

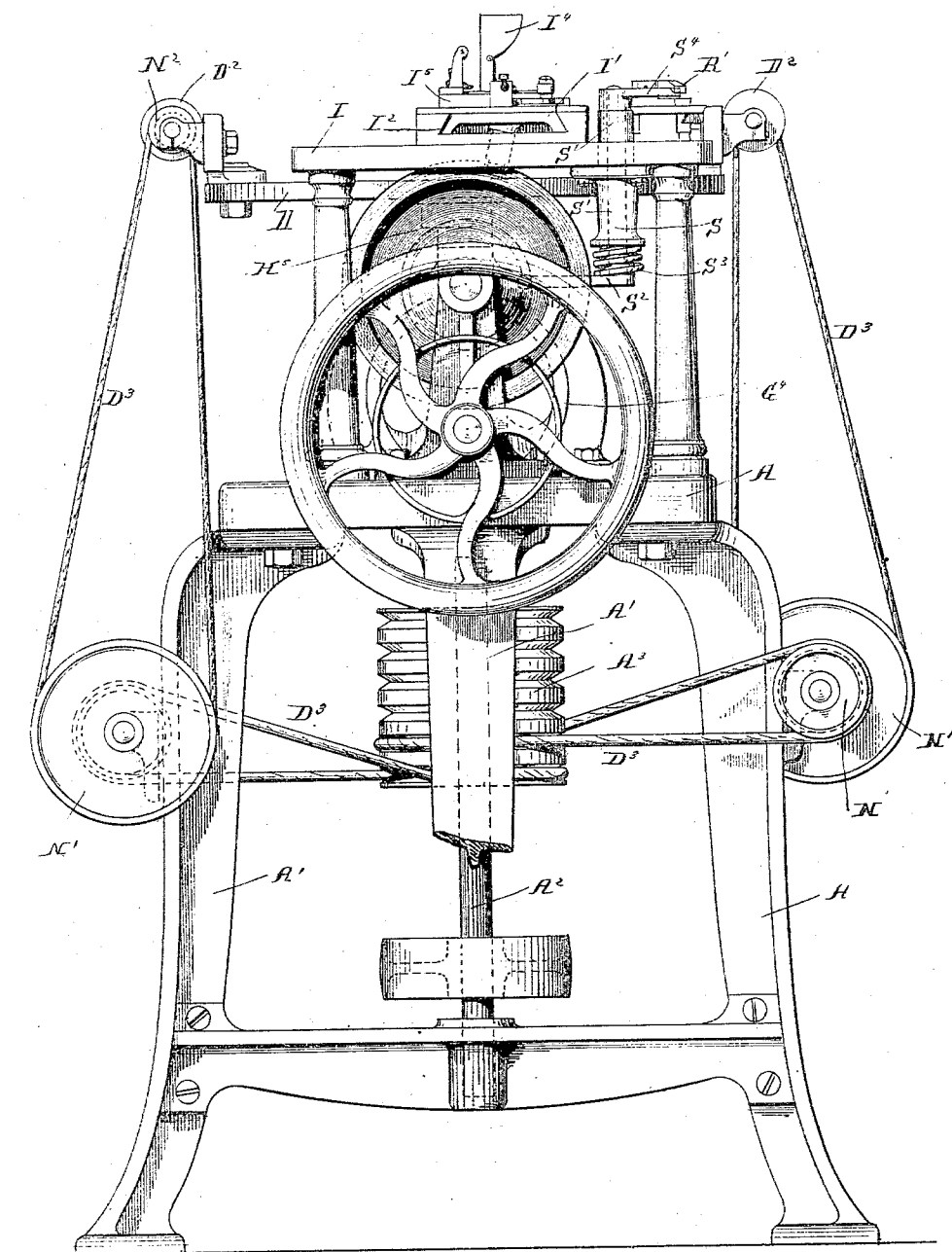
(No Model.)

7 Sheets—Sheet 1

P. M. BEERS.  
NEEDLE POINTING MACHINE.

No. 339,361.

Patented Apr. 6, 1886.



Witnesses  
Andrew C. Campbell.  
W. A. Jones.

