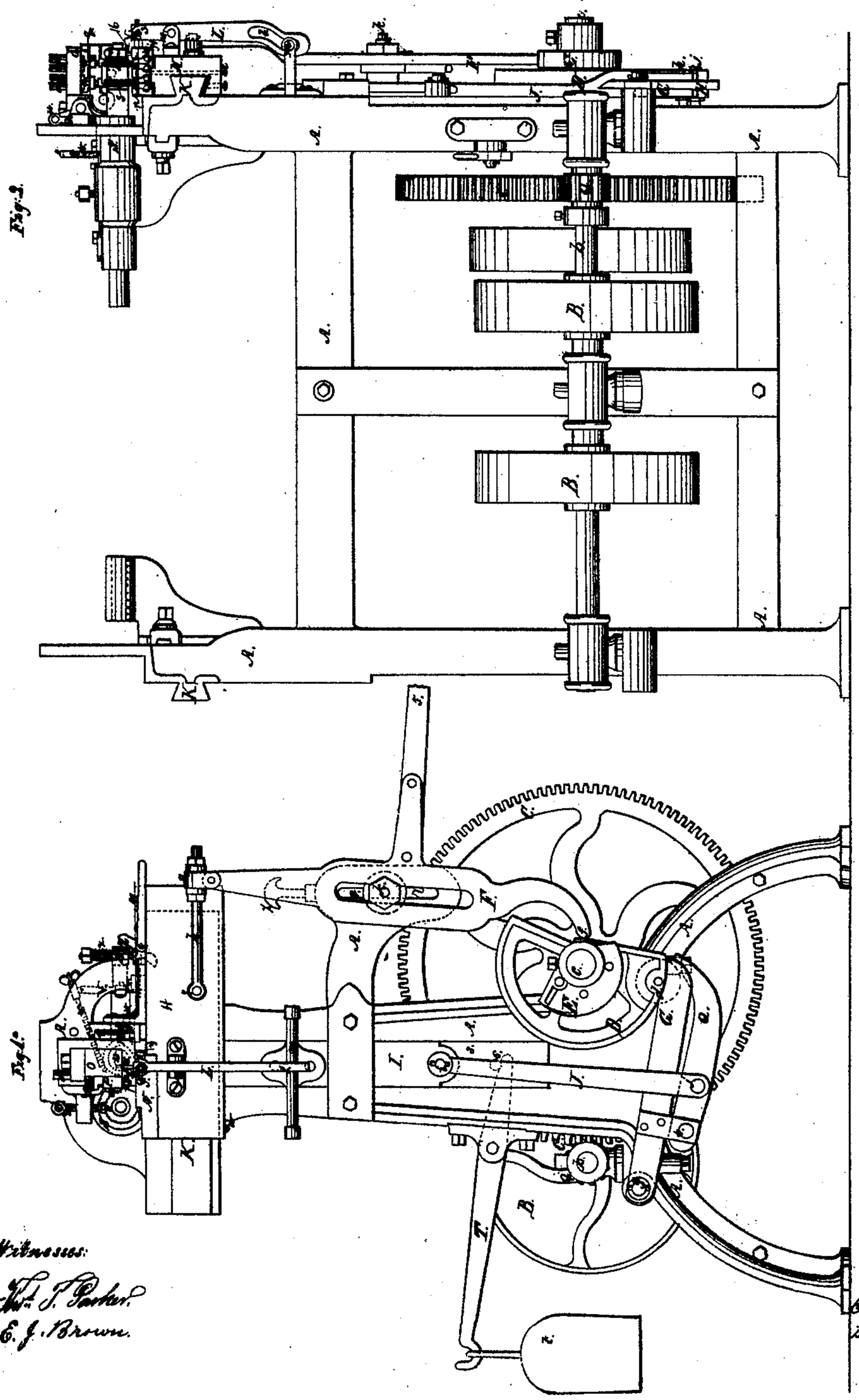
2 Sheets—Sheet 1.

C. P. S. WARDWELL.

MACHINE FOR MAKING NEEDLES.

No. 69,280. Patented Sept. 24, 1867.



Witnesses:

Wm. J. Parker.

E. J. Brown.

Inventor:

C. P. S. Wardwell

by J. S. Brown

Atty.

