this manner the clamps travel round and round while the operator removes finished blanks and inserts new ones in the clamps.

In order to provide for operating upon the rear edges of toe tip blanks having different radii of curvature, the clamp sustaining and driving mechanism, as well as the punching mechanism, is adjustable on the bed of the apparatus toward and from the skiving and shrinking mechanism so as to permit the diameter of the circular path of the clamps to be increased or decreased; and the work table at the loading station is adjustable for the same purpose toward and from the axis about which the clamps rotate. It should be understood, however, that an apparatus of this type is usually custom-built for operating upon toe tips the rear edges of which have a particular radius of curvature, and is provided with clamps having their edges curved in accordance with the curvature of a particular size and shape of tip; and that the adjustments of the clamp-carrying mechanism, the punching mechanism and the table at the loading station, which are made at the factory at which the toe tips are operated upon, are of small extent to move the various elements into exactly the right positions.

The construction and mode of operation, as thus briefly described above, is similar to that of the apparatus of my prior application except that, in the apparatus of the prior application, work feeding mechanisms engage the work at the stations B and C and feed the work and through it the clamps past those stations, while in the present apparatus the clamps themselves are engaged and fed past these two stations.

Referring more particularly to Figs. 6 to 9, the mechanism for moving the clamps from the loading station A first to the skiving and shrinking mechanism B, then to the punching mechanism C and finally back to the loading station A will be described. This whole clamp carrying and moving mechanism, like that of my prior application, is mounted upon a base which is adjustable on the bed plate of the machine toward and from the skiving mechanism. In Fig. 6 a portion of this adjustable base is shown at 31; and fixed in this base is the upright spindle 33 having rotatably mounted in nested relation upon it four sleeves, 35, 37, 39, 41, each adapted to hold the inner end of a rod at the outer end of which a clamp is carried. These sleeves have respectively, fast to their lower ends, stepped blocks which are superposed upon one another, the lowermost block 45 resting upon the smooth middle portion of a constantly rotating ratchet wheel 47 which has ratchet teeth 49 (Fig. 8) extending around its outer margin; and it is through these teeth that the clamps are driven. The ratchet wheel 47 has a depending hub which rests upon a collar at the lower end of the spindle 33 and is driven frictionally by a sprocket wheel 51 which is loosely mounted upon the depending hub of the ratchet wheel 47. Between the under side of the ratchet wheel and the upper side of the sprocket is a friction washer 53, and below the ratchet is a second friction washer. A metal washer 55 forced upward by spring-pressed pins 57 holds the washer and the sprocket in the positions shown so that, when the sprocket is rotated, it will drive the ratchet wheel 47 frictionally. The sprocket 51 (Fig. 4) is driven continuously by means of a chain 59 from a smaller sprocket 61 (also shown in Fig. 5) said sprocket having integral with it and below it a gear 63 which meshes with a gear 65, said last-named gear having integral with and below it a worm wheel 67 which is driven by a worm on the main driving shaft 245 of the machine. This driving shaft extends the whole length of the apparatus (Fig. 2) and is driven from a motor 245a.

Returning now to Figs. 6 and 7, each of the nested sleeves 35, 37, 39, 41 carries at its upper end a hub, to which is attached the inner end of an arm in the form of a rod to the outer end of each of which a clamp is fastened. These four arms are indicated in Fig. 2 at 71, 73, 75 and 77. Inasmuch as all of these arms are mounted in substantially the same manner, the mounting of only one of them will be described in detail. The arm 71 (Fig. 6) has at its inner end integral with it a screw 79 having a hexagon wrench hold 80 which serves not only to fasten the arm to its hub 81 but to clamp to the hub a depending arm 82 which thus becomes rigid with the horizontal arm and the hub. The hub is split and fastened to the inner sleeve 35 by a pinch bolt 83. It is through the depending arm 82 that the clamp-carrying arm 71 is driven by the ratchet 47. To this end a pawl 84 (see also Fig. 9) has a tooth 84a adapted to engage the ratchet wheel 47 at the times when the clamp is to be moved by said ratchet and to be disengaged from the ratchet during the skiving and shrinking operations, during the punching operation and during the pause of the clamp at the loading station A. The pawl 84 is pivoted at 85 to a plate which is integral with the depending arm 82, and a spring 87 urges the pawl to swing downward about its pivot so as to cause the tooth 84a to engage the ratchet 47. In order to lift the pawl from engagement with the ratchet at the desired times so as to disconnect the clamp from the ratchet, the pawl has integral with it a trip finger 84b which is adapted to ride upon a stationary cam, presently to be described. There are three of these cams, one associated with the loading station, one with the skiving and shrinking mechanism, and one with the punching mechanism.

The cam at the loading station will be described later since it differs from the other two which are substantially alike. Referring now more particularly to Figs. 6 and 8, the cam associated with the punching mechanism will be described. This cam consists of two segmental plates 88, 89 adjustably held against a curved surface formed on an upstanding flange of the base 31 by a screw bolt 91 which passes through elongated slots in the plates and is threaded into the base 31. These two cam members or plates 88, 89 form in effect a single cam, the trip finger 84b being located to run partly upon one and partly upon the other of them. The cam member 88 (Fig. 8) carries a hardened plate having an inclined face 88a at one end up which the trip finger rides to disconnect the clamp carrier from the driving ratchet 47. The trip fin-

ger then rides for a short distance on the tops of both the cam members, and then only upon the member 89. During this time the clamp is being advanced intermittently by feed mechanism associated with the punching mechanism. After the punching operation has been completed, the trip finger 84*b* rides off from a shoulder 89*a* on the cam 89 and drops, whereupon the tooth 84*a* of the pawl 84 (Figs. 6 and 9) is reengaged with the rotating ratchet wheel 47, and the clamp is rotated until it reaches the loading station.

The two-part stationary cam which disconnects each clamp carrier from the driving ratchet 49 at the skiving and shrinking mechanism is shown at the right-hand side of Fig. 8, and is substantially like the two-part cam which has just been described. It consists of two curved plates 90, 91 slotted horizontally to permit a bolt 93 to clamp the plates in adjusted position. The plate 91 has at the end approached by the clamps an incline 91*a* up which the trip 84*b* of the pawl rides; and the plate 90 has a shoulder 90*a* from off which the trip drops. The purpose of making the cam in two adjustable parts is to permit the effective length of the cam to be readily varied to provide for tips having longer or shorter rear edges.

In a machine of this kind in which a plurality of clamps are being used and in which a leading clamp whose toe tip is being operated upon may at times be moving slower than the clamp which follows it, it is necessary to provide means for preventing a faster moving clamp from overtaking and colliding with the clamp which is ahead of it. Means are therefore provided for disconnecting a faster moving following clamp from the driving ratchet 47 when it approaches within a predetermined distance of the clamp ahead of it. To this end each of the depending arms, one of which (82) has been described, carries a small segmental plate, the one on the depending arm 82 being indicated at 95, adjustably fastened to the depending arm 82 by a small hook bolt 96 (Fig. 9). The down-turned end of this bolt extends into a segmental groove 97 formed in the upper face of the plate which will be termed an arresting plate since it arrests the following clamp carrier when that clamp carrier approaches near enough. The trailing end of the arresting plate 97 has a cam surface 98 and in its inner edge a small rounded notch. Inasmuch as in Fig. 8 all the clamp carriers are ahead of the one which has been described above, (the direction of rotation of the clamps being counterclockwise as indicated by the arrow) attention is directed to the clamp carrier ahead of the one which has been thus far discussed.

The depending arm of the next clamp carrier is indicated at 99 and its arresting plate at 101. At the trailing end of this arresting plate is an inclined cam surface 102; and a small rounded notch 103 is cut in its rear edge. If now the rear clamp carrier, as viewed in Fig. 8, should approach near enough to the one in front of it, an upstanding arm 84*c* (Fig. 9) formed integral with the pawl 84 would engage the incline 102 thereby rocking the pawl 84 to disconnect its tooth 84*a* from the ratchet 47; the upper end of the arm would engage the notch 103, and all this would take place before the trailing clamp overtook and collided with the clamp ahead of it.

After the arm 84*c* of the trailing clamp carrier has engaged the rounded notch 103, the leading carrier, when it rotates, will draw the trailing carrier after it, the trailing carrier being still disconnected from the driving ratchet 47. In the position of parts shown in Fig. 8, that one of the four clamp carriers which is in the lead—that is farthest to the right—and which may be referred to momentarily for convenience as No. 1, is at rest at the loading station with the trip finger 105*b* of its pawl 105 against a stop 107. The upwardly extending arm 109*c* of the pawl 109 of carrier No. 2 has ridden up the incline at the trailing end of the arresting segment 110 and is resting in the rounded notch in the edge of the segment 110; and carrier No. 3 occupies a similar position with respect to carrier No. 2 that carrier No. 2 occupies with respect to carrier No. 1, the arresting segmental plates being located at different levels so as not to collide with one another.

The leading clamp carrier as viewed in Fig. 8 has been disconnected from the ratchet 47 and brought to rest by its trip finger 105*b* which has previously ridden upon inclined cam 111 and then encountered the stop 107. This takes place at the loading station A. The cam 111 and stop 107 are integral with a horizontal plunger 112, shown also in Fig. 4, said plunger being normally held by a spring 113 in the position shown, in which the cam 111 and the stop 107 lie in the path of movement of the trip fingers so that the clamp carriers will be disconnected from the driving ratchet 47 and brought to rest one by one as they reach the loading station. The plunger 112 is connected by means of a bell-crank lever 115 with a treadle rod 117 (Fig. 1) and treadle 119. Depression of the treadle withdraws the stop 107 and cam 111 from engagement with the trip finger of the clamp carrier. The trip finger then drops into engagement with the ratchet 47; and the clamp carrier is advanced to the skiving and shrinking mechanism. After the treadle has been depressed to free a clamp carrier from the stop 107, it should immediately be released so as to return the plunger with its cam 111 and stop 107 into position to bring the next clamp carrier to rest. In order to make sure that the next following carrier to the one which has been released shall be brought to rest even if the treadle is not released promptly, a second inclined cam 120 is provided which is integral with the cam 111. The cam 111 has an inclination to the horizontal of about 20 degrees. The cam 120 has an inclination of about 45 degrees and rises above the cam 111. If now the plunger 112 is retracted and held retracted, the cam 120 lies in the paths of the trip fingers of the clamp carriers and will act upon any trip finger to disconnect it from the ratchet 47 and to bring it to rest. When now the plunger 112 is released and returns to the position shown, that trip finger will ride down upon the cam 111 in which position its pawl will be momentarily connected with the ratchet 47, and will be moved up the remaining portion of the inclined cam 111 and against the stop 107, when its clamp carrier will be brought to rest.

