March 20, 1928. 1,663,097

E. J. FRINDLE

AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 1

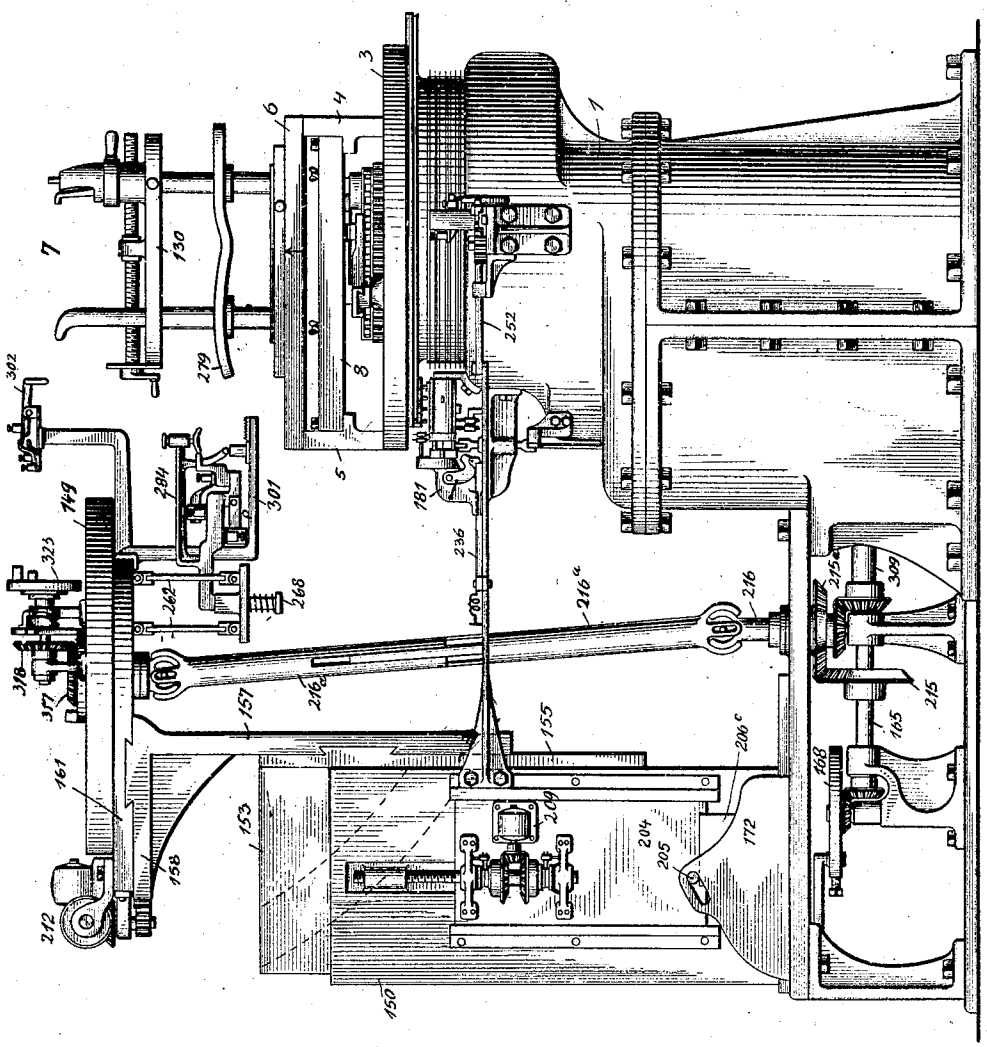


Fig. 1.

Witnesses
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M. Meckle

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By his Attorneys
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March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 2

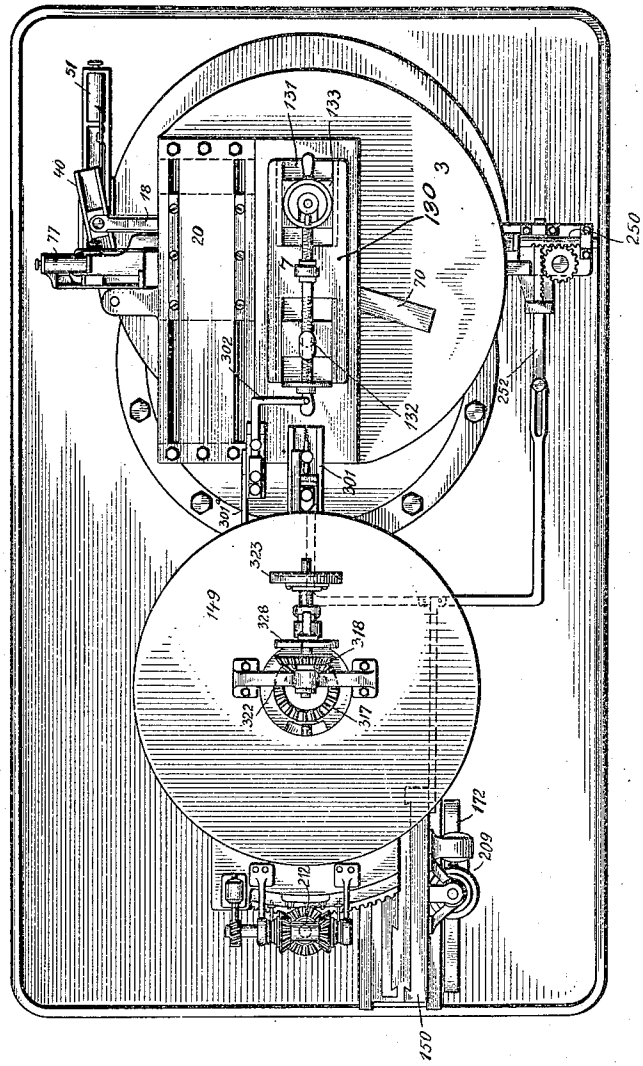


Fig. 2.

Witnesses
Max B. A. Doring
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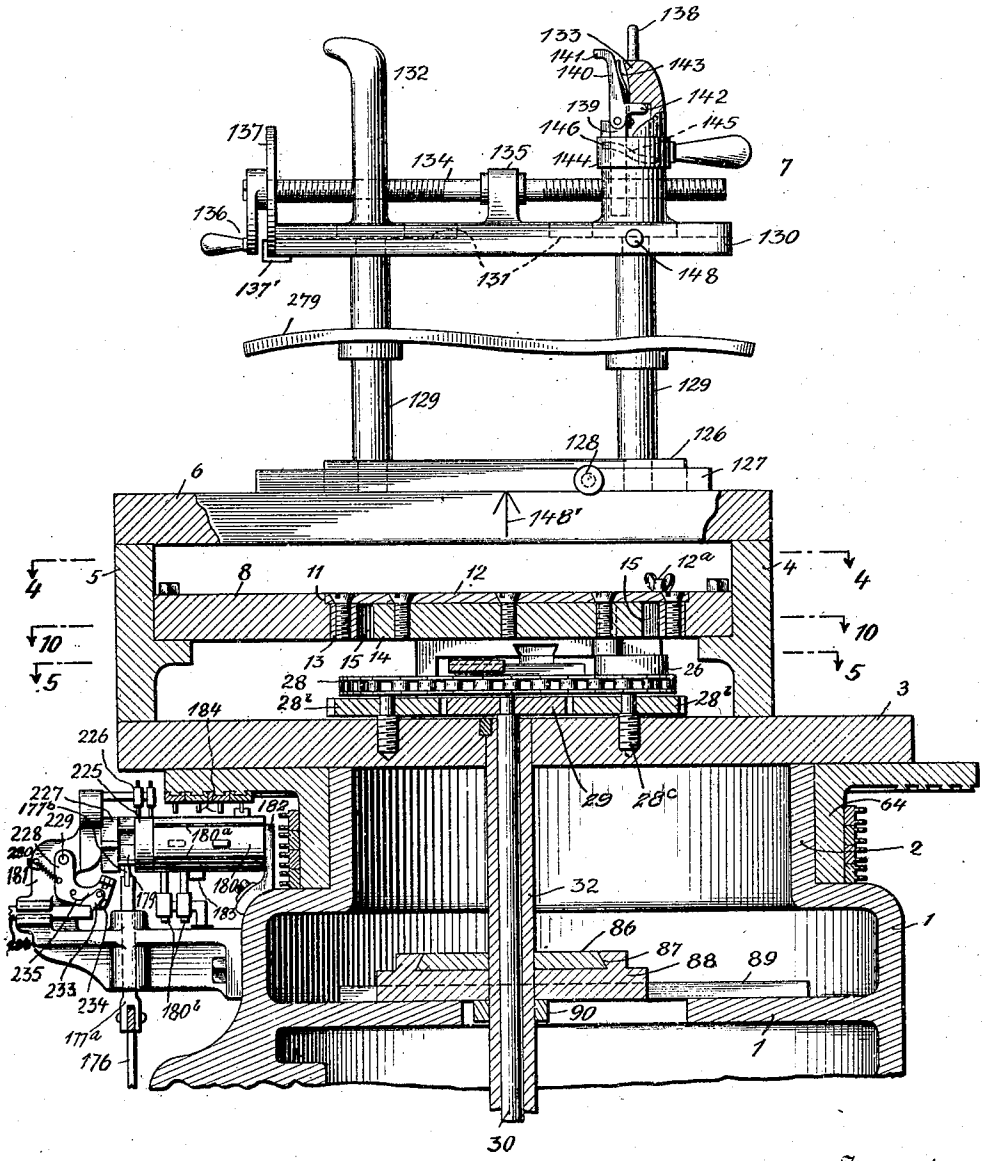
March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 3

Fig. 3.



Witnesses
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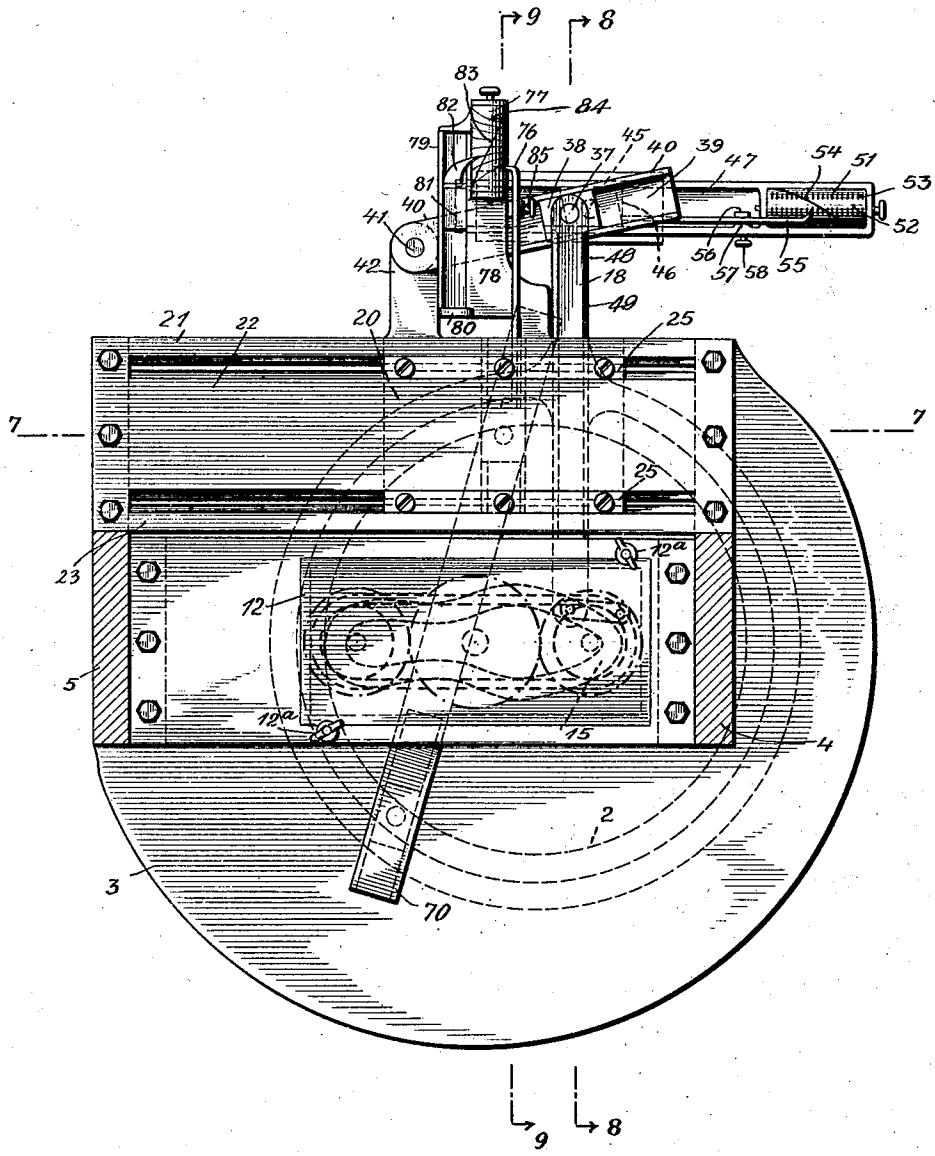
March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 4

Fig. 4.



Witnesses
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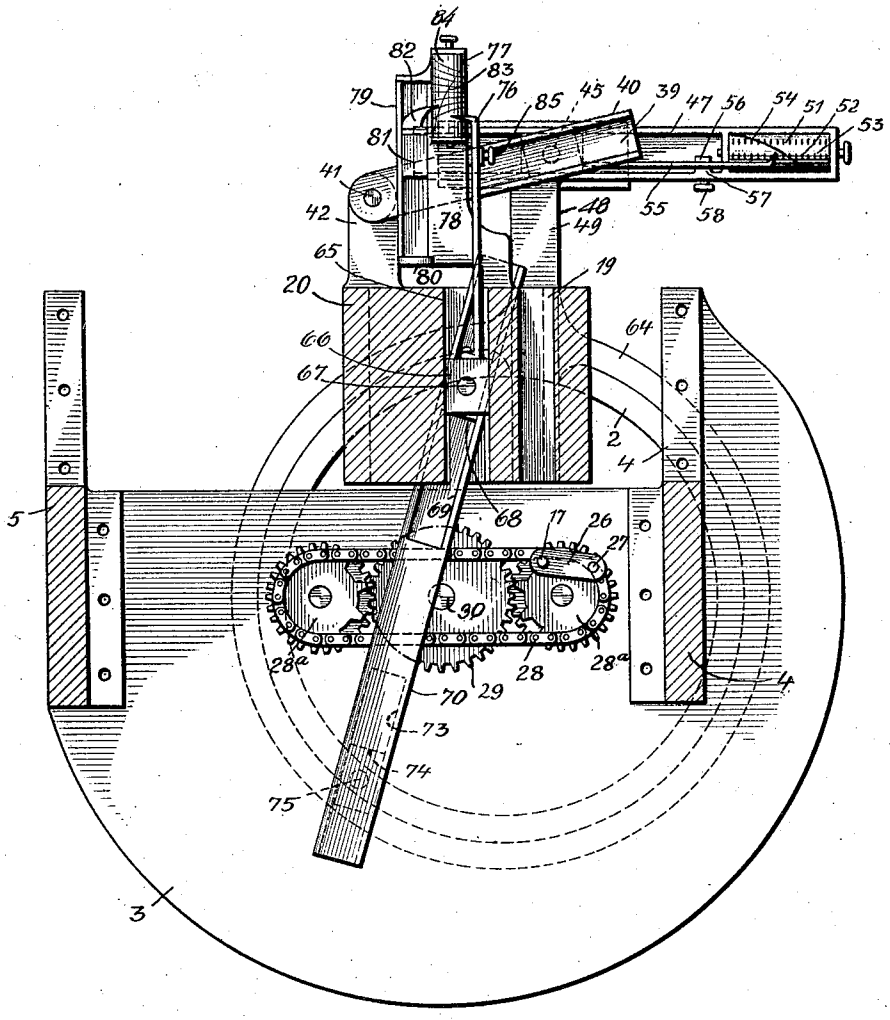
March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 5

Fig. 5.



Witnesses
Max B. A. Doring
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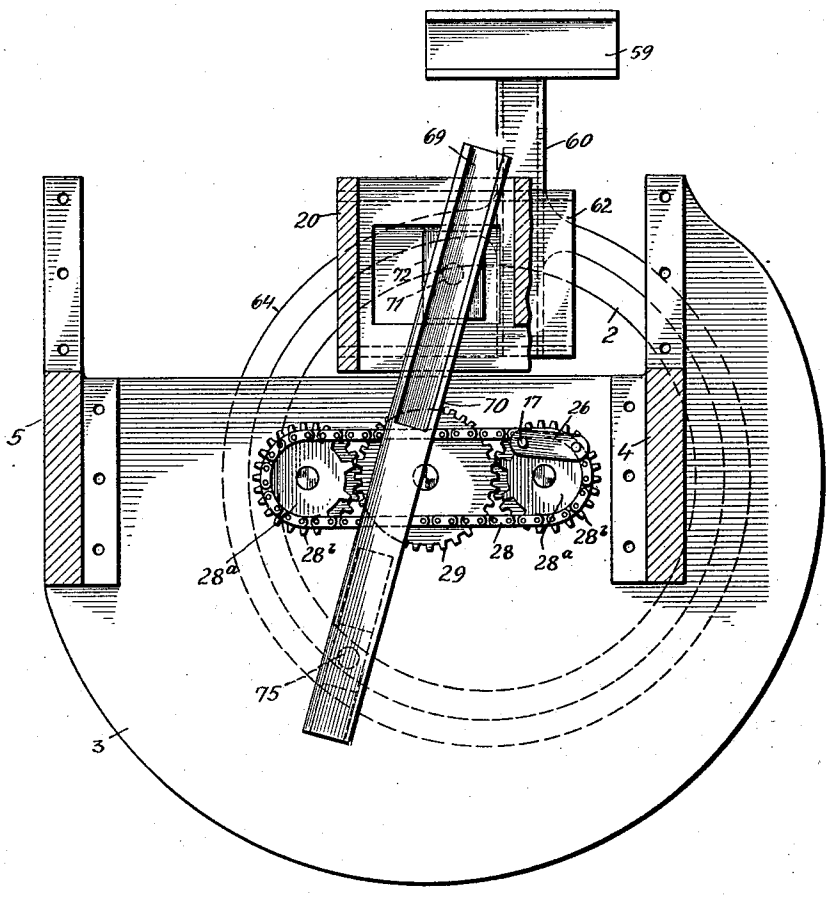
March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

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Fig. 6.



Witnesses
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March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

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Fig: 7.