2 Sheets—Sheet 2.

C. P. S. WARDWELL.

MACHINE FOR MAKING NEEDLES.

No. 69,280. Patented Sept. 24, 1867.

Fig. 6.

Fig. 5.

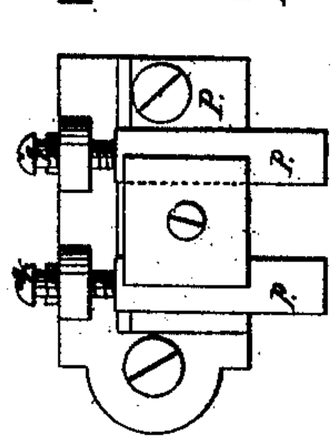


Fig. 11.

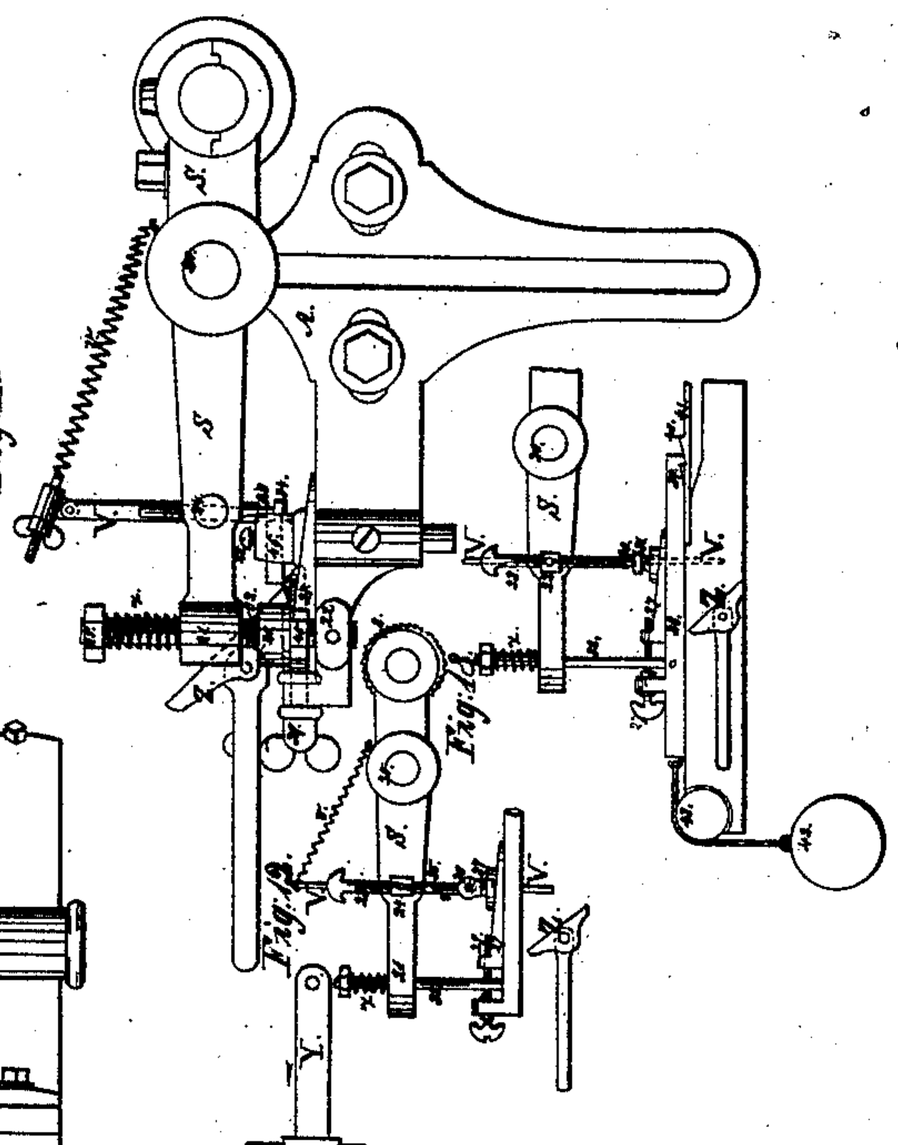


Fig. 3.

