

May 13, 1958

E. JAAKKOLA

2,834,413

SOLE BLANKING APPARATUS

Filed Nov. 8, 1954

9 Sheets-Sheet 1

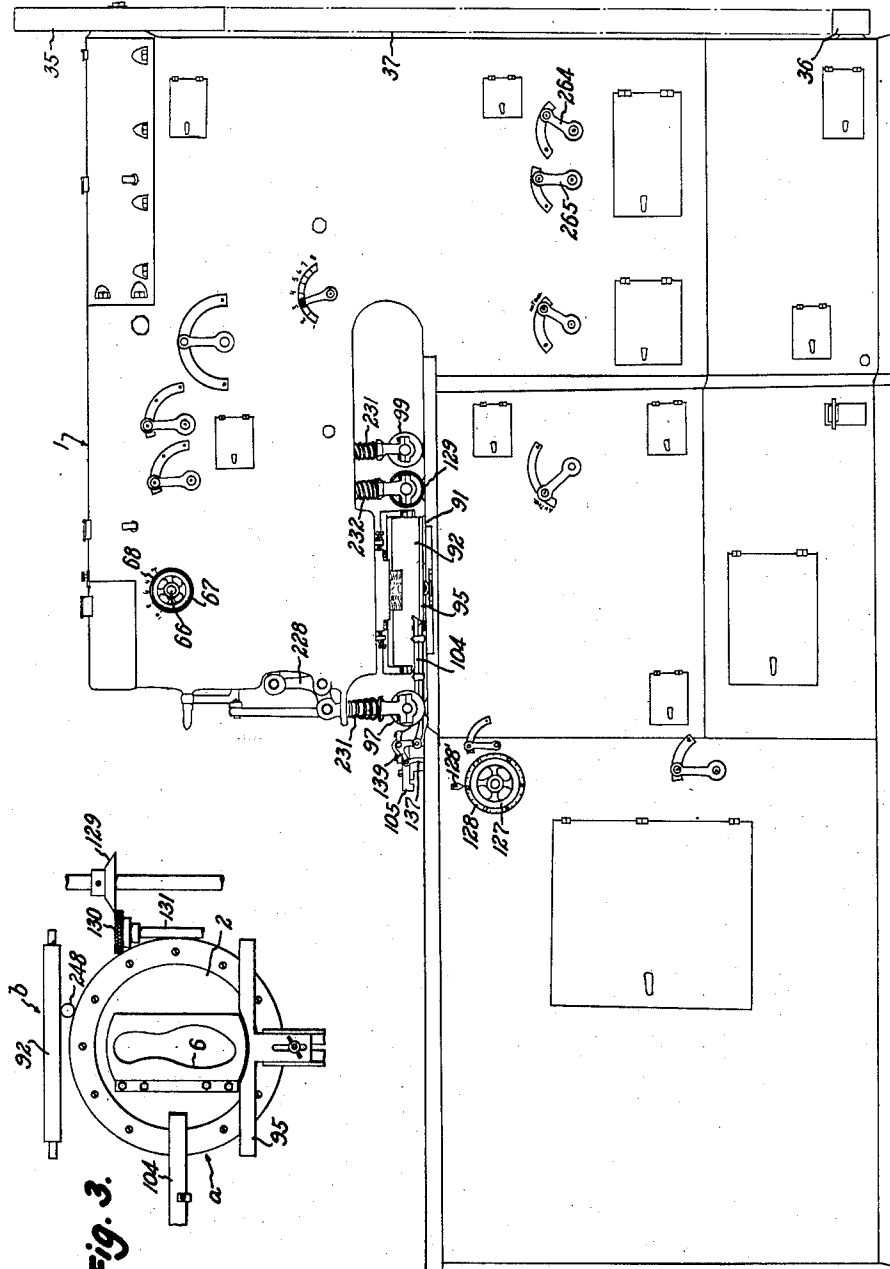


Fig. 1.

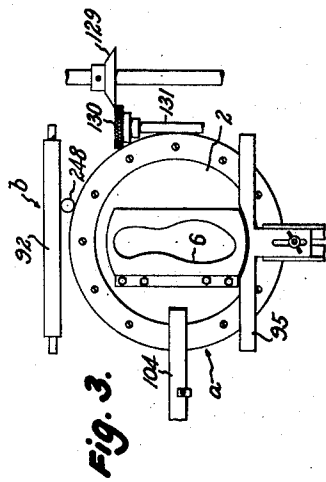


Fig. 3.

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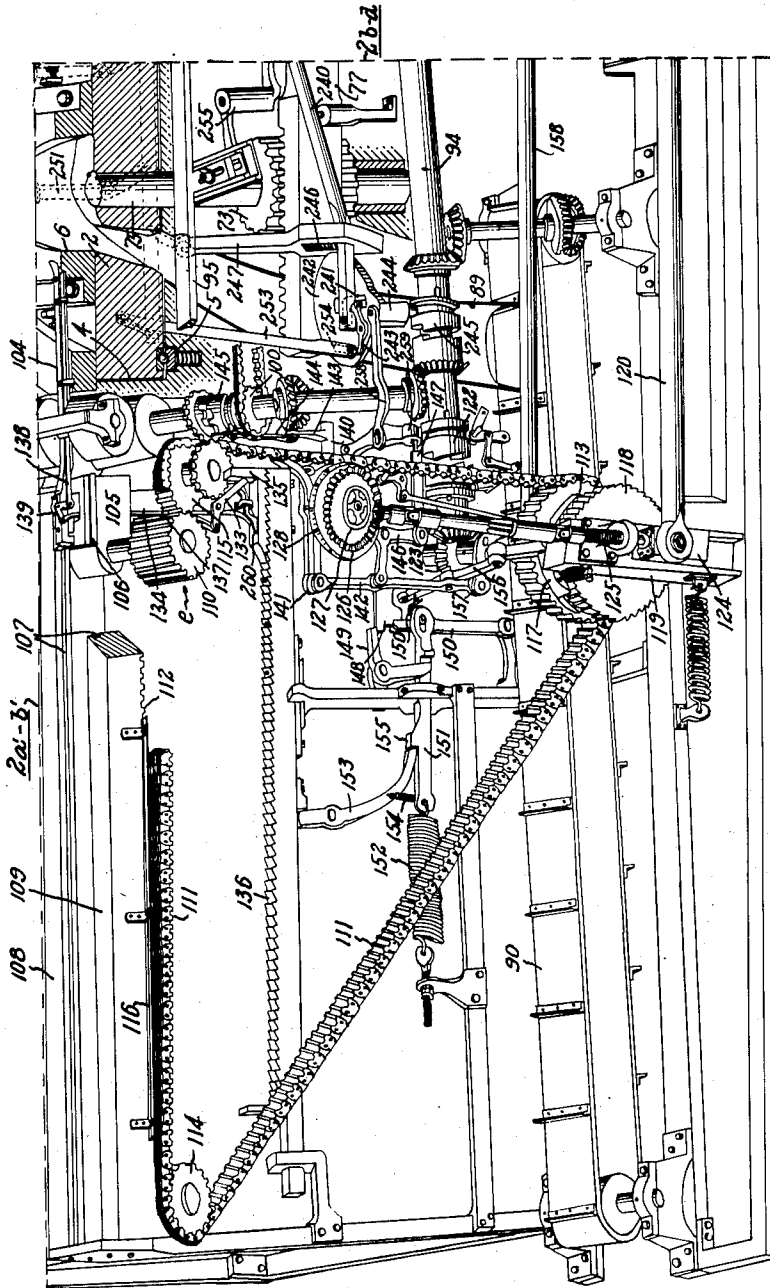


Fig. 2b.

