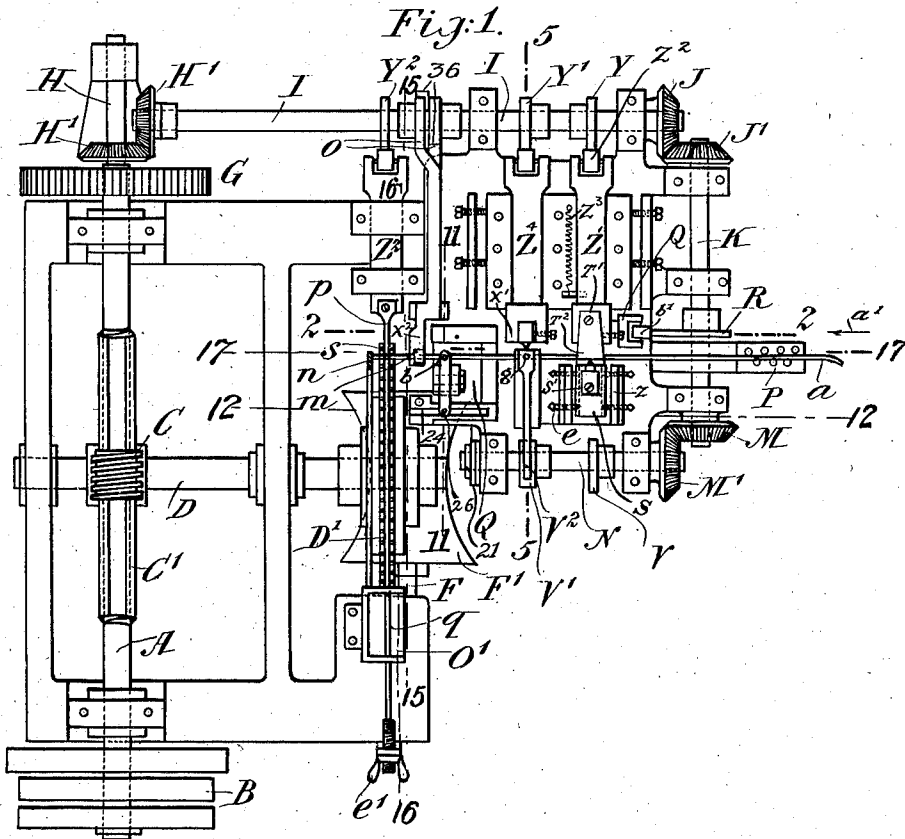
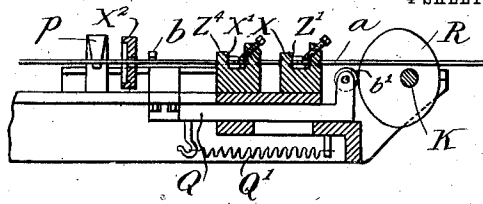


1,042,879.

4 SHEETS—SHEET 1.



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NEEDLE MAKING MACHINE.
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1,042,879.

Patented Oct. 29, 1912.

4 SHEETS—SHEET 3.

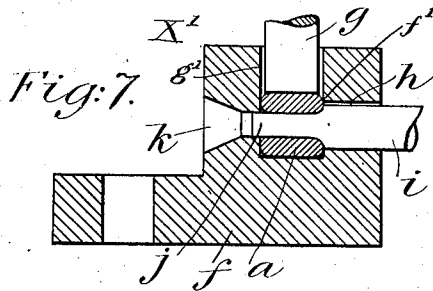
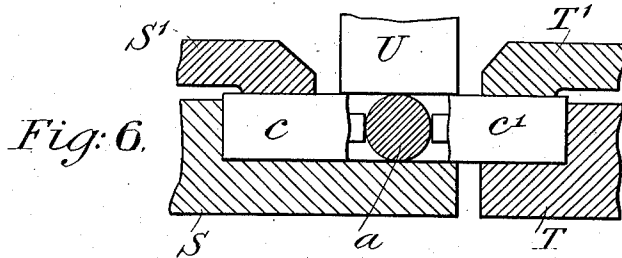
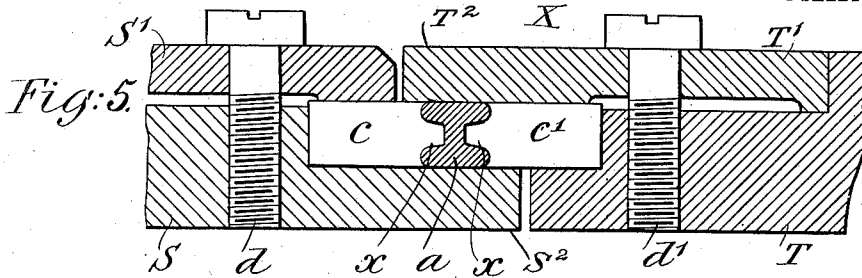
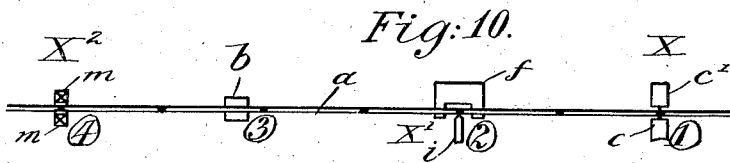
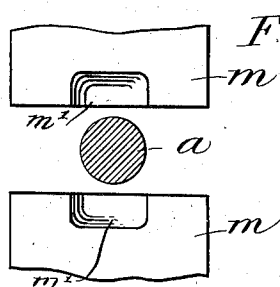
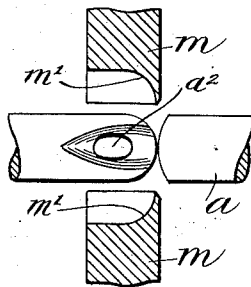


Fig. 8.



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4 SHEETS—SHEET 4.

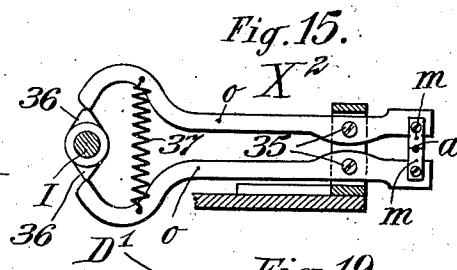
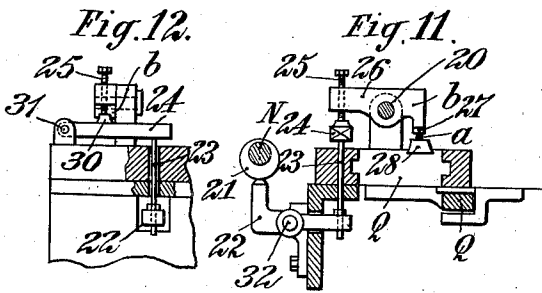
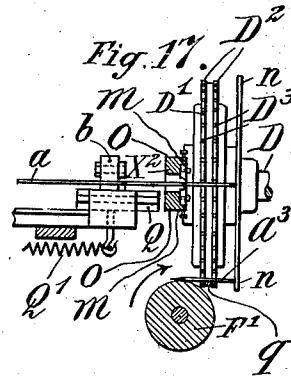
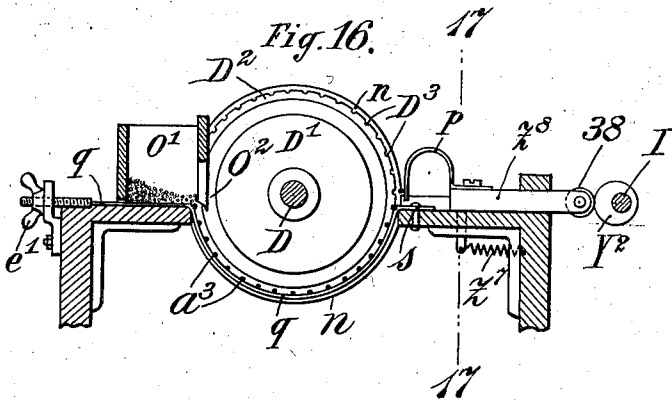
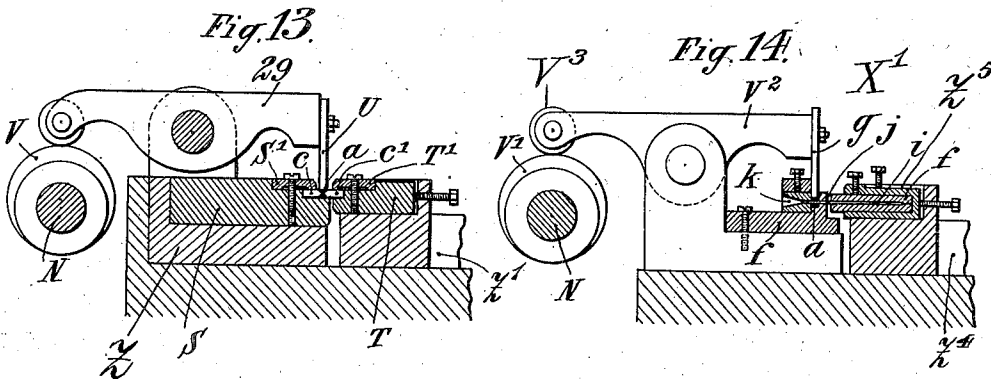


