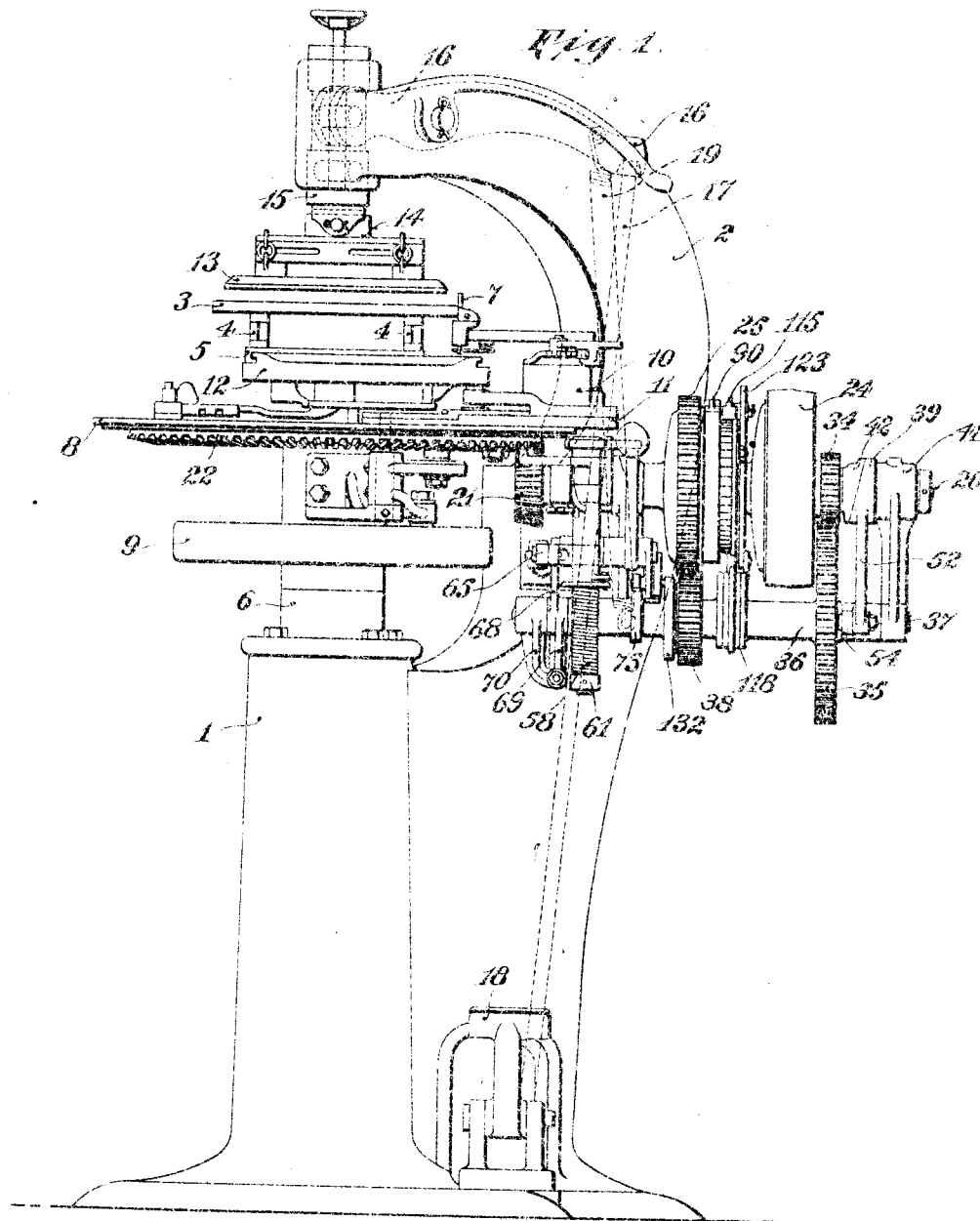


W. G. EATON.
SOLE ROUNDING MACHINE.
APPLICATION FILED DEC. 5, 1907.

1,048,511.

Patented Dec. 31, 1912.

6 SHEETS-SHEET 1.



Witnesses:

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H. D. McPhail

Inventor:

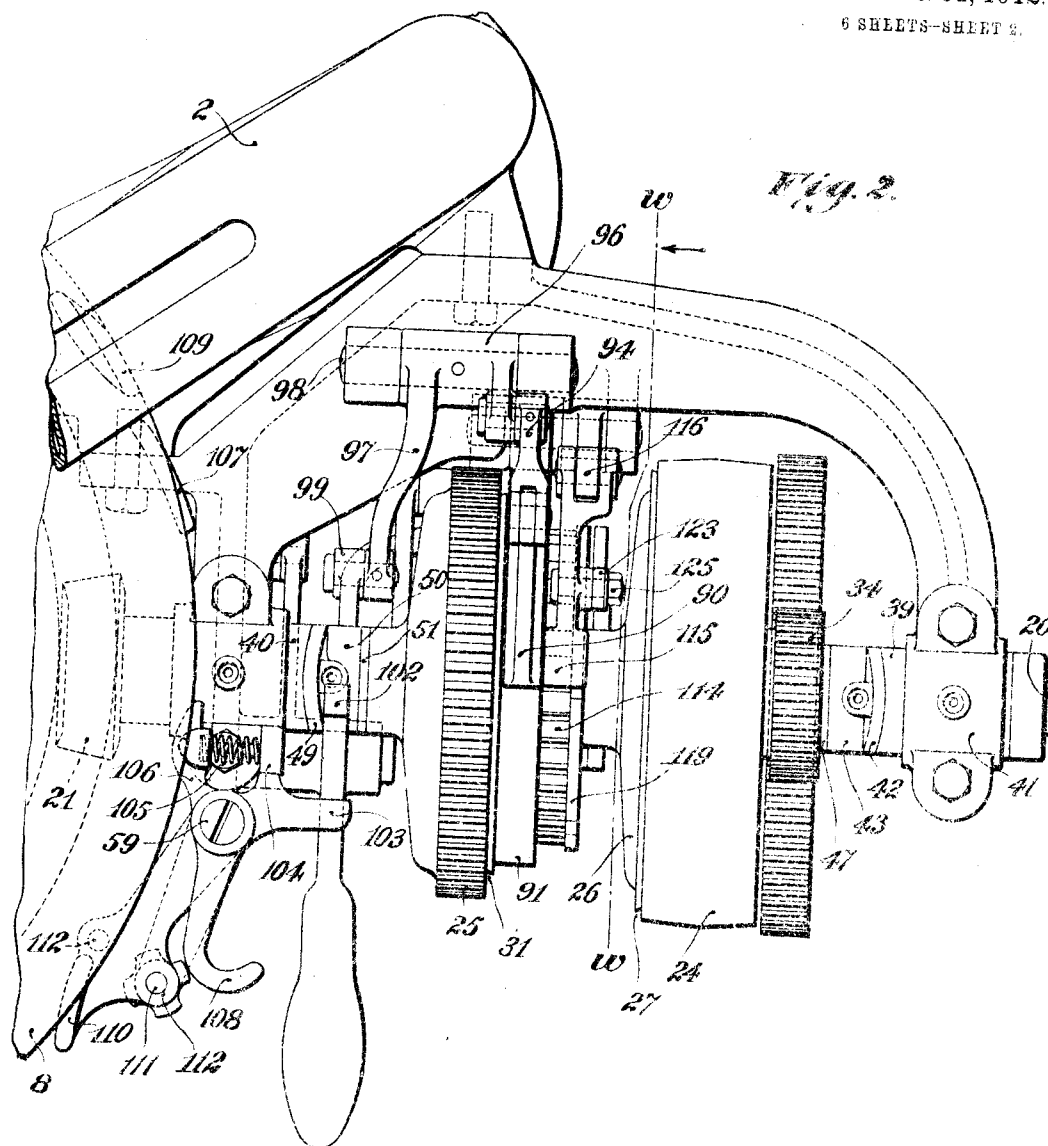
William G. Eaton
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6 SHEETS-SHEET 2.



