

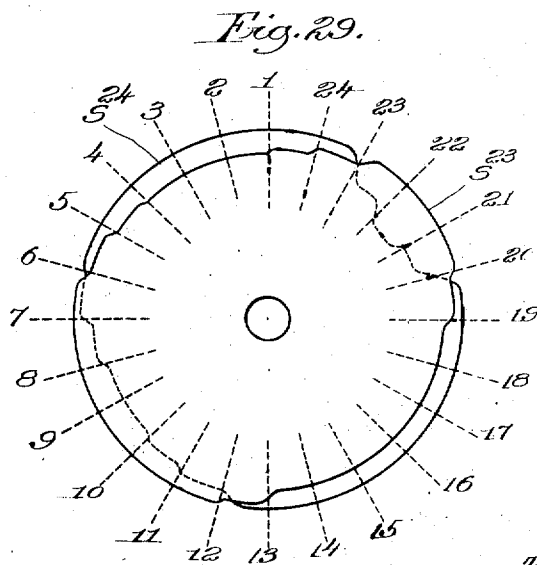
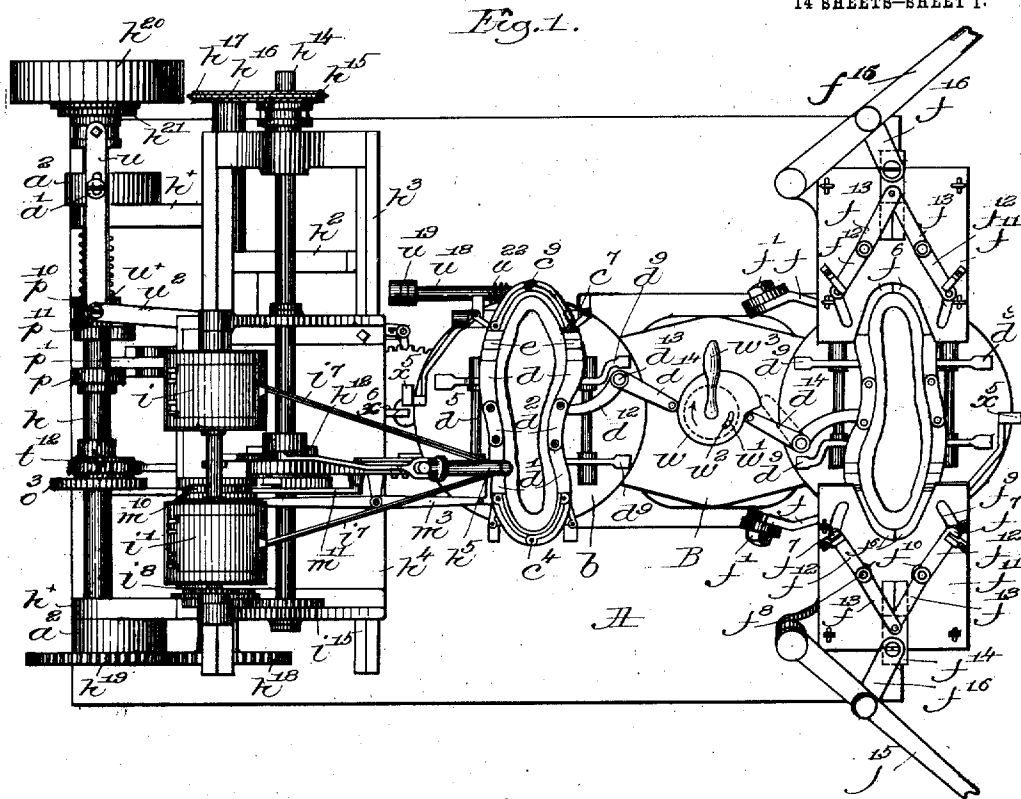
T. K. KEITH.
LASTING MACHINE.

APPLICATION FILED MAR. 29, 1902. RENEWED NOV. 9, 1910.

1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 1.



Witnesses:

Charles L. Neice.

Fred L. Grunhof.

Inventor.
Thomas K. Keith,
by Leroy C. Gregory
attys

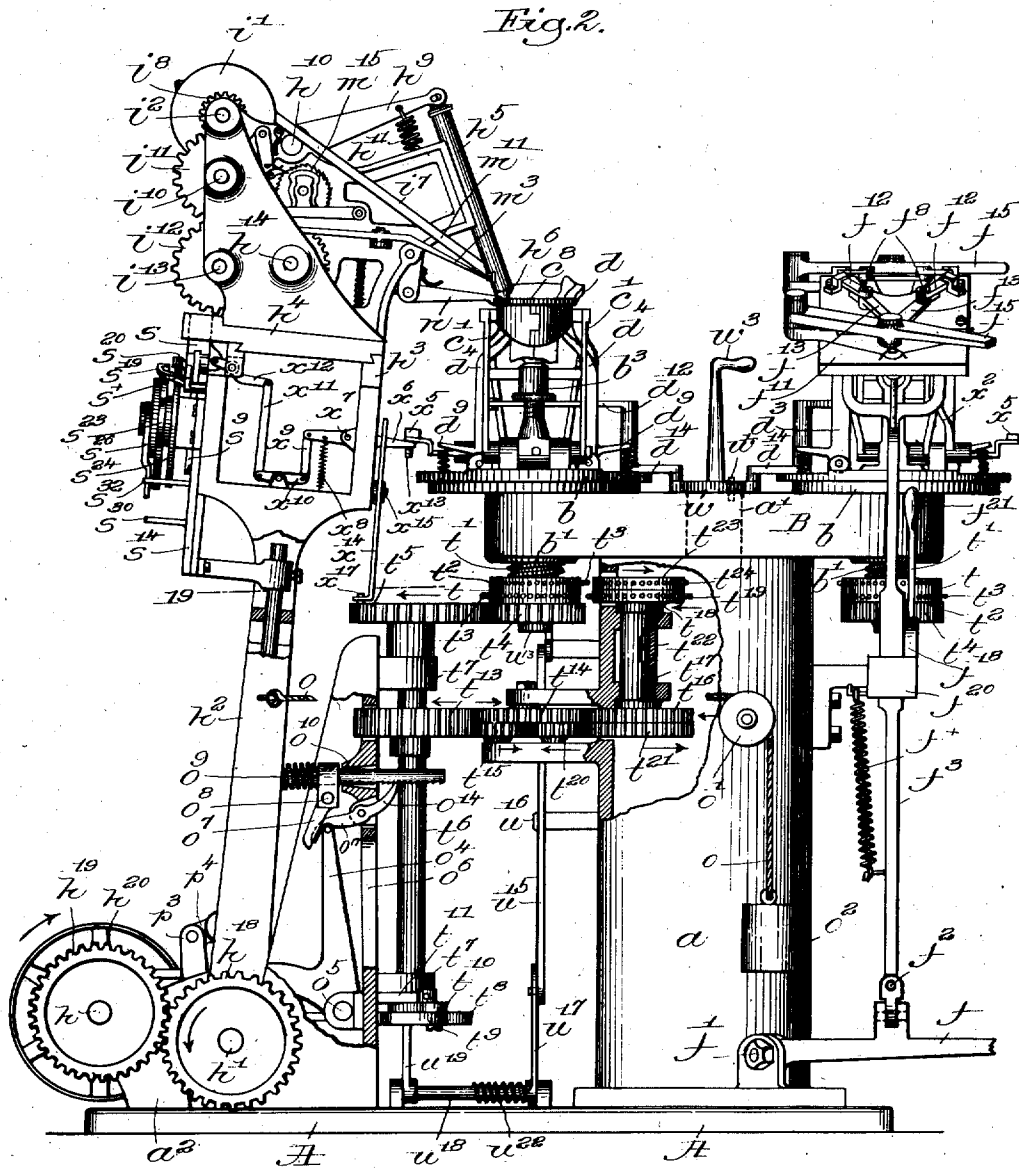
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14 SHEETS—SHEET 2.



Witnesses:

Charles L. Pierce.
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Thomas K. Keith,
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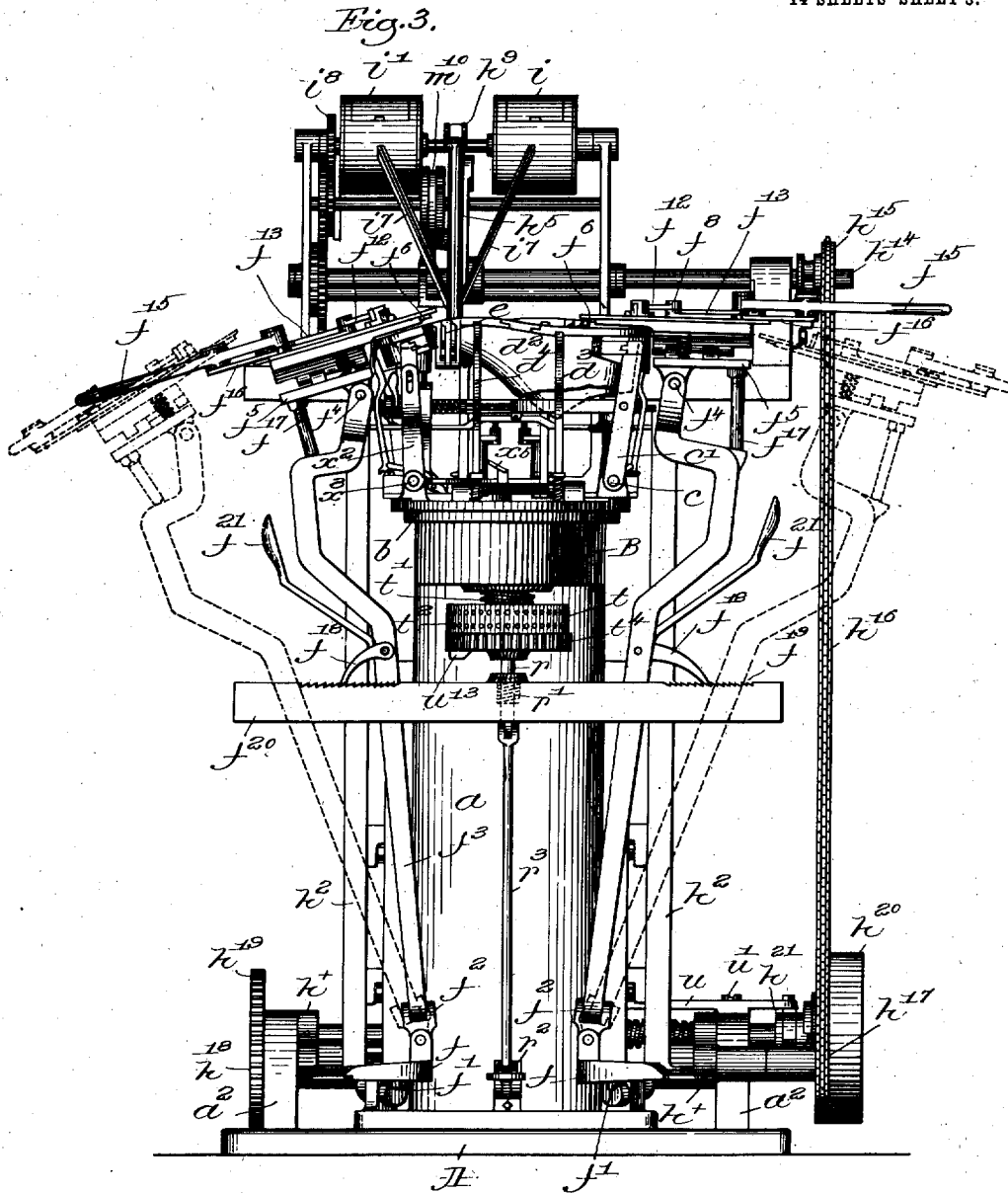
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14 SHEETS—SHEET 3.



Witnesses:

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Inventor.
Thomas K. Keith.
By Henry Gregory
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T. K. KEITH.
LASTING MACHINE.

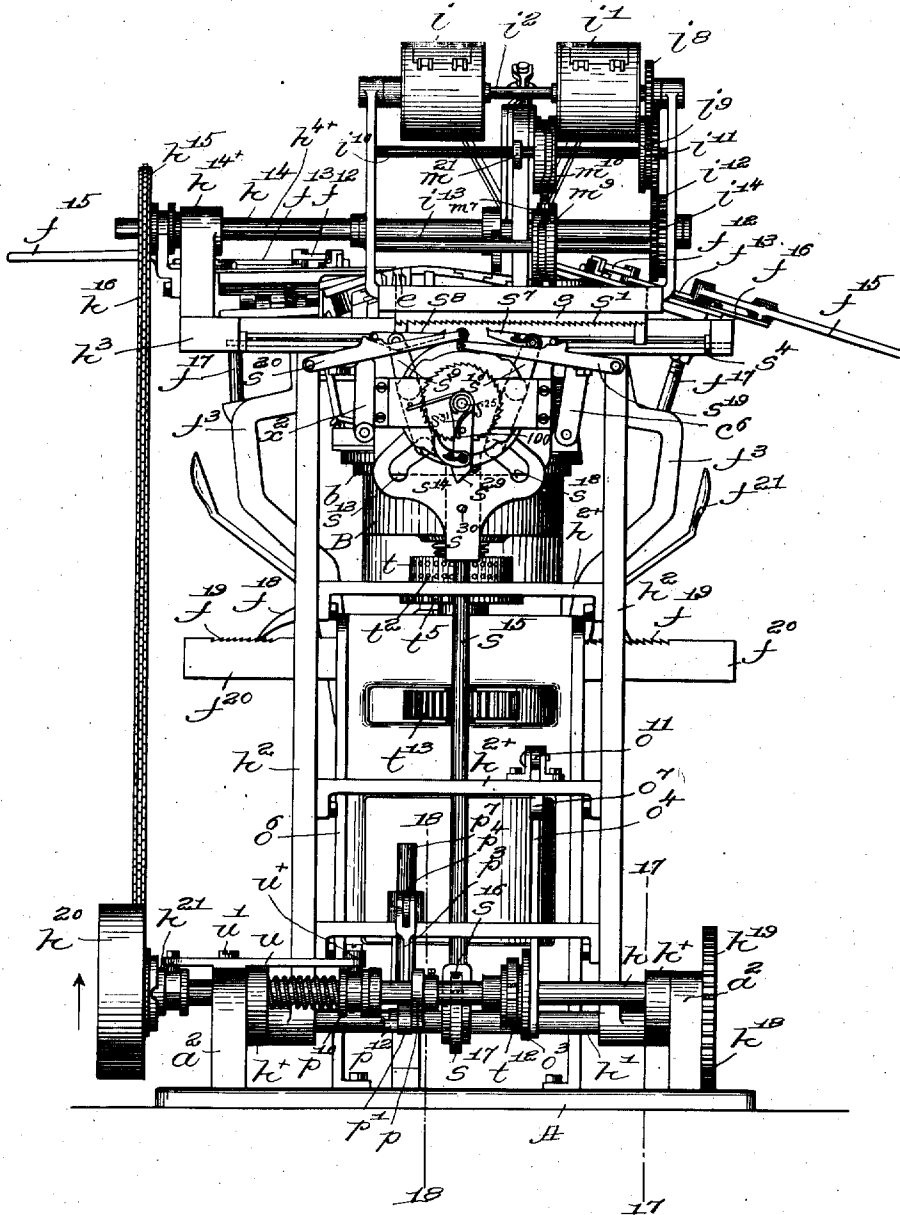
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14 SHEETS—SHEET 4.

Fig. 4.



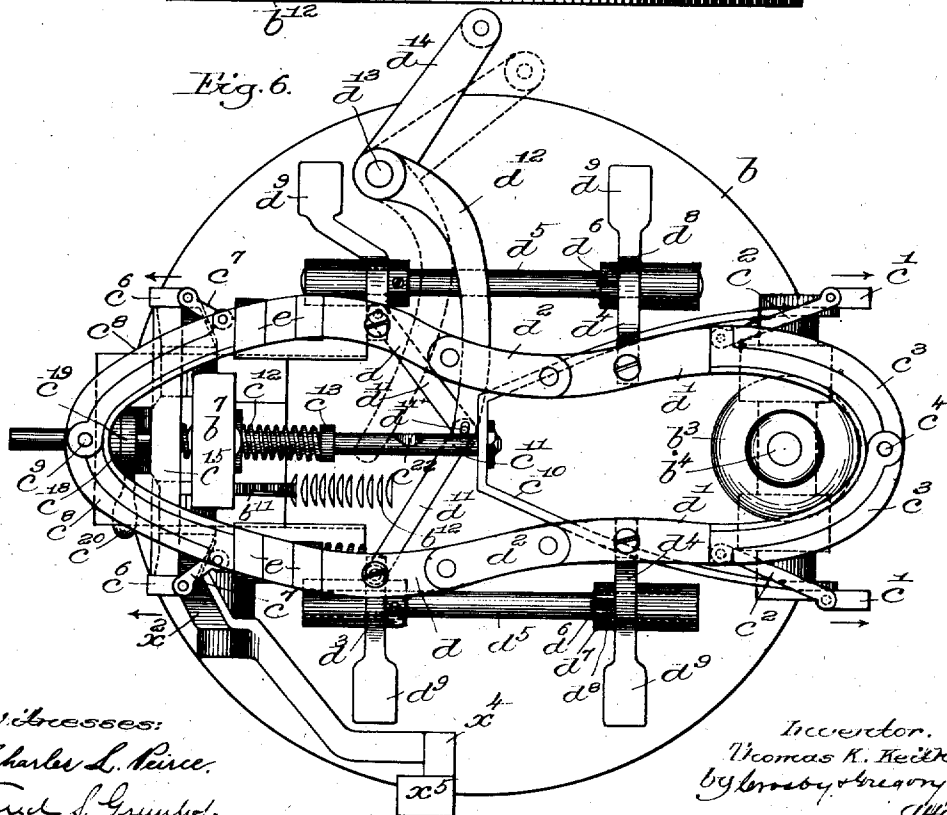
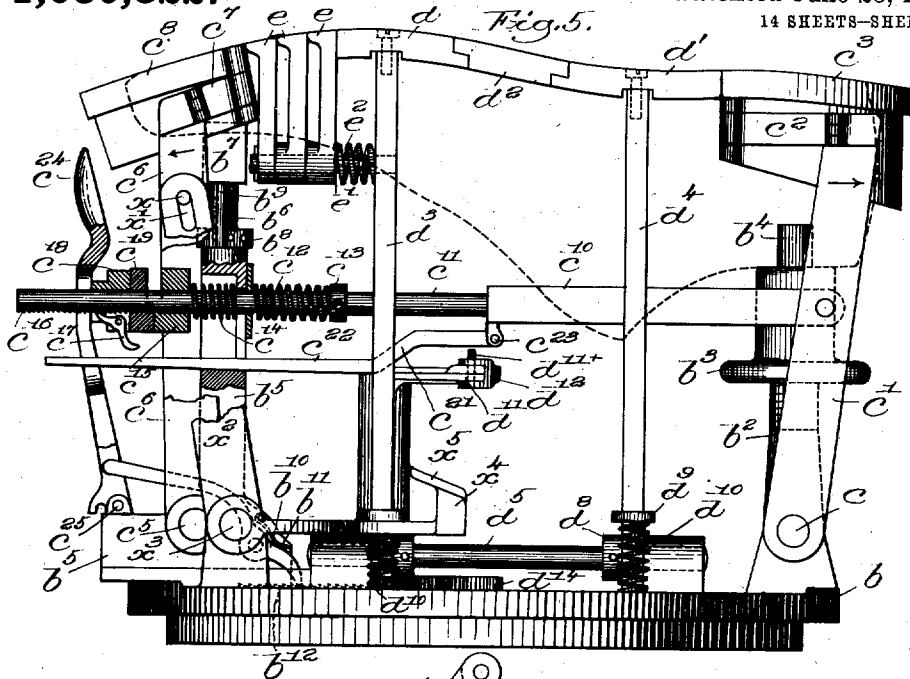
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Patented June 25, 1912.

14 SHEETS—SHEET 5.



Witnesses:
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1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 6.

Fig. 7.

