(Model.)

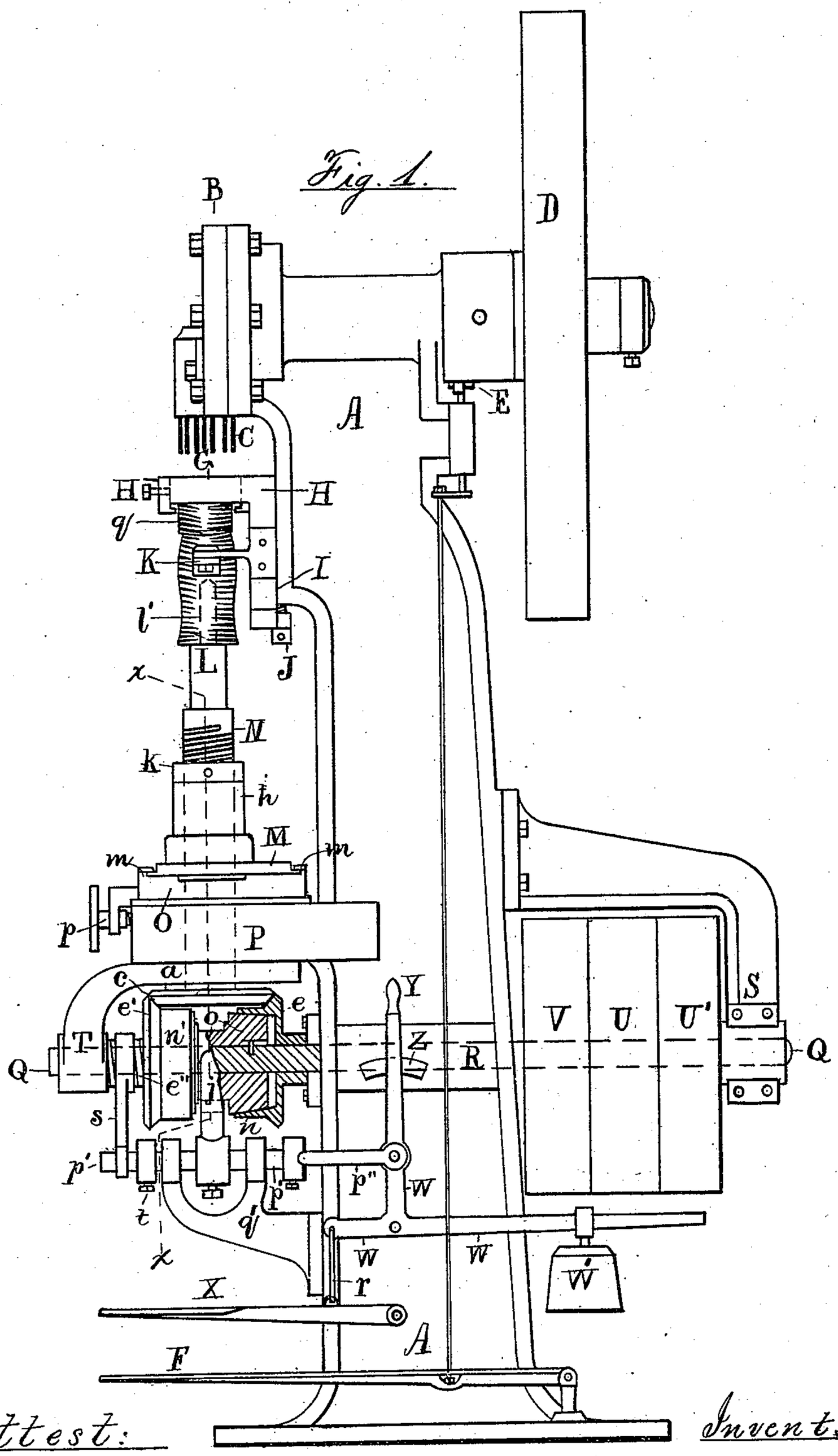
3 Sheets—Sheet 1.

D. WHITLOCK.

HEELING MACHINE.

No. 287,489. Patented Oct. 30, 1883.