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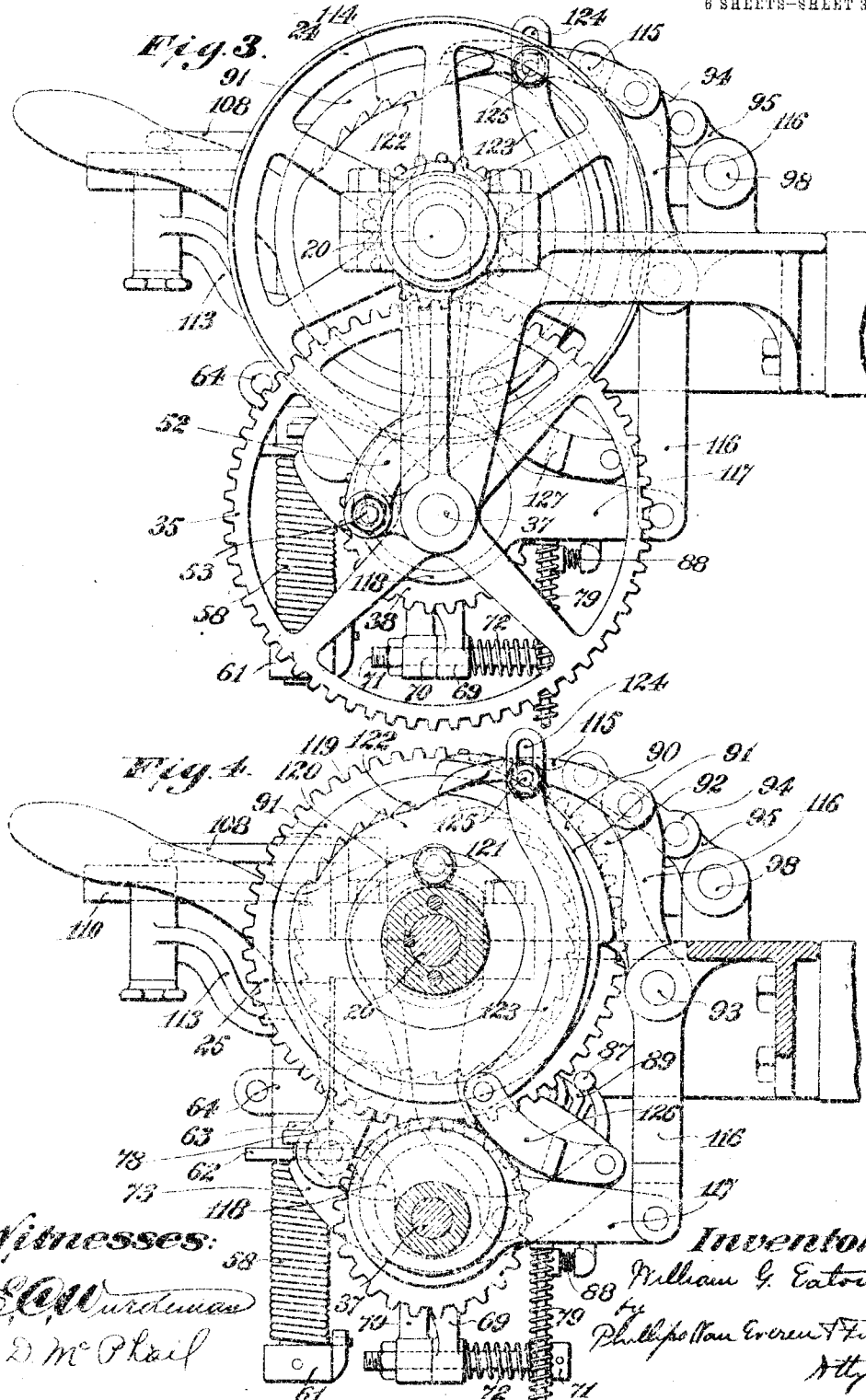
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6 SHEETS-SHEET 3.



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6 SHEETS--SHEET 4.



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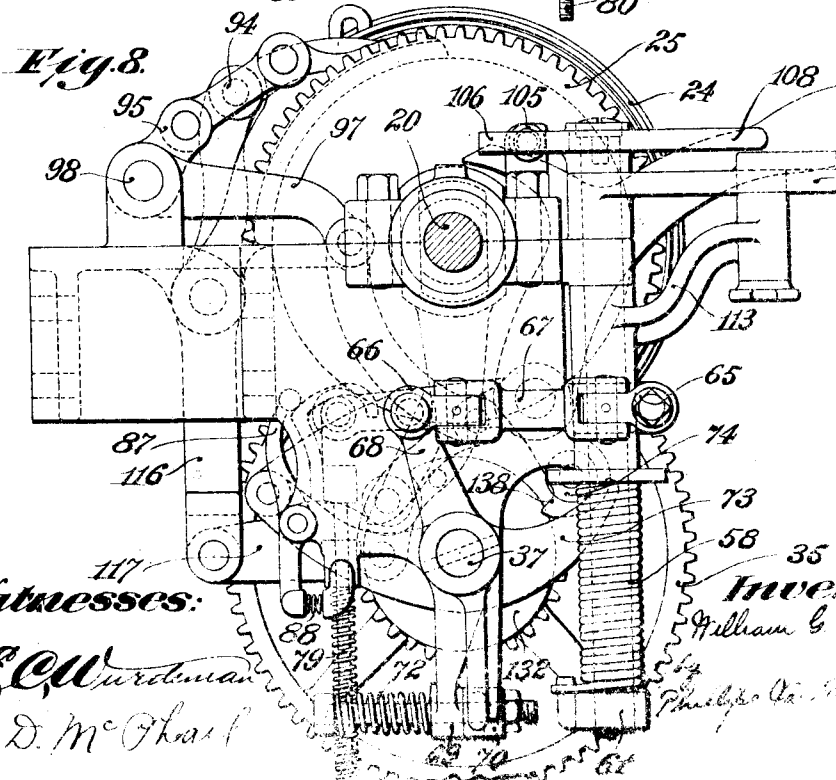
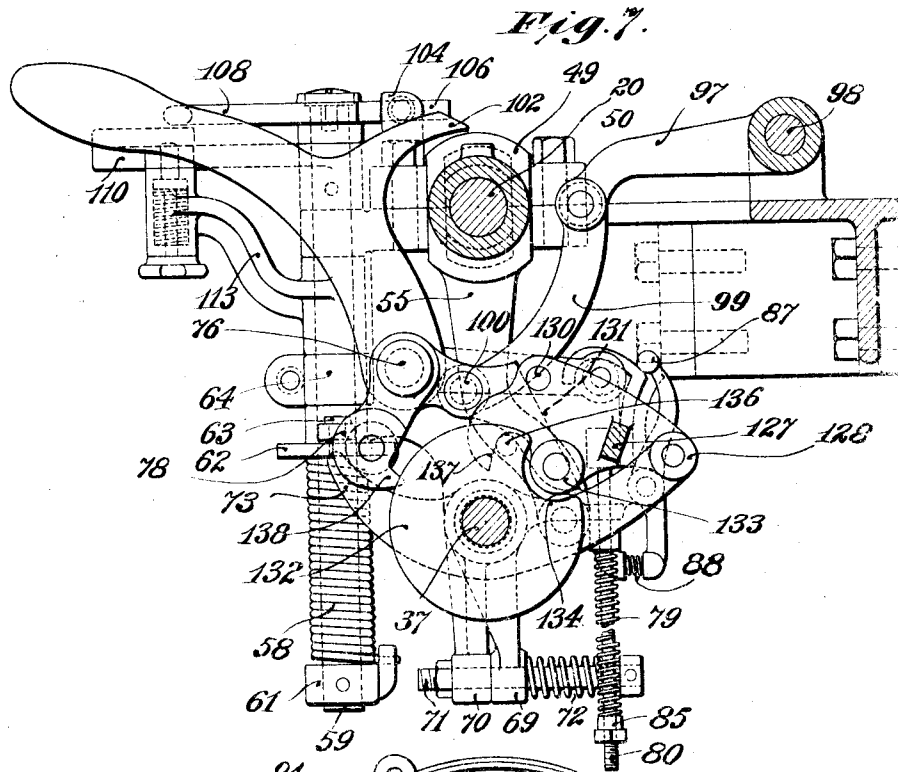
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6 SHEETS-SHEET 1



