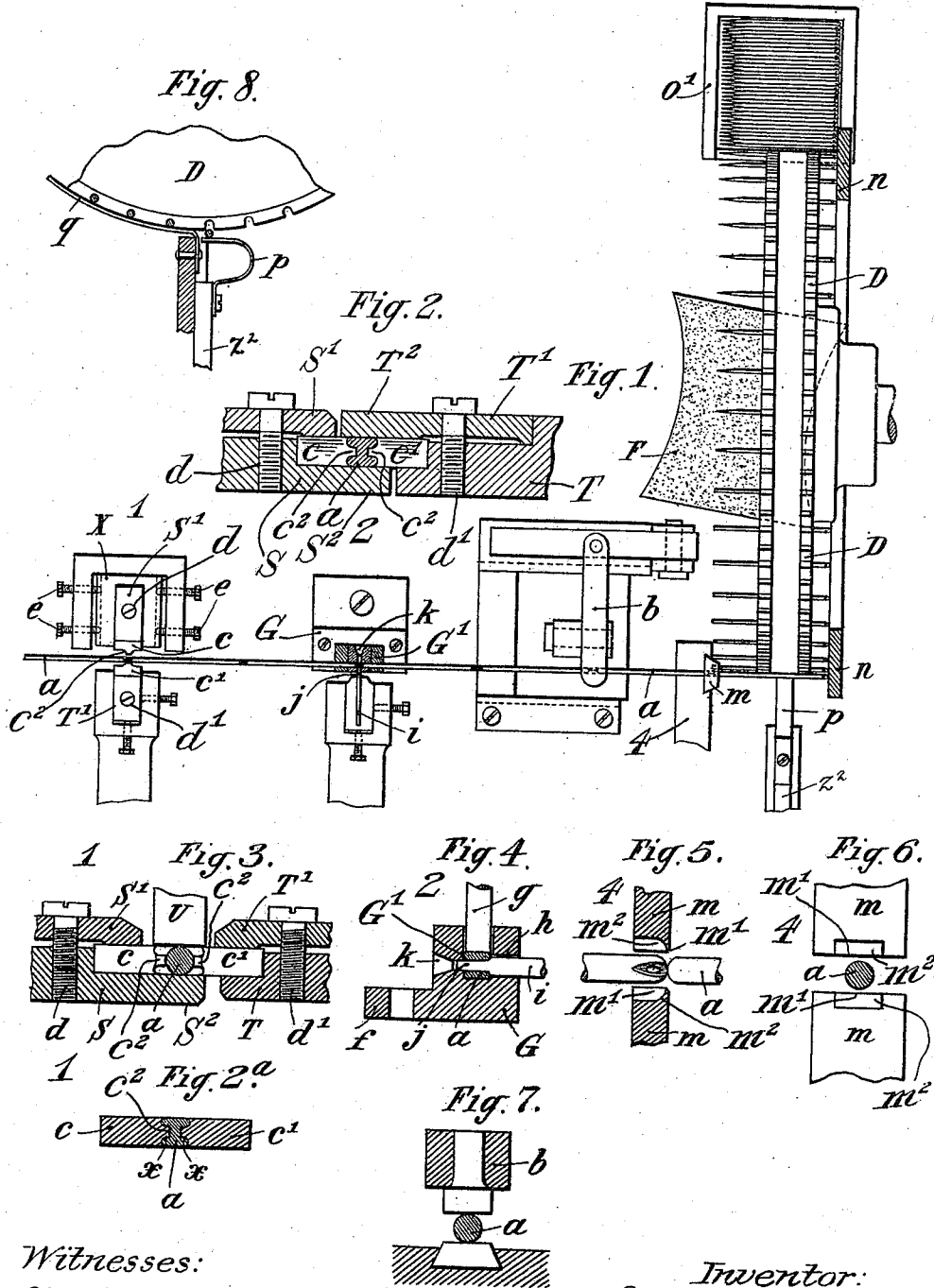


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MANUFACTURE OF NEEDLES.
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MANUFACTURE OF NEEDLES.

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To all whom it may concern:

Be it known that I, PAUL BOHIN, a citizen of the French Republic, and a resident of Paris, France, have invented certain improvements in the Manufacture of Needles, of which the following is a specification.

Heretofore, in the practical manufacture of needles, it has been customary to employ seven different machines, and in order to bring the work performed with the aid of these machines into completed shape ready for tempering, it has heretofore been customary to supplement the operation of these several machines with three manual operations, whereby it will be evident that the manufacture of these articles as commonly practiced is comparatively complicated and expensive not only by reason of the mechanisms required, but also on account of the time necessary for performing the several operations, and the considerable degree of care and skill required to be exercised by the operatives for securing good results.