Fig. 1.



Attest:

H. Thiberath

Danie. W. Hall

Inventor.

D. Whitlock, per

Thos. S. Crane, Atty.

(Model.)

3 Sheets—Sheet 2

D. WHITLOCK.

HEELING MACHINE.

No. 287,489. Patented Oct. 30, 1883.

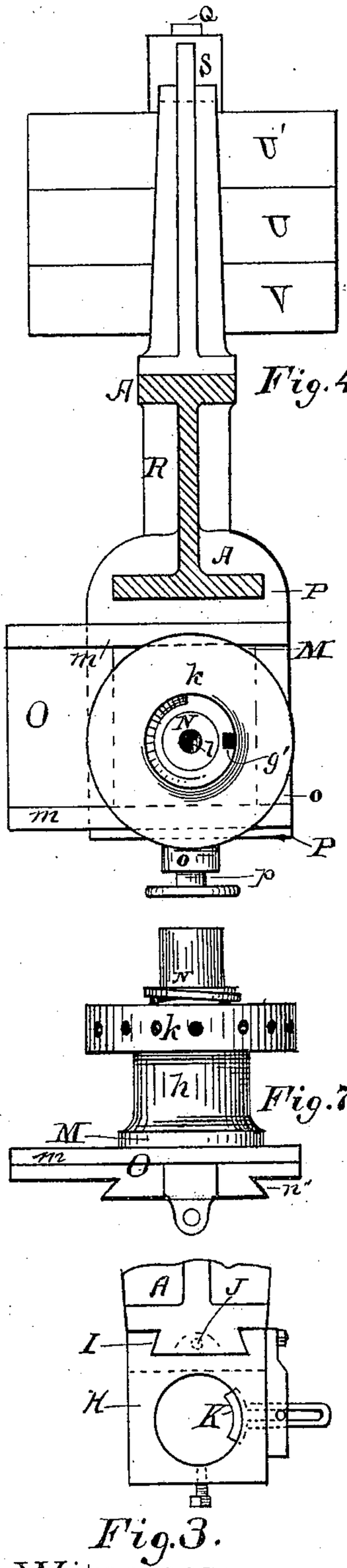


Fig. 4.

Fig. 7.

Fig. 3.

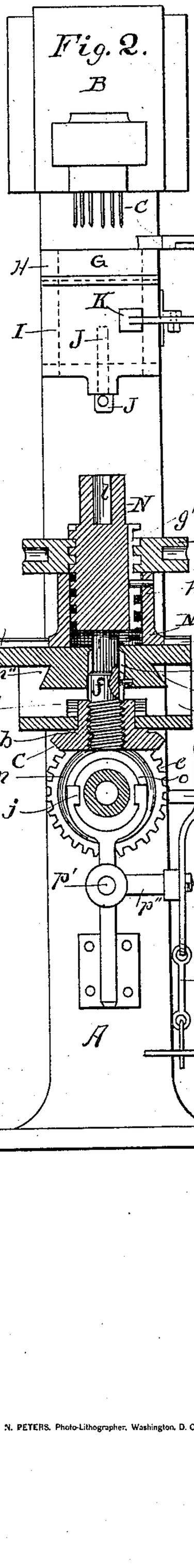


Fig. 2.