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6 SHEETS—SHEET 6.

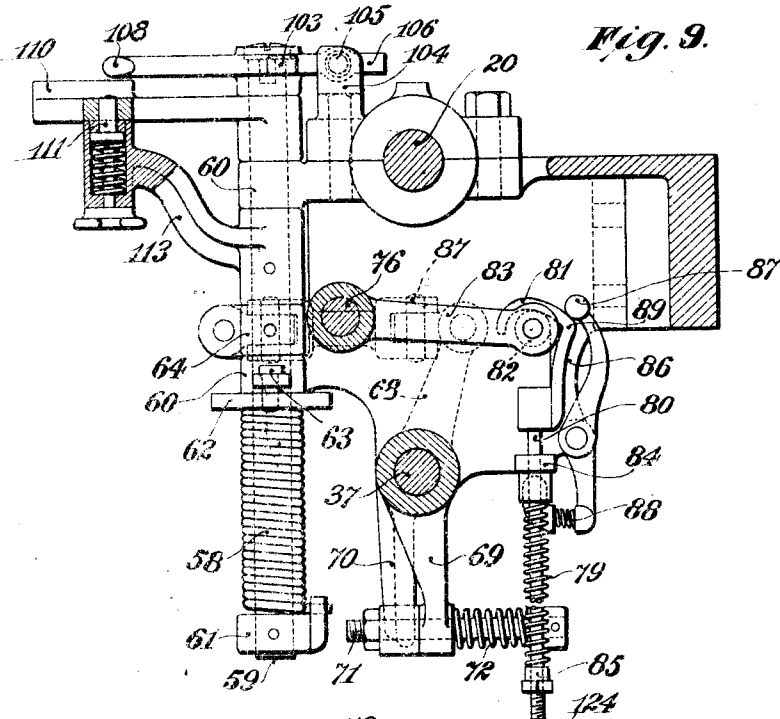


Fig. 9.

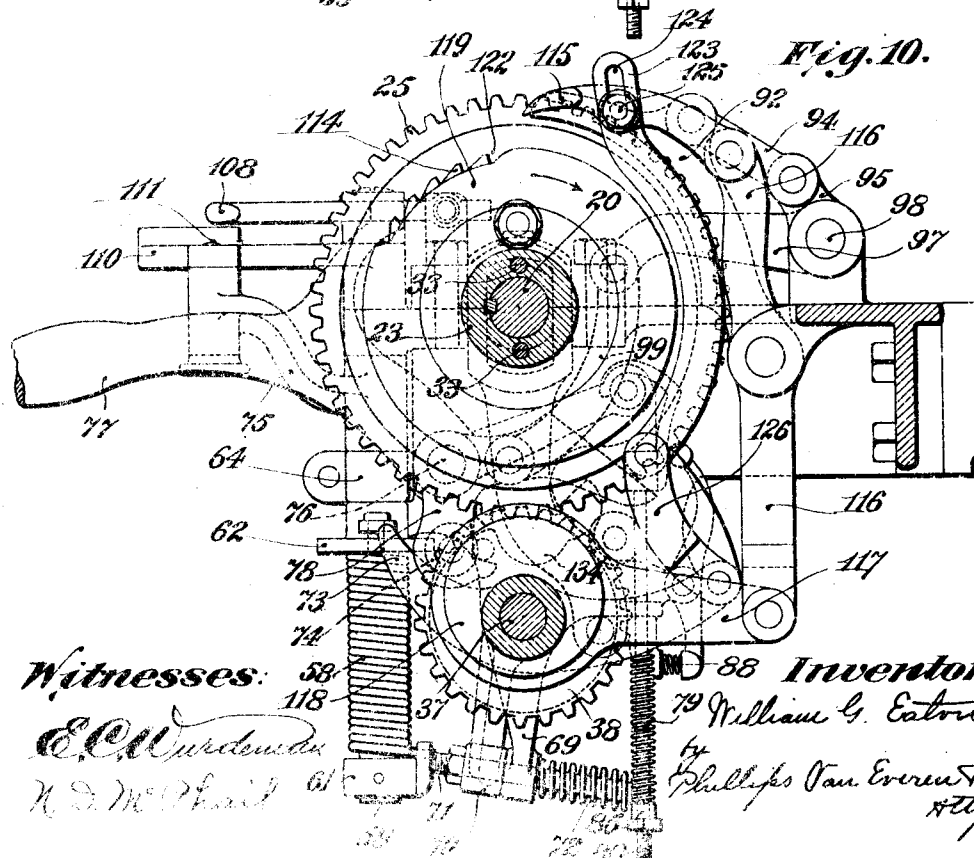


Fig. 10.

Witnesses:

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Inventor:

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Phillips Van Everen Fish
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM G. EATON, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOLE-ROUNDING MACHINE

1,048,511.

Specification of Letters Patent.

Patented Dec. 31, 1912.

Application filed December 5, 1907. Serial No. 405,179.

To all whom it may concern:

Be it known that I, WILLIAM G. EATON, citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Sole-Rounding 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.