At the loading station A (Figs. 2 and 4) the table 121 is located, said table having a ledge 122 (Fig. 4) slightly below the level of its supporting surface to receive and support the under jaws of the clamps presently to be described; and this table is provided with two adjustable stops 123, the forward edges of which form a gage or guide to determine how far the rear portion of the toe tip 100 (Fig. 2) shall project beyond the jaws of the clamp when the toe tip is placed in the clamp by the operator. After a clamp (for example the clamp E in Fig. 2) has been brought to rest

in front of the table 121 at the loading station A, the operator releases the clamp manually, in a manner presently to be described, from the finished toe tip, removes the old tip, and places a new tip in the clamp with its rear edge against the guides 123. He then closes certain jaws of the clamp upon the tip and depresses the treadle 119 (Fig. 1) to withdraw the plunger 112 (Fig. 4) with its stop 107, whereupon the clamp carrier is engaged by the constantly rotating ratchet 47 and rotated to the skiving and shrinking mechanism B.

In order to steady the upright spindle 33 (Fig. 6) about which the clamp carriers revolve, a stay rod 125 (Fig. 2) is fast at one end to the top of the spindle and at the other end to a stationary part of the shrinking mechanism.

It will be noted that several of the clamp carriers may be located, as the three leading ones are in Fig. 8, in that portion of their path which lies between the punching mechanism and the loading station. In that figure the rearmost clamp carrier has not yet presented its clamp to the punching mechanism while the three leading clamps have passed it. There is not room for a fourth clamp between the punching mechanism and the loading station, and consequently it is desirable that means be provided for arresting the fourth clamp carrier (the rearmost one in the figure) before its clamp reaches the punching mechanism. To this end a lever 127 is pivoted at 129 to the base of the clamp-carrying mechanism. Said lever is shown as having been swung somewhat in a clockwise direction about this pivot by reason of the engagement of a hardened plate 99*a* on the depending arm 99 of the third clamp carrier with a cam 130 which is adjustably fastened to the lever 127. In Fig. 9 the plate on the depending arm 82, which corresponds to the plate 99*a*, is shown at 82*a*; and the depending arms of the other carriers have similar plates.

Normally this lever 127 is held by a compression spring 132 in a retracted position, with a point on its convex face in contact at about the point 133 with the stationary cam plate 89. The spring 132 bears at one end against a washer 134 carried by a rod 135 and at the other end against a stationary bracket in which the rod is slidable. The inner end of the rod has fast to it a block 137 (Fig. 8*a*) having at one end an upstanding flange which engages the concave face of the lever 127 and at the other end another upstanding flange, the top 138 of which is an inclined cam adapted at times to be moved into the path of the trip fingers of the clamp carriers so as to arrest a clamp carrier under certain conditions. Normally the spring 132 holds the block 137 to the left of the position shown and in a position in which its cam surface 138 lies outside the path of movement of the trip fingers. Every time a clamp carrier moves past the punching mechanism and toward the loading station, it swings the lever 127 in a clockwise direction thereby pulling the block 137 out into the position shown, a position in which the inclined cam surface 138 lies in the path of movement of the trip fingers. If now, as is shown in Fig. 8, a group of clamp carriers collects at and just before reaching the loading station so that one of the clamp carriers holds the lever 127 in the position shown, a following clamp carrier will be arrested before its clamp reaches the punching mechanism. As shown in the figure, the third clamp carrier is holding the lever 127 in the position shown, and the fourth or last clamp carrier has been arrested because its trip finger 84*b* has run up the inclined cam surface 138.

The construction and mode of operation of the clamps will now be described. Before beginning this description, however, it will be repeated that when the rear portion of a toe tip is presented to the skiving and shrinking tools, the tip should be clamped very close to its edge; but that, when the rear portion of the tip is presented to the punching mechanism, a considerable extent of the rear portion of the tip must project from the clamp so as to permit an ornamental row of holes to be punched in the margin. Consequently each clamp is provided with two sets of jaws, one set of which will be termed the main jaws and the other of which will be termed the auxiliary jaws, said auxiliary jaws being movable into two positions, an inner position in which they do not clamp the toe tip and an outer position in which they are automatically caused to clamp the toe tip close to its projecting rear edge. At the loading station A (Fig. 2) the operator causes the main jaws to engage the tip. At this time the auxiliary jaws occupy their inner or retracted position in which a considerable extent of the rear portion of the toe tip 100 projects beyond them. When the clamp, with the toe tip engaged by the main jaws, approaches the skiving and shrinking mechanism B, the auxiliary jaws are automatically moved out and then closed upon the tip; and they remain in this position during the operation of said skiving and shrinking mechanism. At the end of the shrinking operation they are automatically freed from the toe tip and moved into their inner position so as to expose more of the margin of the toe tip. They remain in this inner position during the punching operation and until the clamp has passed the loading station A again and once more approaches the skiving and shrinking mechanism B.

Inasmuch as the clamps are all substantially alike only one of them will be described in detail. Referring now more particularly to Figs. 10, 11, 12, 13 and 14, the rigid base or frame of the clamp is shown in Fig. 13, said base having at its rear end a split hub by means of which the clamp frame may be fastened to the outer end of one of the arms 71, 73, 75, 77 (Fig. 2) of the clamp carriers. The frame or base comprises a lower portion terminating in a flat plate 139, which forms the lower jaw of the main clamp, and an upper forked portion having spaced arms 140, 141. The upper jaw 142 (Fig. 10) of the main clamp is pivoted at 143 between the arms 140, 141 and is normally held in raised position by a tension spring 145 which is fastened at its lower end to the base or frame and at its upper end to a pin 146 carried by the hub of the jaw. In order to swing the upper jaw down into the position shown in Fig. 10 to clamp a toe tip 100, a hand lever 147 is pivoted between two hardened blocks 149 (Fig. 11) which have lower curved faces and are received in cut-away portions 150 (best shown in Fig. 13) at the outer ends of the arms 140, 141. These two blocks 149 are fastened by screw bolts 151 to the outer ends of a forked leaf spring 152 having a shorter forked reinforcing leaf spring 153 on top of it, the two springs being fastened at their inner ends to the frame of the clamp by screws 154. The hand lever 147 (Fig. 10) has at its outer end a depending arm in which is mounted a roll 155 adapted to contact with a hardened plate 157 fastened to the jaw 142. In the position of parts shown in Fig. 10, the lever has been pushed down, and, through the roll 155, has

caused the upper jaw 142 of the main clamp to press the toe tip against the lower jaw 139, the lower jaw being formed with an upstanding rib 158 and the upper jaw with a corresponding depression so that the toe tip is firmly held. When the hand lever is raised, the upper jaw of the main clamp is released and swings up under the action of the tension spring 145 into a position in which an operator may remove the finished toe tip and put a new one into the clamp.

The auxiliary jaws 159, 160 are respectively above and below the main jaws and in effect enclose them. The lower auxiliary jaw 160 has fast to its rear end a rod 161 which is slidable in a socket formed in the base or frame of the clamp; and the upper auxiliary jaw 159 is pivoted to the lower jaw in a manner presently to be described and may be caused to slide in and out with the lower jaw. Referring now to Fig. 14, the lower jaw is shaped as therein shown having a rearwardly extending flat stem at the rear end of which is fastened the lower leg of a U-shaped member 162, the legs of this member lying in substantially horizontal position. To the upper leg of the U-shaped member 162 are fastened two right-angled brackets 163, 164. These brackets are bored to receive pivot pins, one of which is shown at 165 in Fig. 14 about which are pivoted the two spaced legs of the upper jaw 159, which legs lie respectively outside of the two forks 140, 141 of the frame. Each pivot pin 165 carries a roller 167, and these rollers run respectively in guideways, one of which is shown at 169 in Fig. 13, said guideways being carried one on the outer face of the fork 140 of the frame and the other (not shown) on the outer face of the other fork. Two substantially straight spring fingers 170, 171 are provided to maintain the upper jaw 159 normally in raised position. The outer, free ends of these spring fingers engage under ledges formed on the jaw 159 (see the finger 170 in Fig. 14). Both fingers are mounted in substantially the same manner, the mounting of the finger 171 being shown in detail, the inner end of said finger having a loop to receive the stem of a screw 173 and resting upon the head of a second screw 175.

In order to limit the upward movement of the upper auxiliary jaw 159 due to the action of these spring fingers, this jaw and the upper jaw 142 of the main clamp (Fig. 10) have a lost-motion connection comprising two screws one of which is shown at 176, said screws being threaded into the jaw 159 and having their heads received in elongated sockets, one of which is shown at 177 formed in the under side of the jaw 142. This connection also causes the main jaw 142, when it is moved down into clamping position to pull the upper auxiliary jaw 159 down somewhat with it; but the upper auxiliary jaw is swung down into its clamping position, as shown in Fig. 10, by automatic means presently to be described.

It has been explained above that the lower auxiliary jaw 160 (Fig. 10) has fast to its rear end a rod 161 which slides in a socket in the frame of the clamp. In order to guide the jaw firmly in its sliding movement its flat stem (Fig. 12) is received in a guideway formed in the underside of that part of the frame which is extended to form the lower jaw 139 of the main clamp, and is held up in said guideway by small plates 178, 179. In order to limit the extent to which the jaws 159, 160 of the auxiliary clamp may be pulled out, the stem of the lower jaw 160 (Fig. 14) has a plate 180 the forward edge of which is adapted to contact with the edge 181 (Fig. 13) of the opening in the lower member of the frame with which the lower jaw 139 of the main clamp is integral. These two edges 180, 181 also appear in Fig. 12.

When the clamp approaches the skiving and shrinking mechanism, and again when it approaches the punching mechanism, it is disconnected from its driving ratchet, as has been described, and is fed past these mechanisms by gears presently to be described. To cooperate with these gears there is adjustably fastened to the under face of the frame of the clamp by means of screws 183, the segmental rack 184 referred to above, said screws passing through slots 185 in the frame and being threaded into the rack.

