

[54] NEEDLE

2,781,957 2/1957 Le Szen 223/102

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 277,944, Aug. 4, 1972, Pat. No. 3,754,693.

[52] U.S. Cl. 223/102, 112/222

[51] Int. Cl. F02d 11/10, D05b 85/00

[58] Field of Search 223/102, 103, 104; 112/222, 223

[57] ABSTRACT

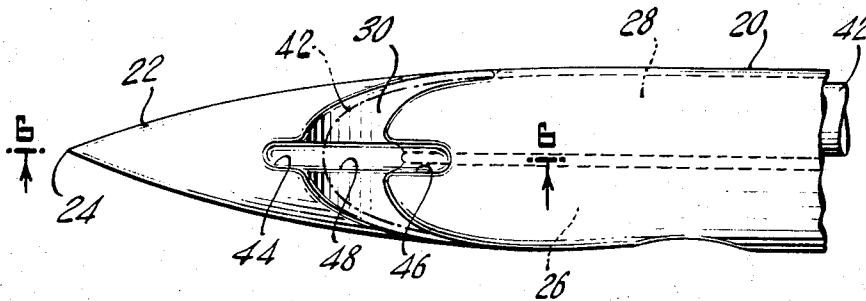
A needle which includes an elongated body formed with a front pointed tip for piercing through the work as well as with a pair of bores rearwardly of the tip for receiving the filamentary material. The body is formed at the front ends of these bores with a transverse notch which forms an open eye so that the filamentary material can extend forwardly along the interior of one of the bores, across the open eye, and then rearwardly along the interior of the other bores enabling the needle in this way to pierce through the work while maintaining the filamentary material out of engagement with the work.