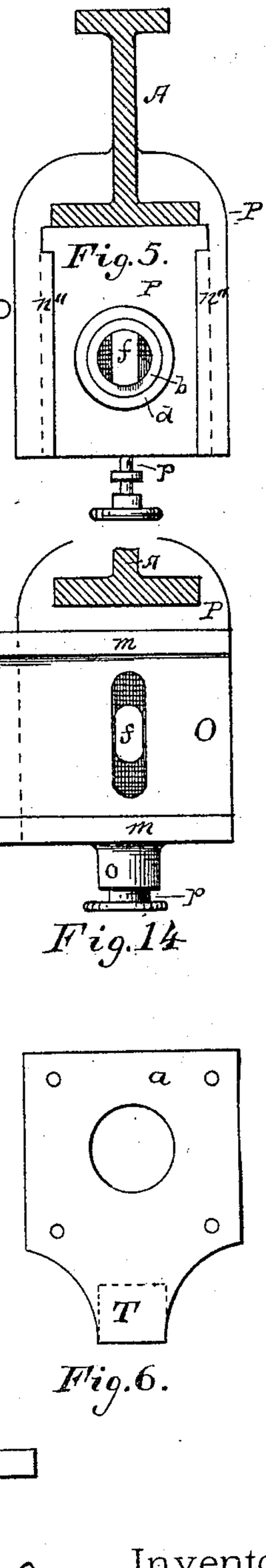


Fig. 5.

Fig. 14

Fig. 6.

Witnesses:

J. Curtis Turner

W. E. Shaffer

Inventor:

D. Whitlock

By his atto

R. D. Smith

(Model.)

3 Sheets—Sheet 3.

D. WHITLOCK.

HEELING MACHINE.

No. 287,489. Patented Oct. 30, 1883.

Fig. 9.