Referring again to Fig. 10 the lower auxiliary jaw 160 has fastened to and depending from it a pin 186 which is engaged by stationary cams, presently to be described, associated with the skiving and shrinking mechanism. The first cam, which is encountered before the clamp has moved far enough in its path to present the toe tip to the skiving mechanism, operates to pull the auxiliary jaws out so that only a narrow width of the toe tip 100 projects beyond them. The lower jaw then runs upon a supporting roller 187 and the upper jaw is engaged and held down by a roller 189, the two last-named rollers being associated, as will presently appear, with the shrinking mechanism. After the toe tip has passed the shrinking mechanism, the upper jaw 159 passes from beneath the roller 189 and from beneath another roller not shown in Fig. 10 and is swung up by the spring fingers 170, 171 (Fig. 14) out of engagement with the toe tip. A second stationary cam then engages the depending pin 186 and pushes the auxiliary jaws back so as to expose more of the margin of the toe tip for the punching mechanism to operate upon. In Fig. 10 the auxiliary jaws 159 and 160 are shown in their extended position and as gripping the work, while in Fig. 11 they are shown in their retracted position in which the work is gripped only by the jaws of the main clamp.

Referring now more particularly to Figs. 16 and 17 wherein the skiving and shrinking mechanism is shown, the skiving mechanism comprises a vibrating knife 201 which cooperates with a stationary shear blade 202 to produce a short abrupt bevel on the rear edge of a toe tip. The shrinking mechanism comprises a plow 203, a shrinking tool 204 and a hammer 203*a*. In Fig. 19 the shrinking tool 204, the plow 203, and the narrow work support 330 upon which the plow is mounted are shown in end view and on a larger scale. The toe tip 100 is fed away from the observer as viewed in that figure, its edge being bent up by the plow and held against the underside of the hot tool 204 which shrinks the leather on one side and causes the unshrunken side to curl toward the shrunken side. The hammer (not shown in the figure) hammers and compacts the curled edge. These work-engaging instrumentalities will not be described further in detail since they are or may be substantially like those of the machine of my prior application which has been referred to above or like those of U. S. Letters Patent No. 1,464,504, granted August 14, 1923 upon an application filed in my name, reference being made to the patent for a detailed description. The principal difference between the old construction and the new construction herein shown is that the shrinking tool 204 and the cooperating plow 203 are considerably longer than the corresponding members of the machines of the prior application and the prior patent referred to above. The upstanding legs of the

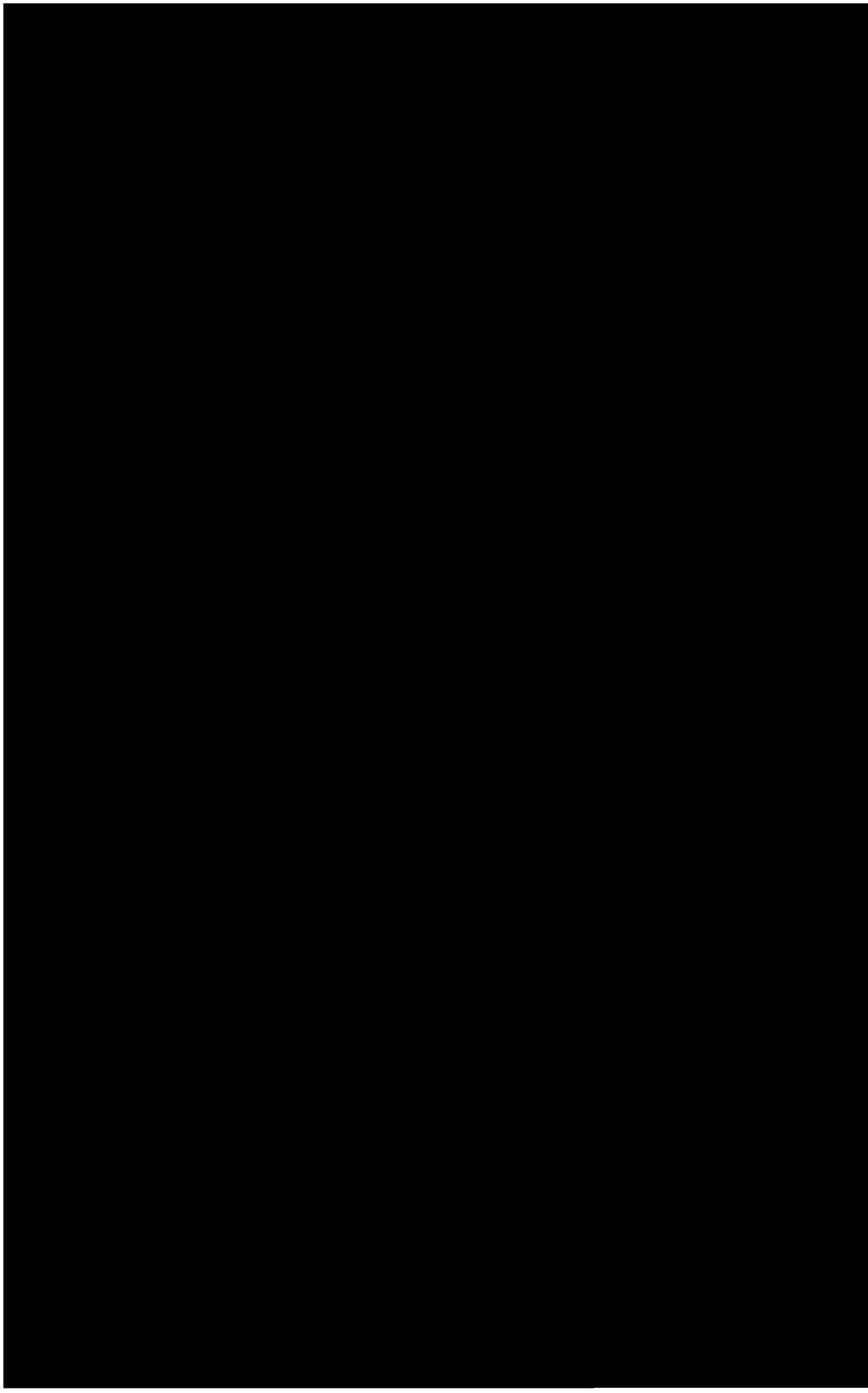
U-shaped shrinking tool are clamped respectively, as in the prior machines mentioned, in the lower ends of upright copper rods 205, 206 (Fig. 20) which are connected respectively to electric cables 205*a*, 206*a* (Fig. 1) so that the shrinking tool is part of an electric circuit and may be raised to a high temperature when desired. The electric circuit will be described later in connection with the wiring diagram of Fig. 25.

Referring again to Fig. 16 there are provided three rollers 210, 187, 211 upon which the lower jaw of the auxiliary clamp runs when a clamp, bearing a toe tip, moves past the skiving and shrinking mechanism. The roller 187 has already been mentioned in connection with Fig. 10; all three rollers are at substantially the same level, and their axes are stationary. A little in advance (to the left in Fig. 16) of the supporting roller 210 is a small roller 411 which engages the upper auxiliary jaw of a passing clamp and closes the jaw upon the toe tip before the toe tip reaches the skiving mechanism. This roller also performs another function, as will appear later. Directly above the roller 187 is the roller 189 (also shown in Fig. 10) which engages the upper jaw of a passing clamp and holds the jaw down upon the toe tip (as shown in Figs. 10 and 3); and to the left of the roller 189 is a second roller 213 which also runs upon the upper auxiliary jaw of the passing clamp and serves also to hold it down in contact with the toe tip. The clamps, with the toe tips, thus move from right to left, as viewed in Fig. 16, to present the toe tips first to the skiving mechanism and then to the searing or shrinking mechanism. As a clamp approaches the skiving mechanism the pin 186 (Fig. 10) which depends from the lower jaw 160 of the auxiliary clamp encounters a cam 214, best shown in Fig. 18, having a cam surface 215 which acts upon the depending pin 186 to pull out the jaws 159, 160 (Fig. 10) of the auxiliary clamp; and, when the leading end of the upper jaw 159 encounters the small roller 411, the jaw is moved down into and held in clamping position. After the toe tip has been carried past the shrinking mechanism and the upper jaw 159 of the auxiliary clamp has passed from beneath the roller 213, the depending pin 186 of the lower jaw of the auxiliary clamp is engaged by a second stationary cam 216 which acts to push back the auxiliary jaws into the position shown in Figs. 11 and 12 so as to expose more of the margin of the toe tip for the subsequent action of the punching machine.

Referring now more particularly to Figs. 15 and 17, the construction of the skiving mechanism will be described. It is desirable that this mechanism should be adjustable toward and from the path of the toe tip clamps as well as angularly so that it may operate properly upon toe tips of different sizes and having rear edges of different radii of curvature. To this end a plate 217 mounted upon two bosses 218 formed upon the bed of the apparatus is provided with segmental slots 219 (Fig. 15) through which pass cap screws 221 which are threaded into the bed. The base 222 of the skiving machine is slidably mounted upon the plate 217 and held in adjusted position by cap screws 223 which pass through alined slots in the base and are threaded into the plate 217. In order to permit ready and accurate adjustment of the base 222, there is adjustably fastened to it by a cap screw 224 a block 225 having teeth cut in it which are engaged by the teeth on a hand lever 226. A pointer 227, fast to the lever cooperates with a scale 228 which is rigid with the plate 217. The skiving mechanism is carried by the base 222 and is consequently adjustable angularly and toward and from the axis of rotation of the toe tip clamps.

Rising from the base 222 are two standards 222*a*, 222*b*. To the standard 222*a* is pivoted at 229 (Fig. 17) a bracket 230 by which the work-engaging parts of the skiving mechanism are carried, said bracket being held in adjusted position by a cap screw 231 which passes through a segmental slot in the bracket and is threaded into the standard 222*a*. This bracket has spaced bosses 232, 233 in alined bushings in which the knife shaft 234 is rotatably mounted. In order to oscillate this shaft so as to vibrate the knife 201, a connecting rod 235 receives at its lower end an eccentric 236 on a rotary shaft 237 and at its upper end a rounded knob or ball 238 (Fig. 17*a*) formed on a split collar 239 which is fastened to the knife shaft 234 by a pinch-screw 240. The shaft 237 is rotatably mounted in the standards 222*a*, 222*b* and has fast to it a grooved pulley 241 around which runs a belt 242. This belt passes over two grooved pulleys 243 and around one of the grooves (Fig. 18) is a large pulley 244 which is fast to the main driving shaft 245. The pulleys 243 (Fig. 17) are carried respectively by the two arms of a yoke 247, the stem of which is adjustably fastened by a set screw 248 in a boss 249 carried at the upper end of a standard which is integral with the base of the machine. This base 222 (Fig. 15) is adjustable in the manner which has been described; and consequently the whole skiving mechanism may be adjusted angularly as well as toward and from the path of movement of the toe tip clamps. By reason of these adjustments the skiving knife 201 and its cooperating shear blade 202 may be brought into proper position with respect to the rear edges of the toe tips.