Inventor.  
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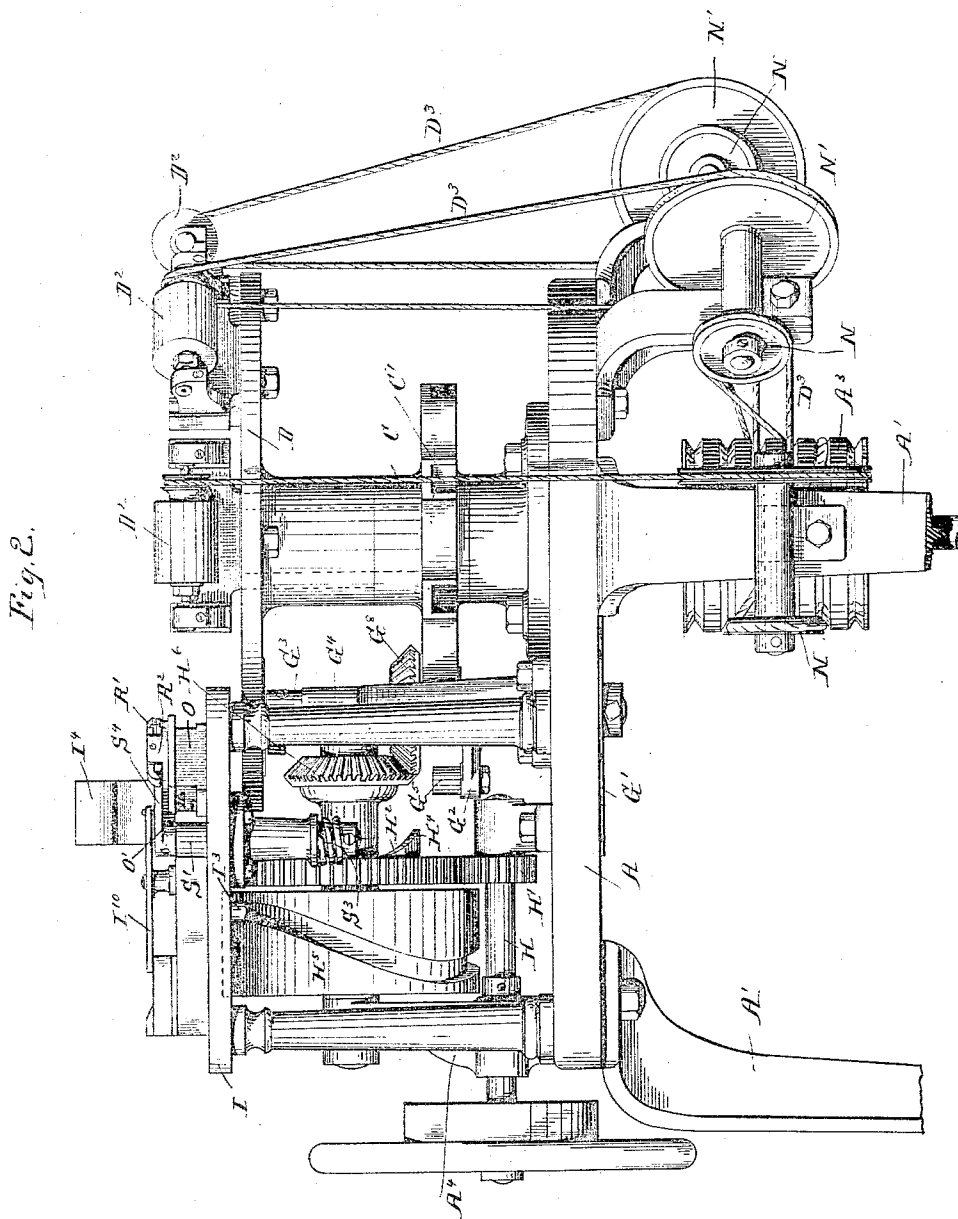
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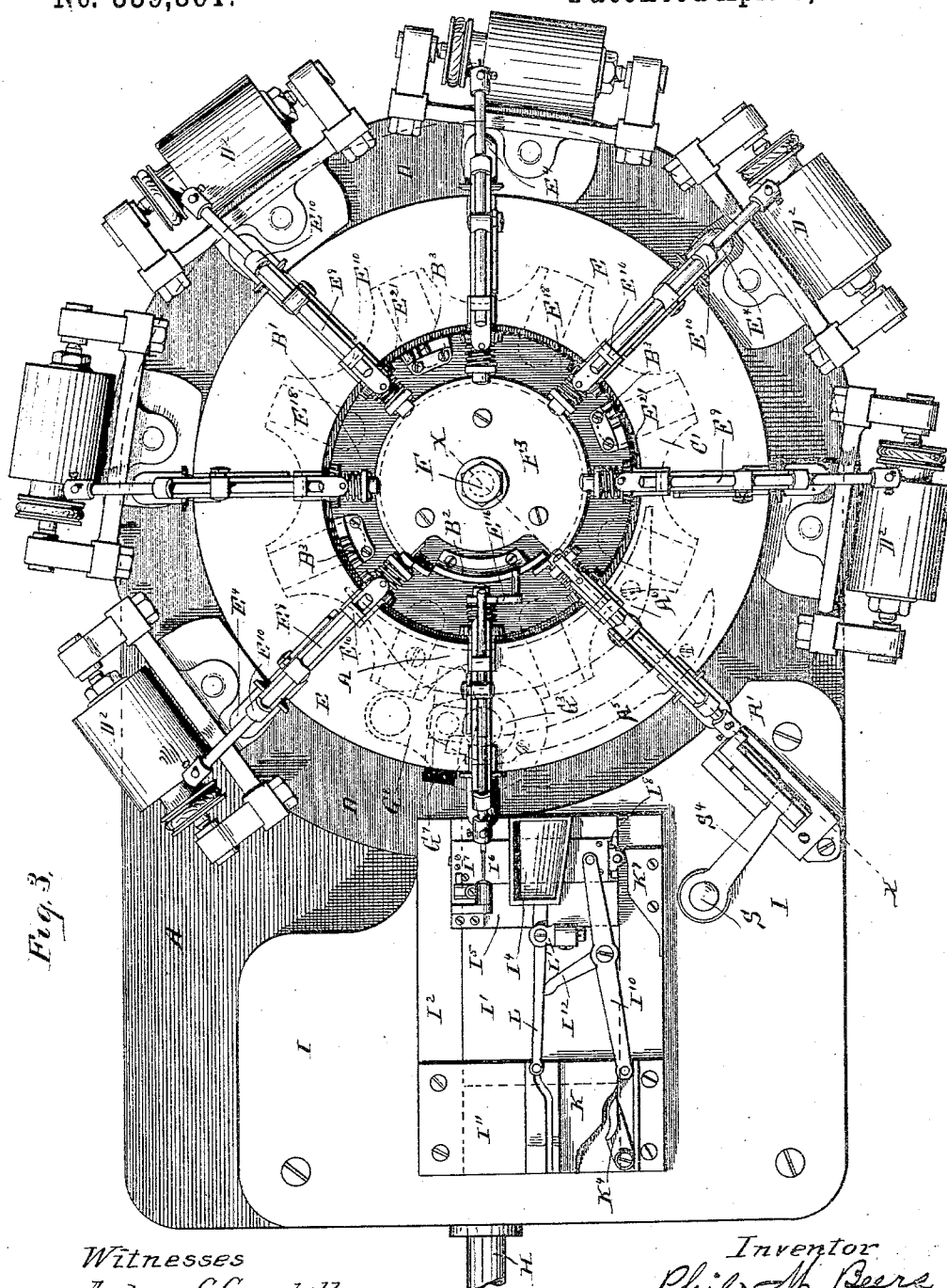
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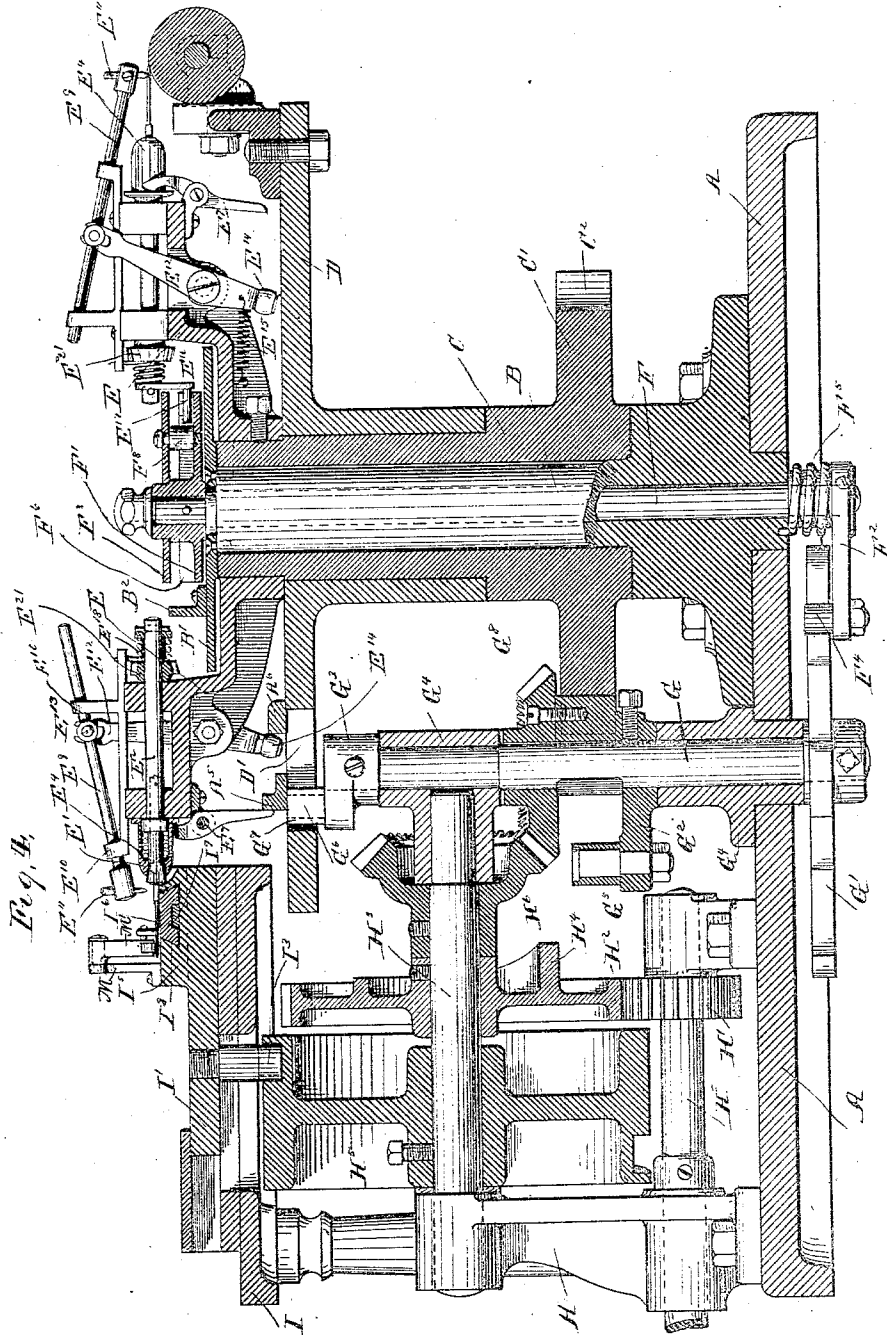
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P. M. BEERS.  
NEEDLE POINTING MACHINE.

No. 339,361. D<sup>2</sup>

Patented Apr. 6, 1886.