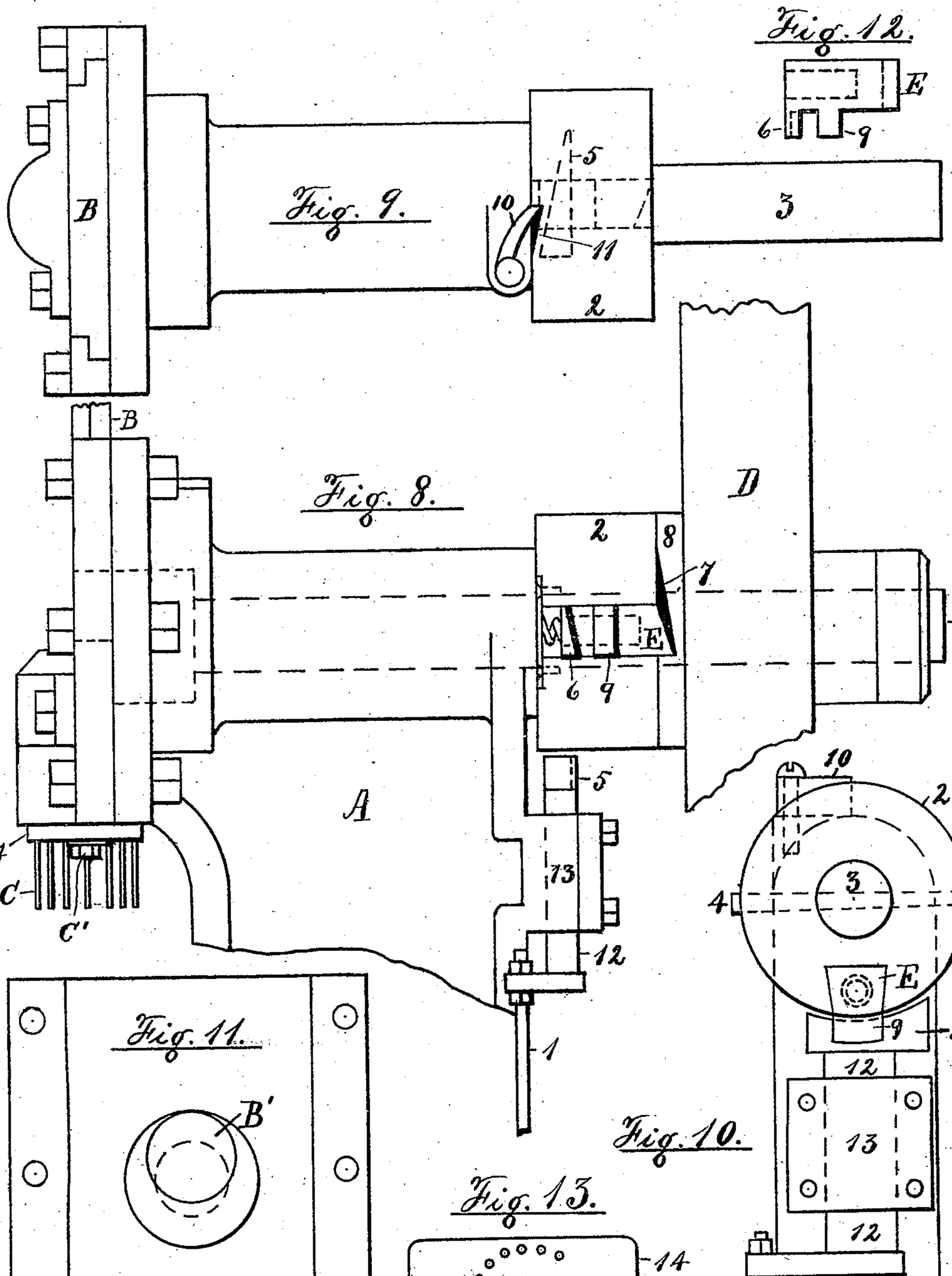


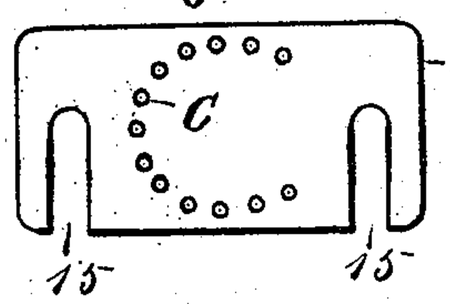
Fig. 12.

Fig. 8.

Fig. 10.

Fig. 11.

Fig. 13.



Attest:

Walter M. Cowgill Jr.

W. F. D. Crane.

Inventor

D. Whitlock, per

Thos. S. Crane, Atty.

UNITED STATES PATENT OFFICE.

DANIEL WHITLOCK, OF NEWARK, NEW JERSEY.

HEELING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 287,489, dated October 30, 1883.

Application filed August 19, 1881. (Model.)

To all whom it may concern:

Be it known that I, DANIEL WHITLOCK, a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Boot and Shoe Heeling Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

My invention relates to certain improvements upon a boot and shoe heeling machine patented to me July 23, 1881, as No. 206,237; and it consists in the improved means herein described for adjusting the last-standard, nail-die, and other parts, and for applying the required pressure to the heel by automatic mechanism.

In the machine patented as above the last-standard had no means of transverse adjustment, the nail-die had no means of vertical adjustment, and the required pressure upon the heel was effected by the operation of a hand-lever upon a screw and nut applied to the sliding bed.

It is the object of the present invention to provide suitable means for the correction of each of these defects.

In the drawings annexed, Figure 1 is a side elevation of a machine constructed with my improvements, one of the driving-gears and part of the friction-clutch cone being shown in section; and Fig. 2 is a front elevation of the same, a section being taken through certain parts on line *x x* in Fig. 1. Fig. 3 is a plan of the holder H, showing its slide I, with the frame A in section; Fig. 4, a plan, partly in section, of sliding bed M and its transverse bed and supports, with the frame A cut off by a horizontal plane just above the bed M. Fig. 5 is a plan of the bracket P, with the transverse bed O removed, the frame A being shown in section. Fig. 6 is a top view of the plate *a* detached from the lower side of bracket P. Fig. 7 is a front view of the transverse bed O, with the sliding bed M in position thereon. Fig. 8 is an enlarged side view of that part of the frame carrying the clutch mechanism, and the shaft of wheel D, the fly-wheel being partly shown. Fig. 9 is a plan of the parts shown in Fig. 8, the fly-wheel being removed. Fig. 10 is a rear elevation of the same with the fly-wheel removed. Fig. 11 is a front elevation of the same with the ram removed, and Fig. 12 is a detached view of the clutch-key to show the projection of the lugs 6 and 9. The key is shown in Figs. 8 and 10 as provided with a spring of the usual construction for throwing it automatically into the notch in the fly-wheel. Fig. 13 is an inverted plan of the adjustable bolster for holding the nail-punches C, an end view of the same being shown upon ram B. Fig. 14 is a plan of the plate O, showing the elongated orifice through which the screw-shaft *f* passes.

