

May 7, 1940.

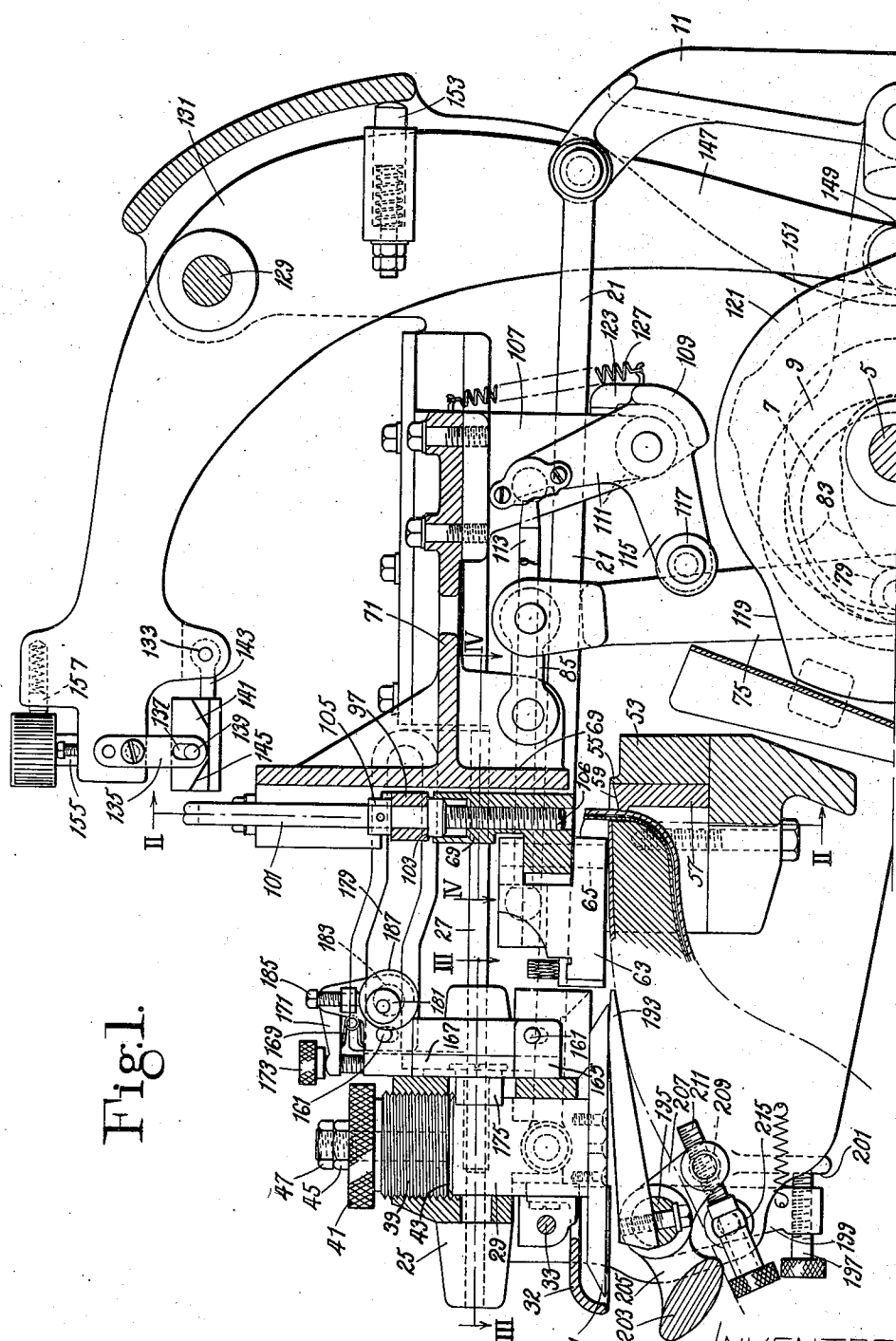
W. T. B. ROBERTS

2,199,512

TOE-TRIMMING MACHINE

Filed June 6, 1939

5 Sheets-Sheet 1



20- INVENTOR
William T. B. Roberts
By his Attorney
Victor Cobb

May 7, 1940.

