J. P. Blake,

Making Sewing Machine Needles,

No. 36,391, Patented Sept. 9, 1862.

Fig. 1.

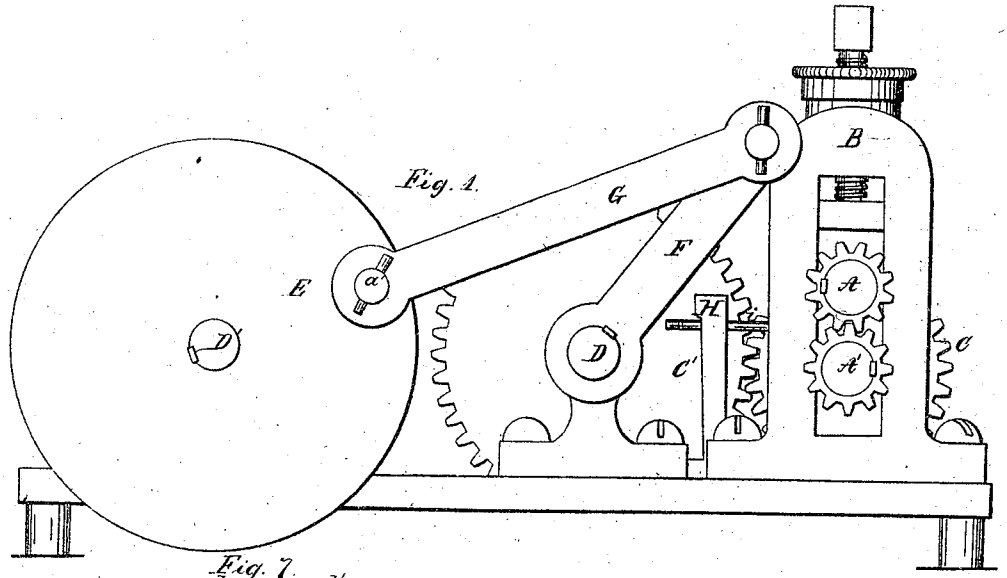

Fig. 7.

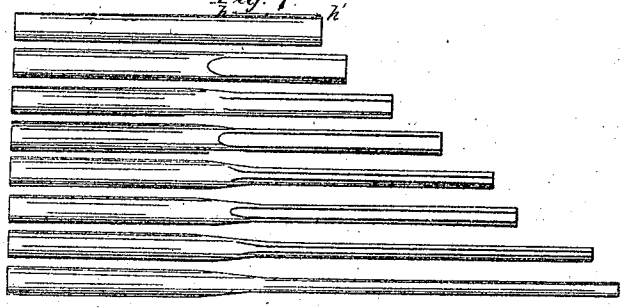

Fig. 2.

Witnesses.

C. L. Renwick

H. C. Ransom

Inventor

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Fig. 3.

