

C. TYSON.

Machines for Screwing the Uppers upon the Soles and Heels of Boots, &c.

No. 149,007.

Patented March 24, 1874.

fig. 4.

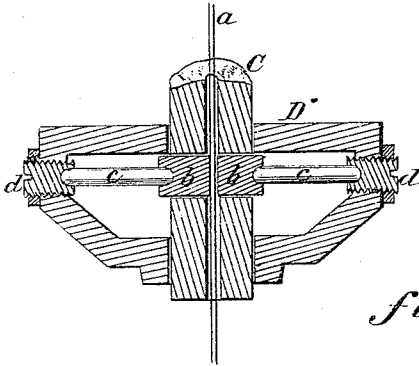


fig. 5.

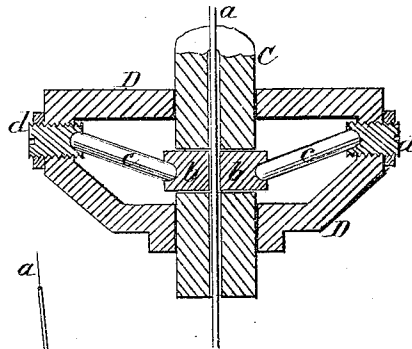
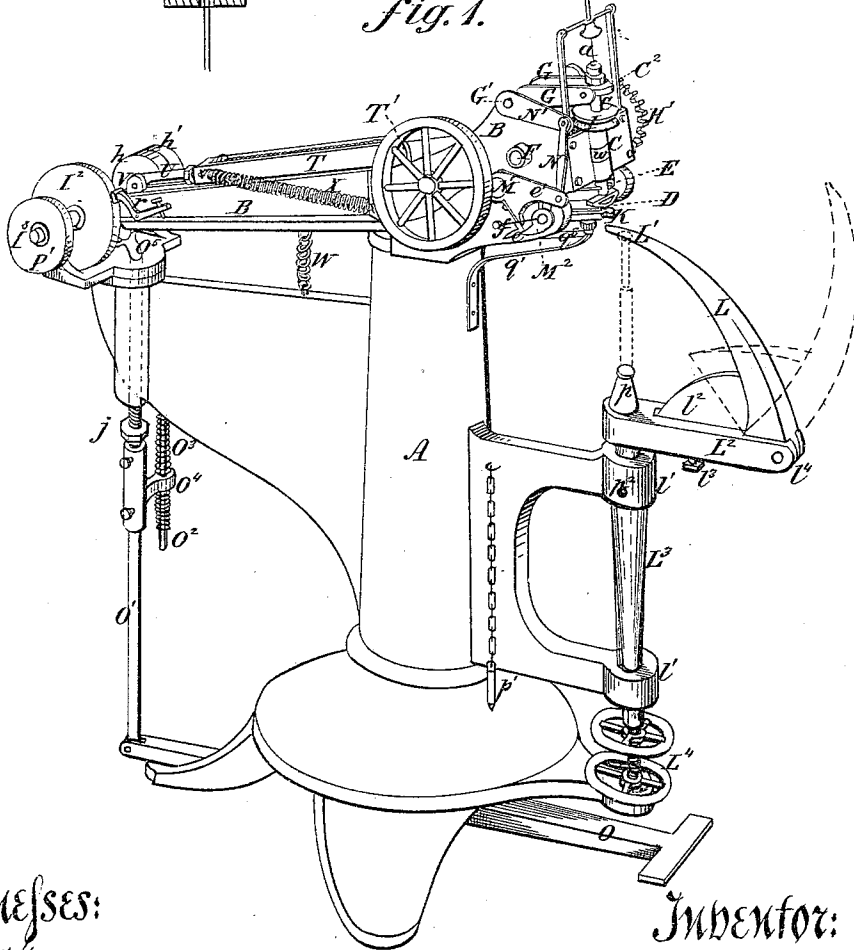


fig. 1.



