F. H. PERRY.

MACHINE FOR OPERATING ON SHOE SOLES.

APPLICATION FILED MAY 4, 1910.

1,030,606. Patented June 25, 1912.

17 SHEETS—SHEET 1.

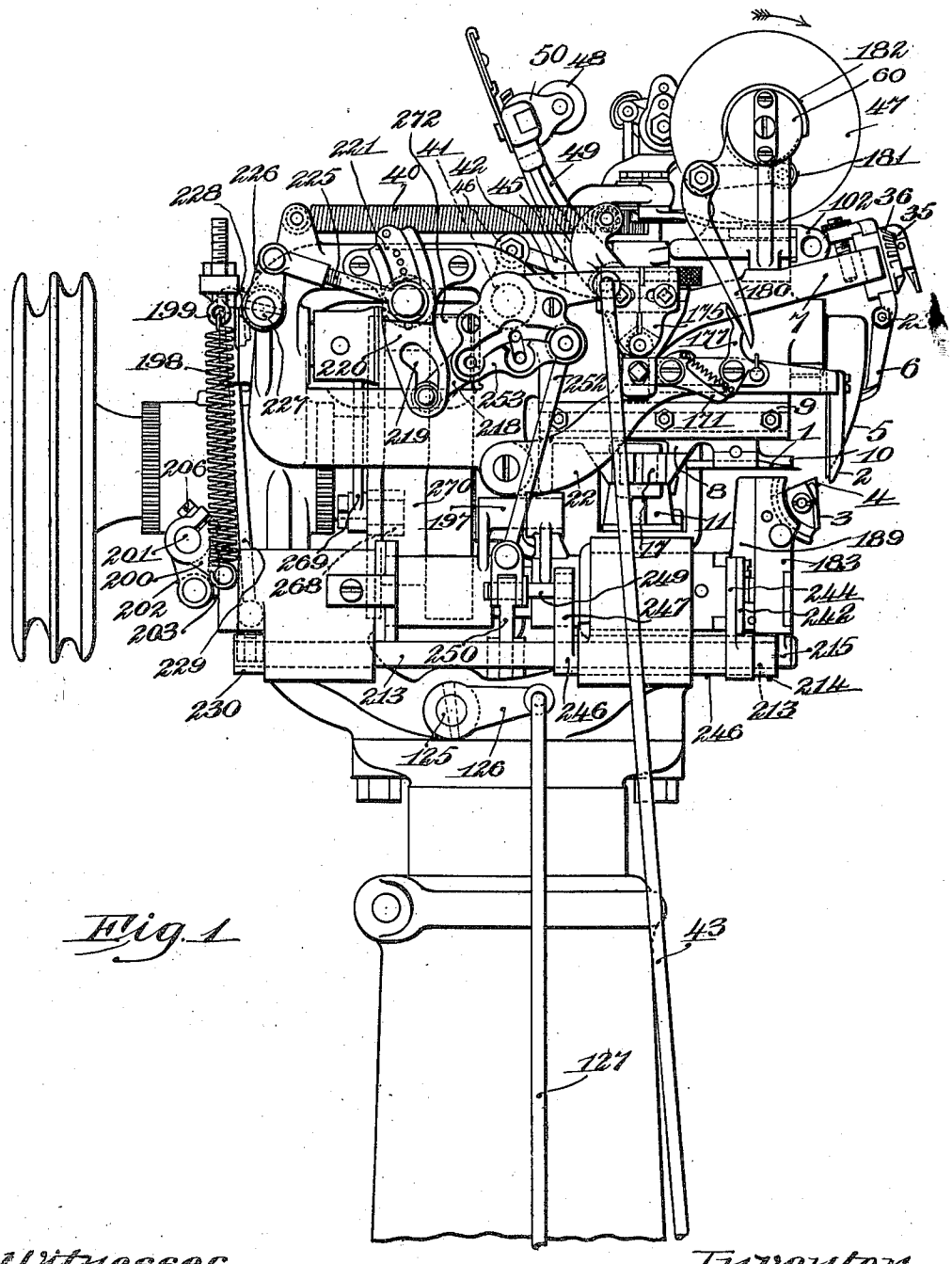

Fig. 1

Witnesses
Edward S. Dey
K. D. McPhail

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Frederick H. Perry
by Phillips Van Everen & Fish
Attys

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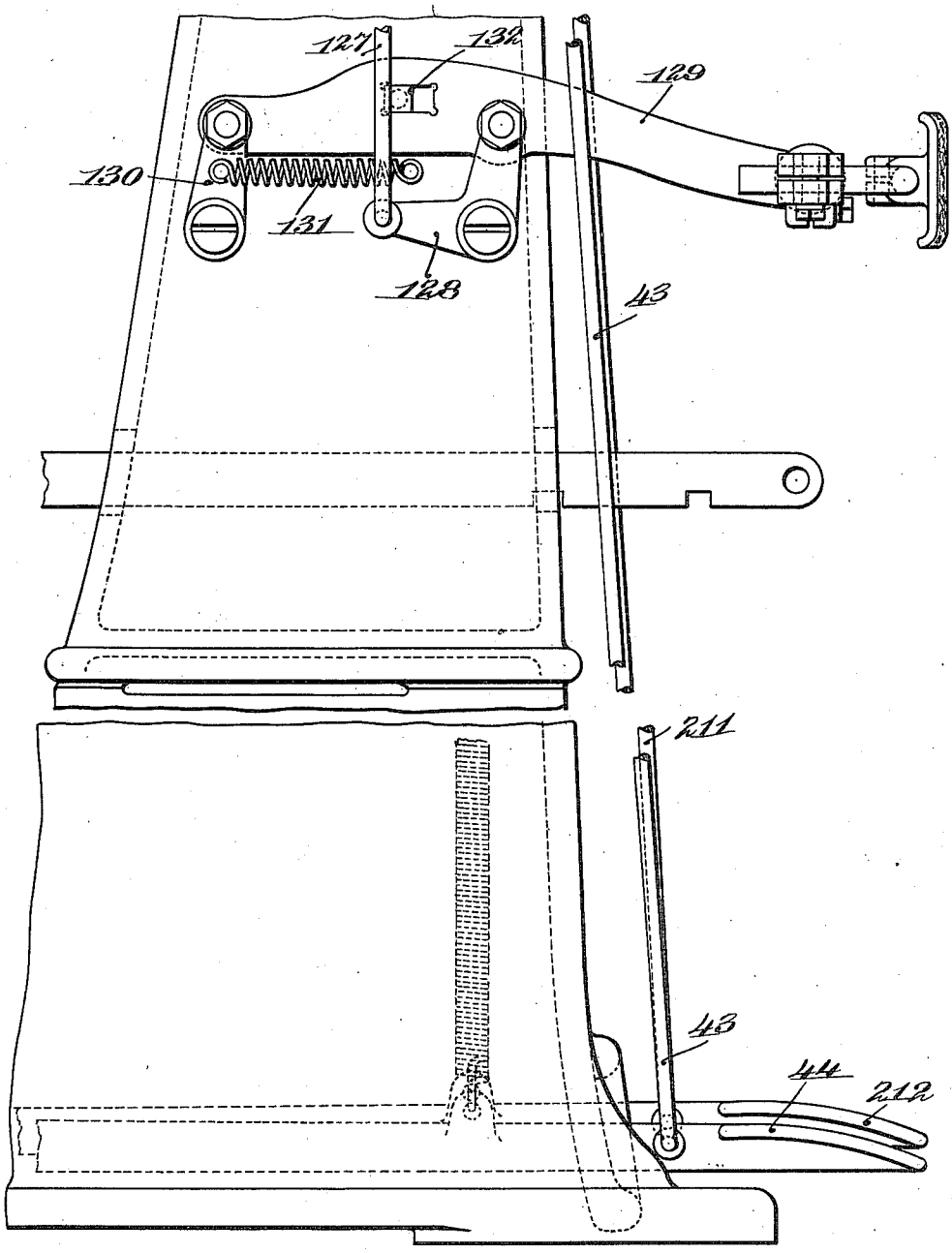

Fig. 2.

Witnesses
Edward S. Day
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Inventor
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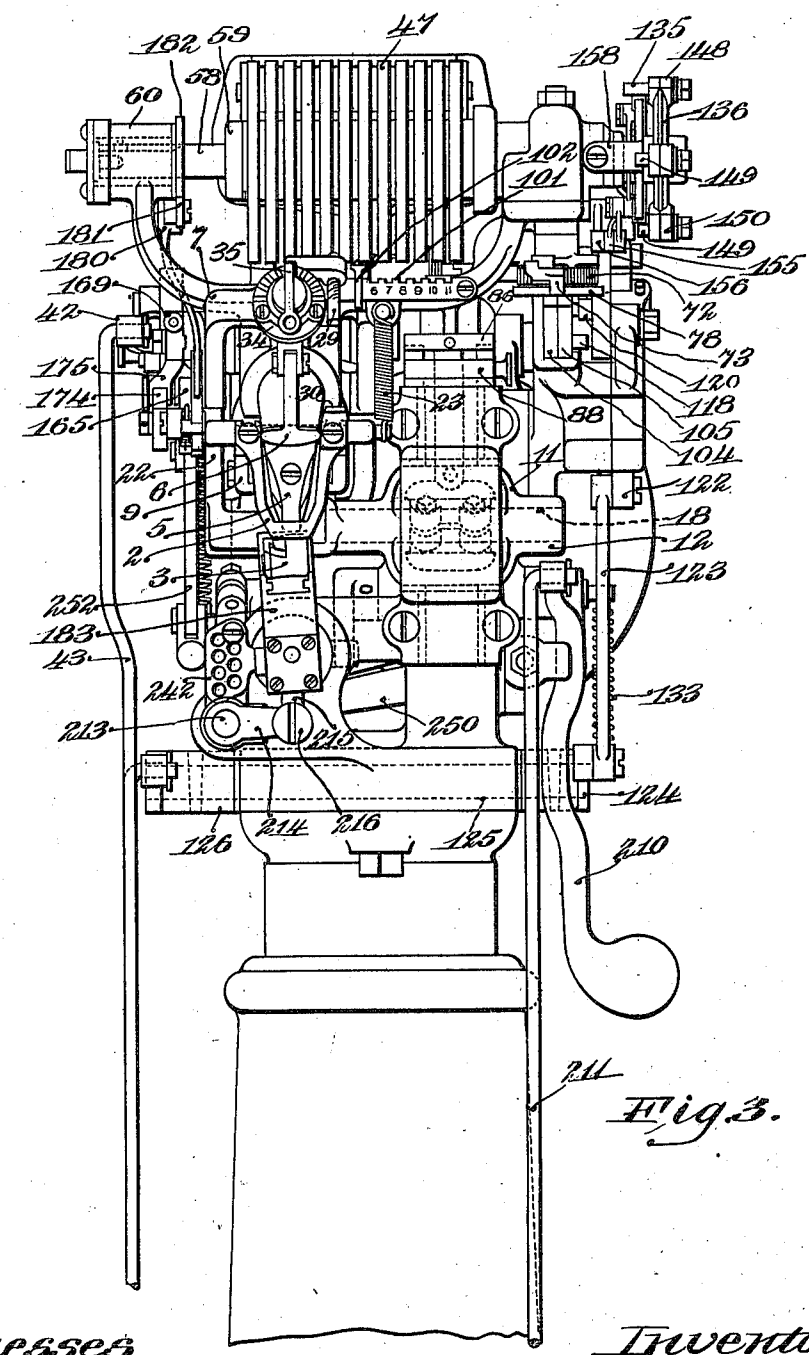

Fig. 3.

Witnesses

Edward S. Gay

K. D. McPhail

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F. H. PERRY.

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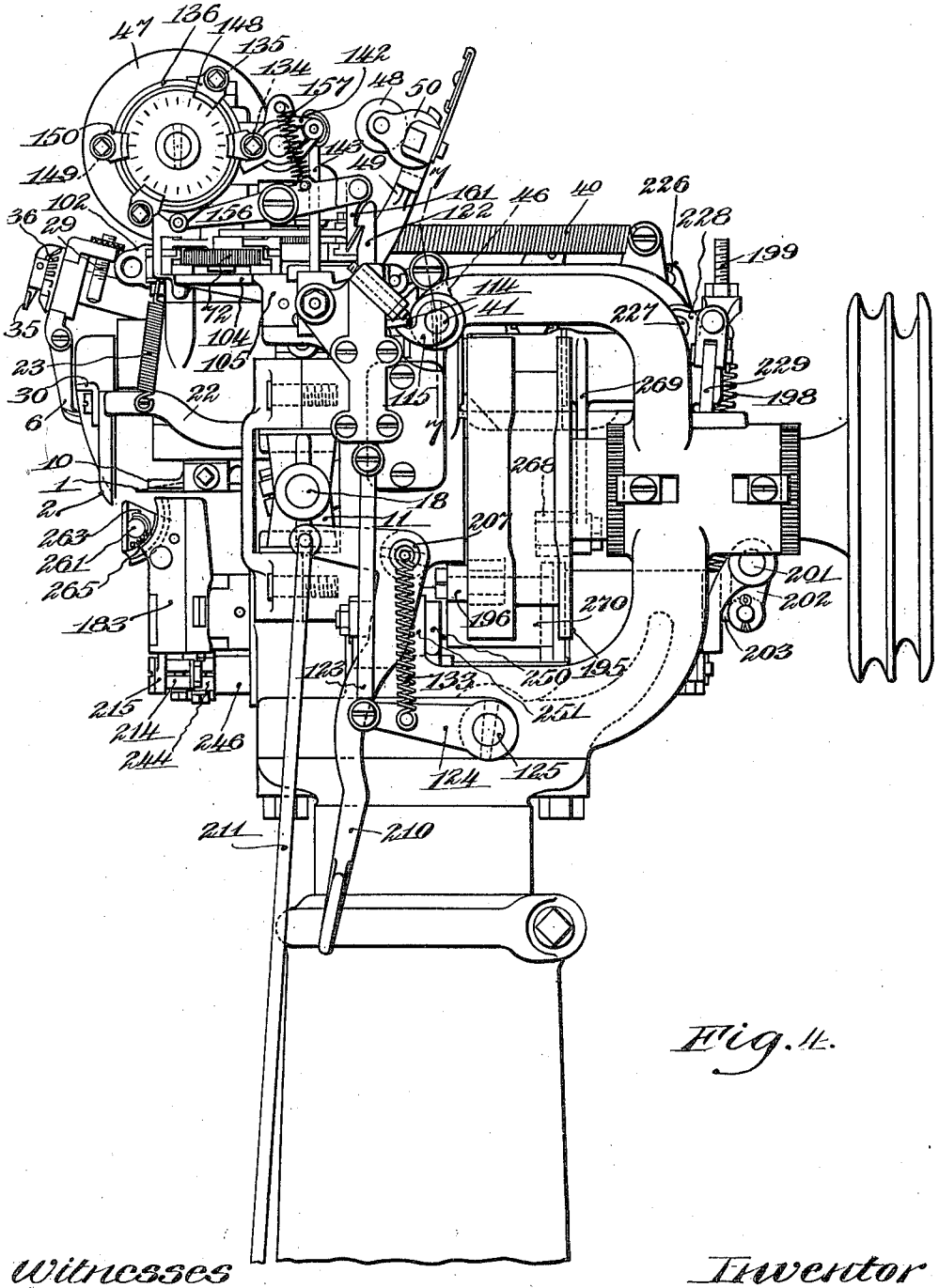

Fig. 4.

Witnesses

Edward S. Day

N. D. McO'Neil

Inventor

Frederick H. Perry.