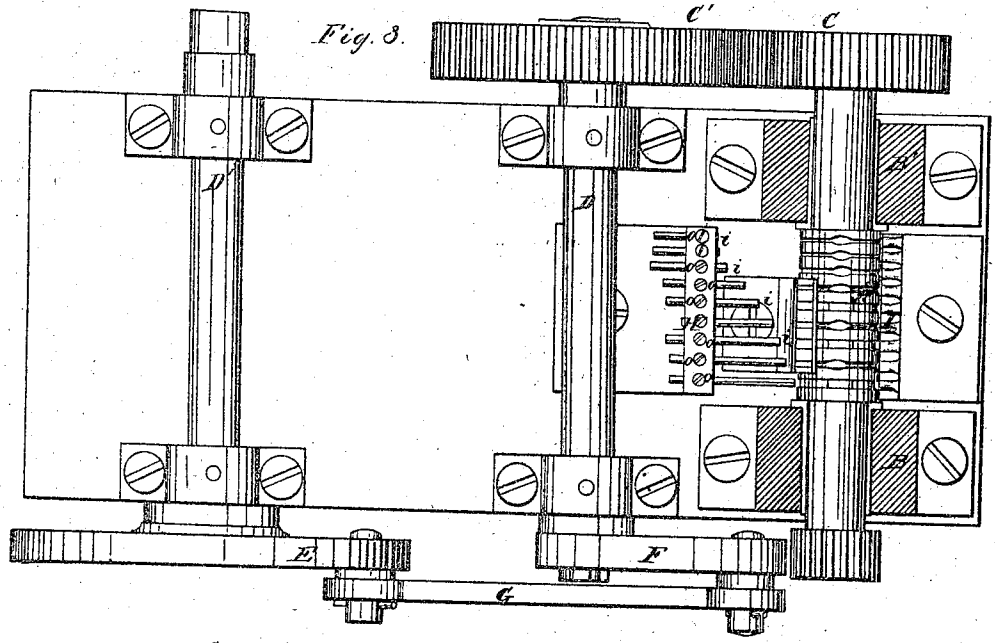


Fig. 6.

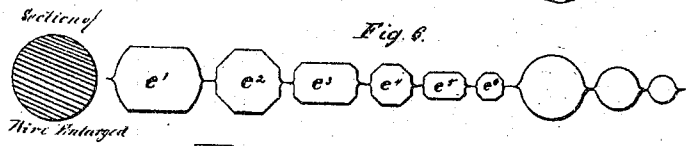


Fig. 5.

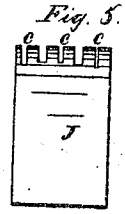
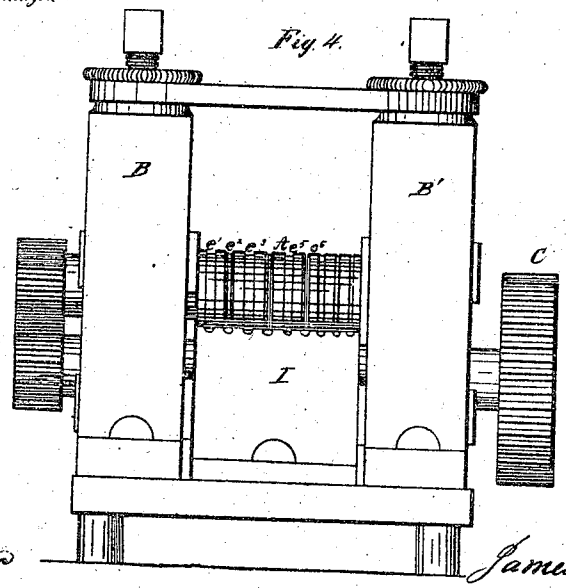


Fig. 4.



Witnesses

E. F. Prescott

H. L. Bennett

Inventor:

James P. Blake

UNITED STATES PATENT OFFICE

JAMES P. BLAKE, OF WATERBURY, CONNECTICUT.

IMPROVEMENT IN MAKING SEWING-MACHINE NEEDLES.

Specification forming part of Letters Patent No. **36,391**, 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 a new and useful Improvement in the Art of Making Needles for Sewing-Machines; 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 machinery used by me in practicing 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 views of the grooves upon an enlarged scale; and Fig. 7 represents views of the needle-wire at different stages of its formation into the needle, upon an enlarged scale.

The larger part of needles for sewing-machines have shanks of larger diameter than their bodies, and such needles have hitherto been formed from steel wire of the size of their shanks and of the length of the needles by paring off the metal from the surface inward until a core is left of the diameter of the body of the needle; and in practicing this method cutting or grinding tools are used to remove the surplus metal from the exterior. This method is defective for several reasons. In the first place, the body of the needle is formed out of the core of the wire, and, as it is well known that the metal at the core of wire is always less dense and less tough than the metal near and at the surface of the wire, the bodies of the needles are made of that portion of the wire which is of the poorest quality. Then, again, a large proportion of the metal is wasted in the manufacture, because the metal of that portion of the wire which surrounds a core of the size of the body of the needle is cut away in chips or is ground into powder. The method also requires a large expenditure of hand-labor to keep the cutting-tools in order and attend to their working, and this labor must necessarily be done by skilled workmen of a high class.