A is the frame of the mahcine, shown as an upright flat ribbed column, to the upper part of which is attached the usual nailing mechanism consisting of a sliding ram, B, carrying the nail-punches C, and operated by a fly-wheel, D, controlled by a clutch, E, and treadle F. Beneath the nail-punches is a nail-die, G, carried in a vertically-adjustable holder, H, fitted to a slide, I, upon the front of column A, and moved at pleasure by an adjusting-screw, J. A stop, K, is secured to the holder H, for setting the last and shoe exactly under the die G.

The last-standard L is mounted upon a sliding bed, M, as before, but in my present invention is fitted to a socket, *l*, formed in the upper end of a spindle, N, inserted vertically in the sliding bed, in the place of the clamping screw-shaft described in my former patent. The sliding bed M is also mounted upon the frame A in an improved manner, being fitted to the ways *m* upon a transverse bed, O, which is fitted in turn to guides *n''* upon a bracket, P, which is attached to the front of the frame A in a suitable position. The transverse bed is provided with an adjusting-screw, *p*, by means of which the last can be moved to or from the column for centering the heel perfectly under the die G.

To raise and lower the spindle N as required for clamping the heel-sections to the shoe beneath the die, a screw-shaft is provided in the center of the bracket P, and its nut is operated by frictional gearing in such a manner as to produce a regulated pressure upon the spindle and the heel *q*, as shown in Fig. 1. The gearing, as well as the nailing mechanism,

is shown in Fig. 1 as driven by a main shaft, Q, supported in a bearing, R, in the column A, and in yoke-bearings S and T, extending, respectively, from the rear of the column and the under side of the bracket P. Ordinary fast and loose pulleys, U U′, are provided, to stop and start the shaft Q when supplied with a driving-belt, as usual, and a pulley, V, conveys the movement to fly-wheel D when belted in a similar manner.

The fly-wheel is intended to revolve all the time that the machine is operated, and is clutched to its shaft by a device especially constructed for checking its rotation automatically when the punches C are withdrawn from the nail-die G. In Figs. 8, 9, 10, and 11 are shown the means employed, the same consisting, partly, of a key or dog, E, inserted in the clutch-hub 2, which is rigidly secured to the shaft 3 by a pin, 4. Fig. 11 shows the eccentric B′, employed to operate the slide B, and Fig. 10 shows the position of the key 1 when the slide is at the top of its stroke, as in Fig. 1.

At 5 in Figs. 8, 9, and 10 is seen the wedge operating in conjunction with a lug, 6, upon the rear end of the key, to withdraw the key from a driving-notch, 7, formed in the hub 8 of the fly-wheel D. The construction and operation of these elements are well known, and they are often used to check the upward movement of a ram like B when the weight or friction of the same suffices to prevent any voluntary movement of the same.

My invention consists in combining a positive lock with such elements by the addition of another lug, 9, to the key, to prevent the former lug, 6, from slipping past the wedge when withdrawn by the inclined surface of the latter; and in providing a spring-pawl upon the frame, near the hub 2, to fit a notch, 11, in the latter, and prevent any rebound of the hub or shaft when checked.

The relation of the pawl to the wedge 5 is shown in Fig. 10, where the pawl is shown dotted behind the hub, and pointing in the same direction as the arrow 16, indicating the motion of the hub, thus preventing any retrograde movement of the latter when stopped by the wedge. Such stoppage is effected by the relation of the lugs 6 and 9, which form a wedge-shaped gap, into which the wedge 5 enters until it jams, and thus prevents the further rotation of the hub. The wedge is mounted upon a strong vertical bar, 12, fitted in a guide, 13, at the rear of frame A, and is operated by a connecting-rod to the treadle in the usual manner.