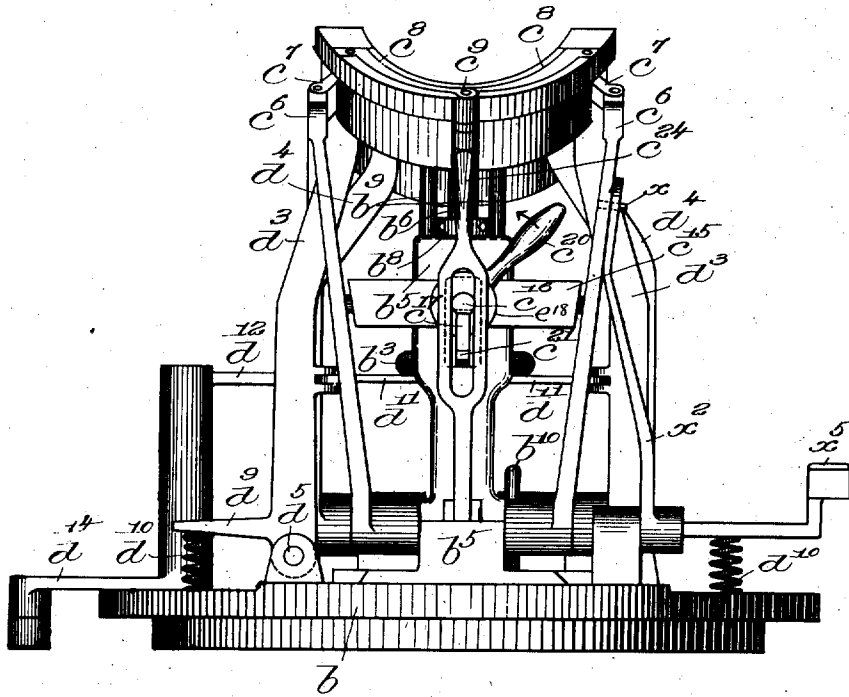
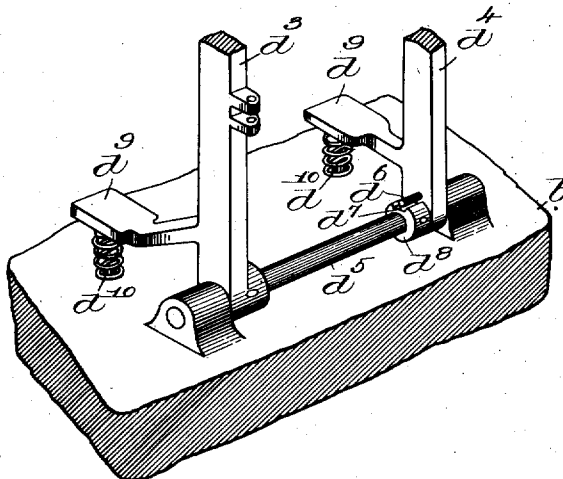


Fig. 8.



Witnesses:

Charles L. Neirce.
Fred S. Grunhof.

Inventor.
Thomas K. Keith,
by Lemmy Gregory
Atty.

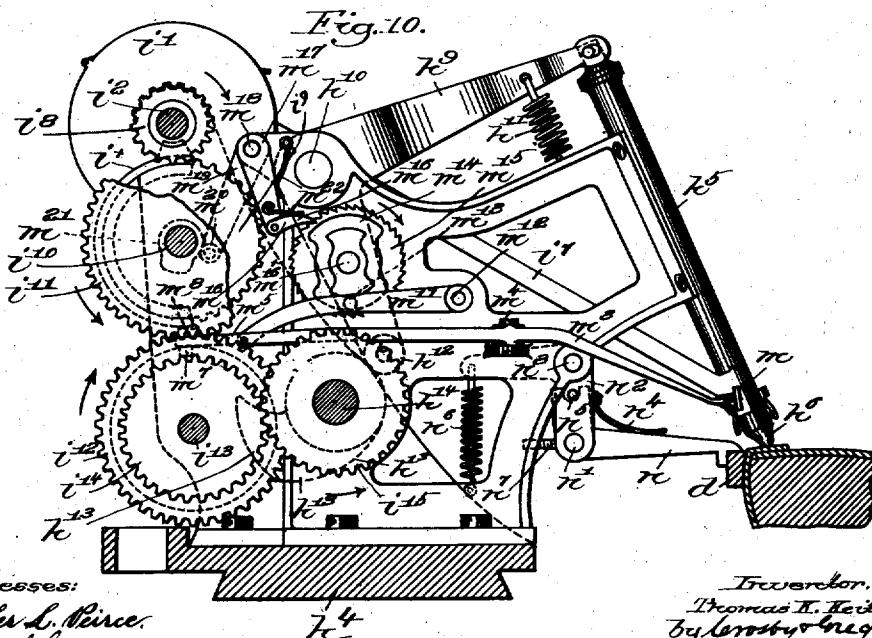
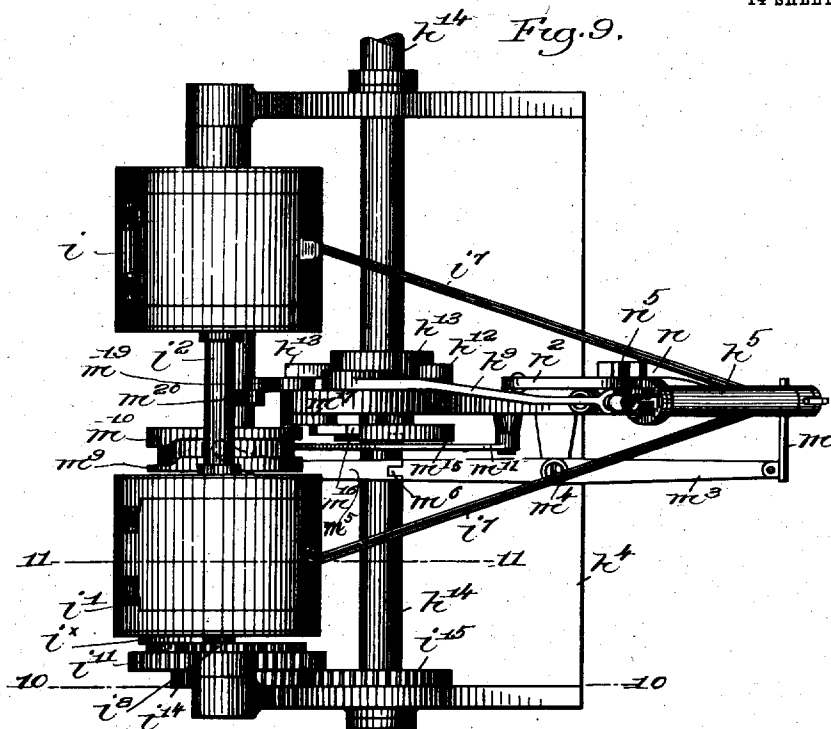
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Patented June 25, 1912.

14 SHEETS—SHEET 7.



Witnesses:
Charles L. Pierce,
Fred S. Grunhof

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Thomas K. Keith,
by Lemuel Gregory
Att'y.

T. K. KEITH.
LASTING MACHINE.

APPLICATION FILED MAR. 29, 1902. RENEWED NOV. 9, 1910.

1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 8.

Fig. 11.

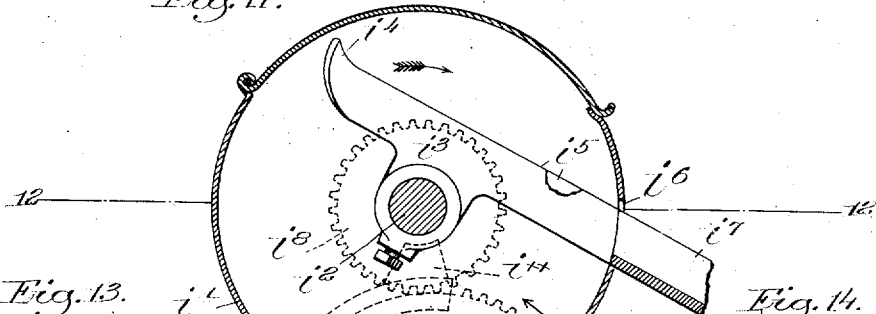


Fig. 13.

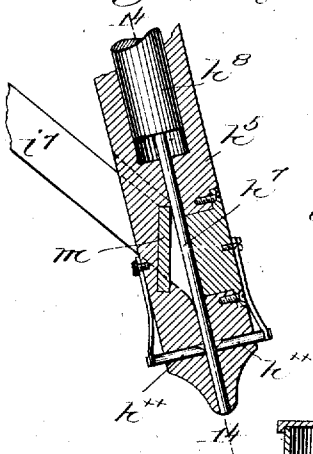


Fig. 14.

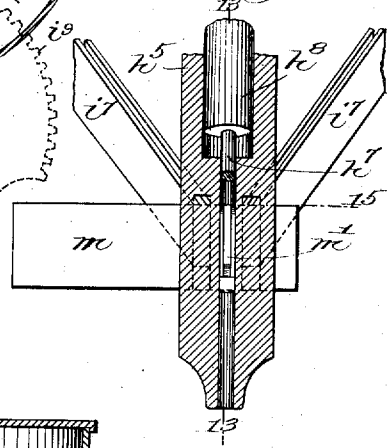


Fig. 12.

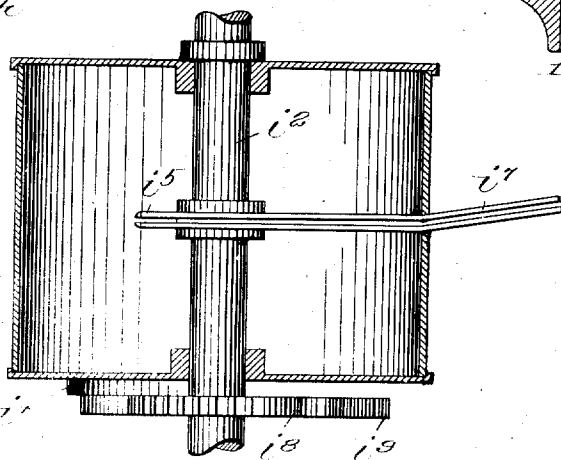


Fig. 16.

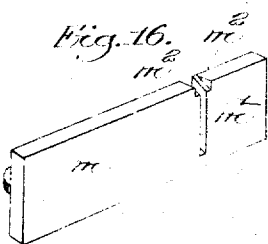
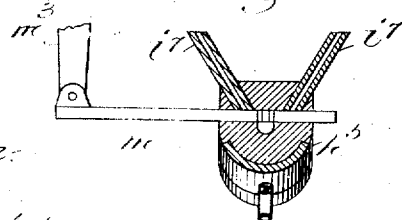


Fig. 15.



Witnesses:
Charles L. Nance:
E. J. Grumbel.

Inventor:
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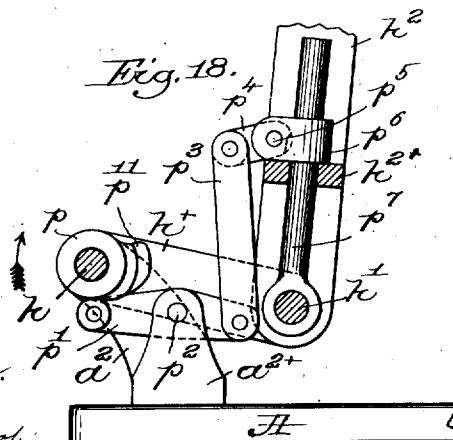
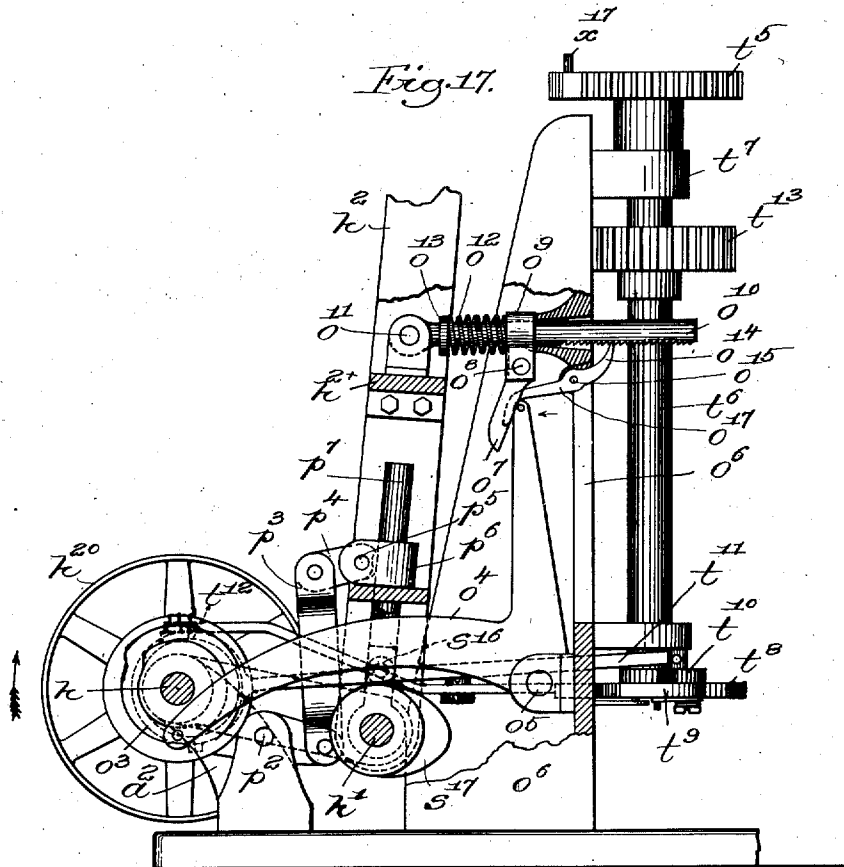
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1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 9.



Witnesses:

Charles L. Peine.

Frank S. Gumbel.

Inventor.
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attys.

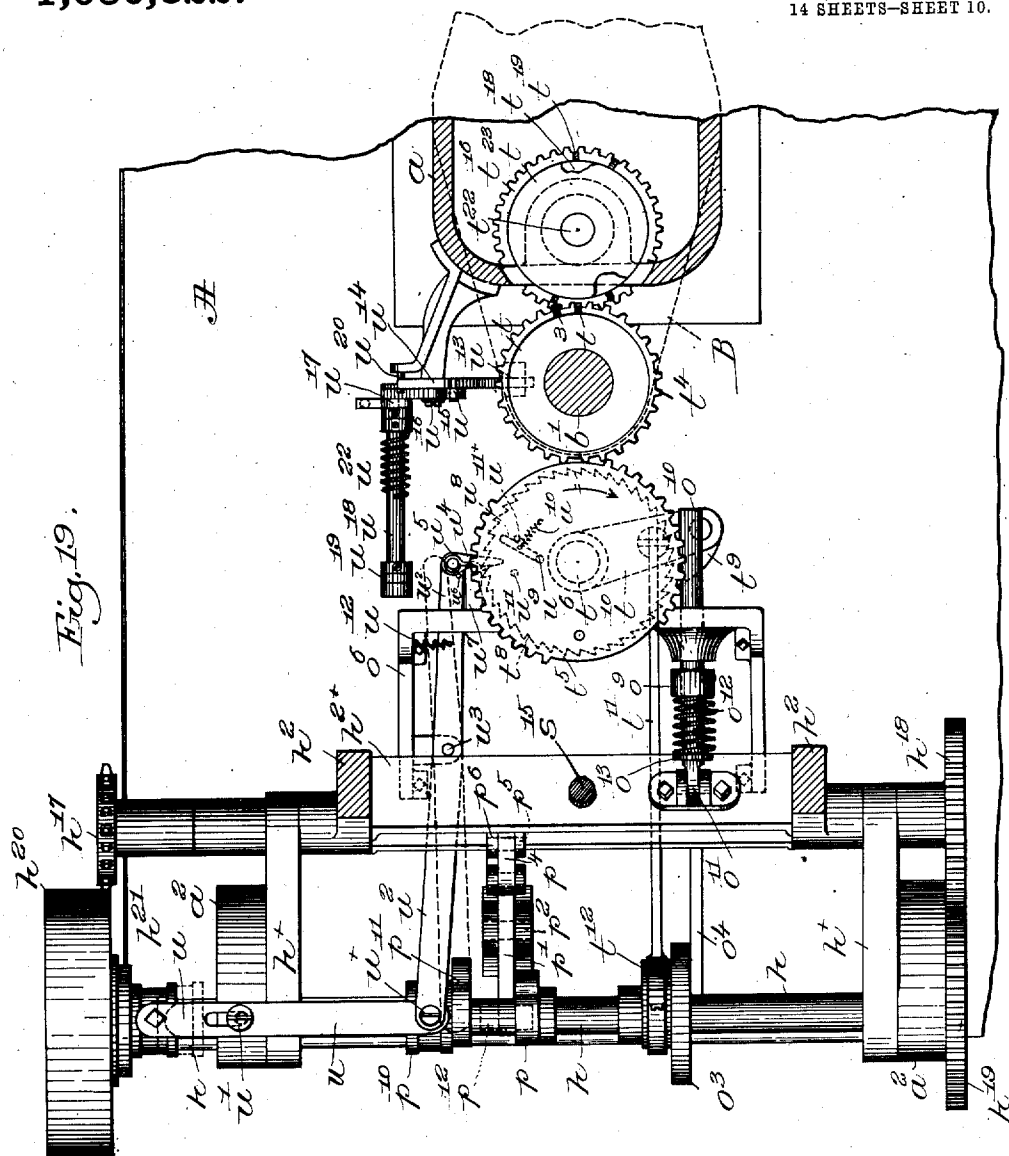
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APPLICATION FILED MAR. 29, 1902. RENEWED NOV. 9, 1910.

1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 10.



Witnesses:

Charles L. Pearce.
Fred L. Grunhof.

In witness whereof,
Thomas K. Keith,
by Leroy Gregory
attys

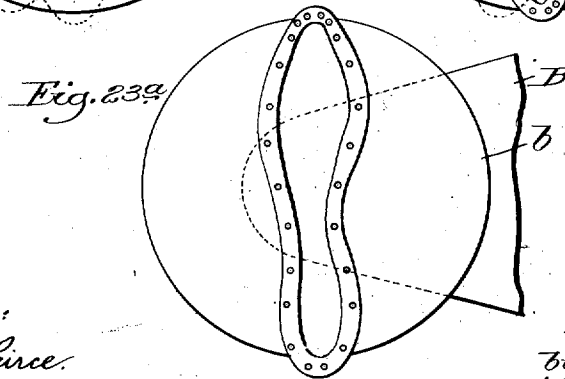
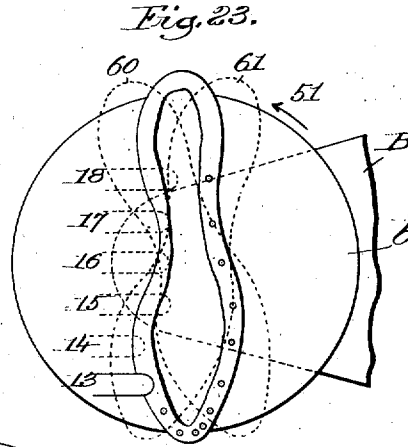
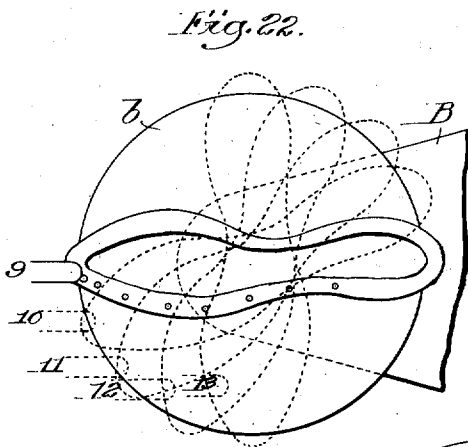
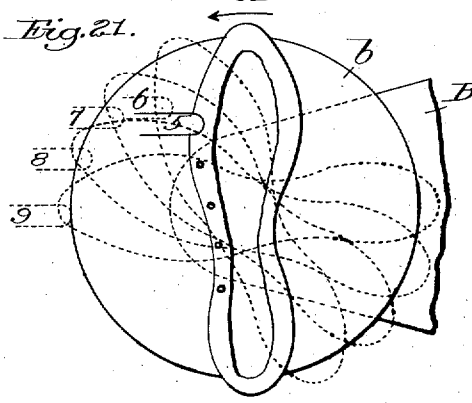
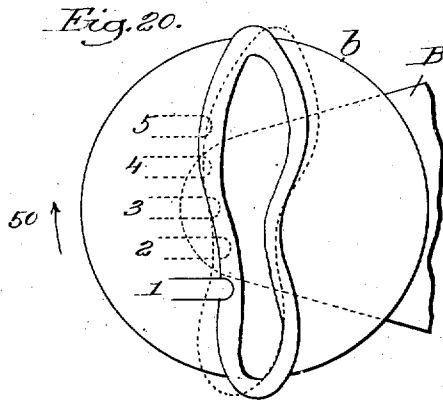
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APPLICATION FILED MAR. 29, 1902. RENEWED NOV. 9, 1910.

1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 11.