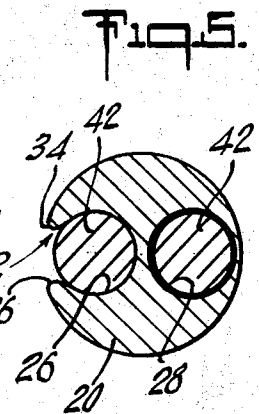
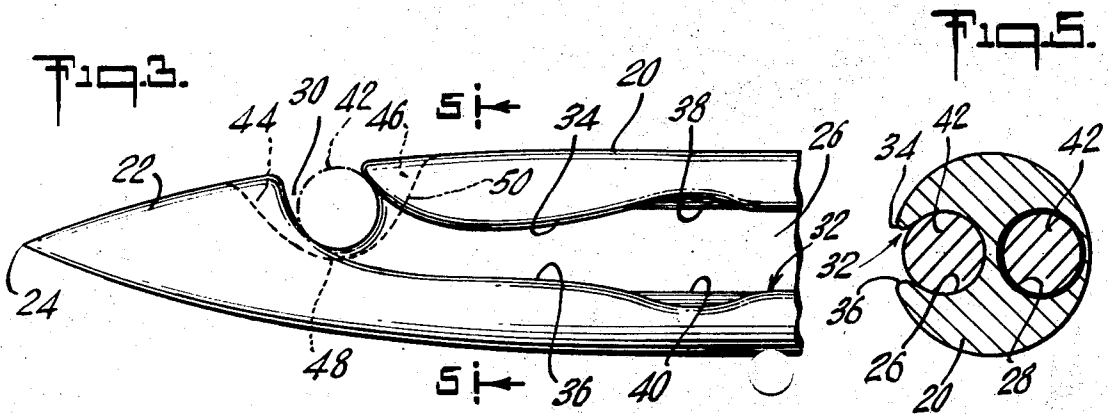
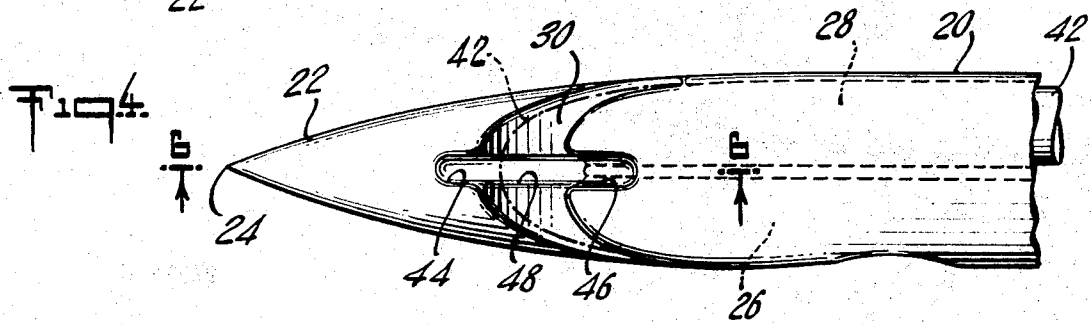
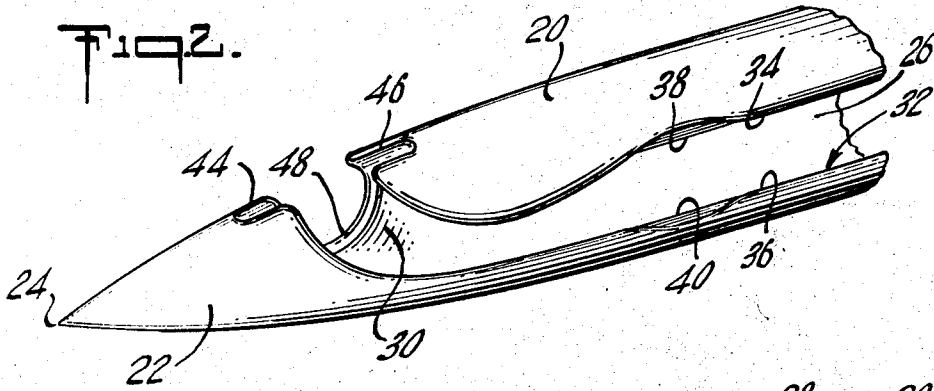
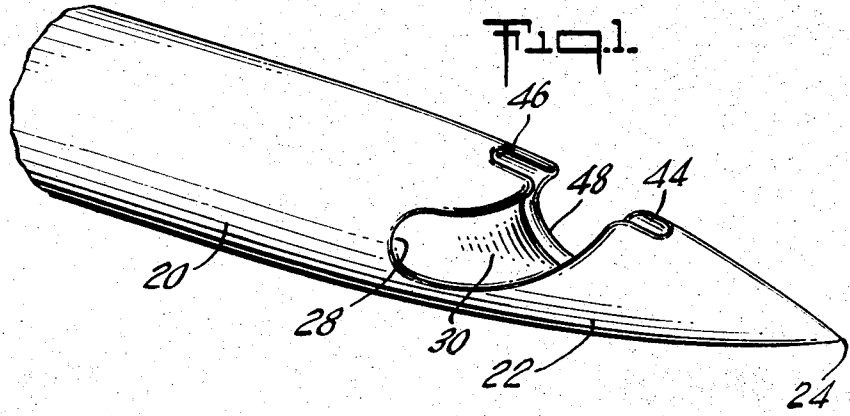
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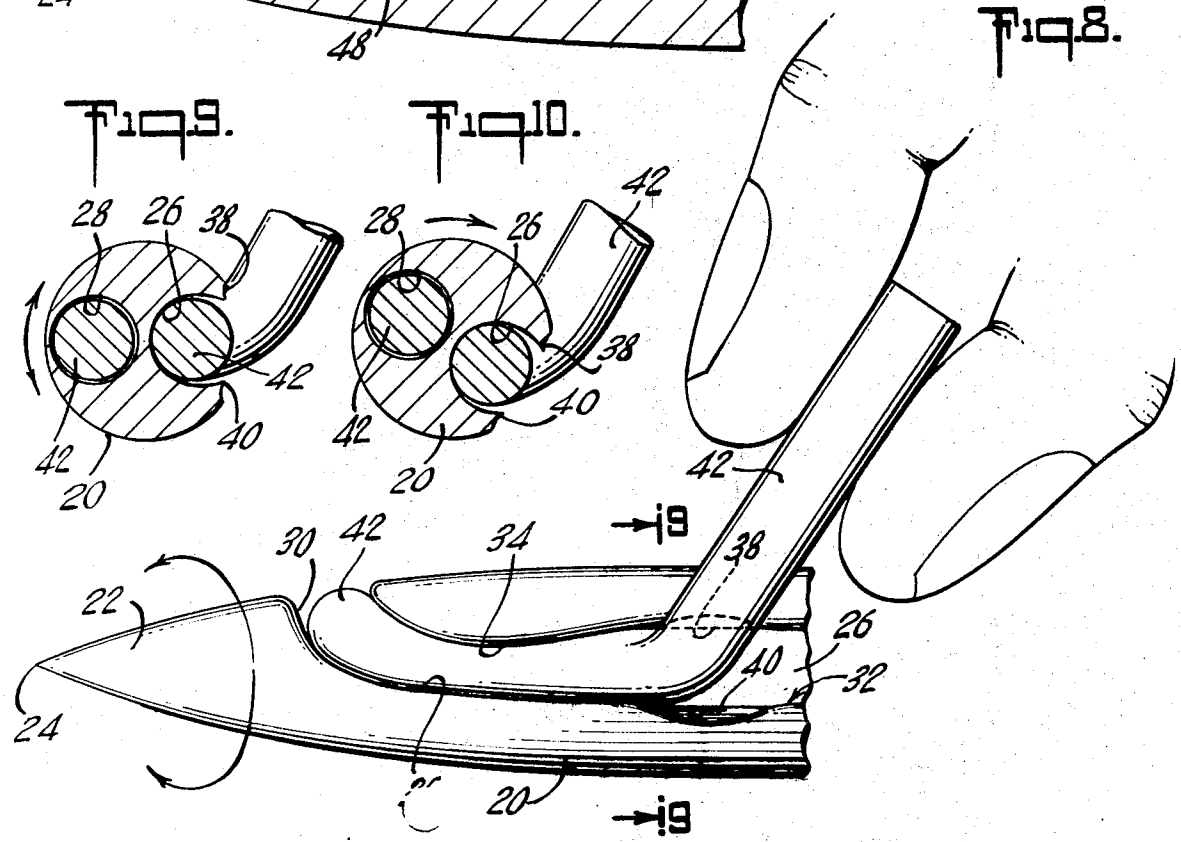
