

1,383,446.

E. E. WINKLEY.
AUTOMATIC SOLE MACHINE.
APPLICATION FILED OCT. 20, 1916.

Patented July 5, 1921.
18 SHEETS—SHEET 1.

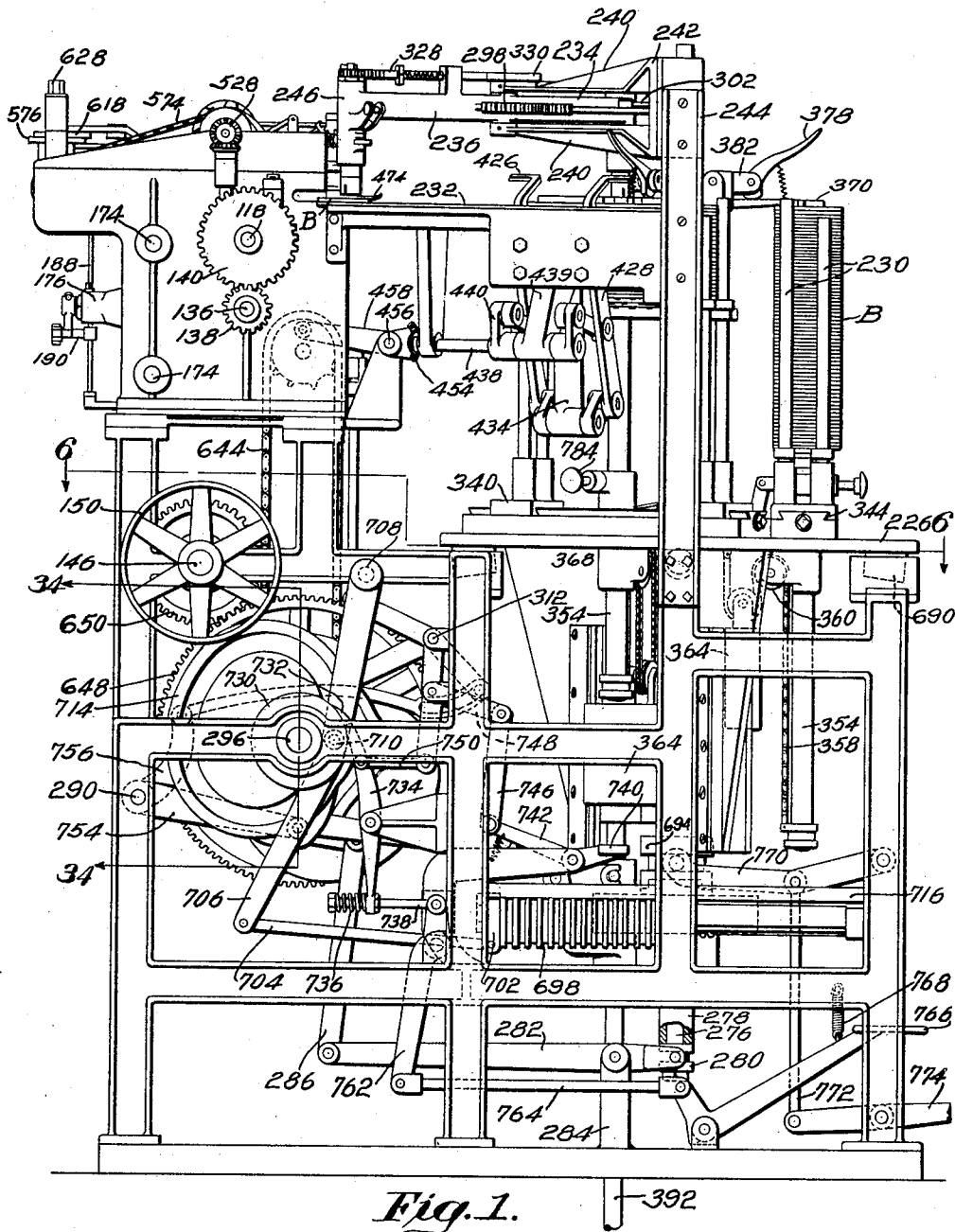


Fig. 1.

Witness,
Roswell F. Hatch.

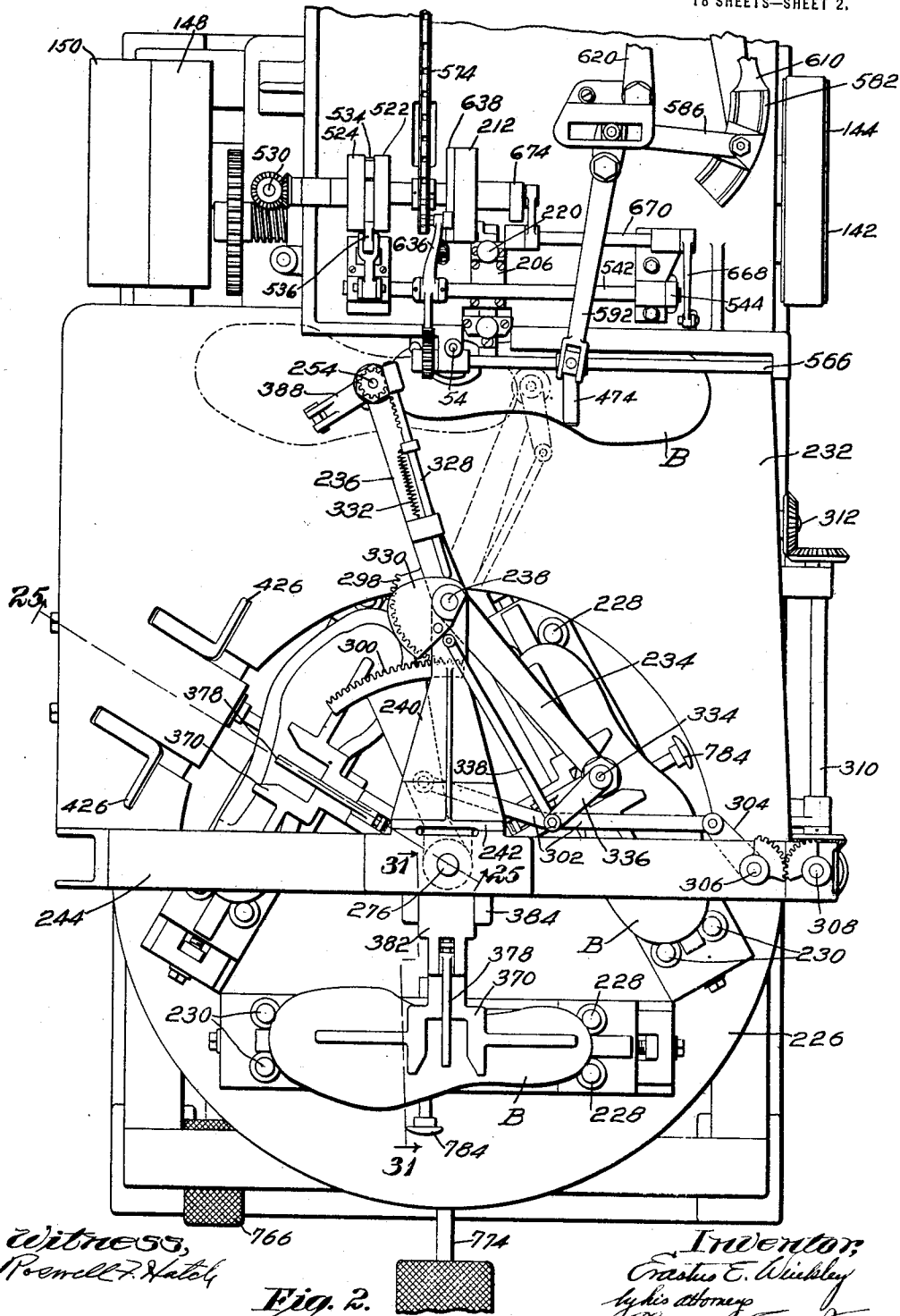
Inventor,
Ernest E. Winkley
by his attorney
Phillips, Wainwright & Fish

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 2.



Witness,
 Russell D. Hatch

Fig. 2.

Inventor,
 Erastus E. Winkley
 by his attorney
 Phillips, Watson & Fish

E. E. WINKLEY,
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 3.

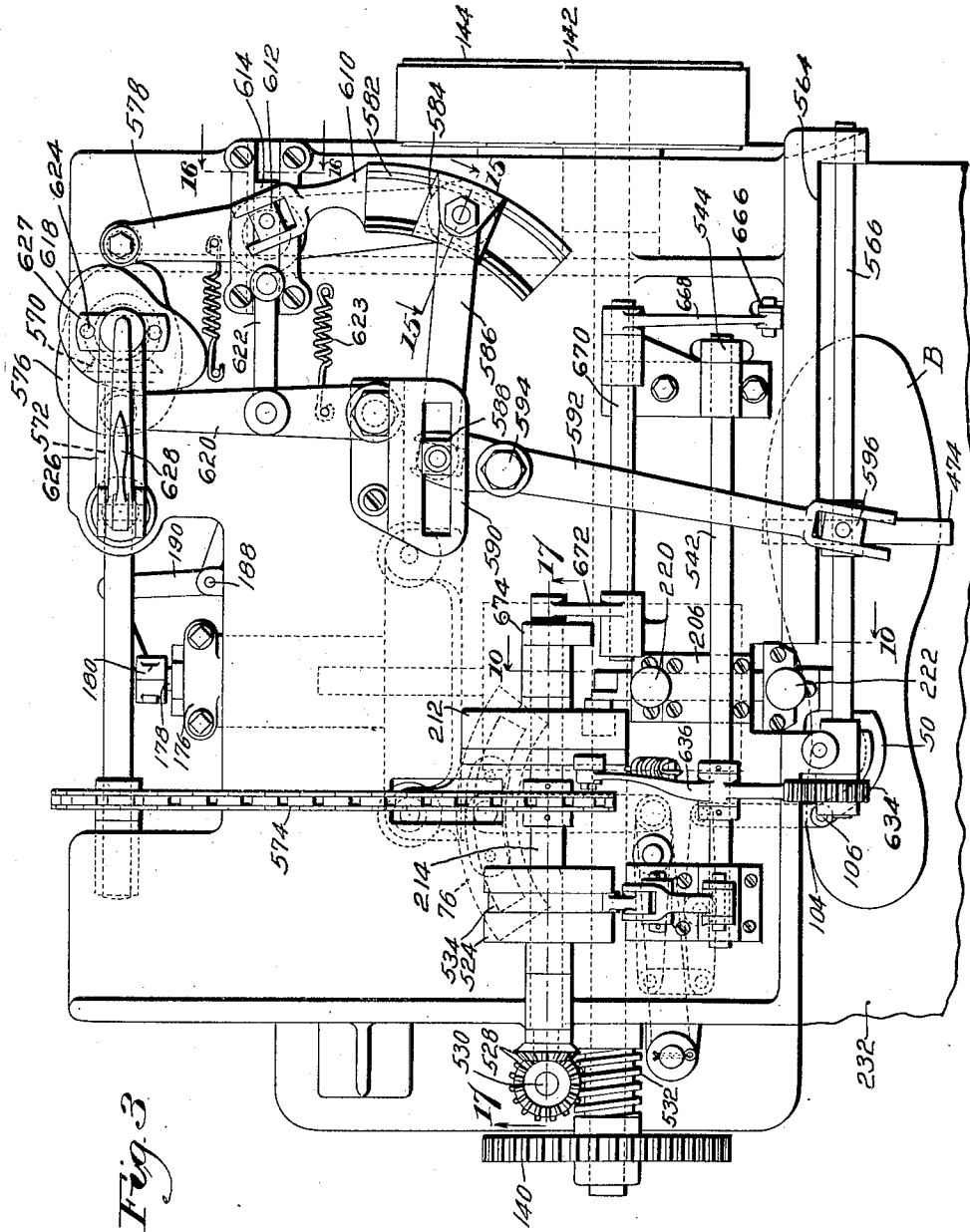


Fig. 3

Witness:
 Jas. J. Maloney.

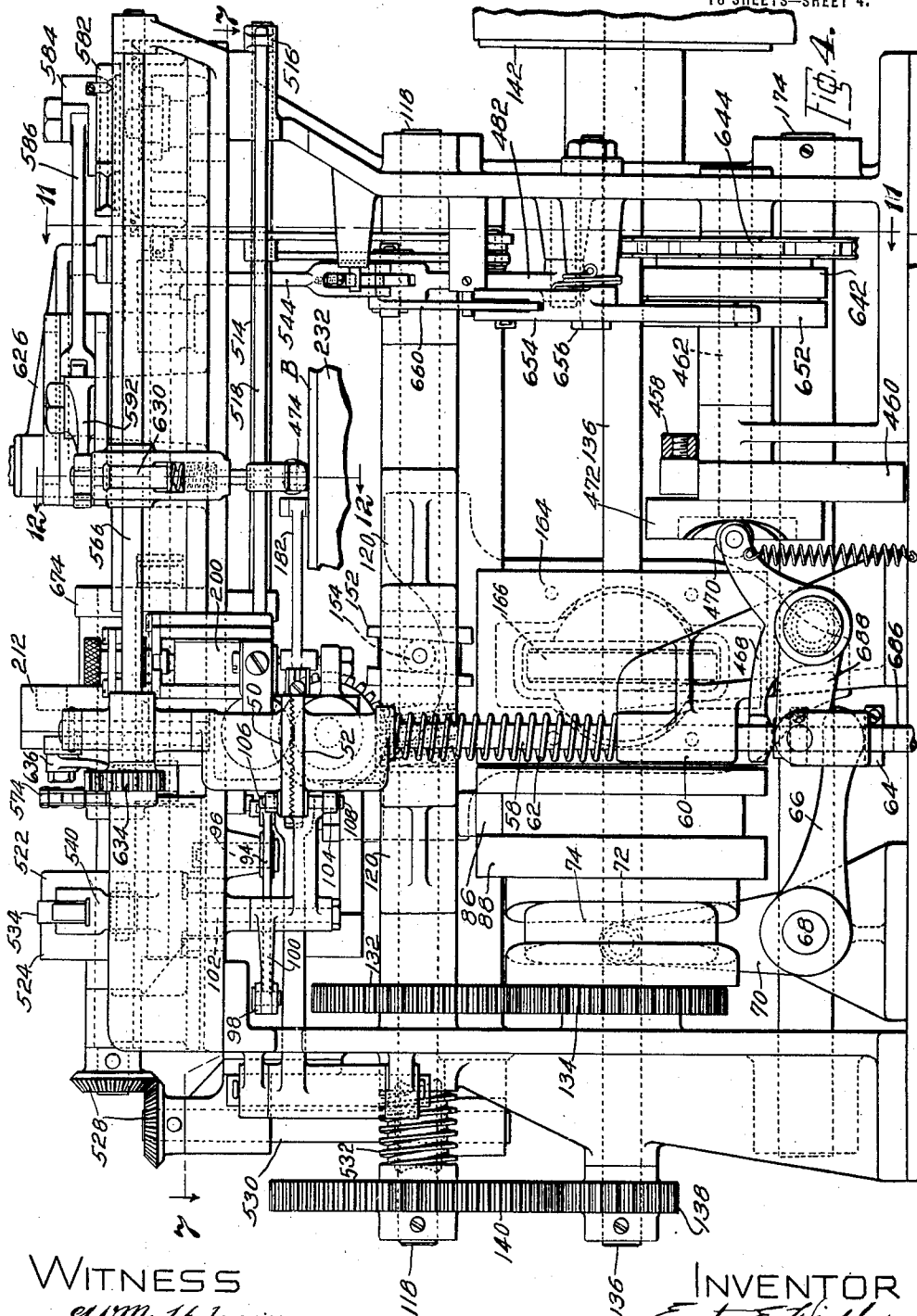
Inventor:
 Ernest E. Winkley
 by his attorney
 Philip, Van Horn & Fish

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 4.



WITNESS
Wm. Helmer

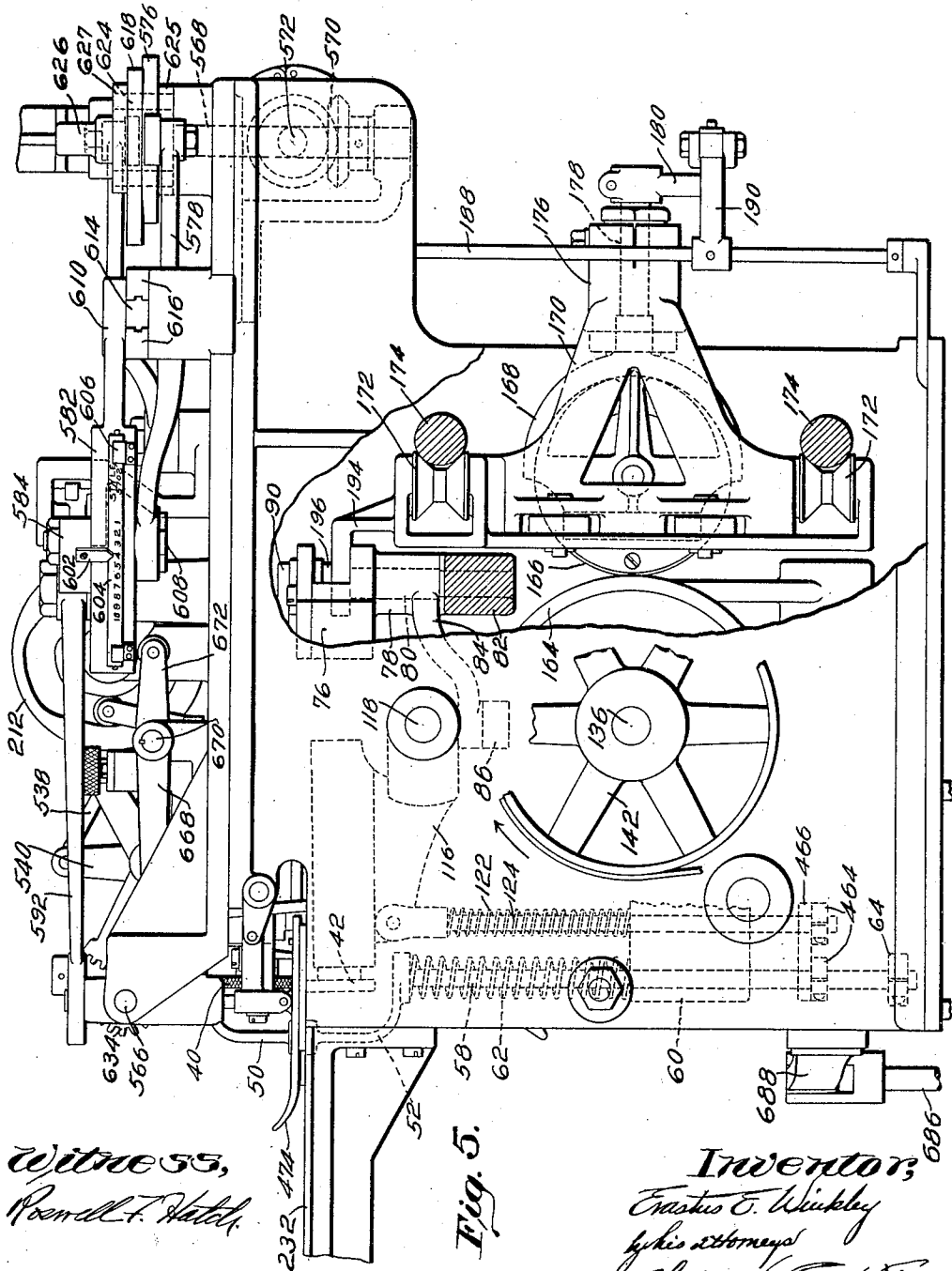
INVENTOR
Erastus E. Winkley
by his attorneys
Phillips, Winkley & Fish

E. E. WINKLEY,
 AUTOMATIC SOLE MACHINE,
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 5.



Witness,
 Russell F. Hatch.

