

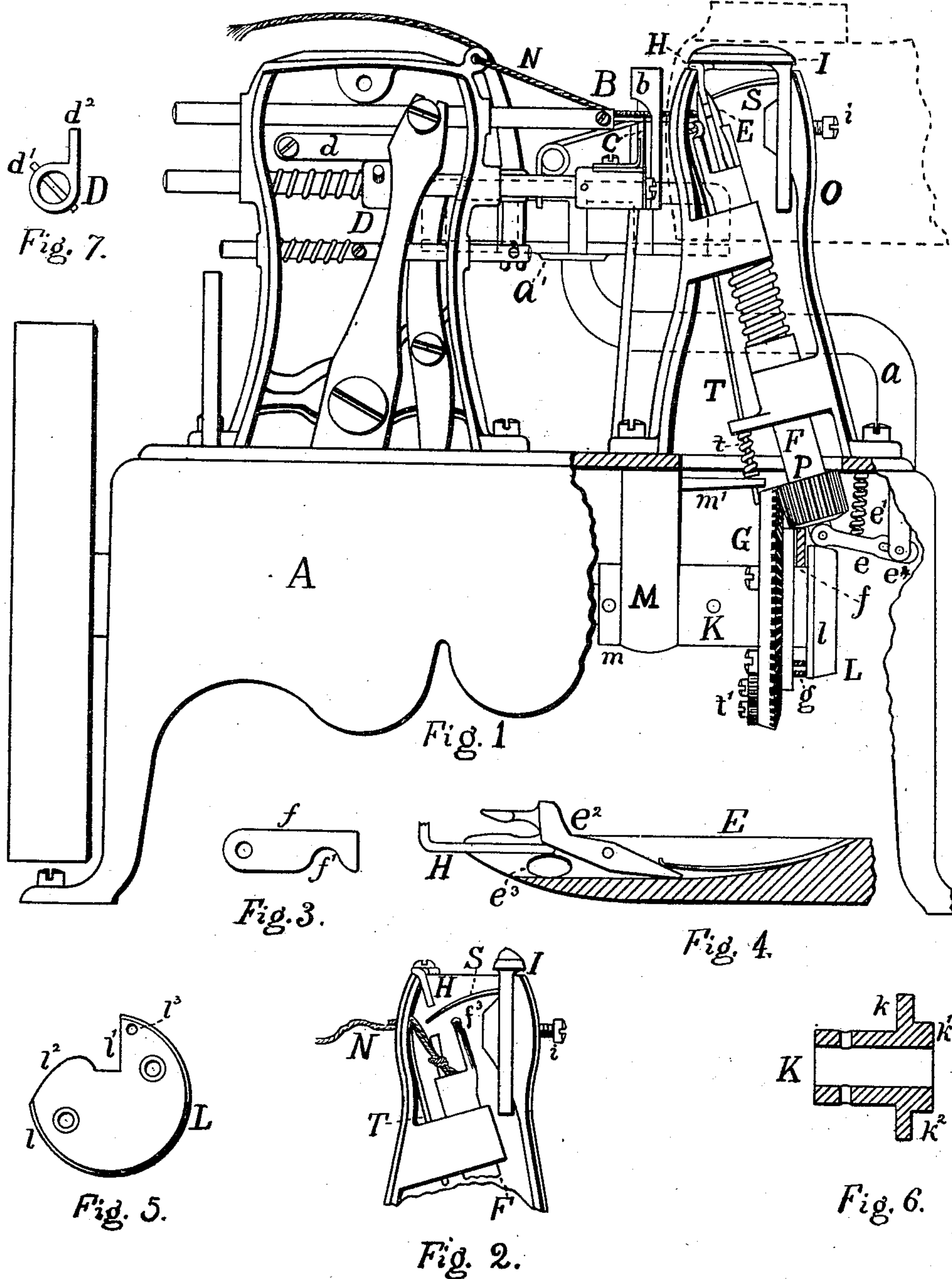
(No Model.)