Fig. 18.

Fig. 19.

Witnesses

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UNITED STATES PATENT OFFICE.

PAUL BOHIN, OF PARIS, FRANCE.

NEEDLE-MAKING MACHINE.

1,042,879.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed January 28, 1908. Serial No. 412,989.

To all whom it may concern:

Be it known that I, PAUL BOHIN, a citizen of the Republic of France, and a resident of Paris, France, have invented certain Improvements in Needle-Making Machines, of which the following is a specification.

This invention relates to certain improvements in that class of machines which are particularly designed and adapted for use in the manufacture of needles, and has for its object to provide a machine of this general character of a simple and comparatively inexpensive nature, and of a strong and compact construction, having certain features of novelty and improvement, whereby the needles may be practically manufactured in a rapid and economical manner without excessive or extraordinary expenditure of time and labor, and without requiring the exercise of any special or peculiar skill upon the part of the attendants or operators such as is requisite where manual labor is employed to the extent which has heretofore been customary in the manufacture of such articles.

The invention consists, in part, in a needle making machine having eye piercing means, wherein means are provided for inclosing the metal wire or strip from which the needle is to be formed during the operation thereupon of such eye piercing means in such a manner as to lessen or prevent such deformation of said wire or strip as would tend to produce surface inequalities or projections requiring removal before completion of the finished needle.

Another part of the invention consists in a needle making machine having an edwise movable eye piercing punch, wherein means is provided for reducing the thickness of the metal wire or strip from which the needle is to be formed prior to the operation of such eye piercing punch, whereby the thickness of such wire or strip may first be reduced for the production of a thinned weakened portion therein through which the punch may be the more readily pressed for the production of the needle eye.

Another part of the invention consists in a needle making machine having channeling means operable for the production of thread grooves in the metal wire or strip from which the needle is to be formed, wherein means are provided for inclosing such wire or strip during the operation of said channeling means such inclosing means

having surfaces adapted for molding contact with said wire or strip to mold the surfaces of the same as may be required for the production of the needle without the formation of beards or projections such as result from the employment of various other mechanisms hitherto used in the manufacture of needles.

Another part of the invention consists in a needle making machine having means operable to feed a metal strip endwise in position to be operated upon by one or more of the operative devices of the machine, wherein means are provided for retaining such metal wire or strip and said operative device or devices against relative shifting movement during the action of the latter upon said wire or strip.

Another part of the invention consists in a needle making machine having relatively movable members provided with registering concave die surfaces adapted, when one of such members is moved toward the other, to be impressed in molding contact with the wire or strip from which the needle is to be formed, and operable, when so impressed, to mold the head or end of the needle.

Another part of the invention consists in a needle making machine having means capable of successive operation, the first to produce eyes at intervals in the length of a metal wire or strip from which needles are to be formed, and the second to sever lengths suitable for needles from such wire or strip, wherein the severing means includes die surfaces adapted for registry during severing of the wire or strip and capable of operation to mold the head of the needle.

Another part of the invention consists in a needle making machine having means operable to feed a metal wire or strip endwise in position to be operated upon by one or more of the operative devices comprised in the machine, wherein point forming means is provided to which the metal strip or wire is presented for the production of the needle point.

The invention further consists in a needle making machine of the character last above defined wherein severing means is provided operable to sever the metal wire or strip into lengths preparatory to the presentation of such lengths to the point forming means.

Another part of the invention consists in a needle making machine having means operable to feed a metal wire or strip endwise

in position to be operated upon by one or more of the operative devices comprised in the machine, wherein means is provided operable to move the metal wire or strip 5 laterally from the path along which it is fed by such feeding means, to permit the presentation of such wire or strip to another device comprised in the machine.

Another part of the invention consists in 10 a needle making machine having eye piercing means and severing means together with feeding and actuating mechanism, whereby a metal wire or strip is moved endwise past such respective means in such a way that 15 eyes are first produced therein, and the wire or strip is afterward divided into lengths, wherein point forming means are provided, together with a device adapted to receive lengths severed from the wire or strip and 20 to carry the same in engagement with such point forming means for the production of the points of the needles.

The invention also consists in certain novel features of the construction, and combinations and arrangements of the several 25 parts of the improved needle making machine, whereby certain important advantages are attained, and the machine is rendered simpler, less expensive and otherwise 30 better adapted and more convenient for use, all as will be hereinafter fully set forth.

The novel features of the invention will be carefully defined in the claims.

In order that the invention may be the 35 better understood I will now proceed to describe the same with reference to the accompanying drawings, wherein—

Figure 1 is a plan view of a needle making machine embodying my improvements; 40 Fig. 2 is a partial vertical section taken through the machine in the plane indicated by the line 2—2 in Fig. 1; Fig. 3 is a partial sectional elevation of the rear portion of the machine constructed as shown in Fig. 1, 45 illustrating certain features of the driving and point forming means which will be hereinafter referred to; Fig. 4 is a sectional detail view taken transversely and vertically through the machine in the plane indicated 50 by the line 5—5 in Fig. 1; Fig. 5 is a transverse sectional view drawn to an enlarged scale showing certain features of the channeling means to be hereinafter referred to; Fig. 6 is a sectional view somewhat similar 55 to Fig. 5, but illustrating a modified formation of the channeling means; Fig. 7 is a sectional detail view illustrating certain features of construction of the eye piercing means to be hereinafter referred to; Figs. 8 60 and 9 are, respectively, views showing in section and end elevation the severing or cutting members which sever the wire or strip into lengths suitable for the formation of needles; Fig. 10 is a diagrammatic view 65 illustrating the various successive steps of

the work during the operation of the improved machine constructed as shown in Fig. 1; Fig. 11 is a sectional detail view taken in the plane indicated by the line 11—11 in Fig. 1, illustrating certain features 70 of construction of the feeding means to be hereinafter referred to; Fig. 12 is a sectional view taken at right angles to the plane of the section in Fig. 11, as indicated by the line 12—12 in Fig. 1, and illustrating 75 other features of construction of the feeding means; Fig. 13 is a sectional view drawn to an enlarged scale and taken transversely and vertically through the machine as indicated by the line 5—5 in Fig. 1, and illustrating 80 certain slightly modified features of the channeling means to be hereinafter referred to; Fig. 14 is an enlarged fragmentary section somewhat similar to Fig. 4, but showing the wire inclosing and eye piercing 85 devices of the machine illustrated in Fig. 1 in transverse section; Fig. 15 is a fragmentary sectional view taken transversely and vertically through the machine as indicated by the line 15—15 in Fig. 1, showing certain 90 features of the means for operating the severing devices; Fig. 16 is a transverse sectional view taken in the plane indicated by the line 16—16 in Fig. 1, showing certain 95 features of the means for carrying the severed lengths of wire past the point forming means; Fig. 17 is a sectional view taken transversely through the machine in the plane indicated by the line 17—17 in Fig. 16, 100 and illustrating the relative positioning of the feeding means, severing means and the means for carrying the severed lengths of wire past the point forming means; Fig. 18 105 is a view showing a different form of needle which may be made by the employment of a machine constructed according to my invention, and Fig. 19 is a fragmentary detail sectional view illustrating a slightly different 110 arrangement of the point forming means which may be employed in the manufacture of needles such as that shown in Fig. 18.