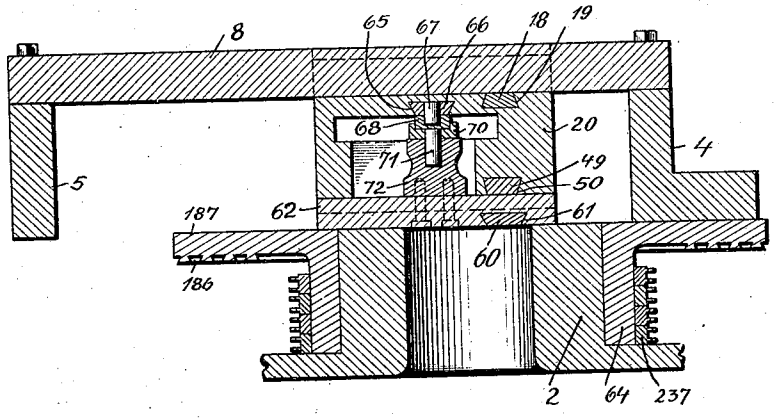


Fig: 8.

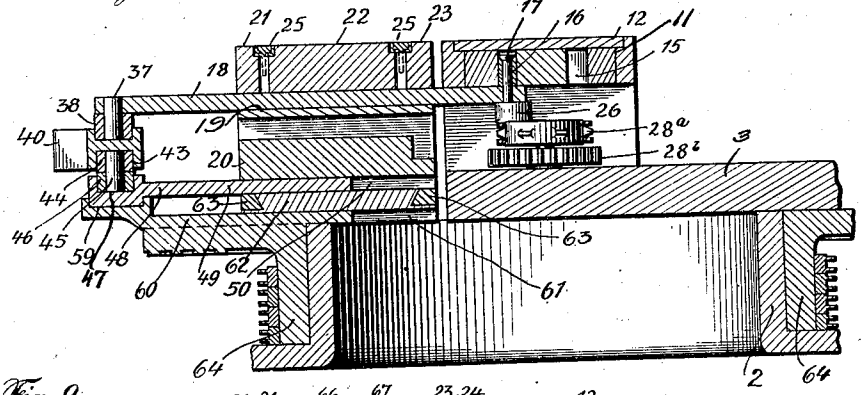
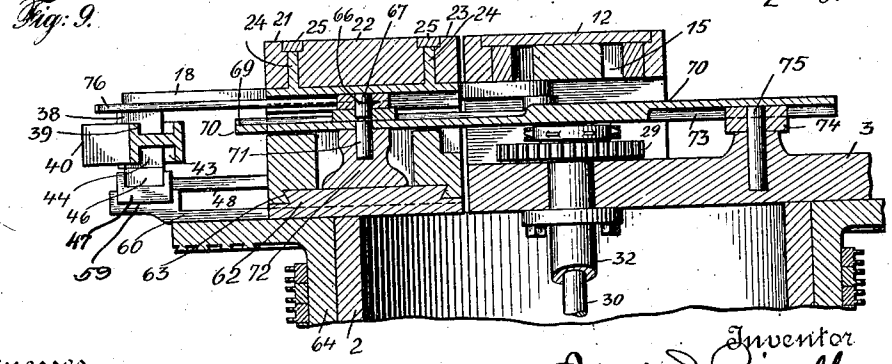


Fig: 9.



Witnesses
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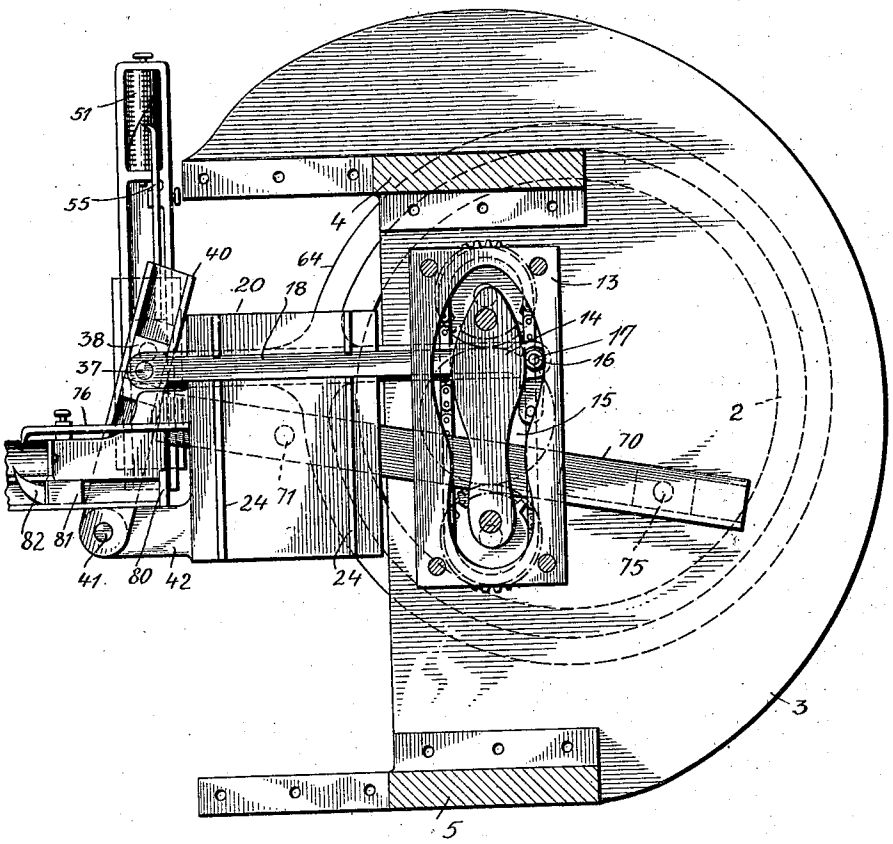
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AUTOMATIC SHOE MAKING MACHINE

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Fig. 10.



Witnesses
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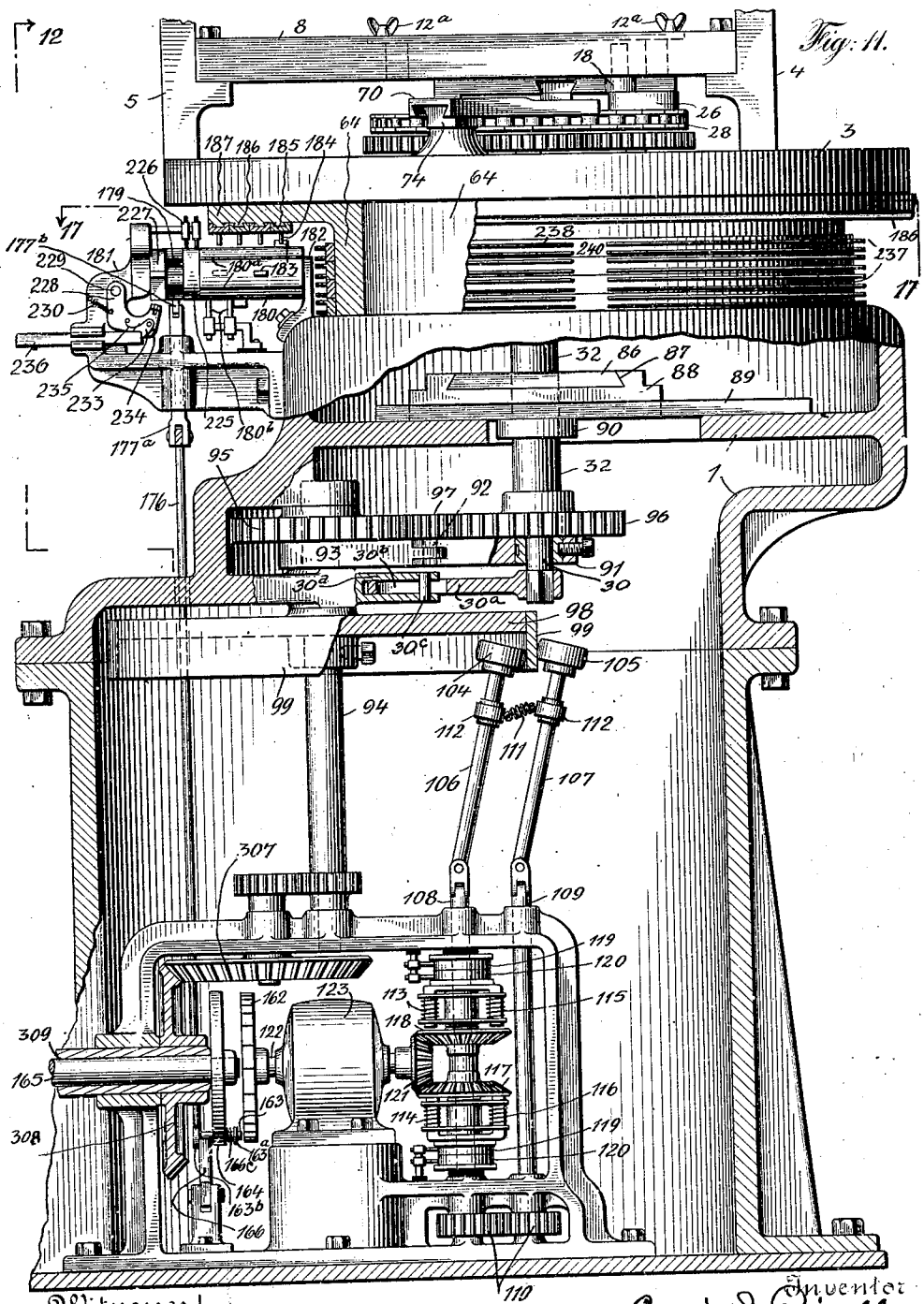
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AUTOMATIC SHOE MAKING MACHINE

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Fig. 11.



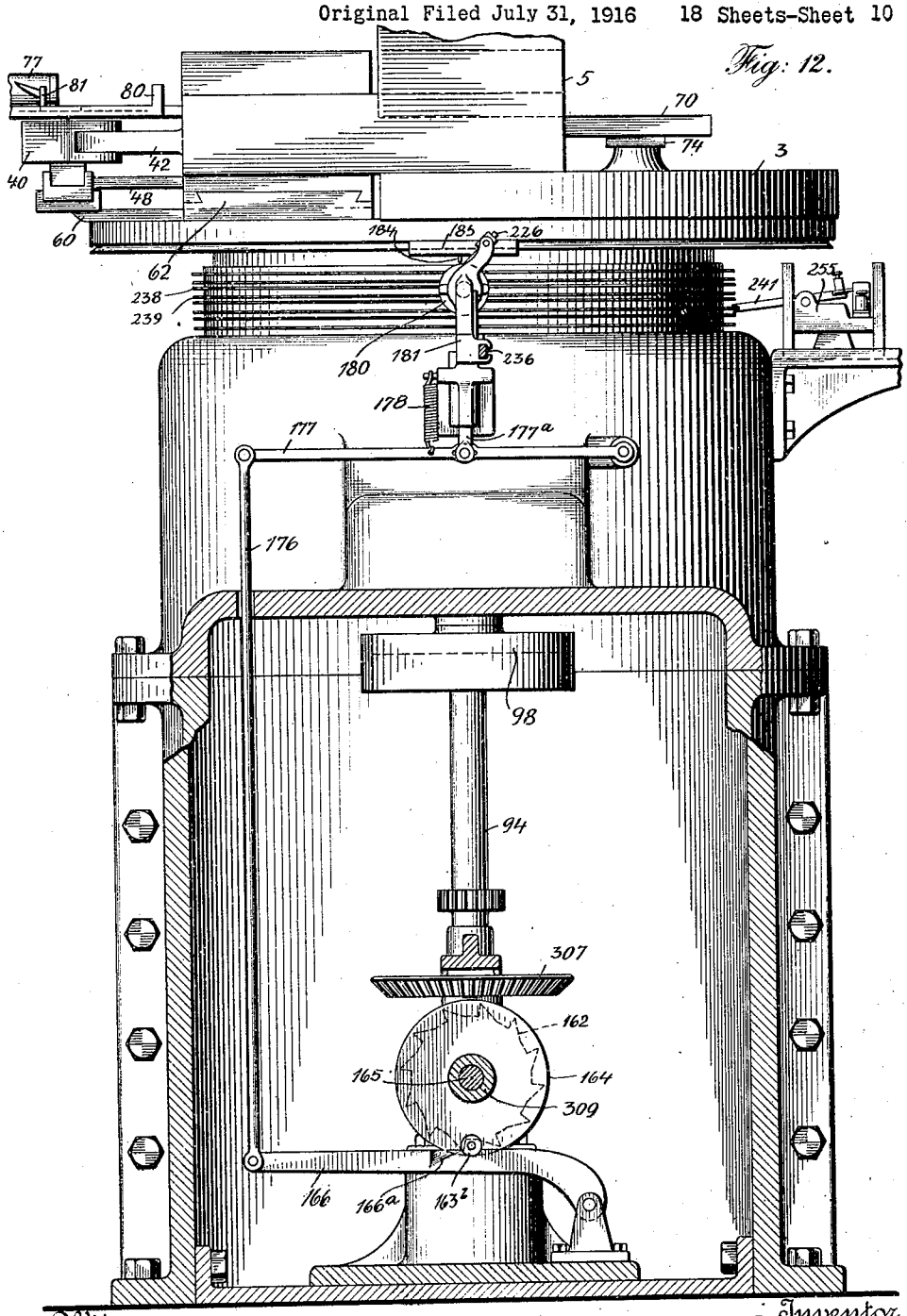
March 20, 1928. 1,663,097

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AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 10

Fig. 12.



Witnesses
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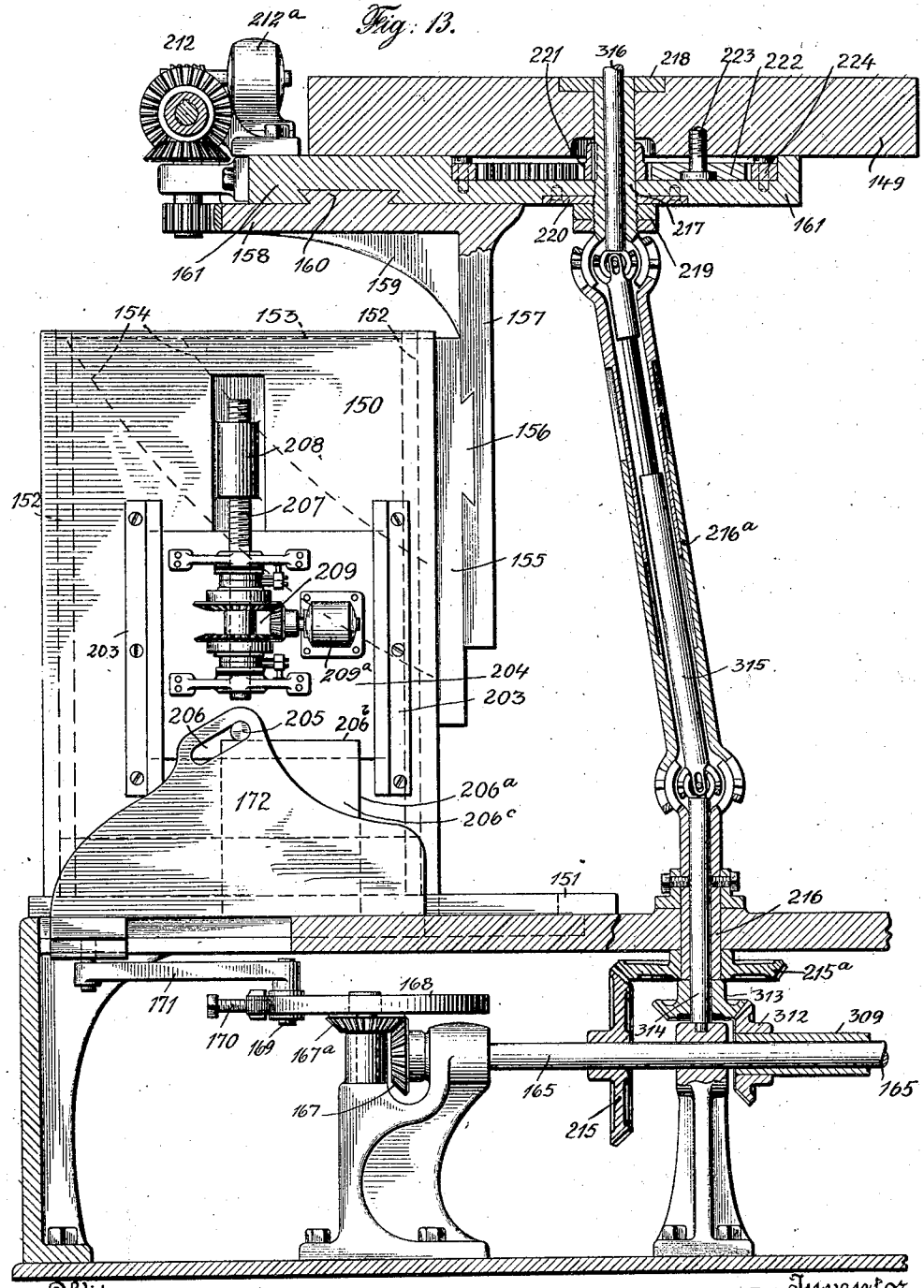
March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

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Fig. 13.



Witnesses
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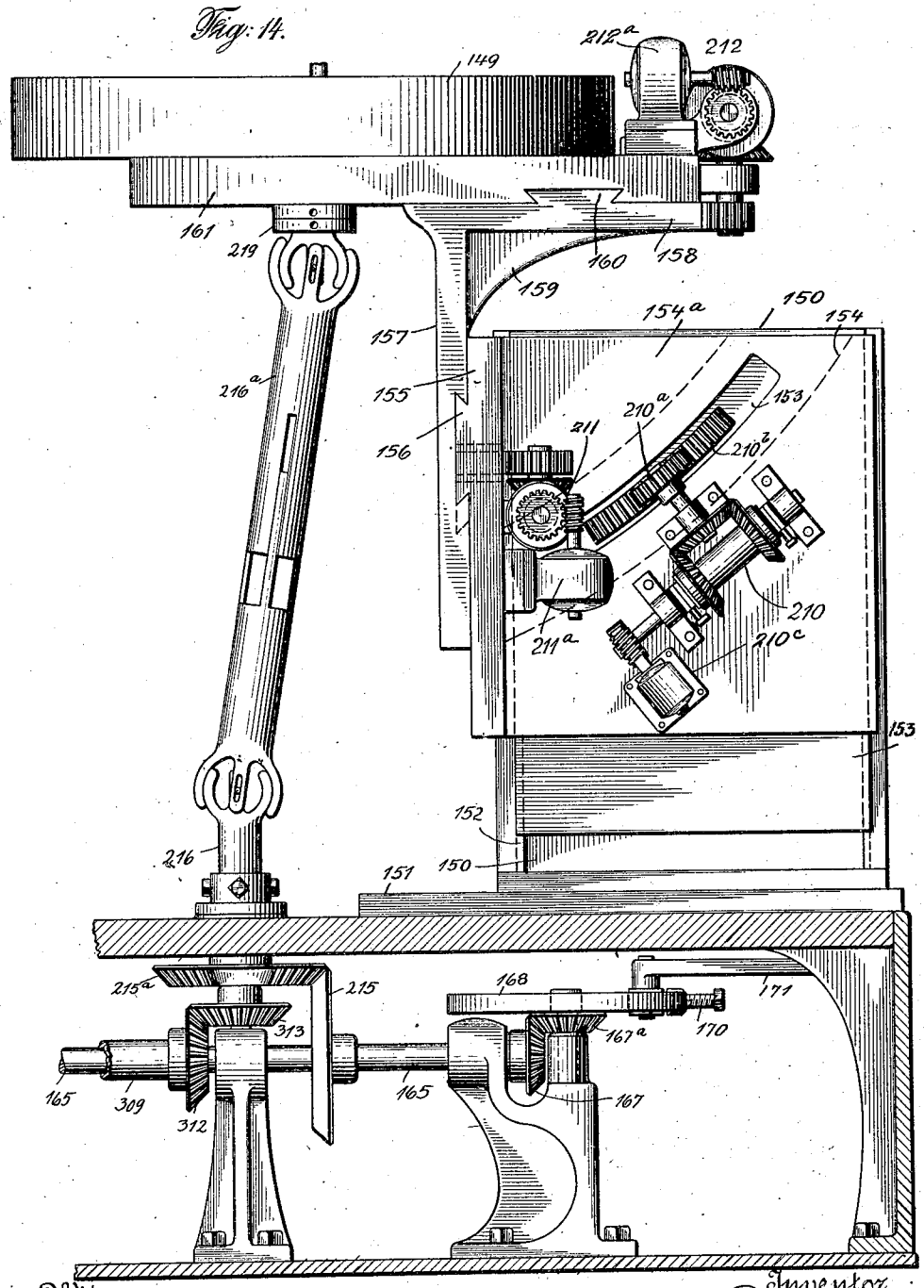
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E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

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Fig. 14.