Fig. 5.

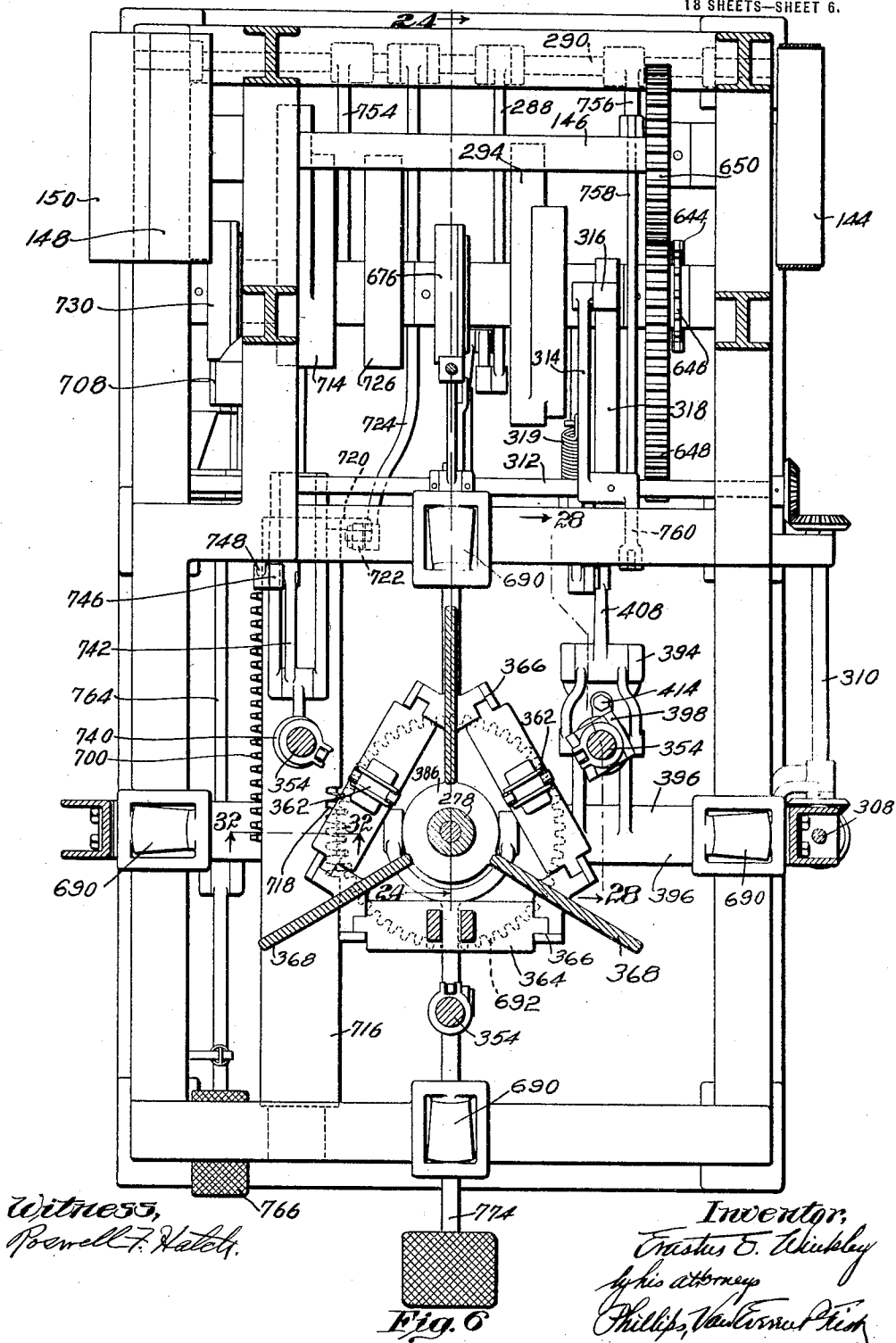
Inventor,
 Ernest E. Winkley
 by his attorneys
 Phillips, Van Ornum & Field

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 6.



E. E. WINKLEY,
AUTOMATIC SOLE MACHINE.
APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 7.

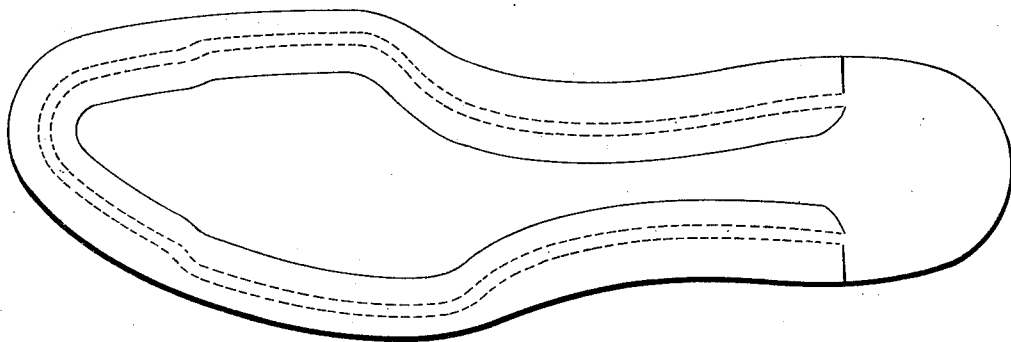
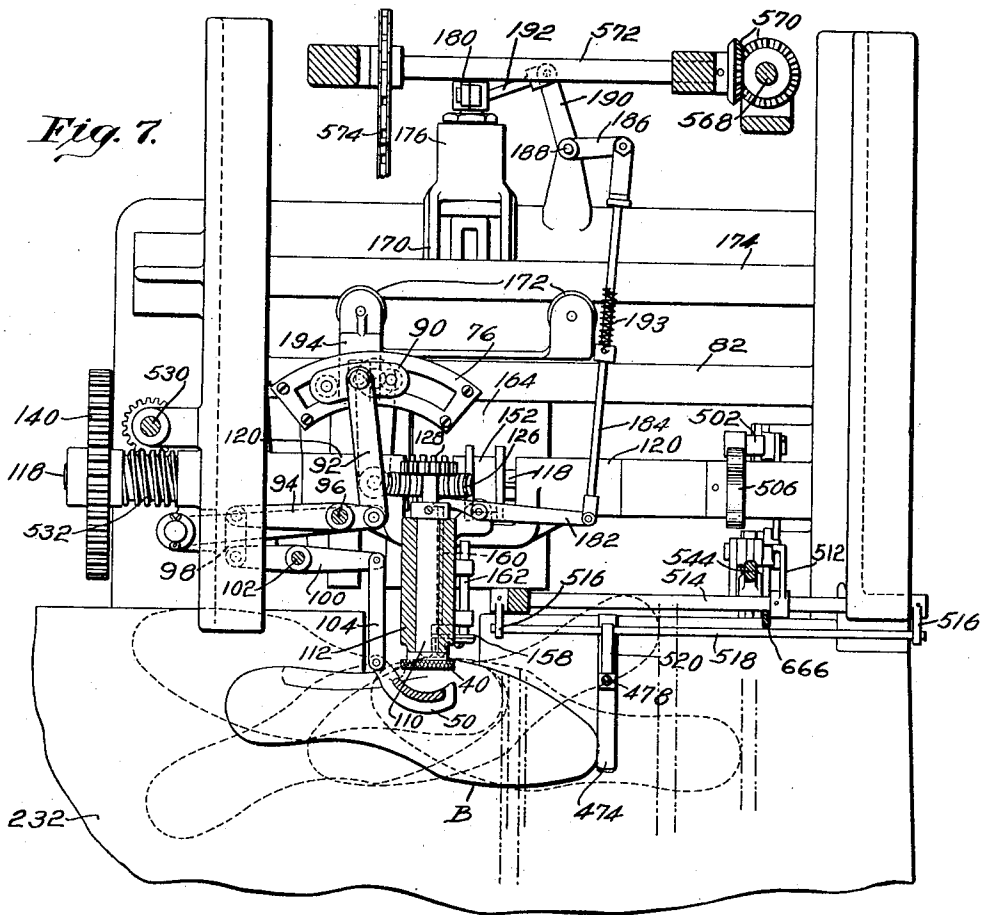


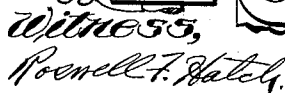
Fig. 8.

Witness,
Rosell F. Hatch.

Inventor,
Ernest E. Winkley
by his attorney
Phillips, Van Horn & Frost

1,383,446.

18 SHEETS—SHEET 8.



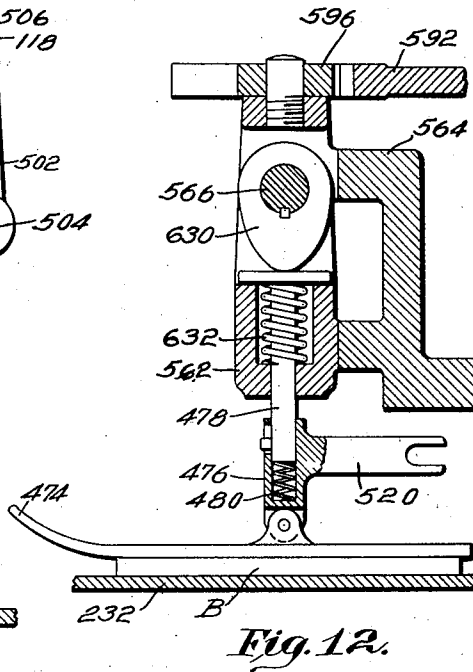
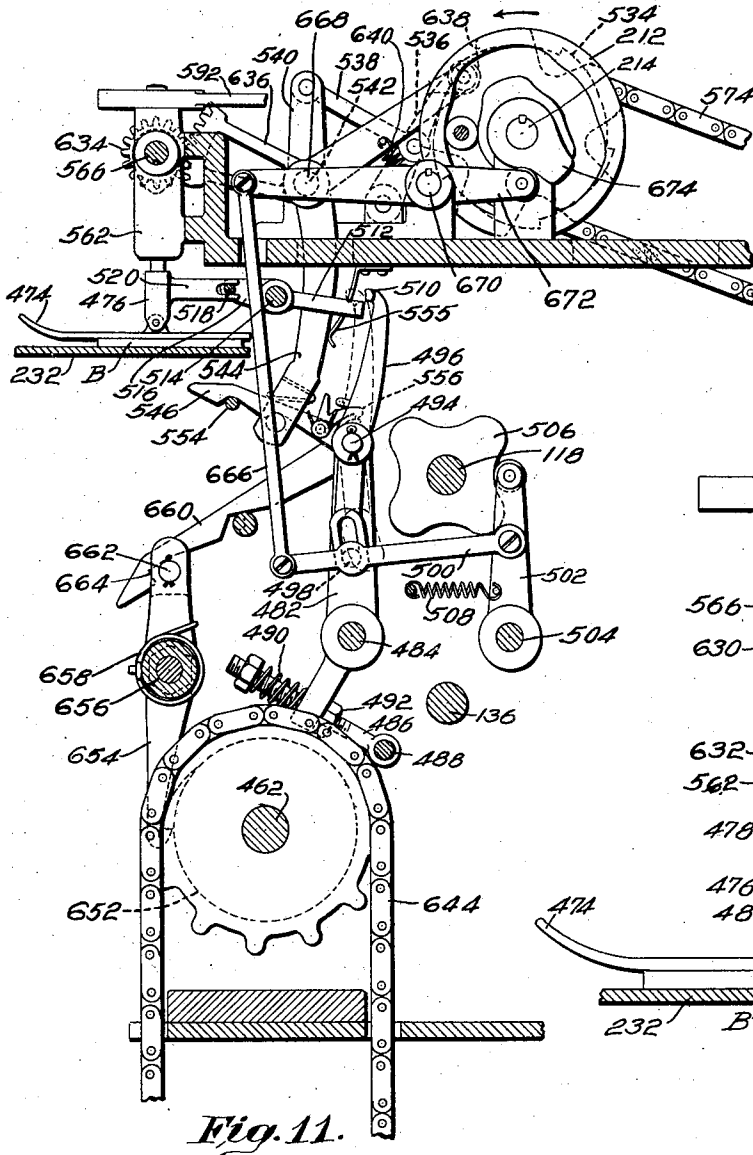
Inventor;
Erastus E. Winkley
by his attorneys
Phillips, Van Horn & Kirk

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 9.



Witness,
Roswell F. Hatch.

Inventor,
Ernest E. Winkley
by his attorneys
Phillips, Van Orman & Fish

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 10.

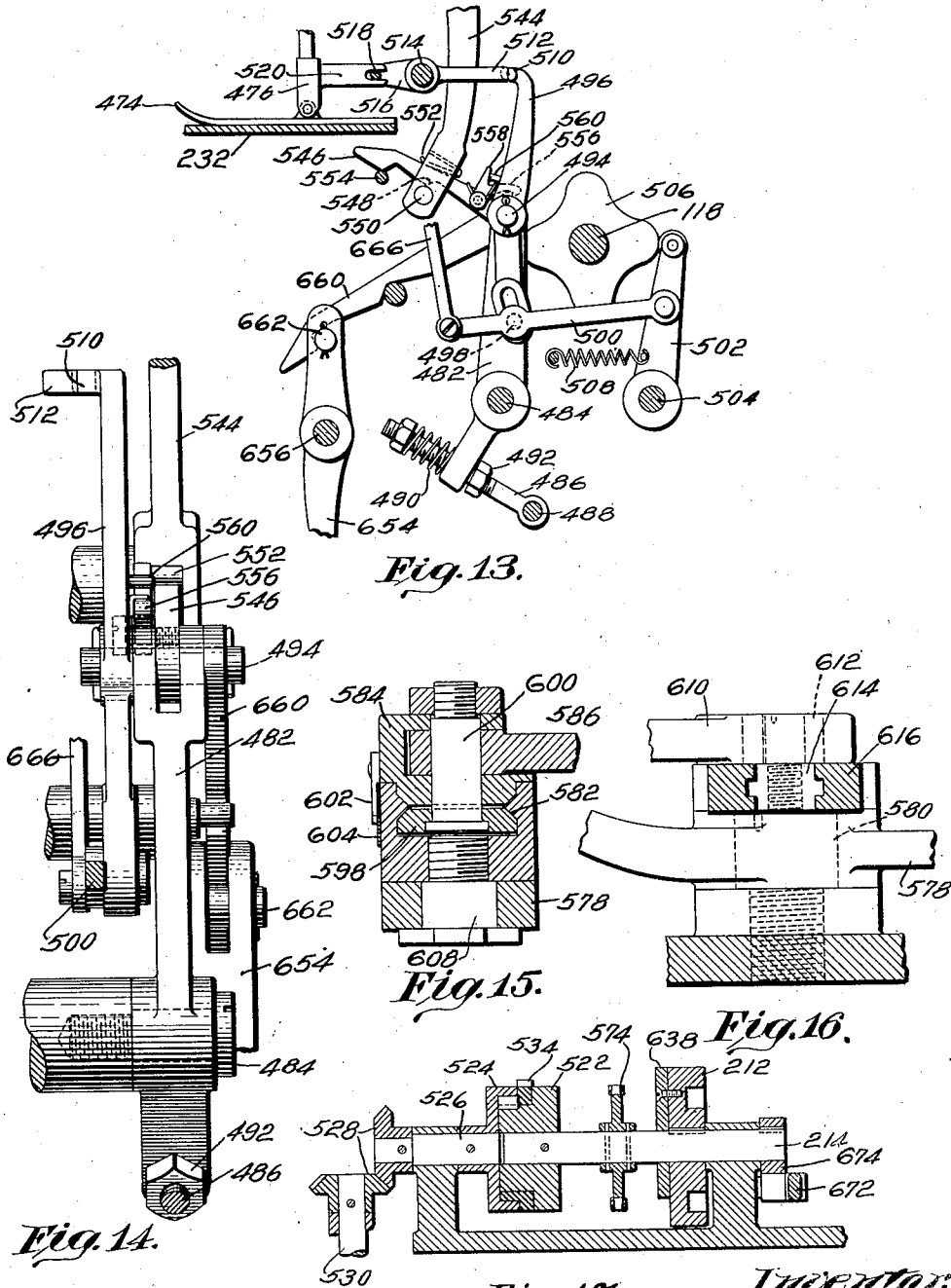


Fig. 14.

Fig. 13.

Fig. 15.

Fig. 16.

Fig. 17.

Witness,
 Russell F. Hallett.

Inventor:
 Ernest E. Winkley
 by his attorneys
 Phillips, Van Orman & Kirk

E. E. WINKLEY.
AUTOMATIC SOLE MACHINE.
APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 11.

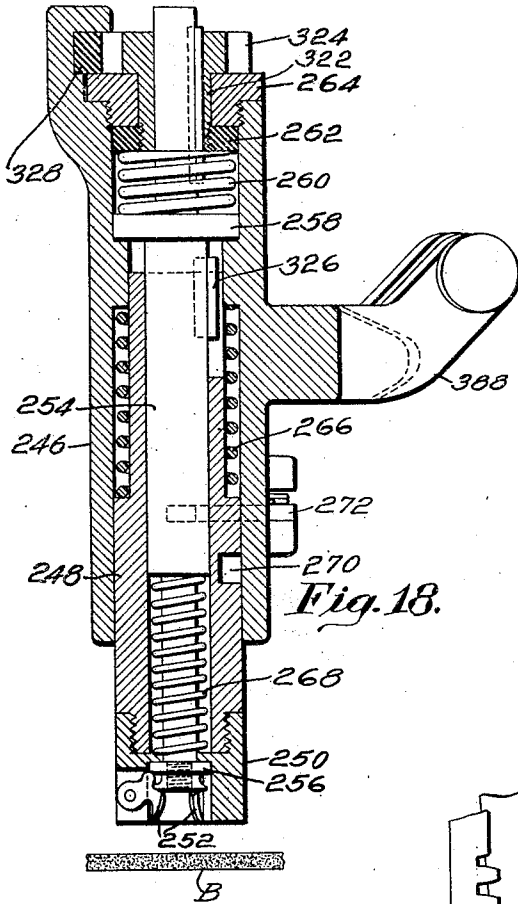


Fig. 18.