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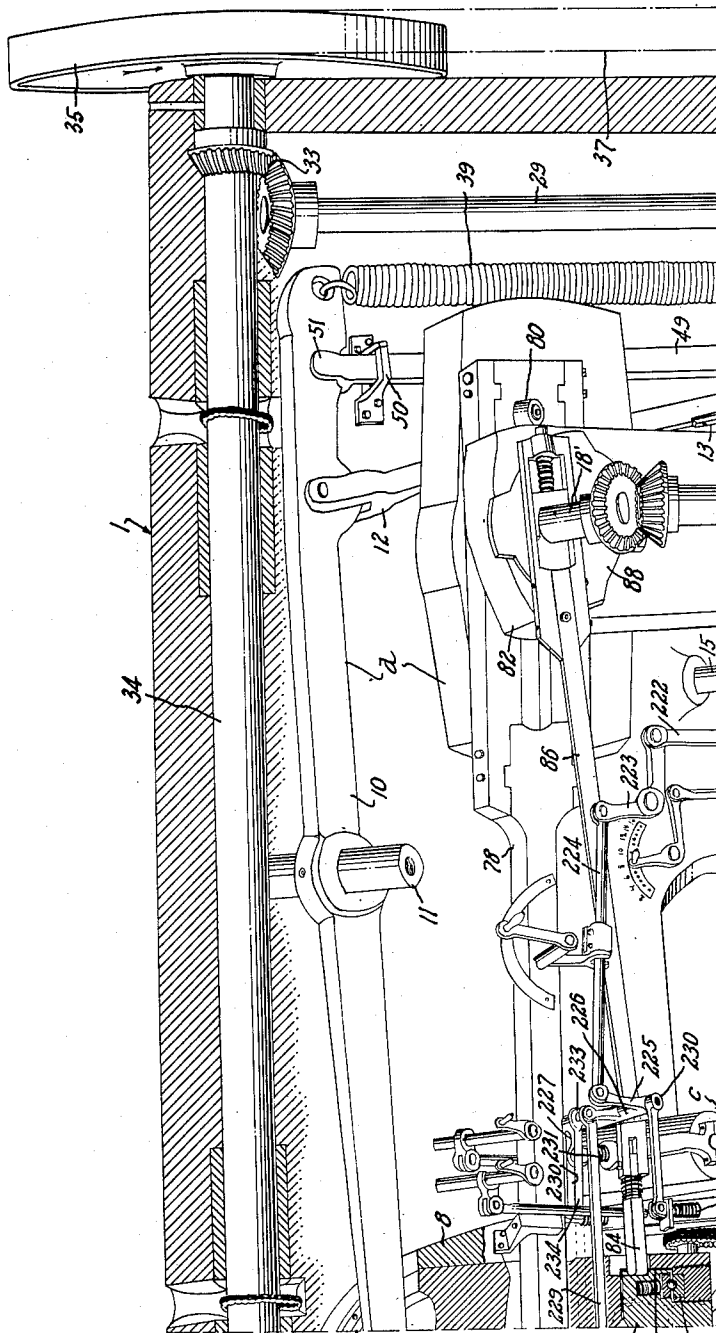


Fig. 2c.

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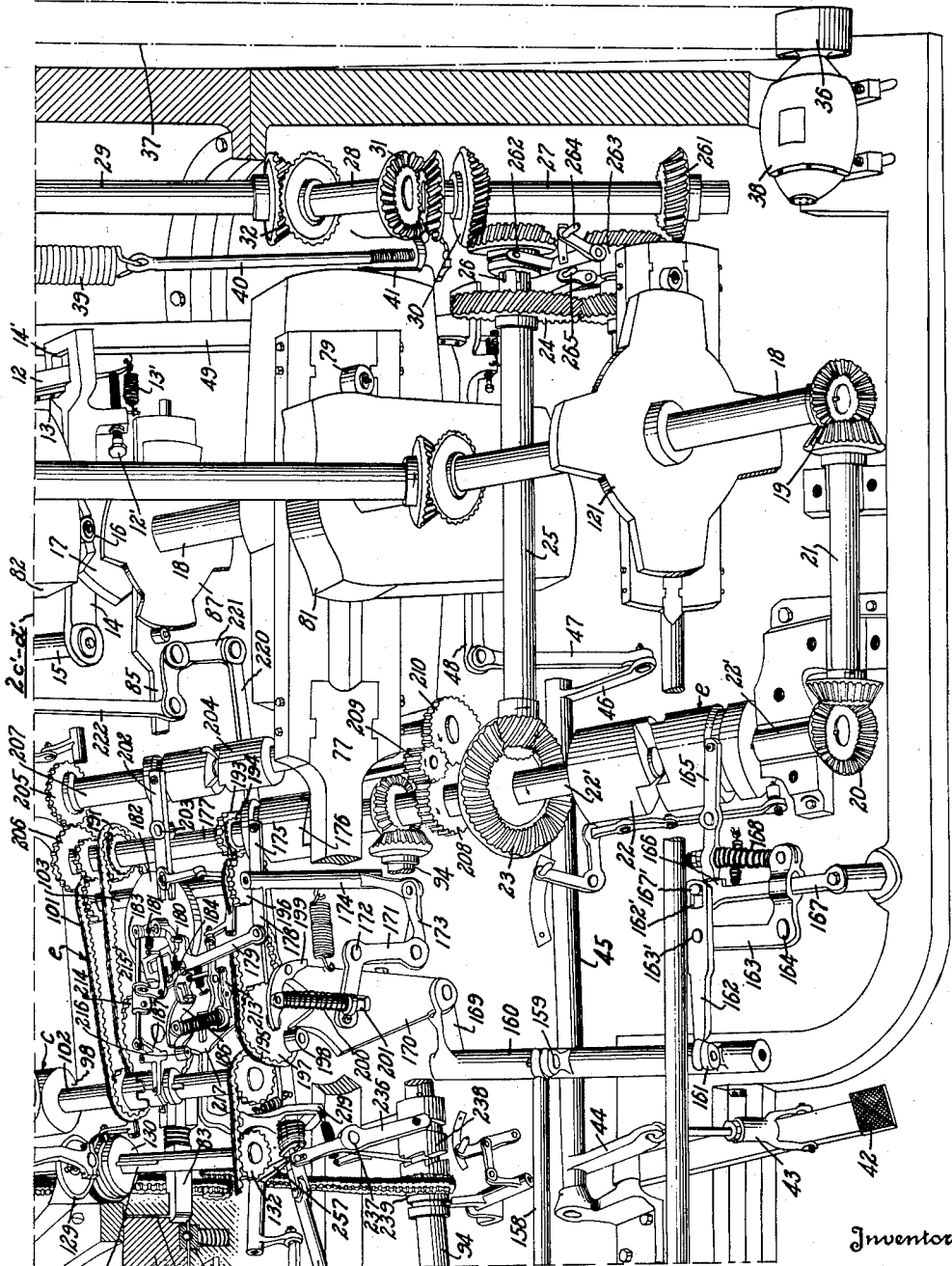


Fig. 2d.