W. T. B. ROBERTS

2,199,512

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5 Sheets-Sheet 2

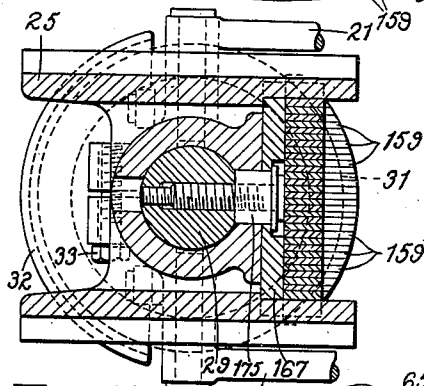
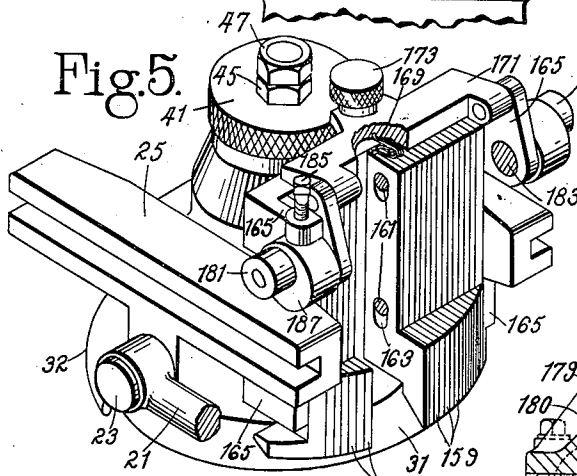
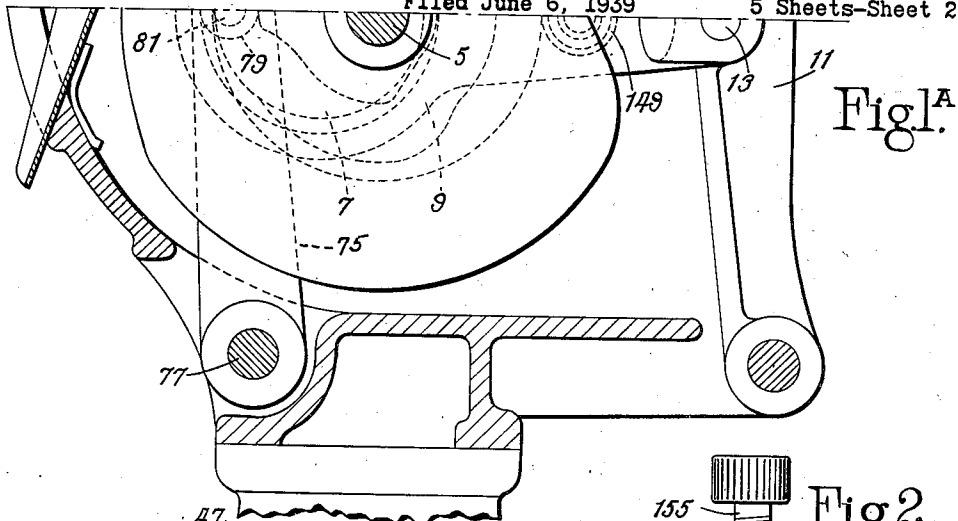


Fig. 3.

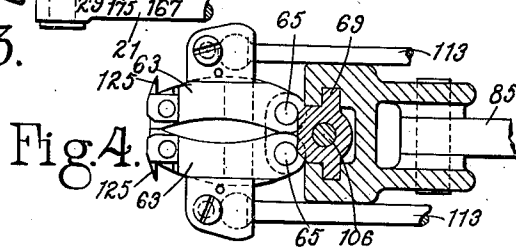


Fig. 4.

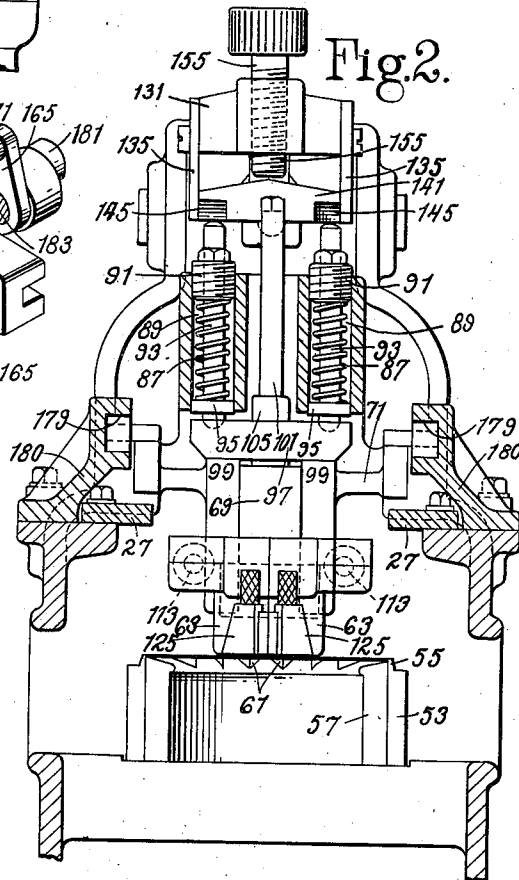


Fig. 2.

INVENTOR
William T. B. Roberts
By his attorney
Victor Cobb.

May 7, 1940.

