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(54) NEEDLE

(71) I, NICHOLAS GEORGE HERR, a citizen of the United States of America, residing at 7367 Hollywood Blvd., Los Angeles, California, 90046, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to needles. In particular, the present invention relates to that type of needle which is adapted to pierce through the work, after which a loop is pulled from the needle, and the latter is extracted from the work and again passed through the work and through the previously extracted loop so as to form in this way the desired stitches.

Conventional needles of this type are incapable of maintaining the filamentary material out of engagement with the work so that the filamentary material necessarily rubs against the work during the formation of the stitches. This is a highly undesirable drawback particularly in the case of needles used during surgical operations for the purpose of applying sutures.

Furthermore, with the conventional needles of the above type it is difficult to grasp the filamentary material in order to pull it from the needle when forming a loop.

In addition, at the end of the operation when it is desired to cut the filamentary material it is necessary to use a separate tool such as a suitable scissors for this purpose. This latter requirement also is a considerable inconvenience since it requires the use of a separate implement. This requirement results in additional time involved in manipulating the additional implement.

According to the invention there is provided a needle comprising an elongate body having a longitudinal central axis and terminating at one end in a sharp, pointed tip for puncturing through work to which filamentary material is to be delivered by the needle, said body being formed on opposite sides of a plane which contains said axis with a longitudinal bore and a longitudinally extending passage, respectively, and in

the region of said tip with a transverse notch forming an eye and communicating with front ends of said bore and said passage so that filamentary material may extend forwardly through one of said bore and said passage, across said eye, and then rearwardly through the other of said bore and said passage, so that when said tip pierces through work the filamentary material will not engage the work and so that a loop can be pulled from said body at said eye thereof, and wherein said passage is provided with an edge having a cutting region for cutting the filamentary material.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which:

Fig. 1 is a fragmentary illustration of a needle illustrating the needle at the region of the front tip thereof;

Fig. 2 is a fragmentary perspective illustration of the needle of Fig. 1 as seen from the side thereof which is not visible in Fig. 1;

Fig. 3 is a fragmentary side elevation of the needle as seen when looking toward the side thereof which is visible in Fig. 2;

Fig. 4 is a top plan view of the needle of Figs. 1—3;

Fig. 5 is a transverse section of the needle taken along line 5—5 of Fig. 3 in the direction of the arrows;

Fig. 6 is a fragmentary longitudinal section of the needle taken in a plane which contains the central longitudinal axis thereof, along line 6—6 of Fig. 4 in the direction of the arrows, Fig. 6 further illustrating how a loop is drawn from the needle;

Fig. 7 is a view identical with that of Fig. 6 but illustrating how a loop may be drawn in a manner differently from Fig. 6;

Fig. 8 is a fragmentary side elevation of the needle showing the structure of Fig. 3 with the filamentary material carried by the needle and in particular illustrating how the filamentary material is cut;

Fig. 9 is a transverse section of the needle of Fig. 8 taken along line 9—9 of Fig. 8 in the direction of the arrows; and

Fig. 10 shows how the structure of Fig. 9 may be rotated in one direction for cutting the filamentary material.

Referring to the drawings, the needle shown is in the form of an elongated body 20 made of any suitable metal, and having a circular cross-section as is apparent from Figs. 5, 9 and 10. The elongated body 20 is of a constant diameter all the way up to the region of its front tapered end portion 22 which terminates in a sharp, pointed tip 24 capable of penetrating into the work material.

The elongated body 20 has a longitudinal central axis contained in a central longitudinal plane which is the plane in which the sectional views of Figs. 6 and 7 are taken. On opposite sides of this central plane the elongated body 20 is formed with a longitudinal passage 26 and a longitudinal bore 28 which extend parallel to the axis of the body 20. This bore and this passage each extends all the way to the rear end of the body 20 which is not illustrated. The passage 26 and the bore 28 each extends forwardly along the interior of the body 20 up to the region of the tapered front end portion 22 of the body 20 and in particular at the region where the diameter of the body 20 starts to diminish forwardly of the constant diameter elongated portion thereof.

At this latter region the body 20 is formed with a transverse notch 30 forming an open eye communicating with the front end of the passage 26 and the front end of the bore 28, so that the filamentary material can extend forwardly along either the passage 26 or the bore 28, then across the open eye 30 and rearwardly along the other of the bore 28 and the passage 26. The filamentary material is shown in this condition in phantom lines in Fig. 4 with the filamentary material shown in phantom lines extending across the open eye 30 in Fig. 3.

Either the passage 26 or the bore 28, the passage 26 in the illustrated example, communicates with the exterior of the needle through a longitudinally extending opening 32 which is formed through the wall of the body 20 beside the passage 26 so that the latter is accessible from the exterior through the longitudinal opening 32. It will be noted that this opening 32 extends along the entire length of the passage 26. The opening 32 has an upper edge 34 and a lower edge 36 between which the opening 32 extends, and these edges have sharp portions 38 and 40, respectively, as shown in Fig. 2, forming cutting regions which are capable of cutting the filamentary material 42.