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## SOLE BLANKING APPARATUS

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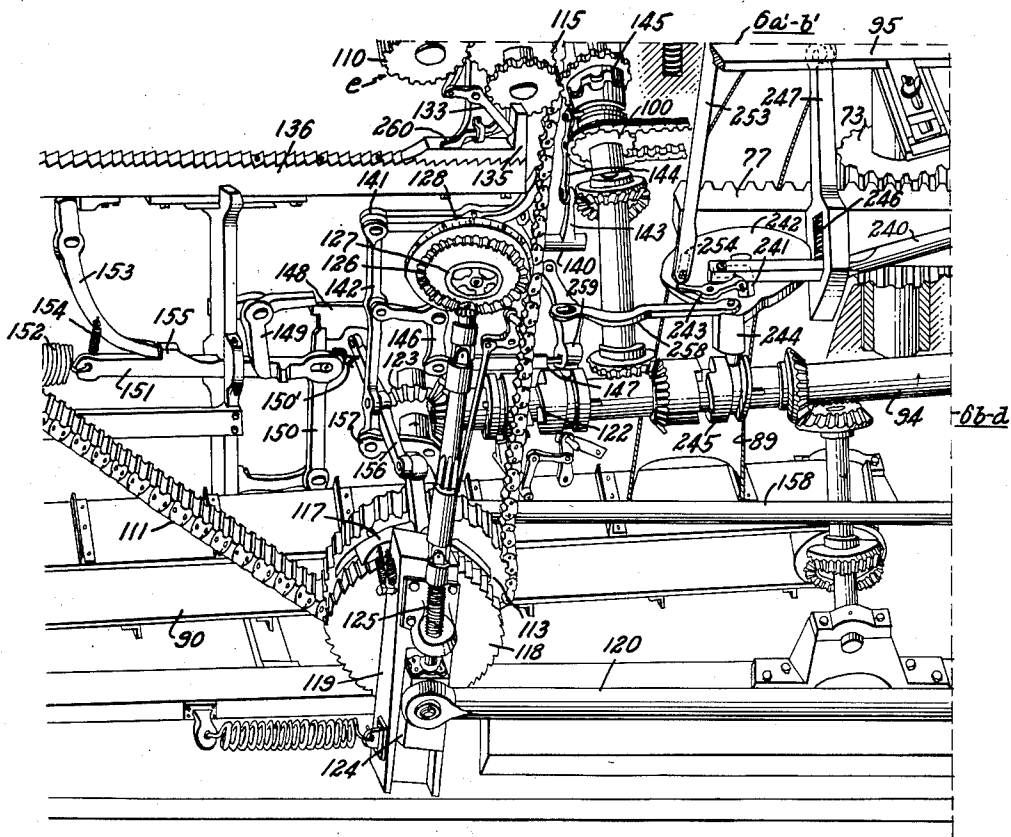
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Fig. 6b.



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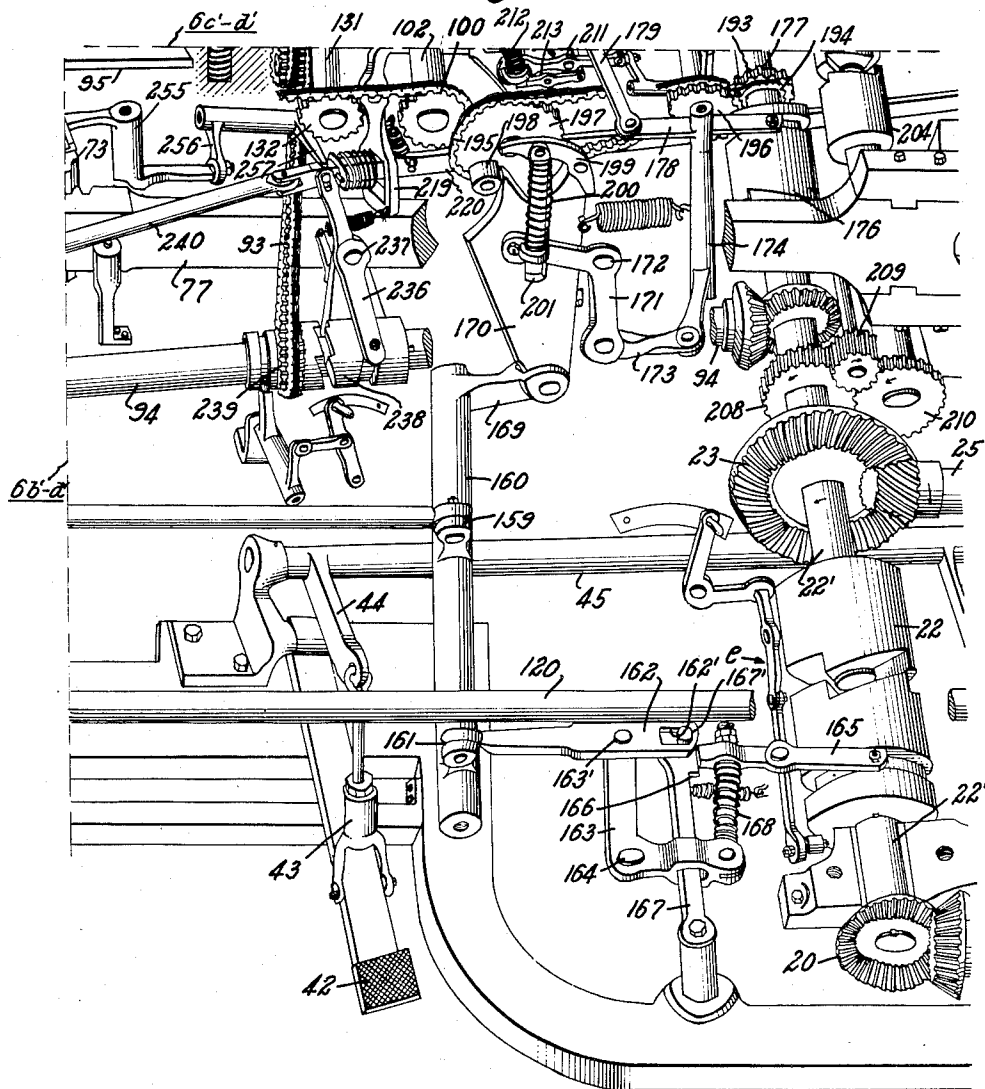
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Fig. 6d.



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## SOLE BLANKING APPARATUS

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Application November 8, 1954, Serial No. 467,415

6 Claims. (Cl. 164—21)

This invention relates to leather cutting mechanisms, and it has particular reference to sole blanking apparatus, that is to say apparatus for cutting or blanking-out shoe sole blanks from pieces of appropriate sole leather.

One object of the invention is to provide apparatus which will cut sole blanks from an appropriately fed sheet of leather in an economical manner preferably by a successive reversal of the cutting-die parts with respect to the sheet with each cutting stroke so that successive blanks will have their narrow heel portions lying opposite the broader sole portions of adjacent blanks.

Another object is to provide apparatus in which the sheet of leather may be fed, step-by-step, to the cutting die parts in such a manner that the minimum of waste will intervene between successively cut blanks.

A further object is to provide means whereby, when the size of the sheet of leather permits, several rows of the successive blanks may be cut without stopping the apparatus.

Still another object is to provide means whereby the feeding mechanism for the leather sheet may be appropriately adjusted to accommodate the apparatus to the cutting of blanks of various sizes commensurate with pairs of die parts which may be substituted one for another as production requirements may dictate.