The present invention relates to an improved process of manufacturing needles which permits of finishing the needles ready for tempering by mechanical means alone, the several operations necessary for the completion of the work being performed as the successive steps of a single process, and without requiring intermediate handling, whereby material advantages and greater convenience are attained, together with increased economy by reason of the lessened time and labor required, and on account of the elimination of care and skill of the operative as factors in the manufacture of the needles.

As distinguishing my present invention from the prior art, it may be stated that my improved process as herein set forth includes the following features of novelty and advantage:

1. The improved process permits of utilizing all of the thickness of the metal wire or strip in the formation of the head of the needle, in such a manner as to effectively obviate the production of beards or projections along the sides of the head such as have hitherto been unavoidable in the process of manufacture, and which have heretofore necessitated the employment of a special mechanism for their removal. According to my improved process, as herein set forth, the head of the needle is formed by means of matrices which closely resemble printing

types, and which compress the wire from which the needle is produced and serve to form or mold the entire circumference of the head thereof, so that the surfaces of said head may be made perfectly smooth and uniform, and free from even the thinnest or slightest of such beards or projections.

2. A second material feature of my improved process as herein set forth resides in the piercing of the eye of the needle, this operation being performed during the application of pressure of the sides of the needle head in a direction perpendicular to the direction of movement of the piercing tool, so that, during such piercing of the eye, the metal of the head is not permitted to be reflected in a direction opposite to the piercing, whereby deformation of the needle-head is effectively prevented.

3. The severing of the needles at the juncture of the head of one needle with the point of the succeeding needle is performed with the aid of two movable cutters, to which are imparted such formations as permit them to produce a smooth rounded surface upon the butt end of the severed needle simultaneously with its separation from the metal wire or strip from which the needles are produced.

4. The preliminary production of thread grooves in opposite sides of the wire or strip from which the needle is to be formed, whereby a weakened part of reduced cross section is produced in the wire or strip, and the employment of an endwise movable piercing punch traversing such thinned or weakened portion of the wire or strip from side to side and in alinement with such thread grooves. Such preliminary weakening of the wire or strip permits the punch to be forced through the same with comparatively little effort and the endwise movable punch is very advantageous in permitting the formation of elongated eyes such as are commonly provided for sewing needles.

I will now proceed to describe my invention with reference to the accompanying drawings, wherein—

Figure 1 is a somewhat diagrammatic view showing an apparatus for carrying out my improved process; Fig. 2 is a view drawn upon an enlarged scale, and showing, in transverse section, certain parts of the apparatus for forming the thread grooves; Fig. 2^a is a sectional view showing the matrices

illustrated in Fig. 2, detached from the carriers; Fig. 3 is a view similar to Fig. 2, but showing a modified formation of the parts therein illustrated; Fig. 4 is a view similar to Fig. 2, but showing certain parts of the apparatus for piercing the needle eye; Fig. 5 is a transverse sectional view showing certain features of the means for separating the needle from the metal wire or strip and for simultaneously rounding or forming the butt end thereof, and Fig. 6 is a face view of the separating means shown in Fig. 5; Fig. 7 is a sectional detail view showing the gripper for feeding the wire through the machine, and Fig. 8 is a fragmentary detail view showing certain features of the means for delivering the severed needle to the turret of the machine.

In these views *a* represents the metal wire or strip from which the needles are to be formed, which wire or strip is ordinarily passed through a straightening device of any preferred kind and is adapted to be engaged by a gripper *b*, to which reciprocatory movement is imparted in such a manner as to compel intermittent forward longitudinal travel of such wire or strip past certain groove forming means indicated at 1 on the drawing, capable of operation after each forward feeding impulse of the wire or strip to produce thread grooves in opposite sides thereof, such as are ordinarily provided at the eyes of needles, and which serve to thin and weaken the metal at the point where the eye is to be produced, so as to facilitate the piercing of such eye by a succeeding operation.

The groove forming or channeling means 1, as shown in detail in Fig. 2, comprise carriers *S* and *T*, which are mounted at opposite sides of the metal wire or strip *a* and are to be moved toward and from the opposite sides thereof in such a manner as to permit matrices *c*, *c'*, carried by said carriers *S* and *T*, to be impressed in the opposite sides of the metal wire or strip *a* at such locations as will coincide with the opposite sides of the heads of the finished needles.