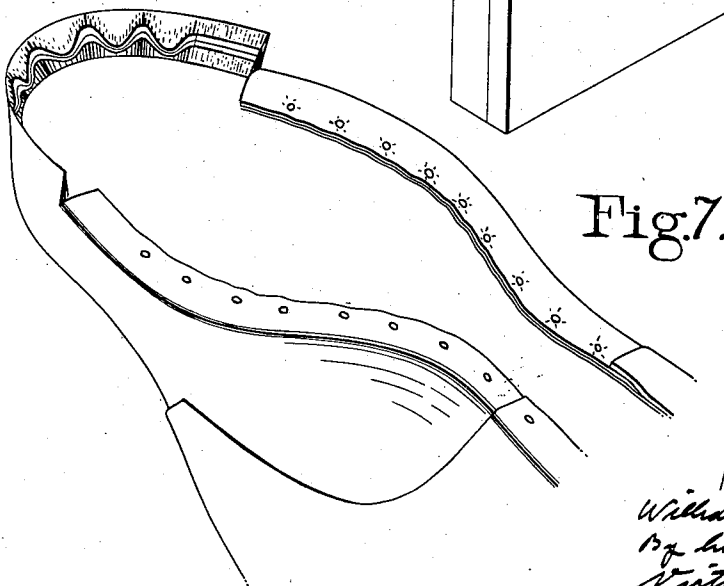
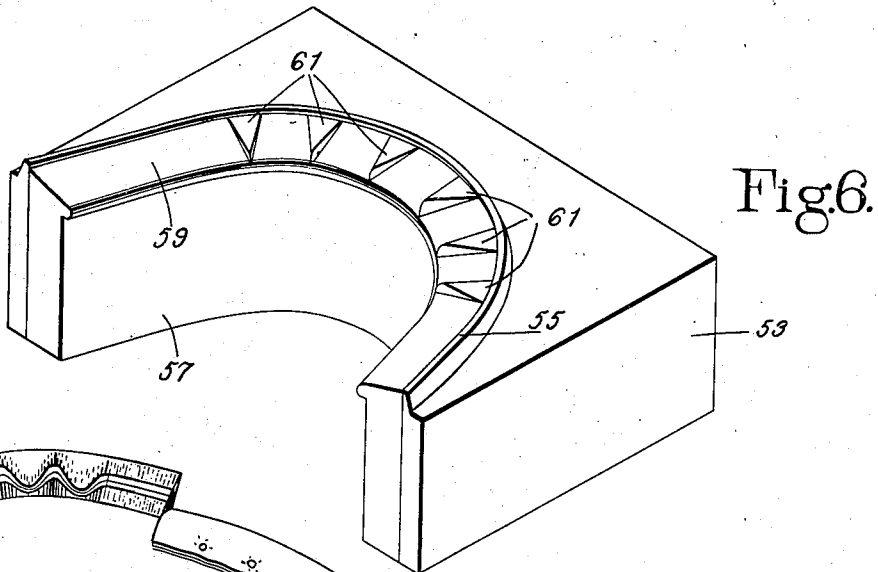
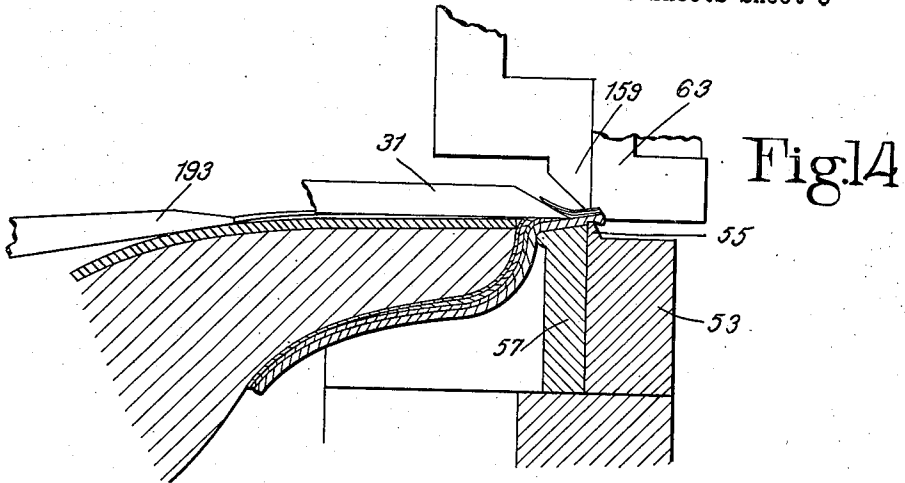
W. T. B. ROBERTS

2,199,512

TOE-TRIMMING MACHINE

Filed June 6, 1939

5 Sheets-Sheet 3



INVENTOR
William T. B. Roberts
By his attorney
Walter Cobb.

May 7, 1940.

W. T. B. ROBERTS
TOE-TRIMMING MACHINE

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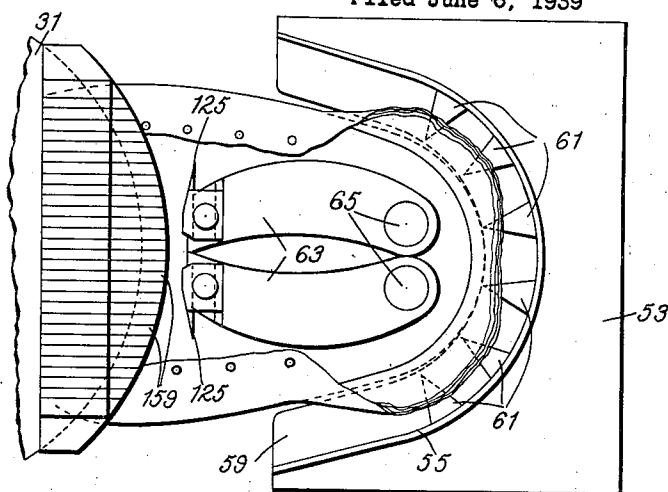


Fig. 8.

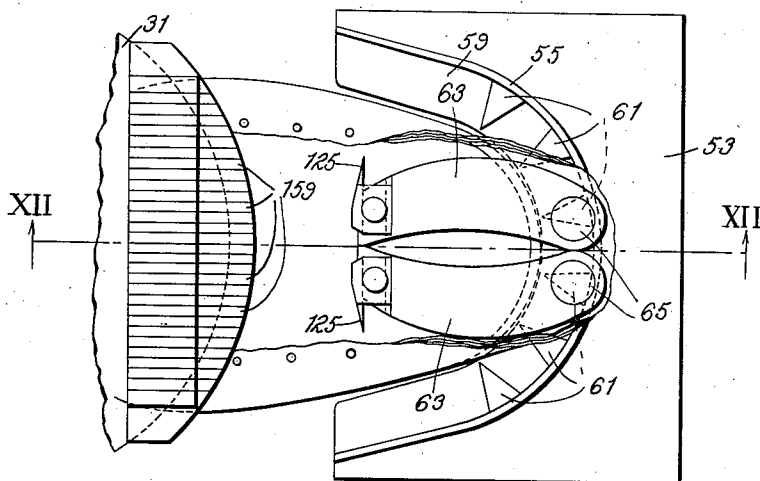


Fig. 9.