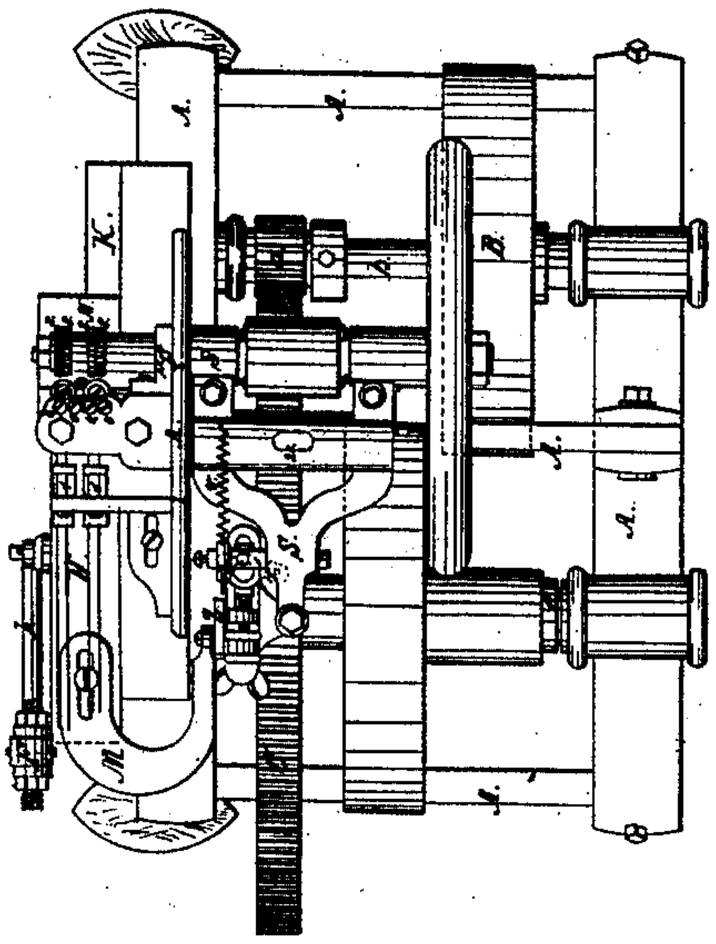


Fig. 8.

Fig. 9.

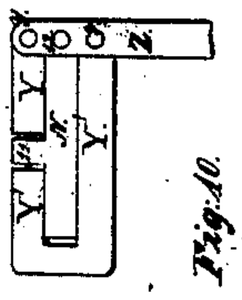


Fig. 10.

Fig. 4.

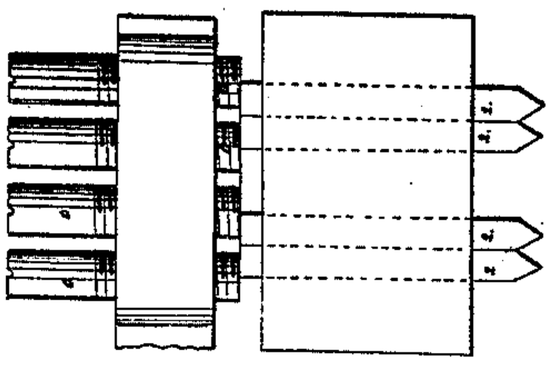
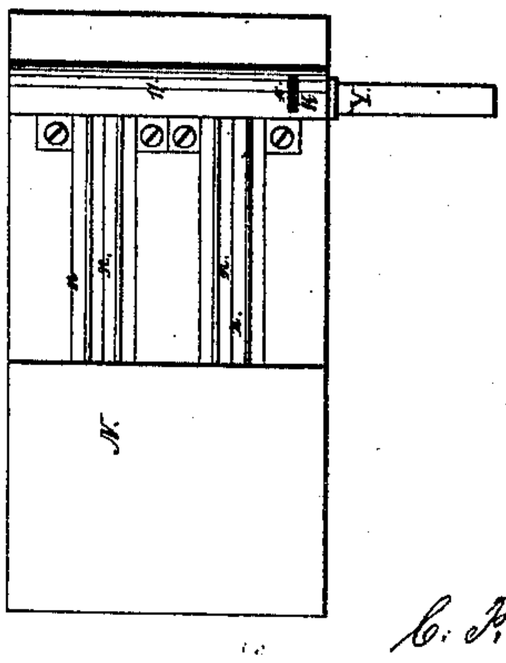


Fig. 7.