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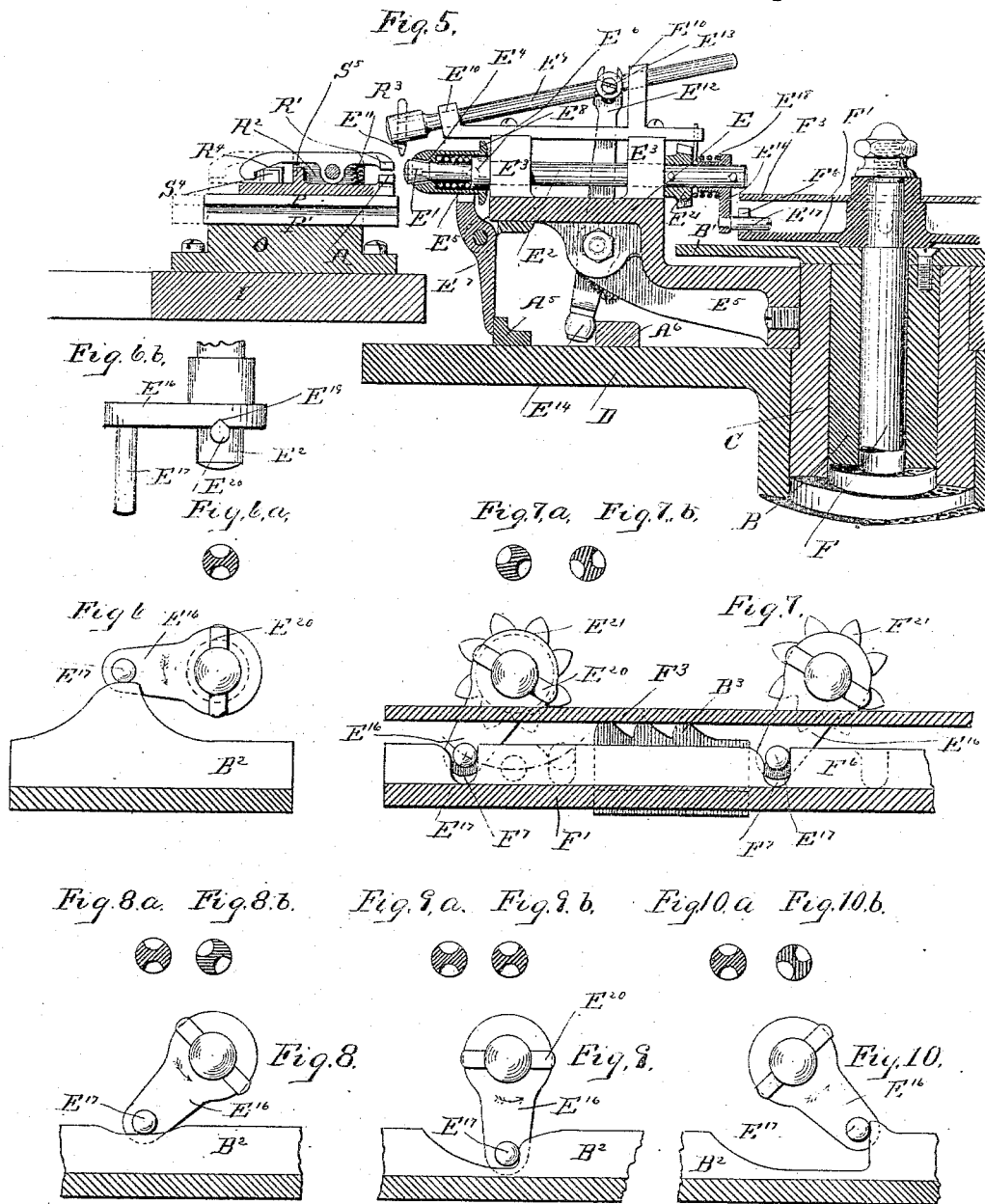
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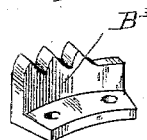
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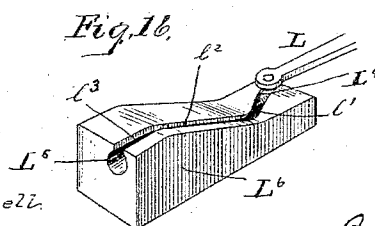
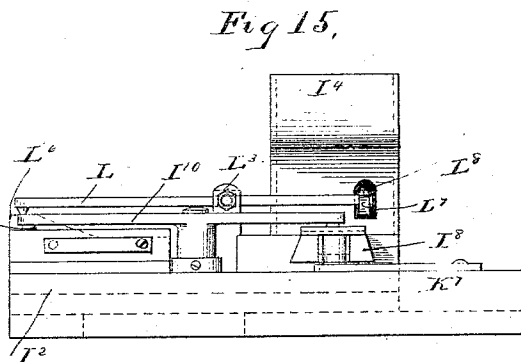
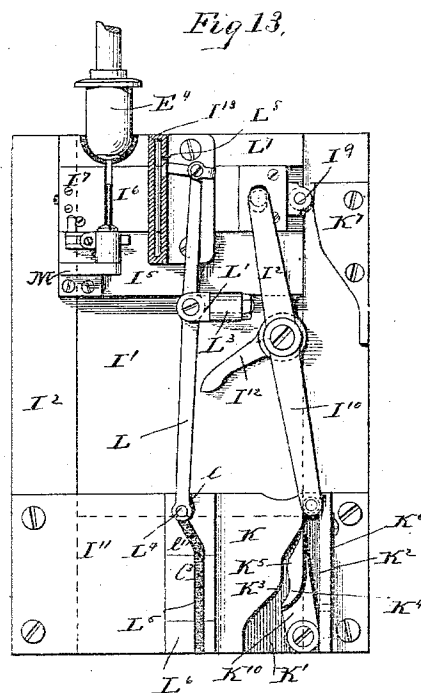
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7 Sheets—Sheet 6.

Patented Apr. 6, 1886.



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(No Model.)

7 Sheets—Sheet 7.

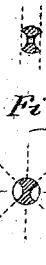
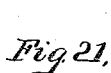
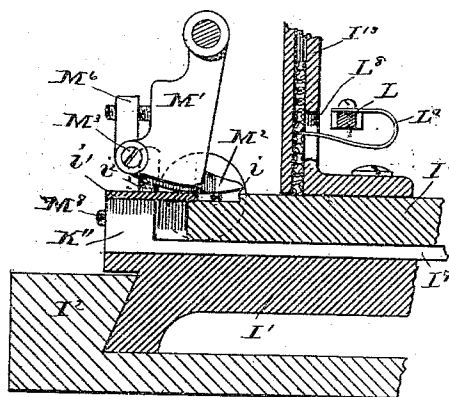
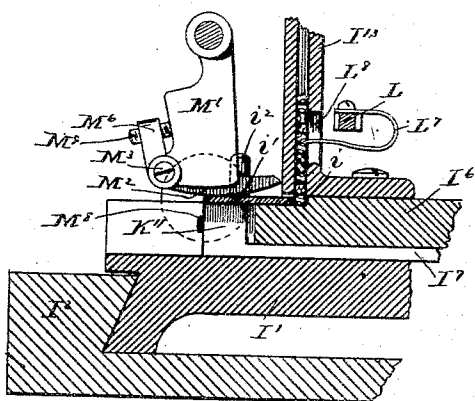
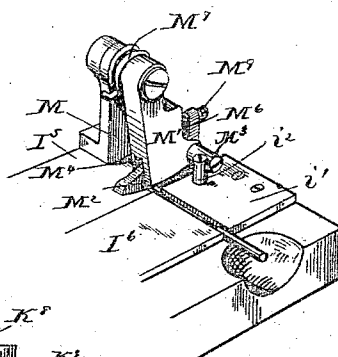
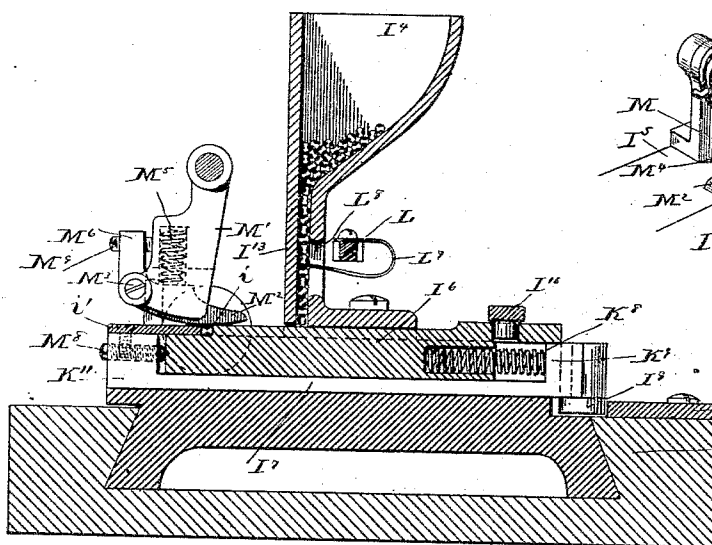
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Fig. 18.

Fig. 20.



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# UNITED STATES PATENT OFFICE.