As herein shown, the improved needle making machine is provided with a frame the upper part of which supports a shaft A provided with pulleys B, adapted to receive 115 a belt or band by means of which said shaft may be continuously driven from any suitable source of power for the operation of the machine. The shaft A carries a worm C in mesh with a worm wheel C¹ secured upon a 120 horizontally directed shaft D extended in the frame at right angles to and below said shaft A and carrying a turret D¹ which operates during the rotation of said shaft D to carry the severed lengths of wire past the 125 point forming means as will be hereinafter more particularly explained.

The movement of shaft A is communicated through a driving belt or band A¹ and appropriate pulleys, as indicated in Fig. 4, 130

to a lower intermediate shaft E, from which rapid rotatory movement is imparted also by means of a driving belt or band E¹, to a horizontally extended shaft F directed across the frame below and at right angles to the turret carrying shaft D and provided with a grinding wheel or drum F¹ so positioned with respect to the turret D¹ as to operate to grind and form the points of the needles supported upon said turret during such rotatory movement of the turret as serves to carry said needles lengthwise along the peripheral grinding surface of said wheel or drum F¹.

H represents a stud mounted to turn upon the frame and driven from the shaft A through the medium of spur gearing G, G¹ and H¹ represents bevel gearing which operates to transmit the rotatory movement of said stud H to a cam shaft I horizontally extended along one side of the machine and provided at its right hand end, as shown in Fig. 1, with bevel gearing J, J¹ serving to impart continuous rotatory movement to the feed actuating shaft K, which is directed transversely across the adjacent end of the frame and has its opposite extremity provided with bevel gearing M, M¹ which serves to impart continuous rotatory movement to an auxiliary cam shaft N journaled upon the frame parallel with the aforesaid cam shaft I, but spaced apart therefrom to permit the interposition of certain of the operative parts of the machine as will be presently explained.

P represents a straightening device supported upon the frame of the machine adjacent to the shaft K, and herein shown comprised of staggered pins between which the metal wire or strip from which the needles are to be formed is led into the machine so that bends or kinks may be eliminated therefrom as far as possible, and b represents a feeding member or gripper engageable with the wire or strip *a* beyond the straightener and intermittently actuated during the operation of the machine in such a way as to operate to draw the wire endwise past the straightening device and also past certain of the other operative parts and to present the extremity thereof to the severing means so that the lengths may be severed therefrom from time to time suitable for the formation of individual needles.

As herein shown, the wire or strip *a* is fed lengthwise into the machine parallel with the shaft D, between the shafts I and N and in a vertical plane slightly beyond the perimeter of the turret or carrier D¹ supported upon said shaft D, and the feeding member or gripper *b* is mounted upon a reciprocatory support or carriage Q guided for endwise sliding movement along a path upon the frame parallel with the direction of feed of the wire or strip *a*, as shown in

Fig. 2, and provided at its outer end with an anti-friction roller *b*¹ engaged by a cam R upon the controlling shaft K, and provided with a retracting spring Q¹ operating to press the carriage endwise against the thrust of said cam, the structure and arrangement of the parts being such that the cam R operates at suitable predetermined intervals to force the carriage or gripper support Q endwise toward the turret D¹ in such a manner as to permit the gripper B during its engagement with the wire to draw the latter endwise to an extent equal to the length of the particular needle to be formed.

The feeding member or gripper *b* is mounted upon one end of a lever 26 fulcrumed at 20 upon the carriage Q as shown in Fig. 12 and having a pendent part 27 which is adapted, when the lever is rocked in one direction, to be depressed into gripping engagement with the upper surface of the wire or strip *a* to grip or clamp the same securely to an abutment 28 upon the carriage, and when the lever is rocked in a reverse direction is adapted to be lifted out of clamping or gripping engagement with the wire or strip, so as to terminate the endwise feeding movement thereof and to release such wire or strip from the support or carriage Q in order that the same may be expeditiously retracted by its spring Q¹ after each forward or feeding impulse imparted to it by the cam R. The opposite end of the lever 26 carries a screw 25 the lower end whereof depends below the said lever and is provided with an enlargement 30 adapted for sliding contact upon the upper face of a cam bar 24 pivoted at 31 upon the frame alongside the guide-way traversed by the slide or carriage Q and adapted to be raised or lowered by means of a vertically directed link 23 which affords connection between said bar and the inwardly directed arm of a lever 22 fulcrumed at 32 upon the frame as seen in Fig. 11 and having an upturned outer extremity engaged by a cam 21 upon forward extremity of the cam shaft N above referred to as clearly shown in Figs. 1 and 13. By this construction, since the shafts K and N are driven in unison, it will be evident that by appropriate arrangement of the cams R and 21, the latter may be caused to depress the outer end of lever 22 in such a manner as to elevate the cam bar 24 during such movement of the carriage Q as tends to reciprocate the gripper in the direction of the arrow *a*¹ in Fig. 1, or toward the turret D¹, whereby during such movement of said carriage and gripper *b* the latter will be pressed by the rocking of lever 26 into effective clamping or gripping engagement with the wire or strip *a* so as to feed the same through the machine toward and past the side of the turret D¹ in the direction of said arrow *a*¹, and the

contour and timed arrangement of said cam 21 will obviously control and regulate the movements of said lever 22 and cam bar 24 so as to cause the latter to be lowered in order that the gripper *b* may be disengaged from the wire or strip *a* at proper times to terminate the feeding movement imparted thereto as may be required during the operation of the machine in the production of needles of various kinds and sizes. The cam bar 24 being thus permitted to fall by gravity at or prior to the termination of the forward or feeding stroke of the support or carriage Q, permits the latter to be expeditiously retracted by its spring Q¹ after the cam R shall have passed out of operation, the gripper or feeding member *b* being slid rearwardly along the wire or strip *a* during such retracting movement of the support or carriage Q, so as to stand in position for renewed gripping or clamping engagement with said wire or strip at the next operation of said cams R and 21.

X and X¹ represent, respectively, the channeling means and eye piercing means which, in the structure herein set forth, are positioned for successive operation upon the metal wire or strip *a* between the straightener P and the feeding member or gripper *b* and within the space separating the respective cam shafts I and N, the arrangement of the parts being such that the gripper operates when actuated, to feed or draw the wire or strip intermittently past the said channeling and eye piercing means so that the successive operations of these respective means are permitted to be recurrently performed upon the wire or strip at such suitable intervals in the length thereof as may be desirable considering the sizes or lengths of the needles to be produced.

The channeling means X is located adjacent to the straightener P so as to be adapted to operate upon the wire or strip for the production of channels or thread grooves at intervals along the length thereof prior to the operation of the eye piercing means X¹ thereon, by which arrangement it will be obvious that the wire or strip is thinned and weakened at the points whereat the eyes are to be pierced prior to the piercing of such eyes, so that this latter piercing operation may be the more readily performed by the application of only such moderate force requisite for the penetration of such thinned or weakened parts of the wire or strip.