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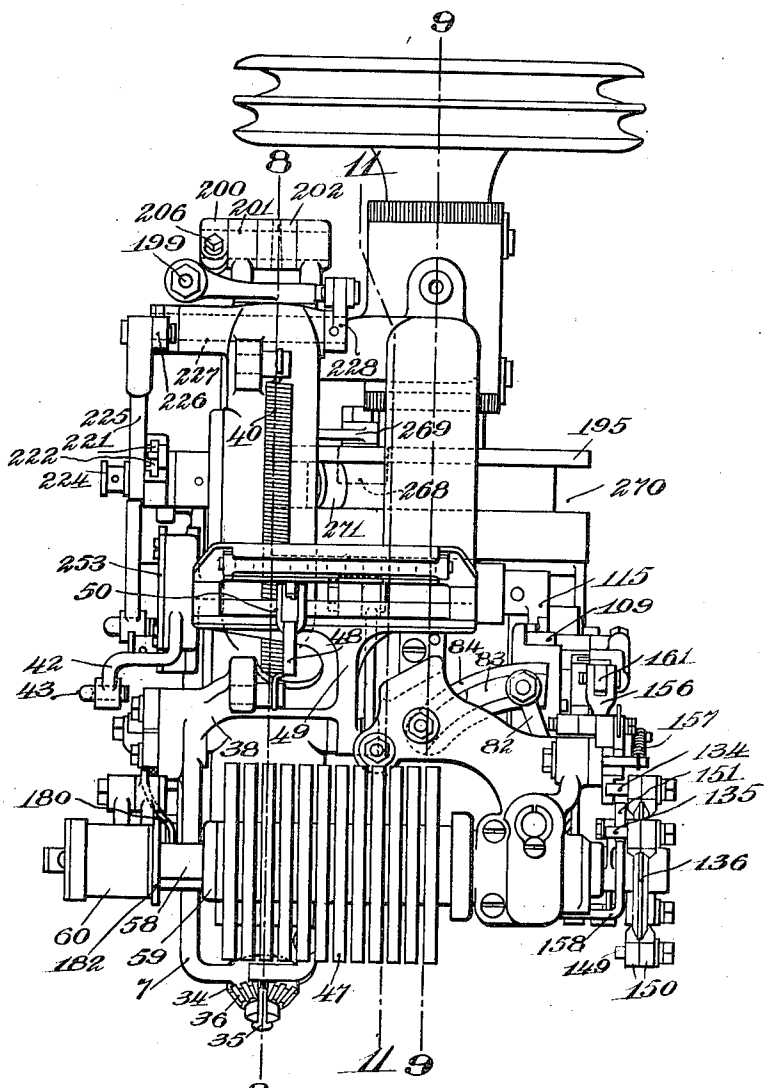

Fig. 5.

Witnesses

Edward S. Bay

K. D. McPhail

Inventor

Frederick H. Perry

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Attys

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17 SHEETS—SHEET 6.

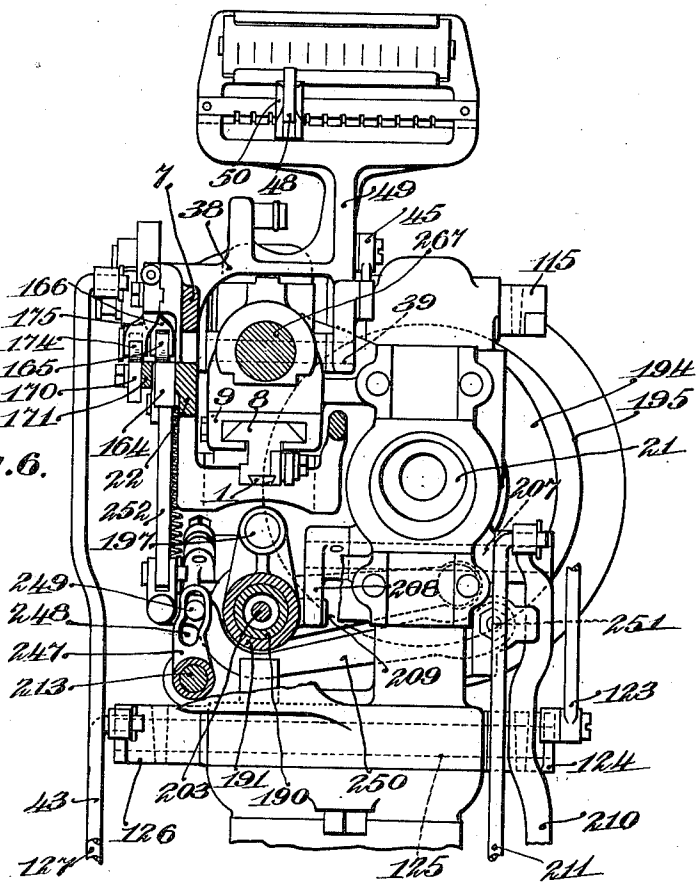

Fig. 6.

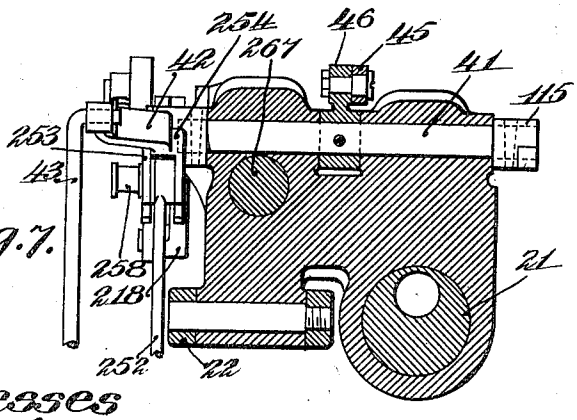

Fig. 7.

Witnesses
Edward S. Day
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17 SHEETS—SHEET 7.

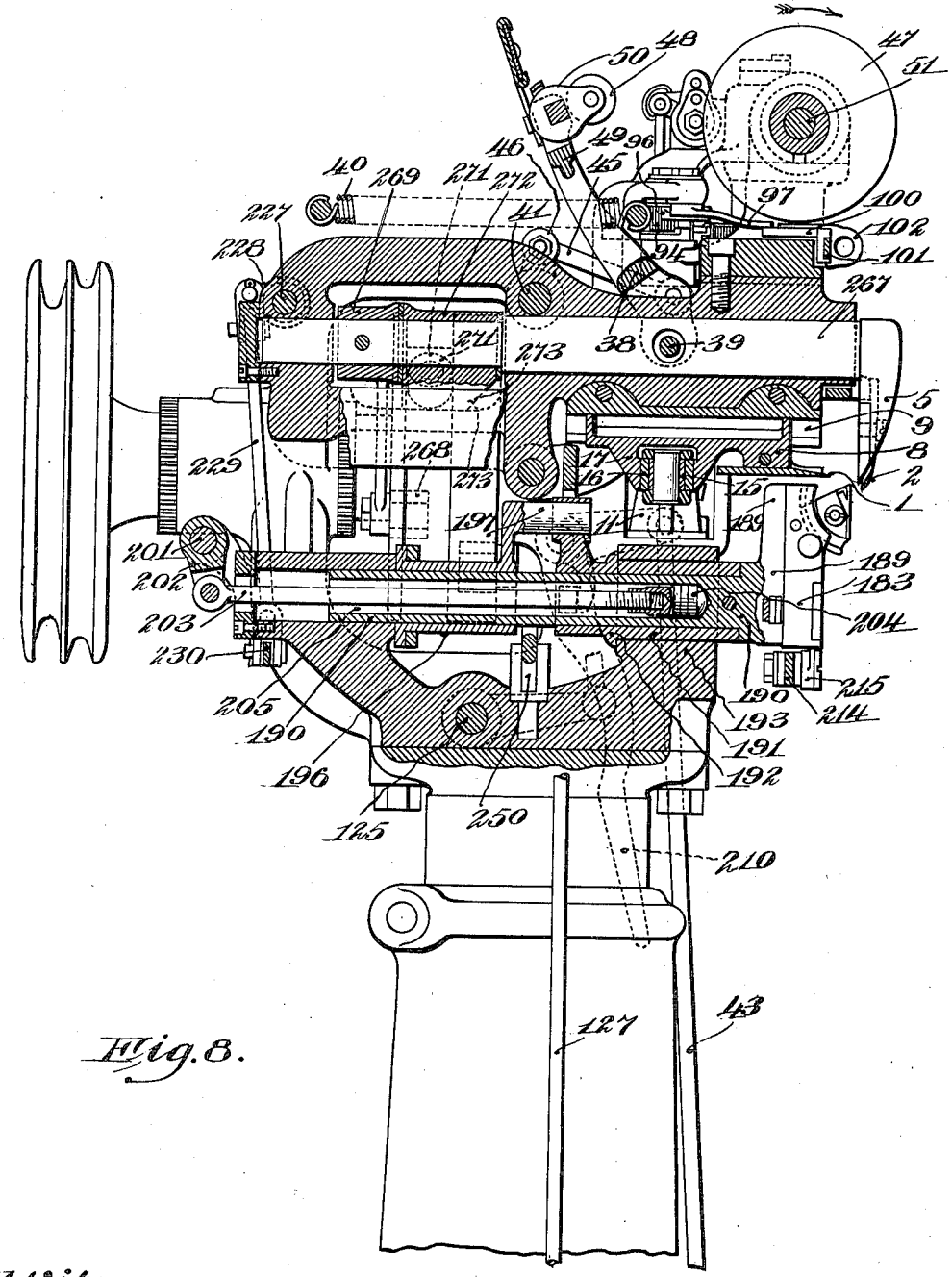

Fig. 8.

Witnesses

Edward S. Day

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17 SHEETS—SHEET 8.

Fig. 9.

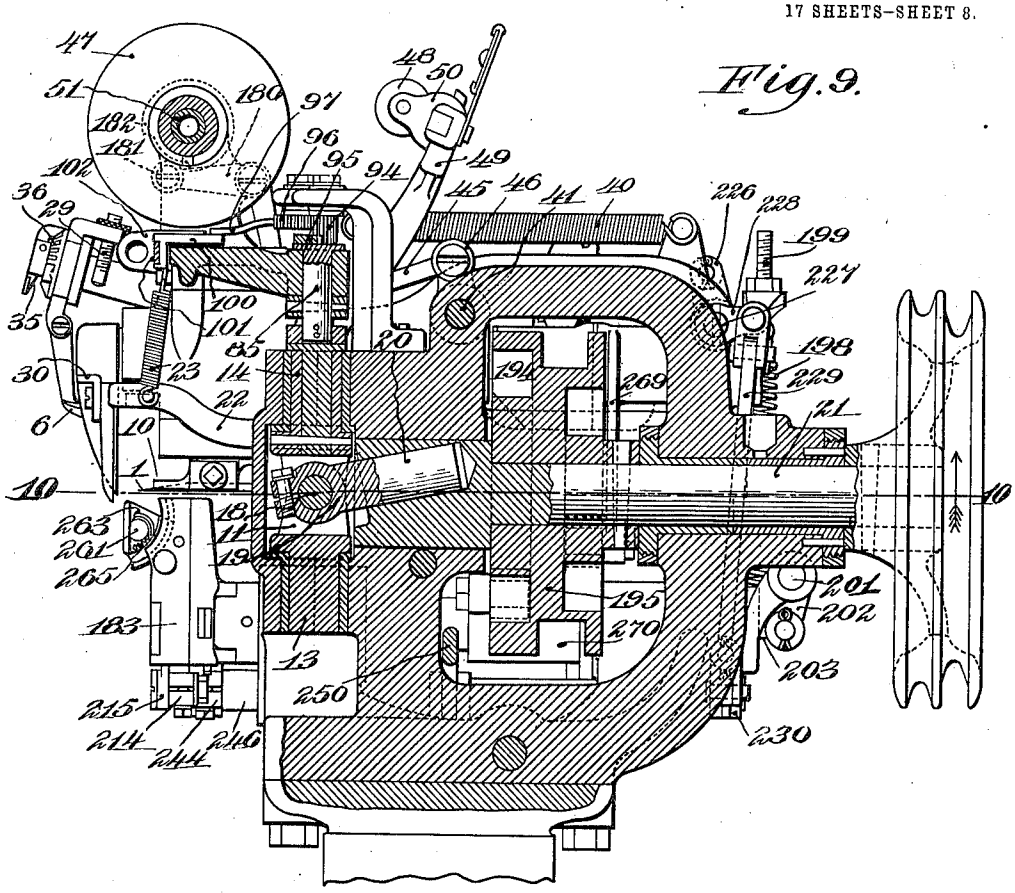
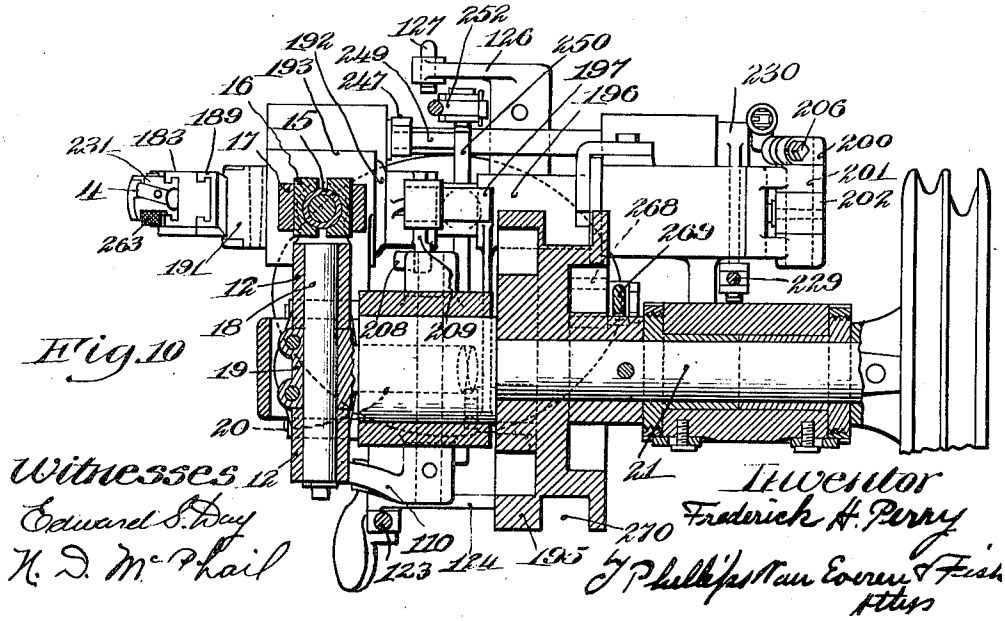


Fig. 10.



Witnesses

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H. D. McPhail

Inventor

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MACHINE FOR OPERATING ON SHOE SOLES.

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17 SHEETS—SHEET 9.

Fig. 11.

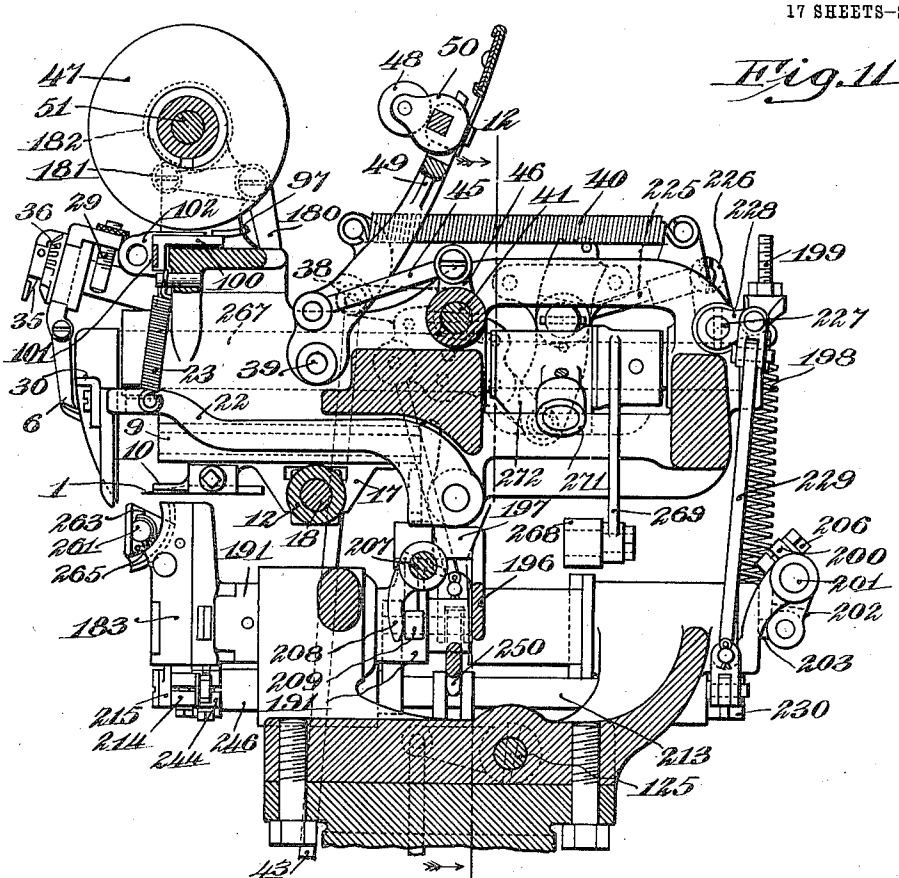

Fig. 12.