A still further object is to provide apparatus which will normally function wholly automatically, but which may alternatively be adjusted either for semi-automatic operation or for operation wholly manually.

With these and other objects in view, as will be apparent from the following detailed description, the invention comprises sole blanking apparatus including, essentially, a work station including a pair of cooperating cutting die parts relatively reciprocable and adapted to receive between them a sheet of sole leather to be cut, means for intermittently feeding the sheet of leather between the die parts when they are at rest, means for varying such feeding movement in proportion to the dimensions of the sole blanks being cut, said feeding means being capable of functioning to cut several rows of successive sole blanks from the sheet when its size permits, means for arresting operation of the apparatus when a sheet of leather has been exhausted, and means for automatically performing the cutting and feeding operations including, preferably, means for simultaneously rotatively reversing the cutting die parts with respect to the sheet of leather through 180°, and including also means adjustable to permit functioning of the apparatus wholly automatically, semi-automatically or wholly manually, all as will be described hereinafter more fully and finally claimed.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated,

Fig. 1 is a side elevation of apparatus embodying the features of the invention,

Figs. 2a, 2b, 2c and 2d when joined along the broken lines 2a-b, 2a'-b'; 2c-d, 2c'-d'; 2a-c, 2a'-c' and 2b-d,

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2b'-d', respectively, provide an enlarged schematic perspective view, with parts broken away, and parts in section, showing the primary operative elements of the apparatus,

Fig. 3 is a somewhat enlarged fragmentary top plan view of the bottom cutting die and associated parts of the mechanism for feeding, positioning and cutting the sheet of leather as the blanking-out operation proceeds,

Fig. 4 is an enlarged fragmentary side elevation, with parts in section, of the control means for the reciprocating cutting head,

Fig. 5 is an enlarged longitudinal sectional view of the mating parts of the blank-cutting die members, and

Figs. 6a, 6b, 6c and 6d when joined along the broken lines 6a-b, 6a'-b'; 6c-d, 6c'-d'; 6a-c, 6a'-c' and 6b-d, 6b'-d', respectively, provide an enlarged fragmentary view illustrating the central portion of the machine as presented in the combined showing of Figs. 2a, 2b, 2c and 2d.

Broadly considered the apparatus comprises a blanking-out mechanism *a* constituting a work station, means *b* and *c* for positioning the leather transversely and longitudinally, respectively, and drive means *d* and *e* for the blanking-out mechanism and leather-positioning means respectively.

A housing 1 provides means for enclosing the parts of the various mechanisms and is furnished with bearing and supporting means for the various operative elements thereof.

Within this housing 1, and comprising parts of the blanking-out mechanism of the work station, are an axially fixed oscillatable plate 2 and an axially reciprocable oscillatable plate 3, both of which plates are provided with similar rotative bearing means 4 and spring cushioned thrust bearing means 5. Removably attached to these plates 2 and 3, so that substitutions can be made to accommodate the apparatus to the blanking out of sole blanks of various sizes, are the female and male die members 6 and 7, respectively.

The rotative bearing means 4 of the plate 3 are carried by an axially reciprocable head 8 held against rotation in the frame 1 by a key 9, and reciprocation is imparted to this head 8 by a rock-lever 10 pivoted at 11 on the frame 1 and to which movement is imparted in its operative stroke by a link 12 having an offset lug 13 engaged by an apertured lever 14. For power actuation of the lever 10 the lever 14 is pivoted upon the frame 1 at 15 and carries a roller 16 in engagement with a peripheral cam 17 rotatable with a drive shaft 18 to which motion is imparted through bevel gearing 19 and 20, a shaft 21, a clutch 22 for controlling a divided back shaft 22', bevel and spur gearing 23 and 24, a shaft 25, and a splined stub 26 through back-shafts 27, 28 and 29 and gearing 30, 31, 32 and 33 from a cam shaft 34 which is driven through pulleys 35 and 36 and a belt 37 from a motor 38 or other appropriate source of power.

In its return stroke the lever 10 is actuated by a spring 39 having one of its ends connected with the lever 10 and its other end adjustably connected through an adjusting rod 40 with a bracket 41 fixed to the frame 1.

Alternatively, the lever 10 may be actuated manually by a treadle 42 connected by a link 43 and lever arm 44 with a rock-shaft 45 operating through a lever 46 and link 47 to actuate a rock-lever 48 pivoted on a bearing (not shown) fixed on the frame and connected with a link 49 slidable in a guide member 50, this link having at its upper end a yoke 51 embracing and bearing against the under edge of the lever 10.

The end of the lever 10 opposite that engaged by the links 12 and 49 is connected to the head 8 by a pivot bearing 52 so that the head is fully mechanically actuated upon its cutting (down) stroke. However, the re-

turn (up) stroke of the head 8 being imparted through the lever 10 through the action of the spring 39, this return stroke may be varied to suit the thickness of the sheet of sole forming material being cut and thus unnecessarily lengthy stroke of the head 8 avoided.

To regulate the stroke of the head 8 there is provided an abutment member 53 carried upon an eccentric 54 at the end of the cam shaft 34. The lower end of the abutment member 53 will normally seat upon a shoulder 55 formed on the head 8, but the time of its seating thereon as the eccentric 54 operates may be controlled by the mechanism shown particularly in Fig. 4. This mechanism includes a trip arm 56 having a pivot 57 on an arm 58 carried by the head 8 and provided with an elongated slot 59 having an offset jog 60 and cooperating with a pin 61 fixed on the abutment member 53. Cooperating with the trip arm 56, and having a lug 62 for locking engagement therewith, is a rock lever 63 pivoted on a bearing 64 fixed on the head 8 and having its end 65 opposite that upon which the locking lug 62 is formed bearing upon a controlling cam 65' carried upon a shaft 66 mounted in the frame 1 and suitably adjustable by a hand wheel 67 the position of which, and hence of the cam 65', may be determined in relation to an index scale 68 (Fig. 1). The rear (right-hand, Fig. 4) edge of the abutment member 53 is provided with a cam face 69 biased by a spring 70 (Figs. 2a and 6a) toward a roller 71 having a fixed bearing. The end of the rock lever 63 which carries the locking lug 62 is biased toward the lower end of the trip arm 56 by a spring 72.

By this arrangement of parts, as the rock lever 10 which actuates the head 8 causes this head to descend, and rotation of the cam shaft 34 imparts reciprocation to the abutment member 53 through action of the eccentric 54, the following functioning of the parts will take place.

As the head 8 descends upon its cutting stroke and carries with it the pivot 57 of the trip arm 56, and the pivot 64 of the lever 63, the lever 63 will, by virtue of engagement of its end 65 with the cam 65', cause the lug 62 to be freed from the end of the trip arm 56, and continued downward movement of the head 8, as the eccentric 54 rotates, will cause the pin 61 to rise in the slot 59 while the cam surface 69 of the abutment member 53 travels over the roller 71, so that the abutment member will move to the left (Fig. 4) off of the shoulder 55 and the pin 61 will enter the offset jog 60 of the slot 59. Obviously, upon the return (upward) stroke of the head 8 these operative steps of the parts will be reversed and the abutment member will be returned to its original position for abutting engagement with the shoulder 55 of the head 8. It should be noted, here, that when the abutment member 53 rides off of the shoulder 55 the head 8 is free to rise in response to movement of the lever 10 under the influence of the spring 39 by reason of the fact that, upon release of the head 8 by the member 53 the rotation of the cam 17 will permit the lug 13 to ride off of the top of the lever 14 and through the aperture 14' therein so that the lower end of the link 12 will be engaged by the stop screw 12' under the pull of the spring 13'. Thereafter, for the next cutting stroke of the head 8, as the shaft 34 rotates it will lift the abutment member 53 back upon the shoulder 55 and rotation of the cam 17 will permit the lever 14 to drop so that the spring 13' can pull the lower end of the link 12 to the left, free of the stop screw 12', to permit the lug 13 to assume its driving position over lever 14.

