Feb. 27, 1934. E. K. BROWN 1,949,349

SEWING MACHINE NEEDLE

Filed Jan. 12, 1933

Fig. 1.

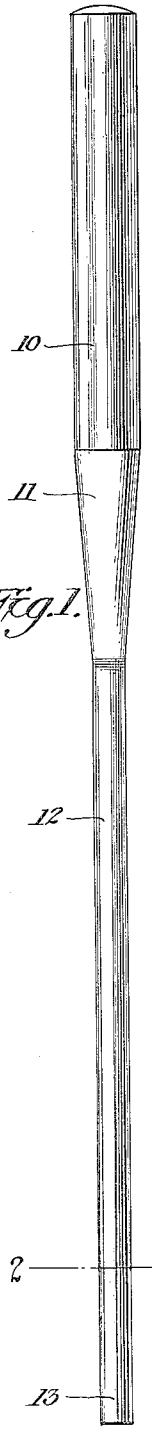


Fig. 2.

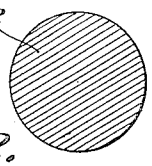


Fig. 6.

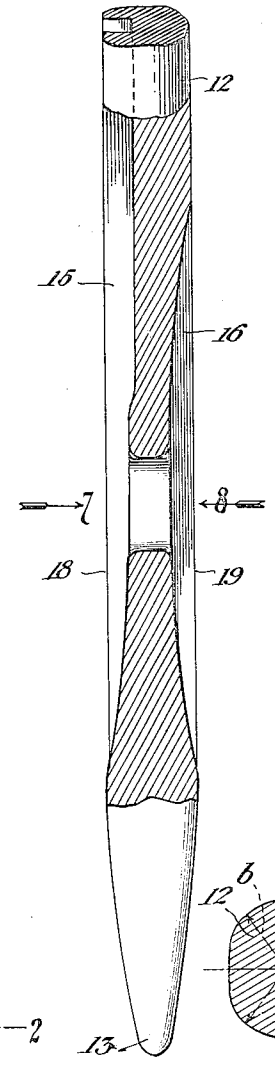


Fig. 3.

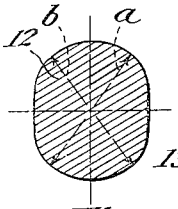


Fig. 7.

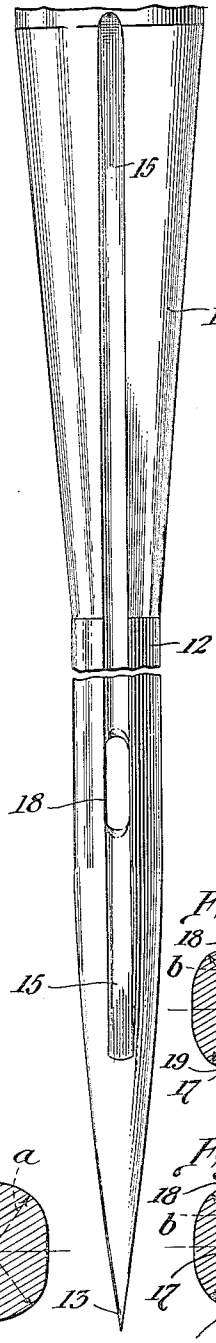


Fig. 5.

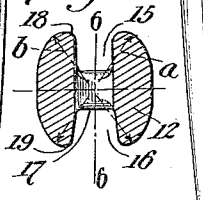


Fig. 4.

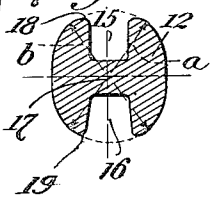
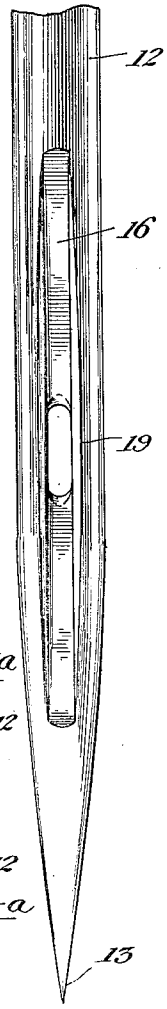


Fig. 8.



Inventor,

Edmund K. Brown

By Stetson, Mason & Howard,

Attorneys.

Patented Feb. 27, 1934

1,949,349

UNITED STATES PATENT OFFICE

1,949,349

SEWING MACHINE NEEDLE

Edmund Karl Brown, Torrington, Conn., assignor to The Torrington Company, Torrington, Conn., a corporation of Connecticut

Application January 12, 1933. Serial No. 651,435

2 Claims. (Cl. 112—222)

This invention relates to improvements in the art of sewing machine needles, and more particularly to a construction of the same whereby greater strength is assured in the blade of the needle with a corresponding increase in the strength of the structure adjacent the needle eye, along with a lesser liability of breaking the needle thread during the operation of the needle.