The whole shrinking mechanism, except the plow 203, which is rigidly fastened to the narrow work support, as has been described, is mounted upon a swinging arm pivoted about the axes of two screws, one of which is shown at 301 in Fig. 1, so that this mechanism may be swung up when desired to give access to the shrinking tool 204. Referring now to Figs. 19 and 20 the manner in which the shrinking tool is carried by this arm will be described. This arm 302 has two depending lugs at its rear end, one on each side of the arm which are received between two spaced upstanding stationary ears, one of which is shown at 303, the screws 301 being threaded through the lugs and having their conical ends received in conical sockets in the depending lugs of the arm. The arm 302 may thus be swung up about the alined axes of the screws when it is desired to have access to the shrinking tool 204, and may be swung down into the position shown to lower the shrinking tool into its operative position. In order to hold the arm up when desired a latch 304, like the one of the patented machine, is pivoted at its rear end to the arm and has a shoulder 305 which, when the arm has been sufficiently swung up, engages a pin 306 on the lug 303. The arm 302 is of a generally inverted U-shape in cross-section and has at the lower portion of its forward end two spaced bosses 307, 308 to receive alined conical pointed bearing screws 309, 310. Hung upon these bearing screws is the carrier for the posts 205, 206 to the lower ends of which the upturned ends of the U-shaped shrinking tool 204 are fastened so that, when the carrier is adjusted about the alined axes of the screws



a block 376 which is slidably mounted in a vertical slot in an upstanding flange of a stationary bracket 377. A screw 378 passes loosely through a bore in the upstanding flange and is threaded into the block 376, there being a small compression spring 379 which encircles the stem of the screw and bears against the top of the block 376. The roller 211, which is located below the roller 213 and engages the under sides of the lower auxiliary jaws of the clamps, is rotatably mounted upon a depending flange of the bracket 377, being rotatable upon the stem of a cap screw 379 which is threaded into the depending flange. The bracket 377 (Fig. 18) is adjustably fastened to the frame of the machine by a cap screw 380 which passes through a slot in a rearwardly extending flange of the bracket and is threaded into the frame.

The roller 189 (Fig. 16) is rotatably mounted at the outer end of a small arm 380*x*, the inner end of which is fastened to a rock shaft 381 which is rotatably mounted in an elongated bearing 382 (Fig. 18). At the rear end of the rock-shaft 381 (Fig. 16*a*) there is fastened by a set screw 383 a peculiarly shaped arm 384 which is normally yieldingly held in the position shown against a stop-screw 385 by a spring-pressed plunger 386 whose casing 387 is pivoted about the axis of a small stationary rod 388. With the construction thus far described it will be understood that the roll 189 (Fig. 16) is normally held in the position shown but may yield upwardly if necessary when a toe tip clamp passes beneath it. It is desirable at times, in order to obtain free access to the shrinking tool 204 that the roll 189 be capable of being swung up and held up out of the way. The purpose of the peculiarly shaped arm 384 (Fig. 16*a*) is to permit the roll to be thus swung and held. When the roll 189 is in its normal operative position, the parts occupy the positions shown in Fig. 16*a* wherein the spring-pressed plunger 386 engages the upper part of the arm 384 as shown. When now the roll 189 is swung up about thirty degrees from the position shown in Fig. 16, the arm 384 is swung down about the axis of the rock shaft 381 and swings the casing 387 of the spring-pressed plunger down about the axis of the rod 388 until the plunger is received in the rounded recess 384*a* formed in the lower portion of the arm 384, the roll 189 being then held in its raised position by the action of the spring-pressed plunger.

The shrinking tool of the machine is maintained at a low heat at all times by a small current of electricity which passes through it. When, however, a clamp carrying a toe tip approaches the shrinking mechanism it operates a switch which cuts out a resistance, in a manner presently to be described, and permits a heavy current to pass through the shrinking tool thereby raising its temperature to a point at which it will sear and shrink the leather along the extreme margin of the toe tip. This switch is of the mercury type, is contained in the switch box 207 (Figs. 1 and 18) and is operated by rocking a horizontal rock shaft 401.

The switch box is supported upon a bar 403 (Fig. 18) which is rigidly fastened to a lug 323*a* formed on the rear portion of the two-part cover 323 said cover being part of the shrinking tool assembly and consequently swinging about the common axis of the pivot screws 301 when the shrinking tool is swung up. The switch, not shown, is operated by rocking the rock shaft 401, said rock shaft having one bearing in the lug 323*a* and another in a lug 405 which is integral with the arm 302 and consequently rigid with the lug 323*a* of the cover. A torsion spring 406 fastened at one end to the bearing 405 and at the other to a collar 407 fast to the rock shaft normally holds the rock shaft in such a position that the switch is open. In order to permit a moving clamp to close the switch and hold it closed for an interval, the outer end of the rock shaft 401 (Fig. 16) has clamped to it a split block 408. Through this block passes a draw bolt 409 having a transverse bore to receive the upper end of a small rod 410 which carries at its lower end a small roller 411. Normally the roller 411 occupies the position shown which lies in the path of movement of the clamps. As a clamp comes along, the roller 411 rides up on the upper auxiliary jaw of the clamp thereby rocking the rock-shaft 401 in a direction to close the switch and permit a heavy current of electricity to flow through the shrinking tool and thereby cause it to be raised to the proper temperature by the time the clamp presents a toe tip to it. Just before the shrinking operation has been finished, the trailing end of the clamp passes from beneath the roller 411, whereupon the switch is opened, and only a small current passes through the shrinking tool. The shrinking tool is thus normally at a relatively low temperature but is raised to the desired high temperature just before a toe tip is presented to it. This small roll 203 also serves a further purpose since it engages the upper jaw of the auxiliary clamp and forces said jaw down against the toe tip so that the toe tip is clamped close to its edge during the skiving operation.

The punching mechanism (Figs. 22, 23 and 24) comprises a punching die carrying the usual hollow punches 587 (Fig. 23) which are normally covered by the usual perforated yielding stripper plate 588, and a platen 589 which is reciprocated in a manner presently to be described to punch the margin of a toe tip as said margin is fed over the stripper plate.

The punching mechanism, like the skiving and shrinking mechanism, has means for engaging a clamp and feeding the clamp and with it the toe tip. The clamp feeding mechanism comprises a gear 501 (Fig. 24) which engages the segmental rack 184 (Fig. 12) of a clamp, said gear being driven intermittently in timed relation to the operation of the punch platen by a second gear 502. These gears are carried in a gear casing 503 which is mounted on the frame of the punching machine for outward swinging movement about the axis of the larger gear 502. To this end a depending bushing 504, (Fig. 22) which receives the stem of the small gear 501 and is clamped rigidly to the split end of the gear casing by a pinch-screw 505, is engaged by the forked inner end of a lever 507 pivoted at 508 to a bracket 509 which is fastened to the bed of the apparatus upon which the punching machine is slidably adjustable as has been described. The outer end of the lever 507 also has a fork, this one at right angles to the first-named fork which straddles the stem of a screw bolt 510 said screw bolt being rigidly held (Fig. 24) in a boss 511 carried by the bracket 509. A compression spring 512 encircling the stem of the screw bolt between the boss and a washer 513 which bears against the outer end of the lever 507, normally holds the outer end of the lever against the head of the cap screw and

consequently holds the gear casing 503 in the position shown. It will be noted, however, that, when a clamp reaches the punching mechanism, it may, if necessary, when its segmental rack engages the small gear 501, swing the gear casing out about the axis of the large gear 502 against the force of the spring 512. This outward yielding movement of the gear casing, like that of the corresponding gear casing of the skiving and shrinking mechanism, ensures proper meshing of the gear 501 with the segmental rack of a clamp.

It has been explained above that the punching machine is adjustable toward and from the axis about which the toe tip carriers rotate. After an apparatus has been set up to operate upon toe tips the rear edges of which have a given radius of curvature, the punching machine may require a slight adjustment (for example one-eighth of an inch) so that the row of ornamental perforations produced by the punching operation may be positioned the desired distance from the rear edge of the toe tip. When such adjustment is made, however, it is desirable that the small gear 501 (Fig. 24), which engages the segmental racks on the clamps, should be maintained in substantially the same position as before so as to engage said segmental racks properly. It has been explained that the bracket 509 is fastened to the stationary base of the apparatus upon which the punching machine is adjustable. This bracket is, therefore, stationary; and consequently the lever 507 (Fig. 24) is normally stationary, its left-hand end being held against the head of the cap screw 510 by the spring 512. Its right-hand end, as has been explained, has a fork which embraces a downwardly extending hollow boss on the gear casing 503 in which hollow boss the stem of the small gear 501 is rotatably mounted. Except for this fork the gear casing would be free to swing about the axis of the large gear 502. The fork, however, holds it in the position shown. When, now, the punching machine is adjusted a short distance toward or from the axis about which the toe tip carriers are rotated, the large gear 502 is adjusted with it, the gear casing swinging about the axis of this gear. The left-hand end of the gear casing 503, however, in which the small gear 501 is located, is substantially held from movement with the punching machine by the fork at the right-hand end (Fig. 24) of the lever 507 which engages the depending boss on the gear casing beneath the gear 501. This boss may slide slightly in the fork cross-wise of the punching machine; but the resulting movement cross-wise of the gear 501 is so small as to be negligible.