Witnesses
Edward S. Day
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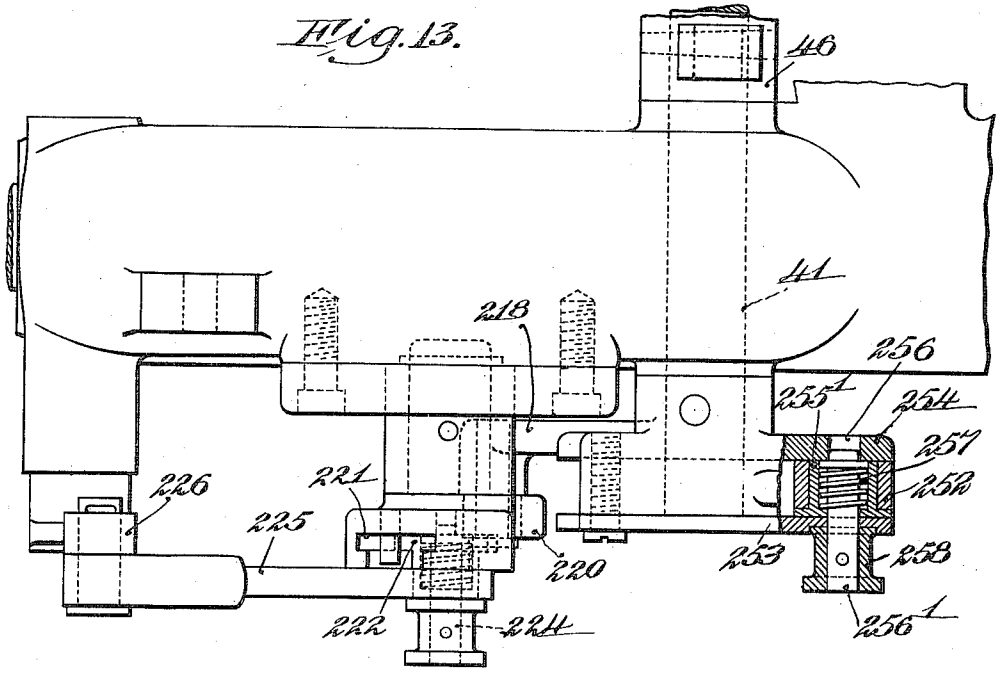
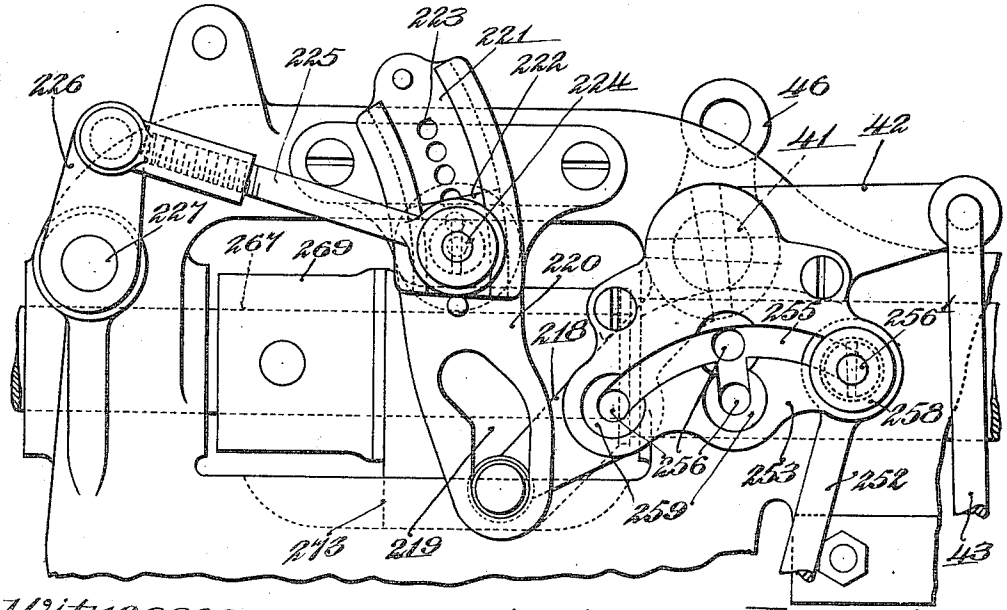
17 SHEETS—SHEET 10.

Fig. 13.





Witnesses

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H. D. McGhail

Fig 14

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MACHINE FOR OPERATING ON SHOE SOLES.

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Patented June 25, 1912.

17 SHEETS—SHEET 11.

Fig. 15.

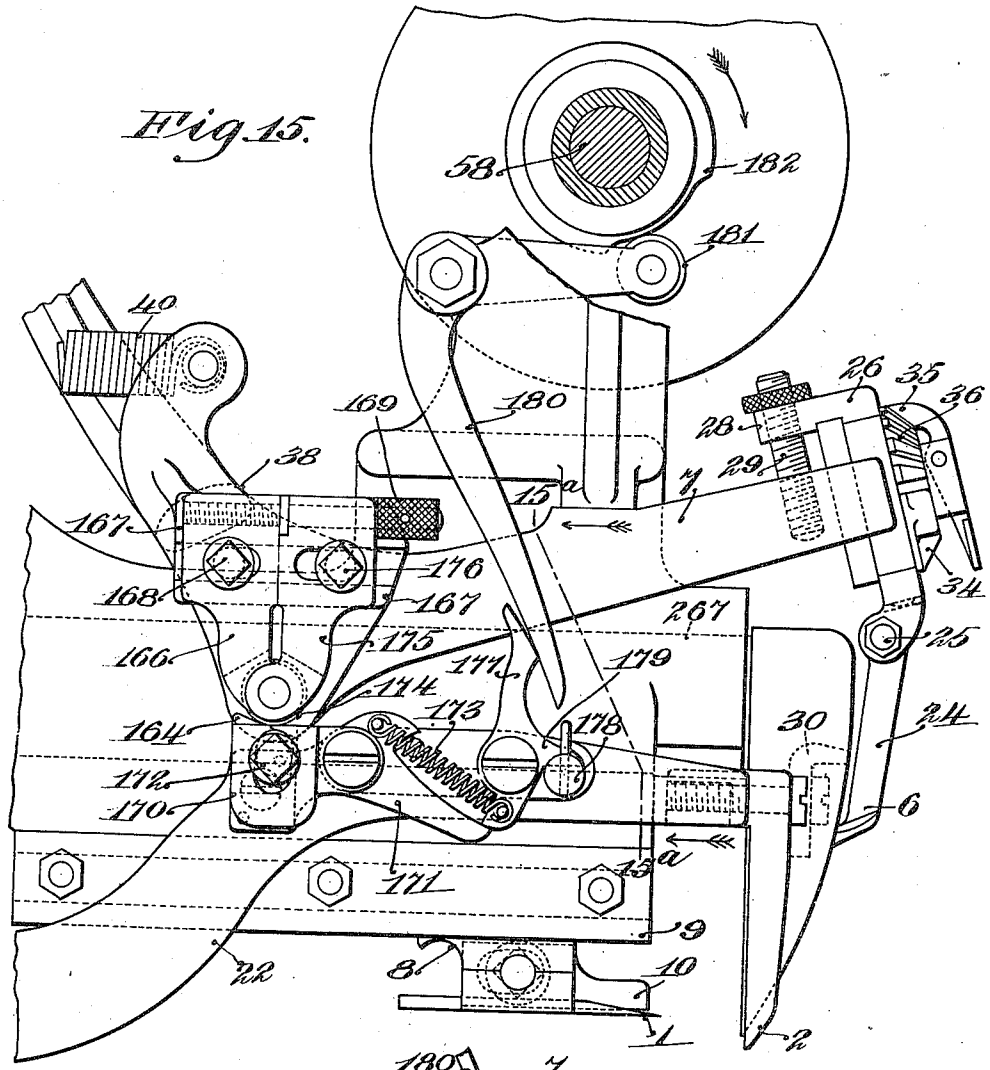
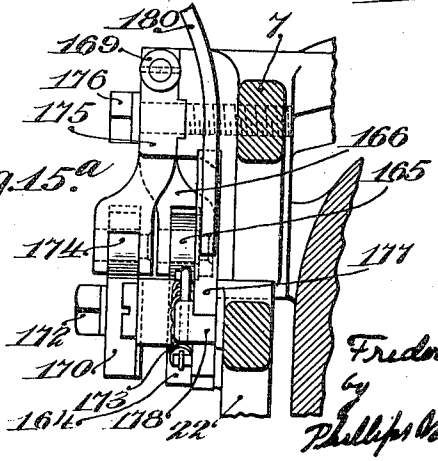


Fig. 15a.



Witnesses

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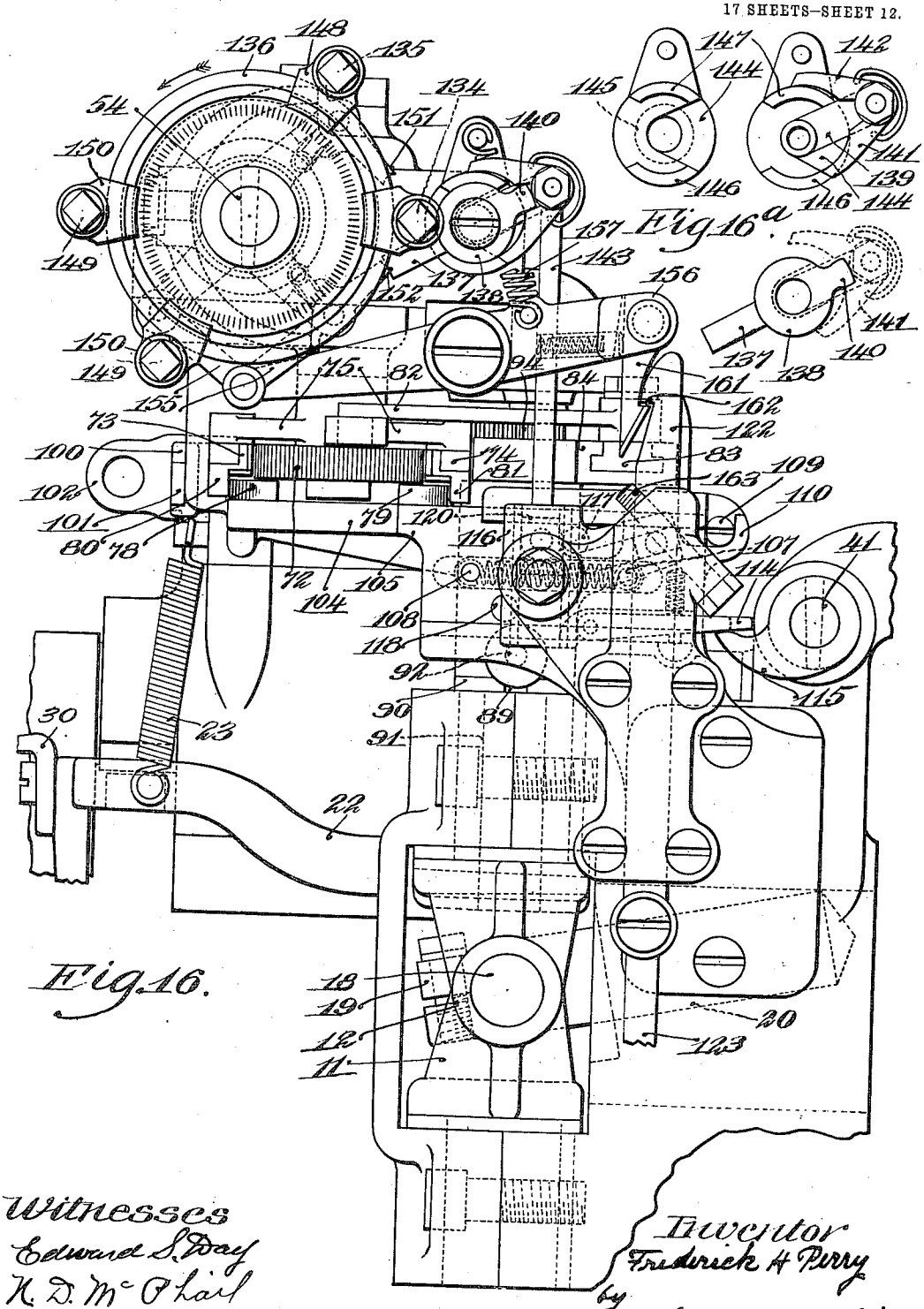

Fig. 16.

Fig. 16a.

Witnesses
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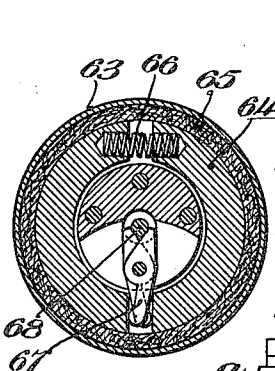

Fig. 17a.

Fig. 17.

Witnesses
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17 SHEETS—SHEET 14.

Fig. 18.

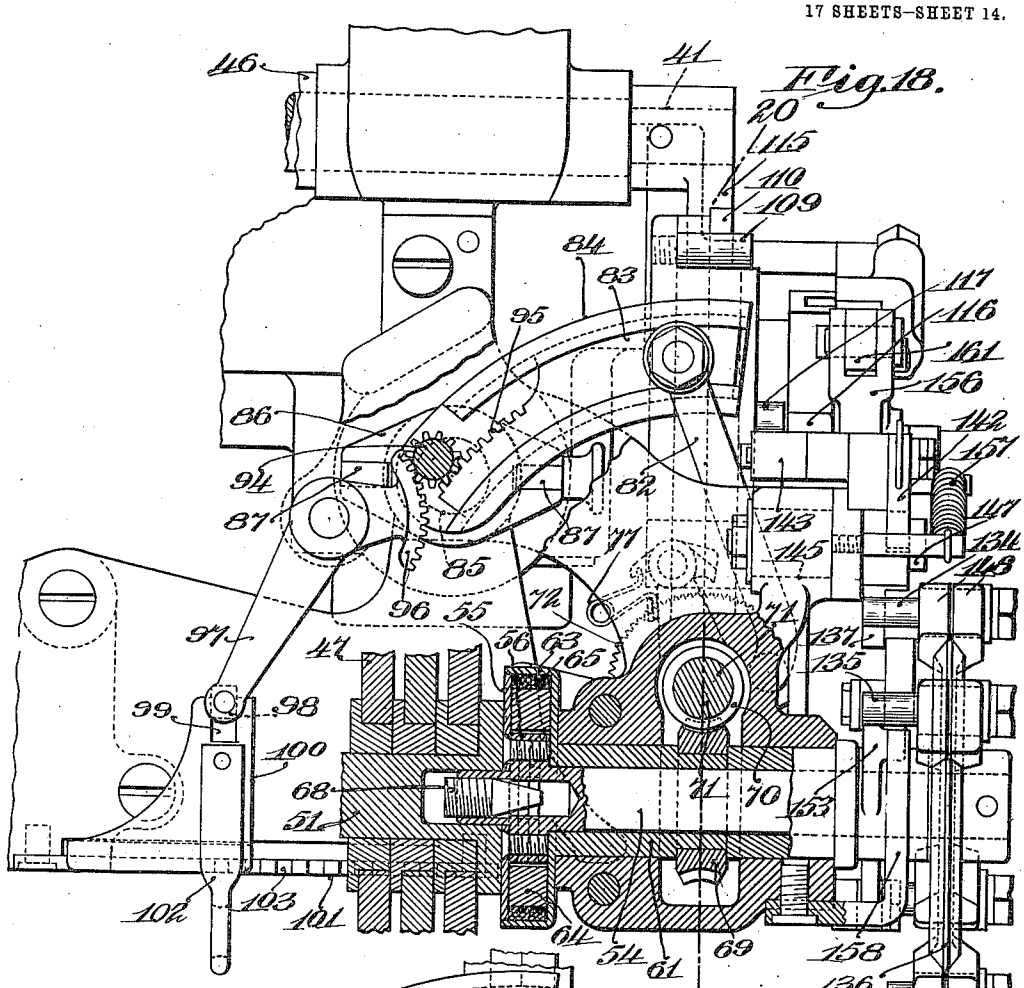
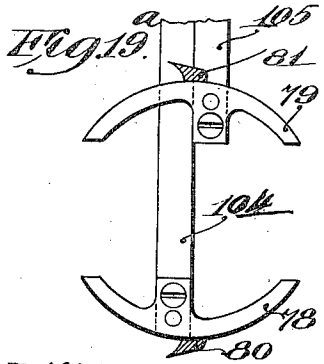
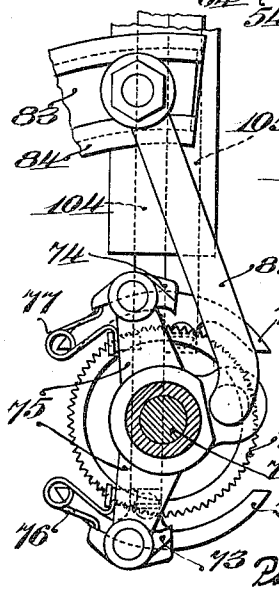


Fig. 19.