Witnesses:

Thos. J. Parker.

E. J. Brown.

Inventor:

C. P. S. Wardwell.

by J. S. Brown.

atty

United States Patent Office.

C. P. S. WARDWELL, OF LAKE VILLAGE, NEW HAMPSHIRE.

Letters Patent No. 69,280, *dated September* 24, 1867.

IMPROVED MACHINE FOR MAKING NEEDLES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, C. P. S. WARDWELL, of Lake Village, in the county of Belknap, and State of New Hampshire, have invented an Improved Machine for Making Machine-Knitting Needles; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a side elevation of the machine.

Figure 2, a front elevation thereof.

Figure 3, a plan of one end or half thereof.

Figure 4, a front view of the eye-punches, showing the method of mounting and adjusting them.

Figure 5, a front view of the cutting-off dies or shear-blades, showing the method of mounting and adjusting them.

Figure 6, a vertical section, from front to back, through one of the cutting-off dies and the spring-presser, showing their relative arrangement.

Figure 7, a top view of the adjustable bed-piece, and of the needle-beds thereon.

Figure 8, a view of the wedge device for clamping and holding the needle-wires on the bed.

Figure 9, a view, showing a modification of the mode of clamping the wires.

Figure 10, a side view of one of the needle-beds or blocks.

Figure 11, a side elevation of the swinging-frame on which the revolving cutters are mounted, and of the mechanism connected therewith, for raising the cutters away from the needles when the slabbing is completed, and for bringing and holding the cutters again down in position.

Figure 12, a diagram of parts corresponding to those in fig. 10, showing a modification of the mechanism for throwing the cutters out of and into position for slabbing the needles.

Figure 13, a diagram, also of corresponding parts, showing another modification of the mechanism for moving the cutters into and out of slabbing position.

Like letters designate corresponding parts in all of the figures.

In this improved machine I employ a reciprocating carriage or table, H, moving horizontally or transversely in the machine. This reciprocating table, by its movements, in connection with other parts, performs or fulfills the following functions: first, of feeding or drawing the wire or wires, by needle-lengths, into the machine; second, of a stationary die in punching the eyes of the needles; third, of a support for the needles in slabbing or forming the barbs thereof; fourth, of a guide to determine the form of the barbs; fifth, of a stationary shear-blade in cutting off the needles from the wires; sixth, mediately of throwing the slabbing-cutters out of action.

In connection and harmony of action with this reciprocating table, for the complete performance of the processes which the enumerated functions involve, I employ, first, a stationary wire-holder, 1, which retains the wires in a fixed position while the reciprocating table recedes for a renewed hold, to feed them forward in the next advance movement; second, I employ eye-punches 2 2, which have a reciprocating movement vertically, or transverse to the movements of the reciprocating table; third, I employ revolving cutters *s s*, for slabbing the needles, or forming the barbs thereof; fourth, I employ a bed-block, N, situated and adjustable in a position oblique to the direction of the reciprocating table's movement, so that the needles are slabbed obliquely to their axes; fifth, I employ reciprocating shear-blades or dies *p p*, which have a vertical movement, or transverse to that of the table; sixth, I employ a swinging-frame, S, in which the slabbing-cutters *s s* are mounted, and a mechanism connected with said swinging-frame, to raise the cutters away from the needles at the proper time and again bring it down into position for action.

In the drawings I have represented only one side of the machine with all the parts complete. Thus, in fig. 2 only the right-hand side is shown fully, while the left-hand side shows only the framework. But the mechanism on that side is only a duplicate of that on the other side, which shows an arrangement of parts for making four needles at a time. By duplicating this mechanism eight needles can be made at once, with only one set of driving parts. Any greater or smaller number of needles may be made at one time, as desired.

Let B represent a pulley to which the motive power is communicated. Upon its shaft *b* a small cog-wheel,

a, gears into a cog-wheel, C, several times larger, so that the motions communicated to the shaft *c* thereof may be as many times slower than the motion of the driving-shaft *b*. Upon the shaft *c* are two cams D and E, the former of which communicates the vertical reciprocating movement to the eye-punches 2 2 and cutting-off shear-blades *p p*, and the latter of which communicates the horizontal reciprocating movement to the table H.