Witnesses
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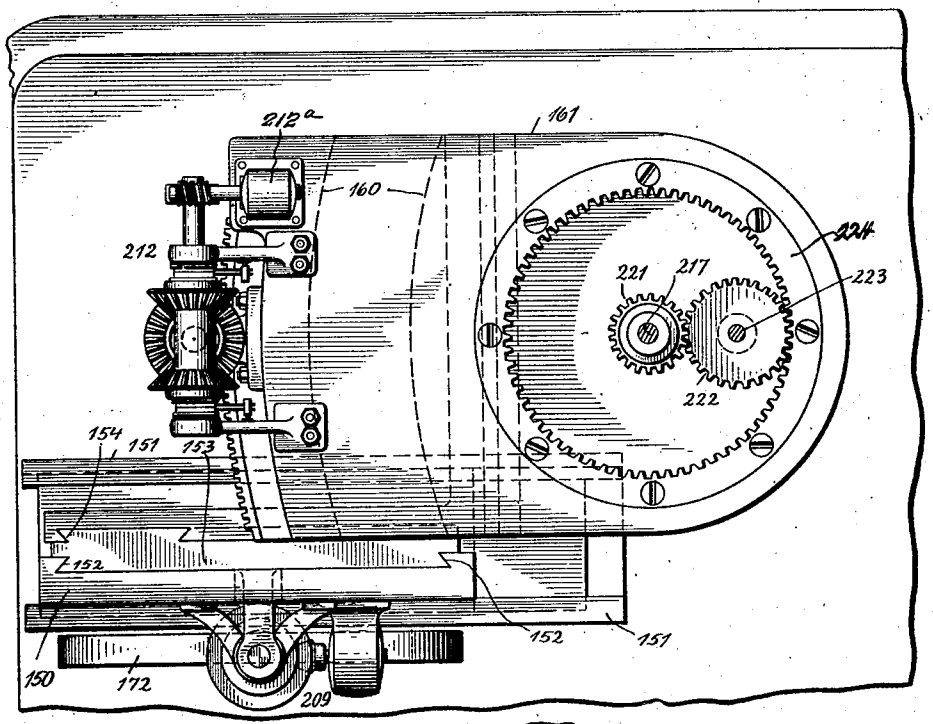
March 20, 1928. 1,663,097

E. J. PRINDLE

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Fig. 15.



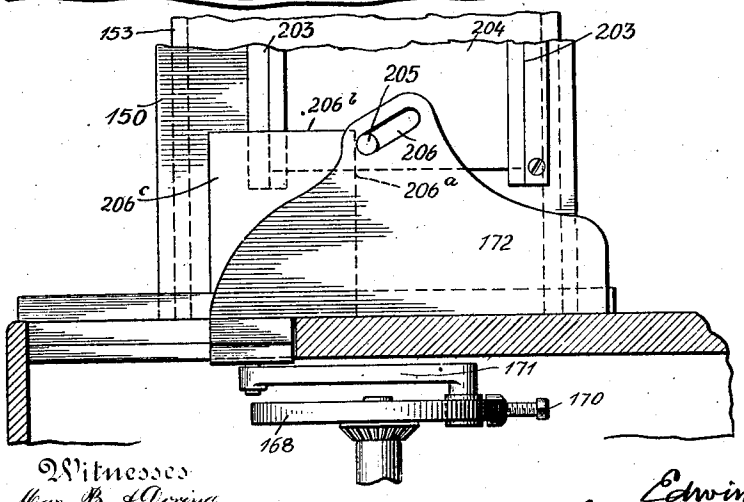


Fig. 16.

Witnesses
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March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

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Fig. 17.

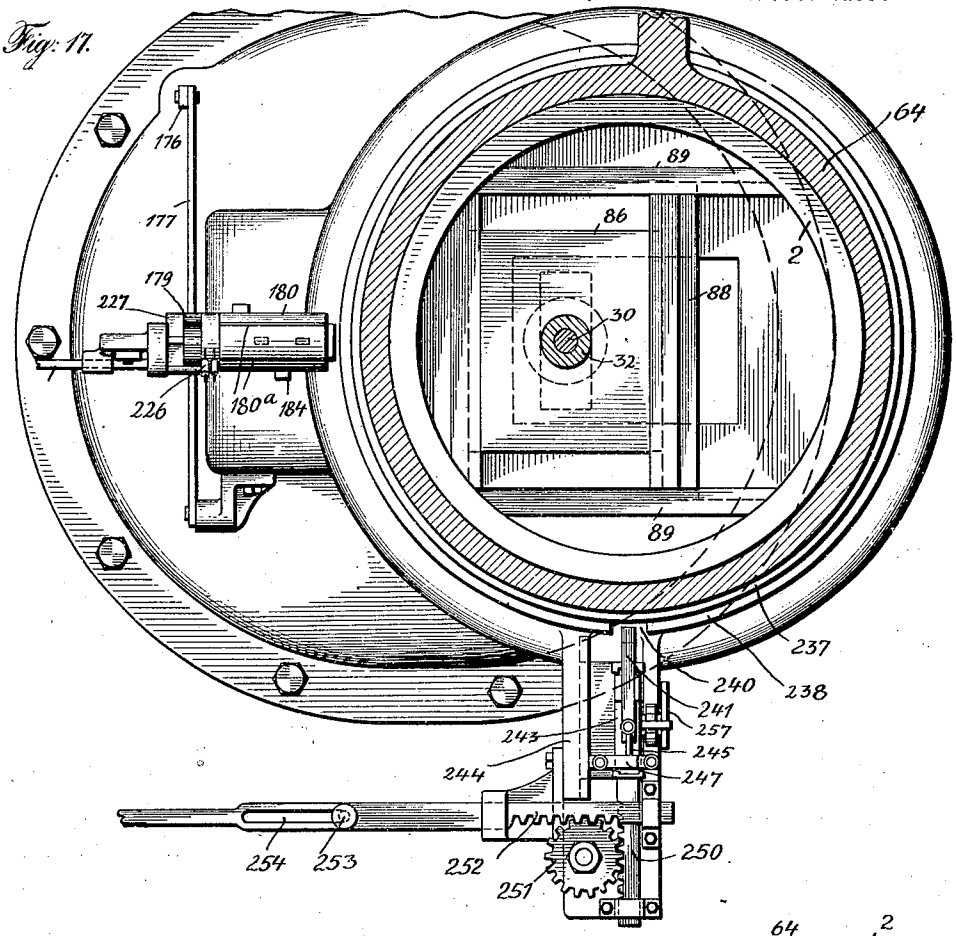
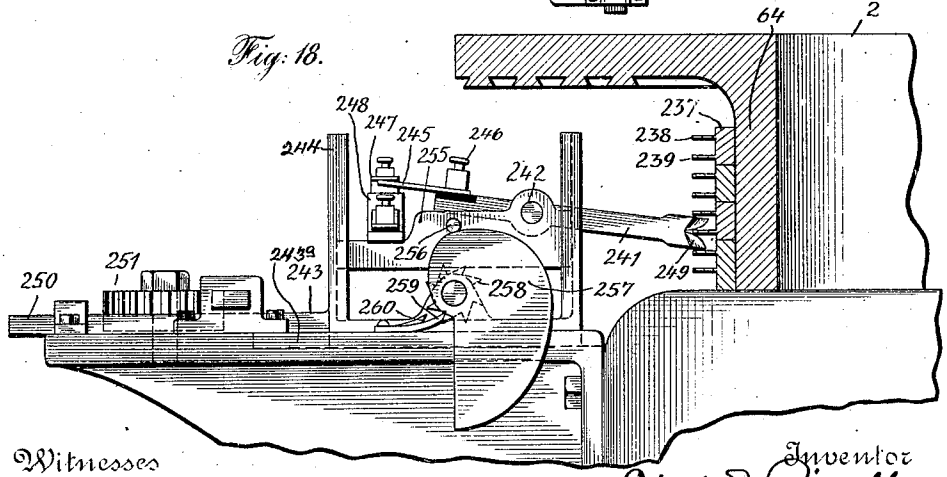


Fig. 18.



Witnesses
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March 20, 1928. 1,663,097

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AUTOMATIC SHOE MAKING MACHINE

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Fig: 19.

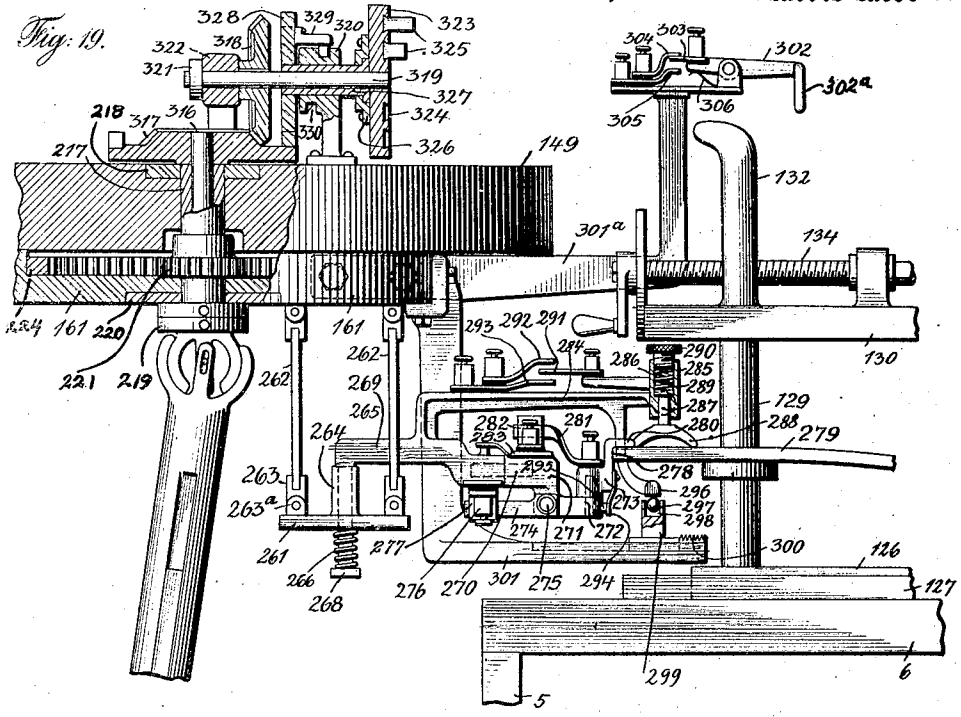


Fig: 20.

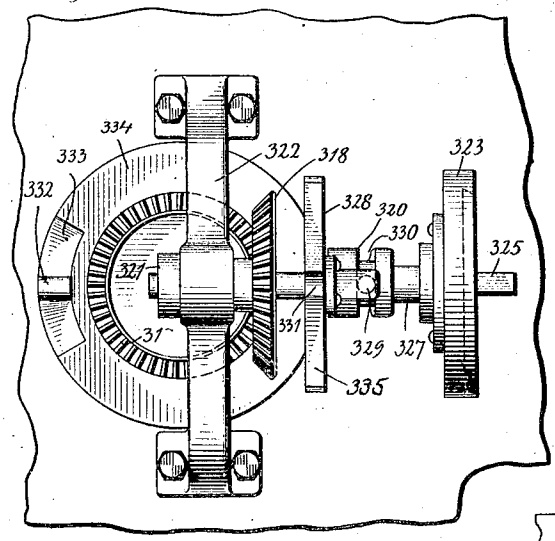
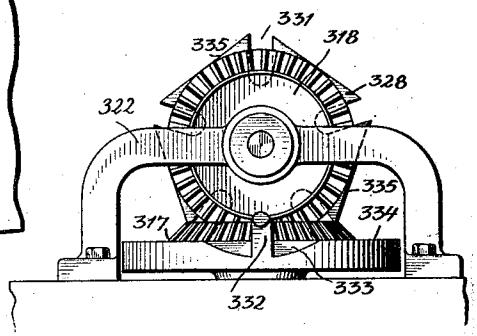


Fig: 21.



Witnesses
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March 20, 1928. 1,663,097

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AUTOMATIC SHOE MAKING MACHINE

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Fig: 22

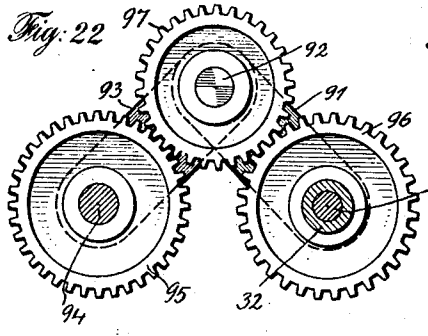


Fig: 23.

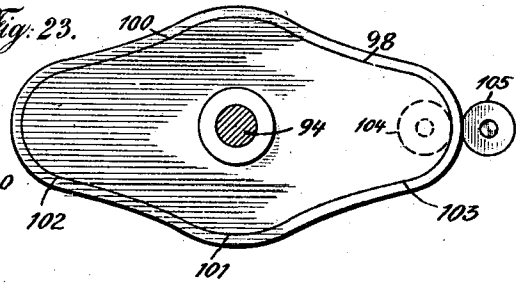


Fig: 24.

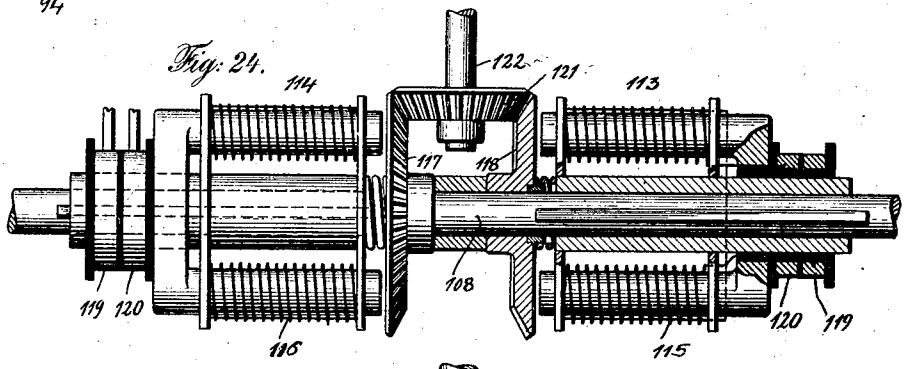


Fig: 25

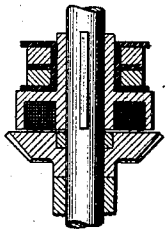


Fig: 26.

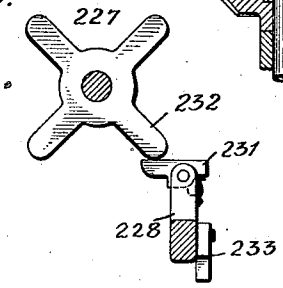


Fig: 27.

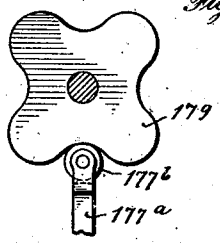
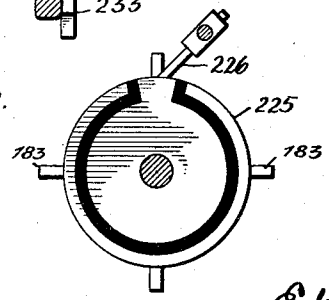


Fig: 28.



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March 20, 1928. 1,663,097

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AUTOMATIC SHOE MAKING MACHINE

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Fig: 29.

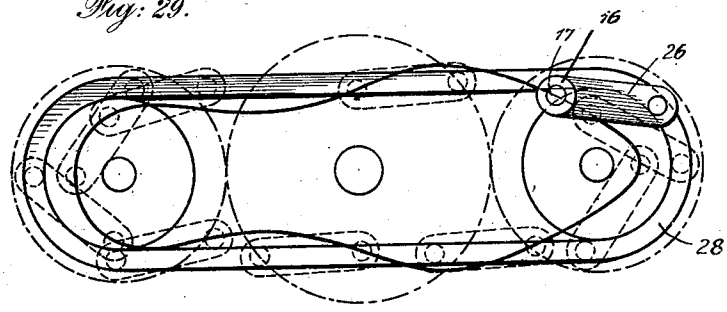
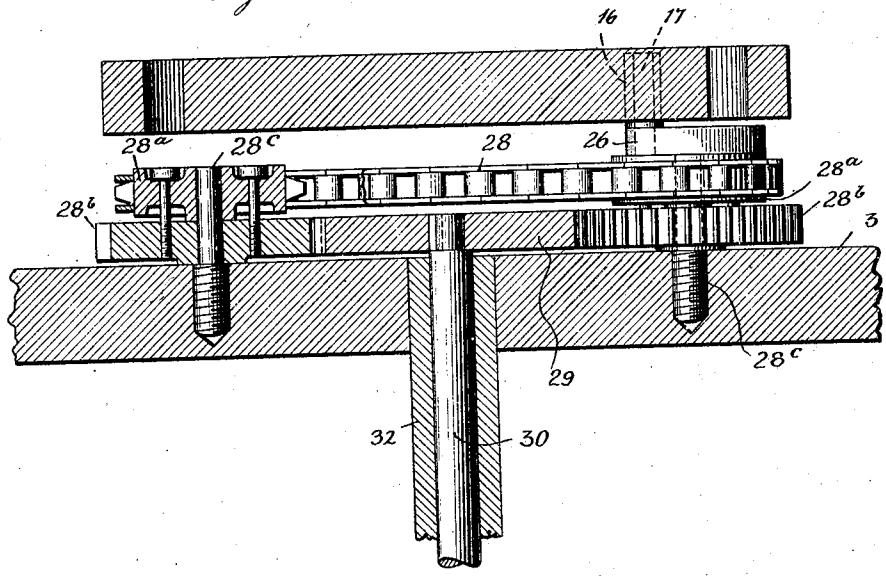


Fig: 30.