Witnesses

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N. D. Mc Phail

Inventor

Frederick H. Perry

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17 SHEETS—SHEET 15.

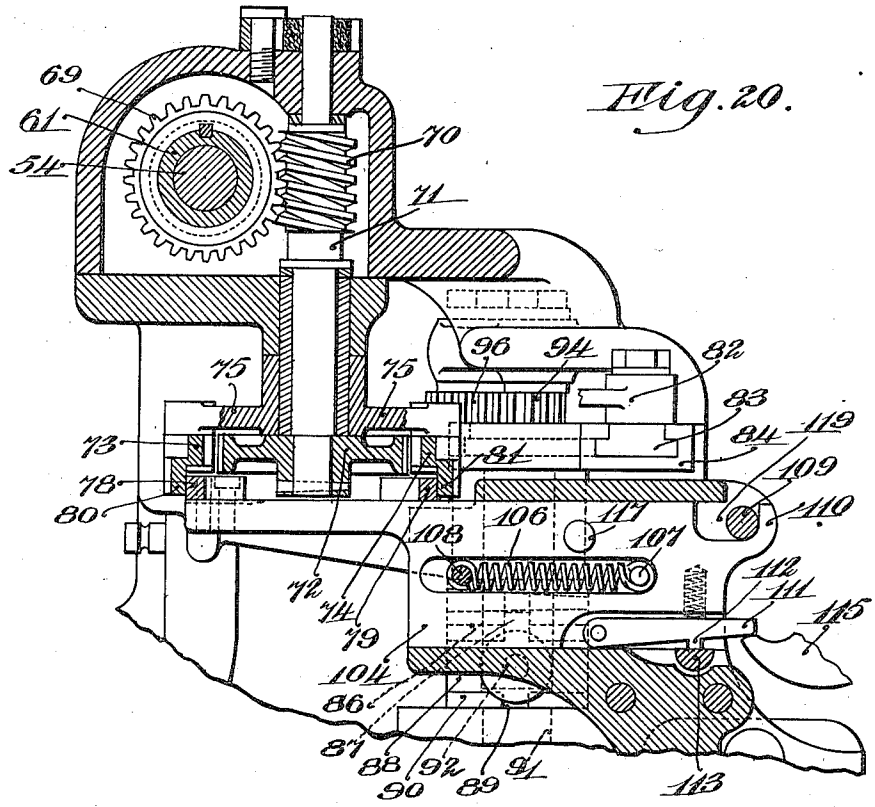
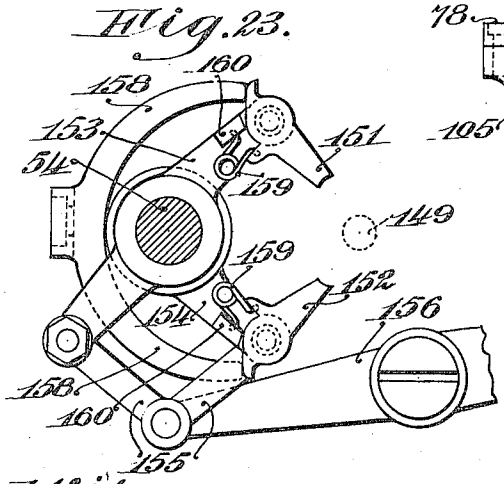


Fig. 20.



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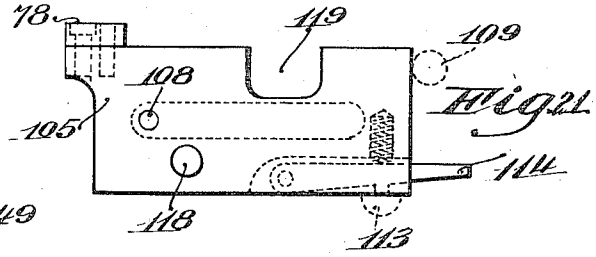

Fig. 21.

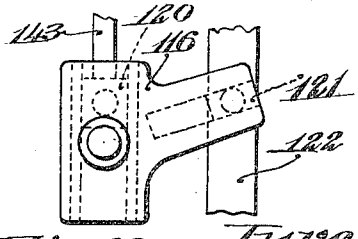

Fig. 22.

Witnesses

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MACHINE FOR OPERATING ON SHOE SOLES.

APPLICATION FILED MAY 4, 1910.

1,030,606.

Patented June 25, 1912.

17 SHEETS-SHEET 16.

Fig. 24.

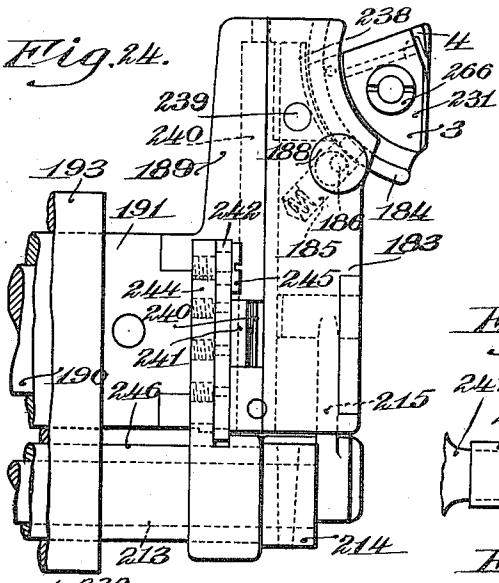


Fig. 29.

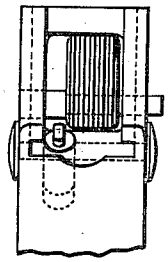


Fig. 25.

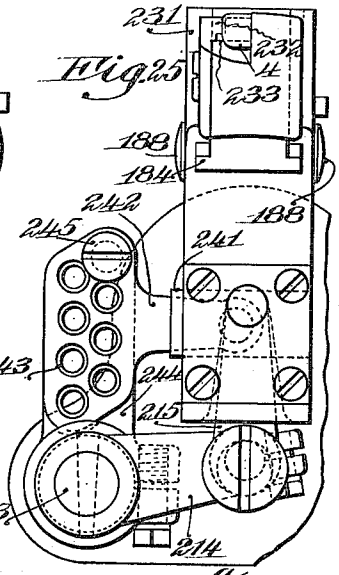


Fig. 30.

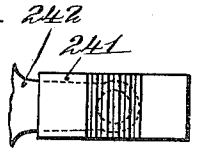


Fig. 28.

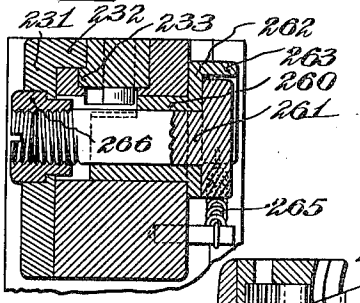


Fig. 28a.

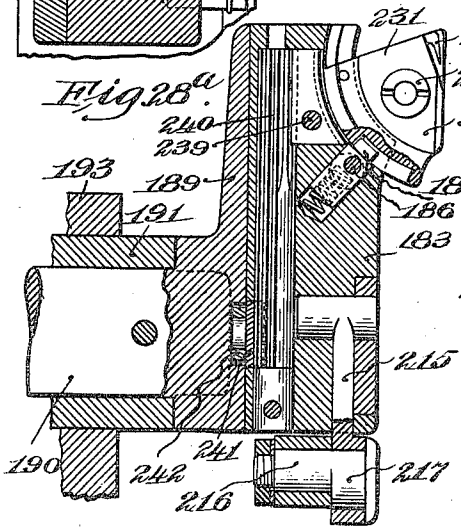


Fig. 26.

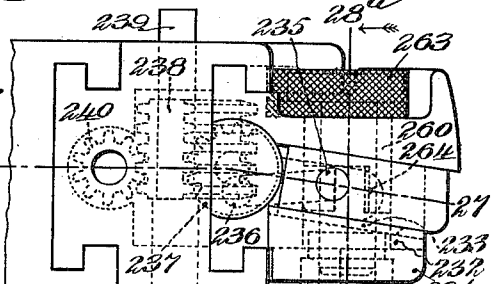
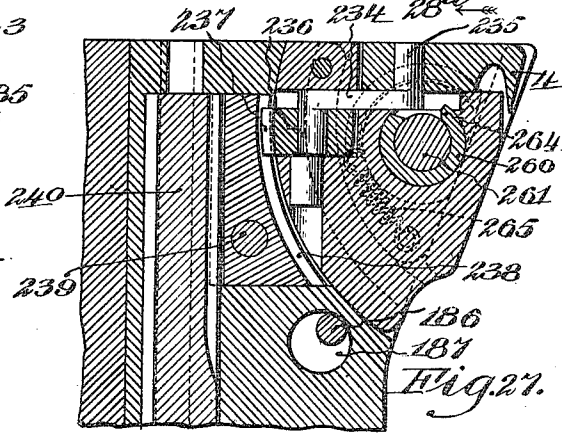


Fig. 27.



Witnesses

Edward S. Day

N. D. McGhail

Inventor

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Attys

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MACHINE FOR OPERATING ON SHOE SOLES.

APPLICATION FILED MAY 4, 1910.

1,030,606.

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17 SHEETS—SHEET 17.

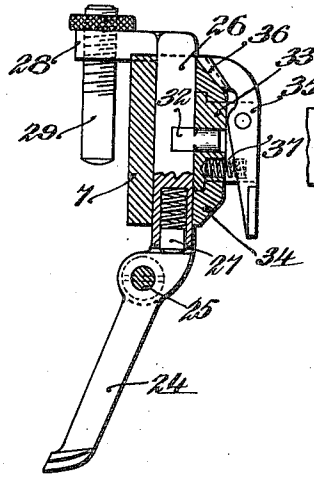

Fig. 32.

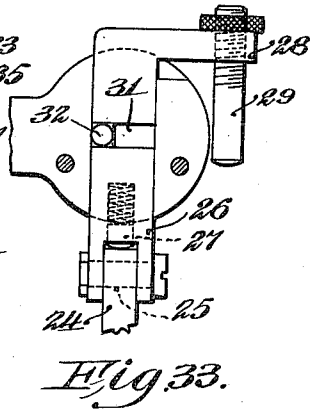

Fig. 33.

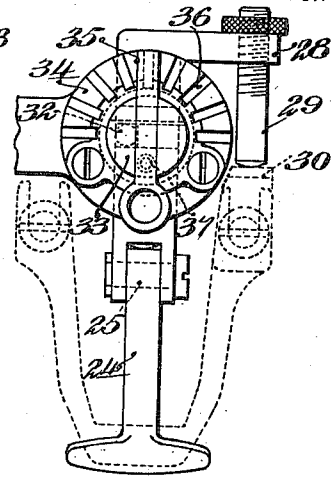

Fig. 31.

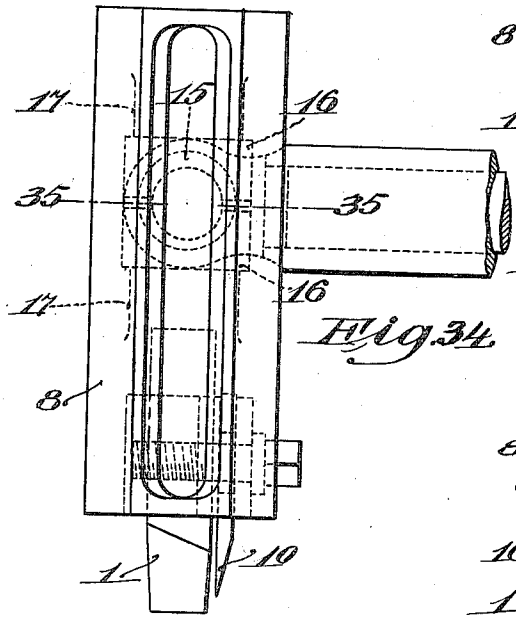

Fig. 34.

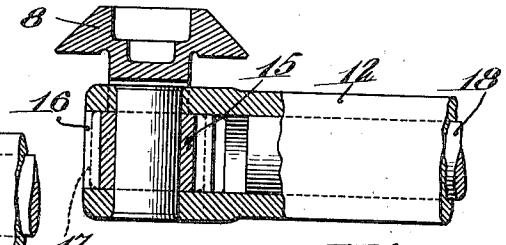

Fig. 35.

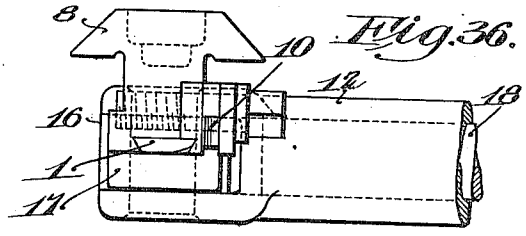

Fig. 36.

Witnesses

Edward L. Day

N. D. McPhail

Inventor

Frederick H. Perry

by Phillips Van Everen & Finch

Attys

UNITED STATES PATENT OFFICE.

FREDERICK H. PERRY, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

MACHINE FOR OPERATING ON SHOE-SOLES.

1,030,606. Specification of Letters Patent. Patented June 25, 1912.

Application filed May 4, 1910. Serial No. 559,332.

To all whom it may concern:

Be it known that I, FREDERICK H. PERRY, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Machines for Operating on Shoe-Soles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to machines for operating upon the soles of shoes, and is intended primarily to improve the construction and mode of operation of that class of machines which is utilized for rounding, channeling, or rounding and channeling the sole of a shoe after the outer sole has been temporarily secured in position preparatory to permanently sewing or otherwise securing it to the shoe.

Machines of the above class as heretofore constructed have commonly been provided with pattern cams or other pattern mechanism for varying the relative position of the knives and work guide to determine the path along which the knives operate. In operating these machines the feed of the shoe is modified to a greater or less extent by the operator in manipulating the shoe, and the pattern mechanism is therefore liable to get out of time with the shoe. This becomes a serious matter in case the projection of the sole is to be varied about the toe as well as along the outer ball portion, or in case the projection of the sole is to be varied on both the inside and outside of the sole.

It is accordingly one object of the invention to provide novel and improved means for correcting the position of the pattern mechanism at suitable intervals during the operation of the machine in case the feed of the pattern mechanism is not in proper time with the feed of the shoe.