It has heretofore been the practice to form a needle with a body wire of round cross-section by, for example, milling a long thread groove in its length and a short thread groove at the eye. These thread grooves must be of sufficient width and depth to bury the thread during sewing, so that the bight of the thread at the eye is not exposed to direct contact with the fabric when the needle passes through the fabric, and so that the portion of the thread extending from the eye toward the sewing machine spool is contained within this longer thread groove during the entire course of movement of the needle into the fabric. In order to have the thread grooves of sufficient depth, with such a circular cross-section, the web left in the body between the grooves was of restricted thickness, and hence it presented at the eye an insufficient surface to the thread, and the thread was often broken at the relatively sharp edge in the eye, by the effect of a thread tension which was desirable for a proper drawing of the thread loops during sewing.

Furthermore, with such a needle, the grooving of the metal to provide space for burying the thread results in a serious reduction of the radius of gyration of the needle, considered as a loaded column, so that the needle has a much lesser resistance against bending in the plane of symmetry through the thread grooves. Hence greater bending occurred, and breakage of the needle is a frequent result. It is especially to be noted that this grooving not only removes much of the metal in this plane, but also the metal remaining at the sides of the long thread groove is very thin and hence has little ability to resist the bending.

These difficulties are intensified when two long thread grooves are employed.

When it is sought to avoid these defects by employing a body wire of sufficiently large size to provide an ample web thickness and radius of gyration, the cross-sectional area and perimeter become so great that the fabric is damaged, and the increased displacement of the fabric causes a greater resistance to penetration and a greater wear. The thinness of metal at the sides of the grooves is overcome but slowly with increase of diameter of the body wire, with such a circular cross-section. If the grooves are made shallower, the thread is no longer buried therein, and skipping of stitches and breakages of thread occur from contact of thread and fabric.

When it is sought, by forging or some other process, to deform the body wire at the location of the eye by extending the periphery thereat outside of the general circular periphery of the body wire itself, the increased cross-sectional area and perimeter requires a larger hole in the fabric for the passage of the portion of the needle adjacent the eye, and the fabric is thereupon momentarily permitted to return by its elasticity when this enlarged portion has passed the fabric and only the normal diameter of the body wire is presented to the fabric. The blade portion of such a needle, however, is no stronger than a needle made in the accepted manner as described above, and bending and breakage occurs. Further, such conformation of the needle may only be produced by a forging or striking operation. The delicate dies required for the needles, especially in the finer sizes, are apt to break, and soon wear. The forging operation, in the plane of the eye, causes the formation of a flash or fin at each side, which must be removed by a further and separate trimming operation. Such needles are, therefore, likewise not wholly satisfactory in service, and are expensive to manufacture.

According to the present invention, the needle is provided with a greater thickness of web between the thread grooves at the eye, and a greater radius of gyration is provided both at the eye as compared to the accepted needle, and along the blade portion between the eye and the shank as compared with any prior needles. These results are attained by a simple and direct method of manufacture which does not require extensive forming dies nor trimming operations, as brought out in my copending and divisional application Serial No. 693,385, filed October 12, 1933.

According to the present invention a body wire is formed with an oblong cross-section having a greater diameter along a major axis than along a minor axis, and the thread grooves are provided along the major axis plane and of an ample depth for fully burying the thread and yet a sufficient web thickness is left between them for avoiding an edge at the eye so sharp as to cause a cutting or breaking of the thread, and an eye is provided between the grooves through this web, without substantial variation of the form or dimensions of the body along the minor axis.

The needle according to this invention therefore may have the most desirable cross-section

from the taper of the point back toward the shank for the entire distance by which the needle may enter or pass through the fabric.

One form of construction of the needle, in which illustratively the needle has a substantially uniform cross-section at the eye and along the blade, with a procedural representation of steps for the manufacture of the same, is shown on the accompanying drawing, in which:

Fig. 1 is a side elevation of a blank for the needle, as formed in manufacture.

Fig. 2 is a cross-section of this blank at line 2—2 of Fig. 1, being at the point where the needle eye is later to be formed.

Fig. 3 shows the deformation or flattening of the blank of Fig. 1, this section likewise being taken at line 2—2 of Fig. 1.

Fig. 4 shows a further step of manufacture, in which the needle grooves have been formed.

Fig. 5 shows the final stage of forming, in which the eye has been pierced.

Fig. 6 is a longitudinal sectional view, substantially on line 6—6 of Fig. 5.

Figs. 7 and 8 are respectively side elevations in the direction of the arrows 7 and 8 of Fig. 6, showing a preferred shape for the thread grooves.