As shown in Figs. 1, 5 and 13, the channeling means includes two members Z and Z¹, between which the wire or strip *a* fed through the machine by the operation of the feeding member or gripper *b* is passed, the member Z being adapted to be held in stationary position upon the frame at one

side of the path of said wire or strip by means of screws *e* or the like, and being chambered for the reception of a removable tool carrier S provided with an extension or tongue S² at its lower part over which the wire or strip *a* is adapted to be passed during its feeding movement and wherewith said wire or strip is adapted to rest in molding contact during the operation of the channeling means as will be hereinafter explained. The upper part of the holder S is provided with a clamping jaw S¹ controlled by a screw *d* and serving to clamp or grip a tool or matrix removably to said tool holder for operation upon one of the lateral sides of the wire or strip, the structure and arrangement of the parts being such that different tools may be applied interchangeably to said tool holder for the formation of different styles or sizes of needles.

The member Z¹ of the channeling means is guided for endwise sliding or reciprocatory movement in a horizontal direction toward and from the member Z at the opposite side of the path of the wire or strip *a* and has its outer end provided with an anti-friction roll Z² engaged with a cam Y on shaft I as clearly shown in Fig. 1, said cam being so set as to impart endwise movement to said member Z¹ against the tension of a retracting spring Z³ and after each forward feeding impulse imparted to the wire or strip by the feeding member or gripper *b* coincident with the operation of the cams R and 21 above described.

The member Z¹ at its end adjacent to the wire or strip *a* is chambered for the reception of a tool holder T similar to the holder S except that it is unprovided with a tongue or extension for the support of the wire or strip from which the needles are to be formed, an adjustable clamping jaw T¹ controlled by a screw *d*¹ as shown in Fig. 5, serving to grip and hold a tool or matrix *c*¹ removably upon the tool holder T for operation upon the lateral side of the wire or strip *a* opposite to the tool or matrix *c*, and as clearly shown in Fig. 5, said jaw T¹ is provided with a tongue or extension T² which is adapted, when the member Z¹ is moved toward the member Z by the operation of said cam Y, to be slid across the upper surface of the wire or strip *a* so as to rest in molding contact therewith and to hold the wire or strip securely in position against shifting movement during the operation of the channeling means in forming the thread grooves in opposite sides of the said wire or strip. By this construction and arrangement of the parts it will be evident that the tongues or extensions S² and T² being engaged above and below the wire or strip *a* serve to guide and direct the same through the machine during the feeding movement of

said wire or strip, and after the cessation of each forward or feeding movement, these tongues or extensions also operate to maintain such wire or strip in accurate position to be operated upon by the respective tools or dies c , c^1 during their operation in channeling the opposite sides of said wire or strip for the production of thread grooves therein, it being understood that in the structure herein shown, after each feeding impulse imparted to said wire or strip by the reciprocating feeding member or gripper b , whereby an appropriate length of the wire or strip is drawn past said matrices or tools c , c^1 , the cam Y is caused to operate upon the slidable member Z^1 to force the same toward the member Z , whereby the die surfaces of the tools or matrices c , c^1 are caused to be impressed in the opposite sides of the wire or strip in substantially the positions shown in Fig. 5.

As herein shown, the tools or matrices c , c^1 have impression or die surfaces in relief somewhat after the fashion of printing types, and in the operation of the channeling means as above described, these die or impression surfaces are impressed in the opposite sides of the wire or strip a in such a manner as to exert a compressing influence thereon, and it will be understood that since the tongues or extensions S^2 and T^2 are provided bearing beneath and above the wire or strip during the impression of said tools or matrices therein, the compressing influence exerted by said tools or matrices will operate to press the upper and lower surfaces of the wire or strip into accurate molding contact with the adjacent surfaces of said tongues or extensions so as to form and mold the upper and lower surfaces of the needle head, the inclosure of the wire or strip around its entire circumference between said tongues or extensions and the respective matrices or tools c , c^1 permitting the molding or forming of the entire circumference of the needle head coincidently with the formation of the thread grooves and preventing the formation of beards or projections such as have been unavoidably produced during the manufacture of needles by other mechanisms heretofore in use and which have heretofore required the subjection of the product to special operations for their removal before the completion of the finished needles.

The means above described are particularly well adapted for use in the production of the thread grooves where needles of large sizes are being manufactured, but in the manufacture of small or fine needles, it is sometimes preferable to vary the channeling means as illustrated in Fig. 6, wherein the tongue or extension T^2 is omitted from the jaw T^1 , a plunger or pressure block member U being substituted therefor, capable of

operation to press the wire or strip a toward the tongue or extension S^2 on which it rests. This plunger or pressure block member U as shown in Fig. 13 is mounted upon one end of a lever 29, fulcrumed at 33 upon the frame and provided with an anti-friction roller 34 engaged with a cam V on shaft N , which operates after each forward feeding impulse imparted to the wire or strip by the gripper b , to rock said lever 29 and press the plunger U upon the upper surface of the wire or strip so as to rest in molding contact therewith during the operation of the tools or matrices c , c^1 in producing the thread grooves of the needle. The block or member U when thus operated, in conjunction with the tongue or extension S^2 whereon the wire or strip rests, acts to clamp and hold said wire or strip securely in position and to prevent shifting movement thereof during the operation of the channeling means.

During the successive revolutions of the shafts I , K and N , bearing cams Y , R , and 21, the feeding and channeling means are each recurrently operated in such a manner as to act alternately upon the wire or strip a , first to feed the same through the machine to such an extent as is requisite for the formation of the desired needle, and then to produce channels or thread grooves in the opposite sides of such wire and simultaneously to mold or form the circumferential surfaces of the needle head adjacent to such thread grooves, and these alternately recurring operations serve to produce thinned or weakened portions at regular intervals along the length of the wire or strip, and the eye piercing means X^1 is positioned in the line of feed of the wire or strip a between the channeling means and the feeding member or gripper b , and as shown herein (see Fig. 10) is distant from the channeling means by the lengths of two unfinished needles, so that two feeding impulses of the gripper b are required to move each thinned or weakened portion of the wire or strip from the position in which it stands after the operation of the channeling means into position to be operated upon by the eye piercing means for piercing the eye in line with the thread grooves at the opposite sides of such wire or strip.

The eye piercing means X^1 , as shown in Figs. 1, 7 and 14, includes an inclosing member or block f held in stationary position upon the frame and provided with a passage or channel f^1 extended through its upper part for the passage and guidance of the wire or strip a and of such form and dimensions as to conform in the surface contour of its walls, as clearly shown in Fig. 7, to the surface contour imparted by the molding surfaces of the inclosing devices at the channeling means to those parts of the wire or strip a which are destined to form

the heads of the needles, and the proportion and arrangement of the parts is such that when the feeding movement of the wire under the impulse of the gripper is stopped to permit the operation of the channeling means thereon, another part of such wire or strip previously operated upon and thinned or weakened by the tools or matrices c , c^1 and molding surfaces of the channeling means is stopped within the channel f^1 of the inclosing member or block f with its molded surfaces in accurate contact with the conforming surfaces of the walls of said passage or channel, and its opposite thread grooves in line with a transverse passage h produced in one side wall of the block or member f and traversed by an endwise movable eye piercing punch i , the extremity j of which is cut away at top and bottom so as to present an oval or elongated form in cross section conforming to the oval or elongated formation commonly imparted to the eyes of needles, as indicated at a^2 in Fig. 8.

The opposite side wall of the inclosing member or block f is provided with an aperture k in alinement with the passage h through which the shank of the eye piercing punch is adapted to play, the inner part of this aperture being of a size and form conforming closely to the oval or elongated extremity j of the punch i , and the outer part of said aperture k is made flared or tapered as clearly shown in Fig. 7, so as to facilitate the discharge of the waste material removed from the thin central web separating the thread grooves of the needle when the punch is moved endwise to cause its reduced extremity j to penetrate such web, as clearly shown in Fig. 7.