PHILO M. BEERS, OF BRIDGEPORT, CONN., ASSIGNOR TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE

## NEEDLE-POINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 339,361, dated April 6, 1886.

Application filed September 10, 1884. Serial No. 142,568. (No model.)

*To all whom it may concern:*

Be it known that I, PHILO M. BEERS, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Needle-Pointing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of needles, and has for its object to produce a machine which will automatically grind and finish the points of all classes of leather-needles.

With this end in view I have devised the novel mechanism which I will now describe, referring by letters to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front end elevation with the leg broken away, the needle-carrying table being removed and but two stones shown on the vibrating table; Fig. 2, a side elevation with the needle carrying table removed; Fig. 3, a plan view complete; Fig. 4, a central longitudinal section with the stone-driving mechanism removed; Fig. 5, a section on the line *x x* in Fig. 3, showing the needle-carrying mechanism and the extractor in elevation. Figs. 6 to 10, inclusive, are diagram views illustrating the various positions of the chuck-oscillating crank in its relation to the registering-cams, and also sections of the needles in different positions, whereby the style of the points is determined; Fig. 11, a perspective of the segment which partially rotates the needle-chuck. Figs. 12 and 13 are plan views illustrating the extreme positions of the feeding mechanism, part of the hopper being broken away; Fig. 14, a section on the line *y y* in Fig. 12; Fig. 15, a side elevation of the feeding mechanism in position, as in Fig. 12; Fig. 16, a perspective of the cam which actuates the needle-separating mechanism. Figs. 17, 18, and 19 are transverse sections of the feeding mechanism with the registering device in elevation, showing three positions of the mechanism in the act of feeding and registering a needle; Fig. 20, a perspective of the registering device, the position corresponding

with Figs. 13 and 19; Fig. 21, an elevation of a finished needle; Fig. 22, a section of the point, as in Fig. 21; Fig. 23, a cross-section through the line of the eye; Fig. 24, a diagram illustrating angles in relation to the grooves at which the point may be ground by the cams illustrated in Figs. 6, 8, 9, and 10.

Similar letters indicate like parts in all the figures.

A represents the bed of the machine, and A' the legs.

A<sup>2</sup> is a drum carried by a shaft, A<sup>2</sup>, which drives the grinding and polishing wheels.

B is a standard bolted firmly to the bed.

B' is a plate at the top of the standard to which the chuck-registering cam B' is attached.

F is a shaft within the standard.

F<sup>1</sup> and F<sup>2</sup> are plates at the upper end of shaft F, the functions of which will be more fully explained.

F<sup>2</sup> is a crank at the lower end of this shaft, having a pin, F<sup>4</sup>, preferably carrying a roll which bears against the periphery of the needle-oscillating cam G', by which oscillatory motion is imparted to shaft F.

F<sup>3</sup> is a spring which acts to hold the roll against the periphery of the cam. The needle-oscillating cam is secured below the bed to a shaft, G, both ends of which are journaled in a yoke, G<sup>1</sup>, which is bolted to the bed.

C is a sleeve carrying a star-wheel which is free to rotate upon standard B.

D is the vibrating table carrying the grinding and polishing stones D<sup>2</sup>, which is journaled upon sleeve C, and rests, preferably, upon an offset in said sleeve.

E is the needle-carrying table, which is firmly secured to sleeve C above the vibrating table, and rotates with said sleeve.

G<sup>2</sup> is an arm carried by shaft G, having at its outer end a roll, G<sup>3</sup>, which engages and imparts intermittent rotary motion to the star-wheel in the same manner as in my former patent, No. 258,695, granted May 30, 1882.

It will of course be understood that any ordinary means of imparting intermittent rotary motion to table E may be substituted in lieu of the star-wheel and revolving arm, if preferred, as the operating mechanism forms no part of my present invention.

G<sup>4</sup> is a crank carried by the upper end of shaft G above the yoke. G<sup>5</sup> is a pin at the

outer end of this crank, which turns freely in a rectangular block, G<sup>1</sup>. This block reciprocates in a slot, D', in table D, thus imparting a vibratory motion to said table.

5 H is the main shaft, which I have shown as driving the entire machine, with the exception of the grinding and polishing wheels or stones, which in my drawings are shown as driven from a separate shaft, although in practice I have driven all the mechanisms from a  
10 single shaft with perfect success.

H<sup>1</sup> is a pinion on shaft H, which meshes with a gear-wheel, H<sup>2</sup>, on shaft H<sup>3</sup>, one end of which is journaled in yoke G<sup>4</sup> and the other  
15 end in a standard, A<sup>4</sup>, projecting upward from the bed. Motion is communicated from shaft H<sup>3</sup> to shaft G by means of beveled gears H<sup>6</sup> and G<sup>5</sup>, carried by said shafts.

H<sup>4</sup> is a face-cam upon gear-wheel H<sup>2</sup>, which  
20 actuates the extractor, as will be more fully explained.

H<sup>5</sup> is a cam-wheel having a peripheral cam-groove in which roll I<sup>3</sup> travels, said roll being carried by a pin projecting downward  
25 from plate I<sup>1</sup>, which reciprocates in ways I<sup>2</sup> in the feed table I.

I<sup>1</sup> is the hopper secured upon block I<sup>5</sup>, which is carried by the sliding-plate I'. The lower portion of the hopper is narrowed down, as  
30 at I<sup>13</sup>, so that but one needle can pass down at a time.

I<sup>4</sup> is the upper cross-slide, which reciprocates in ways I<sup>8</sup> in the block.

I<sup>1</sup> is the lower cross-slide, which is adapted  
35 to reciprocate in a groove in the upper cross-slide, but independently thereof. The upper cross-slide is actuated by a lever, I<sup>10</sup>, pivoted to the sliding plate I'. Each end of this lever carries a pin and roller, the rear end engaging  
40 the upper cross-slide, (see Fig. 19,) and the front end engaging a cam-plate, K, secured upon a bridge, I<sup>11</sup>, upon the feed-table.

K<sup>1</sup> is an open space cut out from the surface of the cam-plate, having a straight wall, K<sup>2</sup>,  
45 upon the right side, and an irregular cam-wall, K<sup>3</sup>, upon the left side.

K<sup>4</sup> is a switch-cam pivoted in the open space and provided with a cam-wall, K<sup>5</sup>, which forms, with wall K<sup>3</sup>, a groove in which the roll  
50 slides in its forward movement. The normal position of the switch-cam is as shown in Figs. 12 and 13, in which position it is held by a spring, K<sup>6</sup>, having a pin at its end which passes through an opening in wall K<sup>2</sup>.

55 In Fig. 12 the sliding plate I' is shown at its extreme forward position. As the plate moves backward the roll upon lever I<sup>10</sup> moves along the cam-wall K<sup>3</sup>, and between said cam-wall and the cam-wall of the switch-cam, which is moved outward against the power of spring  
60 K<sup>6</sup>. This movement of lever I<sup>10</sup> carries the upper cross-slide inward, as indicated in Fig. 13, which also shows the sliding plate I' at the opposite extremity of its movement from that  
65 shown in Fig. 12. From the position shown in Fig. 13 the sliding plate begins to move forward. The switch-cross having resumed

its normal position—the instant the roll passed beyond it, the roll in the return movement will pass along its opposite side—i. e., in the  
70 straight slot formed by the back of the switch-cam and the straight wall K<sup>3</sup> of the open space in the cam-plate.

I<sup>12</sup> is an arm projecting outward from lever I<sup>10</sup>, which bears against bridge I<sup>11</sup> when the  
75 return movement of the sliding plate is nearly finished, and acts to carry the forward end of lever I<sup>10</sup> over against cam-wall K<sup>3</sup>, and to return the upper cross-slide to the position  
80 shown in Fig. 12, the switch-cam being cut away, as at K<sup>10</sup>, to permit the roll to pass over against the wall K<sup>3</sup> again. It will thus be seen that the return movement of the cross-slide must take place in a much shorter time  
85 than is allowed for the forward movement. The lower cross-slide is provided on its under side with a roll, I<sup>9</sup>, which bears against a cam,  
K<sup>7</sup>.

K<sup>8</sup> is a spring recessed into the upper cross-slide and bearing against a projection, K<sup>9</sup>, on  
90 the lower one, which acts to hold said lower slide against cam K<sup>7</sup>. It will thus be seen that as the sliding plate I' moves forward and backward reciprocatory movement will be  
95 imparted to said lower cross-slide by cam K<sup>7</sup>; but such movement will be wholly independent of the reciprocation of the upper cross-slide.