Witnesses
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March 20, 1928. 1,663,097

E. J. PRINDLE

AUTOMATIC SHOE MAKING MACHINE

Original Filed July 31, 1916 18 Sheets-Sheet 18

Fig. 31.

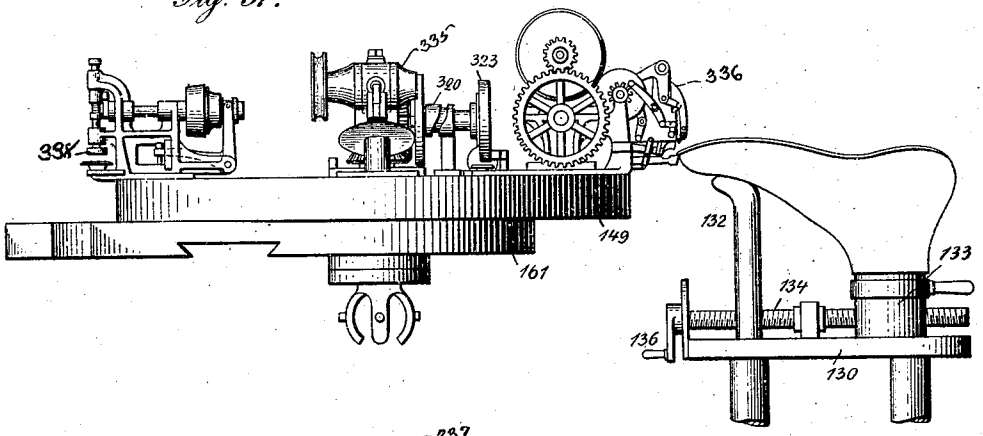
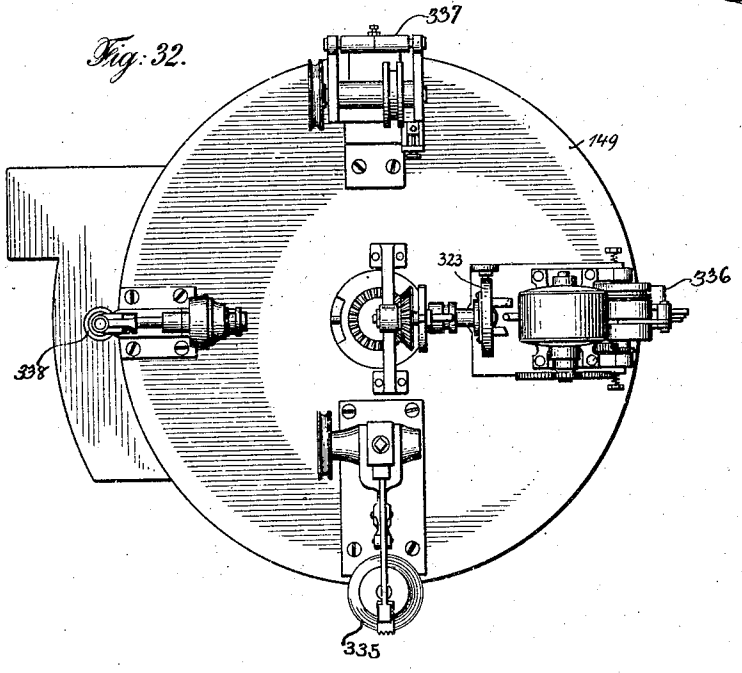


Fig. 32.



Witnesses:
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Prindle and Wright.

Patented Mar. 20, 1928. 1,663,097

UNITED STATES PATENT OFFICE.

EDWIN J. PRINDLE, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY CORPORATION, OF BOSTON, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

AUTOMATIC SHOEMAKING MACHINE.

Application filed July 31, 1916, Serial No. 112,292. Renewed April 13, 1927.

The object of my invention has been to provide a shoe-making machine which shall have, among others, the following advantages:

That of automatically presenting the shoe to a tool or machine which is to perform an operation upon it.

That of being capable of automatically performing a series of operations upon a shoe.

That of being capable of automatically presenting a shoe to a tool or machine, causing said shoe to pass through a part only of its revolution, and of then withdrawing the shoe from the tool and presenting the shoe to a subsequent tool at any desired period in the revolution of the shoe; and

That of being comparatively simple and efficient and readily adjustable from one size in length or width of a shoe to another; and to such ends my invention consists in the shoe-making machine hereinafter specified.

In the accompanying drawings,

Fig. 1 is a side elevation of a machine embodying my invention;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is a side elevation, partly in section of the shoe-supporting jack and its operating devices;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3;

Fig. 5 is a horizontal section on the line 5—5 of Fig. 3;

Fig. 6 is a view like Fig. 5, showing the sliding block cut in a plane horizontally below its lever;

Fig. 7 is a vertical section on the line 7—7 of Fig. 4;

Fig. 8 is a cross-section on the line 8—8 of Fig. 4;

Fig. 9 is a cross-section on the line 9—9 of Fig. 4;

Fig. 10 is a horizontal section on the line 10—10 of Fig. 3, Plate 8 being omitted;

Fig. 11 is a vertical section shown through the base of the machine;

Fig. 12 is a vertical section on the line 12—12 of Fig. 11;

Fig. 13 is an elevational view of the carriage and cam plate, and, in section, the device for rotating the turret;

Fig. 14 is a rear elevation of Fig. 13;

Fig. 15 is a top plan view of Fig. 13;

Fig. 16 is a detail of the cam plate of the carriage, shown in position, when the tool on the turret is in operation upon the shoe;

Fig. 17 is a horizontal section on the line 17—17 of Fig. 11;

Fig. 18 is a side elevation of the automatic rotating device of the jack, shown on an enlarged scale;

Fig. 19 illustrates controlling devices;

Fig. 20 is a top plan view of the tool-controlling device;

Fig. 21 is a side elevation of Fig. 20;

Fig. 22 is a plan view of the gearing for communicating motion from the shaft 94 to the shaft 30;

Fig. 23 is a plan view of a cam gearing for rotating the jack proper;

Fig. 24 is a side elevation partly in section of one of the electric clutches;

Fig. 25 is a sectional detail of Fig. 24;

Figs. 26, 27 and 28 are details of portions of the controlling devices for rotating the jack, etc.;

Figs. 29 and 30 are a partial plan view and a vertical sectional view of gearing for rotating the pin which engages the main path cam of the jack; and

Figs. 31 and 32 are respectively a side elevation and a plan view of the turret.

In the particular embodiment of my invention which I have chosen for illustration, the shoe is supported upon a jack, and the several machines for operating upon the shoe are supported upon a turret. The tool operating upon the shoe is stationary, so far as bodily movement is concerned, during the operation on the shoe, and the jack so moves the shoe as to cause the portion of the shoe being operated upon, say,—the edge of the sole,—to travel past the position of the tool. The jack, however, does not tip, so as to bring the edge of the sole perpendicular to the tool and parallel to the line of travel past the tool, but the turret is tipped instead. Thus, while the tool is at a fixed point, during its operation on the shoe, the tool is tipped about such point to accommodate itself to the various turns of the sole, and thus to be always in proper relation to the sole, the jack, however, seeing to it that the proper portion of the sole is in contact with the tool.

The tipping of the turret is accomplished automatically by electric-controlling devices,

which are controlled by certain fingers. The machine is also provided with electric-controlling devices, which remove the tool from the shoe in a proper direction (say, vertically, for the channel), so as not to injure the shoe; which turn the shoe into the proper position to engage the tool before it is brought into contact with the tool, and which take proper account of the varying level of the shoe soles.

In carrying my invention into practice, I provide a base 1, on which are mounted the shoe-supporting jack and its operating devices. The said base is provided with a vertical circular flange 2, on whose horizontal upper edge rests a table 3. Blocks 4 and 5, respectively, are secured on the upper side of the said table and support a plate 6, upon which is mounted the jack 7. A plate 8 extends from a shoulder on the block 5 to one on the block 4, parallel to the table 3, and such plate is provided with a rabbeted recess 11 (Fig. 3), in which one of the two cams of my machine is removably mounted. Such cam consists of a plate 12, to which are secured blocks 13 and 14, the outer block 13 being of the shape of the recess 11, and the outer and inner blocks being separated by a slot 15 of uniform width, which is of the shape of the in-sole or of the out-sole of the shoe to be manufactured, according to the operations to be performed upon the shoe, and which forms a cam slot for a roller 16. The plate 12 is secured in place by thumb-screws 12^a, threaded into the plate 8, and bearing upon the said plate 12. The roller 16 is mounted on a pin 17 (Fig. 8), which latter is secured in the end of a slide 18. The slide 18 is slidably mounted in a dovetail groove 19 (Fig. 7), formed in a block 20, which block is slidably mounted between guides 21, 22 and 23, the guides extending across from the block 5 to the block 4 (Figs. 4, 8, 9 and 10). The block 20 has ribs 24 (Fig. 9), which extend upward through slots formed between the guides 21 and 22 and 22 and 23, respectively, and such ribs have plates 25 which are received in grooves formed in the guides. The block 20 thus hangs from the guides 21, 22 and 23, and is free to move along them. The pin 17 extends through the slide 18 and receives on its lower end a link 26 (Fig. 5) whose opposite end is secured to a pin 27 on a sprocket chain 28 that runs over sprocket wheels 28^a. The sprocket wheels are fastened to pinions 28^b (Fig. 3) that are journaled on studs 28^c fixed in the table 3. The pinions 28^b are driven by a gear 29 keyed on a shaft 30. The shaft 30 is journaled in a sleeve 32 which is fixed in the table 3, and is held from rotation by arm 30^a, the latter having a slot 30^b engaged by a pin 30^c extending between ears 30^d upon the body of the machine. The pinions 28^b are preferably of such diameter that on one rotation of the gear 29, the pin 27 will have traveled one complete cycle of the length of the chain. Such gearing gives the pin 27 a motion approximately like an ellipse, and thus causes the pin 17 to travel about the cam slot 15, the link 26 permitting the difference in motion between the path of travel of the pin 27 and the path of travel of the pin 17.

The motion of the pin 17 is divided into one component for the width of the shoe and one for the length, so that adjustments can be made to cause the machine, from the motion of the single cam slot 15, to operate upon shoes of varying widths and lengths, made from the model corresponding to the said cam. The slide 18, at its end opposite to that carrying the pin 17, carries a pin 37 (Fig. 4), on which is swiveled a block 38, which latter travels in a slide-way 39 formed in a lever 40, the latter being fulcrumed on a pin 41 that is fixed in a lug 42 carried by the block 20. The lever 40 has, on its under side, a slide-way 43 (Fig. 8), in which is mounted a block 44, the latter being swiveled by a pin 45 to a block 46, which latter is received in the transverse slide-way 47 of a T-slide 48. The shank 49 of the T-slide 48 is mounted on a guideway 50 (Fig. 7), formed in the under side of the block 20, parallel to the guideway 19 of the slide 18. The guideway 47 of the T-slide is extended beyond the free end of the lever 40 and carries a cylinder 51 (Fig. 4) provided with a scale 52, which scale has a series of rows of marks 53 extending longitudinally of the cylinder, corresponding to the widths of models of different dimensions, and has a diagonal line 54, by means of which the particular row for a given width is indicated. This scale is the subject of another application for patent filed by me, and is not claimed herein. The block 46 is provided with a pointer 55, used in connection with the said row of marks, and the extension of the slideway 47 is provided with lugs 56 and 57 between which the pointer 55 can be clamped in adjusted position by a thumb-screw 58. The slideway 47 of the T-slide 48 is received in a slideway 59 carried by a ring-slide 60, the latter being mounted in a slideway 61 of a plate 62 that reciprocates between gibs 63 on the underside of the block 20 (Figs. 8 and 9). The ring-slide 60 is secured to, or forms part of, a ring 64, which embraces the vertical flange 2 on the frame.

As the block 20 moves parallel to the length of the cam slot 15, the movements of the slide 18 in its guideway are solely due to variations in the width of the last. The slide 18, therefore, gives the pivot 37 movements which are in direct proportion to the width of the model last from which the cam slot was made. This action causes the lever

40 to swing more or less upon its pivot 41, and such lever transmits a movement to the block 44 which is directly proportional to the width of the last. The pivot 45 can move only in a straight line relative to the block 20, because the pointer 55 is secured to the block 46 on the said pivot, and such pointer is, in its adjusted position, clamped to the extension of the slideway 47 of the T-slide 48, and the T-slide is mounted in a transverse guideway in the block 20. This arrangement ensures that movement transmitted from the cam slot to the pivot 45 shall be directly proportional to the width of the cam, and prevents any inaccuracy in the transmission of the movement. The position of the pivot 45 in the guideway 43 on the underside of the lever 40 determines whether the motion of the pivot 45 shall be greater or less than that of the pin 17 in the cam 15, according as the pivot 45 is nearer the pivot 41 than the pin 37 or not. The shifting of the pivot 45 causes a relative shifting between the table 3 and the ring 64, thereby causing the jack, and with it the shoe, to have a lateral movement relative to the tool, as will be more fully explained. As the pin 17 travels lengthwise of the cam 15, it carries with it the block 20, so that the block 20 has movements along its guides which are equal to the movements of the pin 17 longitudinally of the cam. In order to be able to transmit such movements to the table 3 which carries the jack, and to vary the movements to correspond with shoes which are longer or shorter than the model from which the cam 15 was made, the following arrangement is provided. A slideway 65 (Fig. 5) is formed in the block 20, transverse to the cam 15, and parallel to the slideway 19. A block 66 is mounted in such slideway and carries a pivot-pin 67, on which is swiveled a block 68, the latter engaging a guideway 69 in the upper side of a lever 70. The lever 70 is fulcrumed on a pin 71 (Fig. 7), carried by a post 72, the latter being fixed on and carried by the plate 62. On the underside of the lever 70 is a slideway 73 (Fig. 5), in which slides a block 74, the latter being swiveled on a pin 75 that is fixed on the table 3. A pointer 76 (Fig. 5) is secured to the block 66, and extends along a cylinder 77, having a scale thereon, like that previously described. The cylinder 77 is journaled between lugs on a plate 78 projecting from the block 20. The plate 78 has a lateral projection 79, on which is formed a stationary abutment 80. A movable abutment 81 is mounted in guides on the plate 79 and carries a pointer 82 to cooperate with the diagonal line 83 of the said cylinder, all as in the manner described in the said previous application. In giving to the table 3, and consequently, the jack and shoe carried thereby, movements in the direction of the length of the cam 15, in order that the single cam may present shoes of greater or less length than the model from which the cam was made to the shoe-operating devices, the model last is placed, with its heel or toe against the stationary abutment 80, and the movable abutment 81 is brought to bear against the opposite end of the last. Such movement properly positions the pointer 82, so that, when the diagonal line 83 is, by the rotation of the cylinder, brought under the pointer 82, the series of points or lines 84 on the said cylinder, which are numbered to correspond to the different sizes of shoe to be worked upon, which series is in line with the path of movement of the pointer 76, will indicate the proper position of such pointer, to cause the machine to work upon a shoe of any desired length. When the pointer 76 has been adjusted, it is clamped, as by a thumb-screw 85, between lugs formed on the plate 78, thus positioning the pivot 67, so that the movement communicated by the lever 70 to the pivot 71, and, consequently, to the plate 62, shall be the desired proportion, greater or less than the length of the model, but shall be exactly in the desired proportions throughout the entire limits of such movement. The movements communicated to the plate 62 are transmitted to the ring 64, through the ring-slide 60, which is guided in the said plate 62, and either the ring 64 is moved with reference to the table 3 the desired amount of length, or the table 3 is moved with reference to the ring 64, according to whether, in the particular embodiment of the invention chosen, the ring 64 is held from bodily movement or the table 3. In the particular embodiment herein shown, the ring 64 is prevented from bodily movement by the flange 2, and, consequently, the table 3 receives the said the movement.

From the above description, it will be seen that, by means of a single cam, any desired variation in length proportional to the single cam may be obtained by a single adjustment (that of the pointer 76), and any desired variation in width may be obtained from the single cam by means of a single adjustment (that of the pointer 55). It will also be seen that the single cam, so far used, is very readily removable from the machine, it being only necessary to loosen the thumb-nuts 12^a, when the cam can be raised out of its seat in the plate 8 and removed from the machine, and a new cam can, with equal ease, be placel in position for work.

In order to hold the table 3 down upon the flange 2, the sleeve 32 (Fig. 3) is extended downward and passes through a slide 86 (Fig. 3) which latter moves in a transverse guide 87 in a slide 88, the latter being mounted between guides 89 formed on the base 1. A collar 90 is secured on the

sleeve 32, beneath the slide 88, and thus, through the sleeve, holds the table 3 to the slide 88, and prevents its rising off the flange 2.

The table is rotated through the medium of the sleeve 32. Such sleeve, below the collar 90 (Fig. 11), carries a link 91, which is connected by a pin 92 with a link 93 swiveled on a vertical shaft 94. The shaft 94 and the sleeve 32 have, respectively, gears 95 and 96 fast thereon, and an idler 97 is mounted on the pin 92 to transmit motion from the gear 95 to the gear 96. The shaft 94 carries an irregular friction-wheel 98, which wheel has a flange 99, having two portions 100 and 101 (Fig. 23) which are, substantially, concentric with the shaft, and which are of short radius, and two portions 102 and 103 intermediate between the said portions 100 and 101 of longer radius, which are also substantially concentric with the shaft, and which are connected with the portions 100 and 101. The flange 99 is engaged by friction-wheels 104 and 105 (Fig. 11) on opposite sides, the said friction-wheels being mounted on the upper ends of shafts 106 and 107, which are connected by universal joints with shafts 108 and 109, the latter carrying intermeshing gears 110 at their lower ends. A spring 111 engages collars 112 on the shafts 106 and 107, respectively, and draws the friction-wheels against the flange 99, with sufficient force to enable them to drive the said flange. The shaft 108 carries friction clutches 113 and 114, which are preferably electrical, and may be of any known construction. The friction clutches comprise magnets 115 and 116, (Figs. 11 and 24) respectively, which are fastened on the shaft 108 opposite bevel gears 117 and 118, respectively, the latter being loose upon the said shaft. Each friction clutch carries a pair of contact rings 119 and 120, respectively. The bevel gears mesh with a bevel pinion 121 on the driving shaft 122, such shaft being preferably driven by an electrical motor 123. According as one clutch or the other is energized, the shaft 109, and, consequently, the shaft 108, are driven in one direction or the other, causing the friction-wheels 104 and 105 to drive the flange 99 in one direction or another. It is in order that the edge of the sole, or the inseam or other portion of the shoe parallel to the edge of the sole, may pass the tool at a uniform rate of speed, that the flange 99 is provided with the portions nearer to or farther from the shaft, so that a uniform rate of speed of the friction-wheels 104 and 105 will cause a varying rate of rotation of the shaft 94 and, consequently, of the table 3 and shoe. The portions 100 and 101 of the flange 99, which are near the shaft, are of small radius, and cause a quick rotation of the shaft, comparatively, and such portions are in mesh while the sides of the shoe are being operated upon. The portions 102 and 103 which are at the greatest distance from the centre of the shaft cause a slow rotation of the shaft, such as is suitable for the toe and heel.

