

[54] **TISSUE AUGER**
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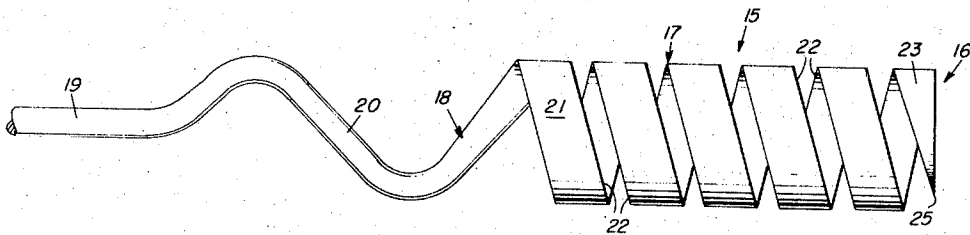
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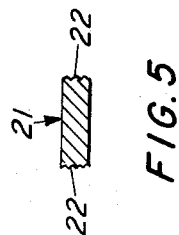
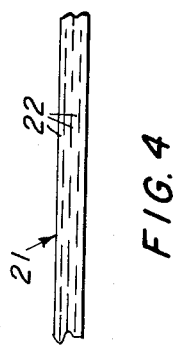
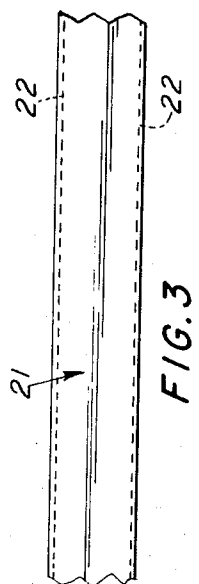
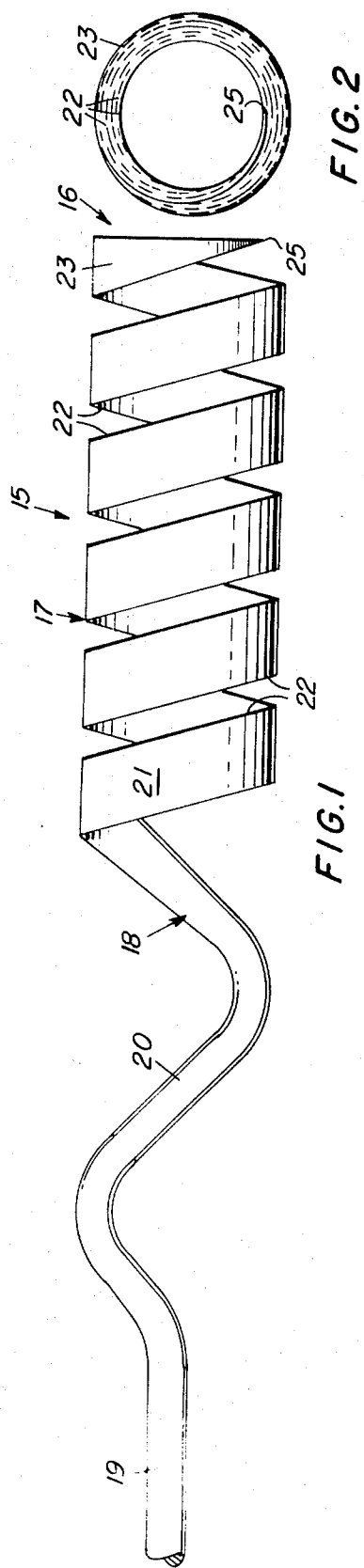
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[57] **ABSTRACT**
A tool for removing core shaped sections from living tissue is formed by a cylindrical body of helically wound wire which terminated at one end in a sharp cutter which pierces and severs the tissue initially when rotated, the core being formed by the following turns of the body whose turns are spaced and provided with serrated edges which further retain the tissue within the body of the tool.

[56] **References Cited**
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5 Claims, 5 Drawing Figures





TISSUE AUGER

The present invention relates to means for performing biopsies and more particularly to a tool having a helically shaped tissue auger provided with a sharp pointed extremity for initially severing and separating samples of living tissue to be removed for examination.

Biopsy devices are known which remove specimens of tissue by scraping, or rubbing, or some other form of abrasive action, but the action of such tools is uncertain both as to effectiveness and the size of the specimen removed.

Other types of biopsy implements utilize a so-called "auger" action similar to that employed by the common wood auger which resembles a flat strip twisted about its longitudinal axis and terminating in a radially disposed knife edge. However, the effectiveness of these devices is reduced by the fact that a knife edge disposed in such a fashion is not effective against soft tissue and the size of the specimen is dependent on the depth to which the knife edge can be forced by rotation of the tool. Furthermore, the specimen thereby produced is not a coherent unit but becomes an elongated strip; as is the case with any auger of that type.

In the present invention, the initial severing, or cutting, is done by a pointed cutter which pierces the tissue with substantially no resistance and is succeeded by a hollow body portion formed by helical turns of wire which permit a cylindrical piece of tissue to form and to be retained therein by continued rotation of the tool about its longitudinal axis combined with forward longitudinal movement. In addition, the turns of wire are axially spaced and may be provided with integrally formed serrations which assist in further severing tissue to form a core shaped specimen which is readily removed in an intact condition by withdrawing the tool in an axial direction.

Other objects and advantages will be apparent after reading the following description in connection with the drawings, in which;

In the drawings,

FIG. 1 is a view in elevation, on a greatly enlarged scale, of one form of tissue auger made in accordance with this invention;

FIG. 2 is an end elevation of the device of FIG. 1, showing the initial cutting means;

FIG. 3 is a fragmentary side view of a section of the wire which forms the core retaining portion;

FIG. 4 is a plan view of the fragmentary portion shown in FIG. 3, and;

FIG. 5 is a cross-section of the portion shown in FIG. 3.