Witnesses:  
J. West Wagner,  
St. Rutherford

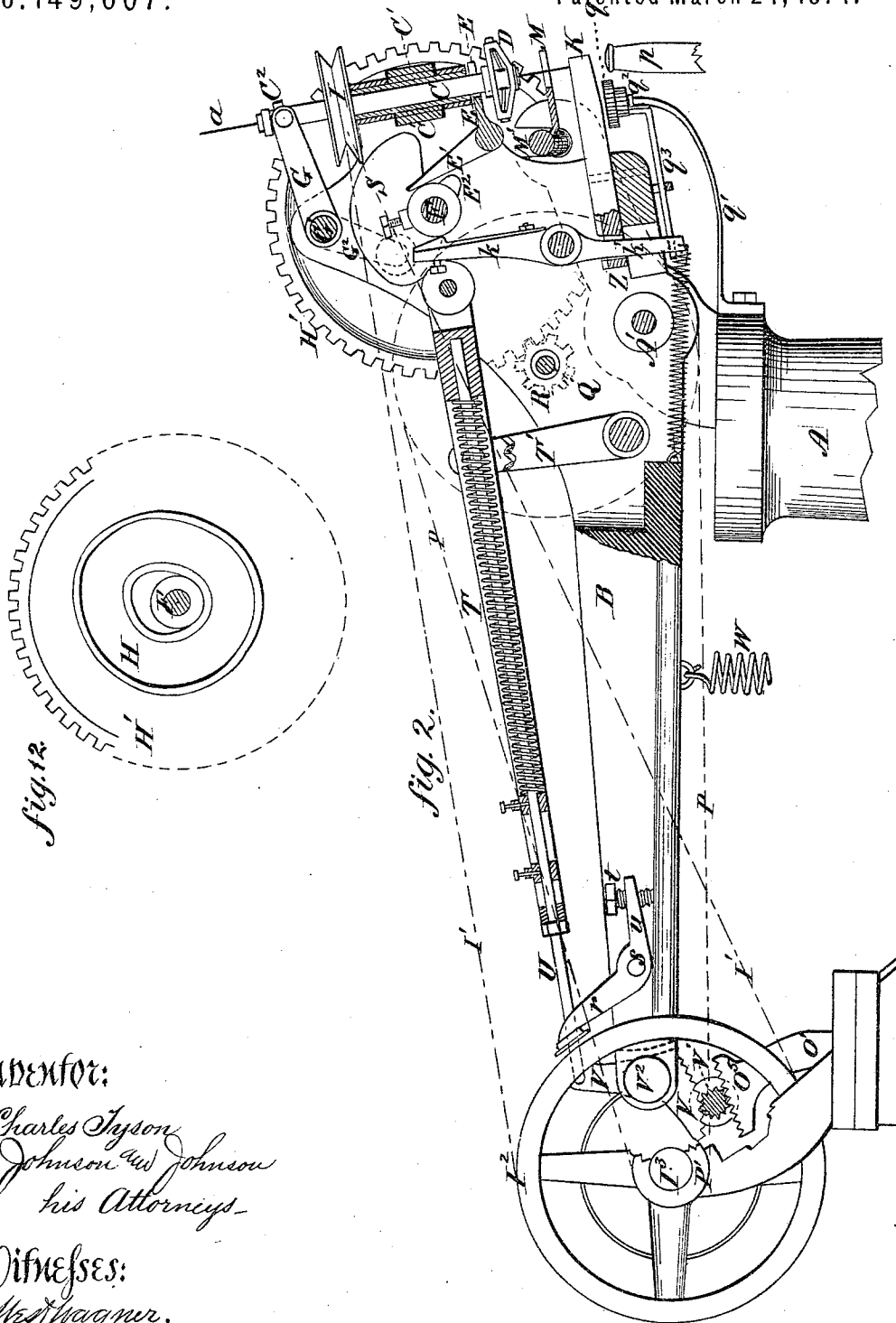
Inventor:  
Charles Tyson  
By Johnson and Johnson  
his Attorneys.