The carriers *S* and *T* are provided, respectively, with clamping members or jaws *S'*, *T'*, which are held in position by means of screws *d*, *d'* and serve to securely clamp the matrices *c*, *c'* upon their respective carriers, and as shown in Fig. 2, the carrier *S'* is provided with an extension *S²* at its lower part which is arranged to project beyond the matrix *c* and is adapted for supporting engagement beneath the metal wire or strip *a* in such a manner as to afford an effective support therefor during the operation of the channeling means 1. The clamping jaw or member *T'* which holds the matrix *c'* upon the carrier *T*, is similarly formed with an extension *T²* which projects beyond the matrix *c'* and has its underside adapted for en-

gagement upon the top surface of the metal wire or strip *a* diametrically opposite to the supporting extension *S²* of the carrier *S*, so that the metal wire or strip is securely held between said extensions *S²*, *T²*, and is, during the operation of the channeling means 1, subjected to compression in a direction perpendicular to the direction of movement of the reciprocatory carriers *S*, *T*, so that the upper and lower parts of the needle head are caused to conform to the corresponding surfaces of the said extensions *S²*, *T²*.

The matrices *c*, *c'* closely resemble printing types in appearance, and are so formed that their die surfaces accurately register with the bearing surfaces of the extensions *S²*, *T²* between which the metal wire or strip is held, and said matrices have raised surfaces *c²* which are adapted, when the carriers are moved toward each other as shown in Fig. 2, to be pressed into the opposite lateral surfaces of the metal strip or wire at points appropriate for the production of the thread grooves which are commonly provided adjacent to the eyes of needles. In this way the thread grooves, which are usually of elongated formation, are speedily produced without imposing unequal or bending strains upon the operative parts such as are unavoidable where rotatory cutters traveling in the direction of the length of the wire or strip are employed for cutting such elongated grooves as has been proposed heretofore. Furthermore it will be seen that during the formation of the thread grooves as above described, the metal wire or strip *a* is embraced between the matrices *c*, *c'* at its opposite sides, and the extensions *S²*, *T²* of the carriers *S*, *T* at its top and bottom, so as to be entirely surrounded by the bearing surfaces of these parts during the channeling operation, such surfaces operating by contact upon the wire or strip to mold or form the same, whereby the production of beads or projections upon the needle head, such as have been unavoidable in certain modes of manufacturing needles hitherto practiced on account of the forcing of the metal outward between the joints of the dies, during the compressing operation, is absolutely avoided. This permits a material advantage and economy in the manufacture of the needles, since such beads or projections, when present, must be removed, and this has heretofore required the employment of special means for such removal.

The structure shown in Fig. 3 is similar to that shown in Fig. 2 except that the upper extension *T²* of the clamping jaw *T'* is omitted and a plunger or head *U* is provided in lieu thereof for pressure upon the top surface of the metal wire or strip *a* so as to permit pressure to be applied to said wire or strip directly through the medium of, said head or plunger which may be

moved toward and from the wire or strip by any appropriate means such as a cam, for example.

After the operation of the channeling means 1, to produce the thread grooves at opposite sides of the needle head, and to smooth and mold the top and bottom surfaces, thereof the further operation of the feeding gripper *b*, serves to bring the head of the needle thus grooved and molded, into alinement with the eye piercing means 2, which is shown in detail in Fig. 4, and which serves to pierce the metal of the head at a suitable point in the length of the thread groove, the prior production of which serves to thin and weaken the metal of the head in such a manner as to materially facilitate the production of the eye by such piercing means.

The eye piercing means 2, as shown in Fig. 4, comprises a guide *G* having a groove *G'* the bottom and sides of which are shaped to accurately fit the corresponding surfaces of the needle head as previously formed or molded by the channeling means 1, and the upper part of which is apertured to receive a reciprocatory head or plunger *g*, capable of being depressed by a cam or equivalent means, to hold the needle head securely pressed upon the bottom of the groove *G'* during the eye-piercing operation. The opposite lateral walls of the guide *G* are provided with alined ports *h*, *k* adapted to be traversed by a reciprocatory piercing tool or member *i*, which is fitted accurately upon the walls of said ports, and is adapted, when actuated, to be forced transversely through the thin central web of the needle head in such a manner as to punch out such portion of said thin central web as is desirable for the formation of the eye of the needle. The port *k* at which the severed part of the web is discharged, is herein shown as made somewhat flared, so as to facilitate the passage of the waste metal and prevent clogging. The eyes of needles are also ordinarily made in elongated form, and where these are produced by punching or piercing as above described, the tool or member *i* will conform in cross section to such elongated formation of the eyes, so that such eyes may be formed by simple endwise movement of the tool or member, thereby effectively avoiding the imposition of unequal lateral or bending strains upon the parts such as would be unavoidable were the eyes cut by rotatory cutters moving in the direction of the length of the strip or wire as has been proposed heretofore. Furthermore, during the punching or piercing of the eyes as above described, the needle head is securely and accurately embraced and surrounded upon its opposite sides and bottom, by the side walls and bottom of the groove *G'*, and upon its top by the head or plunger *g*, so that there