Oscillation is imparted to the plates 2 and 3 of the blanking-out mechanism in timed relation to reciprocation of the head by similar means including pinions 73 and 74 fixed on the shafts 75 and 76 keyed respectively to the plates 2 and 3, and these pinions are driven by rack teeth on bars 77 and 78, respectively, to which reciprocation is imparted through rollers 79 and 80 carried by the bars and engaging similar peripheral cams 81 and 82 rotating, respectively, with the shaft 18 and a

shaft 18' driven from the shaft 18 through suitable bevel gearing, as shown in Figs. 2c and 2d.

In order to insure proper register of the cutting die elements 6 and 7 following each oscillation of the plates 2 and 3, latch means 83 and 84 are provided for each of these plates, these latch means being timed in their operation for proper indexing and release of the plates 2 and 3 by push rods 85 and 86 actuated by similar cams 87 and 88, respectively, rotating with the shafts 18 and 18'.

Thus, as the head 8 moves downward upon its blanking-out stroke the latch means will hold the die-part carrying plates 2 and 3 in fixed cooperating indexed position, and when the head 8 ascends upon its return stroke the latch means will be released and the rack and pinion mechanisms will oscillate the plates 2 and 3 either clockwise or counterclockwise through 180°, whereupon the latch mechanisms will again become operative to index the plates in their altered position.

As the soles are successively cut by the blanking-out die mechanism 6-7, they fall through a chute 89 onto a conveyor belt 90 by which they are conveyed to a packing station or the like.

The sheet of material (leather or the like) from which the soles are blanked out is fed transversely between the die members 6 and 7 by the positioning mechanism *b* which comprises feed rollers 91 and 92 (shown in broken lines Figs. 2a and 6a, and in full lines Fig. 3) one of which, 91, is driven by chain and sprocket gearing 93 from a shaft 94. A gauging and stop member 95 serves to limit feed of the sheet.

The sheet is fed longitudinally of the machine by the longitudinal positioning means *c* including pairs of feed rollers 96-97 and 98-99 flanking the blanking-out die mechanism and driven by chain and sprocket mechanism 100 and 101, respectively from a shaft 102 which derives its drive from a shaft 103.

In order to impart, during the blanking-out operation, a step-by-step movement of the sheet between the die parts in timed relation to the reciprocation of the head 8, there is provided a pusher element 104 carried by a guide block 105 slidably guided by means of cooperating spline and groove means 106, 107 between fixed guide rails 108 and 109. The guide block 105 carries a freely rotatable pinion 110 of considerable axial extent for meshing engagement with both a travelling chain 111 and rack teeth 112 on the lower face of the guide rail 109. Thus, as the linear travel of the chain 111 in one direction imparts rotation to the pinion 110, the reaction of the pinion upon the rack 112 will move the guide block 105 and pusher element 104 in the opposite direction.

As shown particularly in Figs. 2b and 6b, the chain 111 passes around a drive sprocket 113 and two idler sprockets 114 and 115, and the guide 109 carries a pressure strip 16 which serves to hold the chain 111 in proper contact with the pinion 110 during relative travel of these parts. Chain driving motion is imparted to the drive sprocket 113 in a counter-clockwise direction to impart step-by-step sheet-feeding movement to the pusher element 104 through its guide block 105 (to the right, Figs. 2b and 6a) by a pawl and ratchet mechanism 117, 118 driven through an adjustable crank arm 119 by a link 120 to which reciprocation is imparted by a cam 121 (Fig. 2d) rotating with the shaft 18. The throw of the crank arm 119 under the influence of the link 120 may be adjusted, for adapting the feed steps of the pusher element 104 to the width of the soles being cut, by adjustment of a link-pivot block 124 through a screw-threaded shaft 125 which may be rotated through gearing 126 and a hand-wheel 127 indexed in accordance with a suitable scale 128 (Figs. 1, 2b and 6b), which preferably is divided to indicate inches of sole width.

Continuous return movement is imparted to the guide block 105 and to the pusher element 104 (to the left,

Figs. 2b and 6a) by reversing the direction of travel of the chain 111 through a clutch 122 and gearing 123.

For cutting a straight edge upon the sheet of material (leather) from which the soles are to be blanked out so that it may be effectively positioned against the gauging and stop member 95 prior to the start of the blanking-out operation, and also to serve as a means for separating the scrap from the sheet after each of the blanking-out operations and thus furnishing successively usable straight edges for engagement with the gauge and stop member, there is provided a pair of cooperating cutting and feeding discs 129 and 130, respectively (see Figs. 2d, 3 and 6c) the latter of which is arranged to be driven through a shaft 131 and sprocket 132 from the chain 100.

With these primary organizations of the mechanism of the invention thus broadly described, the further mechanical details will now be explained in connection with a recitation of the functioning of the apparatus during its use in the blanking-out operation.

In preparing the machine for its operation in blanking out soles of a particular size, and assuming that the parts of the mechanisms are in the positions illustrated in Figs. 2a to d and 6a to d, which they assume at the completion of a blanking out operation, the following steps are preferably followed.

If a different size and/or conformation of sole blanks from those for which the machine had previously been equipped and adjusted is to be produced, the die members 6 and 7 which have been in use are replaced by others which are proper for the soles to be blanked out, and are properly adjusted for appropriate mating engagement by causing the head 8 to descend by manual operation of the treadle 42 and fly wheel 35, whereafter the attaching bolts for the die parts will be tightened and the head 8 again raised. Thereafter, by appropriate manipulation of the clutches 22 and 122, the pusher element 104 is moved to the left with its guide block 105 to fully retracted position, and a sheet of leather is introduced between the transverse positioning rollers 91 and 92 and fed into the space between the die members 6 and 7 with its right-hand edge extending beyond the right-hand side of the die cavity, its forward edge abutting against the gauging and stop member 95, and its left-hand portion lying between the longitudinal positioning rollers 96 and 97 and its left-hand edge abutting within the pusher member 104. Obviously, the pusher member 104 will be advanced into appropriate engagement with the left-hand edge of the sheet by proper manipulation of the driving mechanism of the chain 111 which moves the guide block 105 carrying this pusher member.

Now the hand wheel 127 is adjusted so that its scale 128, when read on the index 128' (Fig. 1), shows the proper width, in inches, for the width of the soles to be blanked out. Then the cutter members 129 and 130 are adjusted along their respective shafts until they will cut the sheet in substantial alignment with or somewhat beyond the rear edge of the soles as determined by the die members, and if the gauging and stop member 95 is not then in proper position, it is adjusted so that it will contact the forward edge of the sheet.