The invention relates to sole rounding machines of that class which comprise a pattern of the shape of the sole to be produced, a rounding knife, and means for relatively actuating the pattern and knife to cause the knife to travel around the pattern, and relates more particularly to machines of this class in which the rounding knife is movably mounted upon a support, and in which the knife is caused to travel around the pattern by rotating either the pattern support or the support upon which the knife is mounted.

In rounding machines of this type, the blank from which the sole is to be cut is clamped in position upon the pattern while the parts are at rest, and then the driving mechanism, through the operation of which the knife is caused to travel around the pattern, is thrown into operation. The knife then travels rapidly about the pattern and as it comes to its initial position the driving mechanism is thrown out of operation and the relative movement between the parts is arrested. The throwing out of the driving mechanism is so timed that the knife travels somewhat beyond its initial position, so as to insure the completion of the cut, and devices are provided for moving the knife back to initial position.

The driving mechanism is constructed to cause the knife to travel at a high rate of speed around the pattern, in order that the rounding operation may be performed in as short an interval as is practicable. In cutting soles of peculiar or extreme shapes and having outlines provided with sharp and extreme angles, the high speed at which the knife travels causes it to leave the pattern when passing these angles, with resulting imperfections in the soles which

must subsequently be removed. Such failure of the knife to accurately follow the outline of the pattern is most likely to occur in cutting soles in which there is an abrupt and extreme angle at the ball line, since the knife controlling and driving devices are usually constructed to cause a comparatively rapid travel of the knife along the sides of the pattern, and a comparatively slow travel of the knife when passing around the heel and toe.

In accordance with one of the principal features of the invention, the knife is caused to accurately follow the outline of the pattern without materially affecting the speed with which the rounding operation is performed, and without requiring any unusual or additional attention on the part of the operator, by providing mechanism which acts to automatically retard or slow down the speed of travel of the knife for an interval as it is passing the ball line of the pattern, the completion of the rounding operation being effected at the usual speed. The mechanism which is preferably employed for thus automatically slowing down the knife for a short interval during its travel, and while passing the ball line or other point where a sharp or abrupt angle occurs in the outline of the pattern, comprises change speed mechanism included in the driving mechanism, and cooperating devices which operate during the travel of the knife about the pattern to change the speed of the driving mechanism from high to low as the knife is passing the angle on the pattern, and then back to high speed after the knife has passed the angle. The devices for controlling the change of speed of the driving mechanism from high to low and then back to high are preferably of such a character that they may be adjusted or arranged to cause the slowing down and return to high speed at any desired point in the travel of the knife about the pattern, or at any desired number of points in said travel.

While any suitable form of speed changing mechanism may be included in the driving mechanism, I prefer to provide the driving mechanism with high and low speed driving members which may be alternately thrown into action in changing the speed of

the driving mechanism, and to control these driving members by a controlling device arranged to travel in unison with the rotary support with which the pattern or knife is connected, and this construction and arrangement forms one of the features of the invention. I also prefer to connect the controlling device with the rotary knife or pattern support, and to provide mechanism intermediate this controlling device and the driving members, through which the driving members are rendered active and inactive without affecting the lever which the operator manipulates in throwing the driving mechanism into action. These constructions and arrangements of devices constitute further features of the invention.

The invention further contemplates the provision of improved and novel devices for returning the knife to the point from which it starts in the rounding operation after it has been carried beyond this point by the driving mechanism, or by the momentum of the parts after the driving mechanism is thrown out of action. The devices which have heretofore been employed for returning the knife to initial position have been in the nature of recoil or rebound devices, the action of which depends upon the compression of a spring or of air, by the continued movement of the knife or pattern carrying support after the driving mechanism has been thrown out of action. The compressed air or spring of such devices acts to suddenly and violently return the knife to starting position, and in some instances to cause a vibration of the knife, which is dangerous, and which delays the removal of the cut blank and the insertion of a new piece of stock. These devices usually operate to return the knife through a certain distance after it has come to rest, and the point to which the knife will be returned therefore varies according to the distance through which the momentum of the parts carries the knife after the driving mechanism has been thrown out of action. The knife is not therefore accurately and uniformly returned to the same point on the pattern after each rounding operation. Since the knife is frequently used as a gage against which the blank is laid in placing the blank so that it will cover all parts of the pattern, the accurate and uniform positioning of the knife is frequently important in enabling the operator to quickly position the blank so that all parts of the pattern are covered, and so that a perfect sole will be formed by the travel of the knife about the pattern.

An important feature of the invention accordingly consists in providing means which are not dependent for their operation upon the forward movement of the knife or parts connected therewith after the driving mechanism has been thrown out of opera-

tion, and which will act to accurately and uniformly return the knife to the same initial position after each rounding operation. The specific form and arrangement of such means is not material to this feature of the invention in its broader aspects. It is preferred, however, to employ for this purpose a pawl and ratchet, the ratchet being connected to cause a movement of the knife and so arranged that the pawl acts upon the ratchet to move it and the knife into a definite position after the driving mechanism has been thrown out of action. In the preferred form of this feature of the invention, the ratchet is connected with the driving shaft, through which motion is imparted to the rotary knife or pattern support, and the means for determining the point to which the knife is returned comprises a guard adjustably connected with the ratchet and arranged to lift the pawl out of engagement with the ratchet when the guard is brought under the pawl by the rotation of the ratchet. This construction and arrangement of pawl and ratchet and of controlling means, constitute further features of the invention.

The various features above referred to, as well as the further features of the invention relating more or less to the construction and arrangement of parts in which I prefer to embody the invention, will be understood from an inspection of the accompanying drawings, in which--

Figure 1 is a view in side elevation of a sole rounding machine embodying the preferred form of the invention; Fig. 2 is a plan view on an enlarged scale of the driving mechanism for the rotary support, the rotation of which causes the knife to travel around the pattern; Fig. 3 is an end elevation looking toward the left in Fig. 2; Fig. 4 is a vertical sectional view on line *w-w*, Fig. 2; Fig. 5 is a front view partially in section of the mechanism shown in Fig. 2; Fig. 6 is a horizontal sectional view on line *x-x*, Fig. 5; Fig. 7 is a vertical sectional view on line *y-y*, Fig. 5; Fig. 8 is an end elevation of the driving mechanism looking toward the left in Fig. 2, the driving shaft being shown in section; Fig. 9 is a vertical sectional view on line *z-z*, Fig. 6; and Fig. 10 is a view corresponding to Fig. 4 with the parts in a different position.

The various parts of the machine are mounted in a frame consisting of a base portion 1 and an over-hanging portion 2 extending upwardly from one side of the base portion. The pattern 3 is held in position upon the upper ends of supports 4 which rise from a stationary block 5. The block 5 is rigidly secured to the upper end of a cylindrical standard 6 which is bolted to the base 1 of the machine. The travel of the knife 7 about the pattern is produced

by the rotation of a rotary support 8 the hub of which rests upon the hub of a stationary cam 9 which is fixed upon the standard 6. The knife is mounted upon a knife carrier 10 which is mounted to slide upon a guide 11 pivoted upon the rotary support 8. The guide 11 is rocked and the knife carrier 10 moved inward and outward on the guide as the rotary support 8 is revolved to give the proper movements to the knife carrier by means of the stationary cam 9 and a stationary cam 12 which are connected with the slide and carrier respectively in the manner which is fully explained in the patent to Benjamin F. Mayo, No. 882,009, dated March 17, 1908. The knife 7 is also mounted upon the knife carrier 10 in the manner described in said application. The arrangement of the rotary support or table 8 with relation to the pattern is such that the knife is caused to travel around the pattern during the revolution of the support.