In practice the connecting-rod and wedge 5 are pressed upward by a spring, (not shown in the drawings,) so as to engage the key automatically whenever the foot of the operator is removed from the treadle F after nailing a heel. The pressure required to clamp the heel-sections beneath the die is obviously required only when the sliding bed and last-standard are located centrally beneath the die H in position for the nailing operation. The last-holder is not, therefore, joined in any way to the screw-shaft employed to elevate it at the required time, but simply extends to the bottom surface of the sliding carriage when in its lowest position. The screw-shaft extends from beneath upward to the surface of the bed O, upon which the sliding carriage rests, and the shaft and last-standard thus come in contact with one another when superimposed. Any upward movement of the screw-shaft at such time, therefore, elevates the standard and presses the last and shoe firmly against the lower side of the die-holder H. When the screw-shaft is subsequently lowered, the contact between the two descending pieces is broken whenever the movement of the standard is arrested, and the carriage is then again free to be moved in its ways *m* from under the die, and another one substituted for the one upon the last.

Beneath the bracket P is secured a plate, *a*, which is formed with a hole to receive a rotating nut, *b*, the latter having a cog-wheel with beveled teeth attached to it at *c*, and the nut projecting upward into a hole, *d*, formed in the bracket, through which hole the screw-shaft *f* extends toward the spindle N. The sliding bed M is formed with a vertical socket, *h*, to receive the spindle, and a groove, *g*, in the side of the socket is fitted to a feather in the spindle, to keep the same from turning and displacing the last, the standard being secured in the hole *l* by a screw, or by making both hole and spindle square. The screw-shaft *f* being incapable of lateral movement, while the bed O has a longitudinal movement and the plate M has a transverse movement, it is necessary that the orifices in said bed and plate shall be larger than the shaft *f* by as much as their range of movement requires, so that to whatever position—lateral, longitudinal, or both—said spindle N may be moved in its various horizontal adjustments, the screw-shaft *f* will be in position to engage with said spindle. The standard N is provided with an external screw-thread, and a nut, *k*, is fitted thereon and rested on the top of the socket *h*, whereby said standard may be properly adjusted to suit the height of the last and jack, and sustained independent of the lifting screw-shaft *f*. When slid back beneath the die again, the standard and spindle N are vertically over the screw-shaft, and affected by its upward movement, as before.

In practice the nut for moving the screw-shaft is formed by cutting a screw-thread in the hub of the gear *c*, and the gear is retained in the hole in which it revolves in plate *a* by inserting the hub in the hole from the lower side of the plate and securing a collar upon the upper end of the hub, where it projects above the plate into hole *d*. As the nut is turned by the rotations of the gear-wheel, the screw-shaft is necessarily moved endwise, the nut being restrained from end motion by such collar, and the screw being kept from rotation

by a feather sunk in its surface and fitted to a groove, *g*, formed in the side of the hole through which the shaft penetrates the bed P.

Two bevel-gears, *e e'*, are fitted to the shaft Q, and arranged to turn loosely thereon, in gear with the cog-wheel *c*, each of the gears *e e'* being formed with a clutch-ring, *n n'*, between which a double cone, *o*, is fitted to a feather upon the shaft and operated by a shipper-fork, *j*, so as to engage either of the rings *n n'* at pleasure. The fork *j* is moved, as desired, by a shipper-bar, *p'*, the latter being mounted in a guide, *q'*, and connected by a link, *p''*, to one arm of a double bell-crank, W. The rear arm of the bell-crank is extended to form a support for an adjustable weight, W', the pressure and adjustment of which determine the force transmitted from the friction-cone *o* to the clutch-ring *n* and screw-shaft *f*. The front arm of the bell-crank is connected by a link, *r*, to a treadle, X, by which the weight can be lifted at pleasure, and the cone forced into the ring *n'*, to lower the screw-shaft and unclamp the heel when desired.

That the screw-shaft may be lowered only the amount needed to remove the heel from beneath the die when the sliding bed is moved sidewise after the nailing of the heel, the hub of the gear *e'* is formed with a coarse screw-thread, *e''*, upon its exterior, to which is fitted a shipper, *s*. A collar, *t*, is adjustably secured to the shipper-bar *p'*, and the shipper *s* is arranged to press upon the collar and disengage the cone *o* from the lowering-gear *e'* when the screw-shaft has been sufficiently moved.

The transverse bed O is constructed with an extension at one side, to support the bed M when thus moved from under the die, and when in that position the boot or shoe is readily removed from the last and another replaced thereon to be heeled.

