2 Sheets—Sheet 1.

J. P. BLAKE.

MACHINE FOR MAKING SEWING MACHINE NEEDLES.

No. 36,392. Patented Sept. 9, 1862.

Fig. 1.

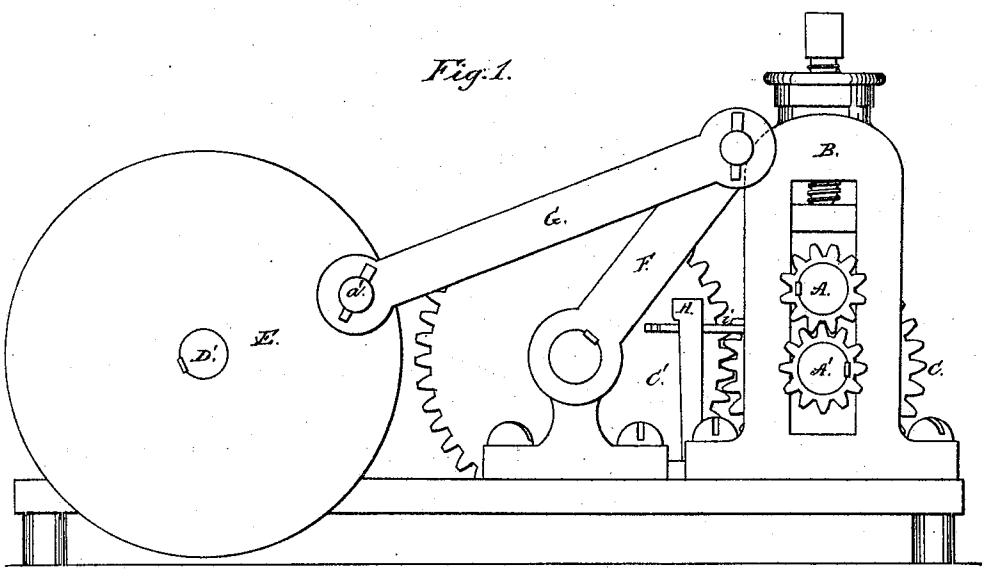

Fig. 7.

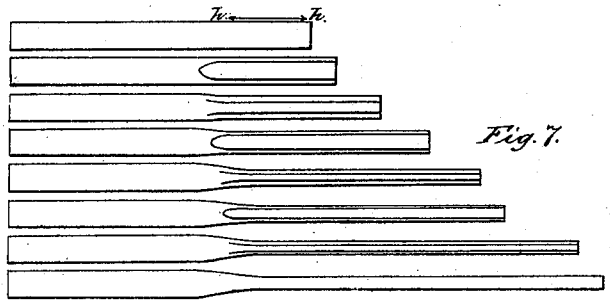

Fig. 2.

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Inventor:
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2 Sheets—Sheet 2.

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Fig. 3.

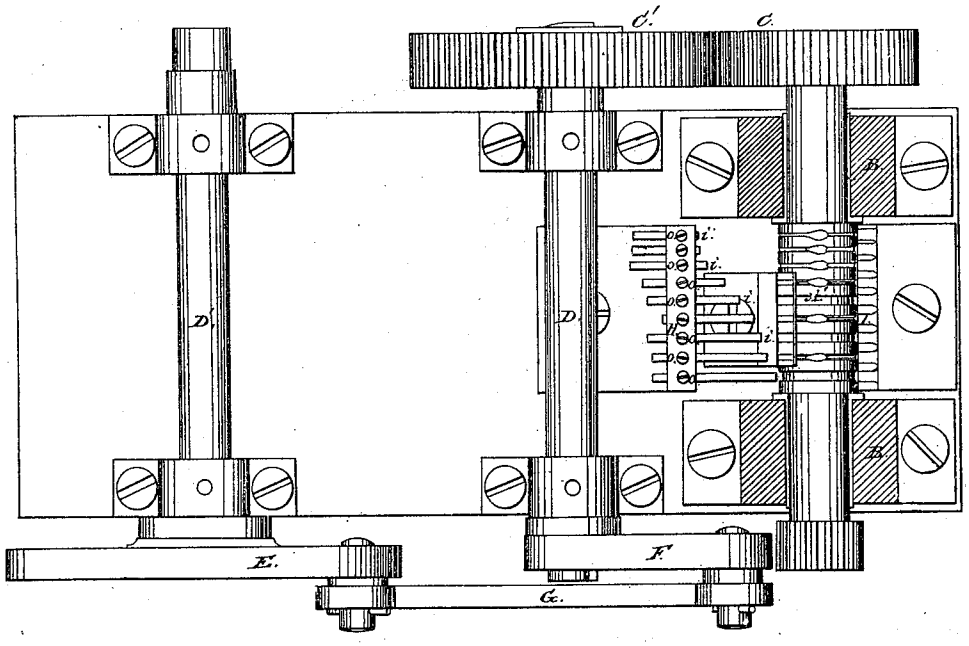


Fig. 4.