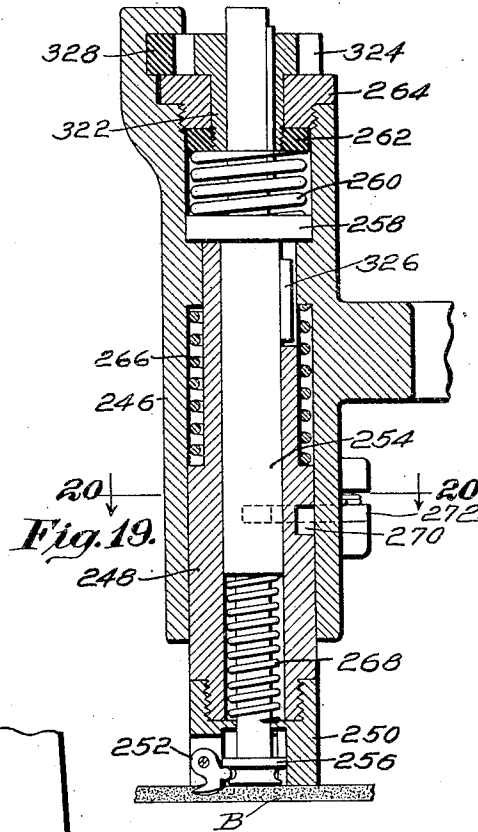


Fig. 19.

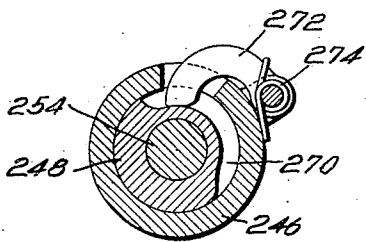


Fig. 20.

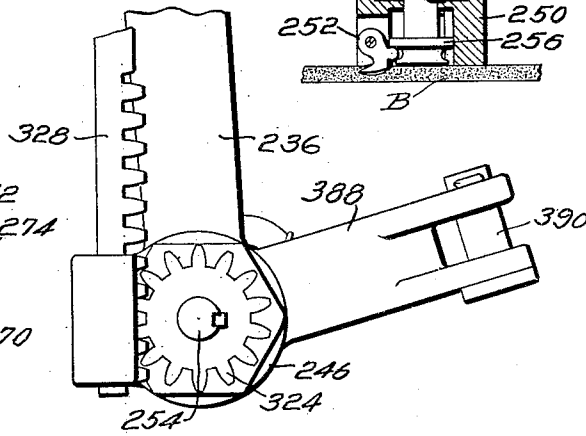


Fig. 21.

Witness,
Rennell F. Hatch.

Inventor,
Eustas E. Winkley
by his attorneys
Phillips, Van Orman & Frost

E. E. WINKLEY,
AUTOMATIC SOLE MACHINE.
APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 12.

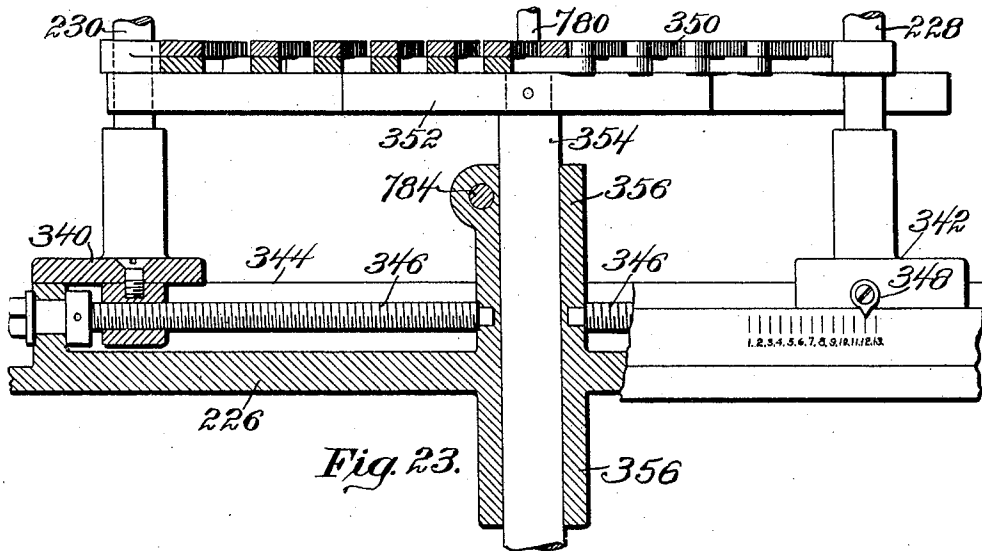


Fig. 23.

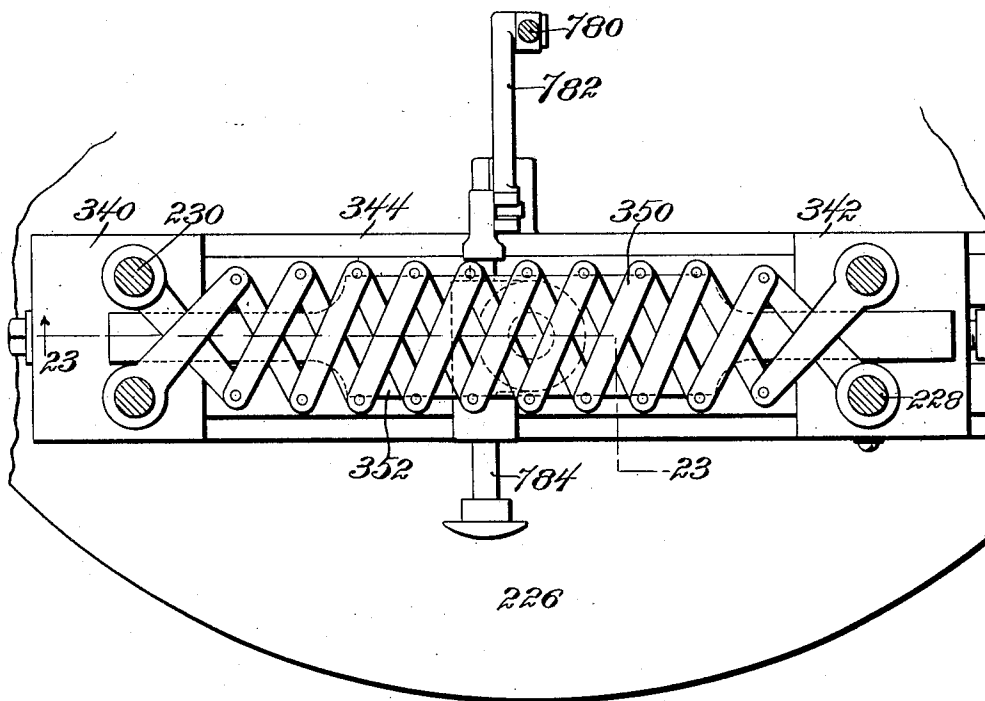


Fig. 22.

Witness,
Roswell F. Hatch.

Inventor,
Eustus E. Winkley
by his attorney
Phillips, Van Arman & Fitch

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.
 18 SHEETS—SHEET 13.

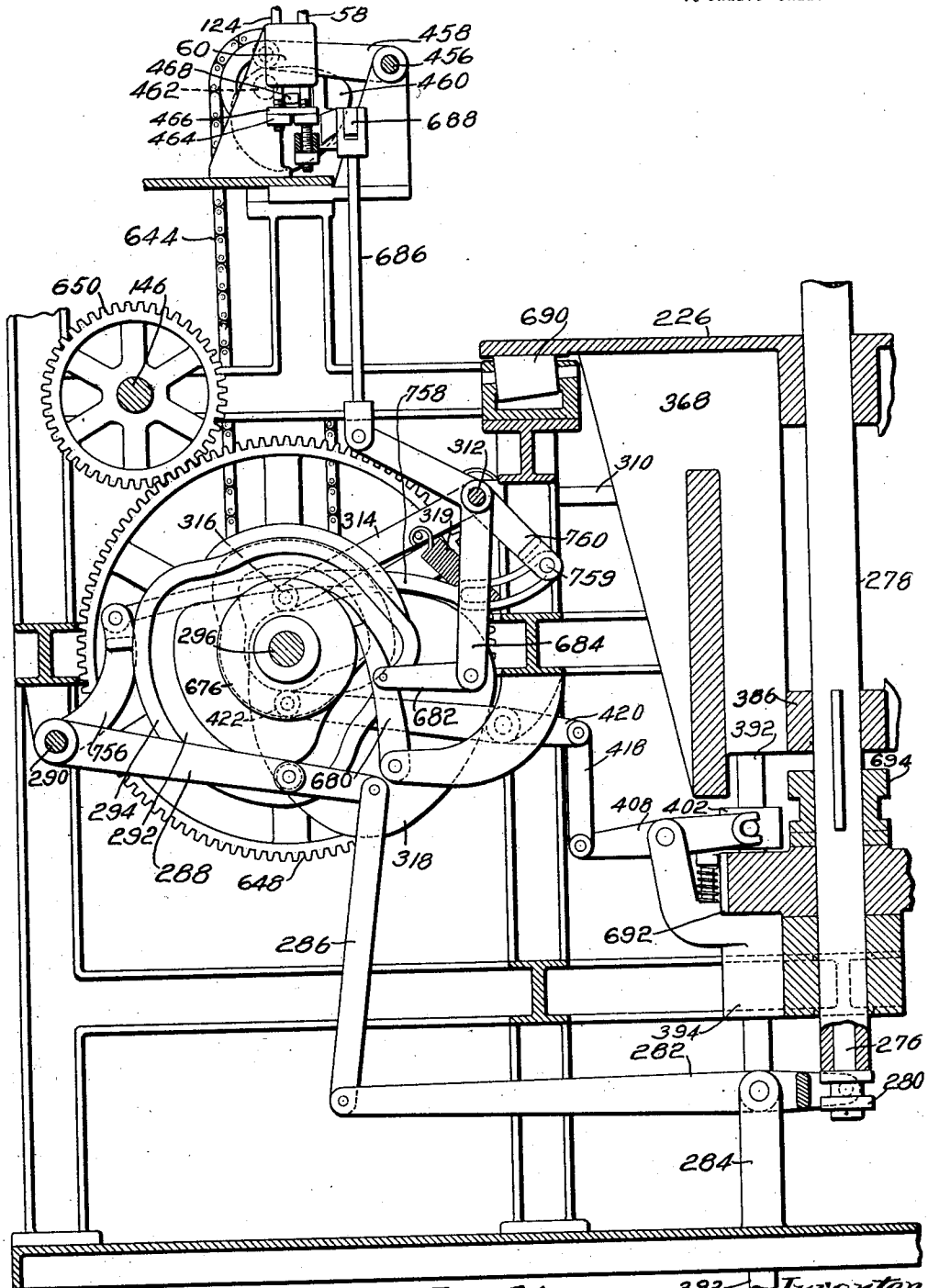


Fig. 24.

Witness,
 Howell F. Hatol.

Inventor,
 E. E. Winkley
 by his attorney
 Philip Van Horn & Son

E. E. WINKLEY,
AUTOMATIC SOLE MACHINE.
APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 14.

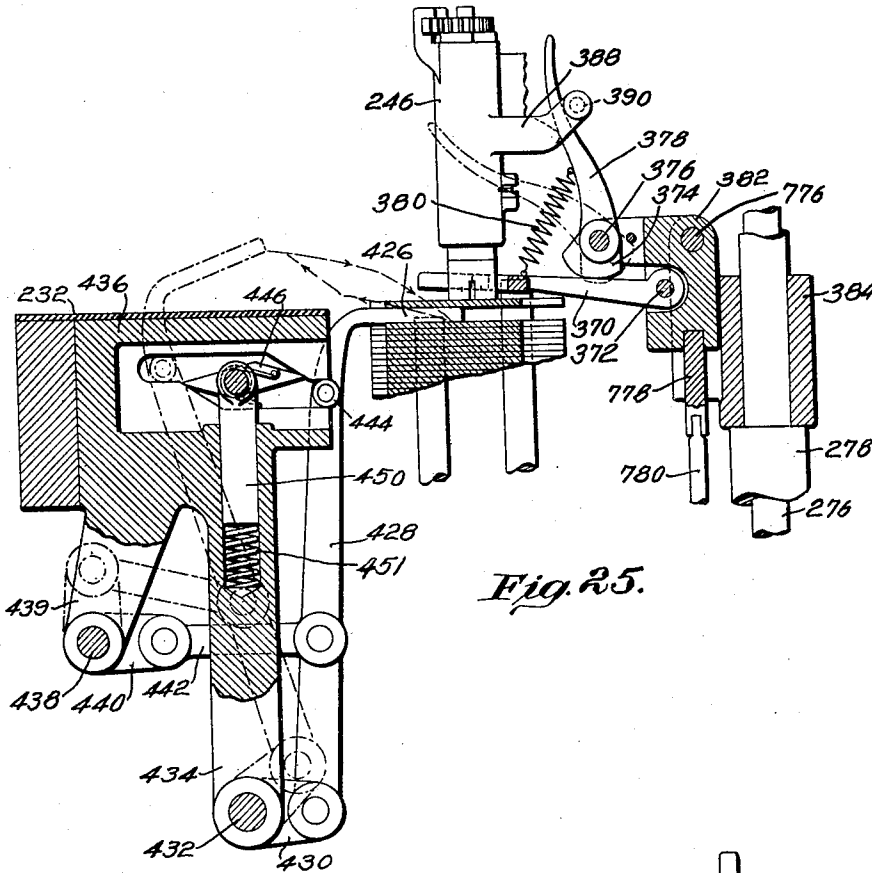


Fig. 25.

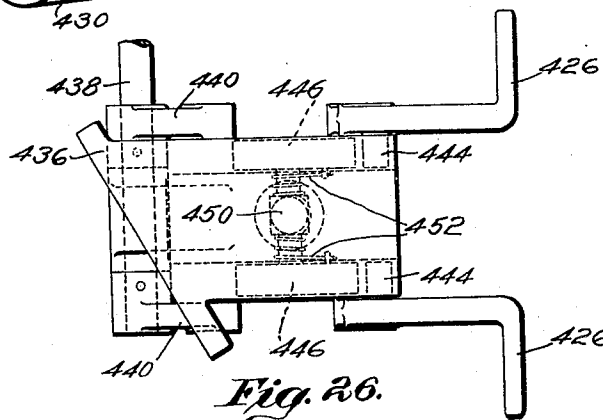


Fig. 26.

Witness,
Roswell F. Hatch.

Inventor,
Ernest E. Winkley
by his attorney
Phillips, Winters & Smith

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 15.

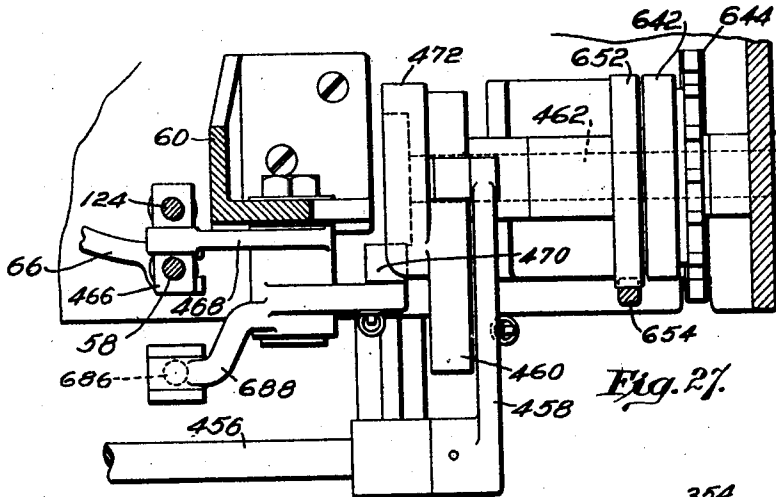


Fig. 27.

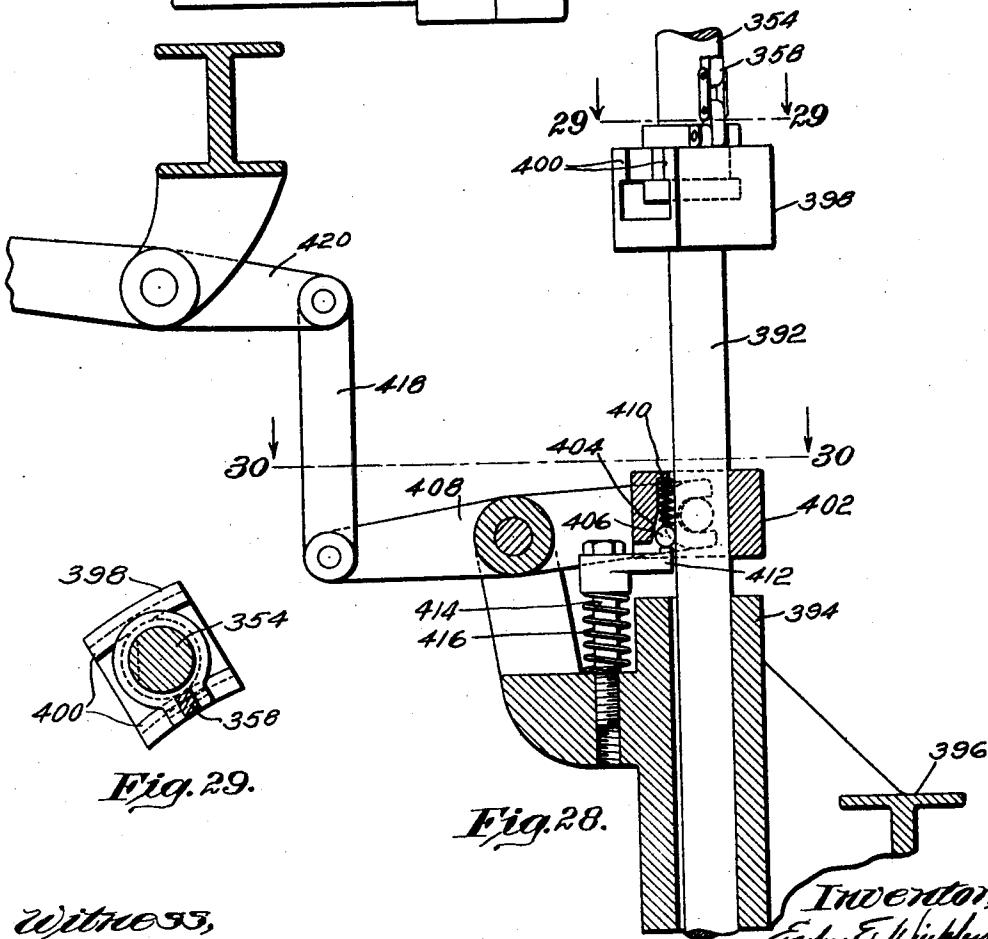


Fig. 28.

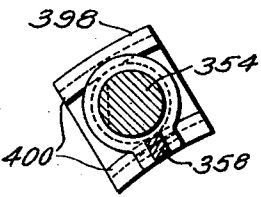


Fig. 29.

Witness,
 Ronald F. Hatch.

Inventor,
 E. E. Winkley
 by his attorney
 Phillips, Lawrence & Kirk

E. E. WINKLEY,
AUTOMATIC SOLE MACHINE.
APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.
18 SHEETS—SHEET 16.

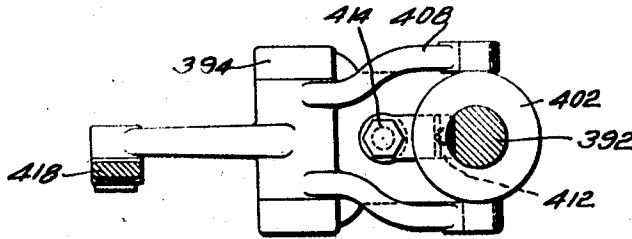


Fig. 30.