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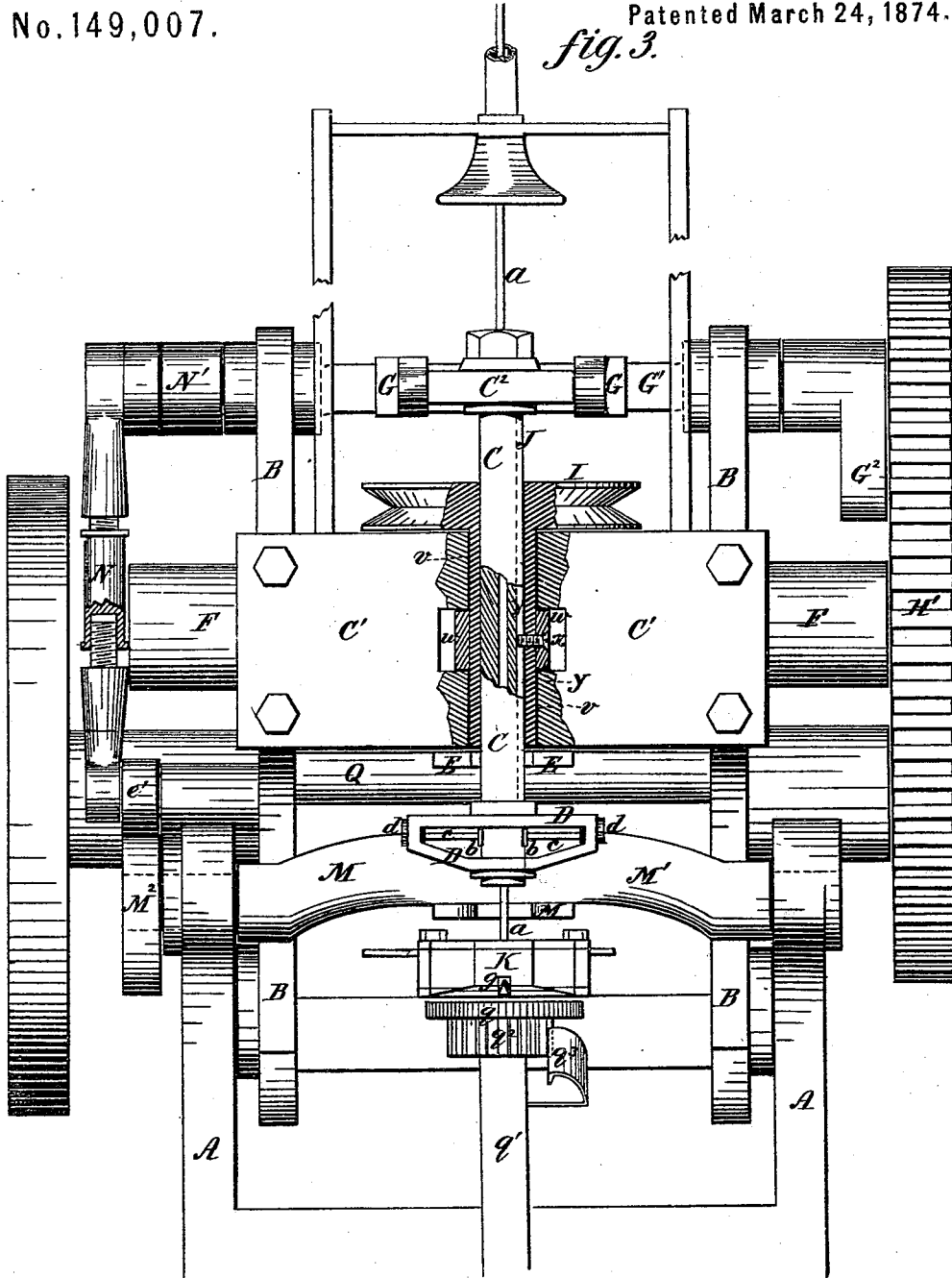
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fig. 3.



Witnesses:

J. Westhagen.  
H. Rutherford

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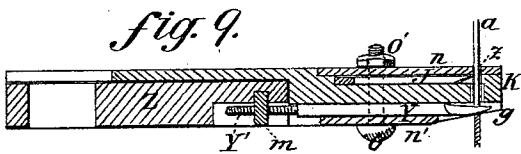
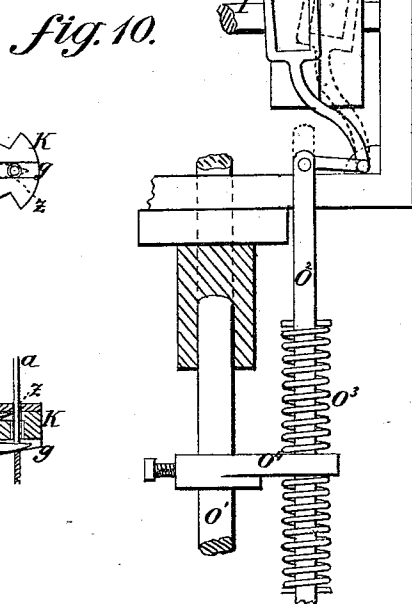
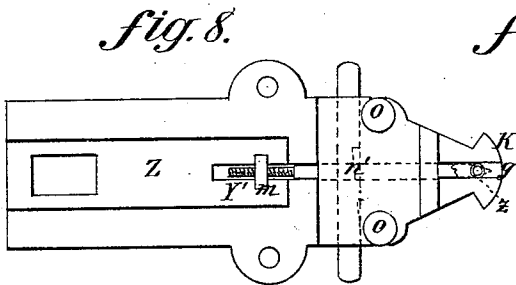
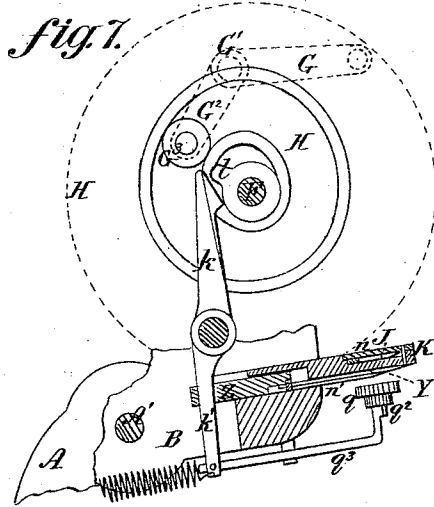
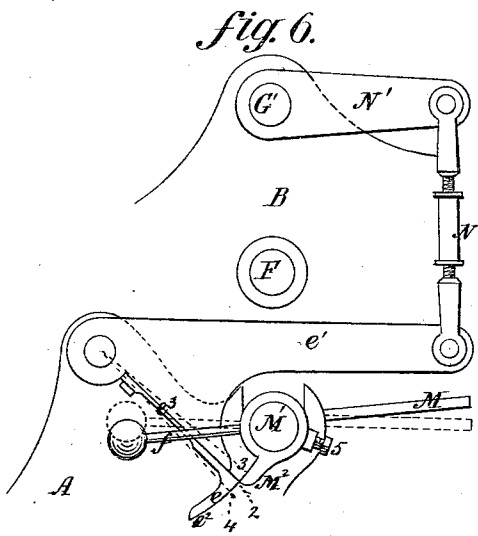
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Printed by:  
 Messrs Wagner,  
 & Rutherford