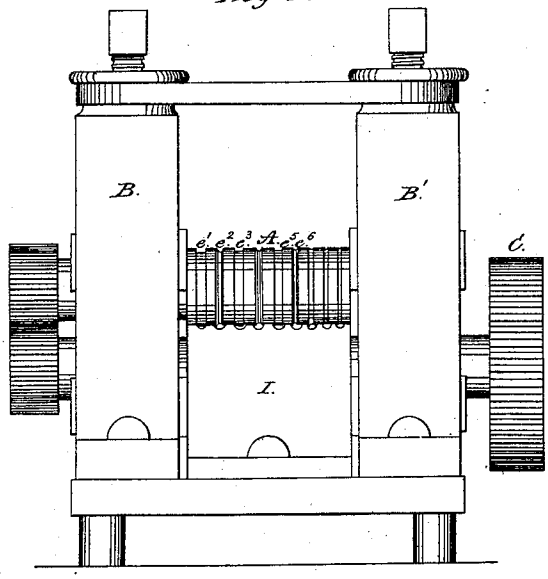
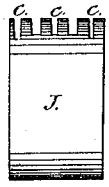
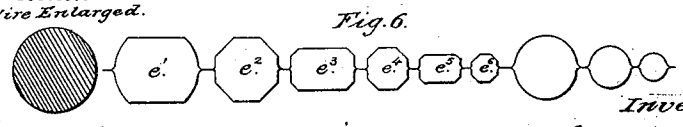


Fig. 5.



Section of Wire Enlarged.

Fig. 6.



Witnesses:
E. F. Renwick
W. L. Bennett.

Inventor:
James P. Blake

UNITED STATES PATENT OFFICE.

JAMES P. BLAKE, OF WATERBURY, CONNECTICUT.

IMPROVEMENT IN MACHINERY FOR MAKING SEWING-MACHINE NEEDLES.

Specification forming part of Letters Patent No. **36,392**, dated September 9, 1862.

To all whom it may concern:

Be it known that I, JAMES P. BLAKE, of Waterbury, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Rolling Machinery for Rolling Sewing-Machine Needles, &c.; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a side elevation of rolling machinery embodying my invention. Fig. 2 represents a vertical longitudinal section of the same. Fig. 3 represents a plan of the same with the upper roll and portions of the roll-stands removed. Fig. 4 represents a front elevation of the rolls and stands. Fig. 5 represents an elevation of the guide behind the rolls. Fig. 6 represents a view of the grooves of the rolls on an enlarged scale, and Fig. 7 represents the steel wire in different stages of progress into a sewing-machine needle and upon an enlarged scale.

I have invented a new method of manufacturing sewing-machine needles, for which I have made application for Letters Patent upon the same date as this application.

The machinery which is the subject of the present patent was invented by me mainly for the purpose of practicing my said new method of manufacture, although parts of this invention are applicable to rolling metals for other purposes.

The first part of my present invention consists in the combination of rolls fitted with grooves alternately flat and octagonal for the purpose of reducing the transverse dimensions of metal rods and elongating them in length.

The second part of my invention consists in the combination of rolls having grooves with enlarged spaces of sufficient size to permit the butt of the piece of metal whose dimensions are to be reduced to be introduced between the rolls, with a series of gages which determine the longitudinal positions of the rods or pieces of metal before the rolls begin to act upon them.

The third part of my invention consists in the combination of rolls grooved substantially as described, with gages to determine the longitudinal positions of the rods, and with guides which hold the rods edgewise when the rolls begin to act upon them.