Referring now more particularly to Fig. 22 the mounting of the gear casing and part of the mechanism for imparting intermittent rotation to the large gear 502 and through it to the small gear 501 will be described. Held upright in a split boss 514, which is rigid with the frame of the punching machine is a bushing 515 having a head upon its lower end. Depending from the under side of the gear casing 503 beneath the large gear 502 is a hollow hub 516 provided with a short bushing 516*a* which is rotatable upon the upper end of the bushing 515 and rests upon the boss 514, the shaft 517 of the gear passing down through and being rotatable in the bushing 515. Rotatably mounted upon the bushing below the boss 514 is the upwardly extending hub of the driving member 518 of a clutch, said member being rotatable on the bushing 515 and being supported by the head at the lower end of the bushing. Pinned to the shaft 517 below the upper driving member 518 of the clutch is the lower clutch member 519, said lower member extending up into the upper member and having a conical face to engage with the depending circular flange of the upper member. Below the lower member 519 of the clutch are two washers, and between them is a ball race 521. In order normally to hold the clutch members in engagement, a forked lever 522 engages with its inner forked end the under face of the lowermost washer, said lever being pivoted about a pin 523. This pin is held by a pinch screw 524 in a small split block 525 having a short depending pin 526 which is received in a suitable socket in a stationary part of the machine. The lever thus straddles the block as well as the shaft 517; and the inner ends of the arms of the fork engage the under face of the lowermost washer. A compression spring 527 bears down upon the outer end of the lever and thus causes the lever normally to hold the lower clutch member 519 up in driving contact with the upper clutch member 518. It should be noted that, since the lower clutch member is pinned to the shaft 517 of the large gear 502, the shaft and gear are also held up. The compression spring 527 rests with its lower end upon the lever 522 and bears with its upper end against the under face of the head of a cap screw 528 the stem of which passes loosely through a bore in the lever and is threaded into a stationary part of the machine.

In the operation of the machine the upper driving member 518 of the clutch is rocked back and forth about the axis of the shaft 517 of the gear 502; and the shaft with the lower clutch member fast to it is pulled down intermittently to disconnect the members of the clutch and to stop the rotation of the gear every time the punching mechanism is operating. To this end there is pinned to the lower end of the shaft 517 a collar 529 having a flat upper face upon which rests a fiber washer 530. Above this washer and loose on the shaft is another collar 531 which, together with the fiber disk and the lower collar 529, forms a brake. The upper collar 531 has an upstanding hub provided with diametrically opposite sockets into which extend two pins 532 carried at the outer ends of the arms of a forked lever 533. This lever (Fig. 23) is a bell-crank lever pivoted at 534 to the frame of the machine, and is rocked in a clockwise direction at the proper times to disconnect the members of the clutch and to apply the brake to the shaft 517 of the gear 502.

The upper member 518 of the clutch may be oscillated about the axis of the upright shaft 517 of the larger gear 502 by any suitable mechanism. In the illustrated machine (Fig. 24) a link 535 is pivoted at its forward end at 556 to the upper clutch member 518 and at its rear end to the outer end of an arm 557 which is fast to an upright rock-shaft 558. Fast to the rock-shaft 558 above the arm 557 is a second arm 559 the outer end of which is pivoted to the outer end of a toggle lever 561 which is connected to the outer end of a second toggle lever 561*a* by a knuckle 562, the second toggle lever being pivoted at its inner end at 563 to a reciprocating yoke 564 best shown in Fig. 23. This yoke has integral with it two guides 564*a*, 564*b*, which are received in suitable guideways in the frame of the machine, and is reciprocated by means of a cam 565 on a horizontal shaft 567 having at one end a large gear 568 which

meshes with a worm 569 on the main driving shaft 245.

Returning now to Fig. 24 and assuming that the bodily movement of the knuckle 562 of the toggle is controlled in a manner which will presently be described, it will be seen that reciprocation of the yoke 564 through the toggle levers 561*a*, 561, the arms 559, 557 and the long link 535 will rock the upper clutch member 518 (Fig 22) continuously so that, when this upper member is intermittently connected with the lower clutch member 519, the gears 502 and 501 will be intermittently rotated. The extent of the rocking movements of the upper clutch member determines the lengths of the intermittent feed movements imparted by the small gear 501 to a toe tip clamp; and in order to permit the extent of these movements to be varied, any suitable mechanism may be provided for controlling the bodily movement of the knuckle 562 of the toggle levers 561, 561*a*. The mechanism shown is or may be substantially the same as that shown in U. S. Letters Patent No. 1,228,768, granted June 5, 1917 upon an application filed in the name of Perley R. Glass and comprises a short link 570 pivoted at one end to the knuckle 562 and at the other end at 571 to a pivoted member 572 having a handle 573 which is held against a pin 574 by a spring 575. The knuckle 562 thus swings about the pivot 571; and, by swinging the handle to a new position and correspondingly changing the pin 574 to the proper one of the series of holes in the plate 575, the pivot 571 is moved to and held in a different position so that the knuckle 562 then swings in a different path. This mechanism for controlling the bodily movement of the knuckle 562 and thereby varying the extent of the intermittent feed movements imparted to the work will not be described further in detail, reference being made to the patent.

It has been explained above that the upper clutch member 518 (Fig. 22) is rocked back and forth about the axis of the shaft 517 of the gear 502, and that at suitably timed intervals the shaft 517 (to which the lower clutch member 519 is pinned) is pulled down and a brake applied to it. This pulling down of the shaft 517 and applying a brake to it is so timed that the gears 502, 501 (Fig. 24) are rotated intermittently in the directions indicated by the arrows so as to feed a toe tip clamp intermittently past the punching mechanism in timed relation to said mechanism. On the forward strokes of the link 535 the gears are rotated a short distance; and a toe tip clamp, which may then be connected to the small gear 501, is fed forward a short distance. On the rearward strokes of the long link 535, the gears are stationary while the toe tip is punched.

Referring now to Fig. 23, it has been explained that the clutch is disconnected and the brake applied whenever the bell-crank lever 533 is rocked in a counterclockwise direction. The mechanism for so rocking it at the proper times comprises an arm 576 having at its outer end a cam surface which engages a roll 577 on the bell-crank lever. The arm 576 is fast to one end of a small horizontal rock shaft 578, to which is also fastened the hub of a short arm 579, the outer end of this arm being connected by a link 581 to one arm of a yoke 583 which is pivoted at 584 to the frame of the machine and is oscillated by means of a cam 585 on the shaft 567.

The punching mechanism may be of any suitable well-known type. In the illustrated machine, as has been indicated, it comprises a set of small punches 587 normally covered by the usual stripper plate 588, and a reciprocating platen 589, the margin of a toe tip being fed intermittently over the stripper plate by the mechanism which has been described above. The platen is fast to the lower end of a vertical bar 590 slidably mounted in the head of the machine. One link 591 of a toggle is pivoted to the bar at 592 and the other link 593 is pivoted to the head at 594. The knuckle 595 of the toggle is connected by a short link to a long link 597 which is pivoted at 598 to the stem of the yoke 583. The link 597 has a guide slot 599 to receive a pin 601 carried by the frame. Thus oscillation of the yoke 583 imparts reciprocation to the platen 589.

The whole punching machine, as in the apparatus of my prior application is adjustable on the bed of the apparatus toward and from the clamp driving mechanism and the skiving and shrinking mechanism. In order to facilitate this adjustment a screw 602 (Fig. 23) which is threaded into the frame of the punching machine is rotatably mounted in but held from longitudinal movement with respect to a boss 603 integral with the upper end of a small rigid standard 604. A hand wheel 605 furnishes means for turning the screw.

It has been found, when certain kinds of leather, for example patent leather, are being operated upon by the shrinking mechanism, that a better result is secured if a substance such as oil, which renders the patent leather finish more flexible, is applied to the surface of the leather before the shrinking tool operates upon it. To this end (Fig. 18) an oiler 615 is provided, said oiler comprising a circular receptacle for containing oil, said receptacle having cut in its top a slot 617 in which a wick may be placed. The stem of the receptacle is pivoted about the axis of the screw 618 so that the receptacle may readily be swung from the inoperative position shown into operative position in which oil will be applied to the under side of the margin of a toe tip blank when the margin of such a blank is moved over the flat top of the receptacle 615.

The electrical circuit is shown in the diagram of Fig. 25. One of the line wires 701 leads directly to one terminal of the primary coil 702 of a transformer. The other line wire 703 leads through a resistance 704 to the other terminal of the primary coil. There is provided, however, a switch 705 by which the resistance may be cut out; and in the illustrated machine, as has been explained, this switch is of the mercury type and is contained in the switch box 207 (Fig. 1). From one terminal of the secondary coil 706 of the transformer, a conductor 707 leads to one terminal of a variable choke coil 708, while from the other terminal of the choke coil a conductor 709 leads to one of the upstanding legs of the U-shaped shrinking tool. A second conductor 710 leads directly from the other terminal of the secondary coil 706 of the transformer directly to the other upstanding leg of the U-shaped shrinking tool. With the switch closed, the variable choke coil is set to produce the desired maximum current through the shrinking tool. When the switch is open only a small current passes through the primary coil of the transformer, and only a small secondary current passes through the shrinking tool; but, when the switch is closed to cut out the resistance, a heavy current is induced in the secondary circuit which raises the shrinking tool to the desired temperature.

Assuming that there is a toe tip carrier at rest

at the loading station A (Fig. 2) the operation of the apparatus is as follows:—The operator places a toe tip blank 100 in the carrier with its rear edge in contact with the guides 123, closes the jaws of the main clamp upon the blank by pushing down the lever 147 and then depresses the treadle 119 (Fig. 1) to release the carrier. The pawl of the carrier then engages the constantly rotating ratchet 47 which moves the carrier toward the skiving mechanism, the jaws of the auxiliary clamp being at this time retracted and open. As the carrier approaches the skiving mechanism, its auxiliary jaws are pulled out or extended by the cam 214 (Fig. 16) so that only a narrow extent of the rear portion of the tip protrudes from them. Presently the upper jaw of the auxiliary clamp engages the small roll 411 whereby two results are accomplished. First the jaw is forced down into contact with the toe tip so that the toe tip shall be gripped close to its edge during the skiving operation; and second the shaft 401 is rocked to close the switch of the electrical circuit so as to cause a heavy current of electricity to flow through the shrinking tool.

At about this time the carrier is disconnected from its driving ratchet; and its segmental rack 184 is engaged by the gear 332. The skiving mechanism presently begins to operate upon the toe tip; and before this operation has been completed, the leading end of the auxiliary jaw of the clamp passes beneath the roll 189. As the carrier progresses the toe tip is subjected successively to the operation of the skiving mechanism and that of the shrinking mechanism. After the latter has been completed and the trailing end of the segmental rack of the clamp has run off from the gear 331, the clamp carrier is once more connected with its driving ratchet. As soon as the trailing end of the upper auxiliary jaw of the clamp passes from beneath the roll 213 (Fig. 16), the jaw is swung up; and presently the pin 186 (Fig. 10), which depends from the lower auxiliary jaw of the clamp, encounters the cam 216 (Fig. 18) which acts to push back or retract the jaws so that a considerable extent of the margin of the toe tip is exposed. As the clamp carrier approaches the punching mechanism, it is disconnected from its driving ratchet, by the mechanism shown in Figs. 6 to 9, and the segmental rack of the clamp is engaged by the gear 501 (Fig. 24) which acts to feed the clamp intermittently past the punching mechanism in such manner that the punching operations take place during the pauses between the intermittent feed movements. After the punching operation has been finished, the segmental rack runs out of engagement with the gear 501 and the clamp carrier is reengaged with its driving ratchet and moved to the loading station where it comes to rest.