The jack and its immediate supporting devices are constructed as follows:—A block 126 (Fig. 3) is mounted between guides 127, which extend parallel to the length of the cam 15, the block 126 being clamped, as by a screw 128, at any desired point along the said guides. Posts 129 rise from the block 126 and support a plate 130, which plate has aligned dovetail guideways 131, also parallel to the length of the cam 15. Toe and heel blocks 132 and 133, respectively, are mounted in the said guideway, and are engaged by a right and left screw 134, which is journaled in a lug 135, rising from the plate 130. Such screw is adapted to be turned by a handle 136, which travels over a scale-plate 137, the latter being secured to the plate 130. The scale-plate is marked off with a scale, giving the proper positions of the screw to adjust the toe and heel blocks for lasts of various sizes. In order to secure the last upon the jack-pin 138 rising from the heel block, a bar 139 is mounted in a dovetail groove in the front of the said block, and carries at its upper end a catch 140, which catch has a hooked end 141, that is adapted to engage a hole or projection on the last; such as a hole in the rear face of the forepart of the last. The catch 140 has a tail 142, which, in the highest position of the bar 139, is adapted to engage a shoulder on the heel-block and to tip the catch away from the forepart, thus releasing the last. A spring 143 on the bar 139 normally tends to throw the catch toward the fore-part. To raise and lower the bar 139, a ring 144 is mounted on the heel-block, and is provided with a cam groove 145 that is adapted to engage a pin 146 on the bar 139 and to raise and lower the said bar by the turning of the said ring. By means of the ring 144, or its handle, the catch 140 can be engaged with the hole in the fore-part or other suitable portion of the last, and then can be forcibly drawn downward to secure the last upon the jack-pin 138 and in the toe-rest 132; or the catch can be raised and released from the last.

It is desirable to have the longitudinal centre of the last being operated upon directly over the longitudinal centre of the cam 15. In order to enable the jack to be thus positioned, a pin 148 (Fig. 3) is secured on the plate 130, and a sole-pattern or last, of the same size as the one from which the cam 15 was made, is placed on the said pin and extended along the side of the plate 130. The block 126 is then shifted, until the longitudinal centre of such last or sole-pattern

is over a centre mark 148′, corresponding to the centre of the cam 15. The pin 148 is preferably in the same vertical plane as the pin 138 when adjusted for a last of the size corresponding to cam 15, said plane extending perpendicular to the guideway in the plate 130. The jack having thus been positioned for the model size, when the jack-pin and toe-rest are shifted by means of the handle 136, the centres of the various sizes of last will remain over the centre of the cam.

In order to so support the machines or tools which are to operate upon the last that they may approach and recede from the work, that they may rise and fall with the varying level of the edge of the sole or of the inseam, and that they may always be perpendicular to the edge of the sole, and in order that one tool may be presented after another to operate upon the shoe, such tools are mounted upon a turret 149, which turret is supported from the base by the following means: A carriage 150 (Figs. 13 and 14) is mounted in horizontal ways 151 formed on the base of the machine and extending toward the jack. Said carriage has vertical ways 152, in which is mounted a vertical sliding carriage 153. The carriage 153 is provided with an arc-shaped rib or guide 154, the centre of curvature of which is at the point of the tool which is in operation on the shoe. A slide 154[a] mounted on carriage 153, provides for tipping of the turret or tool in a plane extending through the axis of rotation of the jack or transversely of the sole edge. The slide 154[a] is provided with a plate 155, extending in a plane perpendicular to the plane of the main portion of the slide 154[a], and such plate is provided with an arc-shaped guide 156, whose centre of curvature is in a line passing through the tool which is in operation, and parallel to the turret. This provides for tipping the turret or tool lengthwise of the sole edge. A slide 157 engages the guide 156, and is provided with a horizontal plate 158, which may be connected with the slide 157 by a vertical web 159. The plate 158 has an arc-shaped guide 160, whose centre of curvature is at the point of the tool in operation, and a plate 161 is mounted upon the guide 160. This provides for swinging the turret or tool in a plane substantially parallel to the bottom of the shoe sole. The turret is swiveled on the plate 161 to enable the tools to be brought successively into position to operate on the shoe.

In order to cause the carriage 150 to recede from its working position, whenever one operation has been completed and another is to be begun, the following gearing is provided:

On the rear end of the driving shaft 122 (Figs. 11 and 12) a toothed wheel 162 (Fig. 11) is mounted, which is adapted to be engaged by a headed bolt 163 mounted in a disc 164, that is fastened on the end of a horizontal shaft 165. The bolt is pressed toward the wheel 162 by a spring 166[c] interposed between a cross pin or disk 163[a] on the bolt and the disc 164. The bolt is withdrawn from engagement with the wheel 162 by the engagement of the bolt head 163[b] with a cam surface 166[a] (Fig. 12) on a lever 166, said lever also having a shoulder that stops the bolt from rotation. When the lever is lowered, the bolt is forced into engagement with the toothed wheel by the spring and the shaft 165 is revolved. The lever during the revolution of the bolt, having been permitted to rise, engages the bolt and withdraws and stops it. The manner of operating the lever will be later described.

At its rear end the shaft 165 carries a bevel gear 167 (Fig. 13) that drives a bevel pinion 167[a], the latter being fixed to a crank disc 168. The crank disc has its crank pin 169 adjustably mounted in a slot in the disc, the adjustment being effected by a screw 170. The crank pin 169 is connected by a link 171 with a slide 172 movable parallel to the slide 150.

The rear end of the lever 166 (Fig. 12) is connected with a link 176 pivoted to a lever 177 pivoted on the frame, which lever is normally held up by a spring 178. The lever 177 has a pin-and-slot connection with a vertically slidable bar 177[a] that carries a roller 177[b] at its upper end. The said roller is adapted to be depressed by a cam 179 that is mounted on the shaft of a tappet-cylinder 180, the latter being journaled in a bracket 181 and in a bearing 182 formed on the frame. The cylinder 180 carries a series of lugs 183, which are placed at different distances, from the ends of the cylinder, and at a circumferential distance apart, proportional to the number of operations to be performed by the machine. These lugs 183 are adapted to be struck by pins 184 carried by blocks 185, the latter being adjustably mounted upon dovetail ribs 186, which are formed on a flange 187 on the ring 64, said ribs being concentric with the said flange. The blocks 185 are adjusted to positions about the ring 64, corresponding to the points in the revolution of the shoe at which it is desired to stop the operation being performed. At the close of each operation, the pin 184, corresponding to the lug 183 which is uppermost on the cylinder, strikes the said lug and rotates the said cylinder a part of a revolution. This causes one of the teeth of the cam 179 to engage and depress the roller 177[b], and through the connections to depress the lever 166, and thus causes the one-cycle device to be set in operation and to cause one revolution of the shaft 165.

The carriage 150 is provided with a vertical slideway 203 (Fig. 13), in which is

mounted a slide 204 having a pin 205 that engages a slot 206 in the slide 172. The lower end of a screw-shaft 207 is journalled on the slide 204, the upper end of the said shaft being threaded through a lug 208 formed on the vertical slide 153. An electric clutch mechanism 209 and motor 209a, similar to those before described as mounted on the shaft 108, are mounted on the slide 204, and splined on the shaft 207.

The pin 205 not only extends through the slot 206, but it engages either the vertical face 206a or the horizontal face 206b of a block 206c, that is fastened on the frame. When the slide 172 is first moved backward, or away from the jack, its cam slot 206 raises the pin 205 vertically (thus raising the tool vertically away from the shoe) until the pin 205 has passed above the level of the horizontal face 206b of the block 206c, when the turret will be moved away from the work. On the forward movement of the slide 172, the tool is first moved horizontally toward, but vertically over the shoe, and is then lowered vertically to place.

The electric clutch mechanism 209 is operated by means to be later described. Another electric clutch mechanism 210 (Fig. 14), screw-shaft and motor 210c are in position between lugs on the vertical slide 154a, and swing this slide by turning a bevel gear 210a along a rack 210b, which is mounted on the vertical slide 153. A similar electric clutch mechanism 211 (Fig. 14) and motor 211a operates the transverse slide 157, and a similar electric clutch mechanism 212 and motor 212a is mounted on the plate 161, whereby the horizontal oscillating movement may be given to the turret 149. The motor 209a moves with the slides 204, and its operating circuit is broken by movement of such slide to elevated position, which movement takes place when the tool is to be withdrawn from the shoe, as will be later described.

In order to rotate the turret from station to station, the shaft 165 has a mutilated gear 215 provided with a toothed segment and a locking segment adapted to engage a series of toothed segments and locking segments on a mutilated gear 215a fixed on a sleeve 216 journaled in the base plate of the machine. This mechanism is timed to delay the rotation of the turret until after the slide 204 has been raised and withdrawn or partially withdrawn to remove the tool from the shoe. The said sleeve 216 is connected by gimbals, or other form of universal joint, with a telescopic sleeve 216a which is likewise connected by gimbals, or other universal joint, with a sleeve 217 which is journaled in the plate 161. The sleeve 217 has a collar 218 at its upper end which is countersunk in the turret to hold the latter down. The sleeve below the plate 161 has lock-nuts 219 which bear against a wear-plate 220 on the plate 161, and thus the turret and plate 161 are secured together. A gear 221 is keyed on the sleeve 217 in a recess in the upper face of the plate 161, and such gear meshes with a pinion 222 that turns on a stud 223 carried by the turret, the said pinion meshing with an internal gear 224 on the plate 161. The said gears are so proportioned that each movement of the sleeve 217 (which occurs every time the one-cycle mechanism operates) causes a rotation of the turret of one station.

In order to stop the machine at the end of a series of operations, the shaft of the cylinder 180 is provided with a contact-ring 225 (Fig. 11), which is engaged by two brushes 226 forming a part of the electric circuit of the motor 123. The contact-ring 225 (Fig. 28) is interrupted at a point corresponding to the position of the brushes 226 just after the last pin 184 has revolved the cylinder at the close of an operation. When the brushes reach the said interrupted portion of the contact-ring, no current can pass from one to the other, and the motor 123 accordingly stops. In order to throw one of the lugs 183 into position to be struck by its pin 184 after the carriage 150 has retracted the turret and advanced it again to the work, a cam 227 (Fig. 11) is mounted on the shaft of the cylinder 180, and a bent lever 228 is hung on a pin 229 on the bracket 181. A spring 230 normally holds the lever in its lower position. The lever is provided with a nose 231 (Fig. 26) that is adapted to engage any one of the fingers 232 on the cam 227 and to rotate the said cam and the cylinder a sufficient distance to throw a new lug 183 into operative position. The lever 228 carries a pivoted finger 233 (Fig. 3), which is normally pressed against a lug 234 on the said lever by a spring 235. The said finger is adapted to be engaged by a bar 236 (Fig. 1) that is mounted in a dovetail slide in the bracket 181 and is connected to the turret carriage 150. When the carriage advances to working position, it advances the bar 236, and the latter engages the finger 233 and forces up the nose 231 of the lever 228 to cause the partial rotation of the cam 227. When the said lever has reached its highest point, it raises the finger 233 above the level of contact with the bar 236 after which the lever 228 swings back to normal position, leaving the cylinder free to rotate when the next pin 184 comes around.

Means are provided by which the jack is automatically rotated to any position where it is desired to have the next tool begin to operate upon the shoe; such, for instance, as the shank or the heel, or the beginning of the welt. Such means will now be described. A series of controlling rings 237

(Fig. 11) are rotatably mounted around the ring 64, or on any other part rotating in unison with the jack, and are provided with any convenient means, such as a thumb-screw, for locking them in position. Each ring is provided with a rib 238 extending horizontally near the upper edge of the ring, and with a rib 239 extending horizontally near the lower edge of the ring. These ribs terminate a short distance apart, leaving a gap 240 between them. They serve to control an electric contact by which the clutches 113 and 114 are energized, so that, according as one rib or the other is in operation, the table will be rotated in one direction or another. The ribs 238 and 239 are engaged by a lever 241 (Figs. 12, 17, and 18), which lever is mounted on a vertical lug 242 on a slide 255. The slide 255 is mounted between vertical guides 244 on a slide 243 mounted between horizontal guides 243^a on the frame of the machine and extending toward the centre of rotation of the jack. The lever 241 has attached to it an insulated contact 245 and a binding post 246, which binding post is connected with a source of supply of current. The contact 245 extends between insulated contacts 247 and 248 that are mounted on the vertical slide 255. These latter contacts have binding posts by which they can be connected with respective feed brushes of the clutches 113 and 114. The lever 241 has beveled shoulders 249 at its forward end, which are adapted to contact with the ribs 238 and 239, so that the said lever will be swung into touch, either with the contact 247 or 248, and thus energize either the clutch 113 or 114, and cause rotation of the table, until the gap between the ribs 238 and 239 comes opposite the lever 241, when the lever, by springs or by its own balancing, will go to its normal or central position, in which it will not touch either of the contacts 247 or 248, and the rotation of the table will stop. In order that the positioning of the table may occur after the tool has been retracted, the slide 243 is provided with a rack 250 that is adapted to be engaged by a pinion 251 on the frame of the machine. The said pinion is engaged by a rack 252 that is guided on the frame of the machine and whose opposite end is connected to the carriage 150. Thus, when the carriage 150 is retracted, the slide 243 is advanced, and the lever 241 is moved into contact with the ribs 238 and 239, and performs its operation. In order that the lever 241 may remain in operative position for a sufficient length of time to ensure the completion of the positioning movement, the rack 252 may be formed in two parts, connected by a pin and slot 253 and 254, respectively, thus providing for lost motion, while the carriage is advancing and giving the positioning devices time to act. In order that the lever 241 may successively engage the different rings 237 corresponding to the various tools on the turret, the pivot of the said lever and the contacts are formed on the vertical slide 255, such being mounted in the vertical guides 244 on the slide 243. The slide 255 carries a pin 256 that is adapted to rest upon a snail-cam 257, and thus to be gradually raised to its highest position, when it will drop to the portion of the snail-cam nearest the centre thereof. The snail-cam is rotated by means of a ratchet gear 258 on the slide 243, which ratchet is adapted to be engaged by the pawls 259 and 260, respectively, which pawls are mounted on the frame of the machine and engage the ratchet wheel as the slide 243 is retracted. Friction is applied to the shaft of the snail-cam to prevent its turning backward.

The cylinder 180 has seated in its surface a series of insulated metallic bars 180^a (Fig. 11), which bars extend parallel to its shaft, and two brushes 180^b are connected with that one of the clutches 113 or 114 which produces a forward rotation of the table. Said brushes are connected by each of said bars as they pass successively under said brushes. The bars 180^a are so positioned that when the cylinder 180 has been rotated by one of the pins 184, the brushes 180^b are not in touch with any of said bars, but rest between them; and when the lever 228 on the approach of the carriage 150 has turned said cylinder to bring the next lug 183 into position to be struck by its pin 184, a bar 180^a is brought under the brushes 180^b, and thus the circuit through the said brushes and the said clutch is restored, and the table is again set in forward rotation and so continues until the completion of the operation of the tool brought up by the said movement of the carriage 150.

It is desirable that the sole of the shoe shall pass the tool operating upon it, so that the immediate portion of the sole being operated upon is parallel to the plate 161 and is at right angles to the line of approach and recession of the tool during its operation. In order to accomplish this, the turret, as before described, is supported by various slides, by which it can have a vertical movement; can be tipped longitudinally or lengthwise of the edge of the sole and transversely or crosswise of the edge of the sole, and can be swung in a plane substantially parallel to the surface of the sole at the point of operation of the tool, provision thus being made for every possible accommodation of the tool to the shoe. The various movements described are accomplished by means of the electric clutches before described, and the means for controlling the respective clutches will now be described.

A plate 261 (Fig. 19) is swung beneath the portion of the plate 161 nearest the jack, the plate 261 being hung from the plate 161 by rods 262 that are connected with the said plates by joints having pivots 263 parallel to the line of movement of approach and recession of the tool and pivots 263[a] which are perpendicular to such line. It is thus ensured that the plate 261 will always be parallel to the plate 161. The plate 261 carries a socket 264 in which is splined a rod 265, the lower end of the rod being provided with a spring 266 that is interposed between the plate 261 and a head 268 on the said rod. The rod 265 has a horizontal portion 269 that carries at its outer end a pin 270 extending parallel to the plate 161. A bracket 271 is journaled on the pin 270, and such bracket carries a pin 272 that is substantially perpendicular to the pin 270. A bracket 273 is mounted on the pin 272. The bracket 271 has attached to it an insulated contact 274, the latter having a binding post 275 that is connected with a source of supply of electricity. The contact 274 normally, under the action of opposing springs, stands between contacts 277, on the arm 269, the binding posts 276 of which are, respectively, connected with the electric clutch mechanism 211 mounted on the screw-shaft between the slide 157 and the guideway 156. The bracket 273 has a surface 278 that is adapted to contact with the edge of a cam 279, which latter has the shape of the sole of the shoe being operated upon, and is mounted upon lugs on the posts 129 that support the jack. The bracket 273 also has a couple of fingers 280 that are adapted to rest on the upper surface of the cam 279. When the bracket 273 is in contact with the cam 279, if the fingers 280, when in contact with the upper surface of the pattern, are not parallel with the plate 161, they will swing the contact 274 to touch either one or the other of contacts 277, and will thus cause the electrical clutch mechanism 211, interposed between the plate 157 and the guide 156 to operate, and will tilt the plate 161 about a horizontal axis passing through the point of the tool. Such tilting will continue until the contacts 277 have been swung out of touch with the contact 274, when the tool will be properly positioned as to this component. The bracket 273 carries a contact 281, which is likewise connected with the source of electricity, by means of its binding post, and such contact normally stands between two contacts 282 and 283, on the bracket 271 which are connected with the clutch mechanism 212 interposed between the plate 161 and the guide 160. If the surface 278 of the bracket 273, when in contact with the pattern, is not parallel with the proper working line of the tool, the contact 281 will touch one of the contacts 282 or 283 and energize the said clutch mechanism 212, causing the plate 161 to shift by a horizontal arcuate movement upon the guide 160, until the contact 281 does not touch either of the contacts 282 or 283. The rod 265 also carries an arm 284, on which is pivoted a bracket 285, the pivot extending parallel to the line of work of the tool. The bracket 285 has a socket 286, in which is mounted a stem 287, carrying fingers 288 that are adapted to rest on the upper face of the cam 279 near its edge. A spring 289 bears on the upper end of the stem 287, its tension being regulated by a screw 290. The bracket 285 carries an insulated contact 291, which latter is connected through its binding post with a source of supply of current, and extends between insulated contacts 292 and 293, respectively, which contacts are, through their binding posts, connected with the respective electric clutches interposed between the plate 153 and the plate 155, so that, when the fingers 288 are tipped by the cam 279 and swing the contact 291 into touch with either of the contacts 292 or 293, the corresponding electric clutch mechanism 210 is energized, and the plate 155 is swung on the rib or guide 154 until the contact 291 is not in touch with either of the contacts 292 or 293. In the case of all the brackets 271, 273 and 285, springs are provided which normally keep their respective contacts out of touch with the clutch-contacts. Such springs may be a flat spring 294, bearing upon a flat shoulder 295, carried by the bracket. In order to hold the various fingers in contact with the cam 279, the arm 284 is provided with a finger 296, which extends as nearly under the edge of the cam 279 as possible, and is there provided with a ball 297, which latter is received in a vertical socket 298, in a rod 299, the latter being mounted in a horizontal slide on the plate 301, such slide being normally pressed toward the said cam by a spring 300.