All parts of my invention are embodied in the rolling machinery for rolling sewing-machine needles represented in the accompanying drawings, wherein the pair of grooved rolls used, A A′, are represented as supported one above the other in stands B B′, which contain the boxes in which the journals of the rolls turn. The driving ends of the rolls, which project beyond one of the stands B, are fitted with pinions that cause the barrels of the two rolls to turn in unison. The opposite driving end of the lower roll, A′, is fitted with a cog-wheel, C, whose teeth engage in those of a cog-wheel, C′, secured to a rock-shaft, D, to which a rocking motion is imparted from a revolving driving-shaft, D′, by means of a crank, E, on the driving-shaft, a crank-arm, F, upon the rock-shaft, and a connecting-rod, G, which connects the crank-pins *a a′* of the crank E and crank-arm F. The crank-arm of the rock-shaft D is of longer radius than the crank of the driving-shaft D′; hence the rotation of the latter imparts a rocking motion to the rock-shaft, and this latter, by means of the two cog-wheels C C′, communicates a corresponding alternating movement to the two rolls A A′. By reason of this alternating movement the rolls turn alternately in opposite directions, and as the movement is imparted by a crank their barrels at the end of each movement are brought gradually to rest before they commence to turn in the opposite direction.

The rolls represented in the drawings contain nine grooves, six of which are used for reducing the metal to the required size, and three for giving the reduced metal the cylindrical form of the body of the needle. The forms of these grooves are represented on an enlarged scale at Fig. 6. The reducing-grooves are alternately flat and octagonal. The office of the first groove, e', is to flatten the wire on its opposite sides. The flattened wire from the first groove is subjected edgewise to the action of the second groove, e^2, which transforms the flattened portion into an octagonal prism, elongating it in length in proportion to its decrease in cross-section. The octagonal prism from the second groove is flattened by the action of the third groove, e^3, and elongated. The flattened piece from the third groove is subjected edgewise to the fourth groove, e^4, and is transformed thereby into an octagonal prism

with a corresponding elongation. The octagonal prism from the fourth groove is flattened by the fifth, e^5, and is again transformed into an octagonal prism by the sixth groove, e^6, each change in cross-section being attended with a corresponding elongation. The octagonal prism produced by any one of the three octagonal grooves can be rounded and finished by subjecting it twice to the action of one of the three round grooves, the wire being turned one-quarter round before the second treatment by the round groove.

The decreasing flat and octagonal grooves reduce the wire to the size required for finishing into the body of the needle; but as the shank of the needle is to remain of the size of the original wire the machinery described is adapted to form the body without reducing the shank, and to make the shoulder (or that part of the needle which connects the body and shank) of conical form. This is effected by cutting the grooves deeper at the parts of the rolls which are opposite to each other at the time they come to rest previous to turning in the direction of the arrows in the drawings, Fig. 2, and by combining a series of gages, *i*, with the rolls to determine the position of the steel wire when the rolls begin to act upon it. These gages consist of a series of rods, *i i*, supported opposite the grooves of the rolls by a rest, H. The gages pass through openings in the rest and are made fast therein by set-screws *o*, so that they can be adjusted with their ends at any desired distances from the centers of the rolls. The gages are so set that when the wire taken from any preceding groove of the rolls is inserted into a succeeding groove the part of the wire which is to form the shoulder of the needle will be in the right position to be acted upon by the shouldering-space of the groove when the end of the wire is in contact with the adjacent end of the gage at the time the rolls begin to bite upon the wire; and in order that the shoulder of the needle may be of conical form, the portions of the grooves which connect the deepest parts with the remainder are tapered into each other, instead of meeting abruptly.

A rest, I, having a series of shallow grooves corresponding in position and height with the lines in which the wire is to be inserted between the rolls, is placed in front of them to enable the attendant to insert the wire readily; and in order that the wire from the flattening-grooves may be held with certainty edgewise when the octagonal grooves are to act upon it a guide-plate, J, is supported behind the rolls with a flat guide-groove, *c*, in it opposite each octagonal groove, of the right size to receive the flattened wire of the preceding flattening-groove when it is inserted edgewise into it.

In order that the attendant, when inserting the wire between the rolls, may place its end in contact with the proper gage with certainty, I apply to each gage a tubular case whose end extends up to the guide-plate J, and is made funnel-shaped, so as to permit the free entrance of the end of the wire inserted between the rolls.