Although the invention has been described as embodied in a particular apparatus in which a shrinking mechanism is employed to produce the finished edge, and a punching mechanism is employed to ornament the leather piece, 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.

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

1. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the operating mechanism, and feeding means associated with the operating mechanism located in the path of movement of the carrier and adapted to engage the carrier and feed it by a movement of the translation past the operating mechanism.

2. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the operating mechanism, and feeding means associated with the operating mechanism located in the path of movement of the carrier and adapted to engage the carrier and feed it by a movement of translation past the operating mechanism, and then to release it to its driving means.

3. Apparatus of the class described having, in combination, a carrier for a shoe part blank, mechanism for operating upon the blank, driving means for moving the carrier toward the operating mechanism, other driving means associated with the operating mechanism and located in the path of movement of the carrier for engaging the carrier and imparting to it a movement of translation, and means for shifting the control of the carrier from the first driving means to the second.

4. Apparatus of the class described having, in combination, a carrier for a shoe part blank, mechanism for operating upon a blank held by the carrier, driving means for moving the carrier toward the operating mechanism, means for disconnecting the carrier from its driving means, and means located in the path of movement of the carrier for thereafter engaging the carrier and feeding it by a movement of translation past the operating mechanism.

5. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank, means for moving the carrier toward the mechanism, means becoming operative when the carrier has reached a predetermined position for rendering inoperative the carrier moving means, and means located in the path of movement of the carrier for engaging the carrier and feeding it by a movement of translation past the operating mechanism.

6. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank, driving means for the carrier adapted to cause the carrier to approach the operating mechanism, means for disconnecting the carrier from its driving means during the operation of the operating mechanism upon the blank and for reconnecting the carrier with its driving means after said operation, and means located in the path of movement of the carrier operating between the connecting and disconnecting of the carrier from its driving means for engaging the carrier and imparting to it a movement of translation to feed it past the operating mechanism.

7. Apparatus of the class described having, in combination, skiving mechanism, punching mechanism, a carrier for a shoe part blank, feeding means associated with the skiving mechanism for engaging the carrier and feeding it past the skiving mechanism, other feeding means associated with the punching mechanism for engaging the carrier and feeding it past said punching mechanism, and driving means for the carrier for presenting the carrier to the two feeding means.

8. Apparatus for performing two separate operations upon a shoe part blank having, in combination, a carrier for a blank, two spaced mechanisms for operating upon the blank, each mechanism having associated with it means located in the

path of movement of the carrier for engaging and feeding the carrier by a movement of translation, driving means for the carrier adapted to present the carrier first to one feeding means and then to the other, and means for disconnecting the carrier from its driving means during the operations of the two mechanisms whereby during the two operations the respective feeding means engage and feed the carrier past the operating mechanisms.

9. Apparatus of the class described having, in combination, shrinking mechanism, punching mechanism, a carrier for a shoe part blank, feeding means associated with the shrinking mechanism for engaging the carrier and feeding it past said shrinking mechanism, other feeding means associated with the punching mechanism for engaging the carrier and feeding it past said punching mechanism, and driving means for presenting the carrier to the two feeding means.

10. Apparatus of the class described having, in combination, shrinking mechanism, punching mechanism, a carrier for a shoe part blank, feeding means associated with the shrinking mechanism for engaging the carrier and feeding it continuously past said shrinking mechanism, other feeding means associated with the punching mechanism for engaging the carrier and feeding it intermittently past said punching mechanism, and driving means for presenting the carrier to the two feeding means.

11. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier movable toward the mechanism and having a member by which it may be engaged and fed, a feeding member associated with the operating mechanism and adapted to engage the member on the carrier and feed the carrier past the operating mechanism, one of said members being mounted for yielding movement to ensure proper engagement of the members.

12. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier movable toward the mechanism and having a member by which it may be engaged and fed, a feeding member associated with the operating mechanism and adapted to engage the member on the carrier and feed the carrier past the operating mechanism, one of said members being mounted for bodily movement to ensure proper engagement of the members.

13. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier movable toward the mechanism and having a member by which it may be engaged and fed, a feeding member associated with the operating mechanism and adapted to engage the member on the carrier and feed the carrier past the operating mechanism, one of said members being mounted for yielding bodily movement to ensure proper engagement of the members.

14. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank movable to and past said mechanism, a rack on said carrier, a gear associated with the operating mechanism and adapted to engage the rack, and means for mounting said gear for yielding movement to ensure its meshing with the rack.

15. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank movable to and past said mechanism, a rack on said carrier, a gear for engaging the rack associated with the operating mechanism and adapted to engage said rack, a gear casing in which said gear is mounted, and means for mounting said gear casing for yielding movement.

16. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank movable to and past said mechanism, a rack on said carrier, a gear for engaging the rack associated with the operating mechanism and adapted to engage said rack, a pivoted casing in which said gear is mounted, and means for mounting said gear casing for yielding movement about its pivot.

17. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank movable to and past said mechanism, a rack on said carrier, a gear for engaging the rack associated with said mechanism, a second gear for driving the first-named gear, and a casing for the gears pivoted about the axis of the second gear.

18. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for the blank movable to and past said mechanism, a rack on said carrier, a gear for engaging the rack associated with said mechanism, a second gear for driving the first-named gear, a casing for the gears pivoted about the axis of the second gear, and yielding means for permitting the casing to swing about its pivot.

19. Apparatus of the class described having, in combination, punching mechanism for operating upon a shoe part blank, a carrier movable to present a blank to the punching mechanism, and means associated with said mechanism for engaging the carrier and feeding it intermittently past the operating instrumentalities of said mechanism.

20. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank and a carrier for presenting the blank to the mechanism, said carrier being operable during its movement to expose a given extent of the blank during the operation of the mechanism and to expose a different extent after the operation has been completed.

21. Apparatus of the class described, having, in combination, mechanism for operating upon a shoe part blank and a carrier for presenting the blank to the mechanism, said carrier being operable during its movement to expose a given extent of the blank during the operation of the mechanism and to expose a greater extent after the operation has been completed.

22. Apparatus of the class described having, in combination, two spaced mechanisms for operating successively upon a shoe part blank, a carrier for presenting the blank first to one mechanism and then to the other, and means for operating the carrier to expose a greater extent of the blank during the operation of one mechanism than during the operation of the other.

23. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier movable to and past said mechanism, said carrier comprising a pair of jaws normally retracted so as to expose a considerable extent of the blank, and means operating before the blank reaches the mechanism for moving the jaws out so that less of the blank is exposed.

24. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier movable to and past said mechanism, said carrier comprising a pair of jaws normally open and retracted so as to expose a considerable extent of the blank, and means operating before the blank reaches the mechanism for moving the jaws out so that less of the blank is exposed and for closing the jaws upon the blank.

25. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier movable to and past said mechanism, said carrier comprising a pair of jaws which are movable out and in to expose respectively less or more of the blank during the operation of the mechanism, and cams for respectively moving the jaws out before the carrier reaches a position in which the blank is presented to the operating mechanism and for moving the jaws in after the operation of the mechanism upon the blank.

26. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for presenting the blank to the mechanism, said carrier comprising two pairs of blank holding members, one pair of which is normally open, and means for closing the open pair upon the blank and holding them closed during the operation of the mechanism and for permitting them to open after the operation has been completed.

27. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for presenting the blank to the mechanism, said carrier comprising two pairs of blank holding members, one pair of which is normally open, and means associated with the operating mechanism for closing the open pair upon the blank and holding them closed during the operation of the mechanism and for permitting them to open after the operation has been completed.

28. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier for presenting the blank to the mechanism, said carrier comprising two pairs of jaws, one pair of which clamps the blank continuously and the other of which is normally out of clamping relation with the blank, and means for causing said other pair to clamp the blank during the operation of the mechanism.

29. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier movable to present the blank to the mechanism, said carrier comprising two pairs of jaws, one pair of which clamps the blank continuously and the other of which is normally out of clamping relation with the blank, and means associated with the operating mechanism for causing said other pair to clamp the blank during the operation of the mechanism.

30. Apparatus of the class described having, in combination, two mechanisms for operating successively upon a shoe part blank, and a carrier for presenting the blank first to one mechanism and then to the other, and means for causing said carrier to expose a greater extent of the blank during the operation of one mechanism than during that of the other.

31. Apparatus of the class described having, in combination, two mechanisms for operating successively upon a shoe part blank, a carrier in the form of a clamp for presenting the blank successively to the mechanisms, said clamp having a pair of jaws, and means for operating the jaws to expose different extents of the blank during the respective operations of the mechanisms.

32. Apparatus of the class described having, in combination, two mechanisms for operating successively upon a shoe part blank, and a carrier for presenting the blank successively to said mechanisms, said carrier comprising two pairs of jaws, one pair of which is movable toward and from the other pair so as to expose more or less of the blank during the respective operations of the mechanisms.

33. Apparatus of the class described having, in combination, two mechanisms for operating successively upon a shoe part blank, and a carrier for presenting the blank successively to said mechanisms, said carrier comprising a clamp having two pairs of jaws, the members of each pair being pivoted together, one pair of jaws with its pivot being movable so as to expose more or less of the blank during the respective operations of the mechanisms.

34. Apparatus of the class described having, in combination, two mechanisms for operating upon a shoe part blank and a carrier for presenting the blank successively to the mechanisms, said carrier comprising a frame, a main clamp one jaw of which is rigid with the frame and the other of which is pivoted to the frame, and an auxiliary clamp, one jaw of which is slidable with respect to the frame and the other of which is pivoted to and slidable with the first-named jaw of the auxiliary clamp.

35. Apparatus of the class described having, in combination, a shrinking mechanism and a punching mechanism for operating successively upon a shoe part blank, and a carrier for presenting the blank successively to the mechanisms, said clamp having a pair of jaws movable toward and from the edge of the shoe part to expose less or more of the blank during the respective operations of the mechanisms.