L is a lever which I term the "needle-presser lever," which is pivoted in a yoke, L<sup>1</sup>, the  
100 shank L<sup>2</sup> of which is journaled in a standard, L<sup>3</sup>, secured to the sliding plate. The forward end of this lever is provided with a ball, L<sup>4</sup>, which engages in an undercut circular groove, L<sup>5</sup>, in block L<sup>6</sup>, which is attached to bridge I<sup>11</sup>.  
105 The shape of the block and groove are clearly shown in Fig. 16, the object being to impart both vertical and horizontal vibratory motions to lever L.

L<sup>7</sup> is the presser-spring, which is attached  
110 to the rear end of lever L. This spring is preferably a bow-spring, as shown in Fig. 19, the point of which passes into a slot, L<sup>8</sup>, in the narrow portion of the hopper, separating the  
115 shanks of the needles, as shown in Fig. 19, straightening them up and pressing them down, as will be again referred to. Suppose the sliding plate I' to be at its extreme backward position, lever L will be at the rear end  
120 of the groove, as in Figs. 13 and 16, and the point of spring L<sup>7</sup> will be out of slot L<sup>8</sup>. As the sliding plate I' moves backward—i. e., toward the front of the machine—no movement  
125 of lever L takes place while the ball remains in the straight portion of the undercut groove. After passing this portion of the groove there is an oblique portion of the groove. As the groove is undercut to correspond in shape with the ball, it is apparent  
130 that the ball must remain in the groove, no matter how much it may vary either vertically or horizontally from a right line. The action of the oblique portion of the groove as the sliding plate moves backward—i. e., toward

the front of the machine—is to carry the point of spring L' into the hopper, and between the needles, as shown in Fig. 19. At this moment the ball will have reached the inclined portion 5 of the groove. As the ball travels up the incline it of course acts to depress the rear end of lever L and the presser-spring, thus straightening up the shanks of the needles and pressing the lowest needle into the groove 10 between the shoulder *i* on the upper cross slide and the edge of plate *i'*, which is attached to projection K<sup>11</sup>, on the lower cross-slide. The upper cross-slide is cut away to form shoulder *i*, and plate *i'* lies over this cut-away portion, 15 as clearly shown in Figs. 17, 18, and 19, said cut-away portion of the upper cross-slide forming the bottom of the groove, into which the lower needle is forced. The downward pressure of spring L' continues while the ball is 20 traveling up the incline, and is held while the ball is in the straight portion *i'*, and until the ball has begun to travel down the incline in the forward movement of the sliding plate. As the ball travels down the incline the rear end 25 of lever L is lifted, the presser spring being made sufficiently elastic to yield until it is drawn out by the action of the oblique portion of the groove which throws the rear end of the lever to the position shown in Fig. 13. The 30 presser-spring is then forced into the hopper between the needle, again, and the action of straightening up the shanks and pressing a needle down into the groove between the cross-slides is repeated, as before, each reciprocation of the sliding plate imparting four 35 movements to lever L.

Fig. 17 shows the action of the presser-spring in straightening up the shanks of the needles and forcing the lowermost one out of 40 the hopper and into the groove between the plate *i'*, secured to the lower cross slide and shoulder *i* upon the upper cross-slide, both cross-slides being at their extreme positions toward the right. From this position both 45 slides move toward the left, the upper slide being actuated by lever I<sup>10</sup> and the lower slide with plate *i'* by cam K<sup>7</sup>. The two move evenly for a short distance, carrying the needle between them. The cam-wall K<sup>3</sup>, which actuates 50 lever I<sup>10</sup>, and through said lever the upper cross slide, and cam K<sup>7</sup>, which actuates the lower cross slide, are so "laid out" relatively to each other that when the upper cross-slide has traveled part (approximately 55 half) way across the lower cross-slide, carrying plate *i'* travels away from the upper cross-slide, leaving an open space between plate *i'* and shoulder *i* upon the upper slide, as indicated in Fig. 18, after which the movement of the 60 upper cross-slide is accelerated to "line up" the needle between the two slides. The object of this movement is to allow the needle-registering mechanism, which I will now describe, to act freely upon the needle.

65 M is a standard secured to block I<sup>8</sup>, to which a swinging arm, M', is pivoted.

M<sup>2</sup> is a presser-foot recessed within the

swinging arm and pivoted, as upon pin M<sup>3</sup>, so as to swing within the recess M<sup>4</sup> in the swinging arm. Within the swinging arm is a socket 70 in which is a spring, M<sup>5</sup>, acting against the presser-foot to force it down upon the needle, as indicated in Figs. 18 and 19.

M<sup>6</sup> is an arm projecting from the presser-foot, which carries a set-screw, M<sup>7</sup>, by which 75 the pressure may be regulated for different sizes of needles. The pivot pin M<sup>3</sup> of the presser-foot is elongated to form a stump, which is engaged by a pin, *i'*, upon plate *i'*. While the two cross-slides are in the position shown 80 in Fig. 18—i. e., while plate *i'* is running away from shoulder *i* pin *i'* upon plate *i'* comes in contact with the pivot-pin M<sup>3</sup>, thus acting to carry the presser-foot forward.

M<sup>8</sup> is a spring coiled around the pivot of the 85 swinging arm, whose ends bear, respectively, against the standard and the swinging arm, and which acts to hold the swinging arm against pin *i'*. As the action of spring M<sup>5</sup> is to hold the presser-foot down upon plate *i'*, 90 it follows that as the plate moves forward toward the left the presser-foot will move with it, and as soon as the needle comes under the presser foot it will be held thereby and rolled until the grooves of the needle shall be at top 95 and bottom, as clearly indicated in Figs. 18 and 19. After the operation of rolling by the spring presser-foot, which I term "registering the needle," the accelerated motion of the upper cross-slide, as already described, takes 100 place and the needle is lined up in the groove, ready to be grasped by the chuck.

M<sup>9</sup> is a set-screw passing through projection K<sup>11</sup> and bearing against the end of the 105 upper cross slide, the adjustment of which determines the proximity of plate *i'* and shoulder *i* at the extreme left of their movement, as in Fig. 19, it being essential that the needle be lined up in order to insure its being grasped by the chuck. At the same time there must 110 be no friction upon the needle, otherwise the chuck might not retain it.

As it is sometimes desirable to change the pressure on the needles in changing from large to small, or vice versa, I have provided a set- 115 screw, M<sup>10</sup>, in arm M<sup>6</sup>, bearing against the swinging arm, the adjustment of which determines the pressure of the foot upon the needle. After the needle has been grasped by the chuck, as will be more fully described, the forward 120 movement of the sliding plate begins, leaving the needle in the chuck. As soon as the plate has moved back far enough to clear the needle the return movement of the cross-slide takes place, caused by the engagement of arm 125 I<sup>12</sup> with the bridge I<sup>11</sup>, the two slides moving back together. Another needle is then received in the groove between shoulder *i* and plate *i'*, then carried forward and registered, and then grasped by the chuck, as before. 130

E represents a series of chucks upon the needle-carrying plate E, whose spindles E<sup>2</sup> are free to rotate in bearings E<sup>3</sup>, secured to said plate. These chucks may be of any preferred

construction; but I preferably split the end of the chuck, provide an internal socket to receive the shank of the needle, and an outward bevel at the outer end, which is engaged by a corresponding bevel upon a cap or sleeve, E<sup>4</sup>, which acts to close the jaws upon the shank of the needle as it is forced forward by a spring, E<sup>5</sup>, which bears against the end of the sleeve, and a shoulder, E<sup>6</sup>, upon the spindle.

E<sup>7</sup> is a crotched lever pivoted at the edge of plate E, the upper or crotched end of which engages a flange, E<sup>8</sup>, on the cap, and whose lower end engages a cam, A<sup>5</sup>, upon table D, the purpose of which will be more fully explained.

E<sup>9</sup> represents a presser-bar adapted to slide in guides E<sup>10</sup>.

E<sup>11</sup> is a gage at the point of the presser-bar, which is provided with a groove (not shown) in which the needle rests, and may be adjusted up or down to regulate the pressure of the points of the needles upon the stones.

