

[54] **SURGICAL CUTTING NEEDLE**

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[73] Assignee: **Deknatel, Inc.**

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[51] Int. Cl. **A61b 17/32**

[58] Field of Search 30/164.9, 168; 83/660;
128/305, 339; 142/42; 145/25

[56] **References Cited**

UNITED STATES PATENTS

1,471,062 10/1923 Riblett145/25 UX
2,524,636 10/1950 Preis et al.30/164.9 X

FOREIGN PATENTS OR APPLICATIONS

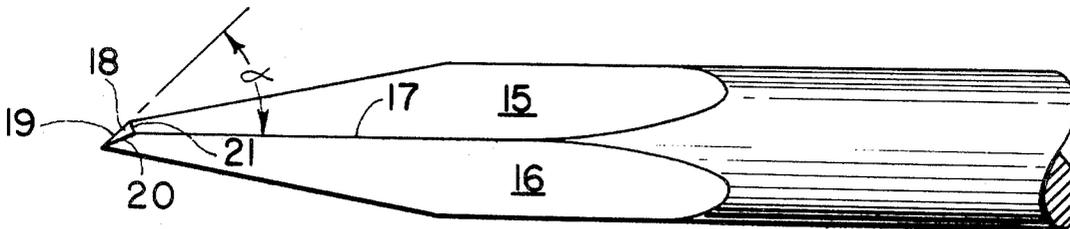
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Attorney—Larson, Taylor & Hinds

[57] **ABSTRACT**

An improved surgical needle of the type having a simple main cutting edge extending across the needle and formed by the intersection of two planar surfaces, for use in cutting through bone, cartilage or other hard body tissue material. The forward end of the needle includes a third planar surface extending at an angle to the axis of the needle and forming, as its intersection with one of the first two mentioned planar surfaces, a strong rearwardly sloped chisel cutting edge arranged to impinge on the hard material to be cut.

6 Claims, 9 Drawing Figures



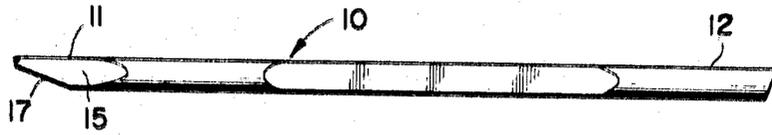


FIG. 1

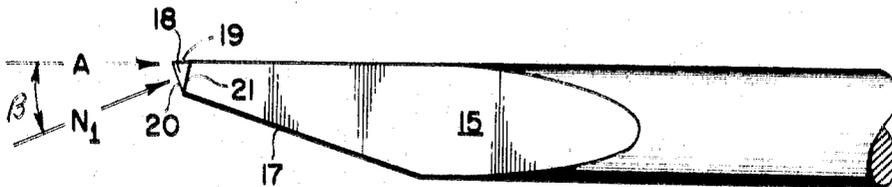


FIG. 2

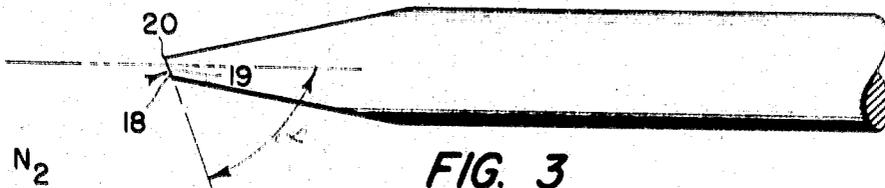


FIG. 3

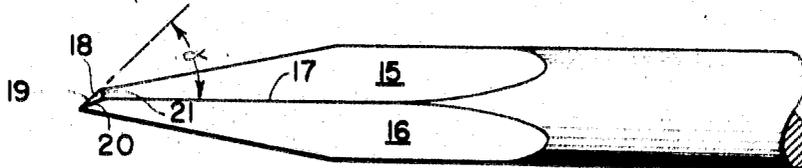


FIG. 4

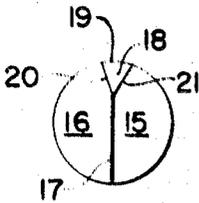


FIG. 5

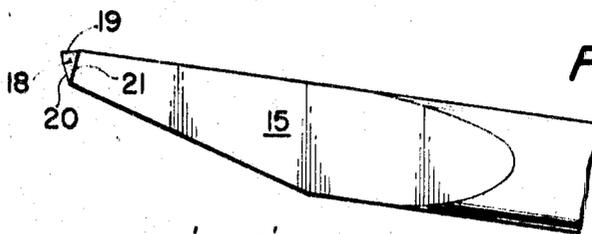


FIG. 6

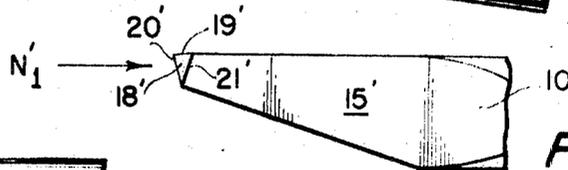


FIG. 7



FIG. 8

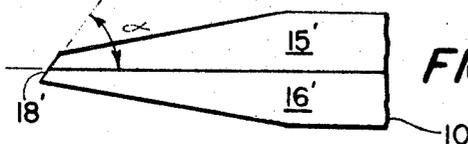


FIG. 9

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SURGICAL CUTTING NEEDLE

BACKGROUND

1. Field of the Invention

This invention relates to surgical cutting instruments and in particular it relates to an improved surgical needle for cutting bone, cartilage or other hard tissue material.