In the top of the inclosing member or block f is produced a vertical opening g^1 which has communication with the central part of the passage f^1 and is extended in vertical alinement with the path of the eye piercing punch i , and g represents a plunger or pressure piece or member which is adapted to traverse said opening g^1 and to bear upon the top surface of the metal wire or strip in such a manner as to hold the same clamped securely within the said passage or the channel f^1 so as to effectively prevent shifting movement thereof during the operation of the punch i in piercing the needle eye in the previously thinned or weakened portion of the wire or strip. In this way it will be understood that when the feeding movement of the wire terminates, leaving the channeled part thereof within the passage f^1 accurately positioned in line with the travel of the eye piercing punch i , in order that the needle eye may be produced in accurate location, the plunger or member g operates to hold the wire or strip securely against endwise shifting movement while said punch is being operated.

For the actuation of the punch i I have shown the machine provided with an actuating slide or member Z^4 guided for endwise reciprocatory movement parallel with the member Z^1 and transversely of the path of the wire or strip a through the machine, said member Z^4 being chambered at its end adjacent to the block f for the reception of an adjustably mounted chuck Z^5 in which the shank of the punch i is removably held in such a way that it may be replaced or substituted when worn or as may be required for different sizes or styles of needles. A retracting spring Z^6 serves to hold the member Z^4 normally drawn out from member f , so that the reduced extremity j of the punch is withdrawn from the channel f^1 , while a cam Y^1 on shaft I is engaged with an anti-friction roller on said slide member Z^4 and is so timed as to operate after each feeding impulse imparted to the wire or strip a by the feeding gripper b , to force the reduced extremity of the punch endwise through the thinned or weakened portion of the wire or strip within the passage or channel f^1 of block f for the production of the needle eye. The plunger g is herein shown mounted upon one end of a lever V^2 fulcrumed on the frame and having its opposite end provided with an anti-friction roller V^3 engaged with a cam V^1 on shaft N , which cam is so timed as to operate after each forward or feeding impulse imparted to the wire or strip a by the operation of the feeding gripper b , but prior to the operation of the punch actuating cam Y^1 , to hold said wire or strip securely against movement within the passage or channel f^1 of block f during the operation of the cam Y^1 in forcing the punch carrying slide member Z^4 endwise against the tension of its retracting spring to pierce the wire or strip for the production of the needle eye. By this arrangement of the parts it will be seen that in the machine constructed according to my invention, as herein set forth, the wire or strip is accurately held in position while the punch is operated for piercing the needle eye, and deformation of the previously formed molded surfaces of the needle head, or endwise shifting of the wire or strip such as would throw the thread grooves out of registry with the punch are effectively prevented, and by reason of the wire or strip having been previously thinned or weakened by the channeling means, so that a comparatively thin web is left remaining between the thread grooves at its opposite sides, it will be understood that comparatively small force applied to the punch will suffice to pierce the eye so that piercing punches of very small size may be successfully employed without undue liability of breakage. In the structure herein shown, the parts are so arranged also that the ex-

trernity of the punch i is never entirely withdrawn from the opening h in order to further lessen the liability of breakage or damage to the punch.

5 In order to facilitate the use of the machine to which my invention is herein shown embodied, I have provided the channeling and eye piercing means above described with certain adjusting devices which, 10 as illustrated, include the screws e e whereby the member X of the channeling means is rendered capable of adjustment parallel with the direction of feed of the wire or strip a through the machine, together with 15 screws e^1 e^1 which permit similar adjustment of the members X^1 and Z^1 of the channeling and eye piercing means. As shown in Fig. 7, the block or member f is also provided with an aperture f^2 for the reception 20 of a screw or the like, whereby the same may be held upon the machine frame in adjusted relation to the punch i carried by the member Z^1 . The jaws S^1 and T^1 of the channeling means also afford appropriate 25 adjustment and substitution of the matrices or tools c , c^1 while screws e^2 e^2 at members X^1 , Z^1 also permit convenient adjustment of the chucks T and Z^5 which carry the matrix c^1 and punch i respectively.

30 The feeding member or gripper b is so positioned as to be adapted for gripping engagement with the wire or strip a at some distance from the forward extremity thereof, and adjacent to said extremity of 35 the wire or strip I provide means recurrently operable to sever therefrom lengths or sections suited for the production of individual needles, and for moving the lengths or sections thus severed at angles to the path 40 along which said wire or strip a is fed by the operation of said gripper b , so that the said severed lengths or sections may be presented with greater facility and in closer succession to point forming means capable 45 of operation for the production of the needle points, without lessening the capacity of the machine or otherwise interfering with the free operation of the feeding means.

50 The turret D^1 on the shaft D in the structure herein shown, constitute the means for moving the severed lengths or sections of the wire or strips at angles to the direction of feed due to the operation of the gripper b , and n represents a disk-like or annular member 55 adjacent to the turret D^1 and of greater diameter than said turret and forming a stop with which the forward extremity of the wire or strip a , protruding in advance of said gripper b , is adapted to contact, as 60 indicated in Fig. 17 in such a manner as to assist in terminating and limiting the forward or feeding movement imparted to said wire or strip by the operation of the feeding member or gripper b , and to gage the 65 positions in which the severed lengths or

sections are presented to the turret D^1 , the proportions and arrangement of the parts being such, as herein shown, that the wire or strip, when fed forward by said gripper b , 70 is stopped by said member n with its terminal needle length positioned adjacent to one lateral side of the turret and projecting substantially equal distances beyond the opposite faces thereof, and X^2 represents the 75 cutting or severing means which is interposed in the path of the wire or strip a between the feeding member or gripper b and said turret D^1 , as indicated in Figs. 1 and 17, such cutting or severing means being operable to sever the terminal length 80 of the wire or strip a after each operation of said feeding member or gripper b so that the severed length suitable for the production of a finished needle may be received by the turret D^1 and thereby carried 85 laterally away from the path in which the strip or wire is fed by said gripper across the point forming or grinding wheel or drum F^1 of the point forming means, as will hereinafter be explained. 90

As shown in the drawings, such cutting or severing means X^2 includes knife or cutter members m , m similar to each other and positioned above and below the wire or strip a , as indicated in Figs. 8, 9 and 15, 95 said members being separable to such an extent as will suffice to permit the wire or strip to be passed freely between them during the forward or feeding movement imparted thereto by the gripper b , and being 100 movable toward each other so as to cut into the upper and lower surfaces of the wire or strip and sever the terminal needle lengths or sections from such wire or strip after each feeding impulse of the gripper b . 105 These members m , m are also provided, adjacent to their cutting edges with concave molding or die surfaces m^1 , m^1 adapted to meet in registry with each other when the members m m are forced together during the 110 cutting or severing operation in such a manner as to exert such pressure upon the wire or strip adjacent to the point of cut as will impart to its extremity a substantially smooth rounded surface such as is commonly present at the butt end of a finished 115 needle.

As shown herein, the members m , m are carried upon the ends of levers, o o fulcrumed at 35 upon the frame and having 120 their opposite ends extended in position to be engaged by diametrically opposite cam surfaces 36, 36 upon the cam shaft I , a spring 37 serving to retain said levers o , o normally in such position that the members 125 m , m are separated sufficiently for the free passage of the wire or strip a between them, and the cam surfaces 36, 36 being so timed as to rock said levers o , o and press the members m , m toward each other and into 130

cutting engagement with the wire or strip *a* after each forward or feeding impulse imparted thereto by the gripper *b*.