Inventor:  
 Charles Tyson  
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 his Attorneys

# UNITED STATES PATENT OFFICE.

CHARLES TYSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN MUNDELL, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR SCREWING THE UPPERS UPON THE SOLES AND HEELS OF BOOTS, &c.

Specification forming part of Letters Patent No. 149,007, dated March 24, 1874; application filed September 23, 1873.

## CASE A.

*To all whom it may concern:*

Be it known that I, CHARLES TYSON, of the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Machines for Screwing the Uppers onto the Soles and Heels of Boots and Shoes, of which the following is a specification:

This invention relates to machines for uniting the sole to the upper, in the manufacture of boots and shoes, by means of screws cut upon and from a continuous wire, and in which, during the cutting of the screw, it is at the same time entered into the material to firmly unite the pieces, and then severed from the wire, as in the machine patented to Amasa B. Howe, assignee of Eugene Lemercier, of date December 16, 1862; but in such machine these several operations have been effected by manual labor. By my invention these several operations are performed automatically in an organized machine, in which each successive step in the operation (except the rotary motion of the screwing-spindle) is performed by certain devices which are actuated by a cam-shaft, each revolution of which causes the complete operation required for the several things stated, while the motion of the cam-shaft and the screwing-spindle are continuous during the operation of forming and entering successive screws, and their length automatically regulated to the varying thickness of the material by means of an escapement or tripping device operating in connection with the feeding-clamp, while the feed of the wire is effected by combining with the screwing-spindle a clamp sliding upon and independent of the movement of said spindle, as will be hereinafter described.

In the accompanying drawings, Figure 1, Sheet 1, represents a view in perspective of a machine embracing my invention; Fig. 2, Sheet 2, a vertical section; Fig. 3, Sheet 3, a front elevation; Figs. 4 and 5, Sheet 1, sectional views of the automatic feed clamping device for the wire; Fig. 6, Sheet 4, a side view of the escapement or detent device for the wire-

feeding clamp; Fig. 7, same sheet, a section, showing the manner of operating the cut-off for the wire and the feed device for the shoe; Figs. 8 and 9, same sheet, bottom and sectional views of the pressing-nose; and Fig. 10, same sheet, the band-shifting device of the treadle.

Upon a fixed standard, A, a horizontal frame, B, is pivoted at A', and arranged to carry the several operating parts of the machine. The spindle C forms the guide for the wire  $\alpha$ , and is mounted in a guide-head, C<sup>1</sup>, at the front of the pivoted frame B, and it has a rotary and axial movement to form the screw upon the wire and screw it into the material. The spindle carries at its lower end an automatic clamp for laying hold of the wire to cut the screw and screw it in, and the fixed frame A carries a device for automatically releasing the clamp after the screw has been entered.

In the combination of the screwing-spindle with the clamp-slide D the latter is free to be moved up and down upon the spindle, and the clamping devices consist of two steel jaws,  $p$ , fitted upon toggle-pins  $c$ , to slide within openings in the spindle, and so as to be closed upon and clamp the wire within the spindle, the toggle-pins being socketed in the jaws and adjusting-screws  $d$  in the ends of the clamp. The forcing down of the clamp straightens the toggles and clamps the jaws against the wire to be fed down, as shown in Fig. 4, and the upward movement of the clamp flexes the pins  $c$  to release the jaws and the wire, so that the spindle with the jaws can rise freely over it to take a new feed, as shown in Fig. 5. This clamp is moved between an upper and a lower automatic device, which serve to control its vertical movement, above stated. The clamping of the wire holds it firmly while cutting the screw and entering it into the sole, and the clamp-head revolves with the spindle by its jaw and pin connection.