In manufacturing sewing-machine needles with this machinery steel wire is selected of the size of the shanks. The driving-shaft D is caused to revolve continuously by power, and in consequence thereof the rolls turn alternately to and fro. The attendant, standing in front of the rolls, inserts the end of the wire through the enlarged part of the first groove at the time the rolls come to rest previous to turning in the direction of the arrows in Fig. 2, and pushes the wire through the rolls until its end strikes the gage for that groove. Then as the rolls turn in the direction of the arrows the shallow portions of the grooves bite upon the wire and roll it toward the attendant, at the same time flattening it and elongating it. The attendant turns the wire one-quarter round and inserts it in the second groove, when the rolls again come to rest, as before, taking care that the end of the flattened portion is in contact with the gage, and that the flattened portion is in the groove of the guide J, so that the wire is subjected edgewise to the octagonal groove. When the end of the flattened portion is in contact with the gage, the shoulder partially formed at the first operation is in the proper position at the time the rolls again bite upon the metal and roll it toward the attendant. The wire is submitted in this manner successively and alternately to flat and octagonal grooves until it is sufficiently reduced in size, when it is finished by the proper round groove, as before stated. Each successive action of the rolls reduces the cross-section of the wire that is to form the body of the needle and elongates it in length, while the shank, being unaffected, retains its size, and the shoulder, being acted upon by the tapering portions of the grooves, receives a conical form.

The various changes in form which the metal undergoes by these operations is shown on an enlarged scale at Fig. 7, from which it will be seen that no metal is wasted in the process, but that the whole of the body of the needle is elongated out of a short portion, *h h'*, of the original wire. Not only is there no loss, but the surface metal of the original wire is incorporated into the body of the needle, so that the toughness and density of the surface metal of the wire are retained in the needle. Moreover, as the successive grooves hug the metal tightly and prevent its spread laterally while it is extended in length it is rendered even denser than the original wire, and I have found by trial that the steel is improved by the operation. If the steel should be too hard tempered to permit of the continuous formation of the needles, it should be annealed, which may be done in the usual manner and at the discretion of the manufacturer. If the shank is to be of as small diameter as the first octagonal groove, wire of suitable size is selected and subjected first to the second flat groove. If drawn wire of suitable size

for this purpose is not at hand, wire of a larger size may be obtained and reduced in size previous to subjecting it to the body-forming rolls by subjecting it to the action of grooved rollers revolving continuously in one direction and furnished with flat and octagonal grooves of proper sizes constructed according to the first part of my invention. In working with the machinery the needles may be cut off as fast as formed, or the wire may first be cut into lengths sufficient to form two needles, and each end of these needle-blanks may be subjected in succession to the rollers, thus forming a needle-body at each end of the piece, leaving the two shanks attached to each other, butt to butt, after which the two may be cut apart.

I have described one pair of rolls as containing a sufficient number of grooves arranged in regular order to reduce and finish the bodies of the needles; but it is obvious that the grooves may be arranged in any order and that two or three more pairs of rolls might be used, each pair containing a portion of the grooves required, and then the same mode of operation could be practiced by subjecting the wire in succession to those grooves of the several pairs of rolls which properly succeeded each other in size and form.

It is also obvious that the rolls instead of turning alternately in different directions might be arranged to turn continuously in the directions of the arrows in Fig. 2, provided the enlarged portions of the grooves were extended sufficiently round the rolls to permit the introduction of the wire through the grooves and its projection against the gages before the shallow portions of the grooves began to act upon it; but there must always be a sufficient length of the shallow portion of each groove to act upon the length of wire which is submitted to it.

The bodies of the needles formed by my machinery may be pointed, grooved, and drilled in the usual manner.

Having thus described my improved machinery, it is proper to state that I am aware that metal rods have for a long period been reduced in diameter and elongated in length by passing them between grooved rollers whose grooves decreased progressively in cross-section. I am also aware that grooves of various forms have been tried for this purpose with greater or less success; but I believe that I am the first who discovered that metal rods can be reduced in diameter with greater success by means of grooves which alternately flatten the rods and impart to them an octagonal form than they can by grooves of any other form, and that steel wire can be readily rolled down and elongated in length with greater facility by such grooves than by the usual process of drawing through a draw-plate.

What I claim as my invention in this patent is—

1. The combination of rolls fitted with grooves alternately flat and octagonal for the purpose of reducing the transverse dimensions of metal rods and elongating them in length, substantially as described.

2. The combination of rolls having a groove with an enlarged space of sufficient size to permit the butt of the piece of metal whose dimensions are to be reduced to be introduced between the rolls with a gage which determines the longitudinal position of the rod or other piece of metal before the rolls begin to bite upon it, substantially as described.

3. The combination of rolls grooved, substantially as described, with gages (to determine the positions of the rods of metal) and with guides, (which hold the rods edgewise when the rolls begin to act upon them.)

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Witnesses:
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E. S. RENWICK.