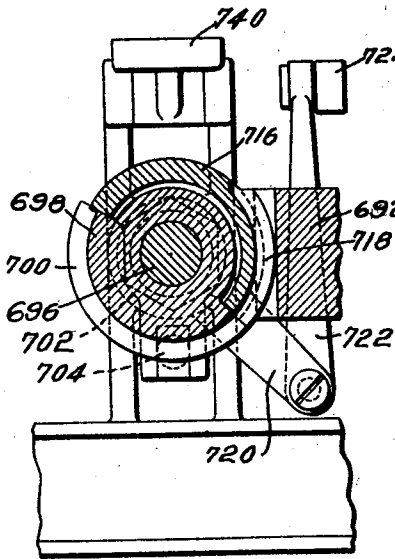


Fig. 32.

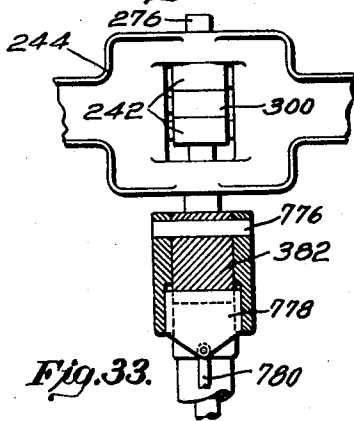


Fig. 33.

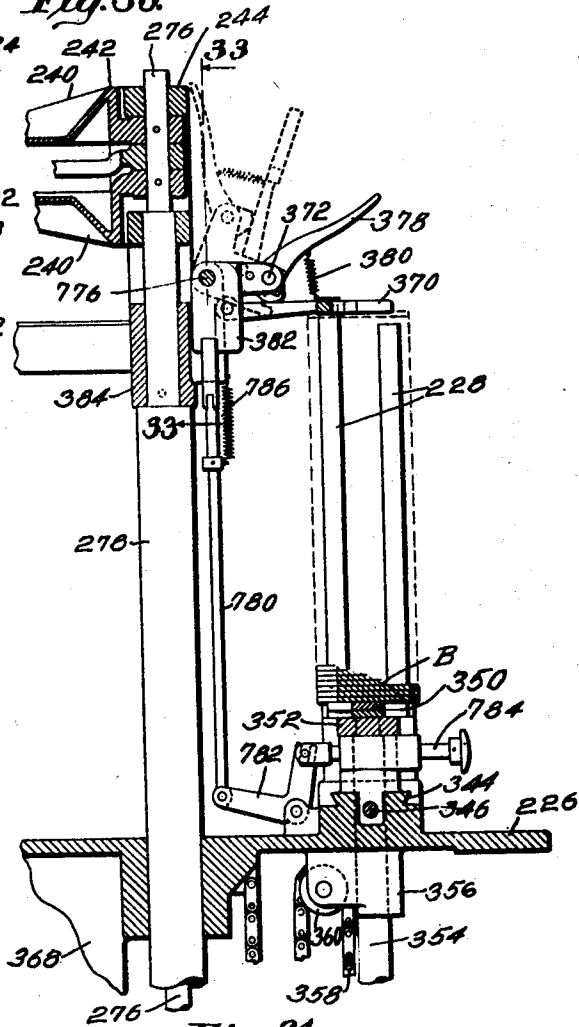


Fig. 31.

Witness,
R. M. F. H. H.

Inventor,
E. E. Winkley
By his attorney
Phillips, W. W. & King

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,388,446.

Patented July 5, 1921.

18 SHEETS—SHEET 17.

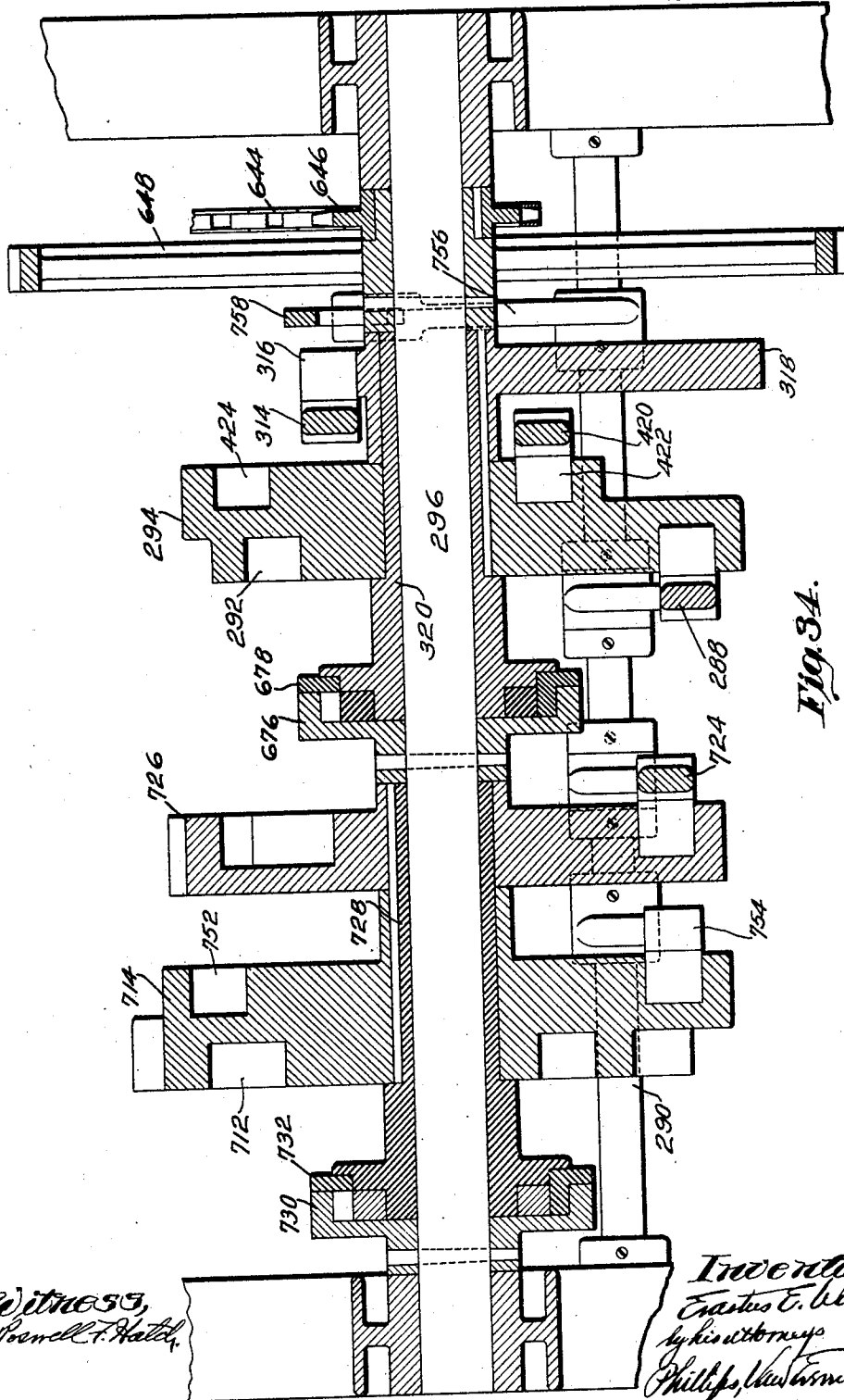


Fig. 34.

Witness,
 Russell T. Hattley

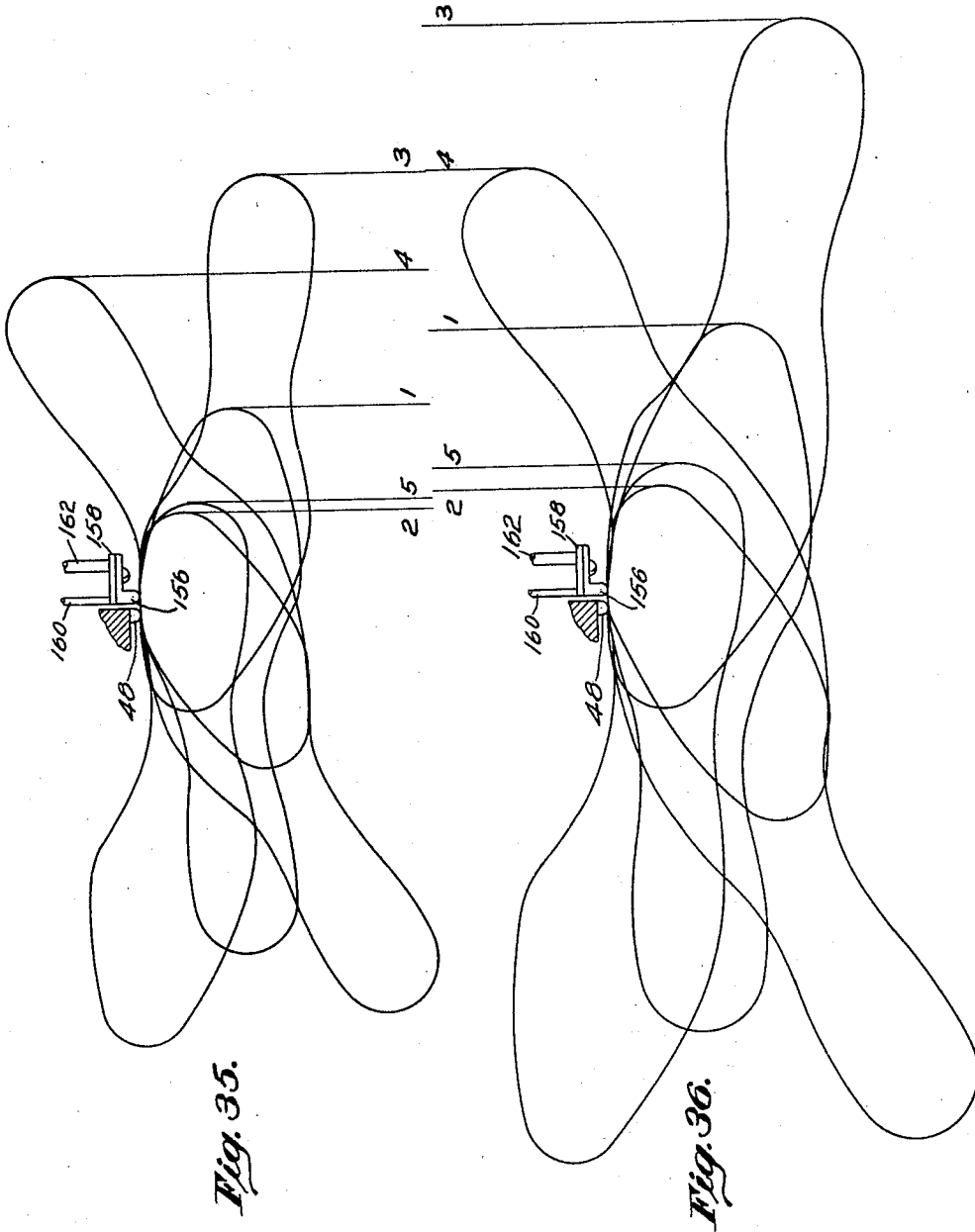
Inventor,
 Erastus E. Winkley
 by his attorneys
 Phillips, Kuster & Hinch

E. E. WINKLEY.
 AUTOMATIC SOLE MACHINE.
 APPLICATION FILED OCT. 20, 1916.

1,383,446.

Patented July 5, 1921.

18 SHEETS—SHEET 18.



Witness,
 Roswell F. Hatch.

Inventor,
 Eustis E. Winkley
 by his attorneys
 Phillips, Van Arman & Kish

UNITED STATES PATENT OFFICE.

ERASTUS E. WINKLEY, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

AUTOMATIC SOLE-MACHINE.

1,383,446.

Specification of Letters Patent.

Patented July 5, 1921.

Application filed October 20, 1916. Serial No. 126,685.

To all whom it may concern:

Be it known that I, ERASTUS E. WINKLEY, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Automatic Sole-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines in which blanks, particularly those employed in the manufacture of shoe-soles, are operated upon. The object of the invention, generally stated, is to provide automatic means for handling the blanks for the purpose of supplying them successively to the operating-means, and removing them successively therefrom, and also for the purpose of guiding and controlling both the blank and the operating-means during the operation on the blank.

The invention, in certain aspects is susceptible of embodiment in machines of various types, for performing various operations, but in other aspects it is peculiarly applicable to machines for performing a progressive operation upon the marginal portion of a sole-blank or other blank of irregular outline. In this aspect an object of the invention is to produce improved means for controlling automatically the various functions of the machine in accordance with the attainment, by the blank, of different positions in the course of the operation thereon.

Other objects of the invention, and the various features of construction and arrangement by which they are attained, will be set forth hereinafter, in connection with the description of the preferred embodiment of the invention.

In the accompanying drawings Figure 1 is a side-elevation of an automatic insole-channeling and slitting machine embodying the present invention; Fig. 2 is a plan-view of the machine, with the exception of the rearmost portion, on a larger scale than Fig. 1; Fig. 3 is a plan-view of the rear portion of the machine, on a larger scale than the preceding figures; Fig. 4 is a front-elevation of the rear portion of the machine, with the blank-supplying mechanism removed;

Fig. 5 is a side-elevation of the rear portion of the machine, with the parts broken away and in vertical section; Fig. 6 is a plan-view, in section on the line 6—6 of Fig. 1; Fig. 7 is a plan-view in section on the line 7—7 in Fig. 4; Fig. 8 is a plan-view of an insole in its condition after the operation of the present machine; Fig. 9 is a front-elevation, partly in section, showing in detail the engagement, with the insole-blank, of the feed-rollers and the channeling-knife and slitting-knife; Fig. 10 is a side-elevation, partly in section on the line 10—10 in Fig. 3; Fig. 11 is a side-elevation, partly in section on the line 11—11 in Fig. 4, showing particularly the automatic mechanism controlled by the end-feeler; Fig. 12 is a vertical sectional-view, on the line 12—12 in Fig. 4, showing details of the means for supporting and actuating the end-feeler; Fig. 13 is a view similar to Fig. 11, showing some of the parts in different relation; Fig. 14 is a side-elevation, partly in vertical section, showing parts of the mechanism shown in Fig. 11, but on a larger scale than said figure; Fig. 15 is a section on the line 15—15 in Fig. 3, but in a different position than the latter figure; Fig. 16 is a section on the line 16—16 in Fig. 3, but on a larger scale; Fig. 17 is a section on the line 17—17 in Fig. 3; Figs. 18 and 19 are detail-views of one of the blank-pickers, in vertical median section, in two different operative positions; Fig. 20 is a section on the line 20—20 in Fig. 19; Fig. 21 is a detail plan-view showing the picker of Fig. 18, together with a part of the actuating mechanism therefor; Fig. 22 is a plan-view, partly in horizontal section, of one of the stack-holders; Fig. 23 is a side-elevation of the stack-holders, partly in section on the line 23—23 in Fig. 22; Fig. 24 is a side-elevation, partly in vertical section on the line 24—24 in Fig. 6; Fig. 25 is a fragmentary elevation of parts of the blank-receiving and stacking mechanism, partly in section on the line 25—25 in Fig. 2, but on a larger scale than the latter figure; Fig. 26 is a detail plan-view of part of the mechanism shown in Fig. 25; Fig. 27 is a detail-view, in plan, of part of the cam-mechanism of the machine; Fig. 28 is a detail elevation, partly in section on the line 28—28 in Fig. 6, but on a larger scale than the latter figure.

ure, showing the locking-device for the stack-elevating mechanism; Fig. 29 is a horizontal section on the line 29—29 in Fig. 28; Fig. 30 is a horizontal section on the line 30—30 in Fig. 28; Fig. 31 is a detail elevation, partly in section on the line 31—31 in Fig. 2, showing details of the blank-feeding mechanism; Fig. 32 is a detail elevation, partly in section on the line 32—32 in Fig. 6, but on a larger scale than the latter figure, illustrating the mechanism for rotating and locking the turntable; Fig. 33 is a detail elevation, partly in section on the line 33—33 in Fig. 31; Fig. 34 is a vertical axial section, showing particularly the main cam-shaft and the cams and clutches mounted thereon; Fig. 35 is a diagrammatic plan-view showing various positions assumed by an insole-blank, during the operation of the machine thereon, with relation to the edge-gage and the edge-feeler; and Fig. 36 is a view similar to that in Fig. 35, but showing an insole-blank of a larger size.

The invention is illustrated as embodied in a machine having a channeling-knife and a slitting-knife which act upon the marginal portion of an insole-blank so as to produce the usual channel, lip and feather. The knives are normally stationary so that they operate with what is commonly known as a "drag-cut", and the blank is fed past the knives by means of upper and lower feed-rollers 40 and 42 (Figs. 9 and 10), of which the knurled peripheries bear against the upper and lower surfaces of that portion of the blank which is commonly described as the "between-substance", namely the portion lying between the bottoms of the channel and the slit. The channeling-knife 44 and the slitting-knife 46 have operative extremities of the usual form, and the points of their operation upon the blank are determined, with relation to the distance from the edge of the blank, by the relative positions of the knives and of an edge-gage 48 (Figs. 10 and 35), against which the edge of the blank is constantly pressed as the result of the conjoint action of the feed-mechanism and of the blank-swinging mechanism hereinafter described. The edge-gage is mounted in a stationary position on the frame of the machine.

In Letters Patent of the United States No. 1,152,584 granted to the present applicant September 7, 1915, an automatic machine for operating upon insoles is described in which, as in the present machine, the insole is not only fed past the operating instrumentalities, but is also turned or swung, in its plane, to conform the direction of feed to the curvature of the edge of the insole, by the automatic mechanism of the machine. In said machine the turning movement of the insole is produced by a device adapted to engage and grip the upper surface of the

insole intermittently and to swing the insole in one direction or another as required, under the automatic control of a feeler engaging the edge of the blank. In the present machine the blank is swung by automatic mechanism operating in the same general manner, but in this present mechanism the feeding function is divorced entirely from the blank-swinging mechanism, and the latter mechanism is somewhat different in form from that of the machine in said patent. In the present machine the blank is swung by means of two clamp-members 50 and 52 (Figs. 4, 7 and 10) which grip the blank between them, at a point within or in front of the point of operation of the knives and the feed-rollers with the blank, and which are arranged to swing, while so gripping the blank in one direction or the other about a vertical axis which is approximately coincident with the said point of operation.

To permit the movement just described the upper clamp-member is fixed on the lower end of a rock-shaft 54, which turns in a bearing-sleeve 56 fixed on the frame of the machine. The lower clamp-member 52 is fixed on the upper end of a rod 58 (Figs. 4 and 5), which is arranged to turn and also to slide in a bearing 60 on the frame of the machine.

The engagement of the clamping-members with the blank is intermittent, and alternates with the intermittent rotation of the feed-rollers. The clamping-members engage the blank under the spring-pressure, a spring 62 being coiled around the rod 58 and tending to press the clamp-member 52 into engagement with the blank. The operative surfaces of the clamp-members are serrated, as shown in Fig. 4, to permit them to hold the blank with sufficient security without the use of excessive pressure against the blank.