In communicating the proper motions to the eye-punches and cutting-off shear-blades by the cam D, the said punches and blades are suitably mounted in a block or head, O on a vertical bar, I, which may move up and down in a groove or ways, 3, fig. 1. To this sliding-bar a connecting-rod, J, is pivoted at *i*, and its lower end is pivoted at *j* to a cam-lever, Q, which is itself pivoted at one end (as at 4) to projections of another cam-lever, G, that is pivoted at *g* to the frame of the machine. The cam D acts directly on the movable end of the lever G, and produces the ordinary movements of the sliding-bar I and head O. The cam is adjusted on its shaft *c* by a set-screw, as shown, so as to properly time the motions of the punches, shear-blades, and other parts moved thereby. The auxiliary lever Q is moved by a friction-roller, *d*, on the cam D, separately from the lever G, and has a more powerful leverage to draw down the bar I, as well as diminished friction, by the use of the said friction-roller. The use of this auxiliary lever is to act at the moment of punching the eyes of the needle, which requires a comparatively powerful action.

The cam D draws the sliding-bar and head downward only, and the return motion is effected by a counter-weight, *t*, on a lever, T, the opposite end of which bears upward against a pin or stud, 6, fig. 1, on the sliding-bar I.

For communicating the horizontal forward motion to the reciprocating table H, from the cam E, a cam-lever, F, is pivoted at *k* to a projection of the frame. The lower end or point *f* of this lever is curved towards the cam, substantially as shown in fig. 1, so that neither the cam D, nor its friction-roller *d*, can interfere with the motions of the lever, and so that it can more readily adapt itself to the irregular form of its own cam E. The upper end of the lever F is connected with the table H by a connecting-rod, *h*, which is pivoted to the table at 7, and has an adjustable connection with the lever at 8, fig. 1. The fulcrum-pivot *k* of the lever is adjustable up and down in a slot, 9, of the frame by a set-screw, *z*, so that the extent of movement given to the table may be varied at pleasure.

The return movement of the table is effected by a counter-weight on a lever, 5, projecting from the lever F.

In feeding the wires along, it is necessary that they should be alternately clamped to the table H or bed-piece N thereon, and then set free, for the return movement of the table. I have an improved mechanism for this purpose, by which I clamp any number at once, by the simple movement of a wedge, Y, as shown particularly in fig. 8. This wedge fits and slides under a wedge-shaped block, 10, substantially as shown. The wires are held between the block 10 and a fixed bar, 11, situated over and parallel with the block. As the wedge is driven in under the block 10, the block is raised uniformly at both ends, and clamps the wires securely between it and the bar 11, and as the wedge is drawn outward the block descends and leaves the wires free.

The wedge Y is moved in and out by means of a lever, L, which is pivoted at 12 to the side of the table H and moves therewith. Its upper end is pivoted by adjustable cone-points *y y* to the shank of the wedge, and its lower end is provided with a cam-slot, *l*, fig. 2, in which moves a transverse rod, *m*, secured to the vertical reciprocating bar I. This rod is long enough to allow the lever L to traverse it in its entire horizontal motion with the table H, and, as the sliding-bar I moves up and down, it actuates the lever L so as to produce the motions of the wedge Y, as required.

In fig. 9 is shown a modification of the wedge-clamp above described. The same letters and figures of reference indicate parts of corresponding functions to those of the wedge device. The vibrating lever L presses a block, Y, toward a stationary bar 11, and clamps the wire between their surfaces; and another hook-shaped block, Y′, may be connected with the lever L, below its fulcrum 12, and clamp another wire against the bar 11. When only one or two wires are worked together, this arrangement may be preferable to the wedge device, but the latter is applicable to any number of wires arranged side by side.

The stationary holder 1, to hold the wires fixed while the table recedes, has swing-plates 13, which, when brought down into nearly a vertical position, press on the wires and hold them from returning; but when the wires are drawn forward the hold is released, and the plates swing upward and rest freely on the wires. A spring, 14, may be used to keep the swinging-plates close upon the wires.