The vertical control of the tool is obtained in the following manner:—A bracket 301[a] is carried by the plate 161, and a lever 302 is mounted on the said bracket, the lever having a depending end 302[a], which is adapted to contact with the upper surface of the sole of the shoe being operated upon. The said lever carries an insulated contact 303, which is connected by its binding post with a source of supply of electricity. The said contact normally stands between contacts 304 and 305, which are, respectively, connected with the clutch mechanism 209 on the screw shaft 207 connected with the vertical slide. A spring 306 normally tends to hold the lever 302 in touch with the upper contact 304, which contact is connected with the clutch for lowering the slide 153. When

the slide 172 is operated to raise the slide 204 and to withdraw the turret preparatory to indexing it, the lever 302 will engage the contact 303 and will lower the slide 153 as fast as the slide 204 is raised, until the backward movement of slide 204 breaks the circuit for motor 209, after which the slide 153 and the turret carried thereby will be raised by the continued upward movement of slide 204. When the slide 172 lowers the slide 204 and the slide 153, after the turret has been indexed and moved up to the work, the lever 302 will strike the sole of the shoe and swing into engagement with contact 305. This will cause the proper clutch to rotate the screw shaft 207 after the circuit of motor 209 has been again completed by the downward movement of the slide 204. Then during the continued downward movement of slide 204 the rotation of the screw 207 will raise the slide 153 as fast as the slide 204 moves downward, and after the movement of slide 204 is completed, the slide 153 will continue to be raised until lever 302 is disengaged from contact 305. If, then, the changing level of the sole either raise or lower, the lever 302, by the movement caused will compensate for such movement through the electric clutch until the contact 303 stands between the contacts 304 and 305, without touching either one.

In order to control the tools upon the turret, the following mechanism is provided:—A bevel gear 307 (Fig. 11) is connected by gears with the shaft 94 (Figs. 11 and 12) and meshes with a gear 308, which latter is fast on a sleeve 309 on the shaft 165. The sleeve 309 is provided with a bevel gear 312, (Fig. 13) which meshes with a bevel gear 313 on the lower end of a shaft 314, within the sleeve 216 before described. Such shaft is connected by gimbals, or other form of universal joint, with a shaft 315 within the sleeve 216ª, the said shaft being telescopic so that it may elongate and shorten. The shaft 315 is connected by a universal joint with a shaft 316 within the sleeve 217. The shaft 316 carries, at its upper end, a bevel gear 317, (Figs. 1, 2 and 19) that meshes with a bevel gear 318 on a shaft 319 carrying the devices for controlling the various parts of a tool to be mounted on the turret. The shaft 319 passes through a bracket 320 on the turret, and its end nearest the shaft 316, bearing in a bracket 322, carries a collar 321, so that longitudinal movement of the shaft 319 is prevented. The shaft 319 carries at its outer end a disc 323 having on its outer face a series of circular dovetail grooves 324, in which are mounted pins or stops 325, which are adapted to strike the various controlling levers of a machine mounted on the turret, and thus to control such machine. The pins 325 can be adjusted to various positions in their grooves, to cause them to act at the desired times. The disc 323 is fixed to the shaft 319, and is connected by a collar 326 with a sleeve 327 on the said shaft, said sleeve having bearing in the bracket 320. In order to cause the pins 325 to remain inactive, and not to touch their controlling levers, except when the particular tool to which they belong is in operative position, the following means are provided:—A stop wheel 328 is fast on the sleeve 327, and such stop-wheel carries an arm 329 that engages a cam-groove 330 in the hub or boss of the bracket 320. Such cam-groove is so shaped that once during every rotation of the stop-wheel 328 it will force the stop-wheel and the sleeve and, consequently, the disc 323, toward the machine to be operated, and thus throw the pins 323 into position to operate. The stop-wheel 328 is of the ordinary Geneva stop-mechanism construction. It has a series of equi-distant notches 331 (Fig. 21), corresponding in number to the number of machines or tools on the turret. These notches are adapted to be engaged by a tooth 332, carried by a flange on the gear 317, said disc being cut away, as at 333, to permit the rotation of the stop-wheel, and having a flat surface 334 throughout the remainder of its circumference to engage flat surfaces 335, formed on the stop-wheel between the notches. Thus, the stop-wheel is rotated, one notch for each revolution of the shaft 316, (that is, one notch for each complete rotation of the shoe) and is prevented from rotation when not in engagement with the tooth 332, by contact of the surface 334 on the flange carrying the said tooth.

The turret of my machine is shown in Figs. 31 and 32 (for the purposes of illustration only), as provided with the following machines:—

First operation: The tack puller 335 which may have substantially the construction of the machine of the patent to Paquette and La Chapelle, 473,708, April 26, 1892.

Second operation: The welt sewing machine 336 which may have substantially the construction of the machine of the French and Meyer Patent #412,704, October 8, 1889.

Third operation: The inseam trimming machine 337 which may have substantially the construction of the machine of J. O. Selby, #788,796, May 2, 1905; and

Fourth operation: The machine for beating out welts 338 which may have substantially the construction of the machine of the patent to A. F. Littlefield, #320,075, June 16, 1885. Other machines could, of course, be substituted and the number of operations could be made larger or smaller.

The operation of each portion of the mechanism of the foregoing machine has been described as the structure of such por-

tion has been set forth. It will, therefore, now only be necessary to state the general operation of the machine. The machine is stopped after the series of operations have been completed and the turret has been raised and withdrawn, the one-revolution shaft 165 having made one-half its revolution and still being connected with the motor 123, the circuit for which is broken at the brushes 226. Assuming that the cams 15 and 279 corresponding respectively to the contour and outline of the sole of the shoe to be operated upon have been placed in their respective positions, and that the stop pins 184 and controlling rings 237 have been positioned so as to cause the respective operations to cease and begin at the proper points about the margin of the shoe, the shoe is placed upon the jack, the pointers 55 and 76 are adjusted for the width and length of the shoe, and then the machine is started by turning the cylinder 180 until the circuit through the brushes 226 is closed, thus starting the motor 123. The one-revolution shaft 165 now completes its rotation, and in so doing indexes or completes the indexing of the turret and moves it forward and down to bring the tool which is in working position into engagement with the shoe on the jack. As the turret completes its forward movement the lever 228 is operated to turn the cylinder 180 to bring a lug 183 into position to be struck by the corresponding pin 184, and to bring a bar 180^a under the brushes 180^b, so that the circuit through these brushes, and through the clutch 113 or 114, which produces a forward rotation of the table, is completed, and the forward feeding movement of the table and jack is started. The table is then rotated through the action of the friction gears 104 and 105 engaging the flange 99, the rate of rotation being varied by the shape of such flange, so as to cause the material of the shoe to pass the tool at a uniform, or substantially uniform, rate of rotation. During such action, the carriage 150 is stationary in its forward position, and the turret is not rotating. The turret is, however, being tipped and raised or lowered by the various controlling electric clutches operated from the cam 279, or from the sole of the shoe, so that the edge of the sole, or the inseam, constantly passes the tool in a substantially horizontal direction, and parallel to the normal working line of the tool. This operation continues until the first pin 184 strikes its lug 183 and rotates the cylinder 180. This breaks the circuit through the brushes 180^b and the forward clutch 113 or 114, thus stopping the rotation of the table, causes a depression of the link 177 by the cam 179 and sets into operation the one-cycle mechanism for giving the shaft 165 a single revolution. During this revolution the crank pin 194 retracts the slide 172, thus raising and retracting the turret, the sleeves 216, 216^a and 217 are then rotated to rotate the turret one station, and then the crank pin advances and lowers the turret. During the last part of the rearward movement of the turret the rack bar 252 is moved to advance the slide 243 and the lever 241, bringing the end of the lever against one of the ribs 238 or 239, so that the lever is swung into engagement with the contact 247 or 248. This engages either clutch 113 or 114, and causes the table to be rotated to the position in which the next operation is to begin. When the turret carriage 150 advances toward the work, it causes the lever 241 to be retracted, and to be raised to the level of the next controlling ring 237. The slide 150, in its advancing movement, swings the lever 228, and through this action on the cam 227 rotates the cylinder 180 to bring the second lug 183 into position to be struck by its pin 184 and a second bar 180^a will engage contact 180^b. This starts rotation of the table. It will be apparent that a bar 180^a will be omitted in case the shoe is to be stationary during the corresponding operation. The second tool now performs its work upon the shoe, the tool approaching the shoe with a downward, as well as forward, movement, so that, for instance, it can properly form or reach into a channel in the shoe. While such tool is in operation, if it be one whose operation needs to be varied during its travel about the shoe, the pins 325 actuate the various controlling-levers, cams and parts of the tool to cause the desired changes in its operation. The cycle of movements thus described continues until the interruption in the contact-ring 225 comes opposite the brushes 226, when the machine stops, because the current has been cut off from the motor 123.

It will be obvious that my machine is adapted to perform a series of operations in the making of a shoe, without intervention of any sort on the part of the operator, after it has been adjusted and started. It will also be obvious that, considering the very complex nature of the work performed, the machine is comparatively simple. There are only two cams in the entire machine, which are necessary to fit it to work upon a shoe of any particular style, and it is not necessary to change either of those cams in order to enable the machine to work upon shoes of any size and width other than the model size of the style for which the cams are adapted. Only a single adjustment (that of the pointer 55) is necessary to adapt the machine to work upon a different width of shoe, and only two adjustments (those of the pointer 76 and of the handle 136) are necessary to enable it to work upon shoes of different lengths.

It is evident that many changes can be

made in the above-described embodiment of my invention, which changes will be within the spirit of my invention, and I desire not to be limited beyond the requirements of the prior art or the terms of my claims. For instance, the contact-controlling devices which engage the cam 279 may be made to engage the sole of the shoe instead of said cam, and said cam may be omitted. The bracket 301 may be swiveled or hinged, so that the lever 302 can be turned out of the way while a tool on the turret is rotating into position.

Having thus described my invention, what I claim is:—

1. A shoe-making machine, comprising a turret, two or more tools mounted on said turret, means for so feeding a shoe to one of said tools that said tool and the periphery of the shoe will have proper relative movements during the operation of the tool on the shoe, and means whereby said turret may be revolved to successively bring said tools into operative position.

2. In a shoe machine, the combination of a turret, a series of tools mounted on said turret, means for causing proper relative movements between the periphery of the shoe and the tool which is in operative position during the operation of the tool on the shoe, and means for automatically moving said turret to bring said tools successively into operative position.

3. In a shoe machine, the combination of a turret, a series of tools mounted on said turret, means for causing proper relative movements between the periphery of the shoe and the tool which is in operative position during the operation of the tool on the shoe, means for automatically moving said turret to bring said tools successively into operative position, and means for moving apart said turret and shoe between each two successive operations.

4. In a shoe machine, the combination of a turret, a series of tools mounted on said turret, means for causing proper relative movements between the periphery of the shoe and the tool which is in operative position during the operation of the tool on the shoe, means for automatically moving said turret to bring said tools successively into operative position, and means for moving apart said turret and tool between each two successive operations, said last-mentioned means being automatic.

5. In a shoe-making machine, the combination of a shoe-support, a series of tools, means for moving the tools of said series successively into operative position, said shoe-support being adapted to be moved to cause the relative movements between said shoe and tools, and regulatable means for automatically turning said shoe-support at the close of each operation to the proper position for the commencement of the next operation.

6. In a shoe machine, the combination of a shoe-support, a tool, a cam for giving relative movements between said shoe-support and said tool which are the resultant of simultaneous movements lengthwise and widthwise of the shoe, means connected with said cam for transmitting therefrom the component of said movements which is in the direction of the width of the shoe, and means for transmitting from said cam the component of said movements which is in the direction of the length of the shoe.

7. In a shoe machine, the combination of a shoe-support, a tool, a cam for giving relative movements between said shoe-support and said tool, means connected with said cam for transmitting therefrom the component of said movements which is in the direction of the width of the shoe, and means for transmitting from said cam the component of said movements which is in the direction of the length of the shoe, said last two mentioned means being independently adjustable.

8. In a shoe machine, the combination of a shoe-support, a tool, means for moving said shoe-support only in a horizontal plane, and means for angularly adjusting the tool in three planes to enable it to properly conform to the curvature of the shoe.

9. In a shoe machine, the combination of a shoe-support, a tool, means for causing a relative movement between said tool and support to transfer said tool around the shoe, and means for giving said tool an oscillating movement in a plane substantially parallel to the shoe sole, and tipping movements longitudinally and transversely of the sole edge.

10. In a shoe machine, the combination of a shoe-support, a tool, means for causing a relative movement between said tool and support to transfer said tool around the shoe, means for giving said tool an oscillating movement in a plane substantially parallel to the shoe sole, and tipping movements longitudinally and transversely of the sole edge and means for causing relative up-and-down movements of said work-support and tool.

11. In a shoe machine, the combination of a shoe-support, a tool, means for causa relative movement between said tool and support to transfer said tool around the shoe, means for giving said tool an oscillating movement in a plane substantially parallel to the shoe sole and tipping movements longitudinally and transversely of the sole edge, and means for causing a vertical movement of said tool.

12. In a shoe machine, the combination of a tool, a shoe-support, means for causing proper relative movements between said

parts to cause the tool to operate about a shoe, and power operated means for automatically controlling the height of said tool in conformity with the level of the bottom of the shoe.

13. In a shoe machine, the combination of a tool, a shoe-support, means for causing proper relative movements between said parts to cause the tool to operate upon a shoe, and automatic power operated means for controlling the height of said tool in conformity with the level of the bottom of the shoe.

14. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a shoe-support, means for causing proper relative rotation between said shoe-support and the tool which is in operation, and means for automatically stopping said relative rotation at a predetermined point in the relative rotation of the shoe support.

15. In a shoe-machine, the combination of a turret, a series of tools mounted thereon, a shoe-support, means for causing proper relative rotation between said shoe-support and the tool which is in operation, means for automatically stopping said relative rotation at a predetermined point in the relative rotation of the shoe support, and means for starting the rotation of said shoe-support at a predetermined point.

16. In a shoe-machine, the combination of a shoe-support, a turret, a series of tools mounted on said turret, means for causing the proper relative rotation between said shoe-support and the tool which is in operative position, means for stopping said relative rotation at a predetermined point, means for withdrawing said turret from the shoe and moving said turret to bring a new tool into operative position, and means for causing a proper relative movement between said shoe support and turret to cause the tool and shoe to come together at the proper point, and means for bringing said turret and shoe-support together.

17. In a shoe machine, the combination of a shoe-support, a turret, a series of tools mounted on said turret, means for causing the proper relative movements between said shoe-support and the tool which is in operative position, means for stopping said relative movements at a predetermined point, means for withdrawing said turret from the shoe and moving said turret to bring a new tool into operative position, and means for causing a proper relative movement between said shoe-support and turret to cause the tool and shoe to come together at the proper point, and means for bringing said turret and shoe-support together, said withdrawing movement of the turret being upward, as well as away, from said shoe.

18. In a shoe machine, the combination of a tool, a frame, a table mounted thereon, a cam having the general shape of the path of movement which it is desired to give to the shoe, a seat having an open top into which said cam is adapted to be dropped, and means beneath said cam for taking motion therefrom.

19. In a shoe machine, the combination of a tool, a table, a shoe-support mounted thereon, a cam mounted on said table and having the general shape of the path of movement which it is desired to give the tool, said shoe-support being adjustable to place the centre of the shoe over the centre of the cam.

20. In a shoe machine, the combination of a tool, a table, a cam mounted thereon and having the general shape of the path of movement of the tool, a guideway above said cam, and a shoe-support mounted in said guideway, whereby said shoe-support may be adjusted to bring the centre of the shoe over the centre of said cam.

21. In a shoe machine, the combination of a tool, a table, a cam mounted thereon and having the general shape of the path of movement of the tool, a guideway above said cam, and a shoe-support mounted in said guideway, whereby said shoe-support may be adjusted to bring the centre of the shoe over the centre of said cam, said shoe-support comprising toe and heel blocks, and means for moving them in opposite directions from the centre of said support.

22. In a shoe machine, the combination of a tool, a table, a cam mounted thereon and having the general shape of the path of movement of the tool, a guideway above said cam, a shoe-support mounted in said guideway, whereby said shoe-support may be adjusted to bring the centre of the shoe over the centre of said cam, said shoe-support comprising toe and heel blocks, and means for moving them in opposite directions from the centre of said support, said means comprising a right and left hand screw engaging said blocks.

23. In a shoe machine, the combination of a tool, a table, a cam mounted thereon and having the general shape of the path of movement of the tool, a guideway above said cam, a shoe-support mounted in said guideway, whereby said shoe-support may be adjusted to bring the centre of the shoe over the centre of the said cam, said shoe-support comprising toe and heel blocks, means for moving them in opposite directions from the centre of said support, and a scale attached to said means for indicating the proper positions of said blocks, for shoes of various lengths.

24. In a shoe machine, the combination of a tool, a table, a cam mounted thereon and having the general shape of the path of movement of the tool, a guideway above said cam, a shoe-support mounted in said guideway, whereby said shoe-support may be ad-

justed to bring the centre of the shoe over the centre of said cam, said shoe support comprising toe and heel blocks, means for moving them in opposite directions from the centre of said support, said means comprising a right and left hand screw engaging said blocks and moving them in a guideway, said screw-shaft having a pointer, and a scale for indicating the proper positions of said pointer for shoes of various lengths.