The clamping movement is effected by a lever, E, Figs. 2 and 3, mounted in the pivoted frame B, so that its front forked end will straddle the spindle above the clamp, while its rear end E'

extends back to receive the action of a cam,  $E^2$ , on a cam-shaft,  $F$ , carried by the pivoted frame; and each revolution of the cam  $E^2$  will depress the lever  $E$  upon and force down the clamp to bite the wire to form and enter each screw. The spindle is suspended by a swiveling connection,  $C^2$ , with horizontal arms  $G G$ , mounted on a rock-shaft,  $G^1$ , operated by an arm,  $G^2$ , which receives a vibratory motion from a groove-cam,  $H$ , upon the face of a cog-wheel,  $H'$ , on the cam-shaft  $F$ , whereby the spindle is carried down and raised; the cam being such that the descent of the spindle is gradual, and commencing just after the wire is clamped, and its ascent taking place just after the screw is entered and the wire cut, while the rotary motion of the spindle to cut and screw in the screw is produced by a sleeved-pulley,  $I$ , driven continuously by a band,  $I^1$ , leading to a pulley,  $I^2$ , on the power driving-shaft  $I^3$  at the rear of the frame. The sleeve  $v$  is secured in the guide-head by a collar,  $w$ ; and a screw,  $x$ , passing through the collar and the sleeve, enters the groove  $y$  in the spindle, to allow the latter's axial movement while being revolved. The nose  $K$  projects forward from the under side of the pivoted frame  $B$ , and during the above-stated operations of the spindle the nose is brought down upon and firmly holds the work upon a beak-iron or horn,  $L$ . This nose carries both the screw-chaser and the cut-off for the wire.

The unclamping movement is effected by a forked gage or arrester,  $M$ , Figs. 2 and 3, mounted upon a rock-shaft,  $M^1$ , in the fixed frame, and held in a fixed position between the clamp-slide and the nose  $K$ , to serve to arrest the descent of the clamp-slide and release the jaws  $b b$  while the spindle continues its descent to the full length of its movement, which must be sufficient for the largest screw required, the arrester being tripped in this movement of the spindle, and descends with it. The device for holding and tripping the arrester  $M$  consists of a stop projection,  $M^2$ , on the left end of the rock-shaft  $M^1$ , and which is held in its fixed position by a spring-detent,  $e$ , carried by an arm,  $e^1$ , pivoted upon the fixed frame, and connected, by an adjustable link,  $N$ , to an arm,  $N'$ , upon the rock-shaft  $G^1$ , which elevates and depresses the spindle through the cam  $H$ . The arm  $N'$  must be of the same length, and in the same radial position, or nearly so, as the arms  $G$  of the spindle, to insure an equal movement of the detent-arm  $e^1$  with that of the spindle-carrying arms. The detent  $e$  is a spring-plate, having its acting end in the form of a segment,  $e^2$ , of a circle, whose center is the axis of the detent-arm  $e^1$ ; and the stop projection  $M^2$  has a flat side, for action against the segment  $e^2$ , so that when the spindle and the arrester have descended a distance equal to that between the nose  $K$  and the beak-iron  $L$ , plus the projection of the screw after being entered and clinched, the stop projection  $M^2$  will at this moment pass the angle 2 of the segment-detent  $e$ , and there-

by allow the arrester to be free to descend with the spindle, as stated, as shown in Fig. 6. After this full movement, the spindle is brought up by the cam  $H$ , and the arrester  $M$  is caused to rise and bring up the clamp, and to resume its fixed position, by an adjustable weighted arm,  $f$ , Figs. 1 and 6, secured to the rock-shaft  $M^1$ , and extends backward, to constantly exert its force to bring up the arrester, which thereby carries the escapement projection  $M^2$  past the angle 2 of the detent  $e$ , which, being a spring-plate, yields for that purpose, and allows the projection  $M^2$  to again rest against the segment  $e^2$  and hold the arrester in its fixed position. The arrester follows the clamp-slide up and down, the action of the escapement projection causing a hesitation in the downward movement of the arrester at the proper point to relieve the clamp.

In Fig. 6 the parts occupy the position just at the moment before the escapement takes place at the point 2, while the dotted line 3 shows the position of the detent  $e$  while holding the arrester  $M$ , to act upon and release the clamping device; and the dotted line 4 indicates the point to which the detent is carried after the escapement and while the screwing-spindle is making its full descent, and, for determining the accuracy of the required adjustment of these parts, the stop  $M^2$  and the connecting-rod  $N$  are made adjustable. The detent-arm  $e^1$  has a movement due to that of the tilting frame  $B$ , and also a movement due to the action of the arm  $N'$  upon the rock-shaft  $G^1$ , the result of which is that, in proportion as the nose  $K$  approaches the beak-iron  $L$ , governed always by the thickness of the material, the spring-detent will approach the point at which the escapement must take place. Consequently, if the material be thin, the points of escapement will have been more nearly reached, or closer together, than when a greater thickness of material is under operation. For example, if the nose approaches the beak-iron an eighth of an inch, then the spring detent-arm  $e^1$  will be in that position that an eighth of an inch movement will bring the detent at the point of escapement. In this movement the arm  $N'$ , and spindle also, descends the same distance, and the spring-detent  $e$  will be at the point 2, to allow the projection  $M^2$  to pass it and free the arrester  $M$ , to be depressed out of the way.