A. W. WEEKS.

SHOE TYING AND KNOTTING MACHINE.

No. 329,521.

Patented Nov. 3, 1885.



Witnesses:
Albert Greene
A. E. Scoville.

Inventor:
Albert W. Weeks.

UNITED STATES PATENT OFFICE.

ALBERT W. WEEKS, OF LYNN, MASSACHUSETTS.

SHOE TYING AND KNOTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 329,521, dated November 3, 1885.

Application filed March 20, 1885. Serial No. 159,610. (No model.)

To all whom it may concern:

Be it known that I, ALBERT WALTER WEEKS, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented new and important Improvements in Shoe Tying and Knotting Machines, of which the following is a full and concise description.

My invention relates to improvements upon the shoe-tying machine for which United States patent was granted March 20, 1883, numbered 274,236.

The objects of my improvements are, first, by a longitudinal arrangement of the knotting device, to reduce the size of the shoe-receiving standard, and thus render its introduction into a shoe more easy; second, to dispense with a chain for operating the knoter-sleeve and provide therefor a more accurate and positive mechanism; third, to afford means for severing the tie-string close to the shoe. I attain these objects by the mechanism shown in the drawings forming a part of this application, in which—

Figure 1 is a longitudinal elevation of my improved machine, showing also the relation of my improvements to the old machine. Fig. 2 is a detailed front view of the knotting-standard, showing the new position of the knotting device, and also the position and office of the small rod used to assist in tightening the knot. Fig. 3 is a detailed elevation of the lever which raises the knotting-sleeve. Fig. 4 is a longitudinal sectional view of the modified plunger and hook. Fig. 5 is an end view of the plunger-lifting cam. Fig. 6 is a longitudinal sectional view of the hub which carries the large gear for operating the knoter. Fig. 7 is an end elevation of the spline-collar of the presser-foot bar.

Similar letters refer to similar parts throughout the several views.

The following is a more minute description of my improvements: To accomplish the purpose of reducing the size of the shoe-receiving standard O, the knotting device has been placed in a nearly perpendicular position within said standard, as seen in Fig. 1, and the following mechanical changes have been made: The sleeve F of the knoter has been lengthened sufficiently to take its motion direct from the main shaft, and for this purpose it has fixed to

its lower end the small pinion P. The plunger E has been correspondingly lengthened, and to its lower extremity is jointed the short slotted lever *e*, upon which lever rests one end of the spring *e'*, the opposite end of said spring being confined under the main bed-plate of the machine. For the conveyance of the proper motions to the knotting device from the main shaft, the following parts have been supplied: A hub or sleeve, K, having the flange *k* and the shoulder *k'*, is fixed to the main shaft of the machine. To the back of this flange *k*—that is, upon that side nearest the hanger M, Fig. 1—is affixed the large bevel-gear G, which, by means of the small pinion P, gives rotary motion to the sleeve F. Upon the end *k'* of this hub K is fastened the cam L, which cam has the beveled edge *l*, the cam-edge *l'*, and the abrupt notch or drop *l''*. In the formation of a knot the sleeve F has both a rotary and reciprocal, or, as in this arrangement, a perpendicular, motion. To impart this latter motion, a short lever, *f*, pivoted at one end in a lug projecting from the bed-plate of the machine, and having the cam-face *f'*, is provided. That end of this lever *f* having the cam-face *f'* plays between the flange *k* and the cam L, and rests upon the shoulder *k'* of the hub K, and is in a position directly beneath the pinion P, as shown in Fig. 1. When, therefore, in the operation of the machine, it becomes necessary to raise the sleeve F in order to transfer the tie-string from the large to the small hook of the knoter, the friction-roller *g*, which is secured upon a pin, *l''*, between the flange *k* and the cam L, comes into contact with the cam-face *f'* of the lever *f*, and thereby lifts this end of the lever. This lever, thus lifted by the friction-roller *g*, lifts at the same time and in the same direction the pinion P and sleeve F. The pinion P, having a straight and not a bevel face, is not disconnected from the teeth of the bevel-gear G by being thus lifted. As soon as the roller *g* has passed from under the cam-face *f'* of the lever *f* the sleeve F, the pinion P, and the said lever are all suddenly forced in a downward direction, and assume their former positions by the influence of the spring placed upon the sleeve F, thus transferring the tie-string from one hook to the other. It will be seen that this substitution of the gears G and P for the chain heretofore