25. In a shoe machine, the combination of a tool, a table, a cam on said table having the general shape of the path of movement of the tool, a guideway above said cam, a shoe-support mounted in said guideway, a mark on said guideway indicating the centre of said cam, said shoe-support comprising a jack-pin and a toe-rest, said shoe-support having a pin located in the same vertical plane as the jack-pin, whereby a shoe-sole pattern may be engaged on said pin to facilitate the adjustment of said shoe-support, so that the centre of the shoe shall be over the centre of said cam.

26. In a shoe machine the combination of a tool, a shoe support, means for rotating the support, means for moving the support laterally in proportion to the width of the shoe on the support throughout its rotation, and means for moving it longitudinally in proportion to the length of the shoe on the support throughout the operation.

27. In a shoe machine the combination of a tool, a shoe support, means for rotating the support, means for moving the support laterally in proportion to the width of the shoe on the support throughout its rotation, and means for moving it longitudinally in proportion to the length of the shoe on the support throughout the operation, said means being adjustable to varying widths and lengths of shoes.

28. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, and means connecting said bar with points fixed relative to said tool.

29. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, and means connecting said bar with points fixed relative to said tool, said last-mentioned means being adjustable.

30. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, and means connecting said bar with points fixed relative to said tool, said last-mentioned means being adjustable, and guides for said block on said table parallel to the length of said cam.

31. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, and means for connecting said bar with points fixed relative to said tool, said last-mentioned means being adjustable and comprising guides for said block on said table parallel to the length of said cam, said block having a plate slidable in the direction of movement of said block, a lever connected to said block and table and to said plate, said plate being connected to a fixed point in said machine.

32. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, and means for connecting said bar with points fixed relative to said tool, said last-mentioned means being adjustable and comprising guides for said block on said table parallel to the length of said cam, said block having a plate slidable in the direction of movement of said block, a lever connected to said block and table and to said plate, said plate being connected to a fixed point in said machine, said points of connection of said lever with said table, block and plate being relatively adjustable.

33 In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, and means for connecting said bar with points fixed relative to said tool, said last-mentioned means being adjustable and comprising guides for said block on said table parallel to the length of said cam, said block having a plate slidable

in the direction of movement of said block, a lever connected to said block and table and to said plate, said plate being connected to a fixed point in said machine, said points of connection of said lever with said table, block and plate being relatively adjustable, said connection between said plate and said fixed point being by means of a slide on said plate, movable transversely in the direction of movement of said plate.

34. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, means connecting said bar with points fixed relative to said tool, and sun and planet gears mounted on said table for causing said pin to follow said cam.

35. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, means connecting said bar with points fixed relative to said tool, sun and planet gears mounted on said table for causing said pin to follow said cam, a chain moved by said gears and carrying a crank, and a link connecting the crank with said pin on said bar.

36. In a shoe-making machine, the combination of a tool, a rotatable table, a shoe-support mounted on said table, a cam mounted on said table and having the general shape of the relative movement between said tool and support, a block slidably mounted on said table, a bar transversely guided on said block and having a pin engaging said cam, means connecting said bar with points fixed relative to said tool, and sun and planet gears mounted on said table for causing said pin to follow said cam, the sun gear being fixed on said table, and a chain moved by said gears and carrying said pin.

37. In a shoe-machine, the combination of a tool, a work-support, means for causing proper relative movements between said tool and said work-support, said means comprising a friction-gear having a periphery whose distance from the shaft on which it is mounted is varied, so that the material shall pass the tool at a comparatively uniform rate of speed.

38. In a shoe machine, the combination of a tool, a work-support, means for causing proper relative movements between said tool and said work-support, said means comprising a friction-gear having a periphery whose distance from the shaft on which it is mounted is varied, so that the material shall pass the tool at a comparatively uniform rate of speed, said periphery being provided with a flange, and friction pinions engaging opposite faces of said flange.

39. In a shoe machine, the combination of a tool, a work-support, means for causing proper relative movements between said tool and said work-support, said means comprising a friction-gear having a periphery whose distance from the shaft on which it is mounted is varied, so that the material shall pass the tool at a comparatively uniform rate of speed, said periphery being provided with a flange, friction pinions engaging opposite faces of said flange, and means for yieldingly pressing said friction pinions against said flange.

40. In a shoe machine, the combination of a tool, a work-support, means for causing proper relative movements between said tool and said work-support, said means comprising a friction-gear having a periphery whose distance from the shaft on which it is mounted is varied, so that the material shall pass the tool at a comparatively uniform rate of speed, said periphery being provided with a flange, friction pinions engaging opposite faces of said flange, said friction pinions being driven from a shaft having clutches by which it can be revolved in opposite directions, and means connected with said work-support whereby one or the other of said clutches may be automatically engaged, according as it is desired to rotate the work-support in one direction or the other.

41. In a shoe machine, the combination of a turret, as series of tools thereon, a work-support, means for rotating said work-support until a tool has completed its operation, means for withdrawing said turret, said last mentioned means comprising a one-cycle mechanism, and means carried by said work-support that are adapted to cause said one-cycle mechanism to be set into operation as each tool completes its work.

42. In a shoe machine, the combination of a turret, a series of tools thereon, a work-support, means for rotating said work-support until a tool has completed its operation, means for withdrawing said turret, said last mentioned means comprising a one-cycle mechanism, means carried by said work-support that are adapted to cause said one-cycle mechanism to be set into operation as each tool completes its work, and connections whereby said one-cycle mechanism also revolves said turret.

43. In a shoe machine, the combination of a turret, a series of tools thereon, a work-support, a series of rings on said work-sup-

port, each of which rings is provided with two parallel ribs, mechanism for revolving said support in one direction, or in the opposite direction, and a controlling lever for said mechanism, said lever causing said mechanism to revolve in one or the other direction, according as it engages one or the other of said ribs on a given ring.

44. In a shoe machine, the combination of a turret, a series of tools thereon, a work-support, a series of rings on said work-support, each of which rings is provided with two parallel ribs, mechanism for revolving said support in one direction, or in the opposite direction, a controlling lever for said mechanism, said lever causing said mechanism to revolve in one or the other direction, according as it engages one or the other of said ribs on a given ring, and means for causing said controlling lever to be successively presented to said rings, according as one or the other of said tools is in operation.

45. In a shoe machine, the combination of a turret, a series of tools thereon, a work-support, a series of rings on said work-support, each of which rings is provided with two parallel ribs, mechanism for revolving said support in one direction, or in the opposite direction, a controlling lever for said mechanism, said lever causing said mechanism to revolve in one or the other direction, according as it engages one or the other of said ribs on a given ring, means for causing said controlling lever to be successively presented to said rings, according as one or the other of said tools is in operation, said last-mentioned means comprising a support for said lever, and means for raising said support at the completion of the operation of each tool, and for lowering said support when it has reached its highest limit.

46. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for revolving said support relative to said turret, automatic means for withdrawing said turret from said support after each tool has completed its operation, and for turning said turret, means for rotating said support to the proper position for each tool to begin its work, said means being controlled by a lever, a series of ribs on said support adapted to cooperate with said lever and corresponding with each of said tools, and means connected with said turret for withdrawing said lever, on the approach of the turret to the support, and for advancing said lever into contact with said ribs on the recession of the turret from the support.

47. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for revolving said support relative to said turret, automatic means for withdrawing said turret from said support after each tool has completed its operation, and for turning said turret, means for rotating said support to the proper position for each tool to begin its work, said means being controlled by a lever, a series of ribs on said support adapted to cooperate with said lever and corresponding with each of said tools, and means connected with said turret for withdrawing said lever, on the approach of the turret to the support, and for advancing said lever into contact with said ribs on the recession of the turret from the support, said last-mentioned means comprising a slide adapted to support said lever, a rack attached to said slide, a pinion on the frame of the machine, and a rack connected to said turret.

48. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for revolving said support relative to said turret, automatic means for withdrawing said turret from said support after each tool has completed its operation, and for turning said turret, means for rotating said support to the proper position for each tool to begin its work, said means being controlled by a lever, a series of ribs on said support adapted to cooperate with said lever and corresponding with each of said tools, and means connected with said turret for withdrawing said lever, on the approach of the turret to the support, and for advancing said lever into contact with said ribs on the recession of the turret from the support, said last-mentioned means comprising a slide adapted to support said lever, a rack attached to said slide, a pinion on the frame of the machine, and a rack connected to said turret, the connection between said last-mentioned rack and the turret having lost motion, whereby said controlling-lever-slide remains stationary during a portion of the advance and recession of said turret.

49. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for revolving said support relative to said turret, automatic means for withdrawing said turret from said support after each tool has completed its operation, and for turning said turret, means for rotating said support to the proper position for each tool to begin its work, said means being controlled by a lever, a series of ribs on said support adapted to cooperate with said lever and corresponding with each of said tools, means connected with said turret for withdrawing said lever, on the approach of the turret to the support, and for advancing said lever into contact with said ribs on the recession of the turret from the support, said last-mentioned means comprising a slide adapted to support said lever, a rack attached to said slide, a pinion on the frame of the machine, and a rack connected to said turret, the connection between

said last-mentioned rack and the turret having lost motion, whereby said controlling-lever-slides remains stationary during a portion of the advance and recession of said turret, and means for raising the support of said lever at the close of each operation to cause said lever to engage the proper ribs, which means comprise a vertically movable bar to which said lever is pivoted, a pin on said bar, and a snail-cam on said support that is adapted to engage and raise said pin.

50. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for revolving said support relative to said turret, automatic means for withdrawing said turret from said support after each tool has completed its operation, and for turning said turret, means for rotating said support to the proper position for each tool to begin its work, said means being controlled by a lever, a series of ribs on said support adapted to cooperate with said lever and corresponding with each of said tools, means connected with said turret for withdrawing said lever, on the approach of the turret to the support, and for advancing said lever into contact with said ribs on the recession of the turret from the support, said last-mentioned means comprising a slide adapted to support said lever, a rack attached to said slide, a pinion on the frame of the machine, and a rack connected to said turret, the connection between said last-mentioned rack and the turret having lost motion, whereby said controlling-lever-slide remains stationary during a portion of the advance and recession of said turret, means for raising the support of said lever at the close of each operation to cause said lever to engage the proper ribs, which means comprise a vertically movable bar to which said lever is pivoted, a pin on said bar, a snail-cam on said support that is adapted to engage and raise said pin, a ratchet-wheel attached to said cam, and a pawl or pawls on the frame of the machine which said ratchet-wheel is adapted to engage on the withdrawal of the slide supporting said lever.

51. In a shoe machine, the combination of a turret, a series of tools mounted on said turret, a work-support, means for rotating said work-support in opposite directions, said means comprising clutches, one for each direction, a series of rings mounted on said support, one for each of said tools, said rings each having two ribs at different levels, and a controlling lever for said clutches which is adapted to engage said ribs, and to thereby put one or the other of said clutches into action, said ribs terminating short of each other and forming a space between them, whereby when one of said ribs, through said lever, has caused the rotation of the work-support until said space between said ribs comes opposite said lever, said lever will pass to inactive position, in which one of said clutches will be in operation, thereby stopping said work-support at the point to which said space between said ribs may be adjusted.

52. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position.

53. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, said pins being adjustably mounted on said support, whereby the rotation of said support may be stopped at any desired point.

54. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, said pins being mounted upon blocks which are mounted on guides concentric with a rotating part of said support.

55. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, means for withdrawing and rotating said turret at the close of each operation, and for advancing said turret, and means

for rotating said cylinder before the commencement of each operation to again put in operation said means for rotating said work-support.

56. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, means for withdrawing and rotating said turret at the close of each operation and for advancing said turret, and means for rotating said cylinder before the commencement of each operation to again put in operation said means for rotating said work-support, said means for rotating said cylinder being operated by the advancement of said turret.

57. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, means for withdrawing and rotating said turret at the close of each operation, and for advancing said turret, and means for rotating said cylinder before the commencement of each operation to again put in operation said means for rotating said work-support, said means for rotating said cylinder comprising a cam on said cylinder, a lever adapted to be swung into engagement with said cam by the advance of said turret, and a catch, whereby said lever is released when the turret is fully advanced.

58. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, and a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, means for withdrawing and rotating said turret at the close of each operation, and for advancing said turret, means for rotating said cylinder before the commencement of each operation to again put in operation said means for rotating said work-support, said means for rotating said cylinder comprising a cam on said cylinder, a lever adapted to be swung into engagement with said cam by the advance of said turret, and a catch, whereby said lever is released when the turret is fully advanced, said catch being pivoted to said lever, and a bar slidable on the frame of the machine and moved against said catch by the advancement of the turret carriage.

59. In a shoe-making machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support, and means for stopping said rotating means, comprising a cylinder having a device for stopping said rotating means, and having a series of lugs at different points along its length, and also at different points about its circumference, a series of pins or projections carried by said support which are adapted to engage said lugs to rotate said cylinder into operative position, means for withdrawing and rotating said turret at the close of each operation, and for advancing said turret, means for rotating said cylinder before the commencement of each operation to again put in operation said means for rotating said work-support, said means for rotating said cylinder comprising a cam on said cylinder, a lever adapted to be swung into engagement with said cam by the advance of said turret, and a catch, whereby said lever is released when the turret is fully advanced, said catch being pivoted to said lever, and a bar slidable on the frame of the machine and moved against said catch by the advancement of the turret carriage, the swinging of said lever carrying said catch out of engagement with said bar, and a spring for swinging said lever to inoperative position when said catch is released.

60. In a shoe machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support relative to said turret, a cylinder carried by the frame of the machine and having a series of lugs or projections thereon, a series of adjustable projections carried by said work-support, one for each tool, whereby said cylinder is partially rotated at the completion of each operation, and means connected with said cylinder for stopping the entire machine at the completion of the last operation on each shoe.

61. In a shoe machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support relative to said turret, a cylinder carried by the frame of the machine and having a series of lugs or projections thereon, a series of adjustable projections carried by said work-support, one for each tool,

whereby said cylinder is partially rotated at the completion of each operation, means connected with said cylinder for stopping the entire machine at the completion of the last operation on each shoe, and means carried by said cylinder for setting in operation means for withdrawing and advancing and for rotating said turret at the close of each operation.

62. In a shoe machine, the combination of a turret having a series of tools thereon, a work-support, means for rotating said work-support relative to said turret, a cylinder carried by the frame of the machine and having a series of lugs or projections thereon, a series of adjustable projections carried by said work-support, one for each tool, whereby said cylinder is partially rotated at the completion of each operation, means connected with said cylinder for stopping the entire machine at the completion of the last operation on each shoe, means carried by said cylinder for setting in operation means for withdrawing and advancing and for rotating said turret at the close of each operation, and means for partially rotating said cylinder on the advancement of the turret to bring another projection into operative position.

63. In a shoe machine, the combination of a work-support, rotatable in a single plane, a tool, and means for tipping said tool to conform to the curvature of the sole, said means comprising electric clutches for causing tipping in opposite directions, and contacts which are adapted to follow the curvatures of the sole of the shoe for controlling said clutches.

64. In a shoe machine, the combination of a work-support, rotatable in a single plane, a tool, and means for tipping said tool to conform to the curvatures of the sole, said means comprising electric clutches for causing tipping in opposite directions, and contacts which are adapted to follow the curvatures of the sole of the shoe for controlling said clutches, said contacts being inoperative when said tool bears the proper relation to the shoe.

65. In a shoe machine, the combination of a work-support and means for rotating it, a turret, a series of slides upon which said turret is supported, said slides being adapted to raise and lower and to tip said turret in various directions to enable the tool to conform to the sole of the last, each slide being connected with the one upon which it is supported, by a screw-shaft, each screw-shaft having a pair of electric clutches, one for rotating it in each direction, and having a motor for rotating said clutches, and controlling contacts for each pair of clutches, and means whereby said contacts are caused to follow the curvatures and lines of the shoe, and to set one or the other clutch in operation whenever the turret is not parallel to the portion of the sole being operated upon, or whenever the turret does not bear the relation to the portion of the sole being operated upon to enable the tool to properly operate.

66. In a shoe machine, the combination of a work-support and means for rotating it, a turret, a series of slides upon which said turret is supported, said slides being adapted to raise and lower and to tip said turret in various directions to enable the tool to conform to the sole of the last, each slide being connected with the one upon which it is supported, by a screw-shaft, each screw-shaft having a pair of electric clutches, one for rotating it in each direction, and having a motor for rotating said clutches, controlling contacts for each pair of clutches, and means whereby said contacts are caused to follow the curvatures and lines of the shoe, and to set one or the other clutch in operation whenever the turret is not parallel to the portion of the sole being operated upon, or whenever the turret does not bear the relation to the portion of the sole being operated upon to enable the tool to properly operate, said work-support having a cam of the shape of the sole of the shoe, and said contacts being adapted to engage said cam.

67. In a shoe machine, the combination of a shoe-support, rotatable in a single plane, a tool, means for raising and lowering and for tipping said tool, which means comprise electric clutches for causing motion in opposite directions, a part which is maintained parallel to the base of the tool, a sole-shape cam carried by said support, and levers carried by said part, said levers having portions which are adapted to engage said cam, said levers each having a contact which is between two stationary contacts, said stationary contacts being each connected with one of said pairs of clutches, whereby when said levers, through said cam, are swung to cause said contacts to touch, said clutches will be operated until said tool bears the proper relation to said sole, when said contacts will be out of touch with each other, and said clutches will cease to operate.

68. In a shoe machine, the combination of a tool-supporting plate, means whereby said plate may be raised and lowered and tipped in various directions, said means comprising electric clutches for causing motion in opposite directions, a rotating shoe-support, a sole-shape cam beneath the shoe, a socket hung by links from said tool support, so that said socket shall always be perpendicular to said tool-support, a vertically movable rod mounted in said socket, and levers carried by said rod and adapted to engage said cam, said levers controlling contacts for energizing the respective clutches.

69. In a shoe machine, the combination of

a shoe-support, rotatable in a single plane, a tool, means for raising and lowering and for tipping said tool, which means comprise electric clutches for causing motion in opposite directions, a part which is maintained parallel to the base of the tool, a sole-shape cam carried by said support, and levers carried by said part, said levers having portions which are adapted to engage said cam, said levers each having a contact which is between two stationary contacts, said stationary contacts being each connected with one of said pairs of clutches, whereby, when said levers, through said cam, are swung to cause said contacts to touch, said clutches will be operated until said tool bears the proper relation to said sole, when said contacts will be out of touch with each other, and said clutches will cease to operate, there being one lever for each component of the motion of the tool-support which it is desired to control.

70. In a shoe machine, the combination of a tool, a vertically movable tool-support, two electric clutches, one of which is adapted to cause upward, and the other downward movement of said tool-support, a controlling lever for said clutches, said lever being pivoted to said tool-support and having a finger adapted to rest upon the bottom of the shoe, a contact carried by said lever, and two contacts connected with said clutches, said lever-contact being adapted to stand between said clutch contacts.