36. Apparatus of the class described having, incombination, a shrinking mechanism and a punching mechanism for operating successively upon a shoe part blank, a carrier for presenting the blank first to one mechanism and then to the other, and means for causing said carrier to expose a given extent of the blank during the operation of the shrinking mechanism and a greater extent of the blank during the operation of the punching mechanism.

37. Apparatus of the class described having, in combination, a shrinking mechanism and a punching mechanism for operating successively upon a shoe part blank, and a carrier for presenting the blank first to one mechanism and then to the other, and means for causing said carrier to expose a given extent of the blank during the operation of the shrinking mechanism and a greater extent during the operation of the punching mechanism.

38. Apparatus of the class described having, in combination, a shrinking mechanism and a punching mechanism for operating successively upon a shoe part blank, and a carrier for presenting the blank successively to said mechanisms, said carrier comprising a clamp having two pairs of jaws, one pair of which is movable toward and from the other to expose a given extent of the blank during the operation of the shrinking mechanism and a greater extent during the operation of the punching mechanism.

39. Apparatus of the class described having, in combination, mechanism for operating upon a

shoe part blank, a blank carrier, driving means for moving the carrier toward the operating mechanism, said carrier being operable to expose a given extent of the blank during the operation of the mechanism and to expose a different extent after the operation of the mechanism has been completed, and feeding means associated with the operating mechanism adapted to engage the carrier and feed it past the operating mechanism.

40. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier comprising a pair of jaws normally open and retracted so as to expose a considerable extent of the blank, driving means for moving the carrier toward the operating mechanism, means operating before the blank reaches the mechanism for moving the jaws out so that less of the blank is exposed for closing them upon the blank, and feeding means associated with the operating mechanism for engaging the carrier and feeding it past said mechanism.

41. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier comprising a pair of jaws which are movable out and in so as to expose less or more of the blank during the operation of the mechanism, driving means for moving the carrier toward the mechanism, a cam for moving the jaws out before the carrier reaches a position in which the blank is presented to the operating mechanism, means for disconnecting the carrier from its driving means before the blank reaches the operating mechanism, and feeding means associated with the operating mechanism for engaging the blank and feeding it past the operating mechanism.

42. Apparatus of the class described having, in combination, two mechanisms for operating successively upon a shoe part blank, a blank carrier, driving means for presenting the carrier successively to the mechanisms, feeding means, one associated with each operating mechanism for engaging the carrier and feeding it respectively past the mechanisms, and means for causing the carrier to expose a given extent of the blank during the operation of one mechanism and a greater extent during the operation of the other mechanism.

43. Apparatus of the class described having, in combination, a carrier for a shoe part blank comprising two pairs of jaws, one pair of which is movable toward and from the other pair so as to expose more or less of the blank, two mechanisms for operating successively upon the blank, each mechanism having associated with it means for engaging and feeding the carrier, driving means for the carrier adapted to present the carrier first to one feeding means and then to the other, means for disconnecting the carrier from its driving means during the operations of the two mechanisms whereby during the two operations the respective feeding means engage and feed the carrier, means operating upon the moving carrier before it reaches one mechanism to move one pair of jaws toward the edge of the blank before the blank reaches one of the mechanisms, and other means, operating upon the same pair of jaws to move them in the opposite direction before the blank reaches the other mechanism.

44. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to said mechanism, a station at which the carriers are brought to rest after they have passed the mechanism, and means for arresting a following carrier before it reaches the mechanism whenever a predetermined number of carriers are located between the mechanism and the station.

45. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable in a predetermined path, there being a portion of the path leading away from the mechanism in which a group of carriers may come to rest one behind another, and means operated by one of the members of the group, when a predetermined number have thus come to rest, for arresting a next following carrier before it reaches the mechanism.

46. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to the mechanism, and means operated by a leading carrier as it moves away from the mechanism for arresting a following carrier before it reaches the mechanism.

47. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to the mechanism, and means operated by a leading carrier as it moves away from the mechanism for arresting a following carrier before it reaches the mechanism, said means becoming inoperative when the leading carrier has moved a predetermined distance away from the mechanism whereby the following carrier is released and permitted to move to the mechanism.

48. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to the mechanism, a member normally held in inoperative position and adapted, when in operative position, to arrest a carrier before it reaches the mechanism, and means operated by each carrier after it has left the mechanism for moving the member into and holding it for an interval in position to arrest the next following carrier.

49. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to the mechanism, a member normally held in inoperative position and adapted, when in operative position, to arrest a carrier before it reaches the mechanism, and means operated by each carrier after it has left the mechanism for moving the member into and holding it for an interval in position to arrest the next following carrier, said arresting member being released by each carrier when the carrier has reached a predetermined position away from the operating mechanism.

50. Apparatus of the class described having, in combination, a plurality of carriers for shoe part blanks movable in an orbital path, a loading station for the carriers and mechanism for operating upon the blanks, said loading station and mechanism both being located adjacent to said path, means for arresting the carriers at the loading station whereby a number of carriers may collect between the operating mechanism and the loading station, and means for arresting a following carrier before it reaches the mechanism whenever a predetermined number of car-

riers are at rest between the mechanism and the loading station.

51. Apparatus of the class described having, in combination, a plurality of carriers for shoe part blanks movable in an orbital path, a loading station and a punching mechanism located adjacent to said path, and means associated with the punching mechanism for arresting a following carrier before it presents a blank to the punching mechanism whenever a predetermined number of carriers ahead of it have collected between the punching mechanism and the loading station.

52. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to the mechanism, and a member having a portion projecting into the path of the carriers beyond the operating mechanism and adapted to be moved by a leading carrier into a position to arrest a following carrier before said following carrier presents its blank to said mechanism.

53. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers movable to present blanks in succession to the mechanism, and a pivoted member having a portion projecting into the path of the carriers beyond the punching mechanism and adapted to be swung by a leading carrier into a position to arrest a following carrier before said following carrier presents its blank to said mechanism.

54. Apparatus of the class described having, in combination, a carrier for shoe part blanks movable in a predetermined path, and a skiving mechanism adjustable with respect to said path in the plane of the path of the carrier.

55. Apparatus of the class described having, in combination, a carrier for shoe part blanks movable in a curved path, and a skiving mechanism adjustable toward and from the center of curvature of said path in the plane of the path of the carrier.

56. Apparatus of the class described having, in combination, a carrier for shoe part blanks movable in a curved path the curvature of which may be varied to provide for blanks having differently curved edges, and a skiving mechanism for operating upon the curved edges of the blanks, said mechanism being angularly adjustable to bring its skiving instrumentalities into proper positions to operate upon said edges.

57. Apparatus of the class described having, in combination, a carrier for shoe part blanks movable in a curved path and skiving mechanism for operating upon the blanks, and said skiving mechanism being adjustable angularly in one path and toward and from the center of curvature of the path in another path.

58. Apparatus of the class described having, in combination, skiving mechanism, and a carrier for shoe part blanks movable in a circular path to present the blank to the mechanism, said skiving mechanism being adjustable angularly in one path and toward and from the center of the circular path in another path.

59. Apparatus of the class described having, in combination, skiving mechanism, shrinking mechanism, and a carrier movable in a path to present a shoe part blank first to the skiving mechanism and then to the shrinking mechanism, said skiving mechanism being adjustable angularly in one path and in a direction normal to the path of the carrier in another path.

60. Apparatus of the class described having, in combination, a skiving mechanism, a shrinking mechanism, and a carrier movable in a path to present a shoe part blank in succession to said mechanisms, said skiving mechanism being adjustable toward and from said path in the plane of the path of the carrier.

61. Apparatus of the class described having, in combination, a skiving mechanism, a shrinking mechanism, and a carrier movable in a path to present a shoe part blank in succession to said mechanisms, said skiving mechanism being adjustable angularly about an axis which is substantially perpendicular to the plane of said path.

62. Apparatus of the class described having, in combination, a carrier for shoe part blanks movable in a curved path, a plate adjustable on the base of the apparatus, and a skiving mechanism adjustbly mounted upon the plate.

63. Apparatus of the class described having, in combination, shrinking mechanism including a shrinking tool, means for intermittently raising the tool to a high temperature and then permitting the temperature to fall, and supporting members for the tool adapted to engage the tool at spaced localities, one of said members being movable with respect to the other to provide for expansion of the tool due to its changes in temperature.

64. Apparatus of the class described having, in combination, shrinking mechanism including a shrinking tool, means for intermittently raising the tool to a high temperature and then permitting the temperature to fall, and supporting members for the tool adapted to engage the tool at spaced localities, one of said members being pivoted for swinging movement with respect to the other to provide for expansion of the tool due to its changes in temperature.

65. Apparatus of the class described having, in combination, shrinking mechanism including a shrinking tool, a carrier for presenting a shoe part blank to the tool, means operated by the carrier for raising the tool to a high temperature and then permitting the temperature to fall, and supporting members for the tool adapted to engage the tool at spaced localities, one of said members being movable with respect to the other to provide for expansion of the tool due to its changes in temperature.

66. Apparatus of the class described having, in combination, shrinking mechanism for operating upon a shoe part blank, a blank carrier, means for moving the carrier toward and past the mechanism, and means for applying oil to one side of the moving blank before it reaches the shrinking mechanism.

67. Apparatus of the class described having, in combination, shrinking mechanism for operating upon a shoe part blank having a patent leather finish on its display side, a blank carrier, means for moving the carrier toward and past the mechanism, and means for applying to said display side, before the blank reaches the shrinking mechanism, a substance which renders the patent leather finish more flexible.

68. Apparatus of the class described having, in combination, mechanism for punching a shoe part blank, a blank carrier, driving means for moving the carrier toward the mechanism, and a feed member associated with the punching mechanism for engaging the carrier and feeding it past the punching mechanism.

69. Apparatus of the class described having, in combination, mechanism for punching a shoe part blank, a blank carrier, driving means for

moving the carrier toward the mechanism, and a feed member associated with the punching mechanism for engaging the carrier and feeding it intermittently past the punching mechanism.

70. Apparatus of the class described having, in combination, mechanism for punching a shoe part blank, a blank carrier, driving means for moving the carrier toward the mechanism, and a feed member associated with the punching mechanism for engaging the carrier and feeding it past the punching mechanism, said punching mechanism being adjustable with respect to the feed member to cause the punching mechanism to operate closer to or farther from the edge of the blank.