With the preliminary adjustment thus made, the machine is in condition to function automatically and continuously in the production of sole blanks from the sheet of leather or the like until such sheet has become exhausted, and it will be understood that, as the sheet is progressively moved from left to right in the machine by a step by step advance of the predetermined extent for which the mechanism has been adjusted, as described, the reciprocation of the head 8 and the 180° oscillation of the plates 2 and 3 will blank out sole blanks successively end for end. Also, as the sheet progresses from left to right during the blanking out operation the cutter members 129; 130 will cut just to the rear of the die members to provide a straight edge upon the rearward portion of the sheet and separate from it the scrap pro-

duced in the forward portion of the sheet during the blanking out operation, this straight edge later serving to relocate the sheet when it is automatically fed by the lateral positioning rollers 91 and 92 for engagement with the gauging and stop member 95.

Thus, after the sheet has taken one completed longitudinal pass through the machine, and the blanked out soles have fallen through the chute 89 and been conveyed away upon and by the conveyor belt 90, and the scrap discharged at the right of the die mechanism, the sheet will be fed longitudinally to the left by the longitudinal feed rollers 98, 99, 96, 97, along with the pusher member 104 and forward against the gauging and stop member 95 by the rollers 91 and 92, and will be ready for a subsequent step by step pass longitudinally to the right.

In accomplishing these steps in the operation of the machine, the functioning of the parts may be divided into five phases.

Assuming that, as shown in Figs. 2a to d and 6a to d particularly, the parts are in the positions assumed after the completion of a working or blanking-out pass of a sheet of leather through the machine, the first phase of operation will be as follows:

The clutch 22 is still in closed condition and the pusher element 104 has moved to its extreme right-hand position. When the pusher element 104 reaches this position, the free end of the bell-crank lever 133, carried by the arm 134 which moves with the guide block 105, will be depressed by contact with the abutment 135 which is fixed in adjusted position by bolts, as shown, to the reciprocable bar 136 and will, at the same time, cause this bar to move slightly to the right.

As the bell-crank lever 133 is thus moved, it will raise the link 137 and shift the sheet-supporting tongue 138 to the left by operation of the bell-crank lever 139.

As the bar 136 is moved to the right it depresses the cam-shaped end of the lever 140 which, together with the rock lever 141 is mounted upon a fixed pivot located substantially centrally of these levers, and both of these levers have their ends opposite the cam shaped end of the lever 140 connected with a vertically reciprocable link 142. As the righthand end of the lever 141 descends, it operates through the bell-crank lever 143 to oscillate the rock-lever 144 and open the clutch 145. At the same time, the link 142, connected with the opposite ends of the levers 140 and 141, rises and, through the bell-crank lever 146, moves the shouldered link 147 to the left and causes the detent 148 to rise, thus oscillating the bell-crank lever 149 to free the pivoted latch 150 and causing the lever 149 to push the link 151 to the right against the tension of the spring 152 thus permitting the detent 153, under the influence of its spring 154, to engage against the lug 155 of the link 151. Thereafter, the latch 150, under the influence of the spring 150' moves to the right beneath the raised detent 148.

The arm 156 having a fixed pivot at its rearward end is raised by the link 142 and its forward end raises the pawl mechanism 117 out of operative relation to the ratchet wheel 118 to thus deactivate the step-by-step feeding means for the pusher element 104. Also, as the link 142 rises it oscillates the bell-crank lever 157 which, through the link 158, pulls the crank 159 of the fixedly pivoted shaft 160 to oscillate this shaft counterclockwise and, through its crank arm 161, initially pull the slotted link 162 to the left. This movement of the link 162 causes the right-angled lever 163, pivotally connected with it at 163' and having a fixed pivot at 164, to turn counterclockwise and, the clutch operating lever 165 being held by the lug 166 of the locking lever 167 to hold the operating lever 165 in engaged-clutch condition, will compress the spring 168 which bears against the lever 165. It will be understood that this initial movement of the link 162 is completed prior to the end of its slot 162' reacting against the cooperating pin 167' of the locking lever 167. However, when, during continuation of its

movement, the end of the slot 162' reacts against the pin 167', the locking lever will be swung counter-clockwise and will disengage its lug 166 from the clutch operating lever 165 thus freeing this lever 165 so that the energy stored in the spring 163 will become effective to disengage the clutch 22, as shown, thus arresting transmission of driving motion from the shaft 22' to the shafts 18 and 18' and stopping the automatic actuation of the head 8 and other parts of the blanking-out mechanism a.

Rotation of the shaft 160 counter-clockwise also causes its crank 169 to raise the carrier plate 170 which functions to oscillate the bell-crank lever 171 pivoted on a fixed pivot 172 and, through the link 173, turns the shaft 174 clockwise. An arm 175 carried by the shaft 174 operates to engage the clutch 176, which had been disengaged during the step-by-step feeding movement of the pusher 104, so that the shaft 177 is driven from the shaft 22' through the bevel gearing 23.

At the same time, the arm 178 of the shaft 174 pushes the link 179 and causes its lug 180 to impart clockwise motion to the lever 181 which is pivoted on the plate 182 thereby to pull the link 183 to the right. As the link 179 is pushed and the link 183 moves to the right, the influence of the spring which connects the link 179 to the lever 181 causes the lug 184 carried by the plate 182 to move from the vertical portion and to enter the horizontal portion of the right-angled locking slot in the enlarged end of the link 179 and the link 185 is thereby pulled to the right so that a lug carried by the cam plate 186 will be positioned in the lefthand end of the right-angled locking slot in the link 185. Movement of the link 183 to the right oscillates the bell-crank lever 187 which functions to engage the clutch 188. It is to be noted that the clutch 145 having been disengaged, as hereinbefore described, the coupling of the shaft 102 to its complement which drives the chain and sprocket gearing 100 will not impart rotation to the positioning roller 96 at the left of the blanking-out mechanism.

In the second phase of operation, the clutch 176 having been engaged and the shaft 177 thus put in rotation counter-clockwise, the gear 189 will impart clockwise rotation to the sprocket gear 190 and hence to its shaft 103. Thus, the rollers 98, 99 at the right of the blanking-out mechanism, will pull the sheet of leather to the right and during its travel the cutting knife means 129, 130, driven synchronously with the travel of the leather by the shaft 131 through engagement of its sprocket with the chain of the gearing 100, will cut a clean edge on the remaining body of the sheet and complete the separation of the scrap therefrom.

The sprocket 191 which is freely rotatable on the shaft 177 except by its connection therewith through the pawl and ratchet mechanism 192 does not now drive because this mechanism is arranged to impart drive from the shaft 177 only when this shaft is rotated in a clockwise direction, as will later be described. However, the gear 193 has its pawl and ratchet mechanism 194 arranged to impart rotation to the gear 193 when the shaft 177 rotates in a counter-clockwise direction, and hence the chain 195 connected with the sprocket gear 196 now serves to drive the disc sprocket 197 clockwise.

At the completion of a blanking-out operation the lefthand edge of the leather sheet was at the right of and slightly overlying the cutting die member 6. When the disc sprocket 197 makes approximately one revolution, as the rollers 98 and 99 also rotate, the leather sheet will be fed to the right to complete the cutting operation of the cutter elements 129, 130 and its lefthand edge will be adjacent to the nip of rollers 98, 99. As rotation of the disc sprocket 197 continues slightly the roller lug 198 carried by it will press downwardly upon the shoe 199 carried by the carrier plate 170, compresses the spring 200 against the abutment carried by the bell-crank lever 171 and at the same time enters the notch at the

upper edge of the plate 170 so that, as rotation of the disc sprocket 197 proceeds, the plate 170 pivots to the left and permits a lug (not shown) at the rear of the horizontal arm of the lever 171 to enter the vertical portion 201 of a right-angled slot in the plate 170, thus permitting the lever 171 to be oscillated counter-clockwise under pressure exerted upon it by the spring 200, thus rotating the shaft 174 counter-clockwise and disengaging the clutch 176 to stop drive of the shaft 177.