To this end one feature of the invention contemplates the provision in a machine provided with a pattern mechanism for determining the path along which the operating tool travels, of means for shifting the pattern mechanism to correct its position with relation to the shoe. The means for shifting the pattern mechanism may be constructed and arranged to shift the pattern mechanism in but one direction (*i. e.* either forward or back) in correcting its position, the speed of the pattern mechanism with relation to the feed of the shoe being regulated accordingly. It is preferred, however, to so construct the shifting means that it will operate to shift the pattern mechanism in either direction, since with such construction the mechanism for actuating the pattern mechanism may be constructed to feed the pattern mechanism in unison with the feed of the shoe, and the pattern mechanism may be brought into accurate time with the shoe in case the feed of the shoe is either accelerated or retarded by the operator. This construction of shifting means is also well adapted for use in connection with a pattern mechanism which is fed in opposite directions for right and left shoes.

Further features of the invention contemplate the provision of improved means for controlling the mechanism which feeds the pattern cam or other pattern mechanism in machines in which this cam or mechanism is fed in opposite directions in operating upon right and left shoes, whereby the feeding mechanism is automatically set or shifted to feed the pattern mechanism alternately in opposite directions; the provision in a rounding and channeling machine of improved means for throwing the channel knife into and out of operation whereby the channel knife may be thrown either into or out of operation when the forepart guide is engaged with the shoe, or may be retained continuously in or out of working position; the provision in a channeling machine in which the sole guard is mounted to accommodate itself to the lateral curvature of the sole, of a channel knife which may be thrown into and out of operation during the operation on the sole, whereby the channeling knife may be presented at all times in proper relation to the surface of the sole, and at the same time may be thrown into and out of operation to leave any desired part of the sole unchanneled; the provision of improved means for supporting a channeling knife against forward movement while it is in engagement with the work, whereby the devices for retracting and projecting the knife are relieved from strain and an accurate

positioning of the knife with relation to the sole is secured; the provision of improved means for holding the sole support of a machine for operating on shoe soles against the sole of a shoe, whereby the sole support applies a uniform pressure to soles of varying thickness; the provision of improved grading devices for gradually varying the path along which the tool operates in passing from the shank to the forepart, or from the forepart to the shank on the outside of a shoe; and the provision of improved means for enabling the tool which operates upon the sole of the shoe to operate nearer the inseam about the forepart than it does through the shank.

In addition to the features above outlined, the invention includes certain further features and combinations which will be hereinafter referred to and set forth in the claims, the advantages of which will be apparent to those skilled in the art.

The various features of the invention will be readily understood from the accompanying drawings and the following detailed description of the machine illustrated therein.

In the drawings Figure 1 is a side elevation of a rough rounding and channeling machine embodying the various features of the invention in their preferred forms; Fig. 2 is a side elevation of the lower part of the machine base shown in Fig. 1; Fig. 3 is a front elevation of the machine; Fig. 4 is a right side elevation; Fig. 5 is a plan view; Fig. 6 is a front elevation, certain of the parts being removed or broken away to show certain parts which are not clearly illustrated in the other views; Fig. 7 is a sectional view on line 7—7, Fig. 4; Fig. 8 is a sectional view on line 8—8, Fig. 5; Fig. 9 is a sectional view on line 9—9, Fig. 5; Fig. 10 is a sectional view on line 10—10, Fig. 9; Fig. 11 is a sectional view on line 11—11, Fig. 5; Fig. 12 is a sectional view on line 12—12, Fig. 11; Fig. 13 is a detail plan view showing certain devices through which the operator throws the forepart guide and other parts of the machine into and out of operation; Fig. 14 is a detail elevation of the parts shown in Fig. 13; Fig. 15 is a detail elevation showing the grading devices for controlling the crease guide in passing from the shank to the forepart; Fig. 15^a is a sectional view on line 15^a—15^a, Fig. 15; Fig. 16 is a detail elevation showing the mechanism through which the pattern cams are operated and controlled; Fig. 16^a shows detail views of certain parts shown in Fig. 16; Fig. 17 is a front elevation partly in section showing the devices for operating and controlling the pattern cams; Fig. 17^a is a sectional view on line 17^a—17^a, Fig. 17; Fig. 18 is a detail view, partly in section, of the devices shown in Fig. 17; Fig. 19 is a detail plan view showing the parts for operating the pattern cams; Fig. 19^a is a detail plan view showing the guards for controlling the operation of the pawls; Fig. 20 is a sectional view on line 20—20, Fig. 18; Fig. 21 is a detail showing one of the guard carrying slides; Fig. 22 is a detail elevation of a part of the pawl controlling mechanism; Fig. 23 is a detail elevation of a part of the mechanism for correcting the position of the pattern cams during the rounding; Fig. 24 is a detail side elevation of the sole support and carrier for the channeling knife; Fig. 25 is a front elevation of the parts shown in Fig. 24; Fig. 26 is a vertical sectional view through the parts shown in Figs. 24 and 25; Fig. 27 is a sectional view on line 27—27, Fig. 28; Fig. 28 is a plan view of the parts shown in Fig. 24; Fig. 28^a is a sectional detail on lines 28^a—28^a, Fig. 28; Figs. 29 and 30 are details of certain parts shown in Figs. 24 and 25; Fig. 31 is a detail front elevation showing the devices for adjusting the forepart guide; Fig. 32 is a side elevation partly in section of the devices shown in Fig. 31; Fig. 33 is a front elevation of the devices shown in Fig. 31, with certain parts removed; Fig. 34 is a detail plan view of the slide carrying the trimming knife; Fig. 35 is a sectional view on line 35—35, Fig. 34; and Fig. 36 is a front elevation of the devices shown in Fig. 34.

The machine shown in the drawings is a machine for rough rounding and channeling the soles of shoes, and is provided with a trimming knife 1, a work support 2, which also acts as a crease guide, a sole support 3, a channel knife 4, a feed plate 5, which also acts as a cutting block, and a forepart guide 6, which is carried on the front end of an arm 7. These parts have the same general mode of operation in feeding and guiding the shoe during the trimming and channeling of the sole, as the corresponding parts in the well-known Goodyear rough rounding and channeling machine, which is shown and described in the patent to French and Meyer, No. 599,602, dated February 22, 1898.

The trimming knife 1 is secured in a knife carrying slide 8 which is mounted to reciprocate in a guideway formed in a removable bed plate 9 secured in the frame of the machine. The knife carrying slide also carries a blade or point 10 which operates to hold the shoe during the return movement of the sole support and channeling knife, the channeling knife acting to cut the channel during this return movement (Figs. 1, 8, and 34 to 36). The slide is reciprocated through devices shown in Figs. 3, 8, 9, 10, 34 and 35. The knife carrying slide is reciprocated through an oscillating yoke 11 provided with a horizontal arm 12 connected with the slide, and also provided with verti-

cal trunnions 13 and 14 mounted in bearings in the frame of the machine. The end of the arm 12 carries a roll 15 which is engaged by bearing blocks 16 arranged between the transverse ribs 17 on the under side of the slide. A horizontal shaft 18 is journaled in the yoke 11, and an arm 19 is secured upon the shaft and is provided with a cylindrical part 20 which extends at right angles to the shaft. This cylindrical part of the arm fits within an inclined bearing formed in the end of the main cam shaft 21 of the machine (Figs. 9 and 10). Through these connections the yoke 11 is oscillated to reciprocate the knife carrying slide during each revolution of the cam shaft.

The crease guide 2 which guides the shoe while operating upon the shank is in the form of a bell shaped piece adjustably secured to the front end of a skeleton arm 22 which is pivoted on the frame and held yieldingly in position by a spring 23 (Figs. 1 and 4). The forepart guide 6 which is brought into position to engage the upper close to the crease in passing from the shank to the forepart, is in the form of an arm 24 which is pivotally supported at 25 upon a vertically adjustable slide 26 mounted in the front end of the arm 7. The lower end of the arm 24 is pressed yieldingly against the outer surface of the feed plate 5 or crease guide 2 by a spring pressed plunger 27 engaging the upper end of the arm (Fig. 32). The upper end of the slide 26 is provided with a laterally extending arm 28 which carries an adjustable screw 29 arranged to engage a plate 30 on the upper end of the crease guide, when the forepart guide is brought into operation, so that the crease guide moves with the forepart guide during the operation around the forepart of the shoe. In order that the slide 26 may be conveniently adjusted to secure the desired projection of the sole around the forepart of the shoe, the devices shown in detail in Figs. 31 to 33 are provided. As here shown, the slide 26 is provided with a transverse groove 31 engaged by the square end of a crank pin 32 which is journaled in a crank disk 33. The crank disk 33 is mounted in a circular plate 34 secured to the outer end of the arm 7. The operating and latch lever 35 is pivoted in a slot in the outer end of the disk 33, and the upper end of the lever is held in engagement with one of a series of notches 36 by a spring 37. By pressing upon the lower end of the lever 35 the lever may be disengaged from the notches 36, and then the crank disk may be turned to secure the desired adjustment of the forepart guide, the latch lever being then engaged with one of the notches 36. When the forepart guide is adjusted, the screw 29, the lower end of which forms a shoulder for engaging the crease guide, is correspondingly adjusted, so that it will properly engage the crease guide as the forepart guide is brought against the shoe.

The arm 7 which carries the forepart guide extends forward from a yoke 38, the arms of which are secured to the opposite ends of a rock shaft 39 mounted in the frame of the machine (Figs. 5, 6, 8 and 11). The arm is held in raised position by a spring 40. The yoke 38 and arm 7 are operated to move the forepart guide into and out of operation through a rock shaft 41, one end of which is provided with an arm 42 connected through a rod 43 with an operating treadle 44 (Figs. 1 and 2). The rock shaft is connected with the yoke 38 through a link 45, one end of which is connected to the yoke, and the other end of which is connected to an arm 46 secured to the rock shaft (Figs. 1, 7 and 11). When the forepart guide is thrown into operation in passing from the shank on to the forepart, the relative position of the guide and trimming knife is controlled to give the desired outline to the sole about the forepart of the shoe, by one of a series of cams 47 (Figs. 1, 3, 5 and 11). These cams are arranged to be engaged by a roll 48 carried by an arm 49 which projects up from the yoke 38. The roll is mounted in a block 50 which may be adjusted laterally along a guide bar carried by the arm 49, to bring the roll into position to engage any one of the cams 47 when the forepart guide is thrown into operation (Fig. 6). The pattern cams 47 are arranged side by side upon an arbor 51, and are held in proper relation to each other by keys 52 secured in the hubs of the cams, and so arranged that the key in one cam projects into the keyway in the adjacent cam, the key of the right-hand cam projecting into a slot in the flange 53 at the end of the arbor, and retaining the cams in proper position upon the arbor (Figs. 17 and 18). The right-hand end of the arbor 51 is provided with a bearing fitting over the end of a shaft 54. A plate 55 is secured to a flange 56 near the end of the shaft, and is provided with a lug 57 which engages the slot in the flange 53, and thus couples the cam carrying arbor to the shaft 54, so that motion is transmitted from the shaft to the cams. The opposite end of the arbor is supported in the end of a shaft 58 provided with a flange 59 which is coupled to the hub of the left-hand cam 47. The shaft is so mounted in the bearing 60 that it may be moved longitudinally to allow the removal and insertion of different arbors carrying cams of different shapes.

The cams 47 are intermittently advanced during the operation of the machine, and each cam is shaped to so vary the position of the forepart guide during the rounding operation as to give a predetermined contour to the forepart of the shoe sole. In

order that the cams may be used in operating upon both right and left shoes, the means for actuating the cams is so constructed that the movements of the cams may be reversed, the cams being driven in one direction while operating upon right shoes, and in the reverse direction when operating upon left shoes. In the construction shown the shaft 54 is actuated to advance the pattern cams through a friction clutch connecting the shaft with a hollow shaft or sleeve 61 through which the shaft 54 extends. The friction clutch shown comprises a flange 62 formed on the end of the sleeve 61, and provided with a cylindrical rim 63 surrounding the flange 56 on the end of the shaft 54. Two segmental clutch shoes 64 are arranged within the rim 63, and a friction ring 65 is interposed between the clutch shoes and the rim. A spring 66 is interposed between two adjacent ends of the clutch shoes, and an adjusting device is interposed between the other ends of the shoes. The spring acts to force the shoes outward, and thus frictionally connect the shaft 54 and sleeve 61. The device for adjusting the frictional grip of the clutch comprises two levers 67 pivoted in the flange 56 and having their lower ends engaging the ends of the clutch shoes. The inner ends of the levers 67 are engaged by the conical end of an adjusting screw 68 which is threaded in the end of the shaft 54. By adjusting the screw 68 the position of the levers 67 may be varied to increase or diminish the frictional grip of the clutch.

The sleeve 61 is driven through a worm wheel 69 secured to the sleeve and engaged by a worm 70 formed on a vertical shaft 71 (Figs. 17, 18 and 20). A ratchet wheel 72 is secured to the lower end of the shaft 71, and is arranged to be engaged by one or the other of two pawls 73 and 74 arranged on opposite sides of the wheel (Fig. 19). The pawls are mounted in the arms of a bell crank lever 75 which is mounted to oscillate on the bearing shaft 71. The pawls are forced in a direction to engage the wheel by springs 76 and 77, and are normally held out of engagement with the wheel by guards 78 and 79 arranged to engage depending lugs 80 and 81 on the pawls (Fig. 19[a]). When the pawl 73 is in engagement with the ratchet wheel, the pattern cams are rotated in the proper direction for operating upon left shoes, and when the pawl 74 is in engagement with the ratchet wheel the pattern cams are driven in the proper direction for operating upon right shoes.

The pawl carrying lever 75 is continuously operated during the operation of the machine from the oscillating yoke 11 which reciprocates the trimming knife. The pawl carrying lever is connected by a link 82 with a slide 83 which is mounted in a segmental arm 84 carried by the upper end of a shaft 85 (Figs. 17, 18 and 19). The shaft 85 is arranged in axial alinement with the trunnion 14 of the yoke 11, and a coupling is provided by means of which the shaft 85 may be connected with or disconnected from the trunnion 14. This coupling comprises a plate 86 secured on the shaft 85, and provided with slots for engaging lugs 87 on a connecting plate 88 which is mounted to slide on the lower end of the shaft 85. The coupling plate 88 is also provided with lugs 89 for engaging slots in a flange 90 at the upper end of a stud 91 which is secured in the trunnion 14. The coupling plate 88 carries a spring pressed pin 92 the inner end of which engages one of two holes 93 at the lower end of the shaft 85. When the pin is in engagement with the lower hole, as indicated in Fig. 17, the coupling plate connects the yoke 11 and shaft 85 so that the shaft 85 oscillates with the yoke, thus reciprocating the pawls 73 and 74 through the connections described. In case the pattern mechanism for controlling the forepart guide is not to be used, the coupling plate 88 may be raised, and the locking pin 92 engaged with the upper hole 93. When in this position the lugs 89 are disengaged from the flange 90, so that the shaft 85 is disconnected from the oscillating yoke 11, and it remains at rest during the operation of the machine.

In order that the feeding or advance movement of the pattern cams 47 may be varied in accordance with the size of shoe to be operated upon, means are provided for adjusting the slide 83 in the arm 84, and thus varying the throw of the actuating pawls. The devices for thus adjusting the slide 83 comprise a pinion 94 arranged to engage a rack 95 formed on the slide 83, and operated by a gear segment 96. The segment 96 is formed on one arm of a lever 97, the other arm of which carries a pivoted block 98 engaging a slot 99 in an adjustable slide 100. The slide is mounted upon a bar 101, and is held in adjusted position upon the bar by a spring latch and handle 102 which may be engaged with any one of a series of notches 103 in the bar. The notches are arranged to correspond with the adjustments of the slide 83 required for the different sizes of shoes, and the bar may be provided with a scale indicating the size corresponding to each notch.