In addition to being formed with the transverse notch which defines the open eye 30, the body 20 is formed with a pair of

additional notches 44 and 46 respectively situated forwardly and rearwardly of the open eye 30 in the plane which contains the central longitudinal axis of the body 20. These additional notches 44 and 46 communicate with the open eye 30. The body 20 is also formed with an intermediate curved notch portion 48 extending deeper than the transverse notch 30 and communicating therewith, this intermediate notch 48 connecting the pair of notches 44 and 46, so that all of this notch structure 44, 46, 48 has a continuous inner surface 50 which is curved in the manner shown most clearly in Figs. 3, 6, and 7.

With the above-described needle, it is possible to thread the filamentary material 42 forwardly along either the passage 26 or the bore 28, then across the open eye 30 and rearwardly along the bore 28 or the passage 26. The fact the passage 26 is open at one side facilitates the handling of the filamentary material 42. This filamentary material may be suitable suture material where the needle is used for surgical purposes. With the filamentary material threaded in this way through the needle, the latter may be pierced through the work, and then a suitable hook 52 (Figs. 6 and 7) may be applied to the front end of the filamentary material to pull a loop from the needle. This hook 52 may be inserted either into the notch 46 to engage behind the filamentary material in the open eye 30, as shown in Fig. 6, or it may be introduced through the front notch 44 in the manner shown in Fig. 7. In this way, it is extremely convenient to pull a loop of the filamentary material from the needle.

In addition, when it is desired to cut the filamentary material 42, it may be pulled from the passage 26 up to the region of the cutting edges 38 and 40, as illustrated in Fig. 8. Then the body 20 may be turned in either direction as shown by the double-headed arrows in Figs. 8 and 9. For example, if the body 20 is turned in a clockwise direction, as shown by the arrow in Fig. 10, the upper cutting edge 38 will cut the filamentary material 42. If the body is turned in the opposite direction, the lower cutting edge 40 will cut the material.

In this way an extremely robust and simple needle is provided with a smooth exterior surface. The filamentary material is housed within the needle so that it will not engage the work while the needle passes there-through. At the same time it is a convenient matter to form a loop in either the manner shown in Fig. 7 or in the manner shown in Fig. 6 and of course it is possible to cut the filamentary material with either of the edges 38 or 40 without requiring the use of an additional implement for this purpose.



WHAT I CLAIM IS:—

1. A needle comprising an elongate body having a longitudinal central axis and terminating at one end in a sharp, pointed tip for puncturing through work to which filamentary material is to be delivered by the needle, said body being formed on opposite sides of a plane which contains said axis with a longitudinal bore and a longitudinally extending passage, respectively, and in the region of said tip with a transverse notch forming an eye and communicating with front ends of said bore and said passage so that filamentary material may extend forwardly through one of said bore and said passage, across said eye, and then rearwardly through the other of said bore and said passage, so that when said tip pierces through work the filamentary material will not engage the work and so that a loop can be pulled from said body at said eye thereof, and wherein said passage is provided with an edge having a cutting region for cutting the filamentary material.
2. A needle as claimed in Claim 1, wherein said body is formed along at least one side surface with a longitudinal opening extending through a wall of said body and communicating with said passage.
3. A needle as claimed in Claim 2, wherein said elongate body is of a circular cross-section, except in the region of said passage, in any plane transverse to said axis.
4. A needle as claimed in Claim 3, wherein said opening extends from said open eye along the entire length of said passage.
5. A needle as claimed in any preceding claim, wherein said body is formed along both edges between which said opening extends respectively with a pair of cutting regions for cutting the filamentary material.
6. A needle as claimed in any preceding

claim, wherein said body is formed in said plane on one side of said transverse notch which forms said eye with an additional notch communicating with said eye for facilitating grasping of the filamentary material in said eye to form a loop.

7. A needle as claimed in Claim 6, wherein said body is formed in said plane with a pair of said additional notches respectively situated before and behind said transverse notch which forms said eye and both communicating with said transverse notch for facilitating grasping of the filamentary material in the eye either from the front of the filamentary material or from the rear thereof.

8. A needle as claimed in Claim 7, wherein said body is formed in said plane with an intermediate notch portion deeper than said transverse notch, extending across the latter, and interconnecting said additional notches.

9. A needle as claimed in Claim 8, wherein said elongate body, or said elongate body except in the region of said passage, as the case may be, is of a circular cross-section and has to the rear of said tip thereof a substantially constant diameter while said body gradually tapers from its constant diameter portion up to said tip thereof, and all of said notches being situated at a region of said body which is adjacent the constant diameter portion thereof where the body starts to taper toward the tip thereof.

10. A needle substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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