The turret *D*¹ as herein shown comprises spaced disks *D*², *D*², the perimetral edges whereof have registering notches or seats *D*³ wherein the several lengths or sections cut from the wire or strip *a* by successive operations of the cutting members *m*, *m* are adapted to be successively received, as indicated at *a*³ in Figs. 16 and 17, a thin metal band or strip *g* being extended around the lower part of the perimeter of said turret midway between its disks *D*² *D*² as indicated in said figures in such a manner as to bear upon the central portions of the several needle lengths or sections *a*³, and hold the same securely in said notches or seats *D*³ during such rotative movement of the turret as is requisite to carry the said lengths or sections longitudinally along the perimetral grinding surface of the wheel or drum *F*¹, which latter, as indicated in Figs. 1 and 4, is set with its shaft *F* at right angles to the direction of feed imparted to the wire or strip *a* by the gripper *b*, and is concaved or hollowed out at its central portion of its peripheral grinding surface to conform to the circular path in which said lengths or sections *a*³ are moved during the turning of the turret, so that the points of the needle lengths may be appropriately ground or formed by the rapidly revolving drum or wheel *F*¹.

As shown in the drawings, particularly Fig. 16, the strip or band *g* is secured to the frame at *s* adjacent to that side of the turret whereat the needle lengths or sections are received from the severing means, while at the opposite side of the turret the opposite end of said strip or band *g* has an adjustable or screw connection with the frame at *e*¹ by means of which the band or strip may be drawn lengthwise to cause it to press more or less tightly upon the needle lengths *a*³, as its thin and highly flexible character will permit, so that such needle lengths may be properly held to the turret. This accommodates the turret to needles of different degrees of fineness.

p represents a resilient member or spring carried upon a cam actuated slide member *Z*⁸ similar to the slide members *Z*¹ and *Z*⁴ above referred to, and slidable in guides on the frame transversely to the path of the wire or strip *a* when fed by the gripper *b* through the machine, said member or spring *p* being so spaced from the side of the turret *D*¹ past which the terminal length of said wire or strip is fed by the gripper *b* as above described as to permit said terminal length of the strip or wire, prior to the severing thereof by the operation of the cutting members *m*, *m*, to be inserted by the operation of said gripper between said tur-

ret and member or spring *p*, and being adapted for engagement with said terminal length of strip or wire *a* when the slide member *Z*⁸ is moved endwise by the operation of its cam, so as to force the terminal length of said wire or strip into registering notches or seats *D*³ of the turret at a point immediately above the secured extremity *s* of the band or strip *g*.

A retracting spring *Z*⁷ serves to hold the slide member *Z*⁸ normally moved in such a direction as will withdraw the spring *p* from the path of the wire or strip *a* during the endwise feeding of the latter by gripper *b*, and an anti-friction roller 38 on said member *Z*⁸ has contact with a cam *Y*² on shaft *I*, which cam is so timed as to impart endwise movement to member *Z*⁸ to reciprocate the same against the tension of spring *Z*⁷ after each forward or feeding impulse imparted to the wire or strip *a* by gripper *b*, and during the operation of the severing members *m*, *m*, whereby the said slide member *Z*⁸ is moved sufficiently to cause the member or spring *p* to press the terminal length of the wire or strip *a* within the appropriately positioned notches or seats *D*³ of the turret.

Each severed length of wire thus engaged in the notches *D*³ of the turret is held in such engagement by the concurrent operation of the spring *p* and cam *Y*² during such turning movement of the turret as will suffice to move said length of wire downward into engagement with the strip or band *g* and out of line with the remaining uncut portion of the wire or strip *a*, after which the cam *Y*² passing out of operation permits the spring *Z*⁷ to retract the slide member *Z*⁸ and thereby to withdraw the spring *p* out of the path of the end of the wire or strip *a* when next advanced by the feeding impulse of gripper *b*, and the strip or band *g* retains the severed lengths of wire securely engaged with the seats or notches *D*³ of the turret during the further turning movement thereof needful to carry said severed length of wire past the point forming means.

Since the wire or strip *a* from which the needles are produced is comparatively thin, it will be obvious that a very slight extent of rotatory movement of the turret *D*¹ moving at an angle to the direction of feed imparted by the gripper *b*, and occurring after the severing of the terminal length of wire or strip by the operation of the severing means *X*², will suffice to carry such severed length out of line with the remaining uncut part of said wire or strip, so that thereafter such severed length will offer no obstacle to the further forward feeding movement of the wire or strip upon the succeeding feeding operation of the gripper *b*, whereby it will be evident that the turret *D*¹ may be rotated

at a comparatively slow speed by means of the worm gearing $G G^1$ and will thus operate to carry the severed lengths rested in its notches or seats D^2 slowly across the surface of the grinding wheel or drum F^1 in order that the same may be caused to operate thereupon for a longer time and to better advantage for the pointing of the needles.

During the operation of the turret in carrying the needle lengths past the grinding wheel or drum F^1 , the extremities of the needle lengths are caused to bear frictionally upon the concaved perimetral grinding surface of said drum F^1 so that the points of the needles are accurately formed, the needle lengths being caused to turn upon their axes within the notches or seats D^2 by the conjoint rotatory movement of the turret D^1 and said drum or wheel F^1 , so as to assure accurate fashioning of said points, and during the operation of the point forming means, the butt or head ends of the needles, previously fashioned and rounded by the molding surfaces of the severing members m, m , rest in contact with the stop disk or member n , so that uniformity of length is assured in the finished product.

The direction of rotation of the drum F^1 as indicated by the arrow a^5 in Fig. 4, is also toward the stop disk or member n at that part of the grinding surface whereon the ends of the severed lengths a^3 rest to be pointed, whereby it will be seen that the movement of the drum or wheel F^1 is utilized to retain the lengths of wire with their butt ends accurately contacting with said disk or member n to prevent variation in the length of the finished product.

The point grinding drum or wheel F^1 has its shaft F mounted in bearings in the ends of arms F^2 forwardly directed from a bracket F^3 adjustably held upon the frame by means of a bolt and slot connection, as clearly shown at F^4 in Fig. 4, of the drawings, so as to permit convenient adjustment of said wheel or drum F^1 toward or from the limiting stop or member n , whereby it will be seen that the parts may be readily accommodated for use in connection with needles of different lengths or of different degrees of fineness.

At the side of the turret D^1 opposite to the spring p is positioned a receptacle o^1 having an aperture at its lower part whereat the pointed needles are received from the turret after passing the point forming means, the band or strip g being outwardly directed from the side of the turret adjacent to said aperture of the receptacle, so that the finished needles are released from the turret to permit their delivery in said receptacle. A pendent tongue o^2 at the side of the receptacle adjacent to the turret and extended near the spaced disks D^2 thereof as indicated in Fig. 16, operates to with-

draw the completed needles from the notches or seats of the turret and prevents said needles from being lifted out of the receptacle by the rotation of the turret.

The invention presents many important advantages and improved results in its practical use in the manufacture of needles, permitting them to be produced in a substantially continuous operation, which may, when desired, embody the invention set forth in the United States Letters Patent, No. 963,987, granted to me July 12, 1910, and dispensing to a great extent with handling of the product and various other manual operations which have hitherto been required in this art and which have greatly increased the cost of the finished article.

The needle making machine embodying my invention is of an extremely simple and compact nature and is comparatively inexpensive and economical in construction and operation and presents other important advantages by reason of the facility with which its operative parts may be adjusted to meet the requirements of different sizes and styles of needles to be manufactured, and of the novel and improved manner in which the several operative parts co-act with each other and operate recurrently upon the metal wire or strip for the successive production of the needles therefrom. The employment of the holding means, including, in the embodiment herein illustrated, the tongues $T^2 S^2$ at the channeling means, and the member g at the eye piercing means, also presents important advantages, since such holding means, like the channeling and eye piercing means in connection wherewith said holding means is used, is caused to act upon the wire or strip alternately with the operation of the feeding member b thereon, so as to operate effectively to prevent retraction of said wire or strip from its advanced position during the retracting movement of the feeding member which occurs while the strip or wire is held by such holding means.