In a preferred embodiment of the invention the tissue auger, indicated generally by numeral 15 may comprise an initial cutter portion, indicated by numeral 16, a core retaining portion, indicated by numeral 17, and a guiding and operating portion, indicated generally by numeral 18, the auger as a whole being fabricated from a single piece of wire 19, such as fine stainless steel spring wire which is strong and substantially inert with respect to body and tissue fluids.

As an example, although not to be considered as a limiting one, the wire 19 may start out as a standard straight length of round stainless steel wire having an approximate diameter of 0.002 inch which will be spirally coiled for one or two widely spaced turns,

as at 20 and then merge into a section wherein the wire has a rectangular cross-section having a width of approximately 0.035 inch and a thickness of 0.014 inch at which point the rectangular wire is helically coiled to provide the cylindrical core retaining portion 17, the outside diameter of this portion being approximately 0.090 inch. The rectangular wire is disposed so that the wider side walls 21 define the exterior surface of the core retaining portion, while the turns are spaced axially from each other along most of this portion so that the distance between the narrow walls 22 of the wire turns is approximately 0.005 inch except for approximately the last full turn, indicated by numeral 23, where the spacing is gradually increased to a maximum distance in the neighborhood of 0.016 inch at the extremity of the wire. In addition, the radial and longitudinal thickness of the wire are gradually reduced along this portion so as to terminate in a point 25 which acts as an initial cutting means to initially pierce and sever the tissue when rotated.

Further, the narrow surfaces 22 of the core retaining portion are preferably serrated, as indicated in FIG. 3, so that as the tool is rotated, and also advanced in an axial direction, the tissue initially pierced, will be completely severed by the core retaining portion 17 as it is moved forwardly. In this connection, it should be noted that the core section of tissue thus removed is substantially intact and is not deformed or twisted into a spiral slice as is the case where the tissue is removed by an ordinary wood screw-type auger.

It should further be noted that the rotational and axial movement, and the guiding of the tool is best provided when the shank portion 18 is formed so that the main portion of the straight 19 (extending to the left in FIG. 1) is disposed essentially in concentric alignment with the principal axis of the core retaining portion 17. Also, the pitch of the several turns of wire 20 should be relatively steep to permit removal of a tissue core from the retaining portion by the insertion of a stylette. As an example, the pitch of a single turn of the shank in the example just described is approximately 0.220 inch.

While the instrument just described represents a basic tool, it is capable of several modifications, all of which embrace the inventive concept just described. For example, the tool as described may be employed to reach internal organs by the use of a hollow needle provided with an angled tip and having an internal diameter large enough to accommodate the present tissue auger therein for movement to the site of biopsy and for removal of the core specimens through the needle.

Another system for guiding the tool to the site for use and for manipulating it is to attach the tool to the extremity of a deflecting type probe such as is known as a "Muller" wire. This type of device is particularly useful in exploring the various branches of the oral and nasal cavities. A typical "Muller" deflecting tip comprises a tightly wound wire probe having a central control wire passing therethrough. Over an area of flexure near the forward end of the tip, the coiled wires are reduced in diameter over adjacent half turns so that tension produced at the end of the tip by the control wire, causes deflection. In one form, the coiled wire of the "Muller" device may be extended beyond the point where the tip is connected with the central control wire. This extended portion may then be formed to pro-

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vide a core retaining portion and an initial cutter similar to that described above.

While the examples described illustrate various modifications of the invention, it will be understood that they are not to be considered as limiting. The dimensions and types of materials may be varied within reasonable limits.

We claim:

1. A tissue core removing tool comprising a generally flat wire spacedly, helically wound to define a tubular body having an entering portion merging successively into a core retaining portion and a shank portion supporting the tool for rotation and longitudinal displacement with respect to the helical axis, the distal extremity of the wire forming the entering portion terminating in a radially inwardly and longitudinally axially offset cutter disposed to enter the tissue upon rotation of the auger about its axis to detach an elongated section of tissue and to transfer said section to the core retaining portion for removal when the tool is axially withdrawn.

2. A tissue auger according to claim 1, wherein said retaining portion comprises a helix having a plurality of spaced turns of substantially uniform radius.

3. A tissue auger according to claim 2, wherein the spacing between the turns of the helix is substantially uniform over the major length thereof, and said cutter terminates with a knife edge, the entering extremity of said cutter having a progressively increasing longitudinal spacing as it approaches said knife edge.

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4. A tissue auger according to claim 3, wherein the axial spacing between the turns of the helix is substantially uniform over the length of the core retaining portion, the entering cutter extremity being axially spaced from the next adjacent turn by a substantially greater distance, the axial spacing of the remainder of the entering portion gradually reducing as it merges with the core retaining portion.

5. In apparatus for removing a cylindrical core of tissue from a living organism comprising, a tool body comprising a generally flat wire spacedly helically wound to present a tubular configuration defining a generally cylindrical body, means for axially rotating and longitudinally moving said tool body and for guiding the direction of said longitudinal movement, first cutter means disposed at the leading extremity of said tool body for initially severing tissue by rotation of the tool body and for introducing severed tissue into the interior of the tool body, second cutter means on said body rearwardly of said leading extremity for further severing tissue along a cylindrical path concentric to said axis and for retaining severed tissue within the tool body for removal from an organism, said first cutter means being radially inwardly and longitudinally axially offset from the remaining helical turns, and exit means for removal of said retained tissue from the interior of the tool body.

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