In order to release the blank from the action of the clamp-members, cam-mechanism is provided for intermittently drawing downwardly the rod 58 and the clamp-jaw 52. A collar 64 is fixed to the lower end of the rod, and this collar is engaged by an arm 66 (Fig. 4) fixed on the forward end of the rock-shaft 68 which has a bearing on the frame of the machine. A cam-lever 70 projects from the rear end of the rock-shaft, and carries a roller 72 which engages a path in a cam 74. By means hereinafter described this cam is rotated constantly during the operation of the machine, so as to cause the blank to be clamped and unclamped at regular brief intervals.

While the clamp engages a blank, as just described, it may either remain stationary or be swung more or less to one side or the other, according to whether the edge of the blank, adjacent the point of operation of the knives, is or is not, at the moment, in the proper angular relation to the direction of

feed. The mechanism for swinging the clamp comprises a segmental slide-guide 76 (Figs. 5 and 7), which is mounted, to swing about a vertical axis, by means of a hub 78, which depends from the slide-guide and is journaled upon a stud 80 fixed in a transverse member 82 on the frame of the machine. An arm 84, projecting from the hub, carries a roller 86, which engages a path in a cam 88 which is fixed to the cam 74 so as to rotate in unison therewith. This cam 88 is so formed as to swing the slide-guide 76 in one direction while the clamp is in operative engagement with the blank, and then swing the slide-guide back to its original position, shown in Fig. 10, while the blank is released from the action of the clamp.

The movement of the slide-guide is transmitted to the clamp through a slide-block 90, which is mounted on the slide-guide and is provided with anti-friction rollers engaging the segmental guide-way therein, as shown in dotted lines in Fig. 7. The slide-block is connected, by a link 92, with a motion-multiplying mechanism comprising two levers 94 and 100. The lever 94 is mounted on a stud 96 depending from the frame of the machine (Fig. 4), and the link 92 is connected with the shorter arm of this lever. The longer arm of this lever 94 is connected, by a link 98, with the shorter arm of the lever 100, which latter is pivoted on a stud 102, depending from the frame of the machine. The longer arm of the lever 100 is connected, by a link 104, with the clamp-jaws. This link is bifurcated at its forward end, and its upper extremity is pivoted on a stud 106 rising from the upper clamp-jaw, while the lower extremity engages a stud 108 depending from the lower clamp-jaw. This latter stud is sufficiently elongated to permit accommodation of the vertical movements of the lower clamp-jaw.

It will be apparent that when the slide-block 90 is located directly above the axis of oscillation of the slide-guide 76 no swinging movements will be imparted to the clamp, but that if the slide-block be moved from said position on the slide-guide the swinging movements of the slide-guide will cause swinging movements of greater amplitude in the clamp, the direction of these movements being determined by the location of the slide-block at one side or the other of the axis of oscillation of the slide-guide. Owing to the fact, however, that the slide-guide is curved so as to be concentric with the pivotal connection between the link 92 and the lever 94, the clamp will always be returned to the normal position shown in Fig. 7 upon the return of the slide-guide to its normal position, and the operative movements of the clamp will always occur entirely to one side or the other of the normal

position. The position of the slide-block 90 is determined automatically, under the control of the edge-feeler, in a manner which will be hereinafter described.

In order to prevent interference between the function of the feed-rollers and the function performed by the swinging-clamp, the rollers are actuated intermittently so as to feed the blank only in the intervals while the blank is released from the action of the clamp. The upper feed-roller 40 is mounted on a horizontal shaft 110 (Figs. 5, 7, 9 and 10) which is journaled in a bearing-block 112, fixed on the frame of the machine. The lower feed-roller 42 is mounted on a shaft 114, and in order that the feed-rollers may conform to variations in the thickness of blanks operated upon, and also to permit the blank to be conveniently engaged with and released from the feed-rollers, the shaft 114 is mounted in a bearing on the upper end of the arm 116, which is pivotally mounted (Fig. 5) on a horizontal shaft 118. The shaft is journaled transversely on the frame of the machine, the arm 116 being provided with sleeves 120 (Fig. 7) which embrace the shaft. This arrangement is such as to permit the lower feed-roller to move toward and from the upper feed-roller, while relative lateral movement is prevented by the engagement of the bearing in which the shaft 114 turns with the slotted lower portion of the bearing-block 112 (Figs. 9 and 10).

The lower feed-roller is normally pressed upwardly, and toward the upper feed-roller, by means of a compression-spring 122 (Fig. 5), which is coiled around a rod 124 of which the upper end is pivoted to the arm 116. The rod 124 is guided in a perforation in the bearing-block 60 in which the rod 58 slides, as before described.

Rotation is imparted to the shaft 114 and the lower feed-roller through a worm-wheel 126, which is fixed on the rear end of the shaft. This wheel meshes with a worm 128 (Fig. 7) which is mounted on, and rotated by, the shaft 118. This shaft 118 also drives the cams 74 and 88 by which the swinging movements are imparted to the clamp, so that timed coöperation between the clamp and the feed-rollers is assured. For this purpose a gear 132, fixed on the shaft 118, engages a gear 134, of the same diameter, fixed on the cam 74. The two cams are mounted to turn loosely upon a drive-shaft 136 which is journaled, in horizontal position, on the frame of the machine. This drive-shaft provides the power by which the worm-shaft 118 is rotated, being provided, for this purpose, with a pinion 138 (Fig. 4) which engages a gear 140 fixed on the end of the shaft 118. The drive-shaft is actuated through a pulley 142, which is belted to a pulley 144 on the main power-shaft 146 of the machine (Figs. 1 and 6). This power-

shaft is journaled horizontally on the frame of the machine, and is provided with fast and loose pulleys, 148 and 150 respectively, which may be belted to any suitable source of power.

The worm and worm-wheel connection between the worm-shaft 118 and the feed-roller-shaft 114 would, by itself alone, produce a constant rotation of the lower feed-roller, but in order that the rotation of the feed-rollers may be intermittent, for the purpose above described, the action of the worm is modified by mechanism which produces longitudinal movements of the worm upon the worm-shaft. For this purpose a grooved cam 152 (Figs. 4 and 7) is formed integrally at one end of the worm 128, and this cam engages a roller 154 mounted on a stud which projects from the arm 116. The worm and the cam are splined to the worm-shaft, so that they may move longitudinally thereon, and the cam is so formed that during that portion of the rotation of the worm-shaft which occurs during the swinging operation of the clamp an endwise movement is imparted to the cam, and thence to the worm by which the effect of the worm on the worm-wheel is neutralized, so that the worm-wheel remains momentarily stationary, thus interrupting the feed-movement of the feed-roller 42. The upper feed-roller 40 is caused to rotate uniformly with the lower feed-roller by gears 155 (Fig. 10), which connect the rear ends of the shafts 110 and 114.

The swinging movements imparted to the insole-blank by the clamp are controlled by an edge-feeler 156 (Figs. 7, 10, and 35) which engages the edge of the blank a short distance in advance of the point of operation of the knives. This feeler is mounted on a plate 158, carried by slide-rods 160 and 162 which move horizontally in bearings on the bearing-block 112, so that the feeler may advance and recede to maintain its engagement with the end of the blank. The machine is so adjusted that the normal or neutral position of the feeler is that in which the edge of the blank approaches the feed-rollers at a slight angle to the line of feed, such as will insure the maintenance of the edge against the edge-gage 48. Whenever the edge, owing to its curvature in one direction or the other, tends to depart from this angle, the feeler is moved inwardly or outwardly from the normal position, and it automatically throws into operation the mechanism, above described, for swinging the clamp so as to swing the blank into such position that the portion of its edge upon which the knives are operating will be properly adjusted to the line of feed.

The mode of operation just described is, in general, similar to that disclosed in said Patent No. 1,152,584, and, as in the ma-

chine of said patent, the clamp-actuating mechanism is controlled by the feeler through power-multiplying mechanism, by which the operation is rendered certain notwithstanding the slight force directly available from the movement of the feeler. In the present machine, however, the power-multiplying mechanism employed is similar in construction and operation to that disclosed in Letters Patent of the United States No. 1,129,371 granted February 23, 1915 to the present applicant, and since this mechanism is not claimed as a part of the present invention, it need be only briefly described.

The power-multiplying mechanism is shown particularly in Figs. 4 and 5, and the connections between the feeler and this mechanism are shown in Fig. 7. The shaft 136 carries a drum 164 which is rotated constantly, at high speed, by the shaft, and this drum is in frictional engagement with a roller 166. The roller is journaled in a yoke 168 which, in turn, is journaled on a horizontal axis in a carriage 170. This carriage has grooved rollers 172 by which it is guided along transverse guide-rods 174, so that the carriage, and with it the roller, may move parallel to the axis of the friction drum, while the roller is maintained in engagement with the drum. So long as the axis of the roller is horizontal the roller is merely rotated idly by the drum, but if the yoke be turned within the carriage so as to incline the axis of the roller to that of the drum, the drum will impart a compound movement to the roller, by which it is not only rotated but also moved transversely, the carriage 170 being thereby moved along the guide-rods to one side or the other, according to the direction of inclination of the roller, and with a force and a speed which are determined by the friction between the roller and the drum, the speed of the drum and the inclination of the roller.

The yoke 168 is mounted upon a stem 178 which is journaled in a sleeve 176 on the carriage, and the inclination of the roller is produced by turning the stem within the sleeve. For this purpose an arm 180 is fixed on the outer end of the stem, and this arm is swung from side to side by connections with the edge-feeler.

The connections just referred to comprise (Fig. 7) a lever 182 which is pivoted on the frame of the machine, and of which one end abuts against the rear end of the slide-rod 160 by which the edge-feeler is supported. The other end of the lever is connected, by a rod 184, with an arm 186 on the upper end of a rock-shaft 188. The rock-shaft is journaled on the frame of the machine, and is provided, at its lower end, with an arm 190 which is connected, by a rod 192, with the arm 180. A spring 193, connecting the rod 184 with the frame of the machine, main-

tains the lever 182 in engagement with the slide-rod 160 and forces the feeler against the edge of the sole-blank.

When the edge-feeler is in its normal position the connections just described hold the arm 180 in its vertical depending position, and the axis of the friction-roller 168 is then horizontal, so that no lateral movement is imparted to the roller. When the feeler moves forwardly from its normal position, as occurs, for example, when the feeler is encountered by an increasingly convex portion of the edge of the blank, the arm 180 is swung in a direction away from the observer, as shown in Fig. 5, and the friction-roller is so inclined that it is moved toward the observer. When the feeler retreats, on the other hand, the movement of the friction-rollers is in the opposite direction.

The movements of the power-multiplying mechanism are transmitted to the clamp-swinging mechanism by means of an arm 194, which projects upwardly from the carriage 170 and has a slotted end (Figs. 5 and 7) which embraces a stud 196 depending from the slide-block 90. By these means the slide-block is moved to one side or another of its normal median position in the slide-guide 76, and the extent of this movement determines, as above explained, the extent of the swinging movement imparted to the clamp.

The swinging of the blank, resulting from the movement of the clamp, continues until the feeler has been returned to its normal position, whereupon the power-multiplying mechanism tends to return to its normal position, this position being determined by the vertical position of the arm 180.

In machines for channeling and slitting insole-blanks it is common to provide for variations in the distance of the cuts and of the between-substance from the edge of the blank at different parts of the blank, and this provision is usually made by movement of the edge-gage. In this manner the position of the blank is changed, while the positions of operation of the knives and the feed-mechanism remain the same absolutely, but are changed relatively to the blank. This mode of operation is in some degree inconvenient, however, in a machine in which, as in the present case, the movement of the blank is controlled by a feeler which rests against the edge of the blank, for a lateral movement of the blank, caused by a movement of the edge-gage, would disturb the relation between the blank and the edge-feeler. In the present machine, accordingly, the changes in the position of the cuts and of the between-substance are produced by movements of the knives, by which their points of operation are changed, while the edge-gage and the feed-mechanism suffer no change of operative position.

The knives are supported on a forward projection 198 from a knife-block 200 (Figs. 9 and 10). This knife-block is carried on a head 202 at the forward end of a horizontal slide-bar 204, which moves in a bearing 206 on the frame of the machine. The knives are moved by sliding the bar 204 in its bearing, and this is accomplished by cam-mechanism, which is thrown automatically into operation at suitable times by means which will be described. The cam-mechanism comprises a lever 208 which is fulcrumed on a stationary stud 210, and the lower end of this lever is pivoted to the slide-bar, while its upper end carries a roller which engages a groove in a cam 212. This cam is mounted, as shown in Figs. 3, 10 and 17, on a shaft 214 which is supported in bearings at the top of the machine. The cam is partially rotated at each operation, and it is so formed as to move the knives in and out through suitable predetermined distances as different points in the periphery of the sole-blank are encountered.

The required amplitude of the adjusting movements of the knives varies with the size and style of the insoles which are produced, and in order to permit such variation to be made proportionately in all of the adjusting movements, the stud 210, on which the lever 208 is fulcrumed, is made vertically adjustable. For this purpose it is carried by a slide-block 216 which moves vertically in a yoke 218 on the frame of the machine, and the block is supported and adjusted by a hand-screw 220, threaded vertically through the block.

The distance of the cuts, produced by the knives, from the upper surface of the blank depends upon the vertical distances of the operative portions of the knives below the blank-engaging portion of the upper feed-roll 40. In order to permit adjustment of this distance, the knife-block 200 is vertically movable in a dove-tailed guideway in the head 202, and is adjusted therein by means of a hand-screw 222.

To permit convenient removal of the channeling-knife for the purpose of sharpening, and to adjust the edge of the knife in the direction of feed, the shank of the knife is fixed to a bar 224 which is seated and horizontally adjustable in a recess in the front of the projection 198 (Figs. 9 and 10). The shank of the slitting-knife 46 is also removably and adjustably attached to the projection 198.

The supply of blanks B, upon which the machine is to operate, is stacked in one of three stack-holders which are mounted on a turntable 226 (Figs. 1 and 2), this turntable being mounted to rotate about a vertical axis near the front of the machine. Each stackholder comprises a pair of vertical rods 228 which engage the heel-ends

of the blanks, and a pair of rods 230 which engage the toe-ends of the blanks, these rods acting to maintain the blanks in approximate vertical alinement. By means which will be hereinafter described, the stack is automatically maintained at such a height that the uppermost blank is slightly above the level of a horizontal work-table 232, which extends from the stack-holder when the latter is in its operative position, to the feed-rollers and other instrumentalities which operate upon the blank. This feed-table serves to support the blank in horizontal position during the operation of the knives thereupon.

The blanks are successively transferred from the supply stack to the operating instrumentalities by transfer-mechanism comprising two horizontal arms 234 and 236, formed integrally at a slight angle to each other, as shown in Fig. 2, the arms being mounted to swing around a vertical axis on a pivot 238. The pivot is mounted in the rear ends of the upper and lower arms 240 of a yoke-shaped bracket, these arms being integrally connected by a base 242 which is supported at the top of a yoke-shaped frame-member 244 near the front of the machine.

The arm 234 may be described as the supply-arm, while the arm 236 may be described as the discharge-arm. Each of these two arms carries a device, hereinafter described as a "picker," which is adapted to seize an insole-blank and hold it securely while the blank is moved across the work-table 232, either from the supply stack to the operative instrumentalities, or from the latter to another stack-holder which is in position to receive the finished blanks.

The pickers are, in general construction and mode of operation, substantially similar to those which are disclosed in an application for Letters Patent of the United States, Serial No. 579,109, filed Aug. 26, 1910 on behalf of the present inventor. The discharge-arm 236 is provided integrally, at its outer end with a vertical sleeve 246 (Figs. 18, 19, 20 and 21) in which slides the cylindrical shank 248 of one of the pickers. At the lower end of the shank is a head 250 which is radially slotted, and in each slot a claw 252 is pivotally mounted. These claws have hook-like sharpened extremities which may be retracted within the slots of the head, as shown in Fig. 18. By swinging the claws upon their pivots, their extremities may be projected downwardly and outwardly beyond the lower surface of the head, so that they may be introduced into the substance of an insole-blank, as shown in Fig. 19.

The claws are moved by means of a stem 254 which slides within the shank 248. This stem is provided, at its lower end, with a grooved collar 256, which coöperates with rounded projections on the several claws.

The movement of the claws is produced by relative movement of the shank and the stem, such relative movement being produced, in turn, by vertical movement of the sleeve 246 and the discharge-arm 236. When the sleeve is moved downwardly the shank participates in this movement until it is arrested by engagement with the insole-blank and thereafter the stem 254 alone participates in the downward movement of the sleeve, thus producing the relative movement by which the claws are swung outwardly.

To produce the operation of the stem just described, it is supported in the sleeve by means which tend to prevent relative movement of the stem and sleeve. For this purpose a flange 258, near the upper end of the stem, rests upon an internal shoulder in the sleeve, and is pressed against this shoulder by a stiff compression-spring 260. The upper end of this spring is supported against a collar 262 which rests, in turn, against a plug 264 screwed into the upper end of the sleeve.

The arrangement just described is such that the stem continues to move downwardly with the sleeve after the shank has been arrested by the engagement of the head 250 with the insole-blank, but nevertheless, after the claws have been fully introduced into the blank and the stem has reached its most depressed position, as shown in Fig. 19, the spring 260 yields to permit the sleeve to move downwardly through a slight additional space, sufficient to insure the operation of the picker regardless of variations in the thickness of the blanks which are operated upon.

To insure a firm contact between the head 250 and the insole-blank, during the operation of the claws, a compression-spring 266 is coiled around the shank within the sleeve 246, and in engagement with shoulders on the shank and on the sleeve, and for the same purpose a spring 268 is coiled around the lower part of the stem and is seated against shoulders on the stem and on the head 250.

After the claws have been introduced into the insole-blank an upward movement is imparted to the sleeve 246 to relieve the pressure of the blank against the work-table, and in order to prevent this movement from causing the release of the blank by retraction of the claws, means are provided for locking the shank 248 in the position to which it has been moved within the sleeve. For this purpose the shank is provided with a partially annular groove 270, which coöperates with a latch 272. This latch is mounted on a vertical pivot between lugs on the sleeve, and is controlled by a coiled spring 274 which tends to swing the end of the latch inwardly and into engagement with the slot. In the normal position of the parts the latch rests against the cylindrical

surface of the shank, but when the shank is moved upwardly within the sleeve the latch engages the slot and retains the shank in the position of Fig. 19 until the parts are released again in a manner hereinafter described.

The supply-arm 234 is provided with picker-mechanism similar to that just described.

10 The vertical movements of the supply and discharge-arms, and the picker-sleeves carried thereby, are produced by vertical movements of the yoke 240, and for this purpose the yoke is provided with lugs (Figs. 1, 24
15 and 31) which are fixed to a vertical rod 276. This rod is arranged to slide in bearings on the frame-yoke 244, and it passes through a tube 278 on which the turntable 226 is mounted. The vertical sliding movements are imparted to the rod 276 by cam-mechanism, and for this purpose a grooved collar 280, at the lower end of the rod, is articulated with the forked end of a lever 282, which is pivoted on an upright 284 on the
25 frame of the machine. The rear end of the lever 282 is connected, by a link 286 (Fig. 24), to a cam-lever 288, loosely pivoted on a transverse rock-shaft 290, which is mounted in bearings on the frame of the machine. This cam-lever carries a roller which engages a groove 292 in a cam 294. The cam is mounted upon the main cam-shaft 296 of the machine. The main cam shaft is rotated constantly by means hereinafter described, but the cam 294 is mounted loosely upon the shaft, and is operatively connected thereto only at suitable intervals in the operation of the machine, by automatic means which will be described.