The object of my invention is to make better needles than can be made by the old method out of the same material and at lower cost; and to this end my invention consists in the method of making sewing-machine needles by machinery which elongates the portion of the wire which is to form the body of the needle, thus reducing it in diameter and extending it in length.

By this improvement the steel near to and at the surface of the wire is worked into the body of the needle instead of being pared off and wasted, so that considerable material is saved, and as this portion of the wire is denser and tougher than the core the needles produced are of better quality. Moreover, the attenuation of the steel wire by the peculiar system of rolling which I employ in practicing my invention has the effect of rendering the body of the needle even tougher than the original wire. My method also admits of the employment of boys and girls unskilled in the use of delicate cutting-engines, and hence the labor of manufacturing is less costly that that required by the old method of manufacture.

In practicing this new method I employ rolling machinery, for which I have made an application for Letters Patent at the same date as this application. This machinery is 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

) rest before they commence to turn in the pposite direction.

The rolls represented in the drawings con- ain nine grooves, six of which are used for re- ucing the metal to the required size and three or giving the reduced metal the cylindrical orm of the body of the needle. The forms of hese grooves are represented on an enlarged cale at Fig. 6. The reducing-grooves are al- ernately flat and octagon. The office of the rst groove, e', is to flatten the wire on its op- osite sides. The flattened wire from the first roove is subjected edgewise to the action of he second groove, e^2, which transforms the attened portion into an octagonal prism, longating it in length in proportion to its de- rease in cross-section. The octagonal prism rom the second groove is flattened by the ac- ion of the third groove, e^3, and elongated. he flattened piece from the third groove is ubjected edgewise to the fourth groove, e^4, nd is transformed thereby into an octagonal rism with a corresponding elongation. The ctagonal prism from the fourth groove is flat- ened by the fifth, e^5, and is again transformed nto an octagonal prism by the sixth groove, ^{6}, each change in cross-section being attended /ith a corresponding elongation. The octago- al prism produced by any one of the three ctagonal grooves can be rounded and finished y subjecting it twice to the action of one of he three round grooves, the wire being turned ne-quarter round before the second treatment y the round groove. The decreasing flat nd octagonal grooves reduce the wire to he size required for finishing into the body f the needle; but as the shank of the nee- lle is to remain of the size of the original vire, the machinery described is adapted to orm the body without reducing the shank nd to make the shoulder (or that part of he needle which connects the body and shank) f conical form. This is effected by cutting the rooves deeper at the parts of the rolls which re opposite to each other at the time they ome to rest previous to turning in the direc- ion of the arrows in the drawings, Fig. 2, and y combining a series of gages, *i*, with the rolls o determine the position of the steel wire vhen the rolls begin to act upon it. These gages consist of a series of rods, *i i*, supported pposite the grooves of the rolls by a rest, H. The gages pass through openings in the rest nd are made fast therein by set-screws *o*, so hat they can be adjusted with their ends at ny desired distances from the centers of the olls. The gages are so set that when the wire aken from any preceding groove of the rolls s inserted into a succeeding groove the part f the wire which is to form the shoulder of he needle will be in the right position to be cted 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 he rolls begin to bite upon the wire, and in rder that the shoulder of the needle may be f conical form the portions of the grooves which connect the deepest parts with the re- mainder 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 be- tween 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 en- trance 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 ends of the wire through the enlarged parts of the first groove at the time the rolls come to rest pre- vious 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 direc- tion of the arrows, the shallow portions of the groove 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 be- fore 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, re- tains 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 are 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. In working with the machinery, the needles may be cut off as fast as formed, or the wire may first be cut into length 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 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.

I do not in this patent claim the novel parts of my machinery, as these form the subject-matter of another patent; but

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

The method of making sewing-machine needles by machinery which elongates the portion of the wire which is to form the body of the needle, thus reducing it in diameter and extending it in length, substantially as described.

In testimony whereof I have hereunto subscribed my name.

JAMES P. BLAKE.

Witnesses:
W. L. BENNEM,
E. S. RENWICK.