The present needle is constructed from a blank which has been given an oblong cross-section for the entire length of the body between shank and point, and the thread grooves are formed along the major axis plane of such cross-section. Such a blank is shown in Fig. 1 as having a shank 10 by which it may be held in the needle bar clamp, and a tapering portion 11 joining this shank proper to the body wire 12.

This blank may be formed by swaging to produce a body wire of circular cross-section as shown in Fig. 2, and is provided for its entire length with flattened sides by the operation of smooth surfaced dies, until the distance between the diametrically opposite flattened sides is reduced substantially to the desired diameter of the finished needle. The body thus assumes an oblong cross-section as shown in Fig. 3, in which the minor axis is the desired finished diameter, while the major axis diameter is considerably greater. This deforming between smooth dies, furthermore, gives a better surface than can be obtained by milling and/or grinding, with lesser frictional effects and wear.

The thread grooves may then be formed in this flattened blank, preferably by milling as this furnishes a groove of definitely determined shape and dimensions. The illustrated long groove 15 extends for the length of the body wire and extends up onto the tapered portion 11, this long thread groove having its side walls as nearly parallel as feasible, in this preferred form. Diametrically opposite this long thread groove at the location for the eye is formed, in the illustrative example, a short thread groove 16 which is illustrated with slightly tapered walls to permit the thread a relative angular movement about the longitudinal axis of the needle during cooperation with the looper mechanism.

The web 17 which forms the bottoms of the two thread grooves is thus of ample thickness between the grooves.

An eye is provided in this web, with the usual rounded edges, without substantial deformation of the oblong external cross-section at the eye. The edges of the grooves are slightly rounded, as a result, for example, of the usual polishing operation, but a large angle is maintained between the tangents of the peripheral surface and the side walls of the grooves.

The substantially parallel walls of the long thread groove meet the peripheral surface of the body wire at edges which (Figs. 7 and 8) are substantially straight from end to end in the specific form illustrated, and thus afford a groove within which the portion of the thread extending from the eye toward the machine spool may be buried with the least possible removal of material at this critical point.

The width of the groove is standard for the needle size, and the needle itself has substantially the same chordal dimension as the aforesaid minor axis diameter of the blank. That is, the diameter between the flattened diametrically opposite surfaces is substantially the same as the distance from one longitudinal edge 18 of one thread groove to the symmetrical edge 19 of the other thread groove, measured along a chord of the cross-section.

This preferred shape of the body of oblong section may be described as "flattened" in accordance with the usual technical terminology, but it must be understood that "flattened" is not limited to the formation of diametrically opposite plane portions but comprises generally the formation of oblong sections having different diameters along major and minor axes. This shape provides an ample amount of metal adjacent the outer edges of the grooves and the diameter along any diagonal (i. e. in any plane other than the major and minor axis planes) is greater than the minor axis diameter. Therefore, the chordal dimension is substantially equal to the minor axis diameter, the diameters along such diagonals (*a* and *b*, Figs. 3 and 5) remain greater than the minor axis diameter, and also greater than the aforesaid chordal dimension. Thus a considerable quantity of metal exists in the structure to provide the side walls of the grooves, and as this metal is at a maximum distance from the center axis of the needle, the effective radius of gyration is increased and a much stiffer needle results. Hence, the finished needle is more resistant to bending, and hence less liable to breakage.

The needle is characterized by the oblong cross-section between point and shank taper, and by the thickness of web and large radius of curvature permitted at the eye.

It is obvious that the invention is not limited to the formation illustratively shown and described, but that it may be employed in many ways within the scope of the appended claims.

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

1. A sewing machine needle having a body, with diametrically opposite thread grooves at the eye, said eye connecting said grooves, said body being substantially symmetrical with respect to a plane through said grooves, said body also including a blade of oblong cross-section with at least one said thread groove extending along the same, the diameters of the blade along diagonals of said cross-section being greater than the diameter at right angles to said plane whereby to increase the radius of gyration in said plane, the chordal dimension at either edge of said groove parallel to said plane being substantially equal to the diameter at right angles to said plane.

2. A sewing machine needle having a body of substantially uniform cross-section and diametrically opposite thread grooves at the eye, said eye connecting said grooves, said body being substan-

tially symmetrical with respect to a plane through said grooves, said body also including a blade with at least one said thread groove extending along the same, the diameters of the body along diagonals of said cross-section being greater than the diameter at right angles to said plane whereby to increase the radius of gyration in said plane, the chordal dimension between an edge of one said groove and the symmetrical edge of the other said groove being substantially the same as the said diameter at right angles to said plane, the edges formed by the junctions of the peripheral surface of the body with the side wall surfaces of at least one said groove being substantially straight from end to end.

EDMUND K. BROWN.