The method of operating my invention with a nail-die and loading device having been described in the previous patent referred to above, I will merely describe the operation of the new devices shown in connection therewith in the drawings annexed.

The adjustable die-holder H may be arranged by turning the screw J so that the nail-punches C will drive the nails entirely into the heel, or leave them standing above the surface for attaching the last heel-section by blind nailing. This construction of the die-holder, therefore, obviates the necessity of making two sets of holes in the die and one set of punches shorter than another, as described in my former patent.

The punches C are shown in Figs. 8 and 13 attached to the ram B by an adjustable bolster, 14, in which the punches are fastened in the usual manner.

The bolster is formed with slots 15, and is secured to the ram by bolts C', fitted loosely to the slots, so as to permit the adjustment of the bolster upon the lower end of the ram, with the punches accurately fitted in the holes in the die G. This construction insures a rapid and easy adjustment of the different sizes of dies and punches to one another.

The transversely-adjustable bed O affords an improved means of setting the heel centrally under the die.

The friction driving apparatus secures a uniform pressure of any desired degree upon the heel when clamped beneath the die G, and is operated in the following manner: The last carrying the boot or shoe is set by the use of the stop K and screw *p* in the proper position under the die G, the holder H being adjusted vertically to regulate the desired penetration of the nails. The nails are then placed in the die, and the friction-driver is operated to elevate the screw-shaft and spindle to clamp the heel, which is held in proper position beneath the die by any suitable means. To keep the cone *o* from contact with either of the clutch-rings while the operator applies or adjusts the boot upon the last, a handle, Y, is attached to one arm of the lever W, and a segment, Z, is formed upon the frame behind the handle, and provided with a notch to fit the latter when in a central position. When the shoe is ready for clamping, the handle is pulled from the notch, and the weight W' allowed to press the cone with the desired force into the clutch-ring *n* upon the gear *e*. This turns the nut so as to elevate the screw-shaft and spindle N until the resistance causes the friction-cone to slip. The foot is then applied to the treadle F, which acts upon the driving-clutch E, and the nail-driver operated to force the punches C into the nail-die. The nails being driven, the foot is applied to the treadle X and the cone *o* withdrawn from the clutch-ring *n* and forced into the outer clutch-ring, *n'*. The motion of the gear *e'* is thus reversed and the screw-shaft and last-standard lowered, the thread of the gear *e'* operating meanwhile to press the shipper *s* against the collar *t* until the cone is thereby withdrawn from the ring *n'* and the descent of the last-standard automatically checked at the proper time. The handle Y is then placed by the operator in the notch in the middle of the segment Z, and the machine is in a condition to repeat the series of movements at pleasure for securing a heel upon another shoe when ready.

In Fig. 1 is shown in dotted lines, at the upper end of the last-standard L, a stud, *l'*, projecting into the last, which is represented as carrying a shoe under the nailing-die. I have devised this form of last-standard to carry the ordinary wooden lasts, which are all made with a hole adapted to fit such a stud, that custom shoes may be heeled upon my machine on their ordinary wooden lasts, as well as the factory shoes made on cast-iron lasts.

By this simple device numerous styles of shoes now made upon customers' or special lasts may be fitted into the machine with the same facility as with the set of lasts usually

made solid with their own standards, as N, and provided for carrying the regular sizes in the machine.

By the aid of the above-described mechanism the heeling operation can be performed with far more accuracy and uniformity than by the machine heretofore patented to me, the adjustment of the die-holder vertically and of the bed O transversely affording the former advantages, and the devices for driving the screw-shaft *f* by frictional gearing securing the latter.

It is obvious that other forms of frictional gearing may be employed to secure the result effected by my improvements, and I do not, therefore, limit myself to the precise construction described for the friction-cone *o* or wheels *e e'* and rings *n n'*; but having been the first to apply a frictional driver to a boot and shoe heeling machine to produce a uniform and regulated pressure upon the heel-clamp, I claim the same when operated substantially as described. Even with the use of the same frictional gears I have shown herein, other means may be employed to produce and regulate the force transmitted, as by replacing the weight W' by a spring and altering the tension of the latter as desired; and other stop-motions may also be employed than that shown in the form of an automatic shipper, as *s*.