40 The swinging movements of the arms 234 and 236 of the transfer-mechanism are produced as follows:—A gear-segment 298 (Figs. 1 and 2) is fixed to these arms adjacent the pivot 238, and this segment meshes
45 with the gear-segment 300, which is journaled upon the rod 276. A bent link 302 connects the segment 300 with an arm 304, which is fixed upon a rock-shaft 306 which turns in vertical bearings on the frame of the machine. A second vertical rock-shaft 308 (Figs. 2 and 6) is connected with the shaft 306 by segmental gears, and is geared, at its lower end, to a horizontal shaft 310. This shaft, in turn, is geared to a transverse
55 horizontal shaft 312. The shaft 312 (Figs. 6, 24 and 34) is provided with an arm 314 carrying, at its rear end, a roller 316 which engages the periphery of a cam 318. This cam is fixed, together with the cam 294, upon a sleeve 320 which turns on the cam-shaft 296, so that the cams 318 and 294 rotate in unison, and the roller 316 is caused to follow the contour of the cam by means of a spring 319 fixed to the arm. The relative
65 positions assumed by the sole-blanks in

the stack-holders on the turntable, and in operative relation with the knives of the machine, are such that, as an incident of the transferring operation, it is necessary to swing the blanks about vertical axes, both in transferring them from the stack-holders to the knives, and in returning them to the stack-holders. These swinging movements are produced by partial rotations of the pickers.

75 For the foregoing purpose the stem 254 of the picker associated with the arm 236 is keyed, at its upper end (Figs. 2 and 18) to a sleeve 322, upon which is formed a pinion 324. The stem is also connected, by a key 326 and a key-way with the shank 248, so that when the pinion is rotated both the stem and the shank are correspondingly rotated. Rotation of the pinion is effected by rack-teeth upon a rod 328, which slides in bearings on the arm 236. The opposite end of this rod rests against a cam 330 which is fixed upon the yoke 240, and the rod is held in engagement with the cam by a spring 332. In consequence of this arrangement the swinging movements of the arm 236 cause the rod 328 to traverse the cam, and thus to be moved longitudinally at such times and through such distances as to secure the necessary rotational movements of the picker.

Since the picker on the supply-arm 234 is rotated through smaller angles than is that on the discharge-arm 236, the rotations of the former may be produced by a simpler mechanism. An arm 336 is fixed to the upper end of the stem 334 of the former picker, and this arm is connected to a link 338, which is pivoted, at its end, to the yoke 240. The relative positions of this pivotal point and of the link 338 are such as to cause the link to swing the arm and turn the picker-stem from the position shown in full lines in Fig. 2, to the position shown in dotted lines in the same figure.

110 The partial rotative movements of the pickers, just described, are utilized also to effect automatically the release of the blanks by the pickers at suitable times. As shown in Fig. 20, the slot 270, with which the latch 272 coöperates, has a beveled or cam-like form at one end, and this end is so positioned that, when the picker is turned to swing the blank the latch is swung outwardly by the cam action so as to be disengaged from the slot. The picker is, at this time, in depressed position, with the blank held against the table, but when the picker is subsequently raised the shank 248 is at once relatively depressed by the spring 266, while the stem 254 remains in elevated position. This causes the claws to be retracted so that the blank is released. A similar arrangement is employed in connection with the picker on the supply-arm.

In order that the machine may operate on blanks of different sizes, the stack-holders are made adjustable to the length of the blanks. The toe-rods 230 are fixed, at their lower ends, in a slide 340 (Figs. 22 and 23), while the heel-rods 228 are similarly fixed in a slide 342. These slides are mounted upon guideways 344 on the turntable 226, and each slide is held in place, and is also movable, by means of an adjusting-screw 346, which is journaled between the guideways and has threaded engagement with a nut, fixed to the bottom of the slide.

Since the operation of the knives upon the blank is commenced at a point which should be determined with approximate accuracy as to its distance from the heel-extremity, the slide 342 is provided with an indicator 348, which coöperates with scale-marks on the guideway, these scale-marks being numbered in accordance with the sizes of the blanks to be operated upon.

To provide a bottom for the stack-holder which will accommodate itself to the adjustments just described, the heel-rods and the toe-rods are connected by a device 350 in the nature of a lazy-tongs, this device being capable of expanding and contracting while, at the same time, providing numerous closely adjacent points of support for the lowermost blank in the stack. The lazy-tongs is in turn supported, and is raised and lowered, by means of a horizontal bar 352 which extends, at its ends, between the toe-rods and the heel-rods, and which is fixed on the upper end of a rod 354.

The rods 354 slide vertically in bearing-sleeves 356 on the turntable, and they are controlled in their movements partly by counterbalancing mechanism, which supports the weight of the stacks of blanks in the stack-holders and tends constantly to raise the stacks as blanks are removed therefrom.

At the end of each rod 354 is fixed a chain 358, (Figs. 1 and 6) which passes thence upwardly over a pulley 360 journaled on the turntable. The chain then passes under a pulley 362 and is fixed, at its end, to the turntable. The pulley 362 supports a counterbalance-weight 364, and the several weights slide in vertical guideways 366 which are mounted on webs 368 integral with the turntable.

The upward movement of the blanks in the stack-holder, under the influence of the counterbalancing mechanism, is normally arrested by means of a retainer 370 (Figs. 2 and 25) which bears against the uppermost blank. This retainer is cut away at the middle to avoid interference with the operation of the pickers, while it has extensions toward the heel and toe of the blank so as to hold the blank down firmly in flattened position. The retainer is mounted on

a pivot 372, and it coöperates with a cam 374 mounted on a pivot 376 above the retainer. The cam is integral with an arm 378, and a tension-spring 380 connects the arm with the retainer. The spring acts normally to swing the arm downwardly and turn the cam into a position in which it forces the retainer down to, and holds it in, a horizontal position; but by swinging the arm upwardly the retainer may be released and raised into position to disengage the uppermost blank, or to receive a blank which is added to the stack by the transfer-mechanism.

The pivots 372 and 376 are fixed in a block 382 which is mounted on a sleeve 384, and this sleeve is fixed to the tube 278 so as to be rigidly connected and turn with the lower hub 386 of the turntable. The retainer is operated by means associated with the transfer-arms 234 and 236. For this purpose each of these arms carries, projecting from the vertical sleeve at its free end, an arm 388 which is bifurcated and provided with a roller 390. When the picker is swung into position above the stack of blanks, the end of the arm 378 engages the opening between the roller 390 and the solid part of the arm 388, as shown in Fig. 25, and the arm 378 is thus swung upwardly so as to release the retainer. Upon the movement of the picker away from the stack the roller 390 swings the arm 378 downwardly again.

When a blank is to be removed from the stack-holder it is necessary to release the retainer, as above described, but it is also necessary to prevent upward movement of the stack at this time under the influence of the counterbalancing-mechanism. Accordingly means are provided for locking this mechanism temporarily out of action, these means being shown particularly in Figs. 6, 24 and 28. A rod 392 is arranged to slide vertically in a sleeve 394, which is mounted on a member 396 of the frame of the machine in a position in which the rod 392 will align with the rod 354 of that stack-holder which at any time is in the blank-supplying position. The rod 392 is splined to the sleeve 394 so that it will not turn therein, and it carries at its upper end a block 398 with an undercut slot. This slot receives the lower end of the rod 354, which is provided with parallel collars that interlock with flanges 400 on the block 398 so as to couple the rods 354 and 392 together for vertical movement. A clutch is employed for preventing such movement at suitable times, this clutch comprising a collar 402, which loosely surrounds the rod 392 and it is provided with a recess in which a ball 406 operates. The recess is provided with an inclined surface 404, between which and the rod 392 the ball is adapted to wedge. The clutch-collar 402

is pivoted to the forked end of a lever 408 which, in turn, is pivoted between arms projecting from the sleeve 394. A spring 410, within the clutch-collar, tends to force the ball downwardly and out of wedging position, but the operation of the ball is also controlled by a finger 412 which is slidably mounted on a stud 414 fixed to the sleeve 394. A spring 416, coiled around the stud and of substantially greater strength than the spring 410, tends to hold the finger 412 in its uppermost position against a head at the upper end of the stud.

The clutch is thrown into and out of operation by a movement of the lever 408. When this lever is in the position shown in Fig. 28 the ball is held out of operation by the spring 410. If, however, the lever be swung in a direction to depress the clutch-collar, the spring 410 is compressed and the inclined surface 404 is brought into wedging engagement with the ball, this engagement being maintained by the yielding pressure of the finger 412, and any tendency to upward movement of the rod 392 is effectively prevented.

The lever 408 is actuated automatically by a cam-mechanism. For this purpose it is connected, by a link 418, with a cam-lever 420, pivoted on the frame of the machine, and this cam-lever carries, at its rear end, a roller 422 which engages a path 424 (Fig. 34) in one side of the cam 294.

When a blank is to be removed from the stack which is in supplying position the clutch is thrown into operation, as just described, and the retainer 370 is then raised. At this time the rising movement of the stack, under the influence of the counterbalancing-mechanism, is prevented by the clutch, but the counterbalancing-mechanism sustains the stack against the pressure with which the picker is operated to engage the uppermost blank.

The means for controlling the movements of the stack of blanks in the stack-holder which is in the receiving position are different, and are shown particularly in Figs. 1, 25 and 26. In this position the upward movement of the stack, at the time when the receiver 370 is raised, is prevented by means of a pair of detent-fingers 426 which are supported in position to cooperate with each stack-holder successively as it reaches the receiving-position. These detent-fingers are formed at the upper ends of levers 428, of which the lower ends are pivoted to links 430. The links are fixed to the ends of a rock-shaft 432 which turns in the lower end of a hanger 434, depending rigidly from a block 436 which is fixed on the frame of the machine below the table 232. The detent-fingers are actuated by means including a rock-shaft 438, journaled in a hanger 439 also depending from the block. This rock-

shaft carries two arms 440 which are connected, by links 442, with the finger-levers 428, so that by quarter-rotations of the rock-shaft the fingers are advanced into and retracted from a position to cooperate with the uppermost blank in the stack.

In addition to the swinging movements of the fingers about the pivotal connections at the lower ends of the levers 428, the movements of the fingers are modified in a vertical direction, by means of mechanism including a gate-cam. Each lever 428 is provided with a roller 444 which works in a cam-path in one side of the block 436, these cam-paths opening into a central recess in the block. In each cam-path is located a gate-cam 446, and these cams are pivoted to the upper end of a slide-rod 450 which moves vertically in a perforation in the hanger 434. The slide-rod is pressed upwardly by a spring 451 engaging its lower end, and each gate-cam is controlled also by a spring 452 which tends to rock it to the position shown in Fig. 26.

The result of the arrangement just described is that, during the advancing movements of the detent-fingers toward the stack, they follow an upper path of movement, in which the rollers 444 pass over the gate-cams, while in the return movements of the fingers the rollers pass beneath the gate-cams. The ends of the fingers accordingly follow the paths indicated in Fig. 25 by a broken line and arrow heads.

Assuming the fingers to have been advanced into engagement with the top of the stack, as shown in Fig. 25, another blank is then brought into position above the fingers by the action of the transfer-mechanism, as shown in said figure, and is there released by the picker. This blank lies upon the ends of the detent-fingers and the picker then retires, thus causing the retainer 370 to be depressed to operative position, whereby the newly received blank is engaged by the retainer. The detent-fingers are then retracted, and their withdrawal from between the blanks is facilitated by their following the lower path of movement above described.

The rock-shaft 438 is actuated, to operate the detent-fingers, by cam-mechanism. For this purpose it is connected, by gears 454, to a transverse rock-shaft 456. An arm 458 projecting rearwardly from the rock-shaft carries a roller which cooperates with a cam 460 (Figs. 4 and 24). This cam is mounted on a cam-shaft 462 journaled on the frame of the machine, and the shaft is rotated at suitable times by automatic mechanism hereinafter described.

Prior to the operation of the transfer-mechanism it is necessary to disengage both the lower feed-roller and the lower clamp-jaw from the blank upon which the machine has operated, to permit the picker to

remove this blank, and to retain these parts in depressed position until a fresh blank has been substituted. Accordingly means are provided for automatically drawing down the rods 58 and 124 prior to the operation of the transfer-mechanism. These rods are provided (Figs. 4, 5, and 24) with collars 464 upon which rests a plate 466 perforated to embrace the rods loosely. A cam-lever 468 is pivoted on the frame of the machine in such a position that one arm lies over the plate 466, while the other arm carries a roller 470 which engages a cam 472 fixed on the cam-shaft 462. In the normal position of this shaft the roller encounters a recess in the cam, so that the lever does not engage the plate 466, and the rods are thus free to rise to their upper operative positions. Throughout the greater part of the operative movement of the cam-shaft the mechanism is operative to hold the feed-roller and the clamp-jaw in blank-releasing position.

The various instrumentalities operative upon the sole-blanks have been described, together with their actuating-mechanisms. It now remains to describe the automatic devices by which the clutches, through which these instrumentalities are actuated, are thrown automatically into operation at the proper times and in suitable sequence to cause the various operations on the blanks to be performed in due time-relation.

In Letters Patent of the United States granted to the present applicant September 7, 1915, No. 1,152,584, there is disclosed an automatic sole-machine in which the drive-mechanism is controlled automatically, as to starting, stopping, and change of speed, by what may be described as an "end-feeler," this being a device which engages the sole-blank in such a manner as to detect the arrival of the end of the blank at a certain predetermined position, in the course of the operation thereon, and thereupon to throw certain controlling-devices automatically into operation. In the present machine a somewhat similar device is employed, but whereas said end-feeler was shown as operating only in a single position, the present end-feeler, by reason of the numerous functions of the machine controlled by it, is arranged to operate in various successive positions, and mechanism is provided for moving it automatically from one operative position to another in the course of the operation upon a single sole-blank.

The end-feeler 474 (Figs. 2, 4, 11, and 12) is in the form of a shoe which is adapted to rest on the upper surface of a sole-blank during the movement of the blank produced by the feeding and swinging devices. The forward end of the shoe is curved upwardly, to permit the blank to be introduced freely beneath it in the first instance. The end-feeler is pivoted to a sleeve 476, which in

turn slides upon the lower end of a stem 478. A spring 480, inclosed within the sleeve, acts to press the feeler downwardly against the surface of the sole-blank, the movement of the sleeve under the influence of the spring being limited by a pin-and-slot connection between the sleeve and the stem, as shown in Fig. 12.

Whenever the blank which is being operated upon is carried, in the course of the feed-movement, beyond the end-feeler, the latter descends under the influence of gravity and of the spring 480, and thereupon throws into operation various mechanism for actuating one or more of the operative instrumentalities of the machine. The comparatively slight force of the spring 480 is not depended upon, however, to furnish the power by which these mechanisms are thrown into operation, but serves merely to throw into operation, in a passive manner, an intermediate power-mechanism by which the drive-clutches of the machine are more directly controlled.

The power mechanism in question is shown particularly in Figs. 11, 13 and 14. A lever 482 is mounted to rock on a stud 484 on the frame of the machine. One arm of this lever extends downwardly, and is perforated to receive a rod 486 which is pivoted at 488 on the frame of the machine. The rod constitutes a guide for a compression-spring 490, which engages the lever-arm and tends to swing it rearwardly so as to move the upwardly-projecting arm of the lever in a forward direction. An adjustable stop-nut 492 is also mounted on the guide-rod 486.

The lever 482 carries, at its upper end, a pivot-rod 494 upon which a lever 496 is mounted, and the lower arm of this lever is slotted to receive a stud 498 projecting from the side of a link 500. The link is pivoted to a cam-lever 502, which is pivoted at 504 on the frame of the machine. The cam-lever carries a roller which engages a cam 506 mounted on the shaft 118, and a spring 508, connected to the cam-lever, acts to maintain the roller in engagement with the cam. Since the shaft 118 is in constant rapid rotation, as before described, the cam 506 acts to oscillate the cam-lever constantly, and the oscillations are transmitted, through the link 500 to the lever 496.

Normally the oscillations of the lever 496 are idle, having no influence on the lever 482. The lever 496 is provided, however, at its upper end with a lateral lug 510, and an abutment is provided by which, at suitable times, the oscillating movement of the lug is arrested, whereupon the lever 496, being fulcrumed upon the lug 510, becomes a lever of the second class, acting to move the lever 482.

The abutment in question is constituted by a lug on an arm 512, fixed to and projecting rearwardly from a rock-shaft 514 which is

journalled, in horizontal position, on the frame of the machine. This rock-shaft is provided, at its ends, (Figs. 4 and 11) with arms 516 which support a horizontal rod 518 extending parallel to the rock-shaft. The rod 518 is embraced by the bifurcated rear extremity of an arm 520 projecting rigidly from the sleeve 476. When the end-feeler is supported, in raised position, upon a sole-blank the parts just described have the position shown in Fig. 11, in which position the lug 510 swings freely over the lug on the arm 512. But when the end-feeler descends, upon disengagement of the sole-blank, the arm 512 is raised, and the oscillating movement of the lug 510 is then arrested as above described.

When the lever 482 is swung rearwardly at its upper end by the action of the lever 496, it acts to throw into operation one or another of the automatic clutches hereinbefore referred to. One of these clutches is that by which the shaft 214 is turned, to operate the mechanism by which the tools are shifted to vary the distance of the between-substance from the edge of the sole. The drive-clutch for the shaft 214 is in the form of the well-known Horton clutch (Fig. 17), and it comprises an inner clutch-member 522 fixed to the shaft 214, and an outer clutch-member 524, roller-wedge elements being introduced, in the usual manner, between these clutch-members and being controlled by the usual controller-ring 534. The outer clutch-member 524 is fixed on a shaft 526, which is connected, by bevel-gears 528, with a vertical shaft 530. This latter shaft is driven (Figs. 2, 3 and 4) by a worm-and-gear connection 532 with the shaft 118, so that the shaft 526 is constantly rotated.

The controller-ring 534 is provided with five teeth, as shown in dotted lines in Fig. 11, of which one is normally engaged by a detent 536 (Figs. 2 and 11) pivoted on the frame of the machine. This detent is thrown out of operative position, when the clutch is to operate, by connection with the lever 482. For this purpose the detent is connected, by a link 538, with an arm 540 which projects upwardly from a rock-shaft 542 journalled on the frame of the machine. A second arm 544 depends from the rock-shaft, and is bifurcated, at its lower end (Fig. 14) to receive a trip-member 546 which is pivoted at its rear end on the rod 494, so that the trip-member is moved longitudinally by the swinging movement of the lever 482.

The trip-member is provided with a shoulder 548 adapted to cooperate with a cross-pin 550 fixed in the arm 544, the trip-member being normally held down against the pin by a grasshopper-spring 552 which presses against its upper surface. Accordingly, when the lever 482 is swung rear-

wardly, in consequence of the descent of the end-feeler 474, the trip-member pulls rearwardly upon the cross-pin 550, thus swinging the arm 544 rearwardly and, through the connections above described, releasing the detent 536 from the controller-ring of the clutch. The clutch is thus permitted to operate so as to impart a partial rotation to the shaft 214.