E<sup>12</sup> is a lever pivoted to the under side of table E and working in a slot (see Fig. 4) in said table. The upper end of this lever engages the presser-bar, as at E<sup>13</sup>, and at its lower end is provided with a roll, E<sup>14</sup>, which at a certain stage in each revolution of the table engages a cam, A<sup>6</sup>, upon table D, the function of which will be more fully explained.

E<sup>15</sup> is a spring connected to lever E<sup>12</sup> and to the under side of plate E, which acts to draw the lower end of said lever inward and to throw the upper end, and with it the presser-bar, outward, as shown at the right in Fig. 4. In this position the gage is pressing upon the needle just back of the eye, and which holds the point of the needle firmly down on the stones. The pressure upon the needle may be changed by adjusting gage E<sup>11</sup> up or down. The outlines of cams A<sup>5</sup> and A<sup>6</sup> are indicated in Fig. 3. The chucks and presser-bars remain in the position relatively to each other and to the stones in which they are shown at the right in Fig. 4 for three-fourths of each revolution—i. e., while a needle in any one of the chucks is being subjected to the grinding action of the six stones, emery-belts, or whatever may be used.

It will of course be understood that the number of stones and the number of chucks used is not an essential feature of my invention, but the number of both may be varied within reasonable limits without departing from the spirit thereof. In the present instance I have shown eight needle-chucks and six stones, so that one chuck will be at the feeding device receiving a needle, one at each of the six stones or grinding wheels, and the eighth will be at the extractor delivering a finished needle. After a chuck, in the revolution of the table, has passed the last stone lever E<sup>12</sup> comes in contact with cam A<sup>6</sup> upon table D, which forces the lower end outward against the power of spring E<sup>15</sup>, and consequently carries the upper end of said lever, and with it the presser-

bar, inward, thus removing all pressure from the needle. At the same time that lever E<sup>12</sup> is acted on by cam A<sup>6</sup> lever E<sup>7</sup> comes in contact with cam A<sup>5</sup>, also upon table D, which forces the lower end of said lever outward and the crotched end (which bears against the flange on sleeve E<sup>4</sup>) inward against the power of spring E<sup>5</sup>, thus opening the chuck and allowing the needle to be seized by the extractor, the construction of which will presently be explained. Cam A<sup>5</sup> is hollowed in, as indicated in Fig. 3, so that during the instant of time that elapses after the finished needle has been removed by the extractor, and before a new needle has been seized by the chuck, lever E<sup>7</sup> resumes its normal position and spring E<sup>5</sup> forces the sleeve forward to close the chuck. This removes the pressure of shoulder E<sup>8</sup> against the bearing and of the lever against the flange on the sleeve, leaving the spindle free to rotate in its bearings during the time that the chuck-registering mechanism, which will presently be described, is acting. After the chuck-registering mechanism has acted the chuck is opened, as before, and seizes the needle, as indicated at the left in Fig. 3. At the instant that the shank of the needle has entered the chuck lever E<sup>7</sup> has reached the end of cam A<sup>5</sup>, which is abrupt. This allows spring E<sup>5</sup> to carry the sleeve forward, thus gripping the needle firmly and leaving lever E<sup>7</sup> at its normal position. Cam A<sup>6</sup> is beveled at both ends, but its outer or bearing surface is a curve concentric with the curve of the table, so that the forward and backward movements of the presser-bar are not abrupt, and during the time that elapses between said movements—i. e., while the finished needle is being removed by the extractor and the new needle is being seized by the chuck—both lever and presser-bar remain at the position indicated at the left in Fig. 4. The presser-bar does not advance to the position in which it is shown at the right in Fig. 4 until just before the new needle is acted upon by the first stone.

E<sup>16</sup> is a crank at the inner end of each chuck-spindle, having a pin, E<sup>17</sup>, which is adapted to be acted on by the chuck-registering cam, and also to engage in notches F<sup>7</sup> in flange F<sup>6</sup> upon plate F<sup>7</sup>.

E<sup>18</sup> is a spring coiled around each chuck-spindle, the end of which is attached to the crank and acts to hold the crank-pin down upon the surface of flange F<sup>6</sup>, or the chuck-registering cam, as may be, forces the pin into notches F<sup>7</sup>, and also acts to force the cranks outward on the spindles, keeping notches E<sup>19</sup> in the cranks in engagement with pins E<sup>20</sup> through the ends of the spindles. (See Fig. 6<sup>b</sup>.)

E<sup>21</sup> represents pinions on the chuck-spindles, which engage short sections of gear-teeth B<sup>2</sup>, which are attached to plate B<sup>1</sup>.

As stated above, plates F<sup>7</sup> F<sup>8</sup> are rigidly secured at the top of shaft F, being supported by bosses F<sup>8</sup> between the plates through which

screws pass. The shaft is oscillated by means of a crank carrying a roll which bears against cam G'. More than half of the periphery of this cam is provided with notches or depressions into which the roll drops, thus oscillating shaft F and the parts carried thereby. This cam is so timed as to make a full revolution for each forward movement of the needle-carrying table, the curved portions of the periphery of the cam (shown only in edge view) being in contact with the roll during that portion of the revolution of each chuck in which the finished needle is removed by the extractor and the new needle received from the cross slides. Just before the new needle reaches the first stone the crank-pin E<sup>17</sup> drops into the first notch in flange F<sup>6</sup>.

As stated above, table D, which carries the grinding and polishing wheels or emery-belts, is arranged to vibrate, but has no rotary movement. The vibratory movement of this table is imparted by a crank carried by shaft G, whose pin G<sup>6</sup> engages block G', which reciprocates in slot D' in the table, the effect of which is to give a backward and forward movement to table D for each forward movement of the needle-carrying table E. The movements of the two tables and plates F<sup>1</sup> F<sup>2</sup>, carried by shaft F, are so timed relatively to each other that before a needle has reached the first stone the presser-bar will have moved forward to hold the needle against the stone and crank E<sup>17</sup> will have dropped into the first notch in flange F<sup>6</sup>. Just before the needle reaches the stone, the forward movement of the needle ceases, and the backward movement of the vibrating table takes place, the needle-carrying table remaining stationary while the stone or emery-belt is moved backward under the needle. While this backward movement of the stone is taking place the engagement of crank pin E<sup>17</sup> in the notch F<sup>6</sup> imparts an oscillatory movement to the chuck and the needle carried thereby, which causes the point to roll backward and forward on the face of the stone, grinding off the corners more or less, as may be desired, the amount of oscillation imparted to the needle determining the shape of the point. At the instant that the stone has passed from under the needle the forward movements of both tables take place, table E moving forward sufficiently to carry the needle to the next stone, table D merely resuming its former position. While the forward movement of the needle-carrying plate is taking place pinion B<sup>2</sup> on the chuck-spindle engages the section of gear-teeth B<sup>3</sup>. (See Figs. 7 and 11.) The crank-pin is lifted out of notch F<sup>6</sup>, but is prevented from being carried over by plate F<sup>3</sup>, between which and the top of the flange it rides during the forward movement. As the spindle is forced to turn by the engagement of the pinion with the section of gear-teeth, but, as the crank, after the pin is lifted out of the notch, is held against further rotation by plate F<sup>3</sup>, it follows that pin E<sup>20</sup> will be forced out of notch E<sup>19</sup>, thus forcing the crank inward

against the power of spring E<sup>18</sup>, in which position it is held until the spindle has made a half-revolution, at which instant the pinion will have passed the last tooth in the section of gearing, and spring E<sup>18</sup> will again force the crank forward, causing notch E<sup>19</sup> to engage pin E<sup>20</sup>. An instant later the crank-pin drops into the next notch in flange F<sup>6</sup>, and the second stone is ready to pass under the opposite side of the needle from that which was acted on by the first stone.