employed gives a more accurate and positive motion to the sleeve F of the knotting device. Immediately after the last-described operation takes place the short lever *e*, which has been
 5 previously driven in an upward direction by means of the cam-edge *l*², and has been held in that position by resting upon the beveled edge *l*, suddenly drops in a downward direction, actuated by the spring *e*¹, into the recess
 10 *l*¹, bringing downward with it the plunger E, which motion of the plunger completes the formation of the knot.

In the improved arrangement of the knotter the point of the needle passes through the
 15 upper end of the plunger E, for which purpose the hole *e*³ is made in said plunger, as shown in Fig. 4.

The method of taking the tie-string N from the needle by the large hook of the knotter is
 20 shown in Fig. 1.

By referring to a former application, numbered 125,313, and filed March 24, 1884, for improvements in "shoe tying and knotting machines," which application is now pending
 25 before the Patent Office, it will be seen that the spring S, which assists the hooks of the knotter in forming a knot, and the lug H, which prevents the small hook of the plunger from closing, have in this new arrangement
 30 taken a position at the top of the knotting-standard O, instead of at the side, the said spring S now having a nearly horizontal position, but both spring and lug retaining the same relation to and performing the same
 35 services for the knotting-hooks as set forth in said application.

It is thought preferable in this improved arrangement of the knotting device to use in the
 40 plunger E a small hook shaped similar to *e*²; but it is to be understood that a hook like that shown, described, and claimed in the above-mentioned application may and can be used.

In order that the tie-string may be severed more closely to the shoe, the presser-foot and
 45 cutter have been combined in such a way that the cutter is now moved forward against the shoe with the presser-foot itself, both cutter and presser-foot being carried upon the end of one and the same bar, as is shown in Fig. 1.
 50 The knife *c* is attached to the hub of the presser-foot B, and this latter has been provided with a hood, *b*, as a protection to the knife *c*. This combination of the presser-foot and cutter renders it very important that the bar
 55 which carries them upon its end should have no rotary motion, for if it should the knife *c* would come into contact with the needle. To prevent this the spline-collar D has been firmly fixed by the pin *d*¹ to the presser-foot
 60 bar. The said collar has the spline-flange *d*², which rests against a flat surface of the casting at the back and is capped over by the cap *d*, thus allowing the said presser-foot bar free reciprocal but effectually preventing rotary
 65 motion. Since the string N is severed before the formation of the knot is completed, and

since the string is cut in such a manner as to leave a very short end, (see Fig. 2,) it became necessary, in order to effectually tighten the
 knot, to provide the tightener T. This latter
 70 is a small rod flattened, flaring, and thin at its upper end, which end, when at rest, is just below the aperture through which the needle and tie-string pass. Passing down through the
 75 lugs which carry the sleeve F, the lower end of the rod T comes close to and upon that side of the gear G which is nearest the hanger M. Upon this same side of the gear G is the small
 cam *t*¹. Just above the guide *m*¹ and upon the
 80 lower end of this rod T is the spring *t*.