The material to be operated upon is held upon the pattern 3 during the rounding operation by means of a clamp 13 carried by a block 14 secured to the lower end of a slide 15 which is mounted in the over-hanging portion 2 of the machine frame. The slide 15 is connected to one arm of a lever 16, the other arm of which is engaged by a rod 17 connected to a foot treadle 18 in such manner that a depression of the foot treadle actuates the slide 15 to force the clamp toward the pattern. The clamp is raised from the pattern by means of a coiled spring 19 connected at one end to the lever 16, and at the other end to the frame of the machine.

The rotary knife supporting table 8 is driven to cause the knife to travel around the pattern through a driving shaft 20 which is connected with the table by means of a beveled pinion 21 secured to the end of the shaft and engaging a beveled gear 22 secured to the under side of the table. Motion is imparted to the driving shaft 20 through a driving sleeve 23 which is secured to the shaft between the hub of the driving pulley 24 and the driving gear 25. The sleeve 23 is provided with a flange 26 on which is formed a clutch member 27 adapted to be engaged by a corresponding clutch member 28 formed on the pulley 24. The sleeve 23 is also provided with a radially extending disk 29 having a laterally projecting flange 30 on its outer edge. The flange 30 is provided with a clutch member 31 arranged to be engaged with a corresponding clutch member 32 on the gear 25.

The pulley 24 and gear 25 are loosely mounted on the shaft 20 so that they may be moved longitudinally on the shaft to engage and disengage the clutch members 27 and 28 and the clutch members 31 and 32.

The longitudinal motion of pulley 24 is transmitted to the gear 25, and the longitudinal motion of gear 25 is transmitted to the pulley 24 through rods 33 mounted to slide in the sleeve 23 and arranged between the hubs of the pulley and gear. The pulley 24 is driven at a comparatively high rate of speed, while the gear 25 is driven in the same direction at a comparatively low rate of speed. The mechanism for driving the gear 25 comprises a pinion 34 secured to the hub of the pulley 24 and engaging a gear 35 formed on one end of a sleeve 36, which is loosely mounted on a rock shaft 37. The other end of the sleeve 36 is provided with a pinion 38 which engages the gear 25.

The pulley 24 and gear 25 are moved longitudinally on the shaft to engage and disengage the clutches by means of two wedge blocks 39 and 40. The wedge block 39 is interposed between the bearing 41 and an inclined bearing surface 42 formed on a sleeve 43 and arranged to engage a corresponding inclined surface 44 on the wedge block. The wedge block is provided with a substantially rectangular opening 45 which fits over a squared hub 46 on the sleeve 43. The front face of the sleeve 43 bears against a washer 47 interposed between the sleeve and the gear 34 which is secured to the pulley 24. The wedge block 40 is similar in construction to the wedge block 39 and is interposed between the bearing 48 and an inclined surface 49 on a sleeve 50. The sleeve 50 is similar in construction to the sleeve 43, and the front end of the sleeve bears against a washer 51 interposed between the sleeve and the hub of gear 25. The wedge block 39 is formed on the upper end of an arm 52, the lower end of which is pivotally connected at 53 with an arm 54 which is secured to the rock shaft 37 and projects forward from said shaft. The wedge block 40 is formed on the upper end of an arm 55 the lower end of which is pivoted at 56 to an arm 57 which is secured to the rock shaft 37 and projects rearwardly therefrom. By reason of this construction with the rock shaft 37 the wedge blocks may be simultaneously moved in opposite directions to shift the pulley 24 and gear 25 to connect either of these driving members with the driving shaft, or to disengage both driving members from the driving shaft and thus throw the driving mechanism out of operation.

The rock shaft 37 is forced yieldingly in a direction to raise the wedge block 39 and lower the wedge block 40 and thus connect the high speed pulley 24 with the driving shaft, and disconnect the low speed gear 25 from the driving shaft, by the action of a torsional spring 58 and suitable connections between the spring and shaft. The spring

58 is mounted upon a vertical rock shaft 59 which is mounted in bearings 60 and is provided at its lower end with a collar 61 with which the lower end of the spring is connected. The upper end of the spring is connected to an adjusting disk 62 arranged below the lower bearing 60, and connected therewith by means of a pin 63 which passes through a lug on the bearing and engages one of a series of holes formed in the disk 62.

The connections between the rock shaft 59 and the rock shaft 37 are as follows: A radially projecting arm 64 is secured to the rock shaft 59 above the lower bearing 60, and the outer end of this arm is connected through pivoted blocks 65 and 66 and a link 67 with the upper end of a lever 68 which is mounted on the end of rock shaft 37. The lever 68 is loosely mounted on the rock shaft 37 and is provided with a downwardly extending arm 69, the lower end of which is connected to an arm 70 secured to the rock shaft. The lower ends of the arms 69 and 70 are connected by means of a bolt 71 secured in the arm 70 and passing through a hole in the arm 69. A spring 72 surrounds the bolt 71 and is interposed between the outer side of the arm 69 and the head of the bolt so that a yielding connection is formed between the lower ends of the arms 69 and 70. By reason of these connections between the rock shaft 59 and the rock shaft 37 to which the clutch shifting devices of the speed changing mechanism are connected, movements imparted to the rock shaft 59 are transmitted to the rock shaft 37 and clutch operating devices. When the rock shaft 59 is moved under the influence of the spring 58, the arm 69 is forced directly against the arm 70, and transmits motion through the arm 70 to the shaft 37. When the rock shaft 59 is moved against the tension of the spring 58 to disconnect the high speed pulley 24 and connect the low speed gear 25 with the driving shaft, the arm 69 acts through the spring 72 to transmit motion to the arm 70 and rock shaft 37. In this case, therefore, the spring 72 may yield after the clutch members on the gear and driving sleeve have been brought into engagement to accommodate any further movement of the rock shaft 59.