Witnesses:
Charles L. Peirce.
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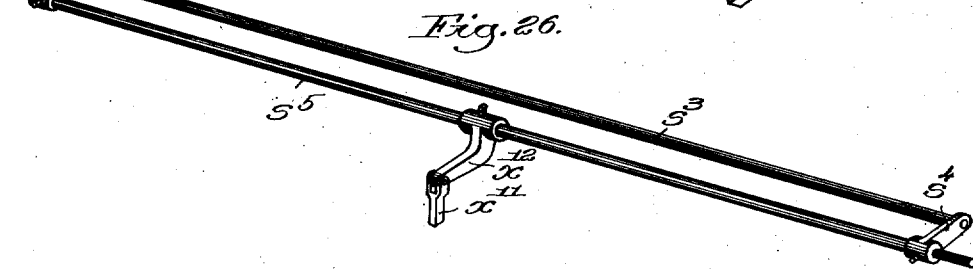
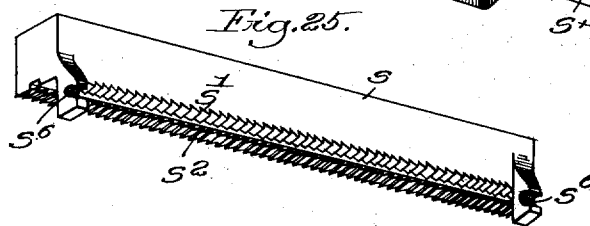
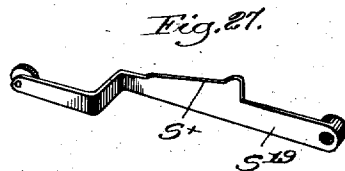
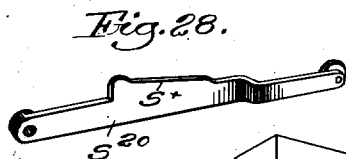
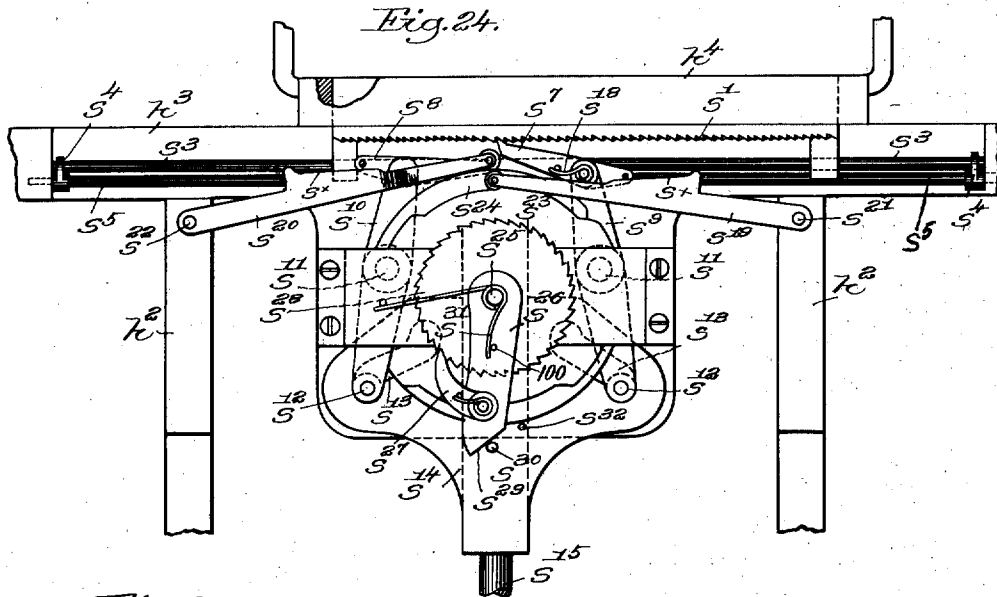
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1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 12.



Witnesses:

Charles L. Rance.

Fred L. Grunhof.

Invention.
Thomas K. Keith,
by Leroy & Gregory
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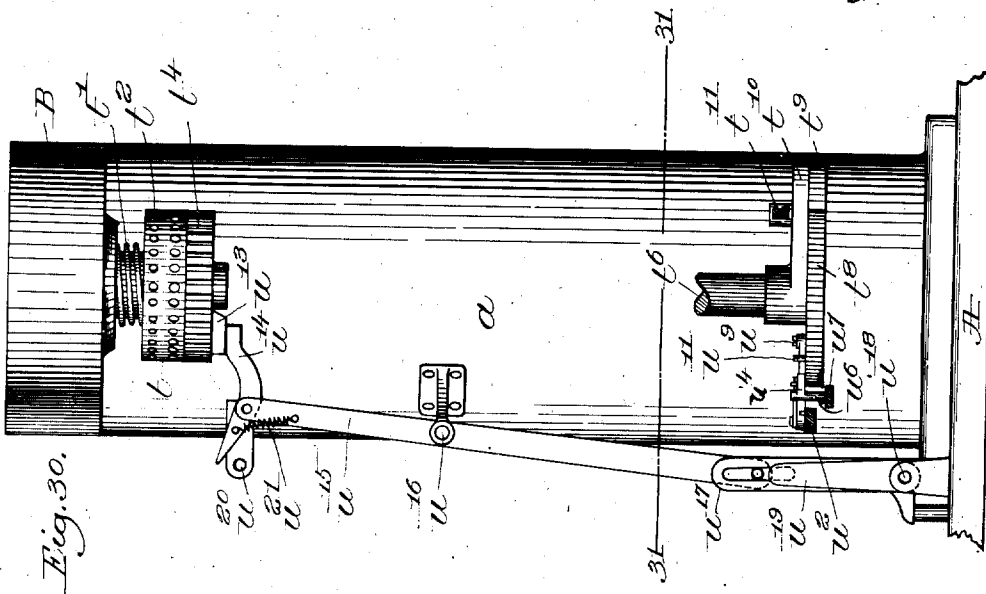
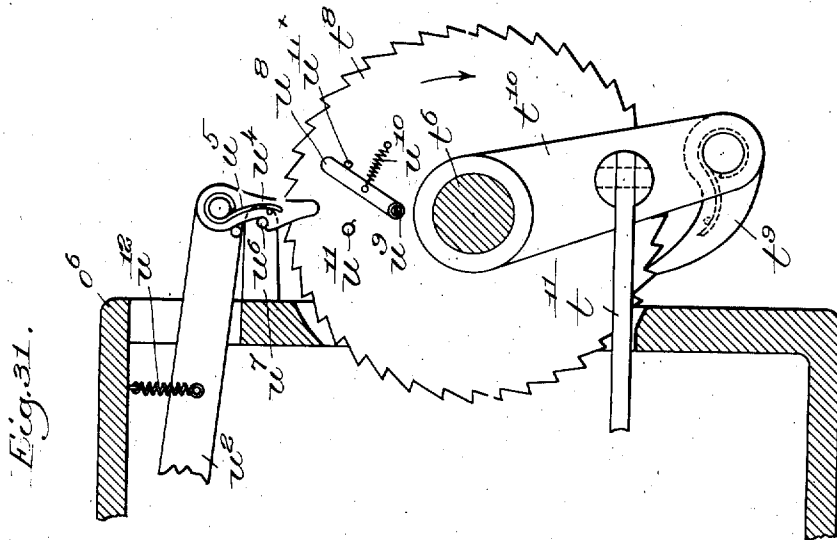
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1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 13.



Witnesses:
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LASTING MACHINE.

APPLICATION FILED MAR. 29, 1902. RENEWED NOV. 9, 1910.

1,030,822.

Patented June 25, 1912.

14 SHEETS—SHEET 14.

Fig. 32.

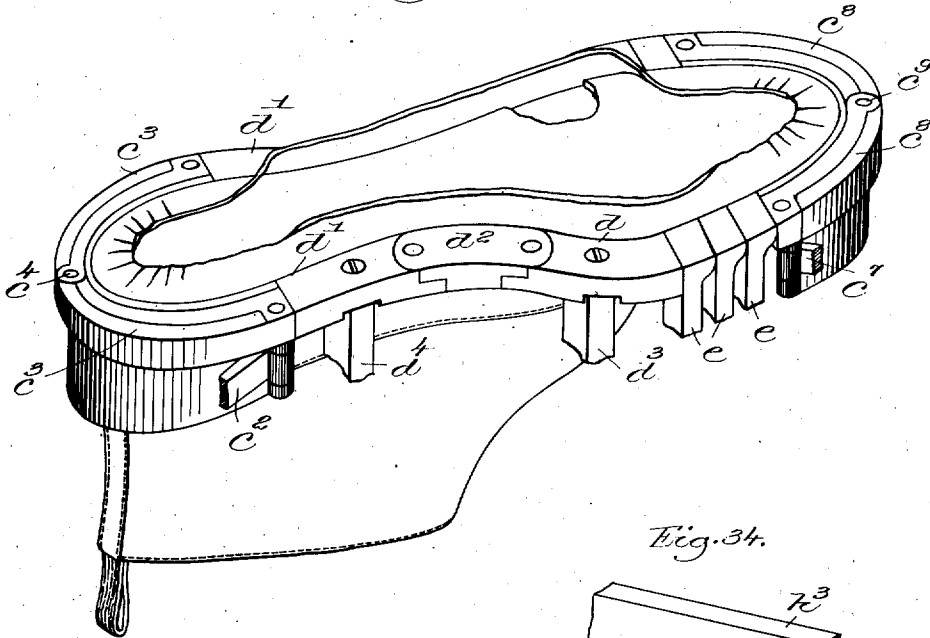


Fig. 33.

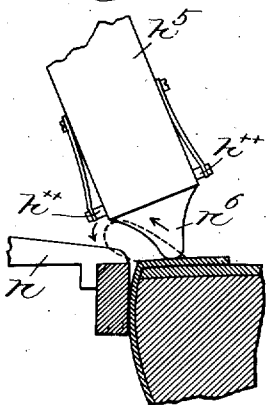
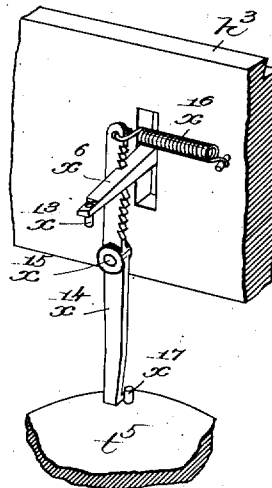


Fig. 34.



Witnesses:
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Fred S. Grunhof.

Inventor,
Thomas K. Keith,
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UNITED STATES PATENT OFFICE.

THOMAS K. KEITH, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, AND BOSTON, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

LASTING-MACHINE.

1,030,822.

Specification of Letters Patent.

Patented June 25, 1912.

Application filed March 29, 1902, Serial No. 100,556. Renewed November 9, 1910. Serial No. 591,512.

To all whom it may concern:

Be it known that I, THOMAS K. KEITH, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Lasting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention has for its object to provide an improved lasting machine for use in lasting boots and shoes.

In the following specification, taken in connection with the accompanying drawings, I have disclosed my invention as embodied in the best form of machine now known to me, although it should be understood that my invention is not restricted in its embodiment to the particular machine here shown and described, but may be varied within the scope of the invention here disclosed.

The machine here shown as illustrative of my invention, may be described generally as containing a plurality or series of last supports, each adapted to support or carry a last upon or about which it is desired the upper of a boot or shoe shall be lasted. These last supports, with the lasts thereupon are presented in succession to suitable end lasting mechanism or mechanisms which operate to last the material over and about the end or ends of the last, the material at such time being preferably clamped smoothly about and against the last on a line immediately below the line of action of the lasting devices by clamping members of an improved form, said members being constructed to retain the upper in clamped position about the last until the completion of the operation of securing the upper in lasted position by the fastening means.

From the lasting devices, the support carrying the last, is automatically presented to a suitable fastening means, preferably a tacker, by which the lasted upper is secured by tacks in lasted position upon the last. Upon the completion of the fastening operation, the support is returned to its original position, and during such movement the clamping members are automatically released in order that the operator may remove the lasted shoe from the support and

substitute therefor another last having thereon the usual parts of a shoe to be lasted. The movement of the support to carry the shoe into and out of operative relation to the fastening means also serves to control the application of power to such means, in the former case starting the operation of the fastening means and in the latter case suspending the operation thereof.

The lasted material is preferably retained by the clamping members about and upon the last during the interval required for the transfer of the last from the lasting devices to the fastening means, in order that there may be no danger of the material slipping from its lasted position. Preferably the fastening means or tacker is also made to perform the function of a lasting device, and to this end, under the embodiment of the invention herein disclosed, it comprises a casing which terminates in a widened portion to constitute a wiper. A reciprocating driver is located within the casing, the driver being actuated by suitable mechanism operating to cause it to drive fastenings through the several layers of material in order that they may be properly secured together. Such fastening means, or tacker, as here defined, is by appropriate mechanism given inward and outward movements relatively to the edge of the last in order that it may, during its inward movements, wipe or press the material of the upper smoothly down upon the innersole, and at the termination of such wiping and pressing movements the driver is actuated to drive a fastening through the upper and innersole. The end of the tacker engages the upper at the extreme edge of the innersole and is maintained in continuous engagement with the upper from such extreme edge to the end of its inward movement, where the fastening is driven, the wiper being then lifted from the upper and returned out of contact therewith until it reaches the position to repeat such operation.

In order that the inward and outward movements of the fastening means, or tacker, may always take place at different portions of the last in the direction of its length, there is preferably imparted to such means and the last a relative movement, either by rotation of the last, or by a traveling movement of the fastening means, or

both. This invention also preferably comprehends the provision of suitable mechanism whereby to insure that the inward movement of the fastening means shall always be substantially at a right angle to the adjacent portion of the periphery of the last.

A further feature of the invention comprises the provision of instrumentalities for imparting a step-by-step traveling movement to the fastening means, and means for automatically controlling this step-by-step movement according to the length of the shoe upon the shoe support which is in position to receive fastenings from the fastening means.

Preferably tacks of different lengths are employed, the longer tacks being utilized in the vicinity of the ends of the lasts, and the shorter tacks along the sides thereof, and means is herein shown for automatically selecting the longer or shorter tacks as the lasting at any particular point may require.

The machine of this application constitutes an improvement upon and a development of the machine shown in application Serial No. 633,693 filed April 24, 1897, and all broad claims to subject-matter common to the two applications are found in the earlier case; also those features of this invention which relate particularly to the tacking mechanism are covered by Patent No. 978,297 which was granted December 13, 1910, upon a divisional application, while those features which involve improvements in shoe supports are covered in divisional application Serial No. 589,682 filed October 29, 1910.

Other features of the invention, including important combinations of parts and details of construction, will be hereinafter more specifically described and claimed.

In the drawings, Figure 1 is a top or plan view of a machine containing one embodiment of my invention, the right hand end of the machine, Fig. 1, being the front of the machine opposite which the operator stands while operating the machine. Fig. 2 is a left hand side elevation of the machine shown in Fig. 1; Fig. 3 is a front elevation of said machine, the view being taken from the right Fig. 1; Fig. 4 is a rear elevation of the machine, the view being taken from the left Fig. 1; Fig. 5 is an enlarged front elevation of one of the last or shoe supports, the outline of a last or shoe being shown in dotted lines in said figure; Fig. 6, is a top or plan view of the parts shown in Fig. 5; Fig. 7, is a left hand end elevation of the parts shown in Figs. 5 and 6; Fig. 8, is a perspective detail showing some of the parts Figs. 5 to 7 inclusive, said figures being hereinafter referred to; Fig. 9 is a top or plan view of the tacker on an enlarged scale, being the form of fastening means

herein selected to illustrate my invention; Fig. 10, a section on the dotted line 10—10, Fig. 9, looking toward the tack hoppers and associated mechanism; Fig. 11 is a section on the dotted line 11—11, Fig. 9, the gears 70 for rotating the sectional raceway within the hopper being indicated in dotted lines; Fig. 12, is a horizontal section on the dotted line 12—12, Fig. 11; Fig. 13, is a vertical sectional detail of the lower or nose end of the tacker, the section being on the dotted line 13—13, of Fig. 14; Fig. 14 is also a vertical section of the same portion of the tacker but taken on the dotted line 14—14, Fig. 13; Fig. 15, is a horizontal section on the dotted line 15—15 of Fig. 14, looking down; Fig. 16 is a perspective detail of the tack selecting gate *m*; Fig. 17 is a vertical sectional detail on a large scale partially broken away, the section being taken on the vertical dotted line 17—17, Fig. 4; Fig. 18, is a vertical sectional detail on an enlarged scale, taken on the vertical dotted line 18—18, of Fig. 4, both these views showing in detail parts which are otherwise partially concealed at the left of Fig. 2; Fig. 19 is a horizontal section on the dotted line 19—19, Fig. 2, looking down; Fig. 20, is a diagrammatic view showing the outline and position of the lasted shoe when first presented to the fastening means, said figure also showing by the successively numbered dotted outlines the successive positions of the fastening means as the latter is moved laterally along the side of the shoe; Fig. 21, is a similar view illustrating successive positions of the shoe and fastening means as the shoe is rotated to the left until the toe of the shoe is presented to the fastening means; Fig. 22, is a similar view showing the successive positions of the shoe and fastening means as the latter is further rotated to carry the fastening means around at the opposite side of the shoe; Fig. 23, is a similar view showing the successive positions of the fastening means as the latter moves down the opposite side of the shoe; Fig. 23^a is a view showing the shoe in final position after the upper has been fastened, and with the positions of the tacks driven by the fastening means indicated around the shoe; Fig. 24, is a detail on an enlarged scale showing in rear side elevation the mechanism for imparting transverse movement to the fastening means, the parts here shown being also shown in Fig. 4; Fig. 25, is a perspective view of the rack block *s*, Figs. 4 and 24; Fig. 26, is a perspective view of the rod *s*³ and actuating parts for imparting rising and falling movement to the rack block *s*; Figs. 27 and 28, are perspective views respectively of the pawl lifting levers *s*¹⁹ and *s*²⁰; Fig. 29, is a detail showing the two cams *s*²³ and *s*²⁴, which support and control the pawl levers *s*¹⁹, *s*²⁰, referred to; Fig.

30, is a rear side view of column *a* looking from the left, Fig. 2, and showing the automatic starting mechanism for the fastening means; Fig. 31, is an enlarged sectional detail, the section being taken on the dotted line 31—31, Fig. 30, looking down, and the parts also being shown in Fig. 19; Fig. 32, is a perspective view showing the lasted upper or shoe while clamped preparatory to fastening; Fig. 33, is a diagrammatic view showing the path of in and out and vertical movements of the tacker or fastening means while in operation; Fig. 34, is a perspective detail showing the lever *x*¹⁴ and immediately adjacent parts.

Referring to the drawings, in the machine there shown as illustrating my invention, A is the bed, of suitable shape and construction to sustain the various parts of the machine. Upon this bed A is erected a suitable column *a*, the upper end of which is provided with a vertical pivot stud *a'* shown in dotted lines Fig. 2, and upon which is pivoted to rotate horizontally, the carrier B. This rotating carrier B carries a plurality of last supports, herein shown as two in number and of similar construction, hence a description of one will be sufficient, it being understood that corresponding parts of both supports are similarly lettered.

Referring particularly to the last support at the right Figs. 1 and 2, and also to Figs. 5 to 8 inclusive, said last support consists of a movable base *b*, shown as a turn table, having a depending pivot or journal stud *b'* loosely journaled in the end of the carrier B, said table consequently rotating about a vertical axis in the carrier B which latter is itself rotatable.

Referring now particularly to Figs. 5 to 8 inclusive, the table *b* at one side has erected upon it a stationary post *b*², threaded at its upper end to receive the rotatable nut *b*³, the upper end of which is provided with a suitable heel pin *b*⁴ adapted to enter the usual socket in the heel end of a last, to hold the latter in position as indicated in dotted lines Fig. 5. Rotation of the nut *b*³ causes vertical adjustment of the heel pin *b*⁴ and corresponding vertical adjustment of the heel end of the last.

At its side opposite the heel support described, the table *b* is provided with a second post *b*⁵, recessed at its upper end to receive freely the lower end of the vertical adjusting screw *b*⁶, supporting at its upper end the toe rest or block *b*⁷ of suitable shape and construction to support properly the toe end of the last, as indicated in dotted lines Fig. 5. A nut *b*⁸ threaded upon the screw *b*⁶ rests upon the upper end of the post *b*⁵ and supports the screw and the toe rest *b*⁷ thereon in proper adjusted position. Rotation of the nut causes vertical adjustment

of the screw and likewise of the toe rest *b*⁷, to accommodate the various lasts. The toe rest is restrained from rotation and is guided in its vertical movement, by two guide rods *b*⁹, which work in suitable apertures in the top of the post *b*⁵.

Coöperating with each last support are similarly constructed clamping or holding means which I will now describe, referring still to Figs. 5 to 8 inclusive, said clamping means, as I have herein chosen to illustrate the same, constituting also a guide or track which conforms to the outline of the bottom of the last. The heel post *b*² carries a horizontal pin *c* upon which are mounted, at opposite sides of the post, like levers *c'*, the upper ends of which are connected by links *c*² with the free ends of the heel clasp, shown as composed of like segments or members *c*³ jointed together at the middle or back of the heel, as indicated at *c*⁴, Fig. 6. Movement of the levers *c'* away from the heel of the last in the direction of the arrows thereon, Figs. 5 and 6, causes the heel clasp members *c*³ to open and release the heel of the last and the material thereupon; opposite or forward movement of said levers acts to close the heel clasp tightly about the heel end of the last and the material thereupon. The toe post *b*⁵ is likewise provided at its base with a transversely extended pin, indicated at *c*⁵, upon which are pivoted, at opposite sides of the post, similar levers *c*⁶, shown as broken away in Fig. 5 to expose parts between the same. The upper ends of these levers *c*⁶ are loosely connected by links *c*⁷ with the free ends of the toe clasp members *c*⁸ jointed together at *c*⁹ in a manner similar to that described with reference to the heel clasp members. Movement of the levers *c*⁶ in the direction of the arrows thereon away from the toe of the last, acts to separate and open the toe clasp members away from the toe of the last, and opposite movement thereof toward the toe of the last acts to close the toe clasp members about the last and the material thereupon.

The clamps for the sides of the last are shown as composed principally of the links or members *d*, *d'*, *d*², flexibly connected or jointed together, as shown in Fig. 6 said members presenting exterior corners between the flat top edges and vertical outer sides thereof, such shaped guides or members enabling the feeler end, to be described, to ride accurately thereover and retain proper engagement therewith during the lasting operation. The links *d* and *d'* at opposite sides of the last, and consequently the connecting links *d*² are pivotally supported by vertical screw bolts upon the upper ends of levers *d*³, *d*⁴, the levers *d*³ being rigidly secured to like and parallel horizontal shafts *d*⁵, Fig. 6, journaled in suitable

bearings on the table b , while the levers d^4 are loosely mounted upon the said shafts, but are connected therewith each through the medium of a pin d^6 playing in a recess, or pocket d^7 of a collar d^8 fast on its shaft d^5 . While every rotative movement of either shaft d^5 is communicated to its lever d^4 , the lever d^4 thereon is moved only when the walls of the pocket d^7 in the collar d^8 contact with one or the other side of the pin d^6 , so that there is a certain amount of lost motion between the levers d^4 and their respective shafts d^5 , to enable the side clamps the more readily to fit the varying contours of the lasts, along the sides thereof. Obviously the number of links or members composing the side clamping devices and the shapes thereof, may be varied as desired and according to the various contours of lasts upon which it is necessary to clamp the material.