As stated above, any number of stones or emery-belts and any number of needle-chucks may be used. In the present instance I have shown eight chucks and six stones, so that one chuck will be at the hopper receiving a needle, one at the extractor surrendering a needle, and there will be a chuck with a needle at each of the six stones. The stones I preferably arrange in pairs, so that the needle has to be turned but three times. For example, a needle is acted on by the coarsest stone. It is then turned and its opposite side acted on by a similar stone. It then passes without turning to a finer stone, after which it is again turned and the opposite side ground on a fourth stone similar to the third, and so on, no matter how many stones may be used, but three sections, B<sup>3</sup>, of gear-teeth being necessary in the arrangement I have shown to subject both sides of the point of every needle to the grinding action of each pair of stones, or, as stated above, emery-belts may be substituted, if preferred, the use of both stones and belts being old. These stones when in use revolve at a high rate of speed, motion being communicated thereto in any suitable manner. I have shown them as driven from a drum, A<sup>3</sup>, by means of belts D<sup>3</sup>, running over pulleys N<sup>1</sup> N<sup>2</sup>. The style of point to be ground is determined by a cam, B<sup>2</sup>, which I term the "chuck-registering cam." This cam is attached to plate B', and is so located that it will act on crank E<sup>16</sup> after the finished needle has been seized by the extractor, its action being to turn the spindle, and with it the chuck, into such a position relatively to the needle at the instant it is seized that when crank-pin E<sup>17</sup> drops into notch F<sup>6</sup> the eye of the needle will be at the angle relatively to the plane of the stones which is necessary to produce the desired style of point. It will of course be understood that a new cam must be substituted whenever the style of point is changed.

In Figs. 6 to 10, inclusive, I have illustrated the shape of the chuck-registering cams used in making the four principal styles of leather-needles. Fig. 6 illustrates the cam used in making a flat-pointed needle, the crank being in the position it occupies at the instant the needle is seized. Fig. 6<sup>a</sup> shows the position of the needle at the instant it is seized, one of the grooves being vertically above the other, it being rolled to this position by presser-foot M<sup>2</sup>. Fig. 6<sup>b</sup> is an edge view of the crank and pin in the position shown in Fig. 6. Fig. 7 illustrates the vibration of plates F<sup>1</sup> F<sup>2</sup> during

the grinding of a point, and Figs. 7<sup>a</sup> and 7<sup>b</sup> the extremes of vibration of the needle while it is being ground. Fig. 8 illustrates the style of chuck-registering cam used in making what are known as "old-style twist-points;" Fig. 8<sup>a</sup>, the normal position of the needle again, and Fig. 8<sup>b</sup> one of its positions while the point is being ground. Fig. 9 illustrates the chuck-registering cam used in making what are known as "cross" points, this style of point being ground at a right angle to the ordinary "flat" point. Figs. 9<sup>a</sup> and 9<sup>b</sup> show the normal position of the needle, and also the position at which the point is ground, the positions being the same. Fig. 10 illustrates the cam used in making what are known as "reverse-twist" points; Fig. 10<sup>a</sup>, the normal position of the needle, and Fig. 10<sup>b</sup> the position at which the point is ground.

I have illustrated and described the production of leather pointed needles alone, for the reason that the points are much more difficult to make. It will of course be understood without extended description that in making round pointed needles the needle-chuck registering cam, needle-oscillating cam, and cranks E<sup>6</sup> are omitted and the needle-chucks are caused to rotate by gears or in any suitable manner. After it has been acted on by the last stone the needle passes to the extractor. Before reaching the latter, however, the action of cam A<sup>6</sup> upon lever E<sup>12</sup> has forced the upper end of said lever, and with it the presser bar, inward, as shown at the left in Fig. 4, thereby removing all pressure from the needle. At the same time the action of cam A<sup>6</sup> upon lever E<sup>1</sup> forces the upper end of said lever inward, carrying sleeve E<sup>1</sup> with it, against the power of spring E<sup>3</sup>, thus releasing the grip of the chuck on the needle, as shown in Figs. 4 and 5.

Any ordinary style of ejector may be used in connection with the improvements I have described. I preferably, however, use an ejector constructed and operated as shown in Figs. 1, 2, 3, and 5.

O is a block rigidly secured to feed-table I, and provided with a dovetail groove, O'.

P is a slide having a spline, P', on its under side which corresponds in shape with groove O'.

R is the under or fixed jaw, which is attached to or made integral with the slide. The upper jaw, R', is pivoted between side pieces, R<sup>2</sup>, upon the under jaw. A spring, R<sup>3</sup>, between the jaws acts to hold them in their opened position. The shank of the upper jaw extends backward from the pivotal point and is curved downward, forming an incline, R<sup>4</sup>, the purpose of which will presently be explained.

S is a rock-shaft journaled in bearings S', secured to or made part of the feed-table. An arm, S<sup>2</sup>, projecting outward from the inner end of this shaft, bears upon the face of cam H<sup>1</sup>, being held in engagement therewith by a spring, S<sup>3</sup>, coiled around the shaft.

S<sup>4</sup> is an arm projecting from the upper end of the shaft, the outer end of which passes under the upper jaw of the extractor, and acts upon a lug, S<sup>5</sup>, upon the lower jaw to give the forward movement to the extractor, and upon incline R<sup>4</sup> to give it the backward movement.

The operation of the extractor is as follows: Cam H<sup>1</sup> is so timed as to make as many revolutions during one revolution of the needle-carrying table as there are needle-chucks carried thereby, said cam being laid out to give one oscillation—i. e., forward and backward movement to the rock-shaft during each of its revolutions. As the completed needle approaches the extractor arm S<sup>4</sup> is bearing against lug S<sup>5</sup>, which forces the jaws forward, spring R<sup>3</sup> acting to hold them open. At the instant that the needle is between the jaws of the extractor (the grip of the chuck on the needle having been released, as stated above) the reverse movement of the rock-shaft begins. This causes arm S<sup>4</sup> to bear against incline R<sup>4</sup>, which acts to close the upper jaw down firmly on the needle, and at the same time to carry the jaws, with the needle between them, backward away from the chuck. The instant arm S<sup>4</sup> begins to move forward again spring R<sup>3</sup> raises the upper jaw and the needle drops out into any suitable receptacle beneath, the operation being repeated for each needle.

The complete operation of pointing is briefly as follows: The needles are placed in the hopper with their shanks toward the center of the machine. The presser-spring L<sup>1</sup>, carried by lever L, acts to separate the shanks, straighten them up, and to press the lowest needle into the groove between the two cross-slides I<sup>1</sup> and I<sup>2</sup>, actuated, respectively, by lever I<sup>10</sup> and cam K<sup>1</sup>, which carry each needle to the needle-registering mechanism, by which the needle is rolled to bring the grooves one above the other, in a vertical line, after which the needle is lined up between the slides and is ready to be grasped by the chuck. The cranks at the inner end of the chucks are in turn acted on by a stationary cam, B<sup>2</sup>, as they grasp a needle, which places them in such positions relatively to the grooves of the needle that when it passes to the stones it is held in the proper position to grind the predetermined style of point. Having grasped a needle, each chuck in turn passes to the first grinding-stone. During the grinding the table remains stationary, while the stone moves backward under the needles, which meanwhile are slightly oscillated by the engagement of the cranks with the notches F<sup>1</sup> in flange F<sup>6</sup> upon plate F<sup>7</sup>, to which movement is imparted by action of cam G<sup>1</sup> on crank F<sup>2</sup>, the points of the needles being held down upon the stones by presser-bars E<sup>7</sup>. After the action of the first stone on the first needle it passes to a second stone similar to the first, having in the meantime been caused to make a half-revolution by the engagement of pinion E<sup>2</sup> with one of the short sections of gear-teeth B<sup>3</sup>. This causes the opposite side of the point

to be ground like the first side. Speaking of the first needle alone, it then passes to the third stone without making a half-revolution, which, however, is made between the third and fourth stones, and again between the fifth and sixth. The action is the same at each of the successive stones, the carrying-table remaining stationary, the chuck, with the needle therein, being slightly oscillated, and the stones moving backward under the needles as the carrying-table moves forward each time the oscillating table (which carries the stone) moves forward with it sufficient distance to resume its former position. Having been acted on by the last stone (it will of course be understood that the number of stones is immaterial, but both sides of the point should be ground alike) each needle in turn is removed by the extractor, and the empty chuck receives a new needle from the cross-slides.

I do not desire to limit myself to the exact construction which I have shown and described, as it is obvious that the details may be varied within reasonable limits without departing from the spirit of my invention.

I claim—

1. The combination, with the sliding plate, of a hopper which carries the needles, an intermittently-acting spring which presses them out singly, two cross-slides between which the needle is received, and a spring presser foot which registers the needles, whereby each is presented to the chuck with the grooves at the top and bottom.

2. The feed cam, the sliding plate carrying a roller engaging therewith, and cam  $K^1$ , in combination with the hopper, the cross-slides, and the spring presser-foot, all carried by the sliding plate.

3. The combination, with the bridge carrying grooved block  $L^6$ , cam-plate  $K$ , and switch-cam  $K^2$ , of the sliding plate carrying the cross-slides, the hopper, and the presser foot.