is no liability of the metal of the head being forced outward between the joints of said parts during the piercing of the eye. This effectively insures against the production of beards or projections upon the needle, and prevents deformation or bending of the wire or strip and also permits the employment of extremely fine punches or tools *i*, without liability of breakage. After its passage through the eye piercing means, the wire or strip *a* is moved or fed, by the further actuation of the feeding gripper *b*, in alinement with severing means 4, which serves at each operation to separate one needle at the juncture of its head with the body portion of the wire or strip and simultaneously with such separation, to compress and mold the butt end of the separated needle into rounded form.

As shown in Figs. 5 and 6, such severing means comprises duplicate cutting and molding tools or dies *m*, *m*, above and below the metal wire or strip *a* and capable of movement toward and from the same in such a manner that their cutting edges *m'*, *m'* are caused to penetrate and sever the terminal needle from the metal wire or strip, said tools or dies having concave molding or forming surfaces *m*², *m*² which conform to the desired rounded surface to be produced at the butt end of the needle and are adapted to register during the severing of the metal wire or strip in such a way as to compress the same and impart a smooth or rounded formation to the butt end of the needle head.

The edges of the tools or dies *m*, *m* are adapted to meet and contact accurately one upon the other when said tools or dies are moved toward each other to sever the terminal needle, whereby the metal of the head is prevented from being forced out through the joint between the dies, in order that beards or projections may be avoided. During the movement of the metal wire or strip *a*, which serves to bring the terminal needle thereof into position to be separated by the severing means 4 and prior to the operation of such means, said terminal needle is brought into position for engagement with a flexible spring *p*, which is supported upon a transversely reciprocable part *Z*² so as to be adapted for operation upon the separation of such terminal needle as above described, to press the same laterally into one of the perimetral grooves of a revolving turret *D* which operates in a well known way to carry such needle over an emery wheel *F* by means of which the needle is ground to a point, being afterward discharged from the turret into a receptacle *O'* in finished condition ready to be tempered.

n represents a stop, back of the turret, with which the butt end of the needle contacts during the movement of the turret *D*,

and q represents a spring or strip of metal extended around the lower perimetral surface of the turret to hold the needles therein during their movement over the emery-wheel F.

q represents a flexible strip extended around the perimeter of the turret D and serving to retain the needles in place after their insertion in the perimetral grooves of such turret by the operation of the spring p .

Having thus described my invention what I claim and desire to secure by Letters Patent is:—

1. The herein described improved process of manufacturing needles, which consists in inclosing a metal wire or strip within means having surfaces adapted for molding contact with the surface of the wire or strip around its entire circumference and, while said wire or strip is so inclosed, subjecting the same to pressure and causing said wire or strip to conform to the surfaces of the inclosing means, the entire thickness of the metal wire or strip being thereby utilized for the production of the needle head without the formation of beards or projections from the surfaces thereof, and afterward severing said wire or strip into suitable lengths.

2. The herein described improved process of manufacturing needles which consists in inclosing a metal wire or strip within means having surfaces adapted for molding contact with the upper and lower surfaces of the needle head, and between matrices capable of operation to form the thread grooves at the sides of the needle head and moving said matrices into engagement with the opposite sides of the wire or strip to compress the same and cause said wire or strip to conform around its entire circumference to the surfaces of the matrices and inclosing means, and afterward severing said wire or strip into suitable lengths.

3. The herein described improved process of manufacturing needles which consists in subjecting said wire or strip successively first to a compressing operation to produce the thread grooves of the needle head, and then to a piercing operation for piercing the eye of the needle, and inclosing said wire or strip around its entire circumference during each of said successive compressing and piercing operations within inclosing means having surfaces in molding contact with the wire or strip, whereby the upper and lower surfaces of the needle head are molded during the compressing operation by which the thread grooves are produced, and whereby said wire is held against deformation during the piercing of the needle eye.