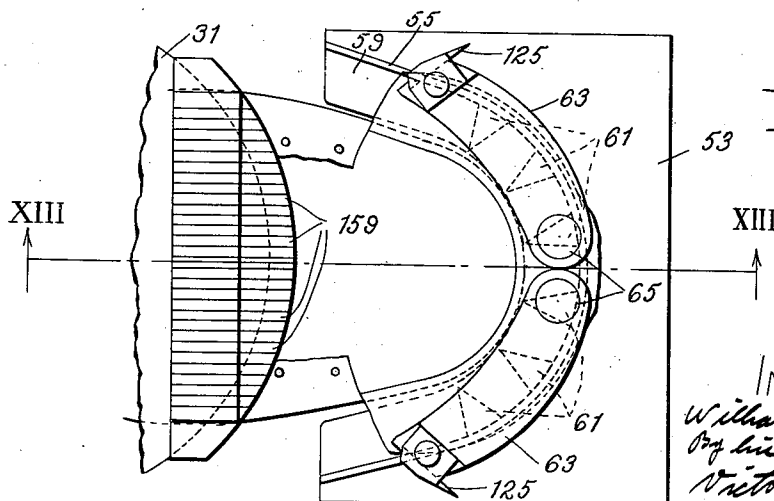


Fig. 10.

INVENTOR
William T. B. Roberts
By his Attorney
Victor Cobb.

May 7, 1940.

W. T. B. ROBERTS

2,199,512

TOE-TRIMMING MACHINE

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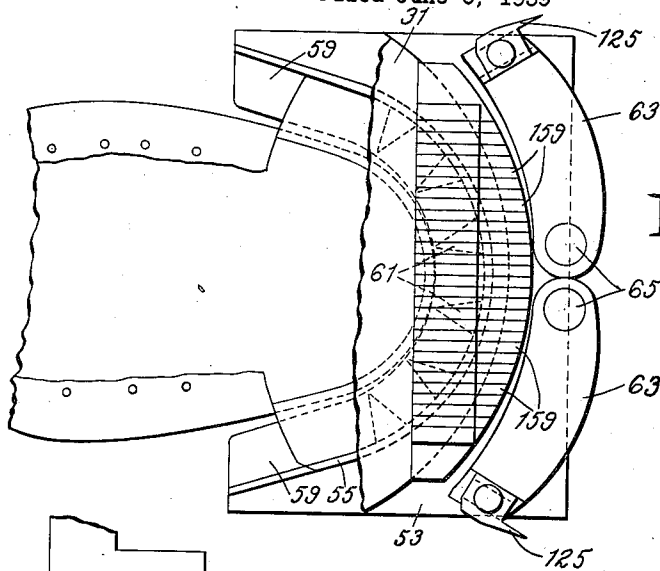


Fig. 11.

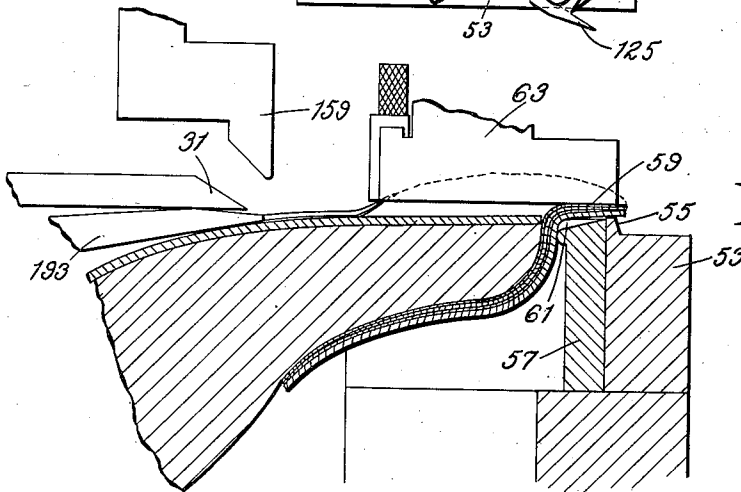


Fig. 12.

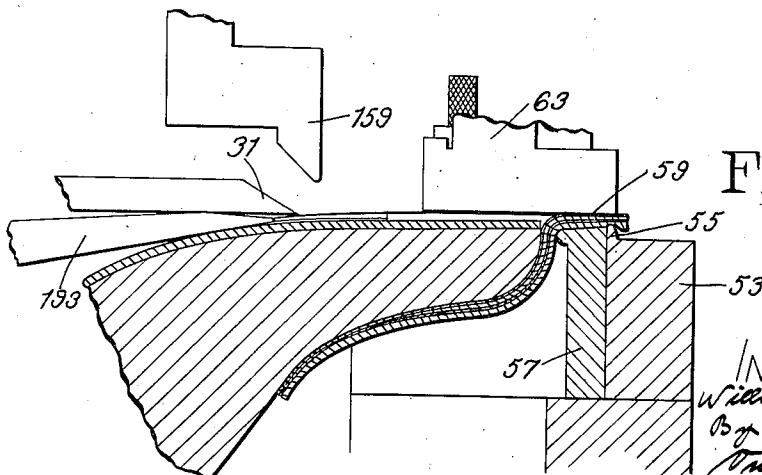


Fig. 13.