By these means the arrester forms the gage that regulates the length of the screws for the different and varying thicknesses of the work, such as the shank of the shoes, which requires a shorter screw than the sole, and also for different thicknesses of soles. It is by the joint action of the lever  $E$  in the pivoted frame  $B$ , to clamp the wire at a point with reference to the movement of said frame, and the arrester  $M$ , having a fixed position with reference to the fixed frame, the beak-iron, and the nose, that any variation in the distance between the nose  $K$  and the beak-iron  $L$  will produce the same variation in the distance between the ar-

rester and the forked lever, and determine the length of the screw.

By adjusting the height of the beak-iron with respect to the nose, the screws may be screwed partially through the material and not clinched, and their full length always obtained, besides the surplus ends left in the cavity *g* of the nose. The nose *K* is brought into position over and near the material upon the beak-iron *L* by a treadle, *O*, pivoted at the base of the frame, and acting through a rod, *O*<sup>1</sup>, to depress the front end of the pivot-frame which carries said nose. This action of the treadle *O* at the same time shifts the driving-belt from a loose pulley, *h*, to a fixed pulley, *h'*, upon the power driving-shaft *I*<sup>3</sup>, and thereby revolves the spindle and puts in motion the operating mechanism in the pivoted frame, the band-shifter *i* being pivoted upon the fixed frame and connected to the treadle-rod *O*<sup>1</sup> by a rod, *O*<sup>2</sup>, provided with a spring, *O*<sup>3</sup>, which constantly tends to depress the rear end of the treadle through an arm, *O*<sup>4</sup>. A belt, *P*, from the pulley *P'* on the driving-shaft *I*<sup>3</sup>, gives motion to a shaft, *Q*, a pinion, *R*, on which meshes with the cog-wheel *H'* of the cam-shaft, and thus automatically operates the several parts. Immediately upon the starting of the machine, a cam, *S*, on the cam-shaft *F*, acts upon the front end of the sliding frame *T*, mounted upon a pivoted arm, *T'*, and which frame carries a rod, *U*, connecting with a cam or bell-crank lever, *V*, pivoted at *V*<sup>2</sup>, which acts upon a cam or head-piece, *O*<sup>5</sup>, on the upper end of the connecting-rod *O*<sup>1</sup>, a bearing-roller, *V*<sup>1</sup>, Fig. 2, being placed between the lever *V* and the head *O*<sup>5</sup>, to relieve the friction and effect a uniform motion of the lever. This backward movement of the frame *T* vibrates the bell-crank lever *V*, to which the rod *U* is connected; and as the end of the lever *V* rests upon the upper end of the treadle-rod *O*<sup>1</sup>, and as the latter is held up by the foot against a stop, *j*, Fig. 1; which limits the ascent of the treadle-rod *O*<sup>1</sup>, and the point to which the nose *K* can be brought down by the foot, it follows that the rearward movement of the frame *T* must, by the action of the lever *V*, raise the rear end of the tilting frame *B*, and thereby bring the nose *K* down firmly upon the material, any variation in the thickness of which will be compensated for by the yielding of the connecting-rod *U*, which has a spring attachment with the reciprocating frame *T* for that purpose, as shown in Fig. 2. The tilting frame *B* is constantly pulled down at its rear end by a spring, *W*, attached to the fixed frame, and the reciprocating frame *T* is constantly pulled forward against its operating-cam *S* by a spring, *X*, attached to the pivoted frame, as shown in Fig. 1. The screw-chaser *J* is made adjustable, and is arranged on the upper side of the nose, which has a vertical opening through it for the passage of the wire in contact with the screw-chaser. The cutter *Y*, for cutting off the screw, is arranged in the under side of the nose in a slide, *Z*, which moves in a groove in