The actuating pawls 73 and 74 are held out of engagement with the ratchet wheel by the guards 78 and 79 during the operation upon the shank of the shoe, and one or the other of the pawls is engaged with the ratchet wheel by the operator when the ball line of the shoe is reached, and is again disengaged when the forepart guide is thrown out of operation at the ball line on

the other side of the shoe. The guards 78 and 79 are carried by two slide plates 104 and 105 respectively (Figs. 16 to 21). The plates are mounted side by side in a fixed guideway, and are connected by a spring 106 arranged in grooves formed in the adjacent faces of the slides, one end of the spring being connected to a pin 107 on the slide 104 and the other end to a pin 108 on the slide 105. The spring acts to hold both slides in normal position with the rear end of the plate 105 in engagement with one side of a stop pin 109, and with a finger 110 on the slide 105 in engagement with the opposite side of the stop pin, thus holding the guards 78 and 79 in position to retain the pawls out of engagement with the ratchet wheel. The slide plate 104 carries a spring pressed latch 111 provided with a depending lug 112 which engages the rear side of a pin 113 when the plate is retracted to throw the pawl 73 into operation, the latch acting to retain the plate in retracted position until it is disengaged from the pin 113. The plate 105 carries a similar latch 114 which engages the front side of the pin 113 when the plate is advanced to throw the pawl 74 into operation, and retains the plate in advanced position until it is disengaged from the pin. The slides are actuated to throw the pawls into operation by the operator, and the latches 111 and 114 are actuated to throw the active pawl out of operation by an arm 115 secured to the end of the rock shaft 41, and arranged to lift the pawls free of the pin 113 when the treadle 44 is released and the shaft 41 is rocked in throwing the forepart guide out of operation. When the shaft 41 is rocked in throwing the forepart guide into operation, the arm 115 swings downward, thus releasing the pawls 111 and 114 so that either pawl may act to lock its slide in the position to which it is moved by the operator.

The devices through which the operator actuates the slide plates 104 and 105 comprise a lever 116 mounted upon a fixed pivot, the axis of which is located between two pins 117 and 118, which project laterally from the slides 104 and 105 respectively, the slide 105 being cut away at 119 for the passage of the pin 117. The lever 116 is provided with a vertical guideway in which a block 120 is mounted, so that it may be moved into position to engage either the pin 117 or the pin 118. The lever 116 is provided with a horizontal arm which is grooved to receive a pivot block 121 carried by a vertical sliding bar 122. The lower end of the vertical sliding bar is connected by a link 123 with an arm 124 secured to one end of a rock shaft 125 (Figs. 3 and 4). The other end of the rock shaft 125 carries an arm 126 which is connected by a link 127 with one arm of a bell crank lever 128 (Figs. 1 and 2). The other end of the bell crank lever is connected to a bar 129 the rear end of which is supported upon a link 130. The front end of the bar 129 is arranged in position to be operated by the knee of the operator, and the bar is held in advanced position by a spring 131. The movement of the bar is limited by a stop block 132 engaging a slot formed in the bar. Through these connections the operator may draw down the sliding bar 122 and thus rock the lever 116, the bar and lever being returned to normal position as soon as the pressure on the bar 129 is relieved by the spring 131 or a spring 133 connected to the arm 24 (Fig. 4). If the block 120 is in the position indicated in the drawings when the lever 116 is rocked, the block will engage the pin 117 and retract the slide 104, thus throwing the pawl 73 into operation, so that the pattern cams will be advanced in the proper direction for operation upon a left shoe. If the block 120 is in position below the pivotal axis of the lever 116 when the lever is rocked, the block will engage the pin 118 and advance the slide 105 to throw the pawl 74 into operation so that the pattern cams will be advanced in the proper direction for operation upon a right shoe.

In order that the position of the block 120 may always correspond to the pattern cams, means are provided for shifting the block at the completion of the movement of the cams in either direction, and means are also provided for locking the block in the position to which it is shifted until the pattern cams have completed their movement in the opposite direction. In the construction shown the devices for shifting the block 120 comprise two pins 134 and 135, which are carried by a disk 136 secured to the outer end of the shaft 54, so that it will revolve with the pattern cams. These pins are arranged to engage a lever 137 mounted upon the frame of the machine, so that it may have a limited movement in either direction, and thus coöperating with the pins to arrest the movement of the pattern cams in either direction. The lever 137 is provided with a hub 138 recessed upon its under side to embrace an arm 139 which is pivoted concentrically with the lever. The hub 138 of the lever is also provided with a short arm 140 overlying the arm 139, and arranged between two spring pressed locking pawls 141 and 142 which are mounted on the end of the arm. The outer end of the arm 139 is connected by a link 143 with the block 120. The arm 139 is mounted in a segmental recess 144 formed in the head of a sleeve 145 which is secured in fixed position in the frame of the machine. The walls of the recess 144 form stops for limiting the movement of the arm 139 and thus accurately positioning the block 120. The

hub 138 of the lever 137 fits within two segmental lugs 146 and 147 formed on the head of the sleeve 145 and adapted to coöperate with the pawl 142 in locking the arm 139 and block 120 in position.

In the drawings the parts are shown in the position which they occupy after a right shoe has been completed and the pattern mechanism and controlling devices have been brought into position ready to begin operation upon a left shoe. As shown in Figs. 16 and 16ª, the pin 134 is at this time in engagement with the lever 137, the advance movement of the pattern cams having been arrested by engagement with the lever and pin during the operation upon a right shoe. At this time the block 120 is raised and held in position for throwing the pawl 173 into operation when the knee bar is actuated by the operator. The pawl 141 is in engagement with the end of the lug 146, locking the arm 139 and block 120 in position. When the pawl 73 is thrown into operation the pattern cams and disk 136 are intermittently advanced in the direction of the arrow, Fig. 16, until the pin 135 strikes the lever 137 and shifts the lever. The recess in the under side of the hub 138 of the lever is somewhat broader than the arm 139, so that the first movement of the lever 137 lifts the pawl 141 out of engagement with the lug 146. Immediately after the pawl has been thus disengaged from the lug the upper side of the recess in the hub 138 engages the upper side of the arm 139, swinging the arm downward until its lower side engages the lower wall of the segmental recess 144, when further movement of the arm 139 and lever 137 is prevented, and consequently the advance movement of the disk 136 and pattern cams is also arrested. This movement of the arm 139 carries the block 120 down into position to engage the pin 118 on the slide 105, and brings the pawl 142 into position to engage the lug 146 and lock the arm and block in position. The parts are now in position for operating upon a right shoe. When the operator again actuates the knee bar, the pawl 74 will be thrown into operation, and the pattern cams and disk 136 will be rotated in the direction opposite to that indicated by the arrow in Fig. 16, until the pin 134 engages and swings the lever 137 into the position indicated in the drawings. During its movement into this position the lever will first operate to disengage the latch 142, and then to swing the arm 139 into the position indicated in the drawings, the movement of the pattern cams being arrested when the lever reaches this position, and the pawl 141 engaging the lugs 146 to lock the arm and block 120 in position. The pins 134 and 135 are adjustably secured upon the rim of the disk 136 by clamping jaws 148, so that the pins may be adjusted to render more or less of the periphery of any of the pattern cams operative, or to vary the operative part of the cam. This enables the same cam to be utilized for rounding different styles of shoes.

In operating upon shoes in which the projection of the sole varies at different parts throughout the forepart of the shoe, the feeding movement of the cams should continue substantially throughout the operation upon the forepart, and the operative periphery of the cam should be of sufficient extent to control the relative position of the guide and knife during the operation upon the forepart of the shoe. In such case the shoe and pattern cams are liable to get out of time owing to the fact that while the advance or feed of the cam is uniform, the advance or feed of the shoe, which is dependent more or less upon the manner in which the shoe is manipulated by the operator, necessarily varies. In order that the pattern cams and the shoe being operated upon may be maintained in proper relation or time throughout the relative travel of the tool about the shoe, means are provided whereby the pattern cams may be actuated at intervals during the relative travel of the tool about the shoe to correct the position of the cams with relation to the shoe. In the form shown this means comprises one or more timing pins 149 which are adjustably secured to the rim of the disk 136 by clamping jaws 150. These pins are of such length that they pass idly by the lever 137. Two of these timing pins are shown, and they may be adjusted to correspond with the points on the shoe sole at which it is desired to bring the cam and shoe into correct relation. The correction in the relation of the pattern cams and shoe is secured by devices which engage the timing pins 149 and shift the pattern cams to bring them into proper relation to the shoe, in case the shoe and cams are out of time. In the construction shown these shifting devices comprise two pawls 151 and 152 which are pivotally mounted upon levers 153 and 154. The pawl carrying levers 153 and 154 are mounted to swing about the shaft 54, and are connected by links 155 with the front end of a lever 156. The levers 153 and 154 are normally held in retracted position by a spring 157 connected with the lever 156 (Fig. 16). When the levers are in retracted position the outer ends of the pawls are swung inward out of the path of the pins 149 by the engagement of the rear ends of the pawls with fixed stop arms 158 (Fig. 23). When the lever 156 is operated to swing the pawl carrying levers toward each other, the pawls are carried away from the stop arms 158 and are swung outward by the spring 159, the outer

position of the pawls being determined by stops 160. The outward movement of the pawls brings their outer ends into position on opposite sides of the timing pin 149, and the pawls act to shift the pin in either direction into a fixed definite position in case it has not arrived at or has passed beyond this position at the time the pawls are actuated. This movement of the timing pins thus shifts the disk 136 and the pattern cams into a definite position, the friction clutch between the sleeve 61 and shaft 54 slipping to allow the movement of the disk and cams.

The lever 156 is actuated to correct the position of the pattern cams by the operator through a spring pressed latch 161 which is pivoted on the rear end of the lever 156, and is arranged to engage a shoulder 162 on the upper end of the sliding bar 122 through which the actuating pawls for the pattern cams are thrown into operation. By forcing forward the knee bar 129 the operator may draw down the bar 122, and thus actuate the lever 156 and the correcting pawls 151 and 152 at any time during the operation upon a shoe. When the bar 122 is drawn down, the lower end of the pawl 161 rides against the end of an adjustable stop screw 163, so that the latch is disengaged from the bar, and the lever 156 and correcting pawls immediately return to normal position after the pawls have engaged and corrected the position of the timing pin 149. Thus the pin is shifted into correct position and immediately disengaged, so that the forward movement of the pattern cams by the actuating pawl is not interfered with.

In order that there may be a gradual increase in the projection of the sole at the juncture of the forepart and shank on the outside of the shoe, when operating upon shoes having Baltimore edge soles, the machine shown is provided with grading devices which may be adjusted to gradually depress the crease guide 2 as the forepart guide 6 is brought down into engagement with the shoe. In order that there may be a gradual decrease in the projection of the sole at the juncture of the forepart and shank on the inside of the shoe in operating on shoes having foreparts which are narrower than the shank, grading devices are provided which may be adjusted to gradually raise the crease guide as the forepart guide is brought down into engagement with the shoe. In order that the projecting edge of the sole around the forepart may be narrower at certain points, if desired, than it is in the shank, the machine is also provided with a stop for determining the position of the crease guide during the operation upon the shank, which is rendered inoperative when the forepart guide is brought into operation, so that the position of the crease guide is controlled wholly by the forepart guide during the operation upon the forepart. In the construction shown the position of the crease guide 2 during the operation of the machine upon the shank of the shoe is determined by a stop plate 164 secured to the arm 22 which carries the crease guide, and arranged to engage a roll 165 which is mounted in a plate 166 secured to the arm 7 which carries the forepart guide (Figs. 15 and 15ª). The plate 166 is mounted on a boss 167 projecting from the side of the arm 7, and is provided with a rib engaging a guiding groove formed in the face of the boss. The roll 165 is so arranged that it may be adjusted into position where it is concentric with the shaft 39 on which the yoke 38 which carries the arm 7 is mounted, as indicated in Fig. 15. When thus adjusted, the position of the roll will not be changed when the forepart guide is thrown into and out of operation. The plate 166, however, may be adjusted toward the left in Fig. 15, so that the roll will be swung away from the plate 164 when the forepart guide is thrown into operation, and will be moved back into normal position when the guide is thrown out of operation. When the roll is thus adjusted, therefore, the crease guide may rise with the forepart guide during the operation upon the forepart of the shoe to allow the sole to be trimmed nearer to the crease and upper than it is through the shank. In this case the roll operates as a stop which is rendered inoperative when the forepart guide is brought into operation at the juncture of the shank and forepart on the outside of a left shoe. When operating on a right shoe the forepart guide is brought into operation at the juncture of the shank and forepart on the inside of the shoe and at this time the roll 165 and plate 164 act as grading devices for allowing the crease guide to gradually rise as the forepart guide is brought into operation and to thus gradually decrease the projection of the sole in passing from the shank to the forepart. The plate 166 is held in adjusted position by a clamping bolt 168 passing through a slot in the plate, and may be adjusted by an adjusting screw 169. The upper edge of the plate 164 is inclined so that rearward adjustment of the roll 165 depresses the crease guide and determines the width of the sole edge through the shank, as well as determining the extent to which the crease guide may rise in trimming nearer the upper while operating on the forepart.

The grading devices comprise a plate 170 adjustably secured to a lever 171 by a clamping bolt 172. The lever 171 is pivoted on the side of the arm 22 and is held yieldingly in normal position by a spring 173. The plate 170 is engaged by a roll 174 carried in the lower end of a plate 175 which

is adjustably secured upon the boss 167 on the arm 7 by a clamping bolt 176. A latch lever 177 is also pivoted upon the arm 22, and the lower end of the lever is held in position to overlie the front end of the lever 171 by the spring 173. The position of the latch lever is determined by a stop pin 178 which is engaged by an arm 179 on the lever. The latch lever is disengaged from the lever 171 for a purpose to be described, by a bell crank lever 180, one arm of which is arranged to engage the upper end of the latch lever, and the other arm of which carries a roll 181 engaging a cam 182 carried by the shaft 58 which supports the left end of the pattern cam arbor and rotates with the pattern cams. In operating upon shoes provided with Scotch edge soles, the roll 174 is adjusted so that its axis is in line with the axis of the rock shaft 39 carrying the yoke 38, so that the position of the roll is not changed in throwing the forepart guide into and out of operation. In operating upon shoes provided with Baltimore edge soles, the roll 174 is adjusted to the right in Fig. 15. In this figure the parts are shown in proper position for operating upon a left shoe, *i. e.*, for beginning the rounding and channeling operation in the shank at the outside of the shoe. The grading devices are therefore in position to cause a gradual increase in the projection of the sole in passing from the shank to the forepart.

Assuming that the roll 174 is adjusted to the right in Fig. 15 when the forepart guide is brought down against the shoe, the roll 174 acting upon the plate 170 gradually forces the crease guide 2 downward, thus gradually increasing the distance between the crease and the edge of the sole until the forepart guide engages the shoe and controls the shape given to the sole. If the sole at any point around the forepart is to be narrower than it is through the shank, the roll 165 will have been adjusted to the left in Fig. 15, so that it will move away from the plate 164 as the forepart guide is brought against the shoe. Soon after the forepart guide has been thrown into operation, the cam 182 operates the bell crank lever 181 to disengage the latch lever 177 from the plate carrying lever 171. This leaves the lever 171 free to rock upon the arm 22, so that the grading devices do not interfere with the movement of the crease guide in unison with the forepart, during the continued operation upon the forepart of the shoe. The cam 182 continues to hold the latch lever out of active position during the completion of the left shoe, and until the outside of the forepart near the ball line has been reached in operating upon the right shoe. The grading devices are inactive, therefore, when the forepart guide is thrown out of operation in passing from the forepart to the shank on the inside of the left shoe, and when the forepart guide is thrown into operation in passing from the shank to the forepart on the inside of the right shoe. Before the forepart guide is thrown out of operation in passing from the forepart to the shank on the outside of the right shoe, the roll 181 passes off of the high part of the cam 182, and the latch lever 177 is released, so that it swings in over the outer end of the plate carrying lever 171, thus rendering the grading devices active. When the forepart guide is thrown out of operation, therefore, in passing from the forepart to the shank on the outside of the right shoe, the grading devices act to allow the crease guide to gradually rise as the forepart guide swings up into normal position, thus gradually narrowing the projecting portion of the sole in passing from the forepart to the shank. This brings the parts into the position indicated in Fig. 15, ready for operation upon a left shoe.