The levers d^3 , d^4 , are provided respectively with heels d^9 , between which and the table are interposed suitable springs d^{10} which tend constantly to throw the upper ends of the levers and the clamping members carried thereby, inwardly, toward and against the sides of the lasts or the material thereupon.

To remove the levers and clamping members from the sides of the lasts, I have provided the toggle levers d^{11} , Fig. 6, connecting the levers d^3 at opposite sides of the last, and which when straightened separate the said levers and by rotating the shafts d^5 also separate the levers d^4 and consequently the side clamping members d , d' , d^2 .

To operate the toggle levers d^{11} , I have provided the operating lever d^{12} pivoted at d^{13} to a post erected on the table, said lever d^{12} having an arm d^{14} which is connected with suitable actuating mechanism which will be hereinafter described in connection with the operation of the machine.

To draw the toe and heel clasps toward their respective ends of the last, I have provided the bail c^{10} , Fig. 5, having its ends jointed respectively to the heel clasp levers c^7 . Connected with the crown of this bail is the rod c^{11} , which is extended horizontally through a vertical slot in the toe post b^5 , see Fig. 5. A spring c^{12} is interposed between one face of the toe post b^5 and a collar c^{13} fast on the rod c^{11} , and a spring c^{14} is interposed between the opposite face of the said toe post b^5 and a yoke c^{15} connecting the like toe clasp levers c^6 , said springs tending normally to equalize or center the bail and rod c^{11} with reference to the toe post b^5 . The outer end of the rod c^{11} at the left Fig. 5, is provided at its underside with ratchet teeth c^{16} adapted to be engaged by a dog c^{17} on a collar c^{18} slipped upon the said rod c^{11} . This collar, held by said dog, serves as a back support for a face cam c^{19} surrounding the

rod c^{11} and provided with a suitable handle c^{20} by which it may be rotated about the rod c^{11} . Rotation of this face cam c^{19} in one direction, for instance, upwardly, as indicated by the arrow Fig. 7, causes its cam face to coöperate with a corresponding face on the yoke c^{15} to force the said yoke and the toe clasp toward the toe of the last, and at the same time draw the rod c^{11} and the bail c^{10} in the opposite direction simultaneously to draw the heel clasp against the heel end of the last, thereby simultaneously clamping the material at both the heel and toe ends of the last. Opposite movement of the handle c^{20} and its cam c^{19} effects a release of the heel and toe clasps or clasps. By means of the dog c^{17} the position of the collar c^{18} on the rod c^{11} may be varied to accommodate the toe and heel clasps to lasts of varying lengths.

To facilitate the release of the heel and toe clasps I have extended the toggle joint pin d^{11x} , Fig. 6, vertically above the toggle levers, so that when the said toggle is straightened to release the said clasps, the inwardly moving pin d^{11x} will act upon the cam surface c^{21} of a lever c^{22} pivoted at c^{23} to the bail, and will lift the said lever causing its free end to engage the tail of the dog c^{17} and disengage the said dog from the ratchet teeth on the rod c^{11} , thereby freeing the collar c^{18} and face cam c^{19} and permitting the springs c^{12} , c^{14} , to throw the heel and toe clasps quickly away from their respective ends of the lasts. After the parts have been thus released, obviously it is necessary to return them approximately to their former positions before rotation of the face cam c^{19} will become operative to clamp the toe and heel clasps against the opposite ends of the last, and to accomplish this quickly I have provided the lever c^{24} , Fig. 5, pivoted at c^{25} to the base of the post b^5 , and which, when struck by the hand of the operator, operates to push the collar c^{18} and the cam c^{19} , the yoke c^{15} , its levers c^6 and the toe clasp quickly to the right, until the toe clasp brings up against the toe of the last, when the parts are automatically locked in that position by engagement of the dog c^{17} with the ratchet teeth on the rod c^{11} . Thereafter, rotation of the cam about the rod c^{11} will draw the heel and toe clasps tightly against the ends of the last as described.

To enable the toe and heel clasps to be moved toward and from each other to meet varying lengths of last, that is, to meet various sizes of lasts, I prefer to make the toe post b^5 adjustable on and with reference to the table b , said post being herein shown as provided with a base in the form of a dovetail slide shown best in Fig. 7, it sliding between correspondingly shaped guides on the table b . A dog b^{10} , pivoted to the

base of the toe post b^5 , is held by a spring b^{11} normally in engagement with a series of ratchet teeth b^{12} , shown in dotted lines, Fig. 5, and formed in or on the table b , whereby the post b^5 is prevented from accidentally moving too close to the heel post, as for instance during the time when the last is removed from the support, said dog, however, not interfering with the free movement of the toe post away from the heel post when necessary to accommodate longer lasts. This relative adjustment of the toe and heel clasps to accommodate lasts of different lengths necessarily requires that the effective length of the side clamping means be extended to thereby accommodate lasts of different lengths, said extending means being herein represented as a series of fingers e , pivoted loosely upon pins e' carried by the levers d^3 at opposite sides of the last. Springs e^2 are interposed between the respective levers d^3 and the nearest fingers e to retain the latter frictionally in any position into which they are moved. When it is desired to move the toe and heel clasps closer together to accommodate a shorter last, one or more of the fingers e at each side of the last is turned down into a horizontal position, the fingers next to the toe clasp being first turned down, and thereafter the second and then the third fingers at each side of the last. These fingers constructed as herein described, serve not only as clamping members but also to preserve the continuity of the last shaped guide or track formed about the last by the clamping members and clasps, as will be more fully hereinafter described.

Referring now to Figs. 1 to 4 inclusive, the end lasting mechanism is constructed and arranged to operate upon the upper on the last only while the last is carried by the last support which may for the time being, be held in the position indicated at the right of Figs. 1 and 2. The construction of this end lasting mechanism will best be understood by reference to Figs. 1 and 3. Referring to the latter figure, f , f , are two treadle levers fulcrum at f' to the base of the column a . These treadle levers have connected to them by universal joints f^2 , the lower ends of the supporting rods f^3 to the upper ends of which are connected by pivots f^4 the supporting plates f^5 which carry the lasting mechanism. This lasting mechanism may be of any suitable or desired construction capable of lasting or turning inwardly and downwardly the material at or near the ends of the last. I have herein shown such mechanism as of the well known wiper type, the wipers being indicated at f^6 , Fig. 1, they being caused to close and open as they are advanced and retracted by studs f^7 , f^8 , working in slots f^9 , f^{10} , in the top plates f^{11} . These studs are con-

nected by links f^{12} which in turn are connected by other links f^{13} with the actuating block f^{14} which is given a forward and back reciprocating motion by and from a suitable hand lever f^{15} connected therewith by a link f^{16} . The vertical inclination of the lasting plates for the toe and heel, to accommodate the spring at the ends of the last, is varied by means of the adjusting screws f^{17} interposed between the plates f^5 and suitable stop surfaces formed by bending the rods f^3 , as shown in Fig. 3.

The normal positions of the end lasting devices are shown in dotted lines Fig. 3, wherein the supporting rods f^3 are swung apart about their respective fulcrums at the universal joints f^2 , thereby removing their respective end lasting mechanisms free and clear from the last support and connected parts. The lasting mechanisms may be brought together and in close proximity to the ends of a last, preparatory to lasting, by swinging the supporting rods f^3 toward each other into their full line positions Fig. 3, where they are automatically caught and retained by the dogs f^{18} thereon cooperating with the locking teeth f^{19} on the locking bar f^{20} carried by the column a . These dogs may be released by the operator, for the withdrawal of the lasting mechanisms, in any suitable manner, as by the handles f^{21} .

When the upper and inner sole have been assembled in the usual way upon a last, the latter is first placed upon the last support, which is at the right, i. e. the front of the machine, as the operator stands at the right hand end of the machine Figs. 1 and 2. The operator next moves the handle c^{24} to force the toe clasp against the toe of the last, and the cam handle c^{20} to tighten both the toe and heel clasps against their respective ends of the lasts. He then releases the toggle d^{11} in a manner to be hereinafter described, to permit the springs d^{10} to throw the side clasps against the material at the sides of the last, the operator at the same time, with the assistance of his pincers, or in any other suitable manner, drawing the sides of the upper upwardly about the body of the last in order that the same may be held by the side clasps in a stretched condition upon the last. With the material thus held firmly to the last in a plane or line just below the bottom of the last, or just below the line of action of the lasting wipers, the operator swings the supporting rods f^3 , carrying the end lasting mechanisms from their dotted line positions toward each other into their full line positions Fig. 3, thereby bringing said end lasting mechanisms up to the respective ends of the last where they can be operated to last the material thereupon. Of course the clasps and clasps referred to are still in position holding the upper to the last. The operator now, through the me-

dium of the handle levers f^{15} , Fig. 1, advances and closes the toe and heel plates to lay the material at the toe and heel of the last, and after the material has been crimped and laid down upon the upturned bottom of the last or upon the innersole thereon, it is there compressed by depression of the treadle levers f , f , by the foot of the operator, which act through the rods f^3 to correspondingly depress the entire lasting mechanisms, causing the heel and toe wipers f^6 to press the crimped and folded material tightly down upon the innersole, the compression continuing only so long as the operator holds the treadles, or either of them depressed. The arrangement of the pawls f^{18} causes them to force the lasting mechanisms farther over the shoe when depression by the treadles f is effected, as will be obvious from Fig. 3. After the compression, the treadles and wipers are raised by springs f^x , Fig. 2, the lasting plates are then withdrawn, and with the toe and heel clasps and side clamping members still in position clamping the upper tightly against the sides of the last, thereby holding the upper in its lasted position, the operator releases the dogs f^{18} , holding the lasting mechanisms up to the last, thereby permitting the lasting mechanisms to fall away from the last into their dotted line positions Fig. 3 by their own weight, after which the carrier B is rotated to carry the last support with its lasted and clamped shoe into the position at the left Figs. 1 and 2, for the purpose of having its upper tacked or secured permanently in position or to the innersole, the shoe previously lasted and swung into such position and now having its upper permanently secured, being at the same time swung to the right into position in front of the operator, where it is removed and a new last, upper and innersole placed in position and lasted while the one previously lasted is being tacked or secured.

I will now describe the mechanism or means which acts upon the lasted shoe when carried away from the operator by rotation of the carrier B, to secure one lasted upper to the inner sole while another upper is being positioned and lasted by the operator. This mechanism is shown at the left Figs. 1 and 2 and in detail principally in Figs. 9 to 15 inclusive. Referring first to Fig. 2, the bed A at one side the column a is provided with a suitable bearing a^2 for a shaft h , upon which is fulcrumed one end of each of two links h^x , Fig. 18, said links at their free ends carrying a second shaft h' which serves as a fulcrum or pivotal support for the oscillating or in and out moving double standard h^2 for the fastening means or tacker. At its free end, Fig. 2, the oscillating standard h^2 constituting sustaining means for the fastening means is

provided with suitable guideways h^3 for a head h^4 free to travel to and fro or slide in said standard and suitably shaped and constructed to hold the preferably inclined driver tube or tacker casing h^5 , best shown at the right Figs. 9 and 10. This tacker casing h^5 may contain usual tack or fastening driving devices, I having for convenience herein shown said casing as provided with a proper nose h^6 , preferably widened, as shown in Figs. 13 and 14, the better to serve as a wiper to meet and wipe the material of the upper over and lay it upon the innersole, and within said casing reciprocates the driver h^7 , Fig. 13, connected with and actuated by the reciprocating driver carrier h^8 . This driver carrier is actuated by a bell crank lever h^9 , Fig. 10, connected with the upper end of the carrier, and fulcrumed at h^{10} in a part of the head h^4 . A spring h^{11} tends constantly to move the driver and its carrier into their lowermost or tack driving positions, they being lifted therefrom into their elevated positions through the medium of the bell crank lever h^9 , the lower end of which is provided with a roller h^{12} which runs in contact with a suitably shaped driver cam h^{13} , shown in dotted lines Fig. 10, fast on a shaft h^{14} journaled in suitable bearings in or on the head h^4 . The shaft h^{14} having its bearings in an upright h^{14x} of the head h^4 is extended at one end beyond said head, as indicated in Figs. 9, 3 and 4, said shaft having a groove as h^{4x} which receives a key or spline fixed to a sprocket wheel h^{15} , driven by a sprocket chain h^{16} from a sprocket wheel h^{17} fast on the shaft h' , Fig. 19, hereinbefore referred to, said shaft during the traveling movement of the fastening means sliding through the sprocket wheel, this being necessary in order that the sprocket wheel may rotate the shaft h^{14} in all positions of the tacking means during its traveling movement in one and then in an opposite direction. The shaft h' , Fig. 2, is shown provided with a gear wheel h^{18} , in mesh with and driven by a wheel h^{19} fast on the shaft h , which is the main shaft of the machine. This main shaft h is provided with a suitable driving or belt pulley h^{20} , which, however, is connected with the said shaft only through the medium of a suitable clutch device h^{21} , Fig. 1, which will be hereinafter referred to, so that the said driving shaft and the fastening means, tacker or other mechanism connected therewith is in motion only when the clutch is rendered operative for driving purposes.

Referring again to Figs. 9 and 10, i , i' , are suitable hoppers for the reception of fasteners, preferably ordinary tacks and preferably of different lengths, for instance, the hopper i may contain tacks which are shorter than those contained in the hopper i' . These hoppers are similar in construction

tion and consist respectively of a cylindrical drum, best shown in Figs. 10, 11 and 12, mounted upon a common shaft i^2 journaled in suitable bearings in or on the head h^4 .

5 Within each hopper is a short section of raceway i^3 , Fig. 11, fast on the shaft i^2 so as to rotate therewith and within the hopper. One end of this short raceway i^3 , see Fig. 11, is preferably made hook-shaped, as

10 at i^4 , so as the better to pick up, in quantity, the tacks which lie in bulk on the bottom of the hopper. Some of the tacks thus gathered up by the hooked end of the raceway fall with their shanks in the slot i^5 of said

15 raceway, while others which are not correctly positioned are dropped again into the mass in the bottom of the hopper to be again picked up on a subsequent rotation of the raceway.

20 As the raceway rotates in the direction of the arrow Fig. 11, the tacks which fall with their shanks in the slot i^5 and with their heads resting on the top of the raceway slide by gravity down the raceway, and

25 when the raceway reaches the position shown in Fig. 11 the tacks pass therefrom out through an opening i^6 in the side of the hopper and into a correspondingly constructed but stationary raceway i^7 which

30 leads to the tacker casing h^5 . The shaft i^2 carrying the rotating raceways i^3 is driven by a toothed wheel i^8 thereon, shown in dotted lines Fig. 11 and in full lines Figs. 9

35 and 10, said gear i^8 being in turn driven by a gear i^9 fast on a shaft i^{10} journaled in up-rights of the head h^4 . The shaft i^{10} carries a second gear i^{11} which is driven by a gear i^{12} on a shaft i^{13} journaled in or on the head

40 h^4 and in turn provided with a gear i^{14} driven by a gear i^{15} fast on the shaft h^{14} referred to. Thus the raceways within the hoppers i^3 , i^7 , are rotated by or from the shaft h^{14} which carries the cam h^{13} for actuating the driver.

45 To insure proper flow of the tacks from the rotating raceways i^3 within the hoppers to the stationary raceways i^7 leading therefrom to the tacker, I have constructed the gears i^8 , i^9 , which rotate the shaft i^2 carrying the hopper raceways, in such a manner

50 as to provide a short dwell or period of rest of the said rotating raceways just at the moment they become alined with the stationary raceways to which they are to deliver their tacks.

55 The present embodiment of my invention, see Figs. 10 and 11, is constructed substantially like the well known Geneva stop motion, wherein the gear i^9 , intermeshing with the teeth of gear i^8 , has teeth for a portion of its circumference, said gear having a long untoothed portion or segment i^x located at one side the path of motion of, and extending beyond the teeth of gear i^9 ,

60 said segment at times coacting with a de-

pression i^x , see dotted lines Fig. 11, in a flange or portion of the gear i^8 at one side of its full set of teeth. When the teeth of gears i^8 , i^9 , intermesh, the shaft i^2 of the hopper will be rotated, but whenever the long untoothed portion i^x is in contact with the flange portion of the gear i^8 , and in crossing the space i^x therein the shaft will not be rotated, and during this time the rotating raceways will be stopped that tacks therein may be delivered to the stationary raceways.

Referring now to Figs. 9 and 14 to 16 inclusive, the stationary raceways i^7 converge to the lower end of the tacker casing h^5 , both raceways leading to a transverse passage provided in the casing for the reciprocating gate m shown separately in Fig. 16. This gate m intermediate its length has a vertical slot m' of a size proper to receive the shank of the longest tack used, and the said slot at the upper edge of the gate has its edges chamfered off to present downwardly inclined rests or shelves m^2 , the inclination of which conforms substantially to the downward inclination of the raceway i^7 . Obviously, if this gate m be moved in one direction until its slot m' registers with the slot in one of the raceways, the lowermost tack in the latter will gravitate into the slot of the gate, with its head resting upon the inclined shelves m^2 of the gate, while the solid portion of the gate will close the outlet to the other raceway and vice versa. Having received a tack in this manner, the gate is returned to its central position with the slot m' in line with the driver passage of the tacker casing, when the tack held in the slot of the gate will, see Fig. 13, gravitate into the driver passage down which it will fall until stopped by usual yielding stop blocks h^{xx} . Subsequent descent of the driver forces the tacks downwardly between the stop blocks, which latter separate, automatically, as the tack passes, farther descent of the driver acting to drive the tack into the material upon which the nose of the tacker may for the time being rest. Obviously, when the gate is moved from its middle position where its slot registers with the driver passage toward one or the other of the raceways, tacks will be taken from that raceway alone and delivered to the driver. To provide these necessary movements for the gate, I have in the present instance of my invention, connected the free end thereof, see Fig. 9, with one end of a lever m^3 , fulcrumed at m^4 and provided at its opposite end with a finger m^5 , Fig. 10, which is jointed at m^6 to the end of the lever m^3 , so that while it moves with the lever m^3 as the latter moves about the vertical axis of its fulcrum m^4 , said finger may nevertheless have a rising and falling movement independently of the lever m^3

and without reference to the horizontal vibrations of the said lever m^3 .

The free end of the finger m^5 is provided at its lower and upper sides with rollers m^7 , m^8 , the roller m^7 being arranged to travel in the groove of a path cam m^9 shown best in Figs. 4 and 10 and fast on the shaft i^{13} referred to, Fig. 10, while the roller m^8 is arranged so that it may travel in the groove of a path cam m^{10} , Fig. 4, fast on the shaft i^{10} referred to, Fig. 10.

When the finger m^5 is dropped into its lowermost position Fig. 10, the roller m^7 will travel in the cam m^9 , enabling the said cam to govern the movements of the gate m , causing it to reciprocate from the driver passage always in one direction, viz., to the raceway which conveys short tacks from the hopper i to the driver. When, however, the finger m^5 is lifted to withdraw the roller m^7 from engagement with its cam m^9 , the roller m^8 at its upper side is placed in engagement with the cam m^{10} which will then govern the reciprocations of the gate m , causing the latter to move from the driver passage always in an opposite direction from before, viz., to and from the raceway conveying long tacks from the hopper i' to the tacker. Thus the gate is made to deliver short or long tacks to the driver, according as it is moved by the cam m^9 or the cam m^{10} . Obviously the number of sizes of tacks which may be used in the machine may be varied by mere multiplication or modification of the parts herein shown and described, I having found it convenient to use but two sizes, although other sizes might be found convenient in certain classes of work.

To determine the length of time during which the rollers m^7 , m^8 , are in engagement with their respective cams, and therefore the length of time during which the short and the long tacks are respectively delivered to and driven by the tacker, I have provided, see Fig. 10, a lever m^{11} fulcrumed at m^{12} on the head h^4 and having its free end connected, as shown, with the finger m^5 , which shifts the rollers into and out of engagement with their respective cams. This lever m^{11} , intermediate its length, has a roller m^{13} , which travels in a cam groove m^{14} cut in the face of a ratchet wheel m^{15} mounted on a stud m^{16} on the head h^4 . The cam groove m^{14} is shaped to raise and lower the lever m^{11} and with it the finger m^5 to throw the rollers m^7 , m^8 , into and out of engagement with their respective cams at such times as will deliver the necessary and proper long or short tacks to the driver, the period of time during which each length of tack is delivered being determined by the shape of the cam m^{14} . The ratchet wheel m^{15} has imparted to it a step by step rotation in the direction of the arrow thereon, Fig. 10, by a spring-con-

trolled pawl m^{16} on the end of a pawl carrying arm m^{17} fast on a shaft m^{18} mounted on the head and provided with a second arm m^{19} provided with a roller m^{20} running in contact with a cam m^{21} fast on the shaft i^{10} . The features of the tacker mechanism *per se* are claimed in divisional application Serial No. 329,704. Rotation of the shaft i^{10} thus communicates a reciprocatory motion to the pawl m^{16} for a step by step rotation of the ratchet wheel referred to, a spring m^{22} acting on the arm m^{17} to hold the roller m^{20} always in operative contact with its cam.