INVENTOR
William T. B. Roberts
By his attorney
Trotter Call.

UNITED STATES PATENT OFFICE

2,199,512

TOE-TRIMMING MACHINE

William Thomas Buckingham Roberts, Leicester, England, assignor to United Shoe Machinery Corporation, Borough of Flemington, N. J., a corporation of New Jersey

Application June 6, 1939, Serial No. 277,665
In Great Britain August 19, 1938

10 Claims. (Cl. 12—83.5)

This invention relates to machines for trimming the toe-portions of partially fabricated shoes to prepare the lasting materials for a subsequent toe-lasting operation. The invention is herein illustrated as embodied in an improved trimming machine intended primarily for operating on shoes of the McKay type, but such a machine may be used to perform a corresponding operation on shoes of other types in which the lasting margins at the toe are wider than they need to be after they have satisfied pulling-over requirements.

For purposes of this description, the term "upper" is used to designate only the outer layer which is commonly made of upper leather, and the term "lining" is used to include not only the layer commonly referred to by that term but also any intermediate layers such as a toe-box and a doubler that may be included in the materials that lie under the upper at the toe-end of a shoe.

To facilitate toe-lasting and to avoid excessive bulk of the lasted margins that require to be crimped and pleated by the wipers of a toe-lasting machine, it is desirable to sever much of the lasting margin of the lining and usually a smaller amount of the lasting margin of the upper prior to the toe-lasting operation. The machine herein illustrated comprises various novel features and novel combinations of instrumentalities by which surplus materials may be readily severed in accordance with the requirement above set forth.

The machine is organized to provide for manual presentation of a partially fabricated shoe in a desired relation to the instrumentalities that perform the trimming operation and other operations incidental thereto, the machine including adjustable gaging devices arranged to be engaged by the bottom of the shoe to control the closeness of trimming with respect to the width of the margins to be kept for toe-lasting. The actual trimming is performed with one stroke of a flat cutting blade that travels from an initial position above the ball portion of the shoe to and beyond the toe-end of the shoe, the widthwise extent of the cutting edge being at least as great as the broadest expanse of its cutting duty.

One of the novel features provided by the invention is embodied in an improved cutting bed or block with which the trimming knife cooperates and by which the character of the trimming is determined. The invention also provides other features of improvement including power-operated members that operate in advance of the knife to spread the lasting margins on the upper surface of the cutting bed, a pair of power-operated

cutters arranged to slash the lasting margins at two opposite points near the tip-line to facilitate spreading the toe-margins on the cutting bed, and a group of individually yieldable pressing members arranged to travel ahead of the trimming knife to press the outturned lasting margins firmly against the cutting bed.

The cutting bed is so formed and is so related to the plane of the trimming knife that the latter first severs nearly all the lasting margin of the lining with a skiving cut, then shaves a small amount of material from the inner surface of the lasting margin of the upper if the latter is too thick, and finally severs a narrow outer band from the lasting margin of the upper wherever this margin exceeds a predetermined width.

Another novel feature of the cutting bed is provided by a series of lands on its work-engaging surface. These lands are spaced one from another and located in a plane below the plane of the trimming cut but so near the latter plane that the corresponding portions of the margins lying on them will be skived more deeply than the intermediate portions. The corrugations thus formed in the lasting margins not only reduce the bulk of material subsequently to be crimped and pleated in the toe-lasting operation but also insure even distribution of such bulk by causing the pleats to be developed at regular intervals when the toe-lasting wipers are brought into operation.

In the drawings,

Fig. 1 is a right hand side elevation mainly in section of the upper portion of the machine of the illustrative embodiment;

Fig. 1^A is a similar view to be read with Fig. 1 as a part of that general assemblage;

Fig. 2 is a sectional view taken mainly along the line II—II in Fig. 1;

Fig. 3 is a sectional view taken along the line III—III in Fig. 1;

Fig. 4 is a sectional view taken along the line IV—IV in Fig. 1;

Fig. 5 is a perspective view of a knife and an associated work pressing device of the illustrative embodiment;

Fig. 6 is a perspective view of the cutting bed of the illustrative embodiment;

Fig. 7 shows a shoe in perspective, and indicates how the margin of the upper to be lasted over at the toe end is trimmed by the machine of the illustrative embodiment;

Figs. 8, 9, 10 and 11 are diagrammatic plan views indicating various stages in the trimming operation of the margin of an upper by the machine;

Fig. 12 is a sectional view taken along the line XII—XII in Fig. 9;

Fig. 13 is a sectional view taken along the line XIII—XIII in Fig. 10; and

Fig. 14 shows the parts seen in Figs. 12 and 13 in a position they occupy shortly before the completion of the trimming operation.