The sole support 3 carries the channeling knife 4, and is mounted to rock in a carrier slide 183 to accommodate itself to the transverse curvature of the sole (Figs. 1, and 24 to 27). As shown, the sole support is in the form of a block provided with segmental ribs 184 engaging curved guiding slots formed in the slide 183. The center of curvature of the guiding slots is substantially at the point of the channeling knife, so that the sole guide rocks about the point of operation of the channeling knife in accommodating itself to the surface of the sole. The sole supporting block 3 is retained in the slide 183 by a spring pressed pin 185. A transverse pin 186 is secured in the pin 185, and extends through a hole 187 in the slide 183, the ends of the pin being provided with heads 188 on the opposite sides of the slide, so that the spring pressed pin 185 may be readily disengaged from the sole supporting block when it is desired to remove the block. The slide 183 is mounted for vertical movement in a support 189 which is vibrated in the direction of the feed of the shoe to coöperate with the feed plate in feeding the shoe when moving in one direction, and to draw the channel knife through the sole when moving in the opposite direction. The support 189 is formed on the front end of a shaft 190 which is mounted to rock and move longitudinally in bearings in the frame of the machine (Fig. 8). A sleeve 191 is secured upon the shaft 190, and is provided with a flange 192 which engages the front bearing 193 for the shaft, and limits the forward movement of the shaft and support. The shaft is rocked to vibrate the sole support by a cam groove 194 formed in a disk 195 secured to the cam shaft 21 (Fig. 12). The cam engages a roll

carried by one arm of a bell crank lever 196 which is mounted to rock upon the shaft 190. The other arm of the bell crank lever is provided with a projecting pin 197 which engages an arm projecting from the sleeve 191 (Figs. 8 and 12.)

The sole support is pressed forward to maintain it in yielding engagement with the surface of the sole by a spring which may be so adjusted as to maintain a constant pressure, whatever the thickness of the material being acted upon, or may be adjusted to increase the pressure on the sole as the thickness of the material increases. In the construction shown the shaft 190 carrying the sole support is pressed forward by a spring 198, the upper end of which is secured to an adjustable bolt 199, and the lower end of which is connected to an arm 200 secured to a rock shaft 201. A second arm 202 is secured to the rock shaft, and is connected to a rod 203, the front end of which carries a head 204 engaging the end of the bore 205 in the shaft 190 (Figs. 1 and 8). The arm 200 is provided with a split hub engaging the shaft 201, and is secured in position on the shaft by a clamping bolt 206, so that the arm may be adjusted on the shaft. When the parts are adjusted as indicated in Fig. 1, the pressure of the sole support upon the sole of the shoe will not be materially affected by rearward movement of the support incident to variations in the thickness of the sole. When the sole support moves rearwardly the rock shaft 201 will rock, and the tension on the spring 198 will increase. The movement of the arm 200 will, however, decrease the leverage through which the tension of the spring is transmitted to the sole support, so that the pressure of the sole support will remain substantially constant. If it is desired to have the pressure of the sole support increased with an increase in the thickness of the sole, the arm 200 may be adjusted into a substantially horizontal position, so that the leverage through which the tension of the spring is transmitted will not be materially varied by rearward movement of the sole support. With this adjustment the increase in the tension of the spring 198 when the sole support moves rearwardly will not be counteracted by a decrease in the leverage, and therefore the pressure of the sole support upon the sole will increase as the sole support moves rearwardly.

The sole support may be moved rearwardly in introducing or removing the work, through a rock shaft 207, one end of which carries an arm 208 engaging a lug 209 on the sleeve 191 (Figs. 6 and 11). A bell crank lever 210 is secured to the rock shaft 207, and one arm of the bell crank lever extends into position to be conveniently operated by the hand of the operator, and the other arm is connected by a rod 211 with an operating treadle 212 (Figs. 2 and 4).

It is desirable, in operating upon certain classes of work, to form the channel about the forepart nearer the edge of the sole than in the shank, and means is therefore provided for varying the position of the channel knife with relation to the trimming knife. For this purpose devices are provided for varying the vertical position of the slide 183 which carries the sole support and channeling knife. In the form shown these devices comprise a rock shaft 213 provided at its forward end with an arm 214 which is connected by a link 215 with the knife carrying slide 183 (Figs. 1, 3, and 24 to 26). The lower end of the link 215 is connected with the arm 214 by a pivot pin 216 provided with an eccentric bearing 217 for the end of the link. By adjusting the pivot pin the vertical position of the knife carrying slide may be varied to bring the channel at the desired distance from the edge of the sole. The rock shaft 213 may be operated to raise the knife carrying slide to get the channel nearer the edge of the sole about the forepart by devices which are operated in moving the forepart guide into and out of operation. In the construction shown these devices comprise an arm 218 projecting from the rock shaft 41 which is rocked through the treadle 44 in throwing the forepart guide into and out of operation. The arm 218 carries a roll engaging a cam slot 219 formed in the lower end of a lever 220. The upper end of the lever is provided with a guideway 221 in which a pivot block 222 is adjustably mounted (Figs. 1, 13 and 14). The lever is also provided with a series of holes 223 for receiving the end of the spring pin 224 which is connected in the pivot block. A link 225 connects the pivot block with an arm 226 secured to a rock shaft 227. The rock shaft also carries an arm 228 which is connected by a link 229 with an arm 230 secured to the rear end of the rock shaft 213 (Figs. 1, 5, 9 and 10). When the rock shaft 41 is rocked to throw the forepart guide into operation, the end of the lever 218 rides up the cam slot 219, rocking the lever 220. Just before the forepart guide engages the shoe, the roll enters the upper end of the cam slot, which is so shaped that during the movement of the forepart guide by the pattern cams, the roll will move idly in the upper end of the slot without imparting any movement to the lever 220. If the pivot pin 224 is adjusted as indicated in Fig. 14, where it is in axial alinement with the pivotal support of the lever, there will be no vertical movement of the knife carrying slide 183 when the forepart guide is thrown into and out of operation, and the channel will be cut at the same

distance from the edge of the sole throughout both the shank and forepart. If the pivot block 222 is adjusted toward the upper end of the lever 220, the knife carrying slide 183 will be raised when the forepart guide is thrown into operation, and will be lowered to normal position when the forepart guide is thrown out of operation, the extent to which the slide is raised depending upon the adjustment of the pivot block. With such adjustment of the pivot block the channel will be cut nearer the edge of the sole around the forepart.

In doing certain classes of work it is desirable that the channel be cut only in certain parts of the sole, and means is therefore provided for throwing the channel knife into and out of operation during the operation of the machine. In the construction shown the channel knife is thrown into or out of operation in throwing the forepart guide into and out of operation. In order that the channel knife may be rendered active or inactive during its operation upon the sole, it is mounted to slide in the sole supporting block 3. The knife is retained in the block by a retaining plate 231 secured against the side of the block, and provided with a lip 232 projecting over a rib 233 on the side of the channeling knife (Figs. 25, 28 and 28[a]). The knife is moved in and out to render it active or inactive through a link 234 provided at one end with a laterally projecting pin 235 engaging the knife, and at the other end with an oppositely projecting pin 236 engaging a hole formed eccentrically in a disk 237 which is mounted in the block 3. The crank disk 237 is provided with gear teeth engaging gear teeth formed in the front side of a rack block 238. The rack block is mounted to slide laterally upon a stud 239 secured in the knife slide 183. The rear side of the rack block is provided with rack teeth engaging teeth on the upper end of a shaft 240 which is mounted in a vertical hole in the knife slide. The gear teeth on the rear side of the shaft 240 extend throughout the length of the shaft, and these teeth are engaged near the lower end of the shaft by a rack 241 mounted to slide transversely in the support 189. Through these connections the crank disk 237 may be operated to advance or retract the channel knife, without interfering with the rocking movements of the sole support 3, or the vibratory movements of the support 189. The rack 141 may be moved transversely to advance or retract the channel knife through a link 242, one end of which is pivotally connected to the rack approximately in line with the axis about which the support 189 vibrates. The other end of the link 242 is provided with a series of holes 243 arranged to register with a corresponding series of holes in an arm 244 when the channel knife is in retracted position. The extent to which the knife is projected, and therefore the depth of the channel cut by the knife, may be varied by inserting the pivot screw 245, which connects the arm 244 and link 242 in any one of the series of holes in the link 242 and arm 244. The arm 244 is connected to the front end of a sleeve 246 which surrounds the shaft 213 (Figs. 1 and 6). The rear end of the sleeve is provided with an arm 247 in which a cam slot 248 is formed. This cam slot is engaged by a pin 249 projecting from a lever 250, one end of which is pivoted at 251 to the frame of the machine. A link 252 is connected at its lower end to the end of the lever 251, and is connected at its upper end with a plate 253 secured to the arms 42 and 218 (Figs. 1, 13 and 14). The upper end of the link 252 lies between the plate 253 and a plate 254 formed on the hub which connects the arms 42 and 218. The link is connected with the plates 253 and 254 by a pivot sleeve 255′ and locking pin 256′ which passes through a slot 255 in the plate 253 and through the pivot sleeve, and is adapted to engage any one of a series of four holes 256 in the plate 254. The locking pin is held in position by a spring 257, and is provided with a head 258 for engaging recesses 259 in the plate 253. When the pin 256′ is at the right-hand end of the slot 255, as indicated in the drawings, the channel knife will be held in retracted or inactive position during the operation of the machine upon the shanks of the shoes. When the forepart guide is thrown into operation the link 252 will be moved downward and the channel knife will be advanced into active position through the connections described, so that the sole will be channeled about the forepart. When the forepart guide is thrown out of operation in passing from the forepart to the shank, the channeling knife will be withdrawn into inactive position so that no channel will be cut while operating on the shank. If the pin 256′ is connected with the hole 256 at the left-hand end of the slot 255, the channel knife will be advanced into active position when the forepart guide is out of operation, and will be retracted when the forepart guide is moved into engagement with the shoe. With this adjustment, therefore, a channel will be cut while operating on the shank, and no channel will be cut around the forepart of the sole. If the pin 256′ is secured in either of the two center holes 256, the channel knife will not be moved in throwing the forepart guide into and out of operation, and will be held continuously either in inactive or active position. If the pin is in the upper central hole, the channel knife will be held out of operation and no channel will be cut in any part of the sole. If the pin is secured in the

lower central hole, the channel knife will remain continually in action, and a channel will be cut throughout the shank and forepart.

When the channel knife is advanced into active position the action of the shoe sole upon the knife tends to draw the channel knife forward. In order that the channel knife may be firmly held in active position, and shall not be affected by backlash or connections for throwing it into and out of action, an adjustable stop is provided for resisting the forward pull exerted on the knife by the material being acted upon. This stop is also so mounted that it automatically positions itself in accordance with the adjustment of the devices for projecting and withdrawing the knife. In the form shown, this stop comprises a sleeve 260 surrounding the bolt 261 which passes laterally through the sole supporting block 3, and secures the side plate 231 in position (Figs. 26 and 28ª). The sleeve is provided with an end flange 262 having a segmental knurled rim 263. The inner end of the sleeve is cut away for the passage of the link 234, and to provide a stop shoulder 264 for engaging the front end of the link when the channel knife is advanced into active position. The flange 262 of the sleeve underlies the head of the bolt 261, and the sleeve is forced yieldingly in a direction to bring the shoulder 264 against the end of the link 234, by a spring 265. The bolt is drawn firmly against the flange of the sleeve to clamp the sleeve in position, by a nut 266 threaded on the end of the bolt, and provided with a cylindrical head engaging a counter-bore in the plate 231 (Fig. 28ª). The head of the bolt is flattened on one side to engage a rib on the block 3, as indicated in dotted lines in Fig. 27, and in full lines in Figs. 4 and 9, so that the bolt is held from rotation when the nut 266 is operated to clamp or release the sleeve 260. When the channel knife is to be adjusted the nut 266 is loosened, thus releasing the sleeve 262 so that the spring 265 may turn the sleeve until the stop shoulder 264 engages the end of the link 234. The connection between the link 242 and arm 244 is then shifted to secure the desired projection of the knife beyond the surface of the sole support when the knife is advanced into active position. The parts are then operated to advance the knife, the sleeve yielding to automatically accommodate itself to the position of the knife. The nut 266 is then tightened firmly, binding the stop sleeve in position. Now whenever the knife is advanced into active position, the end of the link 234 is brought against the stop shoulder 264, which resists any pull upon the knife tending to draw it farther into the sole being channeled. This takes the strain off of the connections for advancing and retracting the knife, and prevents any imperfect action due to backlash or wear of the parts.

The feed plate 5 is given a 4-motion movement to coöperate with the vibrating sole support 3 in feeding the work, and is also brought into engagement with the sole midway of its backward or return movement to support the sole against the action of the trimming knife, and during the channeling stroke of the sole support. The feed plate is formed on the front end of a shaft 267 which is mounted to oscillate and move longitudinally in bearings in the frame of the machine. The rocking movements are imparted to the shaft by a cam groove formed in the end of the cam disk 195, and engaging a roll 268 on the end of an arm 269 secured to the shaft (Figs. 4, 8, 11 and 12). The longitudinal movements are imparted to the shaft by a cam groove 270 formed in the periphery of the disk 195, and engaging a roll 271 carried by a sleeve 272 which surrounds the shaft 267. The sleeve is provided with a longitudinal rib 273 which engages a guideway formed in the frame of the machine, and thus retains the sleeve in position on the shaft.

While the various features of the invention have been shown and described as embodied in a rough rounding and channeling machine, it will be understood that various features of the invention are not confined in their application to a machine of this character, but may be embodied with advantage in machines for performing other operations upon the soles of shoes, and in machines in which the tool operating upon the shoe sole may be some device other than a knife, or may be a combination of devices.

Having explained the nature and object of the invention, and specifically described one form of machine in which it may be embodied, what I claim is:—

1. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, and means for shifting the pattern mechanism to bring it into time with the tool during the relative travel of the tool about the shoe, substantially as described.

2. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, and means for shifting the pattern mechanism in either direction to bring it into time with the tool during the relative travel of the tool about the shoe, substantially as described.

3. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, means for feeding the pattern mechanism in opposite

directions for right and left shoes, and means for shifting the pattern mechanism in either direction to bring it into time with the tool during the relative travel of the tool about the shoe, substantially as described.

4. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, and mechanism under the control of the operator for shifting the pattern mechanism at intervals during the relative travel of the tool about the shoe to correct the position of the pattern mechanism, substantially as described.

5. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, and mechanism under the control of the operator for shifting the pattern mechanism in either direction at intervals during the relative travel of the tool about the shoe to correct the position of the pattern mechanism, substantially as described.

6. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, mechanism for feeding the pattern mechanism in opposite directions for right and left shoes, and mechanism under the control of the operator for shifting the pattern mechanism in either direction at intervals during the relative travel of the tool about the shoe to correct the position of the pattern mechanism, substantially as described.

7. A machine for operating on the soles of shoes, having, in combination, means for feeding the shoe, a tool, a guide, mechanism operated in unison with the feeding means for relatively actuating the tool and guide to determine the path along which the tool operates, and means for shifting said mechanism to correct its position during the travel of the tool about the shoe, substantially as described.

8. A machine for operating on the soles of shoes, having, in combination, a tool, a guide, pattern mechanism for relatively actuating the tool and guide to determine the path along which the tool operates, means for feeding said pattern mechanism in opposite directions for right and left shoes, and means for shifting said pattern mechanism to correct its position during its travel in either direction, substantially as described.

9. A sole rounding or channeling machine, having, in combination, a knife, a guide, mechanism for relatively actuating the guide and knife to vary the distance of the cut from the inseam, means for feeding said mechanism in opposite directions for operating upon right and left shoes, and means under the control of the operator for shifting said mechanism to correct its position during its movement in either direction, substantially as described.

10. A machine for operating on shoe soles, having, in combination, a tool, a guide, a cam for relatively actuating the tool and guide to determine the path along which the tool operates, mechanism for feeding the cam, and means for shifting the cam during its feed to correct its position with relation to the position of the shoe, substantially as described.