Normally the rock shaft 37 is held against the tension of the spring 58 in position to maintain both the pulley 24 and gear 25 in position with the clutch members between these parts and the driving shaft out of engagement, so that the driving mechanism is out of operation. The rock shaft is held in this position through an arm 73 secured to the rock shaft and projecting forward from said shaft into position to engage a roll 74 carried by a lever 75 which controls the throwing of the driving mechanism into and out of operation. The controlling lever

75 is pivotally mounted upon a fixed stud 76, and is provided with an operating handle 77 through which the operator may conveniently manipulate the lever in throwing the driving mechanism into operation. The roll 74 which coöperates with the arm 73 in controlling the movements of the rock shaft 37 and the connected clutch operating devices, is mounted on a short arm 78 which extends downward from the hub of the controlling lever 75. The controlling lever is held in normal position by the action of a spring 79, which is connected with the lever through a rod 80 provided at its upper end with a hooked portion 81 arranged to engage a roll 82 which is mounted on the rear end of an arm 83 projecting rearwardly from the hub of the operating lever. The rod 80 is mounted to slide through a bearing 84, and the spring 79 is interposed between the bearing and an adjustable collar 85 on the lower end of the rod. In order to retard the movement of the lever 75, and to prevent a rebound of the lever when it is operated to throw the driving mechanism out of operation, the hooked portion 81 on the upper end of the rod 80 is provided on its rear side with a cam surface 86 adapted to be engaged by a spring-operated brake 87. The brake 87 is in the form of a lever, the upper end of which is arranged to ride against the cam surface 86, and the lower end of which is acted upon by a spring 88. When the rod 80 is forced downward by the spring 79 in operating the lever 75 to throw the driving mechanism out of operation, the brake 87 tends to resist this downward movement as the cam surface 86 forces the brake back against the tension of this spring. As the downward movement of the rod 80 is completed, the upper end of the brake 87 passes over a shoulder 89 at the upper end of the cam surface 86 and resists any tendency to rebound on the part of the spring 79.

When the controlling lever 75 is in normal position, and the driving members of the driving mechanism are disconnected from the driving shaft, the spring 79 acts through said lever to hold a brake shoe 90 in engagement with a cylindrical braking surface 91 formed on the flange 30 of the driving sleeve 23. This brake shoe is formed on an arm 92 which is pivoted on a stud 93. The arm 92 is connected by means of a link 94 with an arm 95 projecting from the hub 96 of a lever 97. The lever 97 is secured to a rock shaft 98, and is connected at its free end to one end of a link 99, the other end of which is pivotally connected at 100 with an arm 101 which projects from the hub of the controlling lever 75.

When the driving mechanism is to be thrown into action the handle of the lever 75 is swung downward until an arm 102

which projects from the upper side of the lever passes under and into position to engage the under side of a latch arm 103. The latch arm is loosely pivoted upon the upper end of the rock shaft 59 and is held in position against a stop 104 by a spring 105 which is interposed between said stop and an arm 106 which projects from the hub of the latch arm. The arm 106 projects into the path of a cam 107, adjustably secured to the rotary table 8. When the cam 107 engages the arm 106, the arm is forced back, thus moving the latch arm 103 to release the controlling lever 75 so that the driving mechanism is thrown out of operation. The latch 103 may be operated manually to release the lever 75 by means of a handle 108 projecting from the hub of the latch arm 103.

When the controlling lever 75 is swung down and latched in the position indicated in Fig. 10, the roll 74 releases the arm 73 so that the spring 58, acting through the rock shaft 59 and the connections between this rock shaft and the rock shaft 37, operates the rock shaft 37 and the connected clutch shifting devices to move the pulley 24 and gear 25 toward the left in Fig. 5, and to force the clutch members between the pulley 24 and the driving sleeve 23 firmly into engagement with each other. The driving shaft and the connected knife supporting table 8 will now be driven at a high rate of speed to cause the knife to travel about the pattern.

The devices for causing a slowing down of the knife supporting table at any desired point in the travel of the knife about the pattern consists of a cam 109 secured to the table and arranged to act upon an arm 110 which is connected with the rock shaft 59. The cam operates the rock shaft in a direction to disconnect the pulley 24 from the driving shaft and connect the slow running gear 25 therewith. The arm 110 is loosely mounted upon the upper end of the rock shaft 59, and is connected with the rock shaft by means of a spring pressed pin 111 which engages one of two holes in the arm 110 and is mounted in an arm 113 secured to the rock shaft. When the pin 111 is in engagement with one of the holes 112 the end of the arm 110 is normally held in the path of the cam 109, so that the cam operates upon the arm to cause a slowing down of the knife supporting table. When the pin 111 is in engagement with the other hole in the arm 110, the end of the arm is held out of the path of the cam 109, so that the knife supporting table will be driven at a continuous high speed until the stopping cam 107 operates the latch 103 and releases the controlling lever to render the driving mechanism inactive and apply the brake 90.

The stopping cam is so adjusted on the

knife supporting table 8 that the knife is carried somewhat beyond its initial point with relation to the pattern, and after the table has been brought to rest it is moved in a reverse direction until the knife is brought to a definite and fixed point with relation to the pattern. The knife is therefore accurately and uniformly positioned with relation to the pattern after each cutting operation. The devices for accurately and uniformly returning the knife to the same initial position after each cutting operation, comprise a ratchet wheel 114 formed on the disk 29 and arranged to be engaged by a pawl 115. The pawl is pivoted upon the upper end of a lever 116, which is pivoted on the stud 93. The lower end of the lever 116 is pivotally connected to one end of a bar 117, the other end of which surrounds an eccentric 118 formed on the continuously rotating sleeve 36. The pawl is continuously reciprocated by the eccentric 118, and the pawl and ratchet are so arranged that when the pawl acts upon the teeth of the ratchet wheel, the driving shaft 20 is rotated in a direction opposite to that in which it is driven in causing the knife to travel around the pattern. The point to which the knife is returned by the action of the pawl 115 is determined by a guard disk 119 which is adjustably mounted upon a bearing 120 formed on the disk 29, and is held in adjusted position by a clamping nut on a bolt 121. The guard disk is so formed and arranged with relation to the ratchet wheel that the greater portion of its periphery extends beyond the teeth of the ratchet wheel. The periphery of the guard disk is cut away at 122 to expose a certain number of teeth of the ratchet wheel to the action of the pawl when this portion of the periphery is in position to underlie the end of the pawl. The guard disk is so adjusted that the exposed teeth of the ratchet underlie the pawl when the driving mechanism is rendered inactive and the brake applied to arrest the travel of the knife.

During the travel of the knife about the pattern, the pawl 115 is held out of active relation with the ratchet wheel by means of a link 123, the upper end of which is provided with a slot 124 engaging a pin 125 on the side of the pawl. The lower end of the link is pivotally connected to one arm 126 of a yoke 127, which is pivotally mounted in a bearing 128 formed on the rear end of the arm 57. This yoke is provided with a second arm 129 which carries a pin 130 arranged to be engaged by the inclined end 131 of the arm 101 which projects from the hub of the controlling lever 75, and to which the brake is connected, as above described. When the controlling lever is thrown into the position indicated in Fig. 10 to start the

travel of the knife, the surface 131 on the end of the arm 101 swings the yoke 127 about its pivot, and lifts the link 123 so that the lower end of the slot 124 engages the pin 125 and lifts the pawl 115 into inactive position. When the controlling lever 75 is released and returns to normal position, the yoke 127 is released by the arm 101, and the pawl 115 would immediately drop into engagement with the exposed teeth of the ratchet wheel 114 if the yoke 127 were not otherwise supported at this time.