From the above description it will be seen how my present invention effects the various changes first mentioned above in my previously-patented machine, and secures the desired improvements in operating the same; and

I therefore claim my invention in the following manner:

1. In combination with the nail-driving mechanism and the removable last and jack L, the last-standard capable of being raised and lowered in a vertical line, means, substantially as described, for so raising and lowering it, and means, substantially as herein shown and described, for the horizontal adjustment of said last-standard longitudinally and transversely, whereby the last may with facility be placed under the center of the nail-die.

2. The combination, with a sliding carriage mounted upon a supporting-bed and carrying a movable spindle and last-standard, substantially as and for the purpose described, of a screw shaft and nut, and mechanism adapted to operate upon said shaft and nut automatically to raise and lower the last-standard, and to thereby clamp the heel-sections upon the sole, substantially as and for the purpose set forth.

3. The combination, with a sliding carriage mounted upon a supporting-bed and carrying a movable spindle and last-standard, substantially as and for the purpose described, of a screw shaft and nut automatically operating said spindle, a driving mechanism, substantially as described, and a device—as a weight or spring—for varying the force transmitted by such driver, and thereby limiting the pressure operating to clamp the heel, substantially as herein set forth.

4. The combination, with the nut and gear operating the screw-shaft *f*, of the driving-shaft Q, gears *e e'*, provided with frictional rings *n n'*, and cone *o*, driven by shaft Q in the manner described, and adapted to be operated by shifter *j*, to raise and lower the screw-shaft as desired.

5. In a heeling-machine, the combination, with the shipper *j*, arranged to operate the double cone *o*, as and for the purpose set forth, of the lever W, handle Y, fitted to a segment, Z, the weight W', and treadle X, suitably connected to the lever W, and operated in the manner herein set forth.

6. The means for regulating the rotations of the screw-nut *b*, driven by the double cone *o*, and frictional rings *n n'*, consisting of the shipper *j*, the shipper *s*, operated by screw-thread upon the hub of the gear *e'*, and the adjustable weight W', suitably connected to the shipper *j*, and operated substantially as and for the purpose set forth.

7. The spindle N, provided with a socket, *l*, and adapted to move up and down in a supporting-socket, *h*, provided with an external screw-thread and an adjusting-nut, *k*, combined with the supporting-plates M and O, capable of horizontal movement in longitudinal and transverse directions, respectively, whereby said spindle and the jack supported by it may be adjusted as to height and horizontal position, as set forth.

8. The spindle N, adapted to move up and down in a supporting-socket, *h*, and mounted on the plates M O, capable of horizontal movement in longitudinal and transverse directions, respectively, combined with a lifting screw-shaft, *f*, the upper end whereof is smaller than the bottom of said spindle N by as much as the range of the horizontal motion of said spindle, whereby said screw-shaft will always be in position to engage said spindle, to whatever point it may be adjusted.

9. The combination, with the nail-punch C, operated as described, of the die-holder H, constructed and arranged for adjustment to and from the punches to vary the penetration of the punches in the die, and the vertically-adjustable jack to force the heel up against the die-holder for blind-nailing heels, substantially in the manner shown and described.

10. The combination, with the sliding spindle N, arranged in the sliding carriage M, and adapted to be raised by the screw-shaft *f* in the manner set forth, of the nut *k*, for adjusting and limiting the descent of the spindle in the manner herein shown and described.

11. The combination, in a heeling-machine, with the nail-punches and their driving-shaft, 3, of the device for locking the clutch mechanism, consisting of the clutch-key provided

with the lugs 6 and 9, the wedge 5, arranged and operated to jam between the said lugs, the pawl 10, and the clutch-hub 2, provided with the notch 11, substantially as and for the purpose set forth.

12. The combination, with the nail-die G, of the punches C and bolster 14, provided with the slots 13, and adjustably secured to the ram B, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DANIEL WHITLOCK.

Witnesses:
H. THEBERATH,
T. S. CRANE.