Each needle-wire rests on a needle-block or bed, *n*, grooved longitudinally, from end to end, as seen most clearly in fig. 7, and the wires may be held in the grooves by light springs 17, fig. 1, pressing down thereon. The blocks or beds *n n* are secured in the top of a bed-block, N, which itself is mounted on the reciprocating table H. The front half or portion of each bed *n* is cut down somewhat, as seen in fig. 10, so as to make the needle-groove therein shallower, and allow the slabbing-cutters to cut without touching the bed. The rear part of the block has its groove deep enough to securely and accurately hold the wire therein, and prevent any side displacement, when the eye-punch comes down on the wire. As the eye requires to be very accurately made, neither to the right nor left of the centre of the wire, the greatest accuracy of construction and surest guards against side displacement are necessary. In order that neither the bed-block N, nor the table H, may cause side displacement, I secure a firm guide or guides, 16, on the top of said bed-block, and cause it to move accurately and closely in a notch or groove in the punch-block O above, and thus secure the proper relative position of the blocks very perfectly.

The eye-punches 2 2 are firmly secured in the block O, and are brought upon the wires at the proper time by the descent of the sliding-bar I. They are adjusted downward by set-screws *o o*, as particularly seen in fig. 4. At the same time that the punches descend the cutting-off shear-blades or dies *p p* are brought down, and cut the completed needles from the wires, by shearing in contact with the front ends of the beds *n n*, which

thus act as stationary blades in connection therewith. The table H does not move while the punching and cutting-off movements are going on.

When the shear-cutters and punches descend, it is necessary that the wires should be surely in their grooves. I employ spring-presses *r r*, located just behind the shear-cutters *p p*, or between them and the punches 2 2, and so arranged as to reach the wires a little before the shear-cutters do, as indicated in fig. 6. Then, when the cutters rise again, these pressers hold the wires down till the cutters are raised from contact therewith, so that the cutters cannot lift the wires by rubbing against their ends. And this, in a great measure, prevents the bending or springing of the needles by the action of the punches, or by the cutters lifting the ends thereof. The pressers are forced down by springs 18 acting on the shanks 19, fig. 6, working in the block P, which is attached to the head-block O of the sliding-bar I. The shear-cutters *p p* are adjusted downward by set-screws *q q*.

In order to fully provide against the springing and setting of the needles from a straight form by the action of the punches in forming the eyes, I use deflectors 15, figs. 1 and 3, situated behind the stationary holder 1, to which they may be secured. By the blue lines in fig. 1, it will be seen that these deflectors tend to spring the wires downward somewhat; and by adjusting the deflectors up or down, the amount of deflection may be made to exactly compensate for any springing or bending which the eye-punches may give, so that they will leave the finished needles straight. The wires are straightened before being fed into the machine.

The form of the barbs in slabbing is determined by setting the bed-block N obliquely, or inclined to the table, so that the bed-grooves and wires shall lie in positions slightly inclined to the direction of the motions given thereto in moving the table forward. To enable this bed-block to be inclined, its lower surface slopes away a little from the centre to each end, or is a little convex or rounding, as seen in fig. 1. Thus it can be inclined or rocked a little endwise. Its inclination is adjusted by a set-screw, *w*, figs. 1 and 2, so as to shape the barb just as required.

The cutters *s s* are raised somewhat, so as to cease to cut the wires as soon as the barbs are slabbed, by raising that end of the swinging-frame S in which their arbor is mounted. This frame swings vertically, or up and down, around a pivot, 20, and at the other end 21 is the mechanism by which I accomplish this raising of the cutters, when, at the proper time, the reciprocating table brings forward an adjustable inclined block, Z. A projection, 22, of the main frame, supports a guide-rod or bolt, 32, which extends upward through the end of the swinging-frame. On this guide-bolt, above the swinging-frame, is a coiled spring, *x*, held down and adjusted in force by a nut which is screwed upon the bolt. This spring holds the end of the swinging-frame down in place at all times; and when the tripping-stud 23 is slipped from its support 34, forces the frame down far enough to lift the cutters mounted on the other end of the swinging-frame out of action. The extent to which the end 21 of the swinging-frame descends when tripped is limited and adjusted by an elastic block, 26, on the guide-bolt 32, moved up and down by a nut, 45, underneath. The tripping-stud 23 is secured in a pivot-block, 24, which turns freely in the swinging-frame, so that the stud may be free to slip off from the supporting-plate 34. The stud is adjustable up and down in the pivot-block, so as to adjust the position of the cutters to the wire when slabbing. The supporting-plate 34 is also adjusted forward and back in its socket 46, so as to allow the tripping-stud to drop off more quickly or more tardily, and it is held in place by a set-screw, 28. The socket 46 is also adjustable up and down by a wedge, 27, driven under it, more or less, by a screw, 29.