This turning of the shaft 174 also causes its arm 178 to pull upon the link 179 and, through the connection of its right-angled slot with the lug 184 of the plate 182, causes this plate to rotate counter-clockwise so that through its connection with one end of the clutch-shifter lever 202, provided with a medially fixed pivot 203, the clutch 204 will be engaged. With this clutch 204 engaged, the shaft 103 will now be driven in a counter-clockwise direction through the gears 205, 206 due to the fact that the shaft 207 is driven counter-clockwise through the clutch 204 by the train of gears 208, 209, 210 from the bevel gear 23 of the shaft 22'.

Meanwhile, the shifting of the clutch 204 to engaged condition causes the lever 202 to actuate the rock lever 211, Fig. 6d, causing mechanism 212 similar to that of the disc sprocket 197 to depress a rock lever 213 which, through a link connection with the slotted link 185, pushes this link upward to release the cam plate 186.

In the third phase of operation, after the clutch 204 has been closed and the drive of the shaft 177 is made clockwise, and while the sprocket disc 214 is driven through one revolution by the chain and sprocket gearing 191—215, the lefthand edge of the sheet of leather will be driven to the left by the righthand rollers 98, 99 until it has reached a position between the lefthand rollers 96, 97 and is stopped. After the sprocket disc 214 has made a little more than one-half a revolution its roller lug 216 will depress the cam plate 186 and will enter the notch in the upper edge of a plate 217 so that this plate 217 will pivot to the left and permit a lug (not shown) on the rear side of the lever 211 to enter the vertical portion of a right-angled slot shown in the plate 217, in substantially the same manner of operation as that of the parts 170, 171, 198, 199 and 201 hereinbefore described.

The plate 217 in pivoting to the left pulls with it the link 179 so that the lug 184 aligns with the vertical portion of its cooperating right-angled slot, and simultaneously the spring of the cam plate 186 depresses its connected end of the lever 211 which, through its connections with the clutch operating lever 202 causes the clutch 204 to disengage. Also, the end of the lever 202, being connected at its forked end with a stud on the plate 182, causes this plate to rotate slightly clockwise. Inasmuch as the link 179 moves only arcuately upon its pivot on the lever arm 178 no clutch shifting motion is imparted to the lever arm 175 and the clutch 176 therefore remains disengaged.

However, the slight clockwise rotation of the plate 182 causes the lug 184 affixed to this plate to oscillate the lever 218 which in turn pushes the link 183 to the left and, through oscillation of the bell-crank lever 187 to which its lefthand end is connected, causes the clutch 188 to be disengaged.

As the plate 217 pivots to the left the lever 219, having a fixed pivot, oscillates counter-clockwise and pushes on a lug (not shown) on the link bar 220 to move this bar to the right so that, through the bell-crank lever 221 (Fig. 2d), link 222 and bell-crank lever 223, the link 224 will be pulled to the right and, by its connection with the crank-arm 225, will turn the shaft 226 clockwise, thereby raising the positioning roller 99 through oscillation of the crank arm 227, the positioning roller 97 through the lever 228 and link 229, and the cutting disc 129 through the crank arms 230, and compressing the hold-down springs 231 and 232 of the rollers 97 and 99 and the

cutting disc 129, respectively. Also, the crank-arm 233 pulls the link 234 to the right and serves to lower the transverse positioning roller 92 by oscillation of the bell-crank lever 235, serving at the same time to permit the hold-down spring for this roller to become operative to press this roller into leather-sheet feeding proximity to its complementary roller 91.

Furthermore, as the bar 220 moves to the right, the rock-lever 236, having a fixed bearing 237 and connected at its opposite ends with the bar 220 and the clutch 238, will turn clockwise and cause the clutch 238 to be engaged, thus imparting drive to the sprocket 239, which is freely rotatable on the shaft 94, and rotating the transverse positioning roller 91 to feed the leather sheet toward the front of the machine and toward engagement with the stop member 95.

Pivotaly connected at one of its ends to and movable with the bar 220 is a link 240 having at its other end a lug engaged in a right-angled slot 241 in a rotary disc 242 carrying a pivoted rock-lever 243 and having a lug 244 for actuation of a clutch 245. As the link 240 moves to the right with the bar 220 the lug at its lefthand end will shift into alignment with the vertical portion of the slot 241 in the disc 242 and will be pushed thereinto by the spring 246 of a link 247 and will cause the disc 242 to turn clockwise and will also oscillate the rock-lever 243 clockwise.

In its movement toward the front of the machine under the feed of the rollers 91 and 92, the leather passes over and depresses a trip button 248 (Fig. 6c) which is adjustably carried by a cross-bar 249 to which vertical motion is imparted by springs 250 and links 251 which latter are reciprocated by crank arms 252 on a rock-shaft which actuates the link 247 and is controlled by a crank and rod mechanism 253 having a lost-motion connection 254 with the disc 242.

Thus, as the button 248 is depressed it actuates the crank arms 252 to rock their rock shaft and pull upon the rod of the mechanism 253, but as this mechanism has the lost-motion connection 254 with the disc 242 it will be inoperative to impart any rotation to the disc.

In the fourth phase of operation, with the clutch 238 engaged and the leather sheet driven forward by the rollers 91 and 92, it will be seen that when the previously cut edge of the leather engages the properly adjusted gauge and stop member 95 the crank shaft 255, which carries this stop member upon one of its crank arms, will be oscillated and will, through operation of its opposite crank arm, cause the rock shaft 256 to oscillate so that its finger 257 presses down upon and depresses the bar 220 so that the lug (not shown) on this bar is disengaged from the lever 219 and the combined power of the springs 231 and 232 acting through their connections will quickly move the bar 220 and its link 240 to the left and, reacting upon the rock-lever 236, will disengage the clutch 238 and thereby arrest leather-feeding movement of the rollers 91 and 92.

As the link 240 thus moves to the left, its lefthand end, being engaged in the vertical portion of the slot 241 and held against escape therefrom by the previous partial rotation of the disc 242, causes the disc to rotate clockwise so that its lug 244 serves to engage the clutch 245. Also, through the link and lever connection 258, 259 this rotation of the disc 242 causes the clutch 122 to be engaged. With these clutches thus engaged, and the rollers 96 and 97 bearing upon the leather under pressure of their springs 231, the leather will be driven to the left as will also the pusher member 104.

When the righthand edge of the leather moves past and releases the button 248, and is therefore slightly to the right of the cutting die member 6, this release of the button 248, and its upward movement under the influence of the springs 250, will cause the link 247 to move upwardly upon the link 240 so that the spring 246 will be relieved. Simultaneously, the oscillation of the rock-

shaft carrying the crank arms 252 will cause the end of the rod of the crank and rod mechanism 253 to push against and oscillate the rock-lever 243 to push the end of the link 247 into alignment with, and permit its entrance into, the horizontal portion of the slot 241 of the disc 242, whereupon further movement of the bar 220 and its link 240 to the left will cause the disc 242 to turn in a counter-clockwise direction and will, through the lug 244, disengage the clutch 245. However, due to the lost motion connection between the link 258 and lever 259, the clutch 122 will remain in engaged condition.