11. A machine for operating on shoe soles, having, in combination, a tool, a guide, a cam for relatively actuating the tool and guide to determine the path along which the tool operates, mechanism for feeding the cam, and means for shifting the cam in either direction during its feed to correct its position with relation to the position of the shoe, substantially as described.

12. A machine for operating on shoe soles, having, in combination, a tool, a guide, a cam for relatively actuating the tool and guide to determine the path along which the tool operates, means for feeding the cam in opposite directions for right and left shoes, and means for shifting the cam during its feed in either direction to correct its position with relation to the position of the shoe, substantially as described.

13. A sole rounding or channeling machine, having, in combination, a knife, a guide, a cam for relatively actuating the knife and guide to vary the distance of the cut from the inseam, mechanism for feeding the cam, and mechanism for shifting the cam during its feed to correct its position with relation to the position of the shoe, substantially as described.

14. A sole rounding or channeling machine, having, in combination, a knife, a guide, a cam for relatively actuating the knife and guide to vary the distance of the cut from the inseam, mechanism for feeding the cam, and means under the control of the operator for shifting the cam at intervals during its feed to correct its position with relation to the position of the shoe, substantially as described.

15. A machine for operating on shoe soles, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, one or more timing devices moving with the pattern mechanism, and means under the control of the operator for engaging and shifting said timing devices to correct the position of the pattern mechanism at predetermined points in the travel of the tool about the shoe, substantially as described.

16. A machine for operating on shoe soles, having, in combination, a tool, a pattern mechanism for determining the

path along which the tool operates, a timing device connected to move with the pattern mechanism and adjustable to correspond to a predetermined point on the shoe sole, and devices which may be thrown into operation by the operator when the tool reaches said point for shifting the timing device into correct position with relation to the shoe, substantially as described.

17. A machine for operating on shoe soles, having, in combination, a tool, a guide, a cam for determining the path along which the tool operates, adjustable timing pins connected to move with the cam, and devices controlled by the operator for engaging and positioning the pins at a predetermined point, substantially as described.

18. A machine for operating on shoe soles, having, in combination, a tool, a guide, pattern mechanism for relatively actuating the tool and guide to determining the path along which the tool operates, mechanism for actuating the pattern mechanism, and mechanism acting to automatically set the actuating mechanism to move the pattern mechanism alternately in opposite directions, substantially as described.

19. A machine for operating on shoe soles, having, in combination, a tool, a guide, a cam for relatively actuating the tool and guide to determine the path along which the tool operates, mechanism for feeding the cam in opposite directions for right and left shoes, and mechanism acting automatically to set the actuating mechanism to feed the cam alternately in opposite directions, substantially as described.

20. A machine for operating on shoe soles, having, in combination, a tool, a guide, a pattern mechanism for relatively actuating the tool and guide to determining the path along which the tool operates, mechanism for actuating the pattern mechanism, and means operating upon the completion of the movement of the pattern mechanism in one direction to set the actuating mechanism to move the pattern mechanism in the opposite direction, substantially as described.

21. A machine for operating on shoe soles, having, in combination, a tool, a guide, a cam for relatively actuating the tool and guide during the travel of the tool about the shoe, mechanism for actuating the cam, and means operating upon the completion of the movement of the cam in one direction to set the actuating mechanism to feed the cam in the opposite direction, substantially as described.

22. A machine for operating on shoe soles, having, in combination, a tool, a guide, a pattern mechanism for relatively actuating the tool and guide to determine the path along which the tool operates, mechanism for actuating the pattern mechanism in opposite directions for right and left shoes, and mechanism for alternately setting the actuating mechanism for right and left shoes, substantially as described.

23. A machine for operating on shoe soles, having, in combination, a tool, a guide, a pattern mechanism for relatively actuating the tool and guide to determining the path along which the tool operates, mechanism for actuating the pattern mechanism in opposite directions for right and left shoes, devices controlled by the operator for throwing the actuating mechanism into operation, and mechanism for alternately setting said devices for right and left shoes, substantially as described.

24. A machine for operating on shoe soles, having, in combination, a tool, a pattern cam for determining the path along which the tool operates, mechanism for feeding the cam in opposite directions for right and left shoes, and devices operated during the feed of the cam in one direction for setting the feeding mechanism to feed the cam in the opposite direction when next thrown into operation, substantially as described.

25. A machine for operating on shoe soles, having, in combination, a tool, a pattern cam for determining the path along which the tool operates, mechanism under starting control of the operator for actuating the cam in either direction, and means operated at the end of the movement of the cam in one direction to set the actuating mechanism to feed the cam in the opposite direction when next started, substantially as described.

26. A machine for operating on shoe soles, having, in combination, a tool, a pattern cam for determining the path along which the tool operates, mechanism for actuating the cam in opposite directions, starting devices under the control of the operator for starting the movement of the cam in either direction, and devices operated at the end of the movement of the cam in either direction for setting and locking the starting devices in position to start the movement of the cam in the opposite direction, substantially as described.

27. A rounding and channeling machine, having, in combination, a trimming knife, a channel knife, a forepart guide, and means for throwing the channel knife and forepart guide into and out of operation adjustable to render the channel knife active on the shank and inactive on the forepart, or inactive on the shank and active on the forepart, substantially as described.

28. A rounding and channeling machine, having, in combination, a trimming knife, a channel knife, a forepart guide, and connections for throwing the forepart guide and channel knife into and out of operation

having provision for adjustment to channel the forepart only, to channel the shank only, to channel both the shank and forepart, or to channel neither the shank nor forepart, substantially as described.

29. A channeling machine, having, in combination, a sole support mounted to accommodate itself to the lateral curvature of the sole, a channel knife mounted in the sole support, and mechanism for throwing the channel knife into and out of action during the operation on the sole, substantially as described.

30. A channeling machine, having, in combination, a channel knife, a sole support carrying the channel knife mounted to rock about the point of operation of the channel knife, and mechanism for projecting and retracting the knife during the operation on the sole, substantially as described.

31. A channeling machine, having, in combination, a channel knife, a sole support carrying the channel knife, a reciprocating carrier in which the sole support is mounted to accommodate itself to the lateral curvature of the sole, and mechanism for throwing the channel knife into and out of action during the operation on the shoe, substantially as described.

32. A channeling machine, having, in combination, a sole support, a channel knife, mechanism for projecting and retracting the knife, and a stop for supporting the knife against forward movement while in the work, substantially as described.

33. A channeling machine, having, in combination, a sole support, a channel knife, mechanism for projecting and retracting the knife adjustable to vary the projection of the knife, and an adjustable stop for supporting the knife against forward movement while in the work, substantially as described.

34. A channeling machine, having, in combination, a sole support, a channel knife, mechanism for projecting and retracting the knife adjustable to vary the projection of the knife, a stop for determining the forward position of the knife mounted to automatically adjust itself to the forward position of the knife, and means for securing the stop in adjusted position, substantially as described.

35. A machine for operating on shoe soles, having, in combination, a sole support, and a spring for holding the support against the sole of a shoe arranged to maintain a substantially constant pressure upon soles of varying thickness, substantially as described.

36. A machine for operating on shoe soles, having, in combination, a sole support, a spring connected to hold said support against the shoe sole, and means for adjusting the connections to maintain a substantially constant pressure upon soles of varying thickness, or to increase the pressure with an increase in the thickness of the sole, substantially as described.

37. A machine for operating on shoe soles, having, in combination, a sole support, a spring, and connections through which the spring forces the support against the sole, including a lever connected to the spring and arranged to vary the leverage inversely to variations in the tension on the spring, substantially as described.

38. A machine for operating on shoe soles, having in combination, a sole support, a spring, and connections through which the spring forces the support against the sole, including a lever adjustable to vary the leverage inversely to variations in the tension on the spring, or to maintain a substantially constant leverage, substantially as described.

39. A machine for operating on the soles of shoes, having, in combination, a forepart guide movable into and out of engagement with the shoe, a shank guide, grading devices between the shank and forepart guides, and means for latching the devices in working relation while the forepart guide is being engaged with one shoe of a pair and while it is being disengaged from the other shoe of a pair, substantially as described.

40. A machine for operating on the soles of shoes, having, in combination, a forepart guide movable into and out of engagement with the shoe, a shank guide, grading devices between the shank and forepart guides, a latch for holding said devices in working relation, means for rendering the latch inactive after the forepart guide has been engaged with and before it is disengaged from one shoe of a pair, and for rendering it again active after the forepart guide has been engaged with and before it is disengaged from the other shoe of a pair, substantially as described.

41. A machine for operating on the soles of shoes, having, in combination, a forepart guide, a pivoted arm for moving the guide into and out of engagement with the shoe, a shank guide, a movable arm for moving the shank guide, and a grading roll on the forepart arm adjustable into and out of axial alinement with the pivot of the arm, a contact plate on the shank guide arm, and means for holding the plate and roll in working relation only when operating on the outside of the sole, substantially as described.

42. A machine for operating on the soles of shoes, having, in combination, a forepart guide, a pivoted arm for moving the forepart guide into and out of engagement with the shoe, a shank guide, a movable arm connected to move the shank guide, a grading

roll on the forepart arm adjustable into and out of axial alinement with the pivot of the arm, a contact plate on the shank guide arm, means for holding the plate and roll in working relation while the forepart guide is being engaged with one of a pair of shoes, and means for rendering the holding means inactive before the forepart guide is disengaged from the shoe and for rendering it again active after the forepart guide has been engaged and before it is disengaged from other shoe of a pair, substantially as described.

43. A machine for operating on the soles of shoes, having, in combination, a forepart guide, a pivoted arm for moving the forepart guide into and out of engagement with the shoe, a shank guide, a movable arm connected to move the shank guide, a stop adjustably mounted on the forepart arm, and a contact plate on the shank guide arm provided with an incline for engaging the stop, substantially as described.

44. A machine for operating on the soles of shoes, having, in combination, a forepart guide, a pivoted arm moving the forepart guide into and out of engagement with the shoe, a shank guide, a movable arm connected to move the shank guide, a grading roll on the forepart arm adjustable into and out of axial alinement with the pivot of the arm, a stop roll on the forepart arm adjustable into and out of axial alinement with the pivot of the arm, contact plates on the shank guide arm for engaging said rolls, and means for rendering the grading roll and plate active when operating on the outside of a shoe and inactive when operating on the inside of a shoe, substantially as described.

45. A machine for operating on the soles of shoes, having, in combination, a forepart guide movable into and out of engagement with the shoe, a shank guide movable with the forepart guide while operating on the forepart, devices for determining the position of the shank guide while operating on the shank, and means for rendering said devices inactive when the forepart guide is in engagement with the shoe, substantially as described.

46. A machine for operating on the soles of shoes, having, in combination, a tool, a pattern mechanism for determining the path along which the tool operates, timing pins connected to move with the pattern mechanism, shifting pawls normally out of the path of the timing pins, and means under the control of the operator for actuating the pawls to engage and position the pins, substantially as described.

47. A machine for operating on the soles of shoes, having, in combination, a tool, pattern mechanism for determining the path along which the tool operates, a disk moving with the pattern mechanism, timing pins adjustably secured upon the disk, shifting pawls normally out of the path of the pins, and mechanism under the control of the operator for actuating the pawls to engage and position the pins, substantially as described.

48. A machine for operating on the soles of shoes, having, in combination, a tool, a guide, a pattern cam for relatively actuating the tool and guide to determine the path along which the tool operates, a disk connected to move with the cam, means for feeding the cam in opposite directions for right and left shoes, timing pins secured upon the disk, shifting pawls normally out of the path of the pins, and means under the control of the operator for actuating the pawls to engage and position the pins, substantially as described.

49. A machine for operating on the soles of shoes, having, in combination, a tool, a guide, a pattern mechanism for relatively actuating the tool and guide to determining the path along which the tool operates, actuating devices for feeding the pattern mechanism in opposite directions for right and left shoes, a starting device operated by the operator, and devices moving with the pattern mechanism for shifting the starting device into position to start the feed of the pattern mechanism in one direction as the pattern mechanism completes its movement in the opposite direction, substantially as described.

50. A machine for operating on the soles of shoes, having, in combination, a tool, a guide, a pattern mechanism for relatively actuating the tool and guide to determining the path along which the tool operates, actuating devices for feeding the pattern mechanism in opposite directions for right and left shoes, stops connected to move with the pattern mechanism for determining its movement in either direction, and starting devices shifted by the pins to reverse the direction of feed of the pattern mechanism, substantially as described.

51. A machine for operating on the soles of shoes, having, in combination, a tool, pattern mechanism for determining the path along which the tool operates, actuating mechanism including pawls for feeding the pattern mechanism in opposite directions for right and left shoes, guards for rendering the pawls inactive, a starting device under the control of the operator for operating the guards to render the pawls active, stops connected to move with the pattern mechanism for determining its movement in either direction, and means operated by the stops for shifting the starting device from the position to operate one guard into position to operate the other guard, substantially as described.

52. A machine for operating on shoe soles, having, in combination, a tool, mechanism for relatively moving the shoe and tool to vary the distance of the point of operation from the last or inseam, and means for shifting said mechanism to bring it into time with the tool during the relative travel of the tool about the shoe, substantially as described.

53. A machine for operating on shoe soles, having, in combination, a tool, mechanism for relatively moving the shoe and tool to vary the distance of the point of operation from the last or inseam, means for feeding said mechanism in opposite directions for operating on right and left shoes, and means for shifting said mechanism to bring it into time with the tool during its feed in either direction, substantially as described.

54. A machine for operating on shoe soles, having, in combination, a tool, a cam, and connected mechanism for relatively moving the shoe and tool to vary the distance of the point of operation from the last or inseam, mechanism for feeding the cam in unison with the travel of the tool, and means for shifting the cam during its feed to bring it into time with the tool, substantially as described.

55. A sole rounding machine, having, in combination, devices for guiding and feeding the shoe, a trimming knife, a knife carrying slide, a stationary bed provided with a guideway for the slide, devices for removably securing the bed in fixed position in the machine frame, and mechanism for actuating the slide, substantially as described.

56. A sole rounding machine, having, in combination, devices for guiding and feeding the shoe, a removable bed secured in fixed position in the frame of the machine, a guideway in the bed, a knife carrying slide mounted in the guideway, and mechanism for reciprocating the slide, substantially as described.

57. A sole rounding machine, having, in combination, devices for guiding and feeding the shoe, a knife carrier, an oscillating yoke connected to reciprocate the carrier, an arm mounted to oscillate on the yoke about an axis at right angles to the axis of the yoke, and a rotary shaft having an inclined bearing engaged by the arm, substantially as described.

58. A sole rounding machine, having, in combination, devices for guiding and feeding the shoe, a knife carrying slide, an oscillating yoke provided with an arm connected with the slide, a shaft journaled in the yoke, an arm secured to the shaft and having a cylindrical part, and a shaft having an inclined bearing within which the cylindrical part of the arm fits, substantially as described.

59. A sole rounding or channeling machine, having, in combination, a sole support, a carrier therefor, coöperating segmental ribs and slots on the support and carrier for allowing the support to rock to accommodate itself to the transverse curvature of the sole, and a retaining pin movable into and out of retaining position to allow the removal and insertion of the support, substantially as described.

60. A sole rounding or channeling machine, having, in combination, a sole support, a carrier therefor, open ended segmental slots in the carrier, segmental ribs on the support for engaging the segmental slots and allowing the support to rock to accommodate itself to the transverse curvature of the sole, a slot in the support and a retaining pin mounted in the carrier for movement into and out of the slot to allow the removal and insertion of the support, substantially as described.

61. A machine for operating on soles of shoes, having, in combination, a forepart guide movable into and out of engagement with the shoe, a shank guide, devices for gradually raising the shank guide as the forepart guide is engaged with the shoe, devices for gradually lowering the shank guide as the forepart guide is engaged with the shoe, and means for rendering the lowering devices active on the outside of the shoe and the raising devices active on the inside of the shoe, substantially as described.

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Witnesses:
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