In the pivot-block 24 of the tripping-stud is also secured a trip-rod, V, so located that when the inclined block Z is brought forward by the reciprocating table it strikes said trip-rod, turns the pivot-block 24, and throws the tripping-rod 23 off from its supporting-plate 34, when the end 21 of the swinging-frame is immediately forced down by the spring *x* to the stop 26, thereby raising the cutters at the other end out of action. Then, at the proper time, when the sliding-head O descends with the eye-punches and cutting-off shear-blades, it brings down an adjustable stop, *u*, figs. 1, 2, and 3, upon the cutter end of the swinging-frame, till the cutters are again brought into position for action, at which time a coiled spring, *v*, drawing sidewise on the trip-rod V, throws the tripping-stud 23 again upon its support 34, ready for a renewal of the process of the mechanism.

In fig. 12 this tripping mechanism is shown somewhat modified. Instead of supporting a tripping-rod, 23, upon a supporting-plate, 34, to be pushed off at the proper time, as above described, the tripping-rod is jointed at 35 to another supporting-rod, 36, which is itself pivoted to an adjustable support, 37, thus forming a sort of toggle-joint arrangement, which cannot bend backward, but can forward. It is held straightened by a spring, *v*, and when the inclined block Z strikes the trip-rod V, the toggle is bent thereby against the force of the spring *v*, and lowers that end of the swinging-frame. As the inclined block Z again recedes, the toggle is straightened by the spring *v*, and the swinging-frame is again brought back into place.

In fig. 13 there is shown another modification of this mechanism. Here the supporting-stud 23 rests, by a pivot, 30, at its lower end, on an adjustable screw or block, 31. This block is mounted on a sliding-bar or carriage, 38, suitably moved forward by the inclined block Z pushing forward the trip-rod V. This movement carries the lower end of the supporting-stud out of vertical line with its pivot 24, and consequently allows that end of the swinging-frame to descend as much as required. When the sliding-bar 38 reaches the extent of its forward movement a notch, 39, in its lower side, hooks around a tooth or projection, 40, on a spring, 41. It is thus held till a stop or projection on the vertically sliding bar I strikes the spring 41, and releases the hold of the catch, and then a counter-weight, 42, drawing on a cord over a friction-pulley, 43, returns the sliding-bar to its former position, and all parts are as before. The wedge 27 simply adjusts the height of the block 31, and moves with the sliding-bar 38. It is the moving of the stud 23 into an inclined position which depresses that end of the swinging-frame.

The teeth of the several cutters *s s* are all so arranged in relation to each other that they cut in succes-

sion at equal intervals. This equalizes the action of the cutters—they run more steadily, and do not "sputter," as they would if any two should cut together.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The reciprocating table H, constructed as described, operating with other mechanism, to feed the wire forward, to punch the eyes of the needles, to slab the ends, to determine the forms of the barbs, and to cut the needles from the wires, substantially as herein specified.

2. I also claim the wedge-clamp Y, constructed, arranged, and operated substantially as and for the purpose herein specified.

3. I also claim the guide or guides 16 on the top of the bed-block N, operating substantially as and for the purpose herein specified.

4. I also claim the spring presser-plate or plates *r r*, arranged and operating in combination with the cutting-off blades and eye-punches, substantially as and for the purposes herein specified.

5. I also claim the deflector or deflectors 15, operating in combination with the reciprocating bed-block N and eye-punch or punches, arranged substantially as and for the purpose herein set forth

6. I also claim the combined arrangement of the bed-block N, adjusted obliquely to the line of its motion, reciprocating table H, and cutters *s s*, adjustable toward and from the table, substantially as and for the purpose herein specified.

7. I also claim the mechanism, substantially as herein specified, for raising the cutters out of action, and returning and retaining them in position for action, substantially as herein set forth.

The above specification of my improved machine for making machine-knitting needles and other needl signed by me this eighteenth day of January, 1867.

C. P. S. WARDWELL.

Witnesses:

JOHN ALDRICH,

JOHN B. HENSLEY.