Thus, the feeding movement of the rollers 96, 97 will be arrested, but the pusher member 104 will continue its travel to the left until its feeding edge has reached the lefthand edge of the leather sheet. As the pusher member 104 thus retreats from the lefthand edge of the leather sheet the link 137 will descend and move the tongue 138 to the right, and at the same time the dog 260 in engagement with the teeth of the bar 136 will cause the link 137 to descend further. The tongue 138 is thus pushed under the leather sheet and is ready to feed.

Thereafter, movement of the arm 134 to the left with the block 105 will cause its teeth in engagement with the teeth of the bar 136 to move this bar slightly to the left, thereby pivoting the detent 153 and freeing it from engagement with the lug 155 of the link 151, so that this link will move quickly to the left under the pull of the spring 152 and will function for release of the latch 150 from beneath the detent 148 and simultaneously oscillate the bell-crank lever 149 to depress this detent and with it shift the link 142 downward. This downward shifting of the link 142 operates through the arm 156 and bell-crank lever 146, and their connections with associated parts including the shouldered link 147, to thereby move the pawl mechanism 117 into operative engagement with the ratchet wheel 118 and disengage the clutch 122, respectively, thus reactivating the means for step-by-step feeding of the leather sheet to the right while deactivating the means for driving the pusher member 104 to the left.

At the same time, the descent of the link 142 will oscillate the bell-crank lever 143 so that the rock-lever 144 will cause the clutch 145 to be re-engaged. Also, this descent of the link 142 will oscillate the bell-crank lever 157 counter-clockwise to push the link 158 to the right and oscillate the shaft 160 clockwise. Through its lever arm 161, the shaft 160 now pushes the link 162 to the right, oscillates the lever 163 clockwise upon its pivot 164 and, pulling upon the clutch operating lever 165 causes the clutch 22 to be engaged. Meanwhile, the slot 162' in the link 162 enables the lug 166 of the locking lever 167 to engage the adjacent end of the clutch lever 165 to maintain engagement of the clutch 22 during the blanking-out operation of the machine. Although this oscillation of the shaft 160 will, through its crank 169, cause the plate 170 to descend, it will not impart oscillation to the bell-crank lever 171 because the lug on this lever will move freely upwardly in the vertical portion of the slot 201 in the plate.

In its fifth, or blanking-out, operation, with the clutch 22 engaged, the shaft 18 now driven through the gearing 19, 20 from the clutch 22 and its shaft 22', causes the link 120 to reciprocate in response to rotation of the cam 121 to thereby actuate the pawl and ratchet mechanism 117, 118 to impart step-by-step feeding movement of the leather sheet to the right under the drive of the chain 111 and pusher member 104.

As hereinbefore explained, in synchronism with this step-by-step feed, the blocks 2 and 3, and the cutting die elements 6 and 7 carried by them, are oscillated through 180° by operation of the rack and pinion mechanism 73—77, 74—78 actuated by the cams 81 and 82, respectively; and the head 8 with its associated cutting die 7 is reciprocated by the cam, lever and link mechanism 17, 16, 14, 13, 12 through the rock-lever 10 with its return

spring 39, under the control of the stroke adjusting mechanism shown in Fig. 4.

It will be noted that all of the clutches are provided with mechanisms whereby they may be engaged and disengaged manually so that the machine need not operate automatically, if desired. Moreover, by proper manual adjustment of various of these clutches partial automatic operation of the machine may be attained.

In normal automatic operation, with the drive of the shaft 25 obtained through the bevel gearing 30, as shown, its production rate will be about 1000 pairs of sole blanks per hour. If, however, for any reason this rate of production is found to be too high, the speed of the machine may be so reduced as to result in a production of about 625 pairs of sole blanks per hour. To accomplish the speed reduction it is necessary merely to disengage the bevel gears 30 and engage the bevel gear pair 261 by appropriate shifting of the collars 262 and 263, respectively, under control of the operating cranks 264 and 265.

Various changes and modifications are considered to be within the principle of the invention and the scope of the following claims.

What I claim is:

1. In sole blanking apparatus, a work station including intermittently operable cutting die mechanism, and means for automatically feeding a sheet of material to be cut in a plurality of cutting passes with respect to said work station so that a different area of said sheet will be presented to said cutting die mechanism at each pass, said feeding means including a pusher member for engagement with the trailing edge of said sheet, a reciprocally guided support for said pusher member, a pinion carried by said support, a fixed rack member with which said pinion is constantly operatively engaged, a travelling chain in driving engagement with said pinion, means for imparting linear travel to said chain to rotate said pinion and cause it to travel along said rack to thereby impart linear movement to said pusher member and therethrough to said sheet toward the die mechanism at the work station, means for imparting a reversal of travel to said chain to retract said pusher member at the completion of a series of die-cutting operations in one pass of said sheet, co-operating pairs of feed rollers mounted in flanking relation to the near and far sides of the work station as related to the linear travel of the sheet during a cutting pass, sheet cutting means at the far side of said work station, means for causing engagement of the far side pair of rollers with said sheet in the completion of a cutting pass, means for imparting rotative drive to said far side pair of rollers to feed said sheet through said sheet cutting means to sever the scrap therefrom, means for subsequently reversing rotative drive of said far side pair of rollers to feed said sheet in a reverse direction for engagement with said near side pair of rollers, means for imparting rotative drive to said near side pair of rollers in a direction to continue the reverse travel of the sheet and cause its trailing edge to move toward and for engagement with the pusher member when in its retracted position, trip and gauge means at said work station for operative contact with said sheet, means operatively connected

with said trip and gauge means for controlling the sheet feeding and retracting movements of said pusher member imparted thereto by said chain in response to the position of the sheet with respect to said trip and gauge means, and means operative in response to actuation of said trip and gauge means for causing said actuation of the pairs of rollers.

2. Apparatus as claimed in claim 1, in which the means for imparting travel to said chain include a drive sprocket meshing with said chain, pawl and ratchet mechanism associated with said sprocket, and means for driving said pawl and ratchet mechanism to impart step-by-step rotation to said sprocket and therethrough to drive said chain and pinion with an intermittent motion to impart through cooperation of said pinion with said rack a step-by-step sheet feeding motion to said pusher.

3. Apparatus as claimed in claim 2, in which means are provided for adjusting the operative stroke of said pawl and ratchet mechanism to thereby adjust the extent of intermittent feeding motion of said pusher.

4. Apparatus as claimed in claim 2, in which means are provided for driving said sprocket with a continuous motion in a direction in reverse of that imparted to it by said pawl and ratchet mechanism, whereby following completion of its sheet feeding motion in one pass said pusher will be retracted with a continuous motion to position it for a subsequent pass.

5. Apparatus as claimed in claim 4, in which the trip and gauge means are operatively connected with clutch means for controlling activation and deactivation of the pawl and ratchet mechanism and the continuous motion imparting means, respectively, which actuate said sprocket, whereby the desired type of actuation of said pusher will be responsive to the position of said sheet with respect to said trip and gauge means.

6. Apparatus as claimed in claim 1, in which means are provided for adjusting said sheet in a direction transverse to that imparted by said pusher, said adjusting means serving to cause operative contact of said sheet with said trip and gauge means.

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