The distance at which the tacks are driven inwardly from the edge of the last or innersole is determined by the edge gage or feeler member n , Fig. 10, the same being shown in the form of a bell crank lever pivoted at n' in the lower end of a second bell crank lever n^2 in turn fulcrumed at n^3 in or on the head h^4 . The free end of the gage or feeler n is shaped to ride on or act against the clamping members hereinbefore described as constituting one form of guide or track, it embracing the upper about the edge of the last, the said gage in contact therewith determining the distance from the edge of the last at which the line of tacks shall be driven through the upper and into the inner sole in connecting the upper to the innersole. A spring n^4 carried by the lever n^2 and acting on the gage n enables the gage to be retained in a yielding manner on the upper side of said clamping member, guide or track, the downward movement of the gage being, however, restrained by a pin n^5 carried by the lever n^2 and entering a notch, see dotted lines Fig. 10, in the upper end of said gage, said spring keeping the gage in position while the shoe support is removed entirely from tacking position with relation to the fastening means. The lever n^2 carrying the gage n is also acted upon by a spring n^6 which tends to move said gage outwardly away from the head h^4 , that it may contact always with the clamping member, guide or track throughout the rotation of the shoe support, it being understood that this track varies in contour with the varying shapes of lasts, but as the tacking means is moved inwardly, as will be described, to act upon the upper and lay it upon the inner sole, the gage riding on the track must remain at rest, and consequently the fulcrum of the gage must move as the fastening means approaches the shoe, the lever n^2 at such time moving about its fulcrum n^3 under the stress of the spring n^6 , said lever n^2 being, however, arrested sooner or later by the adjustable stop n^7 secured to the head, the location of which determines the distance from the inner edge of the guide or track that the tacks shall be driven from the driver tube into the upper laid over upon the inner sole.

To insure proper driving of the tacks

through the edge of the inturned upper into the inner sole entirely about the shoe held on the shoe support by the clamping member, guide or track, I have chosen herein to illustrate the tacker as having imparted to it not only the in and out movement with relation to the edge of the last already referred to, but also a traveling movement, and I have illustrated the traveling movement as a to and fro movement or a traveling movement in two directions, in order that when the tacker is moved inwardly it may act upon and lay the edge of the upper smoothly upon the inner sole preparatory to driving a tack, the outward movement of the tacker enabling the latter to gain a new position preparatory to repeating the before-described operation. This outward movement is preferably always for substantially the same distance from the edge of the last which varies in its contour or outline, and the upward movement of the tacker, to be hereinafter described, is also preferably for a distance substantially always uniform from the upper surface of the gage and from the bottom of the last which varies in spring or curve from heel to toe along the bottom of the last.

The in and out movement of the tacker is especially desirable when rounding the toe and heel, as thereby the overlaying of the edge of the upper may be made very smooth, and thereby also, when working along the sides of the last, the nose of the tacker may operate to fulfill the functions of a lasting device, and wipe over and lay smoothly upon the inner sole the upwardly projecting edge of the upper along the sides of the last, turning it over from the position in which it has been left after having been pulled up as described by pincers or devices in the hands of the operator in fitting the upper to the last during the lasting operation. To provide for this in and out movement of the tacker, the head h^4 is mounted upon a suitable actuator or standard h^2 , referred to, it being moved in and out by mechanism best shown in Figs. 2, 17, 18 and 19.

Referring to Fig. 2, a cord o attached to the oscillating standard h^2 is shown as extended to the right over a pulley o' on the column a , and has depending from its free end a weight o^2 which tends to draw constantly the oscillating standard and the head carrying the tacker toward the edge of the last, the weight thus serving to give to the head and tacker always the necessary inward or smoothing down movement for laying the upper preparatory to securing it to the inner sole by tacking.

To withdraw or remove the tacker away from the last and in opposition to the weight o^2 , I have provided, see Figs. 4 and 17, a path cam o^3 fast on the shaft h and actuat-

ing a bell crank lever o^4 pivoted at o^5 , see Fig. 2, on a standard o^6 erected on the bed, said lever o^4 at its upper end lying immediately back of the long arm of a clutch piece o^7 , pivoted at o^8 , on a collar o^9 , which is free to be slid by a spring o^{12} , on the rod o^{10} , pivoted at o^{11} on the lever h^2 , carrying the fastening means whenever the pin carried by the upper end of lever o^4 is removed from contact with the long arm of the clutch piece. The short arm of the clutch piece is located close to the rod o^{10} , and whenever said clutch piece is moved by the lever o^4 in the direction of the arrow near it, Fig. 17, said short arm engages the rod o^{10} , thus securing the collar fixedly on said rod and moving the latter to the left in said figure, causing the fastening means to be moved outwardly, this outward movement of the fastening means being substantially always for a uniform distance from the base line or position occupied by the fastening means when the next preceding tack was driven. The spring o^{12} is interposed between a fixed collar o^{13} on the rod o^{10} and the loose collar o^9 , and tends to keep the parts normally in the position shown. At each rotation of the shaft h , the path cam o^3 moves the lever o^4 in a direction to cause its vertically extended arm to engage the tail o^7 of the clutch piece, in the direction of the arrow Fig. 17, tipping the said clutch piece about its pivot o^8 and causing it to grip tightly the rod o^{10} , and thereafter, further movement of the lever o^4 in the direction of the arrow will take with it the rod o^{10} and thereby swing the oscillating standard h^2 and its head carrying the tacker to the left Fig. 2, away from the edge of the last on which is the upper which is to be tacked.

To prevent the tacker from kicking back away from the shoe, by reason of the impact of the parts in driving a tack, I have provided a temporary locking device, consisting of a series of teeth on the underside of the clutch rod o^{10} , Fig. 17, to be engaged by a dog o^{14} pivoted at o^{15} in the standard o^6 , and having a gravity tail o^{17} , which holds the said dog normally in engagement with the said ratchet teeth, to catch and lock the oscillating standard and the tacker in their positions farthest inward, effectually preventing the tacker from kicking back.

When the bell crank lever o^4 is moved to actuate the lever having the depending end o^7 to withdraw the tacker from the shoe, it first acts upon the gravity end of the said pawl, lifts the said end and disengages the active end thereof from the ratchet teeth, thereby automatically releasing the lock until the tacker is again brought by its weight toward the shoe, when the said dog will automatically catch and lock it in its position farthest inward. Simultaneously with this outward movement of the tacker

away from the last, the oscillating standard h^2 , its head and the tacker are given an upward movement to free the tacker from the material by a mechanism, Fig. 18, consisting of a cam p , also fast on the shaft h and actuating a lever p' fulcrumed at p^2 in a part of the bearing a^2 referred to, said lever p' at its opposite end being connected by a link p^3 with a clutch member p^4 pivoted at p^5 to a collar p^6 loosely mounted upon the upright rod p^7 carried by the fulcrum shaft h' of the oscillating standard h^2 . Thus at each rotation of the shaft h , the lever p' is depressed and the link p^3 is raised, causing the clutch p^4 to grip the rod p^7 and thereafter lift with it the said rod and the oscillating standard h^2 carrying the tacker.

The relative adjustment of the two cams o^3 and p on the shaft h is such that at each rotation of the shaft the tacker is substantially simultaneously lifted and drawn away from the edge of the last, and then let down, drawn inward again to the last by the weight, thus traversing the path indicated by the dotted line Fig. 33, and giving the necessary in and out movement to wipe over and lay the edge of the upper smoothly upon the innersole preparatory to the driving of each tack. The in and out movement of the tacker takes place always substantially at right angles to the adjacent edge of the last.

During the outward movement and raising of the tacker at each rotation of the shaft h and gage n , hereinbefore described, and illustrated in Fig. 10, remains in contact with the clamping member, guide or track surrounding the last, the said gage having an outward movement with relation to the fastening means as the latter is moved away from the shoe support, the gage being pressed inwardly or toward the fastening means as the latter is moved toward the shoe support, the gage at all times remaining in contact with the said guide or track.

Having described the means by which the necessary in and out and the vertical movements are imparted to the fastening means, I will now describe means herein illustrated for effecting the relative traveling movement between the last and the fastening means or tacker to enable successive tacks to be driven in a continuous line around the last.

The relative movement of the last and tacker which causes the tacks to be driven in a line following the edge of the last is provided partly by a traveling movement of the tacker, partly by swinging the last in front of the tacker, and partly by a combination of both. For example, with the last held substantially stationary the driving of the tacks along the sides of the last is effected by a traveling movement of the tacker or a movement thereof lengthwise of the

last, the insertion of the tacks or fastenings around the toe and the heel of the shoe held on the last being provided for by a relative motion of rotation between the shoe support and the tacker, such motion being herein represented as effected by swinging or rotating the shoe support carrying the last and the shoe, in front of and with reference to the tacker, and partly by a combined swinging or turning movement of the shoe support and the traveling movement of the tacker; and further, in addition to the movements hereinbefore stated, for causing the tacks to be driven around the shoe, provision is made whereby the in and out movements of the tacker take place substantially at right angles to the adjacent edge of the last or the edge of the inner sole thereon to which the upper is being secured.

I will first describe the means for imparting the traveling movement to the tacker, or the movement thereof which enables the tacks to be driven along the side of the shoe, while the latter is held substantially stationary and with no other movement than that necessary to preserve the in and out motion of the tacker at right angles to the edge of the shoe, and will thereafter describe the mechanism by which the shoe has given to it its principal rotative movement during the time in which the tacks are driven around the toe and the heel, and that auxiliary movement whereby the in and out movement of the tacker at right angles to the edge of the sole is maintained while driving along the sides of the shoe.

Referring particularly to Figs. 4 and 24 to 28 inclusive, the tacker head h^4 , hereinbefore described as fitted in dovetailed grooves at the upper end of the oscillating standard h^2 , that it may travel therein, is shown as slotted along its rear edge, that is, at the left, Fig. 2, to receive a rack block s , shown separately in Fig. 25. This block has along its lower edge two distinct series of ratchet teeth s' , s^2 , the teeth of the respective series facing in opposite directions in order that the traveling movement of the tacker may be in opposite directions or to and fro, and the said block is free to move vertically within its slot in the tacker head h^4 , it being supported in said slot upon a rod s^3 , Figs. 24 and 26, carried in the ends of arms s^4 , fast on the shaft s^5 journaled in suitable bearings in the upper end of the oscillating standard h^2 .

While the rack block may be raised and lowered within its slot by turning the shaft s^5 and thereby raising and lowering the block supporting rod s^3 , the said rack block nevertheless is free to slide along the said rod s^3 , when moving with the tacker head, the rod s^3 entering recesses s^6 in depending ears on the rack block, see Fig. 25. Arranged below the two racks on the rack

block s and in line with the respective racks are two oppositely faced pawls s^7, s^8 , Fig. 24, carried respectively by the upper ends of two levers s^9, s^{10} , each fulcrumed at s^{11} to a part of the upper end of the oscillating standard. At their lower ends the levers s^9, s^{10} , are provided respectively with roller studs s^{12} , which lie in the oppositely arranged angular cam slots s^{13} , in a vertically reciprocating actuating plate s^{14} mounted on the end of a rod s^{15} , shown best in Fig. 4. This rod s^{15} has its bearings in the cross bars h^{2x} , connecting the side members of the oscillating standard h^2 and at its lower end, near the base of the standard h^2 said rod has a roller stud s^{16} , shown in full lines Fig. 4 and dotted lines Fig. 17, which rests upon the surface of the cam s^{17} , fast on the shaft h' , hereinbefore referred to. Each rotation of the shaft h' , (and there is one rotation of the shaft for each rotation of the main shaft h), imparts through the cam s^{17} , a complete rising and falling movement or reciprocation to the cam plate s^{14} , moving the latter from its position Fig. 4 into its position Fig. 24, causing its cam slots to separate the lower ends of the pawl carrying levers s^9, s^{10} , and move their upper ends carrying the pawls s^7, s^8 , toward each other, that is, in opposite directions and according as one or the other of the said pawls s^7, s^8 , is for the time being in engagement with its rack s' or s^2 will cause the rack block and the connected tacker head to travel in one or the other direction, as required, of the length of the shoe, see Figs. 20 and 23.

Springs s^{18} , one only of which is shown in Fig. 24, tend constantly to press the pawls s^7, s^8 , upwardly into engagement with their respective racks on the rack block, and the extent to which the pawls are thus elevated and the times during which they are held in elevated or effective position are determined by two supporting levers s^{19}, s^{20} , fulcrumed respectively at s^{21}, s^{22} , on the oscillating standard h^2 . These supporting levers s^{19}, s^{20} , are provided at their free ends with suitable rollers, as shown, which rest respectively upon two surface cams s^{23}, s^{24} , shown detached in Fig. 29, both fast on a shaft s^{25} , journaled in a part of the upper end of the oscillating standard h^2 . At its outer end, see Fig. 24, the shaft s^{25} has loosely mounted upon it a pawl carrier s^{26} , the spring-controlled pawl s^{27} of which is held in engagement with the ratchet wheel s^{28} fast on the shaft s^{25} . The lower end of the pawl carrier is beveled, as at s^{29} , Figs. 4 and 24, and during each upward movement of the cam plate s^{14} is engaged by a pin s^{30} on the said plate and moved by said vertically rising pin to the left Fig. 24, causing its pawl to impart a step by step rotation to the ratchet wheel, its shaft and the two cams thereupon. As the cam plate descends in completing its

vertical reciprocation, a spring s^{31} mounted loosely on shaft s^{25} and having one end thereof resting against a stationary pin s^{32} , and acting by its opposite end on a pin 100, see Fig. 24, returns the pawl carrier to its original position against the stop s^{32} preparatory to another feeding movement at the next rise of the cam plate. The surfaces of the two cams s^{23} and s^{24} , are such that at the proper times, determined by the rotative positions of the said cams, the supporting levers s^{19}, s^{20} , will be raised so that their inclined surfaces s^x , by acting upon and lifting the tails of the pawls s^7, s^8 , will depress the active ends of their pawls and thus disengage them from their respective racks, and at the proper times will drop the tail ends of the pawls and permit the active ends thereof to spring into engagement with their respective racks.

The cams are so shaped that when one supporting lever holds its pawl out of engagement with its rack, the other supporting lever, by dropping, permits its pawl to be in engagement with its rack, so that one pawl acts at a time to feed or move the tacker in its traveling movement, and as before stated, the direction of travel of the tacker depends upon the particular pawl for the time being in operation. An inspection of Fig. 24 will also show that as the pawls are vibrated toward the middle of the head, by the pawl carrying levers s^9 and s^{10} , the tail ends thereof will travel longitudinally of the inclined faces s^x of their respective supporting levers, gradually down the said inclined faces, so that as they travel down the inclines they will be permitted to spring upwardly into engagement with their rack teeth; and by varying the elevation of a supporting lever the time of engagement of its pawl with its rack teeth can be varied. For example, referring to Fig. 24, the supporting lever s^{19} is held in such position that when the pawl s^7 first starts from its extreme right hand position Fig. 4, it is held out of engagement with the teeth of its rack, but as the pawl travels to the left toward its position Fig. 24, the tail of the pawl travels down the incline s^x , and at some point along the incline determined by the elevation of the lever, its tail will have become sufficiently depressed to throw its active end into engagement with its rack teeth, hence the time of initial engagement of the active end of the pawl with its rack teeth and consequently the time during which said end remains in engagement with the teeth in moving to the end of its stroke, may be varied at will by varying the elevation of the supporting lever, thus providing a convenient means for varying the effective throw of the pawl. Of course by raising the lever higher, for instance into the position of the lever s^{20} , Fig. 24, the tail of the pawl is

maintained in such a high position that its active end cannot engage the teeth of its rack. Thus by timing and varying the shapes of the cams s^{23} , s^{24} , the order of engagement of the pawls, the times during which they are permitted to remain in operation, and the throw of each pawl at each movement may be varied and controlled at will.

Referring now to the diagrams shown in Figs. 20 to 22, the movements of the tacker will be perfectly clear. For example, when the tacker first commences to operate, starting from the position 1, Fig. 20, the cam s^{23} has dropped its supporting lever s^{19} a distance such that its pawl s^7 will act upon the rack teeth s' and impart to the latter and to the tacker its traveling movement step by step as indicated by the successive dotted positions of the tacker numbered consecutively in the diagrams Figs. 20-23, inclusive, and which will be again referred to when describing the conjoint movement of the tacker and shoe carried by the shoe support. At this point it is sufficient to note that the differences in the distance through which the tacker is moved from one to another of its successive positions during its traveling movement, as indicated by the diagrams referred to, is determined by varying the height of the supporting lever s^{19} until it becomes necessary, as indicated by the numbered position of the tacker, to reverse the direction of its traveling movement, as for example when moving from position numbered 6 to position numbered 7, when the pawl s^7 is completely disengaged and the pawl s^8 thrown into action, its effective throws being thereafter determined by the height of its supporting lever s^{20} .

I will now describe the mechanism for imparting to the shoe the required rotative movement to enable the tacks to be driven as desired around the shoe. As hereinbefore stated, the turn-tables b carrying the last supports, are respectively provided, as shown in Fig. 2, with depending pivots or journals b' , which extend below the carrier B and are provided at their lower ends, as herein shown with like disks t , t , between which and the underside of the carrier B are interposed friction springs t' to retain the pivots and their turn-tables with the parts carried thereby, frictionally in any position into which they are moved. The peripheries of the disks t are shown as provided each with two circumferential series of holes t^2 for the reception of pins t^3 of the required number, said pins being inserted in the proper holes of their respective series to provide the necessary movements, as will be hereinafter set forth. Below the pin carrying disks t the pivots b' are fur-

ther provided with toothed wheels t^4 , as best shown in Fig. 2. When a last support is swung into position at the front of the machine, viz:—at the right Fig. 2, for the last- ing operation, no rotative movement of the turn-table b carrying the last is necessary, hence there is nothing in engagement with and to rotate the toothed wheel t^4 and the disk t with the connected parts. When, however, the carrier B is turned to carry such last and its support around to the left, Fig. 2, in position to enable the attaching means or tacker to operate upon the shoe, the gear wheel t^4 at the lower end of the pivot of the turn-table is thereby swung into position ready to be engaged by the gear wheel t^5 fast on the upper end of a vertical shaft t^6 journaled in suitable bearings t^7 at the face of the standard o^6 , referred to. I say the gear t^4 is swung into position ready to be engaged by the gear t^5 , because when first swung into such position, no actual engagement takes place, the gear t^5 being a mutilated gear having two blank spaces thereupon to be described, and at the moment the gear t^4 is swung into the position referred to, a blank space of the gear t^5 , see Fig. 19, is in a position opposite the gear t^4 , so that while in position ready for engagement, the actual engagement of the two gears is deferred for a time. It will thus be understood that the shoe supports have each main and auxiliary rotative means working independently of one another, and each controlling and effecting a partial rotation of each shoe support during the operation of fastening the upper to the inner sole lying on the last held in said support. This blank space cannot be seen in Figs. 2 and 17 because it is on the back side of the gear, but the second of the two blank spaces, which is diametrically opposite the first, can be seen at the left of the gear in said figures. Fig. 19, however, shows very clearly the two blank spaces in their proper positions. The vertical shaft t^6 at its lower end, see Figs. 2, 17, 19, 30 and 31, has fast upon it a ratchet wheel t^8 driven intermittently in the direction of the arrow Fig. 19 by a pawl t^9 , carried at the outer end of a pawl carrier t^{10} loosely journaled about the shaft t^6 . The pawl carrier in turn is vibrated by an eccentric rod t^{11} reaching to an eccentric t^{12} , Fig. 19, fast on the driving shaft h on the bed. At each rotation of the main shaft h the pawl carrier is reciprocated and, through its pawl, imparts a step by step rotation to the vertical shaft t^6 . The gear t^5 on the upper end of the vertical shaft t^6 , as shown, has teeth on but a portion of its periphery, there being, as stated, see Fig. 19, two blank portions arranged at diametrically opposite points of the gear, so that the said gear will mesh with the gear t^4 on

the pivot of the turn-table and rotate the latter, and the last, only during certain parts of the rotation of the shaft t^6 .

Referring now particularly to Fig. 2, the shaft t^6 just below its upper bearing t^7 has fast upon it a wide gear t^{13} which meshes with a gear t^{14} of approximately the same diameter and also with a pinion t^{15} of considerably smaller diameter, both mounted in suitable bearings on the side of the column a . The gear t^{14} meshes directly with a gear t^{16} on the lower end of a sleeve t^{17} journaled in suitable bearings at the interior of the column a and carrying at its upper end a disk t^{18} of substantially the same diameter as the disk t on the bottom of the turn table pivot, but approximately one-half of the thickness of the turn-table disk. This disk t^{18} has its periphery provided with a series of holes for the reception of pins t^{19} . The pinion t^{15} referred to as driven by the gear t^{13} , meshes with an intermediate pinion t^{20} which in turn meshes with a gear t^{21} fast on the lower end of a shaft t^{22} within the sleeve t^{17} referred to and provided at its upper end and above the disk t^{18} with a similar disk t^{23} having its periphery provided with holes for the reception of pins t^{24} . Obviously, rotation of the vertical shaft t^6 acts through the mechanism described to rotate the sleeve t^{17} and disk t^{18} in one direction, for example, as indicated by the arrow thereon, while the same shaft and gear operate through the pinions t^{15} and t^{20} to rotate the shaft t^{22} and the disk t^{23} in an opposite direction, as indicated by an arrow on the disk.