4. The combination, with the hopper, of cross-slides  $I^6$   $I^7$ , between which the needle is received, and mechanism—for example, lever  $I^9$ , cam-plate  $K$ , and switch-cam  $K^2$ , and roller  $I^8$ , and cam  $K^7$ —operating as described, whereby the slides, with the needle between them, are moved forward at a slight distance apart, then brought close together to line up the needle, the reciprocation of said slides being wholly independent of each other.

5. The sliding plate carrying lever  $I^9$ , which is provided with arm  $I^{12}$ , in combination with cross-slide  $I^6$ , operated by said lever, and the cam-plate having walls  $K^2$   $K^3$ , and pivoted switch cam  $K^1$ .

6. Cross-slide  $I^6$  and lever  $I^9$ , having rollers at each end, and arm  $I^{12}$ , in combination with cam-wall  $K^3$ , and the switch-cam having cam-wall  $K^2$ , by which the forward movement is imparted to said cross-slide, and bridge  $I^{11}$ , which is engaged by arm  $I^{12}$  to impart the backward movement thereto.

7. The bridge, the cam-plate having walls  $K^2$   $K^3$ , the switch-cam pivoted between said

walls, and having wall  $K^5$ , and cut-away portion  $K^{10}$ , and spring  $K^8$ , which acts on the switch-cam, in combination with lever  $I^9$ , which is carried by the sliding plate, and is provided with arm  $I^{12}$  and rollers at each end.

8. The hopper and two cross-slides between which the needles drop singly, in combination with mechanism—for example, a cam and lever, as shown—for carrying said slides forward at varying speed, and mechanism, as a swinging spring presser-foot, for registering the needles with the grooves at top and bottom, after which the plates close together to line up the needle.

9. The combination, with the cross slides and hopper, of a registering device, the same consisting of a swinging arm, a presser-foot pivoted to said arm by a pin,  $M^1$ , and a spring acting to force the presser-foot down, said registering device being actuated by a pin upon one of the slides which engages pin  $M^1$ .

10. Cross slide  $I^6$ , adapted to slide in ways  $I^8$ , cross-slide  $I^7$ , adapted to have independent motion within slide  $I^6$ , and having projections  $K^9$   $K^{11}$ , a spring between slide  $I^6$  and projection  $K^9$ , and a set-screw in projection  $K^{11}$ , to adjust the relative position of the slides in lining up the needle.

11. The sliding plate, the hopper, the cross-slides having spring  $K^8$  between them, and a set-screw to adjust their positions relatively to each other, in combination with the swinging arm pivoted to a standard upon the sliding plate, a spring presser-foot pivoted to the swinging arm and adjustable by a set-screw,  $M^1$ , and means, as a pin, upon one of the cross-slides to engage the sliding plate.

12. The hopper, cross-slides which receive the needles therefrom, and a spring presser-foot which registers the needles, in combination with a series of chucks carried by an intermittently-rotating table, by which the needles are presented to the stones.

13. The cross-slides, swinging spring presser-foot, and a series of chucks carried by an intermittently-rotating table, in combination with a series of stones carried by an oscillating table.

14. In a needle-pointing machine, a series of needle chucks which are closed by spring-actuated sleeves, levers pivoted to the rotating table, which engage the sleeves, and a cam,  $A^5$ , upon the oscillating table, which is engaged by said levers to open the chucks at a predetermined time.

15. In a needle-pointing machine, a series of chucks upon table  $E$ , which seize the needles, a series of presser bars above said chucks, which carry adjustable gages, and levers pivoted to said table which engage the presser bars, in combination with springs  $I^{15}$ , which act to throw the presser bars forward, and a cam,  $A^5$ , upon the oscillating table, which is engaged by said levers to remove the pressure of the gages upon the needles.

16. In a needle-pointing machine, the cross-slides, and a spring presser-foot which regis-

ters the needles, in combination with a series of chucks which seize the needles, said chucks having spindles with cranks at their inner ends, and a cam, B<sup>2</sup>, which is engaged by said cranks at the instant a needle is seized, and which acts to register the chuck relatively to the needle, whereby the style of point to be ground is determined.

17. A series of needle chucks carried by an intermittently-rotating table, said chucks having spindles provided with cranks, as shown, and a series of stones upon another table, in combination with a notched flange at the top of shaft F, with which the crank engages, and means, as cam G', for oscillating said shaft, whereby the needle is oscillated on its axis while being acted on by the stones.

18. The chucks carried by table E, said chucks having spindles provided with pinions E<sup>1</sup>, springs E<sup>18</sup>, pins E<sup>20</sup>, and cranks E<sup>16</sup>, having notches E<sup>19</sup>, in combination with stationary sections of gear-teeth B<sup>3</sup>, and plates F<sup>7</sup> and F<sup>3</sup>, whereby at predetermined times the chucks are caused to make a half-revolution to present both sides of the points to the stones.

19. In a needle-pointing machine, a series of intermittently-oscillating needle-chucks carried by an intermittently-rotating table, and a series of stones upon another table, in combination with a spring presser-foot which registers the needles, and a stationary cam which registers the chuck as it seizes the needle, whereby the style of point is determined.

20. A series of needle-carrying chucks carried by a rotating table, and a series of stones upon another table, in combination with a series of presser-bars carrying adjustable gages, which press the points of the needles against the stones, and pivoted levers connected to said presser-bars and engaging a cam upon the oscillating table, whereby the presser-bar is drawn inward after passing the last stone and held until a new needle is seized.

21. A series of intermittently-oscillating needle-carrying chucks carried by a rotating table, and a series of stones upon another table, in combination with stationary sections of gear-teeth which engage pinions upon the chuck-spindles, and at predetermined times impart to said spindles a half-rotation, whereby both sides of the points are ground alike.

22. Table E, which carries a series of needle chucks, and table D, which carries a series of revolving stones, in combination with mechanism, as a star-wheel engaged by an arm, whereby intermittent rotary motion is imparted to table E, and mechanism, as a sliding block and crank, for imparting oscillatory motion to table D, whereby each needle is carried to a stone which is moved backward under the needle, then the needle passes forward to the next stone, the first stone moving with it to its former position.

23. A series of needle-carrying chucks upon an intermittently-rotating table, and a series

of stones upon an oscillating table, in combination with mechanism, as cranks upon the chuck-spindles, which engage a notched oscillating plate, whereby the needle-points are oscillated on the stones.

24. A series of rotating stones upon an oscillating table, a series of chucks upon an intermittently-rotating table, and spring actuated sleeves which close said chucks upon the needles, in combination with levers pivoted to the rotating table, and a cam upon the oscillating table, which engages said levers, whereby said chucks are opened and held open during part of each revolution.

25. In a needle-pointing machine, the cross-slides which feed the needles, a series of chucks which seize and hold them, an intermittently-rotating table which carries said chucks, a series of stones upon an oscillating table, which grind the points, and jaws actuated by a rock-shaft, which remove the needles from the chucks.

26. The combination, with the cross-slides and the registering mechanism—for example, a swinging presser-foot—of the chucks carried by a rotating table, and the grinding-stones.

27. Feeding mechanism, as the hopper and cross-slides, and registering mechanism, as a spring presser-foot, in combination with a series of carrying-chucks upon a rotating table, a series of grinding-stones, and an extractor.

28. In a needle-pointing machine, the combination, with feeding mechanism—for example, a hopper and cross-slides, as shown, and independent chucks which grasp the needles—of a device—for example, a swinging spring presser-foot—whereby the needles are partially turned to register them with the grooves at top and bottom, so that each needle occupies the same relative position when grasped by a chuck.

29. The combination, with the cross-slides, chucks, rotating table, and stones, of an extractor consisting of a sliding block, a rigid jaw upon said block, a pivoted spring-lifted jaw having an incline, and an arm upon a rock-shaft, which bears against the rigid jaw to carry the extractor forward, and against the incline to carry it back and to close the jaw.

30. In a needle-machine, a device for registering the needles, the same consisting of a cross-slide, a swinging presser-foot, whereby the needles are rolled upon the cross-slide, and means—for example, pins M<sup>2</sup> and M<sup>3</sup>—for actuating the presser-foot, substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

PHILO M. BEERS.

Witnesses:

A. M. WOOSTER,  
WM. A. JONES.