In the operation of the machine, a little before the lever *e* reaches the drop *l* in the cam
 L—that is, just before the plunger E drops suddenly downward—the small cam *t*¹ has
 85 come into position under the lower end of the rod T and driven said rod in an upward direction, thus causing the thin and flaring part at
 the top to hold both ends of the tie-string N firmly by pinching them slightly between it-
 90 self and the upper part of the needle-aperture. While the string is thus held the plunger E falls down and tightens the knot, as shown in Fig. 2. As soon as the plunger has thus fallen
 the cam *t*¹ passes from under the rod T, and the latter, actuated by the spring *t*, is again
 95 brought down to its first position.

To afford more time in the operation of the machine for piercing the work and introducing
 the needle with the tie-string into the knotting-standard and forming the loop there-
 100 in, as shown in Fig. 1, the gear G and pinion P have been made to hold the relation to each other of three to one—that is, the large gear G has just three times as many teeth as has
 the pinion P—and the sleeve F therefore
 105 makes three revolutions to every one revolution of the main shaft, thus giving to the above-described operation of the needle-bar about one-third of a complete revolution of
 110 said shaft.

The gage I has been simplified, and is now held in any adjusted position by the set-screw *i*.

A stand, A, has been provided, suited to receive and hold the machine in its proper po-
 115 sition. This stand also facilitates belting on to the drive-wheel, and provides a simple means of setting up the machine by screwing the said stand down to a table or bench. Upon
 this stand A, and back of the knotting-standard O, is pivoted the arm *a*, which carries upon
 120 its upper end the cradle *a*¹. This cradle is provided as a receptacle to receive the first shoe of the pair tied together after it is removed from the knotting-standard—that is,
 125 after a knot has been formed within it—and to hold it during the time that the second shoe of the pair is being operated upon. By swing-
 ing arm *a* back the cradle *a*¹ is carried farther from the knotting-standard, and thus it forms
 a gage for determining the length of the string
 130 between the two shoes tied.

The general operation of the machine does

not differ from the description thereof set forth in the before-quoted application, numbered 125,313, filed March 24, 1884.

Having thus described my invention, I claim
5 as new and desire to secure by Letters Patent—

1. In a shoe tying and knotting machine, the combination, with a shoe-receiving standard, O, of the knotting device, substantially as described, placed longitudinally within the
10 said standard, in a manner substantially as shown.

2. In a knotting-machine, the plunger E, having through its tapered end the hole e^3 , and carrying at the same end the small hook
15 e^2 , and having jointed at the opposite end the slotted lever e , substantially as herein shown.

3. In a knotting device, the combination, with a bevel-gear, G, of a pinion, P, fixed upon the
20 hook-carrying sleeve F, and having one-third as many teeth as the gear G, a plunger, E, having the needle-receiving hole e^3 , a hook, e^2 , a slotted lever, e , a spring, e' , a lever, f , having the cam-face f' , a friction-roller, g , and pin l^3 ,
25 for operating said lever, a knot-tightening rod, T, having the upper end flat and flaring, and having the spring t upon its lower end, and the guide m' and cam t' , all substantially as herein shown and described, and for the
30 purpose set forth.

4. In a knotting device, the hub K, having the flange k and shoulder k^2 , in combination, and adapted to receive the gear G and the cam L, substantially as herein shown and described.

5. In a knotting-machine, the combination, with a hub, K, of the large bevel-gear G, having three times as many teeth as the pinion P, and carrying upon that side opposite the teeth the cam t' , the cam L, having the beveled
40 edge l , the cam-edge l^2 , and the drop l' , and further carrying the pin l^3 , all substantially as herein shown and specified, and for the purpose set forth.

6. In a shoe tying and knotting machine, 45 the combination of a presser-foot and cutter, B, with a knife-protecting hood, b , a spline-collar, D, having the flange d^2 and the pin d' , and a spline-cap, d , substantially as and for the purposes shown and specified.

7. The combination, in a shoe tying and knotting machine, of the knotting mechanism with the string-gage arm a , carrying a shoe-receiving cradle, a' , all substantially as shown and described. 50

ALBERT W. WEEKS.

Witnesses:

ALBERT GREENE,
A. E. SCOVILLE.