Immediately upon the completion of its function, the trip-member 546 is disengaged from the cross-pin 550. This is accomplished by the cooperation of a stud 554, which is fixed on the frame of the machine, with a beveled shoulder near the end of the trip-member. The shoulder 548 being thus raised clear of the cross-pin, the arm 544 is at once returned to its normal position by the action of a leaf-spring 555 which bears against the rear of the arm. The clutch-detent 536 is thus returned to operative position, so that it disconnects the clutch and stops the movement of the shaft 214 after it has performed one-fifth of a rotation, this movement being sufficient to cause the cam 212 to move the tools from one operative position to the next operative position in order.

To prevent an immediate repetition of the tripping action just described, a latch 556 is pivoted to the trip member and arranged to cooperate with a lug at the upper extremity of the lever 482, so as to retain the trip-member in raised position clear of the cross-pin 550. The latch retains the trip-lever in this position until, in consequence of the resumption of its normal position by the end-feeler, the lever 496 resumes its normal idle movements with respect to the lever 482 whereupon an arm 558, extending upwardly from the latch, is engaged by a trip-pin 560 projecting from the lever 496, and the latch is thereby thrown out of operation so as to permit the trip-member 546 to resume its operative position.

Referring to Fig. 8, which shows a typical insole which has been channeled and slit, it will be apparent that the width of the margin beyond the between-substance is changed first at the junction of the shank with the ball of the insole, then near the toe-end, then again after passing the toe-end, and again at the junction of the ball with the shank. In order that the end-feeler may detect the arrival of the insole-blank at the various positions in which these changes occur, it is necessary for it to operate at a succession of different distances from the knives. Figs. 35 and 36 show, by the various outlines therein, the position occupied by the blank at the time when these various changes in the position of the knives must be made, and the corresponding operative positions of the end-feeler are indicated by vertical lines, designated by the

Figs. 1 to 5 in the order in which the positions are assumed by the end-feeler.

To permit the end-feeler to be moved to the various positions in question, the stem 5 478, by which the feeler is supported, is mounted (Figs. 3 and 12) in a carriage 562 which slides horizontally along the face of a guideway 564 on the frame of the machine. The carriage is supported, and is held 10 against the guideway, by a horizontal rock-shaft 566 which passes through the carriage and is journaled parallel with the face of the guideway.

The carriage 562 is actuated by cam-mech- 15 anism driven by a cam-shaft 568 which is journaled, in vertical position, at the rear of the machine (Figs. 3 and 5). This cam-shaft is connected, by gears 570, with a horizontal shaft 572 which, in turn, is connect- 20 ed with the cam-shaft 214 by sprocket-wheels and a chain 574. Accordingly, the cam-shaft 568 is partially rotated at each movement of the cam-shaft 214 consequent upon an operation of the end-feeler, so that 25 at each such operation the end-feeler sets in motion the mechanism by which it is moved to a new position of operation.

The cam-shaft 568 carries a cam 576 which is engaged by a roller on the rear end of a 30 cam-lever 578. The cam-lever is pivoted on a stud 580 (Fig. 16) rising from the frame of the machine. At the forward end of the lever 578 is mounted a guideway 582, in which a slide-block 584 is mounted. This 35 block is connected, by a link 586, with a slide-block 588 which moves in a guideway 590 on the frame of the machine. The slide-block 588 comprises two parts, pivotally connected together, one of these parts being 40 embraced by the bifurcated rear end of a lever 592 which is mounted, in horizontal position, on a pivot 594 at the top of the machine. The forward bifurcated end of the lever 592 embraces a pivot-block 596 45 mounted on the top of the carriage 562.

Through the connections just described a partial rotation of the cam 576 causes a movement of the carriage along the guideway 564 so as to change the operative position of the end-feeler. The amplitude of 50 this movement is determined primarily by the form of the cam, but in order that the machine may be adjusted to operate on blanks of different sizes, an adjustable connection is provided between the link 586 and 55 the cam-lever 578, so that it is possible to vary the effective arm of that lever which acts, through the link, upon the lever 592.

The adjustable connection just referred to 60 is embodied in the guideway 582 and the slide-block 584 therein. This slide-block is normally fixed in place by a clamp-plate 598 (Fig. 15) which moves in the lower part of the slot in the guideway, and which is 65 tightened by means of a nut on the upper

end of a bolt 600, which constitutes the pivotal connection between the link and the slide-block. When the machine is to be adjusted for a different size of insole-blanks the nut is loosened, and the slide-block 584 70 may then be moved in the guideway to a position at a greater or smaller distance from the pivot 580. To facilitate this adjustment a pointer 602 (Fig. 5) is fixed to the slide-block in position to coöperate with 75 numerals upon a graduated scale-plate 604. This plate is mounted removably in lugs 606 on the guideway 582, so that it may be conveniently changed according to the style of blanks upon which the machine is to 80 operate.

Assuming the guideway 582 to maintain a fixed relation with the lever 578, it will be apparent that adjustments of the slide-block 584 in the guideway will vary all of the 85 movements of the lever 592 and of the carriage 562 proportionately, so that if all sizes of insole-blanks of a given style differed from each other only in absolute dimensions and not in proportions, the operation of the 90 mechanism, as so far described, would correctly operate the end-feeler for all sizes of blanks of a given style, the shape of the cam 576 being determined in accordance with the characteristics of the style. In 95 some cases, however, blanks of different sizes, but of the same style, are not the same in proportion throughout the range of sizes. The relative length of the shank and the forepart may be different, for example, in 100 different sizes of the same style, or other differences in proportion may be introduced. The adjusting-mechanism for the end-feeler is accordingly so constructed as to adapt itself to these differences in proportion, 105 while permitting itself to be correctly adjusted for all different sizes by merely moving the slide-block 584 as above described. For the purpose in question the guideway 582 is not rigidly mounted on the lever 578, 110 but is attached to the latter pivotally, by means of a stud 608, (Fig. 15) this stud being located at the middle of the length of the guideway. The guideway is provided, at its rear end, with an arm 610 which is 115 bifurcated so as to embrace a block 612 pivoted to a slide 614. The slide 614 moves in a guideway 616 fixed stationary upon the frame of the machine (Figs. 3 and 16). To move the slide 614 in its guideway a second 120 cam 618 is mounted on the cam-shaft 568, and this cam is engaged by a roller on a cam-lever 620 which is connected, by a link 622, with the slide 614. A spring 623, attached to the lever, holds the roller in en- 125 gagement with the cam-surface.

In Fig. 3 the parts are shown with the slide-block 584 adjusted to an intermediate position, corresponding to an insole-blank of medium length. This may be assumed 130

to present the normal characteristics of the style of insole-blank upon which the machine is to operate, and in this position of the parts any rocking movement of the guideway 582 upon its pivot 608, under the influence of the cam mechanism just described, will have no effect upon the movement transmitted from the lever 578 to the lever 592, owing to the fact that at this time the pivots 600 and 608 are in vertical alinement. If, however, the machine be set for an insole of a different size or length, the slide-block 584 will be moved so as to bring the pivot 600 out of alinement, in one direction or the other, with the pivot 608; whereupon, rocking movements imparted to the guideway 582 tend either to augment or diminish the movements which would otherwise be imparted to the lever 592, according to the position of the slide-block 584 and the shape of the cam 618. By a suitable formation of the cam 618, accordingly, any desired departure from uniformity of proportions throughout the range of sizes of the insole-blanks of a given style, may be provided for.

In changing from one style of insole to another, it is necessary to remove the cams 576 and 618, and in order that this may be conveniently accomplished these cams are mounted loosely upon two pins 624 (Figs. 3 and 5) which project upwardly from a disk 625 at the upper end of the cam-shaft 568. The cams are normally retained upon the pins by a plate 627 which is pivoted to the end of a retaining-arm 626. This arm, in turn, is pivoted on the frame of the machine, so that it may be swung upwardly, but it is normally retained in position by a clamping-arm 628, of a construction which need not be particularly described. In changing from right insole-blanks to left-insole-blanks the same cams are used, but they are inverted in position, owing to the fact that in operating on a right insole the operations commence on the inside of the shank, while in operating on a left sole they commence on the outside of the shank, so that the sequence of positions of the end-feeler is reversed.

The possible differences in proportion of two blanks of the same style are illustrated in Figs. 35 and 36, which are comparative diagrams illustrating the operation of the machine upon relatively small and large blanks of the same style. The several operative positions of the end-feeler are indicated in both figures by the numerals 1 to 5.

In connection with each traversing movement of the carriage 562, by which the end-feeler is brought to a new operative position, it is necessary to raise the end-feeler in order that it may clear the edge of the insole-blank and be placed again on the upper surface of the blank. For this purpose a

cam 630 (Figs. 11 and 12) is splined to the rock-shaft 566, and is embraced by the parallel side-walls of the carriage so as to be moved along the shaft together with the carriage. This cam engages a shoe on the upper end of the stem 478, and the stem is held up in engagement with the cam by a coiled spring 632. A pinion 634 (Figs. 3 and 11) is fixed at the left-hand end of the rock-shaft 566, and is engaged by a gear-segment on the forward end of a lever 636, this lever being loosely journaled on the rock-shaft 542. At its rear end the lever 636 carries a roller, which engages a cam 638 on the shaft 214. The cam has five low points, on one or another of which the roller normally rests, being held in this position by a spring 640 attached to the lever, but at the beginning of each partial rotation of the shaft 214 the roller is raised by one of the intermediate high points, thus turning the rock-shaft 566 from the position shown in Figs. 11 and 12, so that the cam 630 permits the stem 478 to be raised by the spring 632, and thus raises the end-feeler to a position in which it is held clear of the insole-blank during the traversing movement of the carriage 562.

The cam-shaft 214, by which the position of the tools is adjusted, completes a rotation once for each cycle of operations upon an insole-blank. Its last movement is caused, through the agency of the end-feeler, upon the completion of the channeling and slitting operations upon the insole-blank, when the knives have reached the heel-portion of the blank. This final movement is employed to throw into operation the train of mechanism by which the lower feed-roller and the lower clamp-jaw are disengaged from the blank and by which the transfer-mechanism is operated to remove the finished blank and supply a fresh blank.

The feed-roller and the clamp-jaw are depressed, as before described, by a cam mounted on and actuated by the cam-shaft 462, and this cam-shaft is rotated, at the proper time, by means of a Horton clutch (Figs. 1, 4, 11 and 27). The clutch comprises a member (not shown) fixed to the shaft 462, and an outer drive-member 642, which is constantly rotated. This outer member is connected, by a sprocket-wheel and chain 644, with a sprocket-wheel 646 (Fig. 34) which is fixed to the hub of a gear-wheel 648. This gear-wheel is fixed to the main cam-shaft 296, and it meshes with a pinion 650 (Fig. 1) on the power-shaft 146, so that the gear 648 serves to drive constantly both the main cam-shaft and the clutch-member 642.

The operation of the clutch in question is controlled by the usual controller-ring 652 (Figs. 11 and 27), this ring having a single lug, as shown in dotted lines in Fig. 11,

which is normally retained by a detent-lever 654. The detent-lever is pivoted on a stud 656 projecting from the frame of the machine (Fig. 4) and is held in engagement with the controller-ring by a spring 658.

The detent 654 is tripped by the same power-mechanism which is employed to trip the Horton clutch by which the shaft 214 is rotated. For this purpose a second trip-member 660 is pivoted, at its rear end, upon the pivot-pin 494, while this member is provided, at its forward end, with a shoulder 664 arranged to cooperate with a pin 662 fixed in the upper end of the detent-lever. As shown in Fig. 11, there is normally a sufficient space, between the shoulder and the pin just described, to prevent their operative engagement during the movement of the lever 482 by which the trip-member 546 becomes effective as above described. When, however, the cam-shaft 214 reaches its final or fifth operative position the amplitude of movement of the lever 482 is automatically increased, so as to render the trip-member 660 effective. For this purpose the link 500 is connected at its forward end, by means of a rod 666, with an arm 668 (Figs. 2 and 11) which is fixed on a rock-shaft 670 journaled in horizontal position at the top of the machine. At its inner end the rock-shaft carries a roller which engages a cam 674 fixed on the cam-shaft 214. This cam has a rise so located as to swing the lever 672 coincidently with the final partial rotation of the cam-shaft 214, thereby causing the link 500 to be swung upwardly, through the connections just described, so that the stud 498 is brought to the upper end of the slot in the lower arm of the lever 496. In this manner the effective lever-arm is so shortened as to substantially increase the movements imparted to the lever 482, thereby causing the shoulder 664 to engage and move the pin 662, and thus release the Horton clutch on the cam-shaft 462. Thereupon the cam-shaft makes one rotation, at the first part of which the lower feed-roller and the lower clamp-jaw are depressed, and at the end of which these parts are released again so that they may engage a fresh blank which has in the meantime been introduced.

The blank-transferring mechanism is operated, as before described, by means of cams 294 and 318, (Fig. 34) fixed on a sleeve 320 which is loosely mounted on the main cam-shaft 296. These cams are normally motionless, but are arranged to be driven by a Horton clutch, and this clutch is thrown into operation at each rotation of the cam-shaft 462. The clutch in question comprises an inner member, integral with the sleeve 320, and an outer member 676 which is pinned to the cam-shaft 296, so as to be rotated constantly thereby. The controller-ring 678 of the clutch is normally engaged

by a detent 680 (Fig. 24) which is pivoted, at its lower end, on a bracket fixed to the frame of the machine. The detent is connected, by a link 682, with one arm of a bell-crank lever 684 pivoted loosely, for convenience, on the rock-shaft 312. The other arm of the lever is connected, by a rod 686, with an arm 688, (Figs. 4 and 24) this arm being fixed to the cam-lever 468 which is actuated by the cam 472 as before described. At each operation of this cam-lever, accordingly, the clutch just described is thrown into operation so as to cause the blank-transferring mechanism to perform its cycle of operations. At the same time the retaining-fingers 426 are actuated more directly from the shaft 462, as before described, through the operation of the cam 460.

By the continued operation of the machine, as so far described, a stack of blanks in one of the stack-holders is ultimately exhausted while another stack-holder, which is in the blank-receiving position, is gradually filled. It is accordingly necessary to rotate the turntable from time to time to interchange the stack-holders, in order that they may be emptied and refilled by the operator of the machine and may then transfer their contents to the operative instrumentalities of the machine. As shown in Figs. 6 and 24 the turntable bears, at its periphery, upon anti-friction rollers 690 journaled on the frame of the machine, these rollers supporting the weight of the turntable. The turntable is rotated automatically, by the power of the machine, at a time which is determined automatically as that at which that one of the stack-holders in the blank-receiving position has become filled with finished blanks.

The turntable is mounted on and keyed to the tubular shaft 278, so as to rotate therewith, and a gear 692 is loosely journaled on the shaft 278 below the turntable. Integral with the gear is one member of a jaw-clutch, the other member being in the form of a sleeve 694 which is splined to the shaft. The clutch-members are normally in engagement, so that the shaft and the turntable may be turned by rotation of the gear. The gear 692 is turned intermittently through angles of 120°, and is then locked in position, in the interval between its turning movements, by mechanism shown particularly in Figs. 1, 6 and 32. A rod 696 is mounted, in horizontal position, on the frame of the machine alongside the gear, and upon this rod a sleeve 698 is mounted to slide longitudinally. The sleeve is provided with a series of gear-teeth 700, each of which extends, in annular form, partly around the sleeve. The sleeve is grooved, at its rear end, to receive a collar 702, (Fig. 1) which collar is connected, by a link 704, with a cam-lever 706. This lever is pivoted, at its

upper end, on a stud 708 on the frame of the machine. The lever 706 carries a roller 710 which engages a groove 712 in a cam 714 mounted on the main cam-shaft 296 (Figs. 1 and 34). By means of this cam the sleeve 698 is moved longitudinally, in a forward direction, at a time when the gear-teeth 700 are in engagement with the gear 692, so that the gear and the turntable are thereby rotated. The return movement of the sleeve occurs at a time when the teeth 700 have been moved out of engagement with the gear, in a manner which will be described.

Associated with the sleeve 698 is a locking-member 716, having the general form of a partly-cylindrical shell, which embraces one side of the sleeve 698 and engages, at its edges, two longitudinal shoulders on the sleeve, as shown in Fig. 32. The locking-member is provided with gear-teeth 718, which are adapted to mesh with the teeth of the gear 692. The locking-member is mounted pivotally, at its ends, upon the rod 696, and its ends engage bearings on the frame of the machine, so that the locking-member does not move longitudinally. Accordingly, when the teeth 718 are in engagement with the gear the gear and the turntable are locked against rotation. In order to throw the teeth of the locking-member and of the sleeve 698 alternately into engagement with the gear 692, the locking-member is provided, at its rear end, with an arm 720 (Figs. 6 and 32), and this arm is connected, by a link 722, with a cam-lever 724. This lever carries a roller which engages a path in the side of a cam 726 (Fig. 34) on the main cam-shaft 296, and the cam is fixed to a sleeve 728 together with the cam 714, so that the actuating-sleeve 698 and the locking-member 716 are moved in timed coöperation. The rocking movements are imparted to these parts at such times as to engage the teeth 700 with the gear 692 during the forward movement of the sleeve 698, then to disengage the teeth 700 and engage the teeth 718 with the gear, and then to move the sleeve rearwardly while the gear is locked by the teeth 718. The sleeve 728, with the cams 714 and 726 carried thereby, is normally motionless but is moved, at the proper time, by a Horton clutch shown in Fig. 34. The inner member of this clutch is integral with the sleeve 728, while the outer member 730 is pinned on and constantly rotated by the cam-shaft 296. The clutch is provided with a controller-ring 732 which coöperates with a detent-lever 734 (Fig. 1) pivoted on the frame of the machine. A spring 736 is mounted on a guide-rod 738 which passes through an opening in the lower end of the detent-lever, and this spring retains the detent normally in operative position.

In order that the rotary movement of the

turntable may take place automatically when one of the stack-holders has been filled and another emptied by the transfer-mechanism, means are employed which are shown particularly in Figs. 1 and 6. A trip 740 is so located as to stand directly beneath the vertical slide-rod 354 of that one of the stack-holders which is in position to receive the finished insole-blanks from the transfer-mechanism. Accordingly, when the stack-holder in question has been filled, and the rod 354 has been depressed to its lowermost position, the rod engages the trip and thereby rocks a lever 742, on the forward end of which the trip is supported. This lever is pivoted on the frame of the machine, and it is connected, by a link 746, with one arm of a bell-crank lever 748 which is also pivoted on the frame of the machine. The other arm of the bell-crank lever is connected, by a link 750, with the detent 734. This detent is tripped and the Horton clutch released, thereby permitting the mechanism to operate by which the turntable is partly rotated as before described.

Before the turntable is rotated it is necessary to insure that the carrier-arms 234 and 236 be swung to an intermediate position in which the pickers will be clear of the blank-retaining devices at the tops of the stack-holders. Accordingly cam-mechanism is employed for this purpose, the cam 714 being provided with a lateral groove 752 which is engaged by a roller on the forward end of an arm 754 (Figs. 1, 6, 24 and 34). The arm is fixed on the rock-shaft 290, and a second arm 756, projecting upwardly from the rock-shaft, is pivoted to a rod 758 which is slotted at its forward end. The slot embraces a pin in the end of a lever-arm 760, which is integral with the cam-lever 314 through which the swinging movements are imparted to the arms of the transfer-mechanism in the manner hereinbefore described. In the normal operation of the mechanism the pin 759 moves freely through the slot in the rod 758, and its movements are controlled wholly by the cam 318 and the spring 319, but when the sleeve 728 is rotated, with the cams 714 and 726, to operate the turret-rotating mechanism, the cam-path 752 actuates the arm 754 in a direction to cause the rod 758 to be drawn rearwardly, thus forcibly swinging the lever-arm 760 and rocking the shaft 312 into an intermediate position, in which it is held until the completion of the turning-movement of the turntable.