71. In a shoe machine, the combination of a tool, a vertically movable tool-support, two electric clutches, one of which is adapted to cause upward, and the other downward movement of said tool-support, a controlling lever for said clutches, said lever being pivoted to said tool-support and having a finger adapted to rest upon the bottom of the shoe, a contact carried by said lever, two contacts connected with said clutches, said lever-clutch being adapted to stand between said clutch contacts, and a spring normally keeping said lever contact in touch with said upper clutch contact, said upper clutch contact being connected with the clutch for lowering the tool-support.

72. In a shoe machine, the combination of a tool-carriage, a vertically movable tool-support mounted on said carriage, a shoe-support, means for revolving said shoe-support, a block slidable parallel to said carriage, a cam-plate mounted on said block, said plate having a cam slot engaging a pin on said carriage, and means for retracting said block at the close of each operation on the shoe, to retract said carriage, said cam-slot being so shaped that said tool-support shall be raised as said carriage is retracted.

73. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a turret-carriage, a shoe-support, means for revolving said shoe-support, means for retracting said carriage at the close of each operation, said last-mentioned means comprising a shaft that is rotated once at the close of each operation; a sleeve geared to said shaft and passing through the turret support, a gear attached to said sleeve, a stationary, internal gear attached to said turret-support, and a pinion meshing with said gears, whereby when said carriage is retracted said turret shall be rotated one station.

74. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for giving said work-support and turret the proper relative movements, and means for controlling the tool in operation, said means comprising a disc rotating in unison with the work-support, and having members for engaging the controlling parts of said tool.

75. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for giving said work-support and turret the proper relative movements, and means for controlling the tool in operation, said means comprising a disc rotating in unison with the work-support, and having lugs or pins for engaging the controlling parts of said tool, means for retracting said disc to inoperative position when the tool is not at its working station, and means for advancing said disc when the tool is at such station.

76. In a shoe machine, the combination of a turret, a series of tools mounted thereon, a work-support, means for giving said work-support and turret the proper relative movements, means for controlling the tool in operation, said means comprising a disc rotating in unison with the work-support, and having lugs or pins for engaging the controlling parts of said tool, means for retracting said disc to inoperative position when the tool is not at is working station, means for advancing said disc when the tool is at such station, said means comprising a Geneva stop-disc on said shaft, said disc carrying a lug or finger that is adapted to engage a cam-groove, said cam-groove being formed in a circular stationary part, and means for rotating said stop-disc, one notch for each rotation of the work-support.

77. In a shoe machine, the combination of a base, a tool mounted thereon, a table, also mounted thereon, a shoe-support mounted on said table, and means for giving said shoe-support a rotation relative to said tool, said means comprising a cam, of the shape of the sole outline, a pin adapted to move in said cam, connections between said pin and a stationary part of the machine, sun and planet gears for moving said pin, said sun and planet gears comprising a sweep,

whereby the planet gears are rotated, a shaft connected with said sweep, a shaft geared to said table for rotating the latter, a cam on said last-mentioned shaft, and an arm on said first-mentioned shaft, engaging said cam, whereby said sweep may be oscillated.

78. In a shoe machine, the combination of a shoe support, a tool, mechanism for rotating the support, a cam for giving relative movements between the shoe support and tool during the rotation of the shoe support which are the resultant of simultaneous movements widthwise and lengthwise of the shoe, means connected with the cam for transmitting therefrom the component of said movements which is in the direction of the width of the shoe, and means for transmitting from said cam the component of said movements which is in the direction of the length of the shoe.

79. In a shoe machine, the combination of a shoe support, a tool, mechanism for rotating the support, a cam for giving relative movements between the shoe support and tool during the rotation of the shoe support, means connected with the cam for transmitting therefrom the component of said movements which is in the direction of the width of the shoe, and means for transmitting from said cam the component of said movements which is in the direction of the length of the shoe, said last two mentioned means being independently adjustable.

80. In a shoe machine, the combination of a shoe support, a tool, mechanism for rotating the support, a cam on the support having the general shape of the path of travel of the tool along the shoe, means connected with the said cam for transmitting to the support movements in the direction of the width of the shoe, and means for transmitting from said cam to the support movements in the direction of the length of the shoe.

81. In a shoe machine, the combination of a shoe support, a tool, mechanism for rotating the support, a cam having the general shape of the path of travel of the tool along the shoe, and means connected with the cam for transmitting to the support movements in the direction of the width and movements in the direction of the length of the shoe, said means being adjustable for different widths and for different lengths of shoes.

82. In a shoe machine, the combination of a shoe support, a tool, mechanism for rotating the support, a cam on the support having the general shape of the path of travel of the tool along the shoe, a cam engaging element, mechanism for causing said element to travel along the cam during the rotation of the support, and connections between said element and a point fixed with relation to the tool for relatively moving the tool and support.

83. In a shoe machine, the combination of a shoe support, a tool, mechanism for rotating the support, a cam on the support having the general shape of the path of travel of the tool along the shoe, a cam engaging element, mechanism for causing said element to travel along the cam during the rotation of the support, and connections between said element and a point fixed with relation to the tool for relatively moving the tool and support adjustable for different widths and for different lengths of shoes.

84. In a shoe machine, a shoe support, means for rotating said support so as to present desired parts of a shoe to a tool, and means adjustable to stop said rotation at any desired angular position of the shoe, said means comprising electrical contact devices operated by the rotation of said support, and a clutch mechanism for said rotating means controlled by said devices.

85. In a shoe machine, a shoe support, means for rotating said support so as to present desired parts of a shoe to a tool, and means adjustable to stop said rotation at any desired angular position of the shoe, said means comprising electrical contact devices operated by the rotation of said support, and a reversible clutch mechanism for said rotating means controlled by said devices.

86. In a shoe machine, a shoe support, means for rotating said support so as to present desired parts of a shoe to a tool, and means adjustable to stop said rotation at any desired angular position of the shoe, said means comprising a stop member adapted to be located at different points upon said support and a clutch mechanism for said rotating means controlled from said stop member.

87. In a shoe machine, a shoe support, a tool support having means for performing a plurality of successive operations on a shoe, means for rotating said shoe support relative to said tool support, and means adjustable to start said relative rotation of the shoe at a different angular position with regard to each tool.

88. In a shoe machine, a shoe support, a tool support having means for performing a plurality of different operations successively on a shoe, means for rotating said shoe support relative to said tool support, and means adjustable to stop said relative rotation at different angular positions of the shoe.

89. In a shoe machine, a shoe support, a tool support having means for performing a plurality of successive operations on a shoe, means for rotating said shoe support relative to said tool support, and means adjustable to start said relative rotation of the

shoe at the desired angular position with regard to each tool, said means comprising electrical contact devices operated by the relative rotation of said shoe support, and a clutch mechanism for said rotating means controlled by said devices.

90. In a shoe machine, a shoe support, a tool support having means for performing a plurality of successive operations on a shoe, means for rotating said shoe support relative to said tool support, and means adjustable to stop said relative rotation at the desired angular position of the shoe, said means comprising a stop member adapted to be located at different points upon said shoe support and a clutch mechanism for said rotating means controlled from said stop member.

91. In a shoe making machine, the combination of a tool and a shoe support, means for rotating said support relative to said tool, and means for controlling said rotating means adjustable to vary the point on the shoe at which the operation of the tool thereon begins.

92. In a shoe making machine, the combination of a tool and a shoe support, means for rotating said support relative to said tool, means for controlling the starting and stopping of said rotating means adjustable to vary the point on the shoe at which the operation of the tool thereon begins and to vary the point at which said operation ends.

93. In a shoe making machine, the combination of a tool and a shoe support, means for rotating said support relative to said tool, and electrically actuated means for controlling said rotating means so as to cause operations to begin at predetermined angular positions.

94. In a shoe making machine, the combination of a tool and a shoe support, means for rotating said support relative to said tool, electrically actuated means for controlling said rotating means so as to cause operations to begin at predetermined phases of rotation, and means for stopping said rotation at predetermined angular positions.

95. In a shoe machine, a shoe support, a tool support having means for performing a plurality of different operations successively on a shoe, means for relatively rotating said supports with regard to each other, means for withdrawing said tool support relative to said shoe support when said rotation has proceeded a predetermined amount during each operation, and means for adjustably determining the amount of rotation for each operation.

96. In a shoe machine, a shoe support, a tool support having means for performing a plurality of different operations successively on a shoe, means for relatively rotating said supports with regard to each other, means for automatically withdrawing said tool support relative to said shoe support when said rotation has proceeded a desired amount during each operation, and means for adjustably determining the amount of rotation for each operation.

97. In a shoe machine, a shoe support, a tool support having a series of tools for performing a plurality of successive operations on a shoe, means for relatively rotating said supports with regard to each other, and means for raising said tool support relative to the shoe when said rotation has proceeded a desired amount.

98. In a shoe machine, a shoe support, a tool support having a series of tools for performing a plurality of successive operations on a shoe, means for relatively rotating said supports with regard to each other, and means for raising said tool support relative to the shoe and for withdrawing the same therefrom when said rotation has proceeded any desired amount.

99. In a shoe machine, a shoe support, a tool support, means for relatively rotating said supports with regard to each other, and means for raising said tool support relative to the shoe and for withdrawing the same therefrom adjustable to act when said rotation has proceeded any desired amount.

100. In a shoe machine, a shoe support, a tool adapted to operate on the shoe, means for relatively rotating said support and tool so as to feed desired parts of the shoe to the tool, said means comprising a driving cam for said shoe support having an outline substantially conforming to the outline of a shoe, and friction rollers engaging the surface of such cam to drive the same.

101. In a shoe making machine, a shoe support, a support having means for carrying a plurality of tools adapted to perform successive operations on a shoe, means for causing relative rotation between said supports, and means whereby such rotation may be started at a point independently determined with regard to each tool when the same is in operative position.

102. In a shoe making machine, a shoe support, a support having means for carrying a plurality of tools adapted to perform successive operations on a shoe, means for causing relative rotation between said supports, and means whereby such rotation may be stopped at a point independently determined with regard to each tool when the same is in operative position.

103. In a shoe making machine, a shoe support, a support having means for carrying a plurality of tools adapted to perform successive operations on a shoe, means for causing relative rotation between said supports, and electrically actuated means whereby such rotation may be started at a predetermined point with regard to each tool when the same is in operative position.

104. In a shoe making machine, a shoe support, a support having means for carrying a plurality of tools adapted to perform successive operations on a shoe, means for causing relative rotation between said supports, and electrically actuated means whereby such rotation may be stopped at a predetermined point with regard to each tool when the same is in operative position.

105. In a shoe machine, a shoe support, a tool support relatively movable with respect thereto and electrically actuated means for relatively adjusting said supports to maintain the desired angle between the tool and the shoe.

106. In a shoe machine, a shoe support, a cam on the support having a contour corresponding to the contour of the shoe along the path of operation of the tool, a tool support relatively movable with respect thereto, portions of one of said supports being movable in planes at an angle to each other, and means controlled by the cam for effecting movement of one or more of said portions to maintain the desired angle between the tool and the shoe.

107. In a shoe machine, a shoe support, a tool support relatively movable with respect thereto, portions of one of said supports being movable in planes at an angle to each other, and electrically actuated means for effecting movement of one of more of said portions in accordance with variations in the contour of the shoe along the path of operation to maintain the desired angle between the tool and the shoe.

108. In a shoe machine, a shoe support, a tool support relatively movable with respect thereto, portions of one of said supports being movable in planes at an angle to each other, circuit closers adapted to be actuated by a foot-shaped contour, and electric clutch mechanisms each adapted to move one of said portions to adjust the position of the tool in the corresponding plane, each of said clutch mechanisms being controlled from one of said circuit closers.

109. In a shoe machine, the combination of means for relatively adjusting the shoe and tool, and means for electrically controlling said adjusting means at predetermined times during the operation of the tool about the shoe.

110. In a shoe machine, the combination of means for relatively adjusting the shoe and tool, and means for electrically controlling said adjusting means at predetermined times during the operation of the tool about the shoe by a contact adapted to engage the shoe.

111. In a shoe making machine, the combination of tool and shoe supports, means for giving said parts relative movement, a contact arm capable of oscillation and adapted to be oscillated by engagement with said shoe, and electric means co-operating with said arm, and controlling said adjusting means.

112. In a shoe making machine, the combination of tool and shoe supports, means for giving said parts relative movement, a contact arm capable of oscillation and adapted to be oscillated by engagement with said shoe, and electric means co-operating with said arm, and controlling said adjusting means, said electrical means comprising electric clutches and gearing adapted to transmit motion in opposite directions, and electrodes connected with said clutches and adapted to be operated by said contact.

113. In a shoe machine, the combination of a shoe support and a tool, and electric means for automatically adjusting their relative positions at predetermined times during the operation of the tool about the shoe.

114. In a shoe machine, the combination of a shoe support, a tool, means for moving the shoe support to cause the shoe to travel past the tool in the plane of the sole, and electric means for automatically adjusting the relative position of the tool and sole at predetermined times during the operation of the tool about the shoe.

115. In a shoe machine, the combination of a shoe support, a tool, means for moving the shoe support to cause the shoe to travel past the tool in the plane of the sole, electric means for automatically adjusting the relative positions of the tool and sole, said electric means comprising current-controlling devices adapted to rest against and to be operated by a foot-shaped contour, and an electric motor connected therewith for controlling said relative positions.

116. In a shoe machine, the combination of a shoe support, a tool, means for moving the shoe support to cause the shoe to travel past the tool in the plane of the sole, electric means for automatically adjusting the relative positions of the tool and sole, said electric means comprising current-controlling devices adapted to rest against and to be operated by a foot-shaped contour, and a plurality of motors for controlling said relative positions, each of said motors operating with relation to one component of the necessary adjustment.

117. In a shoe machine, a shoe support, a tool support adjacent thereto, a plurality of tools having relatively movable parts mounted upon said tool support, and means acting after the close of an operation upon the shoe for moving said tool support to place another tool in operative position with regard to the shoe.

118. In a shoe machine, a shoe support, a turret adjacent thereto, a plurality of tools having relatively movable parts mounted upon said turret, and means acting after the close of an operation on a shoe for rotating

said turret to place another tool in operative position with regard to the shoe.

119. In a shoe machine, a shoe support, a tool support adjacent thereto, a plurality of tools having relatively movable parts mounted upon said tool support, means acting after the close of an operation upon the shoe for moving said tool support to place another tool in operative position with regard to the shoe, and means for setting in motion the movable parts of the tool when the same has been placed in operative position.

120. In a shoe machine, a shoe support, a turret adjacent thereto, a plurality of tools having relatively movable parts mounted upon said turret, means acting after the close of said operation on a shoe for rotating said turret to place another tool in operative position with regard to the shoe, and means for setting in motion the movable parts of the tool when the same has been placed in operative position.

121. In a shoe machine, a shoe support, a tool support having a plurality of tools mounted thereon, means for rotating said shoe support, and means acting after the close of an operation upon the shoe for moving said tool support to place another tool in operative position with regard to the shoe.

122. In a shoe machine, a shoe support, a tool support having a plurality of tools mounted thereon, means for rotating said shoe support, means acting after the close of an operation upon the shoe for moving said tool support to place another tool in operative position with regard to the shoe, and means for setting in motion the movable parts of the tool when the same has been placed in operative position.

123. In a shoe machine, a shoe support, a tool support having a plurality of tools mounted thereon, means for rotating said shoe support, and means acting after said shoe support has rotated through any desired angle, for moving said tool support to place another tool in operative position with regard to the shoe.

124. In a shoe machine, a shoe support, a tool support having a plurality of tools mounted thereon, means for rotating said shoe support, means acting after said shoe support has been rotated through any desired angle, for moving said tool support to place another tool in operative position with regard to the shoe, means for setting in motion the movable parts of the tool, and means for stopping such motion.

125. In a shoe machine, a shoe support, a turret having a plurality of tools mounted thereon, means for rotating said shoe support, and means acting after said shoe support has rotated through any desired angle, for rotating said turret to place another tool in operative position with regard to the shoe.

126. In a shoe machine, a shoe support, a tool support adjacent thereto, a plurality of tools having relatively movable parts mounted upon said tool support, means acting after the close of an operation upon the shoe for withdrawing said tool support from the shoe, and means for moving said tool support to place another tool in operative position with regard to the shoe.

127. In a shoe machine, a shoe support, a turret adjacent thereto, a plurality of tools mounted on said turret and having relatively movable parts, means acting after the close of an operation upon the shoe for withdrawing said turret from the shoe, and means for rotating said turret to place another tool in operative position, while said turret is in withdrawn position.

128. In a shoe machine, a shoe support, a turret adjacent thereto, a plurality of tools mounted on said turret and having relatively movable parts, means acting after the close of an operation upon the shoe for withdrawing said turret from the shoe, means for rotating said turret to place another tool in operative position, while said turret is in withdrawn position, and means for setting in motion the movable parts of the tool when the same has been place in operative position.

129. In a shoe machine, a shoe support, a tool support, tools having relatively movable parts mounted upon said support, means for bringing the tools successively into working relation to the shoe support, and automatic means for setting in motion the movable parts of a tool when in working position.

130. In a shoe machine, a shoe support, a turret, a plurality of tools having relatively movable parts mounted thereon, means for bringing the tools successively into working relation to the shoe support, and automatic means for setting in motion and for stopping the motion of said movable parts of a tool when in working position.

131. In a shoe machine a tool, a shoe support, mechanism for automatically bringing the tool and support into working relation, mechanism for relatively tipping the tool and shoe support, mechanism for relatively rotating and moving the support and tool to transfer the tool along the shoe from one point to another, mechanism for stopping the relative movement when the latter point is reached, mechanism for disengaging the tool at this point, and mechanism for relatively moving the support and tool from this point to starting position.

132. In a shoe machine a tool, a shoe support, mechanism for automatically bringing the tool and support into working relation, mechanism for relatively tipping the tool and shoe support, mechanism for relatively rotating and moving the support and tool to

transfer the tool along the shoe from one point to another, mechanism for stopping the relative movement when the latter point is reached, and mechanism for relatively moving the support and tool from this point to starting position.

133. In a shoe machine, a tool, a shoe support, mechanism for relatively rotating and moving the support and tool to transfer the tool along the shoe, mechanism for stopping the relative movement adjustable to vary the point on the shoe at which the operation of the tool ends, mechanism for disengaging the tool and shoe, and mechanism for relatively moving the support and tool to starting position.

134. In a shoe machine, a tool, a shoe support, mechanism for relatively rotating and moving the support and tool to transfer the tool along the shoe, mechanism for stopping the relative movement, mechanism for disengaging the tool and shoe, and mechanism for relatively moving the support and tool to starting position adjustable to vary the point at which the operation of the tool begins.

135. In a shoe machine, a tool, a shoe support, mechanism for automatically bringing the tool and support into working relation, mechanism for relatively rotating and moving the support and tool to transfer the tool along the shoe, mechanism for stopping the relative movement, mechanism for disengaging the tool and shoe, and mechanism for relatively moving the support and tool in reverse direction to starting position.

In testimony that I claim the foregoing I have hereunto set my hand.

EDWIN J. PRINDLE.