4. The herein described improved process of manufacturing needles which consists in positioning a metal wire or strip at different points in its length, within inclosing means, having surfaces which contact with

and conform accurately to opposite sides of the heads of needles to be produced, in the path of a piercing tool which plays endwise through such inclosing means between said contacting surfaces, imparting successive endwise movements to said tool to cause the same to penetrate the wire or strip at different points in its length for the production of the eyes of the needles, and then severing the wire or strip into suitable lengths.

5. The herein described improved process of manufacturing needles which consists in producing eyes at intervals along the length of a metal wire or strip, presenting such wire or strip in operative relation to cutters having concave molding surfaces which conform to the rounded surface at the butt end of the needle, successively operating such cutters to sever needles from the wire or strip, and pressing such wire or strip in contact with the concave molding surfaces of the cutters during the operation thereof to impart a rounded surface contour to the butt end of each needle.

6. The herein described improved process of forming the heads of needles, which consists in inclosing a metal wire within an inclosing die of the same width as the thickness of such wire and, while said wire is so inclosed, subjecting the same to the pressure of small dies and causing said wire to conform to the surfaces of the inclosing die by the pressure of such small dies, the entire thickness of the metal wire being thereby utilized for the production of the needle head without the formation of beards or projections from the surfaces thereof.

7. The herein described improved process of forming the heads of needles which consists in inclosing a metal wire within inclosing dies equal in width to the thickness of such wire and having surfaces which mold the upper and lower surfaces of the needle head, and pressing dies which form the thread grooves of the needle head, and moving said pressing dies into engagement with the opposite sides of the wire to form the channels or thread grooves of the needle head and simultaneously to press such wire into accurate contact with the molding surfaces of the inclosing dies.

8. The herein described improved process of forming the heads of needles which consists in subjecting a wire successively first to a compressing operation to produce the thread grooves of the needle head, and then to a piercing operation for piercing the eye of the needle, said wire being inclosed around its entire circumference during each of said successive operations within inclosing dies of the same width as the thickness of the wire, and causing the metal of the wire to conform to the surfaces of the inclosing dies by the application of pressure during the formation of the thread grooves, whereby

the upper and lower surfaces of the needle head are molded, and holding the needle head against deformation within said inclosing dies during the piercing of the needle eye.

9. The herein described improved process of piercing the eye of a needle which consists in inclosing the needle head within inclosing dies which conform accurately to the surfaces of the needle head at top and bottom, the sides of the needle head so inclosed being positioned in the path of a piercing tool which plays transversely through the inclosing dies, and then imparting endwise movement to the piercing tool to cause the same to traverse the inclosing dies and penetrate the needle head from side to side for the production of the needle eye.

10. The herein described improved process of manufacturing needles, which consists in feeding a metal wire or strip endwise through inclosing dies having molding surfaces which conform to diametrically opposite surfaces of the needle, successively compressing said wire or strip within the inclosing dies at different points in its length and thereby producing in such wire or strip a plurality of similar spaced weakened parts having thread grooves extended lengthwise along opposite surfaces of the wire or strip and simultaneously pressing such wire or strip into molding contact with the molding surfaces of the inclosing dies, and finally dividing such wire or strip into suitable lengths.

11. The herein described improved process of manufacturing needles which consists in producing diametrically alined thread grooves spaced at different points in the length of a metal wire or strip, affording spaced weakened portions therein, imparting longitudinal movement to the weakened

wire or strip to feed the same endwise past an endwise movable eye piercing punch, successively forcing such punch diametrically through and in alinement with the spaced weakened portions at different points in the length of the wire or strip from one side thereof to the other, to produce eyes affording communication between the thread grooves, and finally dividing the wire or strip into suitable lengths.

12. The herein described improved process of manufacturing needles which consists in inclosing a metal wire or strip within inclosing dies having molding surfaces which conform to diametrically opposite surfaces of the needle, successively compressing the opposite sides of a metal wire or strip and thereby producing diametrically alined thread grooves spaced at different points in the length of such wire or strip and affording spaced weakened portions therein and simultaneously forcing the wire or strip into molding contact with the molding surfaces of said inclosing dies, imparting longitudinal movement to the weakened wire or strip to feed the same endwise past an endwise movable eye piercing punch, successively forcing such punch diametrically through and in alinement with the spaced weakened portions of the wire or strip from one side thereof to the other, to produce eyes affording communication between the thread grooves, and finally dividing the wire or strip into suitable lengths.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

PAUL BOHIN.

Witnesses:

JOSEPH VAN DAM,
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