The positions of the pins in the disks t^{18} and t^{23} and in the disks t on the bottoms of the turn table pivots are such that during the period when the turn table is not rotated directly from the vertical shaft t^6 by the mutilated gear t^5 , that is, during the time that a blank space on the gear t^5 is passing the gear t^4 on the lower end of the turn-table pivot, the pins, either of the disk t^{18} or of the disk t^{23} , will engage cooperating pins on the disk t on the turn-table pivot and impart to the latter a step by step rotation in one or the other direction according to whether the pins which impart the rotation are on the disk t^{18} or on the disk t^{23} . The purpose of this will best be understood by reference to the diagrams Figs. 20 to 23 inclusive, each of which is a view looking down upon one of the turntables b , after it has been swung by the carrier from the position shown at the right, Fig. 2, into the position shown at the left, Fig. 2, preparatory to the action of the tacker.

Referring to Fig. 20, the full outline of the shoe indicates the position into which the shoe will be swung by rotation of the carriage in taking the shoe from the lasting

devices to the tacker, and when the carrier stops with the shoe in the full line position, Fig. 20, the tacker in its first advancing movement over the edge of the shoe will move in the line indicated by the full line position numbered 1 on said Fig. 20. As hereinbefore stated, when the shoe is first swung into position in front of the tacker, a blank space on the mutilated gear t^5 is opposite the gear on the turn-table pivot, so that no swinging movement of the shoe by said gear takes place until after the blank space has been turned out of the way, hence the shoe remains substantially stationary for a time, during which the pawl s^7 , Fig. 24, engaging the rack s' on the underside of the tacker head imparts a traveling movement to the latter by successive steps longitudinally of the last, putting the tacker into the successive positions numbered 2, 3, 4, and 5, Fig. 20, said tacker in moving into each of these successive positions first moving inwardly on the upper and acting to wipe the same at right angles to and over the edge of the inner sole and to lay it flat upon the innersole, and then driving its tack before lifting and retreating and moving along into the next succeeding position. As the tacker in moving along the outside of the shoe approaches the wide part or ball of the shoe, its inward and out movement would not be quite at right angles to the edge of the shoe sole if the latter were permitted to remain in its full line position, hence at about the time the tacker withdraws to move from its position numbered 3 to its position numbered 4, a pin t^{24} on the top disk t^{23} , Fig. 2, engages a pin t^3 on the turn-table pivot disk t and moves the said turntable disk, the turntable and the shoe thereupon slightly in the direction of the arrow 50, Fig. 20, and into its dotted line position Fig. 20, so that the tacker as it advances to its positions numbered 4 and 5, Fig. 20, will approach the last in its dotted line position, Fig. 20, at right angles or substantially so, to the side of the last, which would have been impossible had the last or shoe been permitted to remain in its full line position. Before the tacker has advanced from its position numbered 5, Fig. 20 and Fig. 21, to its position numbered 6, Fig. 21, the turn-table and its shoe are returned again to their full line position, Figs. 1, 20 and 21, by engagement of a pin t^{19} on the lower disk t^{18} with a pin on the turn-table disk, and after the shoe has been thus returned to its original position Figs. 20 and 21, and before the tack is driven in the position numbered 6, Fig. 21, the first one of the series of teeth on the mutilated gear t^5 engages the gear t^4 on the turn-table pivot, and commences to rotate the turn table in the direction of the

arrow 51, Fig. 21, and by the time the tacker assumes the position numbered 6, the turn-table is rotated sufficiently to carry the shoe into the dotted position, also numbered 6, Fig. 21. After driving a tack in position numbered 6, Fig. 21, further rotation of the turn-table and shoe, by the meshing of the gears t^5 and t^4 , moves the shoe into dotted line position numbered 7, Fig. 21, and in order to drive the tack in the position indicated by the tacker position numbered 7, Fig. 21, the pawl s^7 is thrown out of engagement by the lifting of its supporting lever by its cam and the pawl s^8 is by its cam thrown into engagement with the rack s^2 to feed the tacker head in the reverse direction, from its position indicated by number 6, Fig. 21, to the position indicated by number 7, Fig. 21. When this change of pawls is effected, the height to which the supporting lever s^{20} for the pawl s^8 is raised, to put the latter into engagement with its rack, is such that the time of engagement will be just sufficient to impart to the head the short reverse movement necessary to move the tacker from position 6 to position 7. Having driven the tack in position numbered 7, Fig. 21, rotation of the turn-table and shoe, by the gears referred to, is continued, and when position number 8 of the shoe is reached, the tacker having been moved by the pawl s^8 from position 7 to position 8, Fig. 21, this time by longer engagement of the pawl due to a lower position of its supporting lever s^{20} , tack numbered 8 is driven, Fig. 21. After tack number 8 has been driven, continued rotation of the turn-table and shoe brings the former into position number 9, Fig. 21, and simultaneously therewith further movement of the tacker by the pawl s^8 also brings the tacker to position number 9 and enables tack number 9 to be driven where indicated in Fig. 21 and in Fig. 22.

Referring now to Fig. 22 where the full outline of the shoe and tacker indicate the last-mentioned position, numbered 9, Fig. 21, tack numbered 9 is the last tack to be driven at the toe on the outer side of the median line of the shoe and the next tack is to be driven the same distance on the opposite side of the median line of the toe, hence continued and further rotation of the turn-table and shoe carries the shoe from position number 9 to position number 10, Fig. 22, where tack number 10 is driven, Fig. 22, the tacker having been moved by the pawl s^8 from position number 9 into position number 10. Continued rotation of the turn-table and shoe carries the latter successively into positions numbered 11 and 12, Fig. 22, while the tacker at the same time is moved by the pawl s^8 , into positions numbered 11 and 12 of the same figure, the decrease in

the length of movement of the tacker between these successive positions being produced by the rise of the supporting lever s^{20} of the pawl s^8 through its cam s^{24} . Further and final rotation of the turn-table and shoe from position 12 into position 13, Fig. 22, for the driving of tack number 13 requires a reversal of the direction of travel of the tacker head, hence the pawl s^8 is thrown out of engagement with its rack s^2 , and the pawl s^7 is thrown into action, and its operating lever s^{10} held in such position that the first step movement in the reverse direction by pawl s^7 shall move the tacker from position number 13, Figs. 22 and 23, into position 14 where tack number 14 is driven. The tacker has now reached its starting position corresponding to number 1 Fig. 20, but is at the opposite side of the shoe from that of its position number 1, Fig. 20. The tacker now being actuated by the pawl s^7 moves successively from position numbered 14, Fig. 23, into positions numbered 15, 16, 17 and 18, Fig. 23. During this time the mutilated gear s^1 is out of mesh with the gear t^4 by reason of the second blank space having come into position opposite said gear t^4 , but when the tacker is moving from position 14 to position 15, a pin t^{19} on the disk t^{23} engages a pin on the pivot disk t and imparts to the shoe an auxiliary movement to carry it into its position numbered 60, Fig. 23, the shoe remaining in this position until the tacker has driven a tack in the position numbered 16, when a pin t^{24} on the disk t^{23} engages a pin on the pivot disk, and not only returns the shoe to its central position, but by its longer engagement, turns the shoe somewhat in the opposite direction into the full line position and then into the dotted line position numbered 61, Fig. 23, in order that tacks may be driven respectively in positions numbered 17 and 18, more nearly in the proper positions and with proper inward movement of the tacker, than would be possible had the shoe been permitted to remain in any one of the positions indicated in Fig. 23. After having driven a tack in position numbered 18, Fig. 23, the leading tooth of the second series of teeth on the mutilated gear t^5 engages the gear t^4 on the turn-table and swings the turn table in the same direction as before, viz., as indicated by arrow 51 to turn the shoe into its original position Fig. 20, and as the heel is rounded in front of the tacker, the latter is given the necessary feeding movements substantially as described with reference to the rounding of the toe, in order that the tacks may be driven about the heel substantially as they were driven about the toe.

In thus describing the relative movements of the shoe and tacker in driving the tacks about the shoe, the number of tacks referred to and the number of successive positions of

the shoe and tacker has been indicated as much less than would be the case in actual practice, for if it were attempted to show the positions necessary for the full number of tacks usually employed in actual practice, the diagrams would be so confused as to prevent a clear understanding of the movements. It will be understood, however, that by varying the number of pins in the engaging disks and the locations thereof and by varying the outlines of the pawl cams s^{23} and s^{24} the number and extent of the several throws imparted to the tacker head by the pawls and the number of auxiliary positions into which the shoe is moved by the pins and the locations of such positions may be varied at will according to the judgment of the operator and the number of tacks which it is desired to drive in one complete circuit of the shoe. After the tacking has been completed and before the carrier B is rotated to carry the lasted and tacked shoe again to the front of the machine and a newly lasted shoe to the tacker that its upper may be tacked in position, it is desirable that the operation of the tacker and its cooperating parts be stopped temporarily until the new shoe has been properly positioned. This is done automatically and the parts again automatically set in motion at the proper time to operate upon the new shoe by the following mechanism.

Referring to Fig. 19, the clutch h^{21} previously referred to as connecting the driving pulley h^{20} to the driving shaft h , and which may be of any suitable or desired construction, is withdrawn, to disengage the pulley and shaft, or is moved to engage the same, by means of a rod u slotted longitudinally to receive the fulcrum stud u' on a part of the bed and connected at its opposite end at u^x to one end of a lever u^2 fulcrumed at u^3 to a part of the stand o^6 referred to. The lever u^2 at its inner end, see Figs. 19 and 31, carries a pivoted hook u^4 acted upon by a spring u^5 which tends to throw the said hook normally into position to engage a stationary pin u^6 on an ear u' of the stand o^6 , said hook by its engagement with said pin locking the said lever in its full line position Figs. 19 and 31, holding the clutch h^{21} in position to engage the pulley with and to rotate the driving shaft and its connected parts.

As hereinbefore stated, a complete tacking operation, that is, the driving of the tacks completely around one shoe, requires one complete rotation of the vertical shaft t^6 , Figs. 2 and 19, and just before the tacking of a shoe has been completed, the free end of a dog u^8 , pivoted at u^9 on the top side of the ratchet wheel t^8 at the lower end of said vertical shaft, meets the end of the hook u^4 and yields against the action of its spring u^{10} until the tension on the said spring or

the final bringing up of the said dog against its back stop u^{11} moves the dog u^4 to disengage it from the holding pin u^6 , thereby releasing the lever u^2 and permitting its spring u^{12} to move the said lever into its dotted line position, Fig. 19, withdrawing the clutch member and stopping the driving shaft h and its connected parts, that is, stopping all movement of the tacker and the mechanism for rotating the turn-table and shoe. As soon as the hook u^4 has been released and withdrawn by the movement of the lever u^2 , the dog u^8 which disengaged the hook is automatically drawn by its spring into its original position against the front stop u^{11x} in order that it may be out of the way when the said lever is again moved to engage the hook with its pin u^6 to start the mechanism for the tacking of a new shoe. The operator now manually swings the carrier B through a semi-circle to bring the tacked shoe into position in front of him for removal and for the application of a new unlasted shoe, and at the same time to carry the previously lasted shoe into position at the back of the machine and in front of the attaching or tacking mechanism. As the carrier approaches the end of its semi-rotation and just before the newly lasted shoe reaches its position at rest in front of the tacking mechanism, the latter is automatically set in motion by the following mechanism. Each of the gear wheels t^4 at the lower ends of the turn-table pivots, is provided with a lug u^{13} , Fig. 30, one of which is shown in full lines Fig. 2, and Fig. 30, which lug, as its end of the carrier is swung into position in front of the tacker, see Figs. 19 and 30, strikes the end of a dog u^{14} , pivoted in the upper end of the vertical lever u^{15} fulcrumed at u^{16} on the column a , and pushes the said dog and the lever before it, throwing inwardly the lower end of the lever. When the lower end of the lever u^{15} is thrown in, it takes with it the upper end of another lever u^{17} , loosely connected with it and fast on a shaft u^{18} , said shaft carrying an arm u^{19} which is likewise thrown inwardly causing it to strike against the outer edge of the clutch controlling lever u^2 and move said lever u^2 inwardly to actuate its clutch to engage the pulley with the driving shaft, and at the same time lock the hook u^4 behind the lock-pin u^6 referred to, thus starting the driving shaft and the tacking mechanism just as the carrier reaches a position at rest.

As the dog u^{14} on the upper end of the vertical lever u^{15} is pushed back by the lug u^{13} on the gear referred to, the tail end of the dog rides upon a fixed pin u^{20} , Fig. 30, and against the action of a spring u^{21} , which gradually depresses the front or engaging end of the dog until it clears the lower edge of the lug on the gear, when a coil spring

u^{22} encircling the shaft u^{18} , Fig. 19, returns the lever u^{15} automatically to its full line position Fig. 30, so that should the final movement of the carrier, after the lug engages the dog, exceed what is necessary to move the lever u^{15} and the clutch to start the mechanism, the dog will automatically disengage itself from the actuating lug after the proper movement has been effected and without danger from excessive movement. The pivoted dog also enables the lug to pass freely thereover without further movement of the lever while the gear is being rotated by the mutilated gear t^5 in the rotation of the last in distributing the tacks about the shoe. Thus the tacking mechanism is automatically set in operation by the lug on the gear t^4 , just as the carrier approaches its position at rest, and the said mechanism is automatically stopped by the pivoted dog u^8 , referred to, on the ratchet wheel t^8 , when the tacks have been driven completely about the last.

When the lasting is performed the upper is clamped by the clamping members and the toe and heel clasps as described, and as stated these clamping members remain in position to hold the upper during the operation of the tacking mechanism, they serving during such time as a bearing for the edge gage to direct the line of travel of the tacker with reference to the side of the shoe. The clamps likewise remain holding the uppers after the tacking has been completed, but I have provided convenient means for releasing the clamps and clasps automatically as they approach the front of the machine, in order that when brought to a state of rest the shoe is already unclamped ready for removal and for the substitution of a new shoe to be lasted.

Referring to Figs. 1 and 6, the free end of the lever d^{14} , which controls the toggle d^{11} , and the clamping and unclamping of the toe and heel clasps, bears against the edge of a helical surface cam w , Fig. 1, loosely pivoted upon the top of the pivot a' of the carrier B. This cam has a slot w' into which protrudes a stop pin w^2 on the stationary pivot a' , the pin and slot serving to limit the rotative movement of the said cam, which is accomplished by a suitable handle w^3 provided for the purpose. One-half of the cam, viz.:—the lower half viewing Fig. 1, is semi-circular, while the remaining or upper half is quite eccentric or helical, and as the carrier is swung to carry a lasted shoe from the position at the front of the machine at the right Fig. 1 into the position at the left Fig. 1, to be tacked, the roller stud shown in the end of the lever d^{14} travels about the concentric or semi-circular portion of the cam w and holds all the clamping parts firmly in position clamping the upper to the sides of the last. After the tacking,

however, the second movement of the carrier in returning the lasted and tacked shoe again to the front of the machine while transferring a newly lasted upper to the tacking mechanism, causes the lever d^{14} controlling the clamps on the lasted and tacked shoe to travel upon the eccentric portion of the cam w , it being turned by the gradually rising face of the cam into its dotted line position Fig. 6, and by the time the carrier has reached the end of its semi-rotative movement, the movement of the lever d^{14} will have moved the toggle d^{11} sufficiently to release the side clamping members and the toe and heel clasps and leave the shoe free for ready withdrawal by the operator. The action of the ends of the two levers d^{14} against the surface of the cam w tends constantly to move the cam in the direction of the arrow Fig. 1, into position with the right hand end of the slot w' in contact with the pin w^2 . The operator, however, having removed the lasted and tacked shoe and placed in position upon the last support a new shoe for lasting, must move the lever d^{14} to release the clamps and permit them again to grip the new upper placed in position. This the operator accomplishes by grasping the handle w^3 and moving the handle and the cam in a direction opposite that of the arrow Fig. 1 for a distance limited by the length of the slot w' , but which is sufficient to enable the lever d^{14} previously held in its dotted line position Fig. 1, to drop from the high point of the cam to the lowest point thereof, that is, onto the concentric portion, which breaks the toggle and permits the springs d^{10} automatically to throw the side clamps against the sides of the shoe, and also permits the operator thereafter by the levers c^{24} and c^{20} described to bring into action the toe and heel clasps. As soon as the carrier is rotated to carry the newly lasted shoe into tacking position, the frictional engagement of the lever d^{14} with the surface of the cam w , moves the latter again in the direction of the arrow into its original position to unlock and hold unlocked the clamping mechanism of the tacked shoe carried to the front of the machine for removal, as described. Thus the clamps are automatically released when brought in succession from the tacking mechanism to the front of the machine, leaving the lasted and tacked shoe perfectly free for removal.

As various sizes of shoes vary as to their lengths, it is necessary to adjust the clamping members and the tacking mechanism automatically to act upon the shoes of different lengths when presented for lasting.

Referring particularly to Fig. 5, it is clear that the toe clasp c^8 will move farther to the right when engaging the toe of a short shoe than when engaging the toe of a longer shoe, hence I have arranged upon the side

of one of the carrier levers c^6 for the toe clasp, a pin x which enters a slot x' in the upper end of a lever x^2 pivoted at x^3 and provided with a foot x^4 having an upwardly inclined toe x^5 . As the toe clasp moves inwardly to meet the toe of a short shoe the upwardly inclined toe x^5 will be depressed, and as the said clasp is moved outwardly to accommodate a longer shoe the said upwardly inclined toe is elevated.

When the carrier B is rotated to carry the lasted shoe from the right Fig. 1 around to the left to be tacked, just before the carrier completes its semi-rotative movement, the inclined toe x^5 , see Fig. 2, meets the end of a lever x^6 pivoted at x^7 on the upper end of the oscillating standard h^2 and, riding over the end of said lever depresses it, thereby lifting the inner end of the lever against the action of the spring x^8 and through the medium of the link x^9 , pivoted lever x^{10} and link x^{11} connected with an arm x^{12} on the shaft s^5 , Figs. 2, 24 and 26, turns the said shaft to raise the rod s^3 and the vertically movable rack block s . Thus with the other parts remaining the same, that is, with the supporting levers s^{19} and s^{20} supported by their cams as before, this raising of the rack block will shorten the period of engagement of the pawls with the rack teeth and thereby reduce the length of each throw or step movement of the tacker head by the said pawls. Inasmuch as the engagement of the pawl with its rack is caused by movement of the tail end of the pawl down the incline s^* of its supporting lever, and since the engagement cannot take place until the tail end has moved down the incline sufficiently to enable the active end of the pawl to be put into engagement with the rack, it must be clear that the higher the rack teeth the farther will the tail of the pawl have to follow down the incline before the pawl can rise and engage with the teeth, hence the later will be the initial engagement of the pawl with the teeth, and the shorter the time of engagement because the limit of movement is always fixed. Of course, the shorter the shoe the lower will be the upwardly inclined toe x^5 and the farther down will it depress the lever x^6 and raise the rack block s , hence the shorter the shoe the shorter each step by step movement of the tacker head by the pawls. For purposes of fine adjustment, I provided a contact screw x^{13} , Fig. 2, in the end of the lever x^6 , by which the depression of the lever by the toe, in any position of the latter, may be adjusted at will.

Since the table b carrying the last with its clamps and the toe x^5 commences to rotate soon after reaching its position in front of the tacker, the said toe will leave the end of the lever x^6 and would release the latter and drop the rack block unless some means

be provided for holding the lever and rack block in position for the required length of time. This is provided for by the locking lever x^{14} , Figs. 2 and 34, pivoted at x^{15} to the front face of the top of the oscillating standard h^2 , said lever x^{14} being provided at its edge near its upper end with a series of holding notches any one of which, according to the position of the lever may hook over the said lever x^6 and lock the latter in whatever depressed position it may be. A spring x^{16} connected with the upper end of said locking lever serves to draw it constantly into or toward its locking position, so that when the said lever x^6 is depressed by the inclined toe x^5 , it is at once locked in its depressed position and remains so locked during the entire tacking operation. As the rotating table approaches its final position at rest, at the close of the tacking, a pin x^{17} on the mutilated gear t^5 , Fig. 2, engages the depending lower end of the locking lever x^{14} and moves said lever to release the lever x^6 and permit it to be moved to drop the rack block. The next upward and backward movement of the tacker head takes with it the locking lever x^{14} and clears it of the pin x^{17} on the gear, so that on the next return movement the gear will have moved a sufficient distance to permit the said lever x^{14} to drop behind the pin, so as not to interfere with the further rotation of the gear. This rotation of the carrier to transfer a newly lasted shoe from the front of the machine to the rear thereof in position to be tacked, automatically sets in motion the tacking mechanism, automatically adjusts the step by step traveling movement of the tacker according to the length of the shoe for the time being upon that end of the carrier, so that the tacks will be properly spaced to make a complete round of the shoe and be separated by the same relative distances whatever the length of the shoe; and when the tacking operation has been finished, the tacking mechanism is automatically stopped and withdrawn and raised to clear the shoe, so that it can be swung with the carrier again to the front of the machine and the rack block restored to its normal position preparatory to adjustment by the approach of a new shoe.