2. Description of the Prior Art

It is apparent that a surgical cutting instrument must be as sharp as possible in order to perform its function properly. In my previous U.S. Pat. Nos. 2,869,550 and No. 3,094,123, issued Jan. 20, 1959 and June 18, 1963, respectively, I disclosed and claimed a new sharper surgical needle having a single main cutting edge formed by the intersection of two planar surfaces, the said edge extending from one side of the needle to the other side thereof. In this type of needle greater sharpness is obtained by increasing the slope angle of the main cutting edge relative to the needle axis. However, as the slope angle is increased, a point is reached at which so little material is left at the point that the point lacks sufficient structural strength to effectively penetrate the tissue to be cut without the tip of the point burring or otherwise becoming deformed.

In my U.S. Pat. No. 3,094,123 I disclosed and claimed the concept of blunting the tip of the needle to avoid deformation of the tip, even when using a fairly sharp slope angle.

However, to avoid burring when cutting through bone, cartilage, or other hard body tissue the amount of blunting would have to be much greater than as disclosed in my U.S. Pat. No. 3,094,123. However, such increased blunting would then tend to reduce the sharpness of the needle to a point where penetration of the tissue would be difficult.

Thus, there exists a need for a surgical needle having a very sharp point and which is strong enough to retain its structural integrity when used to cut through bone or other hard tissue.

SUMMARY OF THE INVENTION

Thus, the purpose of the present invention is to provide a surgical cutting instrument which is both sharp enough and strong enough to cut through bone or other hard body tissue without burring or otherwise becoming deformed at its point.

According to the present invention there is provided a surgical cutting instrument having a main cutting edge extending from one side of the needle to a point near the other side thereof and passing through the axis of the needle, the said main edge being formed by the intersection of two planar surfaces. To simplify discussion of the invention, it is convenient to refer to the side of the needle having the main cutting edge as the "bottom" of the needle, and to refer to the plane defined by the main cutting edge and the needle axis as the "reference plane," so that, when the main edge is on the bottom the reference plane is vertical. However, it is apparent that the needle could assume any orientation in practice.

The forward end of the needle is ground to form a third planar surface which intersects both of the first two planar surfaces. The plane of this third planar surface is such that it forms an angle other than 90° with the reference plane so that the intersection of the third planar surface with one of the first two planar surfaces is located forward of its intersection with the other of the first two planar surfaces thereby forming a strong, sharp, rearwardly sloped chisel-type forward cutting edge at the intersection of the third planar surface with said one of the first two planar surfaces. At one end this chisel edge intersects the outer periphery of the needle to form the forwardmost tip which is the first part of the needle to be presented to the bone to be cut; and at its other end this chisel edge joins smoothly with the said main cutting edge. The horizontal component of the angle between the reference plane and the plane of the third planar surface may be any convenient angle but preferably is 45° . In this context assuming the reference plane is vertical, the plane of the third planar surface may be vertical or it may be sloped forwardly as it extends from its intersection with the main cutting edge to its intersection with the outer periphery of the needle. Stated dif-

ferently, when the third planar surface is vertical, the line of intersection between the third planar surface and the reference plane will be substantially perpendicular to the needle axis; and when the third planar surface is sloped upwardly and forwardly the line of intersection of the third planar surface and the reference plane will form an angle other than 90° with the needle axis.

Thus, it is an object of this invention to provide a new improved surgical cutting needle for cutting bone or other hard tissue which overcomes disadvantages of previously known surgical cutting needles.

It is another object of this invention to provide a surgical cutting needle of the type having a main cutting edge extending almost completely across the needle and formed by the intersection of two planar surfaces, and including a third planar surface at the forward end of the needle formed at an angle relative to the needle axis to form a chisel-type cutting edge.

Other objects and the attendant advantages of the present invention will become apparent from the detailed description to follow together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

There follows a detailed description of the preferred embodiments of the present invention to be read together with the accompanying drawings. However, it is to be understood that the detailed description together with the accompanying drawings are intended only to illustrate preferred embodiments of the invention and that the invention is capable of numerous modifications and variations within the spirit and scope of the invention as defined in the claims.