the nose-piece, and by which the cutter is connected to a lever, *k*, pivoted in the tilting frame, and operated by a cam, *l*, Fig. 7, Sheet 4. The stem *Y'* of the cutter has a screw-thread, and is screwed into a nut, *m*, Figs. 8 and 9, fixed in the slide *Z*, whereby the cutter may be adjusted and removed and replaced when necessary. The chaser *J* and the cutter *Y* are both held within their respective grooves in the nose by removable plates *n* and *n'* for access to these parts. These plates *n n'* are secured to the nose by screw-bolts *o* fitting into notches in the edges of the plates and nose, and clamped by screw-nuts *o'*, so that, slackening off the nuts, the bolts and plates can be easily removed when anything is required to be done to either of the cutters, and the several parts replaced, as shown in Figs. 8 and 9. The beak-iron *L* is arranged so that its acting point *L*<sup>1</sup> will be directly below the nose *K*. It is pivoted at its lower end so as to be turned back upon a horizontal arm, *L*<sup>2</sup>, fixed upon a vertical stem, *L*<sup>3</sup>, mounted in guide-bearings *l l* in the fixed frame, and upon which stem *L*<sup>3</sup> the beak-iron and its arm *L*<sup>2</sup> is free to be swung round horizontally as the work progresses. The beak-iron *L* has a branch arm, *l*<sup>2</sup>, by which it is supported, and is adjusted by a screw, *l*<sup>3</sup>, in the arm *L*<sup>2</sup>, in which adjustment the horn turns upon its pivot *l*<sup>4</sup>, so as to raise and lower the acting point *L*<sup>1</sup> with respect to the nose. This pivoted horn is for use in screwing on the soles, and, being of metal, clinches the inner end of the screw when the latter strikes it as it is screwed home, as described in the patent referred to. The horn is turned back out of the way upon its pivot *l*<sup>4</sup> when the sole-work is finished, and the heel portion of the soles are supported for operation by a post, *p*, which fits loosely within a deep socket in the vertical stem *L*<sup>3</sup>, and which is elevated and held within said socket at the proper height by a pin, *p*<sup>1</sup>, passing through the stem at *p*<sup>2</sup> beneath the socket-post; or any suitable device may be used for this purpose when the post is substituted for the horn. The stem *L*<sup>3</sup> is adjustable by a screw, *L*<sup>4</sup>, and lock-nuts at its lower end, for effecting the proper adjustment of the horn or post with respect to the nose.

A feed arrangement for boots and shoes consists of a roughened roller, *q*, supported upon a spring-arm, *q*<sup>1</sup>, from the fixed frame just beneath the nose, so that the edge of this roller will press upon and by its intermittent motion feed the work along, while it also serves as a gage to determine the distance of the screws from the edge of the sole. This is done by the operator pressing the sole against the roller, and the latter is operated by a ratchet, *q*<sup>2</sup>, and a pawl, *q*<sup>3</sup>, and the latter is operated to produce this feed by the back stroke of an arm, *k'*, Figs. 2 and 7, of the same lever, *k*, which operates the cutter-slide *Z*, so that the feed of the work shall take place just after the entered screw has been severed, and the nose is raised. The lever *k* is kept in po-

sition for the action of the cam *l* by a spring, in any suitable way, which constantly draws the lever forward and the knife back.

When the work upon the soles from shank to shank is finished, the machine is stopped by removing the operator's foot from the treadle *O*, which instantly shifts the driving-band by the shifter *i* from the fixed to the loose pulley. The momentum of the shaft *I*<sup>3</sup> and its pulleys tends to continue the motion of the working parts a little; and to avoid this I employ a brake, *r*, pivoted at *s* to the tilting frame in a position to bear upon the pulley *I*<sup>2</sup>, and to stop the machine, as shown in Fig. 2. The brake is adjustable by a screw, *t*, passing through a branch arm, *u*, and its capacity to stop the machine is derived from the movement of the frame *B*, which, upon the full descent of the rear end of the frame *B*, brings the brake *r* down upon the pulley *I*<sup>2</sup>, and instantly stops it. The depression of the nose *K* by the foot to the limit of the treadle-stop *j* instantly raises the brake and releases the driving-pulley *I*<sup>2</sup>, and in this way the tilting movement of the spindle-carrying frame is utilized to put on and take off the brake. The movement of the pivoted frame must have a certain exactness with the action of the escapement devices, and for obtaining such exact adjustment the rod *N*, which connects the two things, is provided with a proper screw-connection, as shown in Fig. 6. The screw is cut with a divided or notched end to clinch it when entered against the horn.

In operating the machine, the treadle *O* brings the nose *K* down near the sole, but not upon it, the stop *j* preventing contact, and this movement simultaneously shifts the band from the loose to the fixed pulley *h'*, and the screwing-spindle *C* and cam-shaft *F* are set revolving by the bands *I*<sup>1</sup> and *P*, Fig. 2. The cam *S*, acting upon cam *V* of the reciprocating frame *T*, lifts the rear end of the frame *T*, and depresses its front end hard upon the sole, in which position it is held by the concentric portion of the cam *S*, while the spindle is carried down by the cam *H*, through the connecting-arms *G* *G*<sup>2</sup>, and with it the clamp *D*, to clamp the wire, which is forced into the opening *z* in the nose, and has the screw-thread cut. The spindle, continuing its descent and revolving, screws the screw into and through the material and against the horn. At this point the clamp *D* has pressed against the arrester *M* sufficiently to release the jaws *d*, unclamp the wire, and set the arrester free by the spring-detent *e* passing the stop projection *M*<sup>2</sup>, which, in the meantime, was operated by its arms *e*<sup>1</sup> *N* *N'* connecting with the spindle-driving rock-shaft *G*. The arrester descends clear of the clamp *D*, and the spindle continues the remainder of its stroke idly, the lost motion being required for the greatest possible length of screws. At this point the cam *S* has passed its concentric surface and allows the rear end of the tilting frame *B* to drop, and thereby raise the nose from the sole. The cutter is