The several features of the present invention are embodied in a machine mounted on a column and having a cam-shaft 5 journaled in spaced bearings in its frame. The cam-shaft is provided with a power-driven one-revolution clutch (not shown) which may be of the type shown in United States Letters Patent No. 784,653, granted March 14, 1905, on application of O. S. Beyer. An eccentric disk 7 on the cam-shaft operates an eccentric strap 9 and a lever 11 to which the strap is connected by a pivot pin. The lower end of the lever 11 is mounted on a fulcrum pin secured in the machine frame, and the upper end is forked to provide for individual connections with a pair of parallel rods 21, 21, spaced apart widthwise of the machine. The forward ends of the rods 21, 21, are connected by pivot pins to a sliding carriage 25 located between them and mounted on horizontal guide-rails 27 on opposite sides of the machine frame. The slide 25 has a vertical bore to receive a stem 29 to which is affixed a flat circular knife 31 about five inches in diameter and lying in a horizontal plane. A portion of the slide 25 is split and provided with a clamping screw 33 to secure the stem 29 and thereby locate the knife 31 in a predetermined cutting plane. The upper portion of the stem 29 is of a smaller diameter than the lower portion, and extends through a screw-threaded adjusting sleeve 39 screwed into the bore and having a knurled part 41 formed on its upper end. The sleeve 39 abuts a shoulder 43 and a retaining nut 45 both on the stem 29. A lock nut 47 is provided to secure the nut 45. When the clamping screw 33 is slackened the knife 31 can be adjusted vertically by rotation of the sleeve 39. The knife 31 is wider than the toe portion of a shoe and requires only a single stroke to trim or sever the surplus materials of the outspread lasting margins extending around the end and along the opposite sides of the toe as hereinafter described.

The knife 31 has four holes symmetrically located near its center to receive screws by which it is affixed to the stem 29. The knife may thereby be attached in four different positions to utilize four segments of its cutting edge successively as one segment after another becomes dull. A guard 32, fixed to the slide 25, partially surrounds the knife to protect the operator.

The machine is provided with a cutting bed of steel that is preferably made of two parts 53 and 57 for convenience of manufacture, the part 53 having a U-shaped recess to receive the part 57, and the latter having a corresponding U-shaped recess to receive and embrace the toe end of a shoe. A ridge 55 on the part 53 projects slightly above the work-supporting surface 59 and establishes the outer boundary of the cutting bed. This ridge is flush with the cutting plane of the knife 31 and insures severing the lasting margin of the upper on a line corresponding to the outer boundary of the surface 59.

The surface 59 is preferably concave or dished to produce a skiving or beveling cut by the knife, and it may or may not be provided with a series of narrow V-shaped lands 61 shown best in Fig. 6. The lands lie in a plane slightly below that of the ridge 55 to cause the knife to cut furrows in the

outspread lasting margins. It is intended that the lasting margins shall be turned outwardly away from the insole and laid upon the cutting bed. It follows that as the knife 31 moves across the cutting bed to trim away the surplus materials, it will first skive the lining as shown in Fig. 14 and finally sever the upper on a line coinciding with the inner edge of the projecting ridge 55. If the cutting bed is provided with lands 61 the materials between them will be trimmed with a beveling cut, but the areas lying on them will be gouged to form furrows or corrugations illustrated in Fig. 7.

The machine is also provided with means for determining the heightwise position of a shoe, such means being effective to regulate the final width of the lasting margin of the upper. This means comprises two cooperative gages 193 and 203 both arranged to be engaged by the bottom of a shoe presented bottom upwards to the machine. The forepart gage 193 is secured by screws to a horizontal rock-shaft 195 mounted in the machine frame. A depending arm 199 is fixed to the shaft 195 and has an adjusting screw 197 threaded in its lower end. A tension spring holds the adjusting screw 197 against an ear 201 on the machine frame. By rotating the screw 197 the gage 193 may be adjusted up and down.

The gage 203 for the heel end of a shoe bottom is a cross bar 203 having a pair of arms 205 through which the shaft 195 extends. The bar may be adjusted up and down by a thumb-screw 211. The latter is mounted in a swiveled anchoring stud 215 and may turn therein without moving endwise. A screw-follower 209 runs on the thread of the screw 211 and has swivel connection with an extension 207 of one of the arms 205.

Referring to Figs. 8 to 13, a pair of spreaders 63 mounted on vertical pivots 65 are arranged to swing over the cutting bed in advance of the knife 31 to turn out the lasting margins of the upper and the lining and press them down upon the bed. If the shoe contains a thermoplastic toe-box the latter will be softened in advance to be easily bent by the spreaders. The upper-spreading fingers 63 are supported by a vertically adjustable slide 69 (see particularly Fig. 4) mounted in a carrier 71 which is arranged to slide horizontally in guideways in the machine frame. The carrier 71 is operated with two steps of travel in one direction, the first to carry the upper spreading fingers 63 over the cutting bed, and the second to carry them beyond the outspread lasting margins to be trimmed. For this purpose the machine is provided with a train of mechanism comprising a cam-groove 83, a cam-roll 79, a lever 75 and a link 85 connecting the upper end of the lever and the carrier 71. The lower end of the lever 75 is mounted on a fulcrum 77 (Fig. 1A).

As the spreaders 63 move over the lasting margins they may yield upwardly against the resistance of compression springs 87 (see Fig. 2) which are contained in bores 89 formed in the carrier 71. The springs are compressed by screw-plugs 91 and exert downward force against collars 95 affixed to rods 93. The lower ends of the rods are rounded and arranged in recesses in a bar 97 that normally lies on portions 99 of the carrier 71. The bar 97 carries an adjusting screw 106 by which the slide 69 may be adjusted up and down to locate the spreaders 63 at the desired level. The upper portion 101 of the screw 106 is smooth and has a square end to take a

wrench. Collars 103 and 105 on the screw prevent end-play thereof with respect to the bar.