To provide ample clearance between the withdrawn and elevated tacker and the shoe preparatory to the removal of the latter at the close of the tacking operation, I have found it desirable to increase the final elevation of the tacker-head as compared with the regular elevations thereof during the tacking operation. This I accomplish, see Figs. 4, 18 and 19 by a sleeve p^{10} splined upon the driving shaft h , said sleeve p^{10} being grooved circumferentially to receive the lower end of the pivot screw u^x , by which the clutch lever u^2 is jointed to the

clutch rod u , so that whenever the clutch is moved to start and stop the shaft h the sleeve p^{10} will be slid longitudinally along the driving shaft h . The sleeve p^{10} at one end is provided with a cam p^{11} which is adapted, by movement of the sleeve p^{10} , to be slid into position over a second roller p^{12} on the end of the lever p' , Figs. 4 and 18, previously referred to as provided for lifting the tacker-head at each in and out movement thereof. The cam p^{11} , however, has a greater throw, see Fig. 18, than the cam p which lifts the tacker-head during the normal operation of the tacking mechanism, so that when the clutch lever u^2 is swung into its dotted position, Fig. 19, to disengage the clutch and stop the tacking mechanism at the close of the tacking operation, the same movement of the lever slides the cam p^{11} into position over the roller p^{12} on the lever p' , enabling the final rotation of the driving shaft, just before it comes to a stop, to depress the lever p' through a greater distance caused by the greater throw of the cam and thereby lift the tacker head into a final position considerably higher than the position into which it is raised during the process of tacking. When the clutch lever u^2 is restored to its full line position to clutch the shaft to the pulley and start a new tacking operation, the cam p^{11} is slid away from its roller p^{12} on the lever p' , leaving the latter under the control of the cam p , which regularly lifts the tacker-head after each driving of a tack.

After the tacking operation has been completed, the operator swings the carrier to carry the lasted and tacked shoe again to the front of the machine, such rotation automatically releasing all the clamps which during the entire previous operation have held the upper smoothly and securely to the last, the said carrier, when it reaches its proper position being automatically locked, Fig. 3, by a vertically moving locking pin r in the bar f^{20} , the upper end of the said pin being conical to fit a recess in the lower end of the turn-table pivot b' . As the table swings into locking position, the end of the turn-table pivot automatically depresses the pin r , which when it reaches the proper position is thrown upwardly by a spring r' , it entering the said recess and locking the carrier in its working position. When the carrier is again to be rotated, the operator depresses the locking pin r by means of a foot treadle r^2 , Fig. 3, connected by rod r^3 with the end of the pin, and swings the carrier by hand through a semi-rotation, when it is again locked by said pin, the treadle in the meantime having been released by the operator.

While the foregoing is a description of one embodiment of my invention in a machine which I have found practically useful

for its intended purpose, yet my invention, as the same appears from this disclosure, is not limited to the particular embodiment herein shown, for obviously it may be varied without departing from the spirit and scope of the invention as claimed.

I am the first, so far as I am aware, to provide an automatic fastening means, whether or not in the form of a tacker as shown, and a last support, with an automatic relative traveling movement to enable the material, all around the shoe, to be fastened; and in addition thereto, I am the first to provide a relative swinging movement to cause the fastening means to be presented always in relatively the same direction with reference to the adjacent portion of the periphery of the shoe. So far as known to me, I am also the first to clamp the upper on the last, then last the shoe, retain it in clamped and lasted condition, and while in such condition, to present the shoe to an automatic fastening means, the clamp preventing wrinkles, and fixing or defining the edge of the upper at the line where it meets the sole. Obviously, any well known lasting devices may be used, whether or not like those shown; and the fastening means, which may be of any desired type, if of the tacker type, as shown, may employ any sort of fastenings adapted to be driven.

By various grades of tacks, is meant, fastenings varying in length, size, quality or type, and thereby adapted to the varying requirements of the work. In these features, therefore, as well as in the various other respects, my invention is not limited to the particular embodiment shown.

It must be understood that the toe and heel clasps are lasting means within the broad meaning of the terms as are also the side clamps which cooperate with the clasps to bring and hold the upper into position to be fastened. As lasting devices these parts are herein claimed. The shoe support features of this machine which are of general utility are, however, claimed in divisional application Serial No. 589,682.

Having described my invention, what I claim and desire to secure by Letters Patent is:—

1. A shoe support and fastening means, one adapted to be rotated in different directions, and the other having a traveling movement in different directions, and actuating means whereby the fastening means is enabled to insert fastenings along the opposite sides of a shoe on said support.

2. The combination with fastening means, means to impart thereto an in-and-out movement relatively to a last presented to it, a rotatable last support, and means to rotate it in one direction during presentation of the heel or toe of a shoe to said fastening means, and in different directions during presenta-

tion of the side of a shoe to said fastening means.

3. In an organized machine, fastening means having an in-and-out movement, a rising and falling movement, and a traveling movement along the edge of a shoe, combined with a last support, and means to move the same in different directions during presentation of a shoe by said last support to said fastening means.

4. A lasting machine comprising end lasting mechanism, a single automatic fastening means, a carrier having a plurality of shoe supports and movable to present the shoes on said shoe supports successively first to said end lasting mechanism and then to said fastening means, and means to impart automatically to said shoe supports a partial rotative movement in one, and then in the opposite direction.

5. An organized machine containing automatic upper fastening means, in combination with a gage, a flexible and extensible clamp-like guide for said gage, and means to press said clamp-like guide against the upper.

6. The combination with automatic fastening means, of a shoe support, clamping members to engage and clamp a shoe upper in position on said support, means to impart a relative movement to said shoe support and fastening means to fasten the upper as required, and means whereby said clamping members may be released automatically after the fastening of said upper.

7. The combination of a shoe support, size indicating means cooperating therewith to indicate variations in length of shoes carried by said support, automatic fastening means, means to impart a relative traveling movement to the said fastening means and shoe support, and means cooperating with said indicating means to vary the said relative traveling movement according to the length of a shoe on said support.

8. The combination of a shoe support, indicating means cooperating therewith to indicate variations in length of shoes on said support, a step-by-step traveling fastening means, and means cooperating with said indicating means to vary automatically the length of step-by-step movements of said fastening means according to the length of shoe presented thereto.

9. Automatic traveling fastening means, a plurality of connected shoe supports, means whereby the same may be presented singly to said fastening means, a size indicating member for and movable automatically with each shoe support to indicate the length of a shoe on said support, and means, connected with said fastening means and engaged automatically by said size indicating member, when the shoe support of the latter is presented to said fastening means, to vary

automatically the traveling movement of said fastening means, according to the length of shoe on said support.

10. A machine comprising a shoe support, fastening means, an edge gage, clamping members to embrace a shoe upper and constitute a guide for said edge gage, means for effecting ready and approximate simultaneous adjustment of said members for clamping the upper on the shoe support, and other means to effect final clamping of said members from said approximate adjusted positions.

11. An automatic fastening means, combined with a plurality of shoe supports, clamping members to engage and clamp a shoe upper on said support, means whereby said shoe supports may be moved to present them singly to said fastening means, and a cam controlling said clamping members and retaining the latter in clamping position until completion of the fastening operation.

12. An automatic fastening means, combined with a plurality of shoe supports, a rotatable carrier on which the same are mounted, clamping members for each shoe support, to engage and clamp the upper of a shoe on said support, and a cam at the axis of rotation of said carrier, for controlling the position of said clamping members, and holding the latter in clamping position until after the shoe has been presented to said fastening means.

13. In a machine of the class described, automatic fastening means, combined with a plurality of shoe supports, a rotatable carrier on which the same are mounted, clamping members for each shoe support to engage and clamp the upper of a shoe on said shoe support, and a cam at the axis of rotation of said carrier constructed to permit the clamping members to remain in clamping position while the shoe is presented to said fastening means, said cam thereafter releasing automatically said clamping members, and means whereby said cam may be moved to permit said clamping members to again clamp another shoe support.

14. The combination with a shoe support having a guide to encircle a shoe thereon, of an upper fastening device, a gage contacting at all times with said guide, means to impart in-and-out movement to said fastening device, and an adjusting stop co-acting with said gage to determine the distance from the inner edge of the guide that fastenings may be driven into the upper laid on the inner sole.

15. A machine comprising a shoe support, tacking means, means to actuate said parts to insure the insertion of tacks in the sole in the line of the contour of its edge, means to lift said tacking means between each tacking operation, and means to lift

said tacking means farther from said support after driving the last tack.

16. The combination with a shoe support, of fastening means, a driving shaft therefor, a link pivoted at one end about an axis coincident with the axis of said shaft, a support for said fastening means carried by the free end of said link, means to raise and lower said link, and actuating connections between said shaft and fastening means.

17. The combination with a shoe support, of fastening means, a rising and falling oscillating support therefor, and two clutches, with automatic actuating means therefor, one of said clutches acting to lift said support and the other to oscillate the same.

18. The combination with a shoe support, of traveling fastening means, means to move said fastening means in the direction of the contour of the sole, and means to also move said fastening means laterally with relation to the edge of the shoe on said support.

19. In a machine of the class described, the combination with a shoe support, of fastening means, means to impart automatic relative travel to said shoe support and fastening means, means to cause in-and-out movement of said fastening means in addition to said relative travel, and two cams one to cause rise and fall of said fastening means at each in-and-out movement thereof, the other having a greater throw to impart greater rising movement thereto just prior to stopping the machine, and means to stop said machine.

20. The combination with a shoe support, of fastening means provided with two racks, alternately and oppositely acting pawls for engagement respectively with said racks, actuating mechanism for said pawls, and means to vary the length of effective throw of said pawls.

21. The combination with a shoe support, of fastening means provided with two racks, alternately and oppositely acting pawls for engagement with the respective racks, means to vibrate said pawls, pawl supporting levers, and cams controlling the positions of the latter.

22. The combination with a shoe support, of fastening means provided with two racks, alternately and oppositely acting pawls for engagement with the respective racks, means to vibrate said pawls, pawl supporting levers having inclined supporting faces, and means controlling the positions of said levers.

23. The combination with a shoe support, of fastening means having racks, oppositely acting pawls to engage the respective racks, means for determining which of said pawls shall engage its rack and means to actuate said pawls.

24. The combination with a shoe support,

of a fastening means, means including two racks to cause a relative traveling movement between said support and said fastening means to fasten the upper at necessary points around the shoe, oppositely acting pawls, and means to cause the same to engage alternately the said racks, and measuring means variable with the length of the shoe on the shoe support and in connection with which, means on the fastening head acts to vary automatically the height of the racks thereby to vary the effective throw of said pawls according to the length of the shoe.

25. The combination with fastening means and a shoe support, of means to rotate said support in different directions in the same plane during the action of the fastening means on the same side of the shoe held on said support.

26. A lasting machine comprising fastening means, a shoe support, means for turning said support automatically, and devices actuated by said shoe support while being moved into position to be rotated preparatory to securing the upper to the innersole for starting the fastening means automatically into operation.

27. In a lasting machine, a shoe support, means to caliper the length of the shoe on the shoe support, fastening means, means to impart intermittently to said fastening means a traveling movement in the line of the contour of the sole, and means controlled by the shoe calipering means for varying the length of the steps of the intermittent movements of the fastening means according to variations in the length of the shoes.

28. In a lasting machine, a carrier, a shoe support rotatively mounted thereon, a clamping means embracing the upper and maintaining it in contact with the last and constituting a guide shaped to conform substantially with the bottom of the last, fastening means, a connected spring controlled edge gage resting on said clamping means during the operation of the fastening means, means to move the fastening means toward said shoe support whatever the shape of the last that it may cross the clamp for a substantially uniform distance to lay the edge of the upper on the inner sole, and independent means acting intermittently to move said fastening means outwardly for a uniform distance from the edge of the clamping means whatever its exterior curvature.

29. In a lasting machine, a shoe support, clamping means surrounding it and shaped to conform to the spring of the last, fastening means, means to impart traveling movement to the fastening means, and means to lift automatically said fastening means from the clamping means and support after

the insertion of each fastening for a like distance whatever the spring of the last.

30. In a lasting machine, a shoe support, means to rotate it about a stationary center, clamping means carried by said shoe support and acting as a guideway or track, fastening means, means to impart to said fastening means an in-and-out movement for the insertion of each fastening, a spring controlled edge gage secured to said fastening means and having its free end sustained on said track, the spring maintaining the gage in contact with the track during the outward movement of the fastening means, and a stop to arrest the movement of said edge gage and determine the extent to which the fastening means shall overlap the track and shoe support at the inward movement of the fastening means.

31. In a fastening machine, a shoe support, fastening means having a tack driving passage, means to move said fastening means in and out with relation to said support, a spring actuated edge gage carried by said fastening means, and means to adjust the point at which the edge gage will be arrested with relation to the tack driving passage of the fastening means at the completion of the inward movement of the fastening means to determine the distance from the edge of the inner sole to be occupied by the line of fastenings inserted.

32. A lasting machine comprising fastening means, a shoe support, devices to move the shoe-support, means for automatically imparting to said fastening means a movement in the direction of the contour of the shoe sustained on said support, means for imparting to said fastening means in-and-out movement, and a rising and falling movement, and means to stop automatically the operation of the fastening means after completing the fastening of the upper to the inner sole and to leave the fastening means in its elevated position.

33. A movable carrier provided with a plurality of shoe supports each mounted upon a shaft having at its lower end a toothed gear, a shaft provided with a mutilated gear presenting a plurality of spaces and a plurality of toothed portions, each shaft and gear of the shoe support being adapted to be engaged with and rotated at intervals by said mutilated gear, means to rotate said shaft, fastening means, and means to effect a traveling movement of said fastening means while the teeth carried by the gear of the shaft sustaining one of said last supports occupy an un-toothed portion of said mutilated gear, a toothed portion of said mutilated gear thereafter engaging the teeth of the gear connected with the shaft carrying the shoe support and partially rotating the same.

34. In a lasting machine, a movable carrier, a plurality of shoe supports mounted thereon, each shoe support having a shaft extended through said carrier and provided with a gear, fastening means including a clutch controlling lever, and means intermediate the gears on the shafts of each shoe support and said clutch controlling lever whereby as the carrier is moved to put the support in position that the shoe thereon may be subjected to the action of the fastening means, said clutch may be made operative to automatically set in motion the actuating devices for the fastening means.

35. In a lasting machine, fastening means, a shaft, means actuated thereby for moving said fastening means, a clutch, means to retain the same in engagement to insure the rotation of said shaft, a shoe support, means to turn the same during the operation of the fastening means to insure the driving of fastenings in the shoe, said means including a ratchet wheel and a dog carried by said ratchet wheel to automatically stop the movement of the fastening means when tacks have been driven completely about the last of the shoe held on the shoe support.

36. In a lasting machine, lasting means, automatically actuated fastening means, sustaining means therefor, a plurality of independently rotatable shoe supports, a carrier for the same adapted to be rotated to place each of the shoe supports, first in operative relation to said lasting means and afterward to the fastening means, clamping members adapted to embrace the shoe upper and impinge the same against the last of the shoe support during the operation of securing the upper to the inner sole on the last, means to automatically release said clamping means, when in the movement of the carrier for the shoe support the upper containing a shoe which has been secured to the inner sole comes into position to have the lasted shoe removed from the shoe support for the substitution of another shoe to be lasted.

37. A movable carrier, a shoe holder mounted thereon, fastening means, means for imparting step-by-step traveling movement to the fastening means and means for controlling this step-by-step traveling movement according to the length of the shoe upon the shoe support then occupying a position to receive tacks from the fastening means.

38. In a lasting machine, a carrier, a shoe support thereon, fastening means, means to impart a traveling motion and an in-and-out movement to said fastening means, and means to swing the shoe support relatively to the fastening means throughout the operation of the fastening means, that the latter in its inward movement may approach the

edge of the shoe varying in contour from a direction substantially at right angles to the edge of the shoe at the point where the fastening is to be inserted.

39. In a lasting machine, upper clamping means variable in position according to the length of the shoe support, a shoe support, fastening means, means for feeding said fastening means, and means co-acting with the upper clamping means and controlled automatically by the length of a shoe on said support to determine the extent of feeding movement of said fastening means in accordance with the requirements of the length of the shoe.

40. In a lasting machine, fastening means, a carrier, a shoe support, means to partially rotate said shoe support when fastenings are being inserted about the toe and about the heel, means to slightly rotate said shoe support in one and then in the opposite direction while fastenings are being driven along the sides to thereby bring the shoe support into suitable position with relation to the fastening means to enable the latter to drive fastenings into the upper opposite the incurves of the sole in the line of the shank.

41. A shoe support, fastening means, means to move the same toward and from the edge of the sole sustained on the shoe support, and means to turn the shoe support in one and then in another direction during the time that the fastening means operates to insert fastenings, whereby to insure that said fastening means shall approach the face of the edge of the sole at right angles to said edge.

42. A lasting machine comprising a shoe support, fastening means movable over the shoe bottom toward and from position for inserting fastenings, sustaining means for said fastening means, and a locking device to prevent movement of said sustaining means and fastening means outwardly away from the shoe due to the blow of the driver when driving a tack into the shoe.

43. A lasting machine comprising a shoe support, means for moving the same in and out with the driving of each tack, sustaining means for said fastening means, a locking device to hold the fastening means in its inward position and preventing the movement of said sustaining means and fastening means away from the shoe due to the blow of the driver when driving a tack into the shoe, and automatic means to disengage said locking device preparatory to moving the fastening means away from the shoe after driving a tack.

44. In a lasting machine a shoe support to sustain a last provided with upper clamping means self-adapting to the length of the last, fastening means, means to impart a step-by-step movement thereto, and means to determine automatically the length of

said step-by-step movements according to the length of the last.

45. A shoe support, tacking means, means to impart a step-by-step movement thereto, and upper clamping means to act on an upper carried by a longer or shorter last and automatically control the length of the step-by-step movement of the tacking means between driving one and the next tack.

46. In a machine of the class described, a shoe support, means to rotate the same step-by-step, tacking means, means to impart a step-by-step movement thereto, upper clamping means controlled by the length of the last on the shoe support and automatically controlling the length of the step-by-step movement of the tacking means between driving one and the next tack, and means to stop automatically the operation of the tacking means on the completion of the tacking operation.

47. A lasting machine comprising a shoe support, tack inserting means, including a nose-piece, means to actuate the tack inserting means to insure the insertion of a series of tacks about the edge of the sole, means to raise the nose-piece of the tack inserting means from contact with the shoe after each tack has been driven, and means to impart to said nose-piece an abnormal movement away from the shoe after driving the last tack therein, to thereby enable the shoe to be removed from its operative position with relation to the tacking means.

48. A shoe support adapted to present a last to the operation of tack driving means, a movable support provided with a guideway, a head cooperating with said guideway and carrying tack driving means and tack supplying mechanism, means to cause said head to travel step-by-step in said support in the direction of the last on the shoe support and along the sides thereof, and means to actuate said tack driving means automatically.

49. A lasting machine comprising fastening means, a carrier, a plurality of shoe supports mounted thereon, said carrier being movable to bring a shoe support containing a shoe in position to have its upper secured to its inner sole by fastenings inserted by said fastening means, and devices actuated by said shoe support while being moved into fastening receiving position to automatically start the fastening means into operation.

50. A movable carrier, a shoe holder thereon, fastening means, toe and heel clamps adapted to lasts of different lengths, means for imparting step-by-step movement to said fastening means, including a pawl and rack bars, and means controlled by the toe and heel clamps to shorten the period of engagement of said pawls with said rack bars to reduce the movement of the fasten-

ing means for the length of the shoe in which fastenings are being inserted.

51. The combination with a shoe support having a guide to encircle a shoe thereon, of an upper fastening device, means to impart in-and-out movement thereto with reference to said support and guide, a gage movably connected with said fastening device, and means to cause said gage to follow and keep proper contact with said guide notwithstanding the in-and-out movement of said fastening device.

52. In a lasting machine, the combination with fastening means comprising a member having a widened extremity, of automatic actuating mechanism therefor constructed and arranged to cause said member to engage the upper at the extreme edge of the last and to maintain said member in sliding engagement therewith from such point to the end of its inward movement and out of engagement with the upper upon its return movement.

53. In a lasting machine, the combination with a fastening means comprising a casing having a widened portion at its extremity to constitute a wiper, and a driver mounted in said casing, of automatic actuating mechanism therefor constructed and arranged to cause said fastening means to engage the upper at the edge of the last and to maintain said means in sliding engagement with the upper from such edge to the extremity of its inward movement, and out of engagement with the upper upon its return movement.

54. The combination of a support, a shoe holder thereon; fastening means, means for imparting a relative step-by-step traveling movement to the support and fastening means, and means for controlling such step-by-step movement in accordance with the length of the shoe upon the shoe support then occupying a position to receive fastenings from the fastening means.

55. The combination with lasting mechanism and fastening means, of a shoe support movable therebetween, clamping devices carried by said shoe support to engage an upper and hold it against a last, said clamping devices being automatically released as the shoe support moves away from the fastening means, and means to restore said clamping devices to clamping engagement with an upper.

56. The combination with fastening means, of a shoe support movable relatively thereto, clamps carried by said support, means to move said clamps to clamp an upper to a last on said support, and means to release said clamps automatically as the support moves away from said fastening means.

57. A machine of the class described having, in combination, a jack rotatable to present different parts of a shoe to the tacker, a tacker support movable to position the

tacker different distances from the axis of rotation of the jack as the shoe is turned to present different parts to the tacker, a tacker on the support, means for actuating the tacker on its support over the shoe and back again, and means for locking and unlocking the support in time relation to hold it while the tacker is doing its work.