71. Apparatus of the class described having, in combination, mechanism for punching a shoe part blank, a blank carrier, driving means for moving the carrier toward the mechanism, and a feed member associated with the punching mechanism for engaging the carrier and feeding it intermittently past the punching mechanism, said punching mechanism being adjustable with respect to the feed member to cause the punching mechanism to operate closer to or farther from the edge of the blank.

72. Apparatus of the class described having, in combination, punching mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the mechanism, a gear for engaging the carrier and feeding it past the punching mechanism, and means for operating the gear intermittently.

73. Apparatus of the class described having, in combination, a shrinking mechanism and a punching mechanism for operating successively upon a shoe part blank, a carrier for the blank, and means including a friction drive for moving the carrier from one mechanism to the other.

74. Apparatus of the class described having, in combination, a plurality of spaced mechanisms for performing different operations upon a shoe part blank, a carrier for the blank, friction driving means for moving the carrier toward one mechanism and from that mechanism toward the other mechanism, means for disconnecting the driving means from the carrier prior to the operation of each mechanism and for reconnecting the carrier with its driving means after the operation of each mechanism, and a plurality of means associated one with each mechanism and located in the path of movement of the carrier for feeding the carrier past each mechanism, each feeding means being held from movement of translation with respect to the operating mechanism with which it is associated.

75. Apparatus of the class described having, in combination, a skiving mechanism, a shrinking mechanism and a punching mechanism for operating successively upon a shoe part blank, a carrier for the blank, and means including a friction drive for presenting the carrier in succession to the mechanisms.

76. Apparatus of the class described having, in combination, a plurality of spaced mechanisms for operating upon a shoe part blank, a carrier for the blank, means including a friction drive for moving the carrier from one mechanism to another, and feeding means, one associated with each mechanism and held from movement of translation with respect to it, for engaging the carrier and feeding it past said mechanisms.

77. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, means including a friction drive for moving the carrier to the mechanism, and feeding means associated with the mechanism and held from movement of translation with respect to it for engaging the carrier and feeding it past said mechanism during the operation of said mechanism, said feeding means being constructed and arranged to release the carrier after the operation to permit the friction drive to move the carrier away from the mechanism.

78. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers for presenting blanks in succession to said mechanism, means for moving certain of the carriers at different speeds at the same time, and means including arresting plates mounted upon the carriers and located at different levels for preventing a carrier from overtaking the one in front of it.

79. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers, driving means for causing the carriers to present blanks in succession to said mechanism, means for disconnecting a carrier from the driving means, and means including an arresting plate mounted upon a leading carrier and an upstanding arm mounted upon a following carrier for disconnecting the following carrier from the driving means.

80. Apparatus of the class described having, in combination, mechanism for operating upon shoe part blanks, a plurality of carriers for presenting blanks in succession to said mechanism, each carrier having an arresting plate located at a level different from that of the plate of any other carrier, and means on each carrier for engaging the arresting plate of the carrier ahead of it.

81. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a carrier, driving means for moving the carrier toward the mechanism, a member movable to connect the carrier with its driving means and to disconnect it therefrom, a trip for operating said member, and a two-part stationary cam for operating the trip, the two parts of the cam being relatively adjustable to vary the effective length of the cam.

82. Apparatus of the class described having, in combination, shrinking mechanism, including a tool adapted to be heated, for operating upon a shoe part blank, a blank carrier including a pair of jaws which are normally open, means for moving the carrier toward the shrinking mechanism, and means encountered by one of the open jaws for raising the temperature of the tool and for closing the jaws upon the blank.

83. Apparatus of the class described having, in combination, shrinking mechanism including a tool for operating upon a shoe part blank, a blank carrier movable toward and past said tool, and means operated by the carrier during its movement toward the shrinking mechanism for supplying heat to the tool.

84. Apparatus of the class described having, in combination, shrinking mechanism including a shrinking tool for operating upon a shoe part blank, a blank carrier movable toward and past the tool, and a member extending into the path of movement of the carrier as it approaches the shrinking mechanism for supplying heat to the tool.

85. Apparatus of the class described having, in combination, shrinking mechanism including a shrinking tool, a blank carrier movable toward and past the tool, means for causing a small

current of electricity normally to flow through the tool to maintain it at a given temperature, and means operated by the moving carrier for increasing the current of electricity.

86. Apparatus of the class described having, in combination, shrinking mechanism and a punching mechanism located at different points upon a circular path, a carrier for a shoe part blank, means including a friction drive for moving the carrier first to one mechanism and then to the other, and feeding means one associated with each mechanism for engaging the carrier and feeding it past said mechanisms.

87. Apparatus of the class described having, in combination, a carrier for a shoe part blank, mechanism for operating upon the blank, friction driving means for moving the carrier toward the operating mechanism, and other driving means associated with the operating mechanism and located in the path of movement of the carrier for taking control of the carrier and feeding it by a movement of translation past the operating mechanism.

88. Apparatus of the class described having, in combination, a carrier for a shoe part blank, mechanism for operating upon the blank, friction driving means for moving the carrier toward the operating mechanism, and other driving means located in the path of movement of the carrier and associated with the operating mechanism for first taking control of the carrier and feeding the carrier by a movement of translation past the operating mechanism, and thereafter permitting the friction driving means to assume control once more.

89. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the operating mechanism in a predetermined path, and continuously operating feeding means associated with the operating mechanism located in the path of feed movement of the carrier and adapted to engage the carrier and feed it past the operating mechanism in a continuation of said path.

90. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the operating means in a predetermined path, a feed member associated with the operating mechanism, means for operating the feed member continuously, and means movable with the carrier into engagement with the feed member to cause the feed member to feed the carrier by a movement of translation past the operating mechanism.

91. Apparatus of the class described having, in combination, mechanism for operating upon a shoe tip having a curved edge, a blank carrier adapted to grip the tip in such manner as to leave the margin adjacent to the curved edge exposed, driving mechanism for moving the carrier toward the operating mechanism in a curved path, a continuously operated feed member associated with the operating mechanism, and a cooperating member movable with the carrier into engagement with the feed member to cause the feed member to feed the carrier bodily past the operating mechanism in the same curved path.

92. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the operating mechanism, feeding means associated with the operating mechanism, means for operating the feeding means continuously, said carrier being provided with means adapted to be moved by movement of the carrier into engagement with the feeding means to cause said feeding means to feed the carrier past said operating mechanism.

93. Apparatus of the class described having, in combination, a carrier having a feed member movable therewith, mechanism for operating upon a blank held by the carrier, driving means for moving the carrier toward the operating mechanism, means for disconnecting the carrier from its driving means, and continuously operated means for engaging the feed member on the carrier and feeding the carrier by a movement of translation past the operating mechanism.

94. Apparatus of the class described having, in combination, a carrier for a shoe part blank, mechanism for operating upon the blank, friction driving means for moving the carrier toward the operating mechanism, feeding means associated with the operating mechanism, and a member fast to the carrier and adapted to be moved by movement of the carrier into engagement with the feeding means to cause said feeding means to feed the carrier by a movement of translation past said operating mechanism.

95. Apparatus of the class described having, in combination, a carrier for holding flat a shoe part blank of sheet material with a portion of the blank exposed to be operated upon, mechanism for operating upon the exposed portion of the blank, driving means for moving the carrier toward the operating mechanism, and feeding means located at all times in a position adjacent to the operating mechanism and adapted to engage the carrier as it approaches the operating mechanism and feed it past said mechanism.

96. Apparatus of the class described having, in combination, a carrier for holding a shoe part blank, said carrier being movable in a predetermined path, a plurality of mechanisms spaced apart along said path for operating upon the blank, driving means for moving the carrier toward said mechanisms, and separate feeding means located respectively at all times one adjacent to each operating mechanism for engaging the carrier as it approaches the mechanism near which the feeding means is located and feeding it past that mechanism.

97. Apparatus of the class described having in combination, mechanism for operating upon a shoe part blank, a plurality of carriers movable independently of one another in a predetermined path so that a leading carrier may at one time be located near to a following carrier and at another time farther from a following carrier, driving means for moving the carriers toward the operating mechanism irrespective of the distance between the carriers, and feeding means adapted to engage the carriers as they approach the operating mechanism and feed them in such manner as to present successive portions of the blanks to said mechanism.

98. Apparatus of the class described having, in combination, mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the operating mechanism in a predetermined path, and feeding means adapted to engage the carrier as it approaches the operating mechanism and feed it past that mechanism in a continuation of said path.

99. Apparatus of the class described having, in combination, mechanism for skiving a shoe part blank, a blank carrier, driving means for moving

the carrier toward the skiving mechanism, and feeding means for engaging the carrier and feeding it past the skiving mechanism.

100. Apparatus of the class described having, in combination, mechanism for skiving a shoe part blank, a blank carrier, driving means for moving the carrier toward the skiving mechanism, and feeding means located at all times adjacent to the skiving mechanism for engaging the carrier and feeding it past the skiving mechanism.

101. Apparatus of the class described having, in combination, shrinking mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the shrinking mechanism, and feeding means for engaging the carrier and feeding it past the shrinking mechanism.

102. Apparatus of the class described having, in combination, shrinking mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the shrinking mechanism, and feeding means located at all times adjacent to the shrinking mechanism for engaging the carrier and feeding it past the shrinking mechanism.

103. Apparatus of the class described having, in combination, punching mechanism for operating upon a shoe part blank, a blank carrier, driving means for moving the carrier toward the punching mechanism, and feeding means for engaging the carrier and feeding it past the punching mechanism.

104. Apparatus of the class described having, in combination, mechanism for operating upon a blank of upper leather to produce a finished edge thereon, a blank carrier, and means independent of the blank for causing the carrier to move at a given speed to present the blank to the mechanism and to feed the blank by a movement of translation at a slower speed past said mechanism.

105. Apparatus of the class described having, in combination, mechanism for operating upon a blank of upper leather to produce a finished edge thereon, punching mechanism, a blank carrier and means independent of the blank for causing the carrier to move at a given speed to present the blank successively to the two mechanisms and to feed the blank by movements of translation at a slower speed past said mechanisms.

106. Apparatus of the class described having, in combination, mechanism for operating upon blanks of upper leather to produce finished edges thereon, a plurality of blank carriers mounted for movement in an orbital path to present the blanks to and to carry them past said mechanism, and means independent of the blanks for moving the carriers at different speeds in different portions of their paths whereby the distances between adjacent carriers vary during the operation of the machine.

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