In order that there may be no danger of the pawl dropping into the ratchet teeth before the driving shaft has been brought to rest, means are provided for delaying the movement of the pawl into active relation with the ratchet teeth for an interval after the controlling lever 75 has been released and has returned to position to throw the driving pulley out of action and apply the brake. This retarding or timing device comprises a disk 132 arranged to engage a roll 133 carried by the arm 129 of the yoke 127. The disk 132 is so shaped that when the roll 133 engages the periphery of the disk, the yoke 127 is held in the position into which it is moved by the controlling lever 75 when that lever is operated to start the travel of the knife. The disk is provided with a recess 134 which registers with the roll 133 when the parts are in normal position. When this recess is in register with the roll, the yoke 127 is free to swing into position to release the pawl 115 and allow it to drop into engagement with the ratchet teeth on the ratchet wheel 114. The face of the disk 132 is held in frictional engagement with the face of the continuously rotating pinion 38 by means of a spring 135.

When the parts are in normal position, the disk 132 is held from rotation by the engagement of a pin 136, which projects laterally from the disk, with a shoulder 137 formed on the arm 129 of the yoke 127 (Fig. 7). When the controlling lever 75 is operated to start the travel of the knife, the yoke 127 is swung backward as before described, and this movement of the yoke carries the shoulder 137 out of the path of the pin 136. The disk 132 now begins to rotate, and the rotation continues until the pin 136 brings up against a shoulder 138 formed on the depending arm 78 of the controlling lever. This movement of the disk carries the recess 134 out of register with the roll 133, so that the disk is in position to support the yoke 127 and prevent the movement of the pawl 115 into engagement with the teeth of the ratchet 114 (Fig. 10). When the controlling lever 75 is released and swings up into normal position, the shoulder 138 is moved out of the

path of the pin 136 and the disk 132 is rotated. The rotation of the disk continues until the recess 134 registers with the roll 133, when the yoke 127 swings downward, thus rendering the pawl 115 active, and bringing the shoulder 137 into position to engage the pin 136 and arrest the rotation of the disk.

When the pawl 115 drops into engagement with the exposed teeth of the ratchet 114, it acts upon the teeth of the ratchet wheel 114 to rotate the driving shaft 20 in a direction to move the knife supporting table 8 backward until the end of the cut-away portion 122 of the guard disk 119 rides under the end of the pawl and lifts the pawl out of engagement with the ratchet teeth. When this occurs, the pawl will continue to reciprocate idly, riding back and forth over the incline at the end of the cut-away portion 122 of the guard disk. Thus the knife will be returned to the same point after each cutting operation, regardless of variations in the distance beyond this point through which the knife is carried before the driving shaft is brought to rest by the brake. The return is also effected without the sudden jar or vibration incident to the operation of recoil or rebound devices, the operation of which depends upon the compression of springs or air by the forward movement of the rotary knife or pattern support after the driving mechanism is thrown out of action.

In operating the machine, the operator places the blank from which the sole is to be cut upon the pattern in the usual manner, and then depresses the controlling lever, which is latched in depressed position. This depression of the lever throws the high speed driver into action, and the knife starts to travel around the pattern, and continues to travel until the stop cam on the knife supporting table operates the latch which holds the lever in depressed position. When this occurs the controlling lever is released and is thrown up, thus throwing the driving mechanism out of action and applying the brake. The stop cam is so adjusted that the driving mechanism is thrown out of action, and the knife supporting table brought to rest, after the knife has passed its initial or starting point, so that the completion of the rounding operation is insured. After the driving mechanism has been thus thrown out of action, the pawl which acts to return the knife to initial position is rendered active, and acts upon the ratchet which is connected with the driving shaft to move the driving shaft in a direction opposite to that in which it is moved by the driving mechanism until the knife is returned to its initial or starting point.

In cutting soles in which there are no

abrupt angles such as would result in a failure of the knife to accurately follow the outline of the pattern, the arm 110 is held in such position that it is out of the path of the slow-down cam on the knife supporting table, and the knife supporting table is driven by the high speed driver throughout its entire revolution. In cutting soles having an abrupt or extreme angle at the ball line, of such a character that the knife would leave the pattern in passing by this point if driven at the usual speed, the arm 110 is adjusted into position where it is in the path of the slow-down cam 109. When the arm is adjusted in this position, the operations performed by the operator are the same as when cutting the usual forms of soles. In this case, however, the speed of the driving mechanism is reduced just before the cutter reaches the ball line, and the cutter is moved slowly past the apex of the angle at the ball line so that it will accurately follow the pattern in making the abrupt change in the direction of its travel required by the abrupt change in the contour of the pattern. Immediately the cutter has passed the apex of the angle, the usual speed of the driving mechanism is restored, and the rounding operation is completed at the usual speed. Thus without any additional attention on the part of the operator, and without any material loss in the time required for performing the rounding operation, the cutter is slowed down at the point where the speed should be reduced in order to enable the cutter to accurately follow the contour of the pattern, and soles of extreme and peculiar styles may be cut with the same facility, and at substantially the same speed, as soles of the more usual forms and styles.

While the features of the invention have been illustrated and described as embodied in a sole rounding machine, it will be understood that certain features of the invention, particularly features relating to the mechanism for turning the machine back to a definite point when the driving mechanism is thrown out, are of more general application, and may be embodied in machines for performing other operations. For instance, the features particularly referred to may be embodied with advantage in any machine in which it is desirable upon the stopping of the machine to reverse its movement and to finally bring it to rest after it has been turned back to a definite point in the cycle of operations performed by the machine.

Having set forth the nature and object of the invention, and specifically described one form of apparatus in which it may be embodied, what is claimed is:—

1. A sole rounding machine, having, in combination, a pattern, a rounding knife,

driving mechanism for causing the knife to travel around the pattern, and mechanism operating to slow down the driving mechanism for an interval as the knife is passing the ball line of the pattern and then speed it up again, substantially as described.

2. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern including speed changing mechanism, and devices operating during the travel of the knife about the pattern to change the speed of the driving mechanism from high to low, and then back to high, substantially as described.

3. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary member connected to one of said parts to cause the knife to travel around the pattern, mechanism for driving said rotary member at a high speed, and mechanism acting to slow down said members while the knife is passing a predetermined point on the pattern and to restore the high speed, substantially as described.

4. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary member connected with one of said parts to cause the knife to travel around the pattern, a driving mechanism for said member including speed changing mechanism, and controlling devices moving in unison with the rotary member for changing the speed from high to low and back to high to slow down the knife for a predetermined interval during its travel around the pattern, substantially as described.

5. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary member connected with one of said parts to cause the knife to travel around the pattern, a driving mechanism for said member including high and low speed driving devices, and mechanism operating during the travel of the knife about the pattern to throw the high speed driver out and the low speed driver in, and then throw the low speed driver out and the high speed driver in, to cause the knife to slow down for an interval, substantially as described.

6. A sole rounding machine, having, in combination, a pattern support, a rotary knife supporting table, driving mechanism for said table including speed changing mechanism and controlling devices moving in unison with the rotary table for changing the speed from high to low and then back to high to slow down the table for an interval during the travel of the knife about the pattern, substantially as described.

7. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, including high

and low speed clutches, clutch shifting devices, and mechanism operating the clutch shifting devices to successively render the low and high speed clutches active during the travel of the knife around the pattern, substantially as described.

8. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary knife supporting table, driving mechanism for said table including high and low speed clutches, clutch shifting devices, and devices moving with the table for operating the clutch shifting devices to successively connect the low and high speed clutches with the table during the travel of the knife around the pattern, substantially as described.

9. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary knife supporting table, a driving shaft connected to the table, a driving sleeve connected to the shaft and provided with clutch members, high and low speed drivers provided with corresponding clutch members, clutch shifting devices, and mechanism moving with the table for operating the clutch shifting devices to successively engage the low and high speed clutches during the travel of the knife about the pattern, substantially as described.

10. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary member connected with one of said parts to cause the knife to travel around the pattern, driving mechanism including high and low speed drivers, a lever through which the driving mechanism is thrown into action, latching devices for the lever, a device moving with the rotary member for releasing the lever to throw the driving mechanism out of action, and mechanism operating to connect the low and high speed drivers successively with the rotary member during the travel of the knife about the pattern, substantially as described.

11. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, a brake, a spring operated device for throwing the driving mechanism out of action and applying the brake, and a braking device for retarding the action of the spring, substantially as described.

12. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, a brake, a spring operated device for throwing the driving mechanism out of action and applying the brake, and a device for preventing rebound of the spring operated device when the brake is applied, substantially as described.

13. A sole rounding machine, having, in

combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, a controlling lever through which the driving mechanism is thrown into and out of action, a spring for operating the lever to throw the driving mechanism out of action, a brake connected with the lever, and a device for retarding the action of the spring and preventing rebound of the lever when the brake is applied, substantially as described.

14. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, including a high speed driver and a low speed driver, a starting lever for rendering the high speed driver active, and means acting independently of the lever to render the drivers alternately active and inactive during the travel of the knife about the pattern, substantially as described.

15. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern including a high speed driver and a low speed driver, a lever through the movement of which the high speed driver is rendered active to start the travel of the knife, or both high and low speed drivers are rendered inactive to stop the travel of the knife, and mechanism acting to render the low and high speed drivers successively active during the travel of the knife around the pattern, substantially as described.

16. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, including a high speed driver and a low speed driver, means for manually throwing the high speed driver into action to start the travel of the knife, mechanism for automatically throwing both high and low speed drivers out of action to arrest the travel of the knife, and mechanism acting to render the low speed and high speed drivers successively active during the travel of the knife about the pattern, substantially as described.

17. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism for causing the knife to travel around the pattern, devices for throwing the driving mechanism out of operation, and mechanism operating independently of the forward movement of the knife to move the knife back to a definite point on the pattern, substantially as described.

18. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary member connected with one of said parts to cause the knife to travel about the pattern, driving mechanism for the rotary

member, devices for throwing the driving mechanism out of operation, and mechanism unaffected by the forward movement of the rotary member for moving the knife back to a definite point on the pattern when the driving mechanism is thrown out, substantially as described.

19. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism connected with one of said parts for causing the knife to travel around the pattern, devices for throwing the driving mechanism out of operation, a ratchet connected to move the knife, a pawl arranged to engage the ratchet and move the knife back to a definite point on the pattern when the driving mechanism is thrown out, and mechanism for operating the pawl, substantially as described.

20. A sole rounding machine, having, in combination, a pattern, a rounding knife, driving mechanism connected with one of said parts for causing the knife to travel around the pattern, a ratchet connected to move the knife, a pawl arranged to engage the ratchet and move the knife back to a definite point on the pattern, and timing mechanism controlling the engagement of the pawl with the ratchet when the driving mechanism is thrown out, substantially as described.

21. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary table upon which the knife is movably mounted, driving mechanism for rotating the table to cause the knife to travel around the pattern, a device moving in unison with the table for throwing the driving mechanism out of action, a ratchet connected to move the table, a pawl arranged to engage the ratchet and move the table back after the driving mechanism is thrown out, and a guard moving with the ratchet for determining the point to which the ratchet is moved by the pawl, substantially as described.

22. A sole rounding machine, having, in combination, a pattern, a rounding knife, a rotary support on which one of said parts is mounted, a driving shaft connected with said support, mechanism for rotating said shaft to cause the knife to travel around the pattern, devices for throwing the driving mechanism out of action, and mechanism for moving said shaft back until the knife is brought to a predetermined point on the pattern when the driving mechanism is thrown out, substantially as described.

23. A sole rounding machine, having, in combination, a pattern, a rounding knife, a driving shaft connected with one of said parts to cause the knife to travel around the pattern, driving mechanism for said shaft, devices for throwing said driving mechanism

out of action, and mechanism for moving said shaft back until the knife is brought to a predetermined point on the pattern when the driving mechanism is thrown out of action, substantially as described.

24. A sole rounding machine, having, in combination, a pattern, a rounding knife, a driving shaft connected with one of said parts to cause the knife to travel around the pattern, mechanism for driving said shaft, a ratchet connected with said shaft, a pawl arranged to engage the ratchet and move the shaft back, and means for rendering the pawl inactive when the knife reaches a definite point on the pattern, substantially as described.

25. A sole rounding machine, having, in combination, a pattern, a rounding knife, a driving shaft connected with one of said parts to cause the knife to travel around the pattern, devices for throwing the driving mechanism out of action mounted for adjustment to vary the point in the travel of the knife at which the driving mechanism is thrown out of action, devices for moving said shaft back to a definite point when the driving mechanism is thrown out of action, and means for adjusting said devices to correspond to the adjustment of the devices for throwing the driving mechanism out of action, substantially as described.

26. A sole rounding machine, having, in combination, a pattern, a rounding knife, a driving shaft connected with one of said parts to cause the knife to travel around the pattern, mechanism for driving said shaft, devices for throwing said driving mechanism out of action, a ratchet connected with said shaft, a pawl arranged to engage the ratchet and move the shaft back when the driving mechanism is thrown out of action, and a guard connected to move with the ratchet for rendering the pawl inactive when the knife is moved to a definite point on the pattern, substantially as described.

27. A machine, having, in combination, a tool, actuating mechanism therefor, driving mechanism including a rotary shaft, and mechanism acting independently of the forward movement of the actuating mechanism for turning the shaft back through a partial revolution and automatically stopping it with the tool in a predetermined position, substantially as described.

28. A machine, having, in combination, a tool, actuating mechanism therefor, main driving mechanism, a reverse driving mechanism thrown into action when the main driving mechanism is thrown out, and devices for throwing out the reverse driving mechanism after a comparatively short reverse movement of the actuating mechanism, substantially as described.

29. A machine, having, in combination, a

tool, actuating mechanism therefor, a high speed driving mechanism, braking means for overcoming the momentum of the parts when the driving mechanism is thrown out, and a slow speed mechanism for then imparting a comparatively short return movement to the actuating mechanism and stopping it with the tool in a predetermined position, substantially as described.

10 30. A machine, having, in combination, operating mechanism, a high speed driving mechanism therefor, a slow speed reverse driving mechanism thrown into action when the main driving mechanism is thrown out

for returning the operating mechanism at a uniformly slow speed after its forward movement has ceased, and means automatically stopping the operating mechanism after it has made a comparatively short return movement, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

WM. G. EATON.

Witnesses:

IRA L. FISH.

FRED O. FISH.