now driven forward by the cam *l* and lever *k*; and cuts off the entered screw. The back stroke of the lever *k* acts, through the ratchet *q*<sup>2</sup> and pawl *q*<sup>3</sup>, to operate the feed-wheel *g* and move the sole to receive the succeeding screw. Both sides of the shoe are screwed from shank to shank, the beak-iron being swung round to turn the toe. The machine is stopped by removing the foot from the treadle and bringing the brake *r* into action. In working upon the heel portion of the sole the beak-iron is turned back, as shown in dotted lines in Fig. 1, and the stem-post *p* raised and supported in its socket at the proper height, and the heels are now secured in the same way as the soles, the heels being the heel portion of the soles, and not the high heels, and the curved end of the beak-iron is not so well adapted for work on the heels as the vertical stem.

Having described my invention, I claim—

1. In a machine for screwing the uppers on the soles and heels of boots and shoes, the clamp *D*, having a rising-and-falling movement upon the screwing spindle, in combination with the spindle *C*, having an axial and revolving motion, essentially as described, and for the purpose stated.

2. The combination of the sliding clamp-head *D* with the clamping-jaws *b* *b*, the toggle-pins *e* *e*, and the screwing-spindle, operating substantially as described.

3. The combination of the clamping device *D* for the wire with the lever device *E*, or its equivalent, for operating the clamping device, essentially as described.

4. The combination of the clamping device *D* for the wire and its operating-lever device *E* with an arresting device, *M*, for releasing the wire from the clamp, essentially as described.

5. The arresting device *M* for flexing the clamp-pins *e*, in combination with a holding and tripping or escapement device, *e* *M*<sup>2</sup>, for holding the arrester and allowing it to drop out of the way, essentially as described.

6. The arrester *M*, lever *E*, clamp *D*, and nose *K*, arranged in relation to each other as described, and to the beak-iron *L*, to operate substantially as and for the purpose described.

7. The spring escapement-detent *e* and the stop *M*<sup>2</sup>, arranged upon the fixed frame, in combination with the screwing-spindle *C* and the operating-cam *H*, arranged upon the pivoted frame *B*, connected as described, and for joint operation, to release the arrester *M* at the moment the wire is unclamped, to determine the length of the screw, essentially as described.

8. The arrester *M*, in combination with the escapement devices and the weighted arm *f*, for bringing up the arrester and locking it with the escapement-detent simultaneously with the ascent of the spindle, for the purpose and essentially as described.

9. The combination of the adjustable connecting-rod *N* with the cam *H* and the escape-

ment-detent device  $e M^2$ , as described, and for the purpose set forth.

10. The screwing-spindle C, its clamping device D, and the lever E, which operates it, the arrester M and its escapement devices  $e M^2$ , the pressing-nose K, and the cut-off for the screw, all carried by and arranged upon the pivoted frame B, and having their several and distinct movements produced from the cam-shaft F automatically, and in their respective successive relations to each other, essentially as described.

11. The combination of the reciprocating frame T with the oscillating pivoted frame B and the treadle O, to effect the automatic pressing and holding action of the nose K upon the stock, essentially as described.

12. The adjustable stop  $j$ , in combination with the treadle-rod  $O^1$  and treadle O, for regulating and limiting the descent of the nose K and shifting the driving-band at the same time, for operation as described.

13. The cutter Y for severing the screw, having a screw-stem,  $Y'$ , and nut  $m$ , for adjustment, as described.

14. The removable plates  $n n'$  of the nose K, arranged and secured as described, and for the purpose stated.

15. The lever  $k k'$ , in combination with the

cam-shaft F, the cut-off Y, and the shoe-feeding device, the parts being arranged to operate as described.

16. The combination of the spindle C for rotating the wire with the lever G, connected with an escapement-detent, substantially as described, the wire-clamping device D, and a screw-cutter, Y, whereby the screw-thread is cut upon the wire without a screw-spindle.

17. The beak-iron L, pivoted as described, in combination with the foot-adjusting screw  $\beta$ , as and for the purpose described.

18. The socketed stem  $L^3$  of the beak-iron, in combination with the extensible post  $p$ , essentially as described, and for the purpose stated.

19. The combination of the socketed extension-post  $p$  with the removable supporting-pin  $p^1$ , as described.

20. The brake  $r$ , in combination with, and arranged to be operated by, the oscillating frame B, in the manner and for the purpose described.

In testimony whereof I have hereunto set my hand this 23d day of August, A. D. 1873.

CHARLES TYSON.

Witnesses:

A. E. H. JOHNSON,

J. W. HAMILTON JOHNSON.