When the spreaders 63 have been carried to the position shown in Figs. 9 and 12 the carrier 71 dwells while other mechanism swings them on their individual pivots 65 to spread the lasting margins laterally over the cutting bed as shown in Fig. 10. For this purpose (see Fig. 1) a bracket 107 of the carrier 71 carries a bell-crank lever comprising two similar arms 111, a yoke portion 109 rigidly connecting them, and an arm 115 provided with a cam-roll 117. The arms 111 and the spreaders 63 are connected respectively by individual links 113 having ball-and-socket connections (see also Fig. 4). An inclined surface 119 on a cam disk 121 engages the cam roll 117 to swing the spreaders 63 away from each other, but the spreaders are normally held in closed relation by a tension spring (Fig. 1) 127 connected to the yoke 109 of the bell-crank lever. This lever also has a stop-finger 123 arranged to abut the bracket 107. Each of the spreaders 63 carries a small cutting blade 125 (see Fig. 9), and as the spreaders swing apart the blades slash the lasting margins at two opposite points near the tip-line, thus freeing the toe portions of the margins from the portions previously lasted. One continuous sweep of the spreaders 63 accomplishes the slashing and the spreading of the margins.

The spreaders 63 dwell briefly in register with the ridge 55 of the cutting bed as shown in Fig. 10 and are then depressed positively to compress the outspread margins against the cutting bed, the thermoplastic toe-box being still in a soft condition. This downward movement of the spreaders is effected by a striker 141 (Figs. 1 and 2) under which the rods 93 stand at this stage of a cycle. The striker is carried by an operating lever 131 to which it is loosely connected with provision for regulating its compressing effect. Accordingly, trunnions 139 projecting from opposite sides of the striker are arranged in vertical slots 137 in a pair of spaced fingers 135 affixed to the lever, and a stem 143 affixed to the striker is connected to the lever by a pivot pin 133. If the lasting margins raise the spreaders during the first step of travel of the carrier 71 the upper ends of the rods 93 will engage cam surfaces 145 on the striker and travel under the striker without likelihood of breaking any of the parts.

The operating movement of the lever 131 is imparted to the striker 141 by a screw 155, and the compressing effect of the striker may be regulated by adjusting this screw. A socket in the lever contains a spring-pressed follower 157 by which accidental turning of the screw is prevented. The lever 131 is mounted on a fulcrum 129 and carries a spring-pressed plunger 153 which, by its engagement with the frame of the machine, normally elevates the striker. An arm 147 of this lever is provided with a cam-roll 149 that cooperates with an operating cam 151 carried by the power-driven shaft 5. The effect derived from this cam is illustrated in Fig. 13, but thereafter the spreaders 63 are raised slightly and carried beyond the ridge 55 of the cutting bed by another step of movement of the carrier 71 (see Fig. 11).

During the short dwell of the spreaders 63 in the position shown in Fig. 10 they are nearly overtaken by a row or series of individually yieldable pressers 159 that run on the outspread materials on the cutting bed slightly in advance of the operating segment of the cutter 31. One

purpose of these pressers 159 is to prevent the materials on the cutting bed from springing away from the latter when the spreaders 63 begin their final step of movement that takes them beyond the range of the knife 31, but if the cutting bed is provided with lands 61 the pressers 159 will depress the outspread materials between the lands to insure cutting furrows as illustrated in Fig. 7.

Referring to Figs. 3 and 5, the pressers 159 are flat strips of metal arranged in face-to-face contact with each other and carried by a plate 167 to which they are connected by two horizontal rods 161. These rods extend through vertical slots 163 in the pressers and their ends are secured in ears 165 formed on the plate 167. The lower ends of the pressers are slightly rounded to run easily over the outspread materials on the cutting bed. The pressers are normally depressed by individual springs 169 all held under initial deflection by a cross-bar 171 the ends of which are pivotally connected to the ears 165 by trunnions. This cross-bar may be adjusted by the head 173 of a screw to regulate the applied force of the springs.

This presser assemblage is mounted on the knife-carriage 25 above the operative segment of the knife 31 and not only partakes of the movements of the carriage but also moves slightly up and down with respect to the carriage. Accordingly, the plate 167 is arranged between guiding cheeks of the carriage and is maintained against bearing faces thereof by a flanged stud 175 adjustably secured to the stem 29, the plate having a slot through which the stud extends. The up-and-down movements of the plate 167 are derived from cam-grooves 179 in a pair of brackets 180 (Fig. 2) affixed to the frame of the machine. Rolls 181 that travel in these cam-grooves are carried by heads 187 affixed to the ends of a shaft 183. The latter extends through bearings in the ears 165. The rolls 181 are coaxial but are offset from the axis of the shaft. Consequently, rotative adjustment of the shaft is effective to locate the limits of the range of movement derived from the cam-grooves 179, and the desired adjustment is maintained by a set-screw 185 carried by one of the ears 165 and arranged to abut one of the heads 187.

In the use of the machine herein illustrated the operator will first adjust the gages 193 and 203 in accordance with the width of the lasting margins desired at the toe-end of a shoe, greater width being obtained by locating the bottom of a shoe at a relatively low level and less width by locating it at a higher level. Since these gages are individually adjustable, they are effective to counteract the "spring" of the bottom of a last to any desired extent. Having made the necessary adjustments, the operator has merely to present the shoe-bottom against the gages 193 and 203 with the toe end of the shoe in the U-shaped recess formed for its reception in the cutting bed, and trip the one-revolution clutch (not shown) by which the cam-shaft 5 will cause the described mechanisms to perform their various functions. It is to be assumed that if the shoe contains a thermoplastic toe-box, the latter will be sufficiently softened with heat to be responsive to the demands of the spreaders 63 and the pressers 159.