The machine as herein set forth is especially well adapted for use in the manufacture of ordinary sewing needles but it will be understood that my present invention is not limited in its scope to its embodiment in or application to machines for the manufacture of needles of any particular style or type but may be applied with equally good results to machines for making various other kinds or styles of needles, such as those employed in mechanical knitting and embroidering, for example, for which purposes, the various operative parts of the machine may be modified as may be deemed necessary or desirable, within the scope of the appended claims. For example, in the manufacture of embroidering needles such as are above referred to and which, as rep-

resented in Fig. 18 are ordinarily pointed at both ends and provided with a central eye, the point forming means may be modified as shown in Fig. 19, wherein two grinding wheels or drums F^1 , F^2 are provided, at opposite sides of the turret D^1 for grinding the opposite ends of the severed needle lengths for the production of the oppositely arranged needle points.

I claim—

1. A machine of the character described having channeling means, eye piercing means, and severing means, mechanisms adapted for alternate operation, one of said mechanisms being capable of operation to feed a metal strip in position to be operated upon by said channeling, eye piercing, and severing means, and the other mechanism being capable of operation to actuate said channeling, eye piercing, and severing means, point forming means, and a device having means for engagement with the severed needles, and capable of movement to carry said needles in engagement with said point forming means.

2. A machine of the character described having channeling means, eye piercing means, and severing means, mechanisms adapted for alternate operation, one of said mechanisms being capable of operation to feed a metal strip in position to be operated upon by said channeling, eye piercing, and severing means, and the other mechanism being capable of operation to actuate said channeling, eye piercing, and severing means, a stop to limit the movement of the metal strip when fed by the feeding mechanism, point forming means, and a device engageable with the severed needles, and operable to carry said needles in engagement with said point forming means.

3. A machine of the character described having channeling means, eye piercing means, and severing means, mechanisms adapted for alternate operation, one of said mechanisms being capable of operation to feed a metal strip in position to be operated upon by said channeling, eye piercing, and severing means, and the other mechanism being capable of operation to actuate said channeling, eye piercing and severing means, point forming means, a device engageable with the severed needles and operable to carry said needles in engagement with said point forming means, and a stop engageable with the ends of the severed needles during the operation of said carrying device.

4. A machine of the character described having channeling means, eye piercing means, and severing means, mechanisms adapted for alternate operation, one of said mechanisms being capable of operation to feed a metal strip in position to be operated upon by said channeling, eye piercing, and severing means, and the other mechanism

being capable of operation to actuate said channeling, eye piercing, and severing means, point forming means, a receptacle for the finished needles, and a device engageable with the severed needles, and capable of operation to carry said needles in engagement with said point grinding means, and to deposit said needles in said receptacle.

5. A machine of the character described having eye piercing means, severing means including cutting members capable of cutting engagement with a metal wire or strip to sever the same into lengths and provided with die surfaces adapted for molding contact with said wire or strip to mold the head of the needle during severing of such wire or strip, and feeding means operable to present a metal wire or strip first to the eye piercing means and afterward to the severing means.

6. A machine of the character described having channeling means comprising alined tools movable for engagement with opposite sides of a metal strip and provided with die surfaces adapted for registry with each other to channel the opposite sides of said strip and means for inclosing the metal strip having surfaces adapted for molding contact upon said strip during the operation of such channeling means.

7. A machine of the character described having channeling means comprising alined tools movable for engagement with opposite sides of a metal strip and provided with registering die surfaces to channel the opposite sides of said strip, and means adapted for molding engagement with the strip at points between the points of engagement of said die surfaces capable of operation to retain said strip in position during the operation of said alined tools and whereon the metal strip is pressed during the operation of such channeling means.

8. A machine of the character described having matrices provided with raised impression die surfaces adapted to be impressed in a metal wire to produce thread grooves therein, and means capable of operation to inclose such wire and provided with surfaces adapted for molding contact therewith during the operation of such groove forming die surfaces.

9. A machine of the character described having matrices provided with impression die surfaces, means to feed a wire endwise past such matrices, means to move the matrices relatively one to the other capable of operation to impress their die surfaces in such wire for the production of thread grooves therein, means capable of operation to inclose the wire and provided with surfaces adapted for molding contact therewith during the operation of such matrices, and means, engageable with the grooved wire after the same is fed past the inclosing

means and capable of operation to sever the same into lengths.

10. A machine of the character described having matrices provided with impression die surfaces, means to feed a wire endwise past such matrices, intermittently actuated means to move one of the matrices relatively to the other, capable of operation to impress their die surfaces in such wire at different points in the length thereof, and means capable of operation to inclose the wire and provided with surfaces adapted for molding contact therewith during the operation of such matrices.

11. A machine of the character described having matrices provided with impression die surfaces, means to feed a wire endwise past such matrices, intermittently actuated means to move one of the matrices relatively to the other, capable of operation to impress their die surfaces in such wire at different points in the length thereof, means capable of operation to inclose the wire and provided with surfaces adapted for molding contact therewith during the operation of such matrices, and means for severing the wire into lengths.

12. A machine of the character described having means to inclose a wire and provided with surfaces adapted for molding contact therewith, and relatively movable matrices within the inclosing means and provided with impression die surfaces capable of operation, when one matrix is moved relatively to the other, to impress thread grooves in the inclosed wire, and to force such wire into accurate contact with the molding surfaces of such inclosing means.

13. A machine of the character described having means to inclose a wire and provided with surfaces adapted for molding contact therewith, matrices one of which is movable relatively to the other within the inclosing means, said matrices having impression die surfaces capable of operation, when one matrix is moved relatively to the other, to impress thread grooves in the wire, and to force such wire into accurate contact with the molding surfaces of the inclosing means, means to feed a wire endwise past the inclosing means, and intermittently actuated mechanism for moving one of the matrices relatively to the other and capable of operation to impress the die surfaces thereof in the wire at different points in the length thereof for the production of spaced thread grooves therein.

14. A machine of the character described having means to inclose a wire and provided with surfaces adapted for molding contact therewith, matrices one of which is movable relatively to the other within the inclosing means, said matrices having impression die surfaces capable of operation, when one matrix is moved relatively to the

other, to impress thread grooves in the wire, and to force such wire into accurate contact with the molding surfaces of the inclosing means, means to feed a wire endwise past the inclosing means, intermittently actuated mechanism for moving one of the matrices relatively to the other and capable of operation to impress the die surfaces thereof in the wire at different points in the length thereof for the production of spaced thread grooves therein, and means for severing the wire into lengths.

15. A machine of the character described having an endwise movable eye piercing punch adapted to penetrate a metal wire for the production of an eye therein, means to feed a wire past such punch, means to inclose the wire during the operation of such punch having surfaces adapted for accurate contact around the circumference of such wire to prevent deformation thereof during the operation of the punch, and means engageable with the wire after the same is fed past the punch, and capable of operation to sever the same into lengths.

16. A machine of the character described having two means capable of successive operation, the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of said wire, said reducing means comprising matrices one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing the wire during the operation of said matrices in compressing said wire and comprising dies having surfaces adapted for molding contact with the wire, and means for feeding a wire past said successively operable means.

17. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, and the eye producing means being a punch adapted for endwise movement through the thinned portion of the wire, and means for feeding a wire past said successively operable means.

18. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce eyes in such thinned portion of said wire,

said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, and the eye producing means being a punch adapted for endwise movement through the thinned portion of the wire, means for feeding a wire past said successively operable means, and intermittently actuated mechanism for operating said successively operable reducing and eye piercing means.

19. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing the wire during the operation of said matrices in compressing such wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye producing means being a punch adapted for endwise movement through the thinned portion of the wire, and means for feeding a wire past said successively operable means.

20. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing the wire during the operation of said matrices in compressing such wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye producing means being a punch adapted for endwise movement through the thinned portions of the wire, means for feeding a wire past said successively operable means, and intermittently actuated mechanism for operating said successively operable reducing and eye piercing means.

21. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces

adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing such wire during the operation of the matrices in compressing the wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye piercing means being a punch adapted for endwise movement through the thinned portion of the wire, means for inclosing the wire during the operation of said punch having surfaces adapted for accurate contact upon the circumference of the wire to prevent deformation thereof during piercing of the eye, and means for feeding a wire past said successively operable means.

22. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing the wire during the operation of said matrices in compressing such wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye producing means being a punch adapted for endwise movement through the thinned portion of the wire, means for inclosing the wire during the operation of said punch having surfaces adapted for accurate contact upon the molded circumferential surfaces of the wire to prevent deformation thereof during production of the eye, means for feeding a wire past said successively operable means, and intermittently actuated mechanism for operating said successively operable reducing and eye producing means.

23. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces equal in width to the thickness of the wire, and adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing such wire during the operation of the matrices in compressing such wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye piercing means being a punch adapted for endwise movement through the thinned portion of the wire, means for inclosing the wire during the operation of said punch having

surfaces adapted for accurate contact upon the molded circumferential surfaces of the wire to prevent deformation thereof during piercing of the eye, and means for severing the wire into lengths.

24. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing such wire during the operation of the matrices in compressing the wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye piercing means being a punch adapted for endwise movement through the thinned portion of the wire, means for inclosing the wire during the operation of said punch having surfaces adapted for accurate contact upon the molded circumferential surfaces of the wire to prevent deformation thereof during the piercing of the eye, and means for severing the wire into lengths.

25. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing such wire during the operation of the matrices in compressing the wire, said inclosing means having surfaces adapted for molding contact with the wire, means for feeding a wire endwise past said reducing and eye producing means, the eye producing means being a punch adapted for endwise movement through the thinned portion of the wire and being elongated in cross section in the direction of feed of the wire for the production of an elongated eye therein, and means for inclosing the wire during the operation of said punch having surfaces adapted for accurate contact upon the molded circumferential surfaces of the wire to prevent deformation thereof during piercing of the eye.

26. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said

reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing such wire during the operation of the matrices in compressing the wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye piercing means being a punch adapted for endwise movement through the thinned portion of the wire, means for inclosing the wire during the operation of said punch having surfaces adapted for accurate contact upon the molded circumferential surfaces of the wire to prevent deformation thereof during piercing of the eye, and means for severing the wire into lengths comprising cutting members engageable with the wire to cut the same and provided with surfaces adapted for molding contact with the wire to round the butt end of the needle during the severing of the wire.

27. A machine of the character described having two means capable of successive operation the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of the wire, said reducing means comprising matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire to compress the same, means for inclosing such wire during the operation of the matrices in compressing the wire, said inclosing means having surfaces adapted for molding contact with the wire, the eye piercing means being a punch adapted for endwise movement through the thinned portion of the wire, means for inclosing the wire during the operation of said punch having surfaces adapted for accurate contact upon the molded circumferential surfaces of the wire to prevent deformation thereof during the piercing of the eye, such inclosing means being apertured for the passage of the punch and for the discharge of the metal removed from the wire by such punch, and means for severing the wire into lengths.

28. A machine of the character described having eye piercing means, severing means including members having cutting edges engageable with a metal strip or wire to sever the same into lengths and provided with registering die surfaces adapted for molding contact with such wire or strip during operation of said severing means to mold the head of the needle, and recurrently actuated feeding means capable of successive operation to present a metal wire or strip first to the eye piercing means and afterward to the severing means.

29. A machine of the character described having two means capable of successive operation, the first to reduce the thickness of a metal wire for the production of a thinned portion therein, and the second to pierce an eye in such thinned portion of said wire, said reducing means including matrices, one of which is movable relatively to the other, said matrices having impression die surfaces adapted, when one matrix is moved relatively to the other, to be impressed in said wire or strip to compress the same, and means for inclosing the wire during the operation of said matrices in compressing such wire, said inclosing means having surfaces adapted for molding contact with the wire.

30. A machine of the character described having severing means operable to sever a wire into lengths, including members having cutting edges engageable with the wire and provided with registering die surfaces adapted for molding contact with such wire during operation of the severing means, a stop engageable with a wire fed past the severing means and operable to limit the movement thereof, point forming means, and mechanism adapted to receive lengths of wire severed by the severing means and operable to present such lengths to said point forming means.

31. A machine of the character described having severing means operable to sever a wire into lengths, including members having cutting edges engageable with the wire and provided with registering die surfaces adapted for molding contact with such wire during operation of the severing means, recurrently actuated feeding means capable of successive operation to present a wire to the severing means, a stop engageable with a wire fed by said feeding means past the severing means, and operable to limit the movement of such wire, point forming means, and mechanism adapted to receive lengths of wire severed by the severing means and operable to present such lengths to said point forming means.

32. A machine of the character described having eye piercing means, severing means operable to sever a wire into lengths, feeding means operable to present a wire first to the eye piercing means and afterward to the severing means, point forming means, and mechanism adapted to receive lengths of wire severed by the severing means and operable to present such lengths to the point forming means.

33. A machine of the character described having eye piercing means, severing means operable to sever a wire into lengths, recurrently actuated feeding means capable of successive operation to present a wire to the severing means, a stop engageable with a wire fed by such feeding means past the severing means and operable to limit the

movement of such wire, point forming means, and mechanism adapted to receive lengths of wire severed by the severing means and operable to present such lengths of wire to said point forming means.

34. A machine of the character described having a matrix provided with a raised impression die surface adapted to be impressed in a metal strip and operable, when impressed therein, to produce a thread groove in said strip, and means co-acting with the matrix to inclose the strip and provided with a surface adapted for molding contact therewith during the operation of said matrix.

35. A machine of the character described having a matrix provided with a raised impression die surface adapted to be impressed in a metal strip and operable, when impressed in said strip, to produce a thread groove therein, means co-acting with the matrix adapted to inclose said strip and provided with a die surface adapted for molding contact therewith during the operation of the matrix, and means for moving the matrix relatively to the inclosing means and operable to impress the die surfaces in the strip to compress the same.

36. A machine of the character described having a matrix provided with a raised impression die surface adapted to be impressed in a metal strip and operable, when impressed therein, to produce a thread groove therein, means co-acting with the matrix adapted to inclose the strip and provided with a die surface adapted for molding contact therewith during the operation of the matrix, means for moving the matrix relatively to the inclosing means and operable to impress the die surfaces in the strip to compress the same, means operable to feed a strip endwise past the matrix and said inclosing means, and means, engageable with said strip after the same is fed past the matrix and inclosing means and operable to sever the same into lengths.

37. A machine of the character described having feeding means operable to impart endwise feeding movement to a metal wire or strip, and eye piercing means past which said wire or strip is adapted to be fed by such feeding means and including an endwise movable eye piercing punch operable to pierce said wire or strip for the production of needle eyes therein, said punch being in cross section elongated in the direction of feed of the wire or strip.

38. A machine of the character described having two mechanisms operable at different points in the length of a metal wire or strip for the production of different parts of a needle, one of such mechanisms being capable of adjustment relatively to the other to accommodate needles of different lengths, feeding means operable to feed a metal wire

or strip endwise and intermittently past
said mechanisms in position to be operated
upon successively by said respective mecha-
nisms, and means operable to vary the ex-
5 tent of endwise movement imparted by the
feeding means to the metal wire or strip to
accommodate needles of different lengths.

In testimony whereof I have hereunto set
my hand in presence of two witnesses.

PAUL BOHIN.

Witnesses:

W. A. LYONS,
MARIE GAETTI.