In the drawings:

FIG. 1 illustrates generally a surgical cutting needle of the type having a single main cutting edge.

FIG. 2 illustrates the point of the surgical cutting needle as shown in FIG. 1 in side elevation, and showing the features of the present invention.

FIG. 3 is a top view of FIG. 2.

FIG. 4 is a bottom view of FIG. 2.

FIG. 5 shows the end of the needle of FIG. 2 taken in the direction of arrow A of FIG. 2.

FIG. 6 illustrates the needle point taken in direction normal to the front surfaces of the needle as represented by arrows N_1 and N_2 of FIGS. 2 and 3.

FIGS. 7, 8 and 9 are views similar to FIGS. 2, 3 and 4, respectively, but illustrating a modified embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a surgical needle 10 having a needle point 11 and a shank portion 12. FIGS. 2-9 illustrate in greater detail the point 11.

FIGS. 2-6 illustrate a first embodiment of the invention. The needle includes the two conventional planar surfaces 15 and 16 which form the main cutting edge 17 as known heretofore. However, the present invention also includes a third planar surface 18 which is formed at an angle other than 90° with the reference plane of the needle. Surface 18 intersects planar surface 16 at its forward side to form a chisel-type forward cutting edge 20; and it intersects the planar surface 15 at its second or rearward side to form a rearward edge 21. The intersection of surface 18 with the outer periphery of the needle is shown at 19.

Consequently, the point formed by edges 19 and 20 forms the forwardmost tip of the needle which is the first part of the needle presented to the tissue to be cut. As force is applied to the needle the tip penetrates the tissue as the sharp forward cutting edge 20, which is formed by the intersection of surfaces 18 and 16, continues to cut new tissue adjacent the tip. Further cutting is carried out by the main cutting edge 17.

As shown in FIGS. 1-6 the plane of surface 18 forms a complex angle with the axis of the needle. It is necessary that the

plane of face 18 be inclined rearwardly by the angle α as shown in FIGS. 3 and 4. This will assure that the edge 20, forming the forward cutting edge, will slope rearwardly as well as downwardly as the face 18 intersects the face 16. In a preferred embodiment the angle α will be approximately 45°. Additionally, to provide a slightly sharper point of introduction, (slope angle) the face 18, as shown in FIGS. 2-6, is inclined rearwardly as well as downwardly, the downward component being illustrated by the angle β in FIG. 2. Thus, the two arrows indicated as N_1 and N_2 represent the components of the normal to the plane 18 taken in the vertical and horizontal planes, respectively. FIG. 6 illustrates the surface of 18.

FIGS. 7-9 illustrate a modified embodiment of the invention wherein like numerals are employed for like parts except that a prime (') has been added to each numeral. The embodiment of FIGS. 7-9 is identical to the embodiment of FIGS. 2-6 except that the face 18' is not inclined rearwardly; that is, N_1' is horizontal and $\beta=0$. Also, the plane 18' appears as a single line in both the top view of FIG. 8 and the bottom view in FIG. 9. In contrast, it will be noted that in the bottom view of the first embodiment (FIG. 4) a portion of the surface 18 can be seen.

Although the invention has been described in considerable detail with respect to preferred embodiments thereof, it should be apparent that the invention is capable of numerous modifications and variations apparent to those skilled in the art without departing from the spirit and scope of the invention as defined in the claims.

I claim:

1. A surgical cutting needle comprising a body portion and a cutting portion, the latter having a longitudinal axis, said cutting portion having a main cutting edge formed by the intersection of first and second substantially planar surfaces,

said main cutting edge lying on a line which intersects the said axis and defines with said axis a reference plane, a third planar surface intersecting the first and second planar surfaces and forming the forward end of the cutting portion away from the said body portion, said main cutting edge extending from the outer periphery of the needle forwardly toward the tip of the needle to an intersection with the said third planar surface, the plane of the third planar surface forming an angle other than 90° with the said reference plane wherein the intersection of the third planar surface with one of the first two planar surfaces forms a chisel-type forward cutting edge extending along the forward end of the needle from its intersection with said main cutting edge forwardly to the forwardmost tip of the needle at the intersection of the chisel-type cutting edge with the outer periphery of the needle whereby the chisel-type forward cutting edge provides sharp initial penetration into hard tissue material and subsequent cutting thereof is done by the said main cutting edge.

2. A surgical needle as claimed in claim 1 wherein the said angle is approximately 45°.

3. A surgical needle as claimed in claim 1 wherein the line of intersection between the third planar surface and the reference plane is substantially perpendicular to the said needle axis.

4. A surgical needle as claimed in claim 3 wherein the said angle is approximately 45°.

5. A surgical needle as claimed in claim 4 wherein the line of intersection of the third planar surface and the reference plane forms an angle with the axis of the needle.

6. A surgical needle as claimed in claim 5 wherein the said angle between the reference plane and the plane of the third planar surface is approximately 45°.

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