The first effect upon the work after tripping the clutch is that represented in Fig. 9 as a result of advancing the spreaders 63 over the cutting bed from their initial positions shown in Fig. 8.

The pivots 65 of the spreaders dwell in the positions shown in Fig. 9 while the spreaders swing away from each other to the positions shown in Fig. 10. As the spreaders move apart in this manner, the cutters 125 cut gashes in the lasting margins at opposite points near the tip-line. The toe-margins, being thus freed from the margins previously secured along the sides of the forepart by lasting tacks or otherwise, are bent outwardly by the spreaders and laid on the cutting bed.

When the spreaders arrive at the positions shown in Fig. 10, they dwell briefly while they are depressed positively from the level represented in Fig. 12 to that represented in Fig. 13, the outspread margins being thereby compressed against the surface of the cutting bed. While these motions are in progress, the cutter-carriage 25 advances slowly at first but with accelerating speed derived from the eccentric 7 (Fig. 1), and when the individually yieldable pressers 159 are about to overtake the spreaders 63, the latter are advanced with another step of movement derived from the cam-groove 83, thus clearing the path of the pressers which traverse the outspread materials on the cutting bed slightly in advance of the operating segment of the cutter 31.

The cutter first attacks and skives the lining as shown in Fig. 14, and if the thickness of the outspread margin of the upper exceeds the extent of vertical projection of the ridge 55, the cutter will also skive a thin shaving from the flesh side of the upper prior to severing all the material that may project beyond the ridge. The range of travel of the cutter 31 is sufficient to carry the operating segment of its cutting edge slightly beyond the ridge 55, whereupon the cutter-carriage 25 returns to its initial position and is followed by the carrier 71 on which the spreaders 63 are mounted.

Referring to Fig. 6, U-shaped members 57 having recesses of different shapes, some provided and others not provided with lands 61, may be used interchangeably with one common master-block 53. For women's shoes and men's lightweight shoes, satisfactory results may be obtained with a cutting-bed not provided with lands 61, but the lands are usually preferably for trimming the toes of heavyweight shoes for men in which the materials are comparatively thick.

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

1. A trimming machine comprising a cutting bed having a U-shaped recess to receive and embrace the toe end of a partially fabricated shoe in which the lasting margins at that end are unsecured, gaging means arranged to locate the forepart of the shoe heightwise, said cutting bed having a work-supporting surface on which said lasting margins may be spread outwardly, power-operated means arranged to spread said margins outwardly on said cutting bed, a trimming knife having a cutting edge extending widthwise of said recess, and power-operated means arranged to operate said knife to sever surplus materials from the outspread margins on said cutting bed with movement lengthwise of the shoe and away from the heel end thereof.

2. A trimming machine as specified in claim 1, in which said cutting bed has a U-shaped ridge establishing its outer boundary flush with the cutting plane of said knife, the knife being movable across said ridge to sever the lasting margin of the upper on a line coinciding therewith.

3. A trimming machine as specified in claim 1, in which said work-supporting surface of the cutting bed slopes with respect to the plane of cutting to produce a beveling cut of the margins lying thereon.

4. A trimming machine as specified in claim 1, in which said work-supporting surface of the cutting bed includes a series of spaced lands by which the outturned lasting margins are deformed to be furrowed by said cutting edge.

5. A trimming machine as specified in claim 1, comprising means by which said spreading means, after spreading the lasting margins on said cutting bed, are moved toward the latter to compress the margins and thereafter retracted from the cutting bed to clear the path of said cutting edge.

6. A trimming machine as specified in claim 1, in which said spreading means comprises a pair of spreaders operated with movement away from the heel end of the shoe and with movement away from each other widthwise of the shoe.

7. A trimming machine as specified in claim 1, in which said gaging means are adjustable to regulate the closeness of the trimming with respect to the perimeter of the insole by determining the heightwise location of the shoe bottom.

8. A trimming machine as specified in claim 1, comprising also a plurality of pressers arranged to partake of the trimming movement of said knife and to press the outspread work against said cutting bed in advance of said cutting edge.

9. A trimming machine as specified in claim 1, in which said spreading means comprises a pair of spreaders operated with movement away from each other widthwise of the shoe, and in which cutters are carried by said spreaders and are arranged to cut gashes in said margins at two opposite points near the tip-line.

10. A trimming machine comprising a cutting bed having a U-shaped recess to receive and embrace the toe end of a partially fabricated shoe in which the lasting margins at that end are unsecured, gaging means arranged to locate the forepart of the shoe heightwise, a trimming knife having a cutting edge extending widthwise of said recess beyond the range of said margins at both sides of the shoe, power-operated mechanism arranged to operate said knife with movement lengthwise of the shoe away from the heel end thereof, a pair of spreaders arranged to spread said margins outwardly on said cutting bed ahead of said knife, and power-operated mechanism arranged to operate said spreaders with movement away from the heel end of the shoe, with widthwise movement away from each other, with movement against the cutting bed to compress the outspread margins, and with further movement away from the heel end to clear the path of said knife.

WILLIAM THOMAS BUCKINGHAM
ROBERTS.