In starting the operation of the machine the operator fills with blanks the stack-holder which is at the moment located at the front of the machine. It is then necessary to cause a rotative movement of the turntable by which the filled stack-holder may be brought to the blank-discharging

position. Since the stack-holder which is at the time in the blank-receiving position is still empty, the automatic means above described for causing a rotation of the turntable do not operate, and it is therefore necessary for the operator to cause this motion to occur. As a convenient means for the purpose the guide-rod 738, which is connected, as above described, with the detent-lever 734, (Fig. 1) is pivoted to the upper end of a lever 762, which lever is pivoted on the frame of the machine. The lower end of the lever is connected, by a rod 764, with a treadle-lever 766, normally held in raised position by a spring 768. By depressing the treadle the operator causes the guide-rod 738 to be moved rearwardly, and a stop-nut on this rod presses the detent-lever 734 so as to disengage it from the controller-ring of the corresponding clutch, and thereupon the mechanism operates to impart a partial rotation to the turntable.

It is sometimes desirable for the operator to be able to turn the turntable independently of the power-mechanism of the machine, and for this purpose provision is made for disengaging the turntable from its actuating and locking mechanisms. The clutch-sleeve 694 is peripherally grooved to receive a stud at the rear end of a lever 770, (Fig. 1) which lever is pivoted, at its forward end, on the frame of the machine. The lever 770 is connected, by a rod 772, with a treadle-lever 774, and by pressing the treadle the operator may raise the clutch-member 694 out of engagement with the coöperating clutch-member, thereby freeing the turntable from the gear 692 and the locking-device.

In order to fill one of the stack-holders with fresh blanks it is necessary for the operator to be able to swing the blank-retainer 370 out of position at the top of the stack-holder. Accordingly the block 382, upon which the blank-retainer and its locking-lever 378 are supported, is attached to the sleeve 384 of the turntable by a pivot 776, and is normally locked in the position shown in Fig. 25 by means of a locking-plate 778, which is arranged to slide in a bearing formed on the sleeve (Fig. 33). The locking-plate is connected, by a rod 780, with a bell-crank lever 782 pivoted on the turntable, and the bell-crank lever is articulated with a plunger 784 projecting outwardly. A spring 786 holds the rod and the locking-plate normally in elevated position, but by pressing the plunger the operator may cause the block 382 to be released, so that it and the parts carried thereby may be swung upwardly to the position shown, in dotted lines, in Fig. 31. It will be understood that a similar arrangement is employed in connection with each of the stack-holders.

The normal automatic operation of the

machine, as a whole, is as follows: An insole-blank, when in engagement with the feed-mechanism and the knives, first occupies a position in which the knives enter the leather at the junction of the heel-portion and one side of the shank. At this time the knives are in a forward position, so as to produce a wide margin between the channel and the edge of the blank. The blank is now fed by the feed-rollers so as to present its margin progressively to the knives, which have therefore a drag-cutting effect. During the progress of this feeding operation the clamp-jaws and their actuating-mechanism act constantly, under the control of the edge-feeler, to swing the blank, whenever necessary, so as to maintain a correct direction of feed.

The end-feeler rests upon the upper surface of the blank, its first position being such that it will be released, and fall, when the blank reaches the position in which the knives are passing from the shank to the forepart (Fig. 7). When the end-feeler is so released it throws into operation the mechanism for moving the knives, the first such movement being rearward, so as to diminish the width of the sole-margin along the side of the forepart. Immediately upon its release the end-feeler is raised and then moved to a position nearer the knives, so as to determine the moment at which the knives have reached the point near the toe-end of the insole, where the margin should be widened again.

The operations just described are continued until the knives have reached the heel-portion again, on the side of the blank opposite to that at which they started to operate. The end-feeler then again operates, and the feed-mechanism and the swinging-mechanism are disengaged from the blank. The transfer-mechanism then operates to seize the finished blank and convey it to the stack-holder which is in the receiving-position, and at the same time to seize a blank in the stack-holder which is at the delivery position and convey it to the knives and the feed-mechanism. Finally, the lower feed-roller and the lower clamp-jaw are released, so that they engage the blank, and the channeling and slitting operations are begun as before.

The present invention is not limited to use in machines for performing the specific operations of channeling and slitting insole blanks, but has features applicable to machines for performing various more or less analogous operations, and it will be understood that the invention is not, in general, limited to the details of construction and operation hereinbefore described and illustrated in the accompanying drawings, but that it may be embodied in various forms within the scope of the following claims.

What is claimed is:

1. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; and means, for presenting the blank to the tool, including a pair of clamp-jaws between which the blank is intermittently clamped, and mechanism operable on both clamp-jaws to swing them about an axis approximately coincident with the point of operation of the tool.

2. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; a feed-member operable also on said marginal portion; and means operable intermittently to grip the flat surfaces of the blank and swing it about the point of engagement of the feed-member as a center.

3. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; means for intermittently gripping the flat surfaces of the blank and swinging the blank about the point of operation of the tool as a center; and feeding-means, independent of the swinging-means, for advancing the margin of the blank with relation to the tool.

4. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; feeding-means operable intermittently upon the blank to advance the margin thereof relatively to the tool; and means, independent of said feeding-means, operable intermittently during the inactive periods of the feeding-means, to swing the blank about the point of operation of the tool as a center.

5. A sole-machine having, in combination, a knife for operating on the marginal portion of a sole-blank; feeding-means operable upon the between-substance of the blank adjacent the point of operation of the knife; and means, operable progressively upon a portion of the flat surface of the blank within the between-substance, for moving the blank differentially with respect to said feeding-means, whereby the blank is swung to maintain its marginal portion in proper relation to the tool.

6. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; and means, for presenting the blank to the tool, including two devices which progressively grip the flat surface of the blank at two points at different distances from the edge of the blank, and automatic actuating-mechanism, for actuating said two devices respectively, adapted to impart independent differential movements to said devices whereby the blank is not only advanced to the tool but also swung to maintain its marginal portion in proper relation to the tool.

7. A sole-machine having, in combination,

a tool for operating on the marginal portion of a sole-blank; feed-rollers engaging the blank adjacent the point of operation of the tool; means for rotating the feed-rollers intermittently, to advance the blank relatively to the tool; and means, operable during the pauses in the operation of the feed-rollers, for swinging the blank to maintain its marginal portion in proper relation to the tool.

8. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; an edge-gage; means for feeding a blank with its edge in contact with the edge-gage; a feeler engaging the edge of the blank adjacent the edge-gage; means for swinging the blank, under the control of the feeler, to maintain the edge in contact with the gage; and means for moving the tool transversely of the line of feed to vary the distance of its point of operation from the edge of the blank during the operation thereon.

9. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; feeding-means also engaging said portion, to advance the blank to the tool; an edge-gage for guiding the blank; and means acting automatically to move the tool during the operation on the blank, transversely to the direction of feed to vary the distance of its point of operation from the edge-gage.

10. A sole-machine having, in combination, instrumentalities, for operating upon the marginal portion of a sole-blank, including means for feeding the blank; an end-feeler arranged to ride on the blank in advance of the point of operation; and mechanism controlled by the end-feeler and operating, when said feeler is disengaged by the end of the blank, to change the operative position of said instrumentalities.

11. A sole-machine having, in combination, a tool for operating on the marginal portion of a sole-blank; means for feeding the blank past the tool; mechanism for changing the distance of the point of operation from the edge of the blank; and means engaging the blank and arranged to determine automatically the distance of its end from the tool and to throw said mechanism into operation when the end of the blank reaches a predetermined distance from the tool.

12. A sole-machine having, in combination, devices, for operating on the marginal portion of a sole-blank, including means for feeding the blank; blank-supplying mechanism for supplying blanks to said devices; and means arranged to engage the blank and adapted to determine automatically the distance of its end from the point of operation of said devices and to throw said mecha-

nism automatically into operation when the end of the blank reaches a predetermined distance from said point of operation.

13. A sole-machine having, in combination, devices for operating on the marginal portion of a sole-blank, including means for feeding the blank; mechanism operable, at a plurality of points in the course of the operation on a blank, to control the operation of said devices; an end-feeler arranged to ride on the blank at a point in advance of the point of operation, said feeler being connected with said mechanism so as to throw it into operation when the feeler is disengaged by the blank; and means operating, after such disengagement, to shift the feeler in a direction to change its distance from the point of operation.

14. A sole-machine having, in combination, devices for operating on a sole-blank including means for supplying the blank, means for feeding the blank, and a tool for acting on the marginal portion of the blank; mechanism for controlling the operation of said devices; and means engaging the blank and arranged to determine the distance of its end from the point of operation of said tool and to throw said mechanism intermittently into operation when the end of the blank reaches various successive predetermined distances from the point of operation of the tool.

15. A sole-machine having, in combination, devices for operating on a sole-blank, including means for feeding the blank; mechanism for controlling the operation of said devices; an end-feeler arranged to ride on the blank in advance of the point of operation on the blank and to throw said mechanism into operation when the feeler is disengaged by the blank; and automatic means for shifting the end-feeler, after such disengagement, to a new operative position and for raising the feeler, coincidently with the shifting movement, to clear the end of the blank.

16. A sole-machine having, in combination, devices for operating along the marginal portion of a sole-blank, including means for feeding the blank; means for holding a supply of blanks; and transfer-mechanism arranged to seize and positively hold a blank from said supply and to transfer it to the feeding-means in a position having a definite relation to that occupied by the blank in the supply-holding means.

17. A machine having, in combination, devices for operating on blanks of sheet-material; a plurality of holders for stacks of blanks; and mechanism for transferring blanks singly from each of the stack-holders to said devices and for thereafter returning blanks which have been operated on to one of the said stack-holders.

18. A machine having, in combination,

devices for operating on blanks of sheet-material; a plurality of holders, for stacks of blanks, movable interchangeably into blank-discharging position and blank-receiving position; and mechanism for transferring blanks singly from the stack-holder in the first of said positions to said operating-devices, and for transferring the blanks which have been operated on to the stack-holder which is in the second of said positions.

19. A machine having, in combination, devices for operating on blanks of sheet-material; a plurality of holders for stacks of blanks, movable interchangeably into blank-discharging position and blank-receiving position; mechanism for transferring blanks from the discharging holder to said devices and from said devices to the receiving holder; and means for automatically interchanging the stack-holders when the transfer of a stack of blanks from one holder to another has been completed.

20. A machine having, in combination, devices for operating on blanks of sheet-material; a plurality of holders for stacks of blanks; a rotary member on which said holders are mounted, movable to bring the holders alternatively into discharging and receiving position; and transfer-mechanism arranged to remove blanks singly from one of said holders and to transfer them to said devices, and thereafter to return each blank to one of the stack-holders; said mechanism being arranged to turn each blank in its plane during one of the transfer-movements.

21. A machine, having, in combination, devices for operating on a blank, a plurality of holders for stacks of blanks mounted for movement successively from blank discharging position to blank receiving position, means for transferring blanks singly from the stack holder in the blank discharging position to said devices, and means for transferring the blanks from said devices to the stack holder in blank receiving position.

22. A machine having, in combination, means, for supporting a stack of blanks, including a follower tending normally to advance the stack; a retainer normally preventing expulsion of the blanks by the follower; means for operating the retainer to release the blanks; and means for locking the follower while the blanks are so released.

23. A sole-machine having, in combination, means for operating upon the marginal portion of a sole-blank; a feeler, for controlling the operating means, arranged to engage the sole-blank; mechanism for moving the feeler, during the operation on the sole-blank, to a series of different operative positions; connections, between said mechanism and the feeler, adjustable to produce proportionate variations in the distances

through which the feeler is moved by said mechanism; and a second mechanism, operable upon said connections to introduce departures from such proportionate variation.

5 24. A sole-machine having, in combination, means for operating upon the marginal portion of a sole-blank; a feeler for controlling the operating-means, arranged to engage the sole-blank; and mechanism for
10 moving the feeler, during the operation of the machine, to different operative position, said mechanism being adjustable to vary disproportionately the movements imparted to the feeler, in accordance with the dis-
15 proportion of the sole-blanks of different sizes.

25. A sole-machine having, in combination, a tool; an unyielding feed-roller and a yielding feed-roller between which a sole-
20 blank is held and fed to the tool; an unyielding clamp-jaw arranged to engage the blank on the same side as the unyielding feed-roller; a yielding-jaw arranged to engage the opposite side of the sole-blank;
25 mechanism for actuating the rollers and the jaws to cause them to feed and swing the blank; and means connected to simultaneously move the yielding members away from the unyielding members to receive and re-
30 lease the blank.

26. A sole-machine having, in combination, a tool; a feed-device arranged to engage a sole-blank close to the point of operation of the tool and to advance the blank to
35 the tool; a swinging-device arranged to engage the blank at a point more remote from the tool and to swing the blank in accordance with the curvature of its outline; and mechanism for imparting alternate inter-
40 mittent movements to the feed-device and the swinging-device.

27. A sole-machine having, in combination, a tool for operating upon the marginal portion of a sole-shaped blank; means
45 for feeding the blank relatively to the tool to transfer the point of operation around the curved marginal portion of the blank; means for holding a stack of sole shaped blanks; means for receiving the sole shaped
50 blanks in a stack after operation thereon by the tool; and transfer-mechanism for transferring blanks, singly, first from the stack-holding means to the feeding-means and then from the latter to the blank-receiving
55 means.

28. A sole-machine having, in combination, a tool for operating upon a sole-blank; an oscillating carrier provided with means for holding two blanks simultaneously; and
60 mechanism for actuating the carrier to move one of the holding-means from a receiving-position to a position of presentation of the tool and to simultaneously move the other holding-means from said position of presen-
65 tation to a blank-discharging position.

29. A sole-machine having, in combination, means for operating progressively upon a sole-shaped blank; means for receiving and holding sole-shaped blanks in stacked position; and means operative, at a time con-
70 trolled automatically by the completion of the operation on a blank, to transfer the blank, in definite position, from the operating-means to the blank-receiving means.

30. A sole-machine having, in combination, means for operating progressively on a sole-blank; a plurality of holders for stacks of blanks; means for moving the stack-holders successively from a supplying-position to a discharging-position; and means for trans-
75 ferring blanks singly from a stack-holder in the discharging-position to the operating-means.

31. A machine having, in combination, means for progressively operating upon
80 blanks singly; a holder for blanks to be operated on; means for transferring blanks singly from the holder to the operating-means; and means acting automatically to remove it from discharging-position to a
90 receiving-position in which it may be re-filled.

32. A sole-machine having, in combination, sole-channeling means; a carrier adapted to support a series of channeled and un-
95 channeled blanks; means for removing each sole-blank in succession from the carrier to the channeling-means and then returning it from the channeling-means to the carrier; and means for moving the carrier to bring
100 up fresh blanks and remove channeled blanks.

33. A machine having, in combination, means for operating upon blanks singly in succession; a carrier adapted to support a
105 series of unfinished and finished blanks; means for removing each blank in succession from the carrier to the operating-means and then returning it from the operating-means to the carrier; and means for moving
110 the carrier intermittently to bring up unfinished blanks and remove finished blanks. the last-mentioned means being thrown into operation automatically by the introduction of finished blanks to the carrier.
115

34. A sole machine, having, in combination, operating and feeding means acting progressively along the marginal portion of a sole blank, additional means for inter-
120 mittently gripping and swinging the blank, and means for controlling the direction and extent of the swinging movements by the contour of the blank.

35. A sole machine, having, in combination, operating and feeding means acting
125 along the marginal portion of a sole blank, means for intermittently and progressively gripping the blank adjacent to the feeding means, a feeler engaging the edge of the blank, and mechanism controlled by the
130

feeler for actuating the sole gripping means to maintain the sole in proper relation to the operating means.

36. A sole machine, having, in combination, a tool for operating on the marginal portion of a sole blank, a feed roll engaging the blank adjacent the point of operation of the tool, oscillating sole clamps arranged to engage the blank within the feed roll, mechanism for operating the clamps to intermittently clamp and release the sole, a feeler engaging the sole edge in advance of the point of operation, and mechanism controlled by the feeler for determining the direction and extent of the movements of the clamps when clamping the sole.

37. A sole machine, having, in combination, means for operating on the marginal portion of a sole blank, a feeler for controlling the operating means arranged to engage the blank, mechanism for moving the feeler during the operation on the blank to a series of different operative positions, and connections between said mechanism and the feeler adjustable to produce proportionate variations in the distances through which the feeler is moved by said mechanism.

38. A sole machine, having, in combination, means for operating on the marginal portion of a sole blank, a feeler for controlling the operating means arranged to engage the sole blank, and mechanism for moving the feeler during the operation of the machine to different operative positions, said mechanism being adjustable to vary the movements imparted to the feeler for sole blanks of different sizes.

39. A sole machine, having, in combination, mechanism for feeding and channeling a sole blank, supplying mechanism acting automatically to present successive blanks in position to begin the channeling at a predetermined point on one side edge, and a blank engaging feeler and connected mechanism for controlling the feeding and channeling mechanisms to terminate their action on the sole when a predetermined point on the opposite side of the blank is reached.

40. A sole machine, having, in combination, mechanism for feeding and channeling a sole, mechanism for automatically supplying blanks with a predetermined point on one side edge in register with the operating point, and mechanism controlled by a feeler riding on the top of the blank

for automatically removing the channeled blank when a predetermined point on the opposite edge reaches the operating point.

41. A sole machine, having, in combination, mechanism for feeding and operating on a sole, mechanism for automatically supplying blanks with a predetermined point on one side edge in register with the operating point, and mechanism controlled by a feeler riding on the top of the blank for automatically removing the finished blank when a predetermined point on the opposite edge reaches the operating point.

42. A sole machine, having, in combination, mechanism for feeding and operating on the marginal portion of a sole blank, mechanism for gripping and automatically swinging the blank to maintain its edge in the line of feed, and mechanism for automatically supplying blanks to the mechanisms acting thereon.

43. A machine, having, in combination, means for supplying blanks in a predetermined position, a blank carrier for taking the blanks at the supply point, means for moving the carrier from the supply point to a different point for delivery, and means for rotating the carrier to turn the blank substantially in the plane of its face to position it at the point of delivery.

44. A machine, having, in combination, means for holding a blank, means for transferring the blank from the holding means to another point for delivery and for rotating it about an axis within its boundary in substantially the plane of its face to position it at the point of delivery.

45. A machine, having, in combination, a blank holder, a picker, a picker carrier, means for actuating the picker to take a blank from the holder and for actuating the carrier to transfer the blank to a point of delivery, and means for rotating the picker to change the angular relation of the blank at the point of delivery.

46. A machine, having, in combination, a holder for a stack of blanks, a picker carrier arm, a picker carried by said arm, means for moving the arm from the holder to a position of blank delivery, means for causing the picker to seize a blank in the stack, means for rotating the picker during its movement to the position of delivery, and means for actuating the picker to deliver the blank.

ERASTUS E. WINKLEY.