58. A machine of the class described having, in combination, a shoe support, a tacker that is pressed yieldingly toward the shoe support to tack driving position, means to retract the tacker after each tack driving operation; and means to lock the tacker against retraction during each driving operation.

59. A machine of the class described having, in combination, a last support, a tacker, means to actuate the tacker to insert fastenings, mechanism to actuate the tacker forth to inserting position and back again, said mechanism having provision for varying the forward movement automatically according to the contour of the shoe edge, and means for locking the tacker in its advanced position during the inserting operation and automatically unlocking it.

60. A machine of the class described having, in combination, a last support, a tacker, means to actuate the tacker to insert fastenings, mechanism to actuate the tacker forth to inserting position and back again, said mechanism having provision for varying the forward movement automatically according to the contour of the shoe edge, and means for locking the tacker against rearward movement while the tack is being inserted and then automatically unlocking it.

61. A machine of the class described having, in combination, a last support, a tacker, means to actuate the tacker to insert fastenings, mechanism to actuate the tacker forth to inserting position, locking it during the inserting operation and then unlocking and retracting it, and supporting means for the tacker arranged to cause it to approach closest to the plane of the shoe bottom at the end of its forward movement.

62. A machine of the class described having, in combination, a last support, a tacker, means to actuate the tacker to insert fastenings, mechanism to actuate the tacker forth to inserting position and back again by a movement about a center located below the tacker, and automatic means for locking the tacker momentarily while in its forward position.

63. A machine of the class described having, in combination, a support, to sustain a last in constant vertical position during operation of the machine on different portions of the shoe bottom, a tacker, means to actuate the tacker to insert fastenings, mechanism to actuate the tacker forth to inserting position over the shoe and back again, means

to lift the tacker from the work during its retraction from inserting position, said mechanism having provision for adapting the plane of forward movement of the tacker to the plane of the portion of the shoe bottom over which it is to operate.

64. A machine of the class described having, in combination, a drive shaft, links laterally extended therefrom, a second shaft carried by said links and geared to the first shaft, a tacker mechanism pivotally supported for oscillation or in and out movement on the second shaft, and a support for holding a shoe to be operated upon by said tacker mechanism.

65. A machine of the class described having, in combination, a drive shaft, links laterally extended therefrom, a second shaft carried by said links and geared to the first shaft, a standard pivotally supported for oscillation or in and out movement on the second shaft, a tacking mechanism on the standard, connections from the second shaft to drive said tacking mechanism, and means to impart tacker positioning movement to said standard.

66. A machine of the class described having, in combination, a drive shaft, links laterally extended therefrom, a second shaft carried by said links and geared to the first shaft, a standard pivotally supported for oscillation on the second shaft, and a tacker guided for movement on the standard longitudinally of the shafts.

67. A machine of the class described having, in combination, a drive shaft, links laterally extended therefrom, a second shaft carried by said links and geared to the first shaft, a standard pivotally supported for oscillation on the second shaft, a tacker guided for movement on the standard longitudinally of the shafts, and means for effecting bodily movements of the tacker inwardly and outwardly over the shoe and laterally.

68. A machine of the class described having, in combination, a drive shaft, links laterally extended therefrom, a second shaft carried by said links and geared to the first shaft, and a tacker mechanism pivotally supported for oscillation or in and out movement on the second shaft, a tacker operating shaft and a sprocket driving connection from the second shaft to the tacker operating shaft to maintain predetermined running relation between the tacker and said driving mechanism.

69. A machine of the class described having, in combination, means for operating on a shoe and means for positioning the shoe relatively to said means and comprising an edge gage n formed on the horizontal arm of a bell crank pivoted at n' , a bell crank which is fulcrumed at n^s and to the independent arm of which the first mentioned

bell crank is pivoted, means n^t , n^s permitting movement of the first mentioned bell cranks about the axis n' and a spring n^s permitting movement of both bell cranks about the axis n^s .

70. A machine of the class described having, in combination, a shoe support, a tacker that is movable over the shoe on said support, and a feeler that comprises the bell crank lever n , and the bell crank lever n^2 to the lower arm of which the bell crank n is fulcrumed for separate movement.

71. A machine of the class described having, in combination, means for operating on a shoe, and a work gage which is movably mounted and yieldingly actuated to project outwardly and downwardly to a shoe receiving position and is movable backwardly and upwardly to guide the shoe into working relation to said operating means.

72. A machine of the class described having, in combination, means for operating on a shoe, and a work positioning device normally projected yieldingly away from the operating means and movable by the work toward the operating means, said machine having means for guiding said device and for limiting its movement by the work.

73. A machine of the class described having, in combination, means for operating on a shoe and a device to position the work in two directions, means yieldingly projecting said device in directions opposed thereto, and limiting means for the movement of the device toward the operating means having provision for adjusting the approach of the work in one direction.

74. A machine of the class described having, in combination, means for operating on a shoe, and an upwardly and laterally movable guide arranged to receive the shoe in a position remote from the said operating means and to guide and direct movement of the shoe into working relation to said means.

75. A machine of the class described having, in combination, a tacker, operating mechanism therefor and means to effect traveling movement of the tacker to space the tacks, including means to vary automatically the length of successive movements.

76. A machine of the class described having, in combination, a tacker, operating mechanism therefor and means to effect traveling movement of the tacker to space the tacks, including a pawl, a ratchet, means for relatively actuating them to effect said movement, and means operating automatically to vary during repeated operations of the tacker the period during which said pawl and ratchet shall be effective to produce tack spacing.

77. A machine of the class described having, in combination, a tacker, operating mechanism therefor and means to effect

traveling movement of the tacker to space the tacks, including means to vary automatically the length of successive movements, a support for the shoe, and means to actuate it automatically to supplement the tacker movements for spacing the tacks.

78. A machine of the class described having, in combination, a tacker, operating mechanism therefor and means to effect traveling movement of the tacker to space the tacks, means to render the traveling movements of the tacker non-uniform, a support for the work, and means to actuate the work support to supplement the tacker movements for spacing the tacks.

79. A machine of the class described having, in combination, a tacker, operating mechanism therefor, means to effect at different times different lengths of traveling movements of the tacker for spacing the tacks, a work support and means for automatically effecting traveling movements of the support to supplement tacker movements.

80. A machine of the class described having, in combination, a tacker, operating mechanism therefor, means to effect at different times different lengths of traveling movements of the tacker for spacing the tacks, a work support and means for automatically effecting traveling movements of the support at certain periods only and of varying lengths to supplement the movements of the tacker for obtaining desired tack spacing.

81. A machine of the class described having, in combination, a tacker, a shoe support, means for actuating the tacker to insert tacks, means for effecting a relative traveling movement of the tacker and the support to space the tacks, and automatic means for relatively moving the tacker and support angularly first in one direction and then back while tacking along the side and shank of the shoe to present the shoe edge and the tacker in similar relations for tacking at different points.

82. A machine of the class described having, in combination, a tacker, a shoe support, means for actuating the tacker to insert tacks, means for effecting a relative traveling movement of the tacker and the support to space the tacks along the side of a shoe, and means for automatically giving to the shoe support and the tacker while working along the shank, a special relative angular movement first in one direction and then reversely to present the curved contour of that portion of the shoe edge substantially perpendicular to the tacker at all points, substantially as described.

83. A machine of the class described having, in combination, a combined tacker and wiper movable over the shoe bottom to lay the upper down and fasten it, means to

impart the working movements to the tacker and wiper, means for relatively moving it and the shoe to space the tacks, and means for angularly moving the shoe and the wiper and tacker relatively to cause the wiping action to take place substantially perpendicular to the shoe edge at differently shaped portions of the shoe.

84. A machine of the class described having, in combination, a wiper, a shoe support, means for actuating the wiper across the edge of the shoe, and means for moving the shoe support angularly while the wiper is operating along the side of the shoe to present the shoe edge at substantially a right angle to the path of the wiper.

85. A machine of the class described having, in combination, a wiper, a shoe support, means for actuating the wiper across the edge of the shoe, and means for imparting to the wiper and the support a relative traveling movement to cause overwiping of the upper progressively along the shoe edge, and additional means to effect definite relative angular movements of the wiper and support for predetermining the direction of the wiping action.

86. A machine of the class described having, in combination, a wiper, a shoe support, means for actuating the wiper forth and back across the edge of the shoe bottom, and means for automatically moving the shoe support angularly as the operation progresses along its sides whereby its edge is maintained substantially perpendicular to the path of the wiper.

87. A machine of the class described having, in combination, a wiper, a shoe support, means for actuating the wiper forth and back across the edge of the shoe bottom, and means for automatically moving the shoe support angularly first in one direction and then reversely as the operation progresses along the shank and ball of one side of the shoe.

88. A machine of the class described having, in combination, a wiper, a shoe support, means for actuating the wiper forth and back across the edge of the shoe bottom, means for imparting traveling movements to the wiper to cause successive portions of the shoe to be overwiped, and means for automatically changing the angular position of the shoe to maintain its edge substantially perpendicular to the working path of the wiper in the shank and the ball.

89. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means for positioning it angularly to present the shoe edge in predetermined angular relation to the path of the wiper, and additional means for rotating the shoe to present successive portions of the toe or heel to the action of the wiper.

90. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means for imparting traveling movements to the wiper, means for imparting angular positioning movements to the support while the side of the shoe is being operated upon, and means for imparting rotary traveling and positioning movements to the shoe while the toe or heel is being operated upon.

91. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means to impart traveling movements to the shoe support, means to impart traveling movements to the wiper, and means for automatically rendering one of said last mentioned means inoperative and the other one operative.

92. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, and means to impart to the wiper a series of traveling movements of different lengths.

93. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means for imparting to the wiper a series of traveling movements to operate on different portions of the shoe, and means for automatically changing the length of the traveling movements as the operation progresses.

94. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means for imparting to the wiper traveling movements while a side of the shoe is being operated upon, said machine having provision for causing predeterminedly different traveling movements of the wiper when an end of the shoe is being operated upon.

95. A machine of the class described having, in combination, a reciprocating tackler, means for actuating it, a shoe support, means for imparting to the tackler a series of traveling movements to operate on different portions of the shoe, and means for automatically changing the length of the traveling movements as the operation progresses.

96. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means for imparting to the shoe support a series of traveling movements to present successive portions of the shoe end to the action of the wiper and means for also imparting traveling movements to the wiper, said wiper movements varying in length at different times to cause the wiping operations to be repeated closer together at one point than at another.

97. A machine of the class described having, in combination, a wiper, means for actuating it, a shoe support, means for imparting to the wiper and the support a series of relative traveling movements varying in

length automatically to concentrate the wiping operations at predetermined points.

98. A machine of the class described having, in combination, a tackler, means for actuating it, a shoe support, means for imparting to the tackler and to the support series of relative traveling movements varying in length automatically to concentrate the tacking operations at predetermined points.

99. A machine of the class described having, in combination, a wiper, means for actuating the wiper, a shoe support movable to carry the shoe into and out of operative relation to the wiper, a clutch for controlling the actuation of the wiper, and means controlled by the position of the shoe support for starting the wiper.

100. A machine of the class described having, in combination, a wiper, means for actuating the wiper and controlling means constructed and arranged to cause the wiper to be started automatically when a shoe is presented in operative relation to it and to be stopped after a predetermined number of actuations.

101. A machine of the class described having, in combination, a movable shoe support, means for actuating it; a wiper arranged to be reciprocated over the shoe bottom when the support is positioned to present the shoe; mechanism for causing the wiper to start automatically when the shoe is presented, make a predetermined number of reciprocations, and then stop automatically.

102. A machine of the class described having, in combination, a movable shoe support, means for actuating it; a wiper arranged to be reciprocated over the shoe bottom when the support is positioned to present the shoe; mechanism for causing the wiper to start automatically when the shoe is presented, make a predetermined number of reciprocations, and then stop automatically; and means to change the position of the shoe support between two successive operations of the wiper.

103. A machine of the class described having, in combination, a tackler, means for actuating it to insert a series of tacks in succession, a clutch for controlling the actuation of the tackler, means controlled by the position of the shoe for starting the tackler, and means for automatically stopping the tackler at the completion of the series of insertions.

104. A machine of the class described having, in combination, a support for a shoe movable to present the shoe to means for operating on the shoe, means for automatically starting the means for operating on the shoe when the support has been moved to present the shoe thereto, and mechanism constructed and arranged to be-

gin automatically to act upon the shoe support to advance the shoe after a predetermined number of operations upon the shoe have been performed.

5 105. A machine of the class described having, in combination, a support for a shoe movable to present the shoe to means for operating on the shoe, and mechanism constructed and arranged to begin automatically to act upon the shoe support to advance the shoe after a predetermined number of operations upon the shoe have been performed, said mechanism including a mutilated gear arranged to present a blank space to the shoe support when the latter reaches operative position and driving mechanism to actuate the gear through its cycle and come to rest automatically with a blank space presented to the shoe support.

20 106. A machine of the class described having, in combination, means for operating on a shoe, a support movable toward and from said means and on which the shoe is clamped, and means for automatically unclamping the shoe when the support is moved away from said operating means.

30 107. A machine of the class described having, in combination, a tacker, a support on which a shoe is clamped and which is movable toward and from operative relation to the tacker, and means for automatically unclamping the shoe when it is moved away from the tacker.

35 108. A machine of the class described having, in combination, a tacker, a shoe support having means for clamping an upper in stretched position about a last and being movable from receiving position to operative relation to the tacker, means to secure the support in the latter position, and means for automatically releasing the clamping means upon the return of the support to receiving position.

45 109. A machine of the class described having, in combination, mechanism for performing an operation on a shoe in a series of steps, means for imparting to said mechanism and to the shoe relative traveling movements for the purpose described, and means for automatically varying the length of said movements according to the length of the shoe.

55 110. A machine of the class described having, in combination, a tacking mechanism, means to impart thereto traveling movements to space the tacks, devices for automatically setting said means according to the size of the shoe presented, and means to preserve the adjustment during the operation on that shoe.

60 111. A machine of the class described having, in combination, a tacking mechanism, a shoe support, means to impart automatically to said mechanism and support relative traveling movements to space the

tacks, and means for automatically obtaining variation of the tack spaces as the shoes vary in length.

112. A machine of the class described having, in combination, mechanism for performing an operation on a shoe, means for supporting the shoe, and means for varying the operation automatically in accordance with the size of the shoe.

75 113. A machine of the class described having, in combination, mechanism for performing an operation on a shoe, means for supporting the shoe, and means associated with the shoe support to indicate the size of a shoe thereon and adapted to cooperate with said mechanism to vary automatically the operation of said mechanism in accordance with the indicated size.

85 114. A machine of the class described having, in combination, mechanism for fastening a shoe step by step, means to effect relative feed movement of the shoe and said mechanism, and means to vary automatically the length of the feed movements according to the size of the shoe.

90 115. A machine of the class described having, in combination, mechanism for fastening a shoe step by step along the sides and around one end of the shoe, means to effect relative feeding of the shoe and said mechanism, and means to vary automatically the length of the feed movements along the sides only in accordance with the length of the shoe.

100 116. A machine of the class described having, in combination, a tacking mechanism, a shoe support, means to impart to said mechanism and support relative traveling movements to space the tacks, and means controlled as to position by the shoe on the support and arranged to set the means for imparting traveling movement to lengthen and shorten the spacing of the tacks with variations in size of the shoe in the support.

110 117. A machine of the class described having, in combination, a reciprocating wiper, means to actuate it a predetermined plural number of times over the work, and means for automatically stopping the wiper in a retracted position.

118. A machine of the class described having, in combination, a column, a plurality of shoe supports mounted for rotation thereon about a common axis into position adjacent to a tacker, and a tacker movable into and out of tack inserting position over the shoe on the adjacent support and having an extra movement toward operative position when the shoe is presented and away therefrom when the shoe is to be withdrawn.

119. A machine of the class described having, in combination, a tacker, means to actuate it to insert tacks successively, and

means for automatically imparting to the tacker a special movement away from the work when it is stopped.

120. A machine of the class described having, in combination, a tacker, means to actuate it to insert a predetermined number of tacks in succession, means to stop the tacker when its work is completed, and means to impart automatically to the tacker a special movement of clearance before it is stopped.

121. A machine of the class described having, in combination, a tacker, means to actuate it to insert a plurality of tacks, and means to give to the tacker automatically a special movement of clearance after a predetermined tack has been driven.

122. A machine of the class described having, in combination, a tacker, a shoe support movable into relation of presentation to the tacker, means to actuate the tacker repeatedly to insert tacks, a clutch to stop the tacker, and means to impart to the tacker a special movement of clearance when the clutch is operated.

123. A machine of the class described having, in combination, a tacker, means for actuating it to insert a plurality of tacks in succession, a clutch to start and stop the tacker, and means operated automatically when the clutch is operated to impart to the tacker a special movement toward the work at the beginning of the tacking operation and a special movement away from the work when the clutch is shifted to stop the tacker.

124. A machine of the class described having, in combination, means for performing a series of similar successive operations on a shoe, shoe positioning means, starting and stopping means, and means working automatically to give to the said operating means a special movement toward the shoe when the machine is started to begin the series of operations and a special movement away from the shoe when the series is completed.

125. A machine of the class described having, in combination, mechanism for performing repeated operations on a shoe, shoe positioning means, starting and stopping means and devices associated with the latter means to give to the said operating mechanism an initial movement toward the shoe when it is started and a final movement away from the shoe when its work is done.

126. A machine of the class described having, in combination, a tacker, a shoe support, means for relatively actuating said tacker and support to insert tacks spaced apart in a shoe bottom, starting and stopping means, and means including the cam p^{10} arranged to be shifted when the machine is started to give the tacker and support

a relative movement of approach and to be shifted reversely when the machine is stopped to effect a relative movement of withdrawal.

127. A machine of the class described having, in combination, a wiper arranged to reciprocate forth and back repeatedly across the edge of a shoe, means for actuating it, means for stopping the wiper, and means for automatically giving it a special movement of withdrawal when it is stopped.

128. A machine of the class described having, in combination, a wiper arranged to reciprocate forth and back repeatedly across the edge of a shoe, means for actuating it, means to lower the wiper upon the work from an elevated position when the machine is started and for automatically raising it again when the machine is stopped.

129. A machine of the class described having, in combination, a wiper; actuating means for advancing the wiper to do its work, raising and retracting it to its starting position and causing the wiper to repeat its cycle; starting and stopping means; and means connected therewith to cause the wiper to be automatically raised to a special position of clearance before stopping the machine and lowered again when the machine is started.

130. A machine of the class described having, in combination, a tacker, actuating means for advancing the tacker to do its work, raising and retracting it to its starting position and causing the tacker to repeat its cycle, starting and stopping means, and means connected therewith to cause the tacker to be automatically raised to a special position of clearance before stopping the machine and lowered again when the machine is started.

131. A machine of the class described having, in combination, means to work an upper over a last by repeated operations applied to different parts of a shoe successively, a driver, mechanism for delivering different sized tacks to the driver, and means operating automatically to change the size of the tack delivered at predetermined times during the lasting operation.

132. A machine of the class described having, in combination, a driver casing having a portion formed to constitute a wiper, a driver, mechanism for delivering different sized tacks to said driver, means for imparting relative traveling movements to the shoe and the wiper, tacking mechanism to carry out the lasting operation around the shoe, and automatic means for determining the size of tacks to be delivered as the lasting progresses over different portions of the shoe.

133. A machine of the class described having, in combination, lasting means, a driver,

mechanism for delivering tacks of two lengths to the driver, and means controlled by the machine for delivering the shorter tacks while lasting the sides of the shoe and the longer tacks while lasting the heel and toe portions of the shoe.

134. A machine of the class described having, in combination, lasting means, means to fasten the upper, means for presenting one kind of fastening material in position to be used while lasting the sides of the

shoe, and means operating automatically to cause another kind of fastening material to be applied while lasting an end of the shoe.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

THOMAS K. KEITH.

Witnesses:

GEO. W. GREGORY,

EDITH M. STODDARD.

Corrections in Letters Patent No. 1,030,822.

It is hereby certified that in Letters Patent No. 1,030,822, granted June 25, 1912, upon the application of Thomas K. Keith, of Boston, Massachusetts, for an improvement in "Lasting-Machines," errors appear in the printed specification requiring correction as follows: Page 20, line 23, after the word "support," strike out the period and insert a comma and the words *and means to lock automatically said fastening means temporarily against outward movement after each inward movement thereof.*; page 21, line 20, for the word "fastening" read *lasting*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of October, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

mechanism for delivering tacks of two lengths to the driver, and means controlled by the machine for delivering the shorter tacks while lasting the sides of the shoe and the longer tacks while lasting the heel and toe portions of the shoe.

134. A machine of the class described having, in combination, lasting means, means to fasten the upper, means for presenting one kind of fastening material in position to be used while lasting the sides of the

shoe, and means operating automatically to cause another kind of fastening material to be applied while lasting an end of the shoe.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

THOMAS K. KEITH.

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EDITH M. STODDARD.

Corrections in Letters Patent No. 1,030,822.

It is hereby certified that in Letters Patent No. 1,030,822, granted June 25, 1912, upon the application of Thomas K. Keith, of Boston, Massachusetts, for an improvement in "Lasting-Machines," errors appear in the printed specification requiring correction as follows: Page 20, line 23, after the word "support," strike out the period and insert a comma and the words *and means to lock automatically said fastening means temporarily against outward movement after each inward movement thereof.*; page 21, line 20, for the word "fastening" read *lasting*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of October, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.