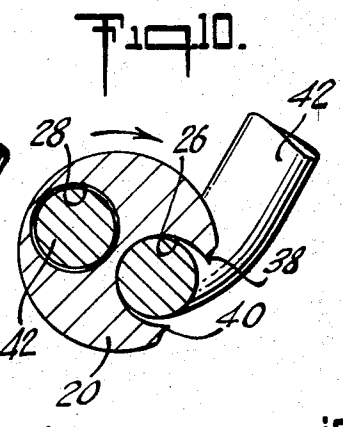
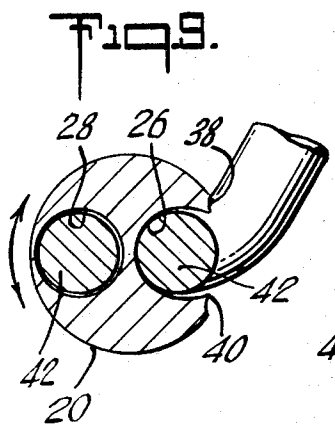
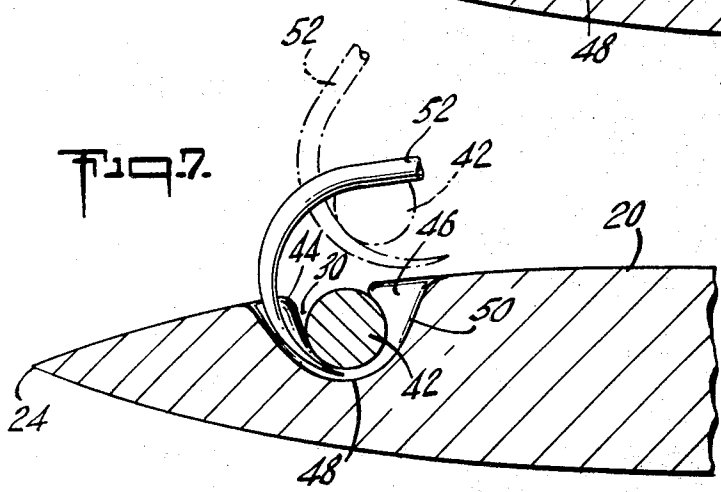
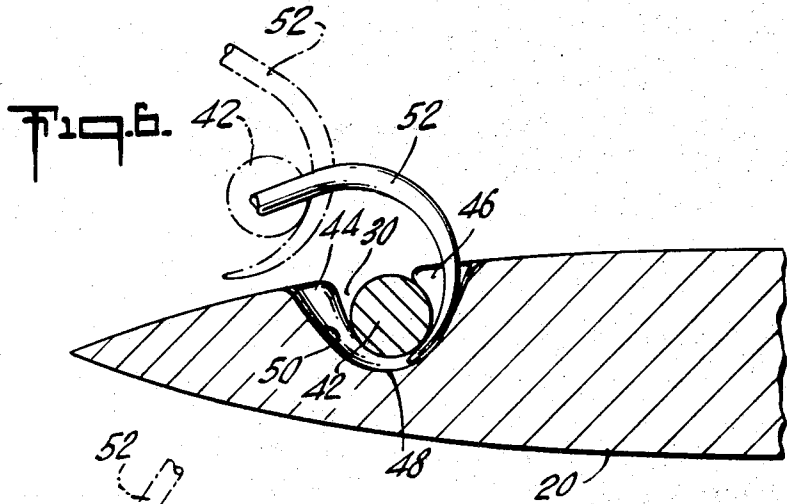
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10 Claims, 10 Drawing Figures







CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of co-pending application Ser. No. 277,944, filed Aug. 4, 1972, and entitled NEEDLE, now U.S. Pat. No. 3,754,693.

BACKGROUND OF THE INVENTION

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.

SUMMARY OF THE INVENTION

It is accordingly the primary object of the present invention to provide a needle which will avoid the above drawbacks.

In particular, it is an object of the present invention to provide a needle which is of an exceedingly simple, robust construction having an exterior smooth surface which will injure the work to a minimum extent while at the same time maintaining the filamentary material out of contact with the work while the needle pierces through the work.

Furthermore, it is an object of the present invention to provide a needle of the above type which greatly facilitates formation of a loop from the filamentary material.

In addition, it is an object of the present invention to provide a needle of this type which enables the filamentary material to be cut without requiring the use of an additional implement such as a scissors.

According to the invention, the needle includes an elongated body formed at one end with a sharp pointed tip facilitating piercing of the needle through the work. This elongated body has a longitudinal central axis contained in a plane on opposite sides of which the body is formed with a pair of longitudinal bores for receiving the filamentary material. At the region of the tip the body is formed with a transverse notch communicating with front ends of the bores and forming an open eye so that the filamentary material may extend forwardly along the interior of one of the bores, across the open

eye, and then rearwardly along the interior of the other of the bores. In this way, when the needle pierces through the work the filamentary material will not engage in the work while at the same time a loop can be pulled from the open eye of the body.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a fragmentary illustration of a needle of the invention 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.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the drawings, the needle of the invention is in the form of an elongated body 20 made of any suitable metal, for example, 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 pair of longitudinal bores 26 and 28 which extend parallel to the axis of the body 20. These bores extend all the way to the rear end of the body 20 which is not illustrated. The bores 26 and 28 extend 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 communicat-

ing with the front ends of the bores 26 and 28, so that the filamentary material can extend forwardly along one of the bores 26 and 28, then across the open eye 30 and rearwardly along the other of the bores 26 and 28. 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.

One of the bores 26 and 28, the bore 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 bore 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 bore 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 of the invention, it is possible to thread the filamentary material 42 forwardly along one of the bores 26 and 28, then across the open eye 30 and rearwardly along the other of the bores. The fact the bore 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 of the invention 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 bore 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 is claimed is:

1. A needle comprising an elongated 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 pair of longitudinally extending bores and in the region of said tip with a transverse notch forming an open eye and communicating with front ends of said bores so that filamentary material may extend forwardly through one of said bores, across said open eye, and then rearwardly through the other of said bores, 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 open eye thereof.

2. The combination of claim 1 and wherein said elongated said body is of a circular cross-section in any plane transverse to said axis.

3. The combination of claim 1 and 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 one of said bores.

4. The combination of claim 3 and wherein said opening extends from said open eye along the entire length of said one bore.

5. The combination of claim 3 and wherein said body is provided along part of at least one edge which defines part of said opening with a cutting region for cutting the filamentary material.

6. The combination of claim 5 and 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.

7. The combination of claim 1 and wherein said body is formed in said plane on one side of said transverse notch which forms said open eye with an additional notch communicating with said open eye for facilitating grasping of the filamentary material in said open eye to form a loop.

8. The combination of claim 7 and 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 open eye and both communicating with said transverse notch for facilitating grasping of the filamentary material in the open eye either from the front of the filamentary material or from the rear thereof.

9. The combination of claim 8 and 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.

10. The combination of claim 9 and wherein said elongated body 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.