

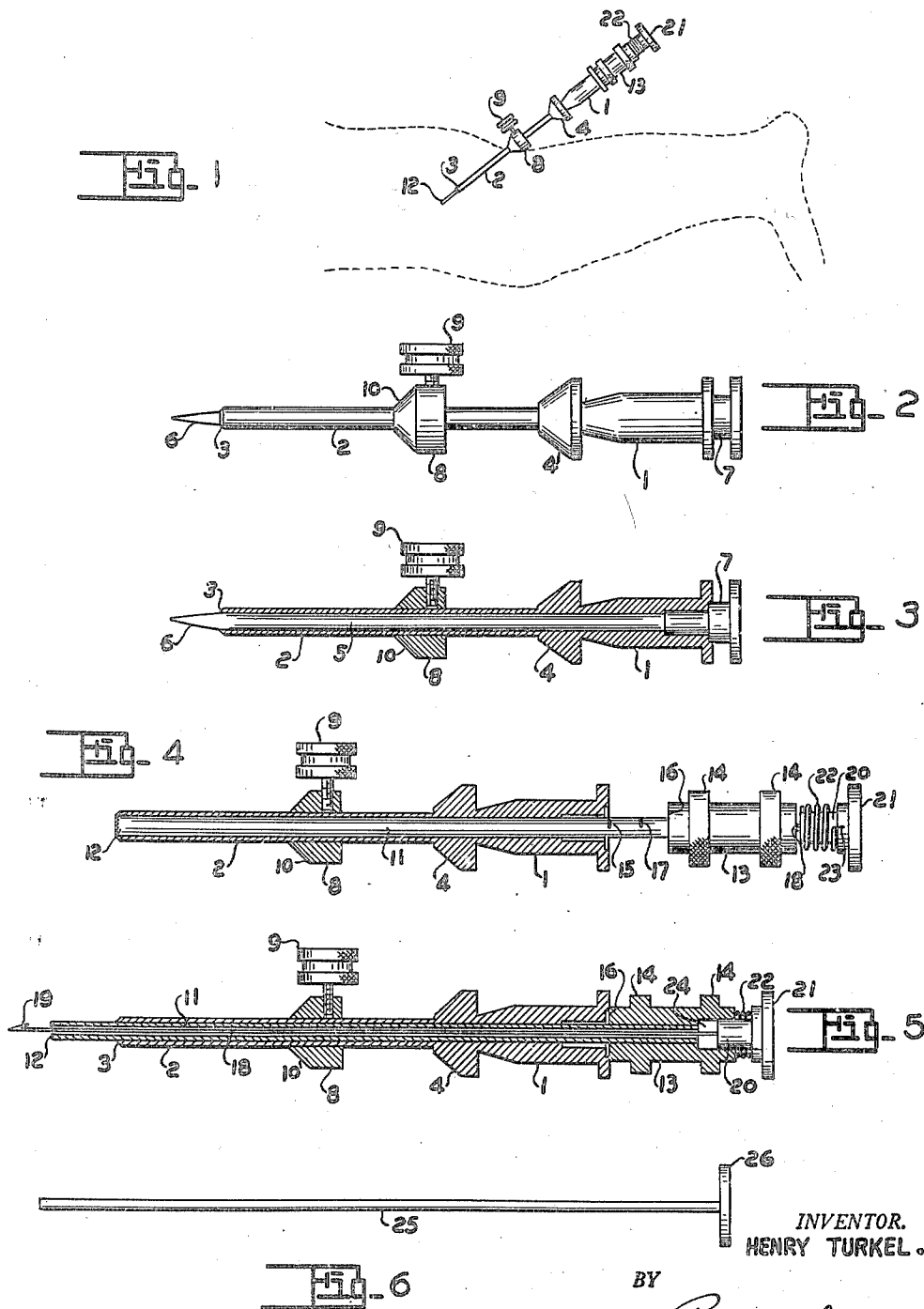
Jan. 31, 1950

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2,496,111

BIOPSY NEEDLE

Filed Sept. 26, 1947



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2,496,111

BIOPSY NEEDLE

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Application September 26, 1947, Serial No. 776,169

6 Claims. (Cl. 128—2)

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This invention relates to a biopsy needle for obtaining subcutaneous or deep-seated tissue or substances from any part of a body, to be used as specimens for analysis and microscopic examination.

Often due to the inherent resiliency of the tissue, for example muscle tissue, it is difficult to remove the biopsy specimen after it has been cut from the surrounding tissue by the particular hollow cutting needle employed.

On the other hand in the case where a specimen is sought from tissue which is not backed by a bone or other relatively immovable substance there is a tendency for the tissue in the area adjacent the cutting end of a needle to recede under the pressure of the needle preventing cutting thereinto.

It is therefore the principal object of this invention to provide a tissue holding and retaining means associated with the hollow cutting needle to overcome the aforementioned difficulties.

Other objects will be seen from the following specification and claims in conjunction with the appended drawing in which:

Fig. 1 is an elevational view illustrating the positioning of a biopsy needle when in use.

Fig. 2 is a side elevational view of the outer guide needle and its stylet positioned therein.

Fig. 3 is an elevational section thereof.

Fig. 4 is an elevational view of the outer needle with stylet removed and with the hollow cutting needle inserted and with the tissue securing needle positioned within the cutting needle, said guide needle being sectioned for illustration.

Fig. 5 is an elevational section of the outer guide needle, the cutting needle therein, with the tissue securing needle positioned within the latter in its operative position, and

Fig. 6 is an elevational view of the stylet for the hollow cutting needle.

It will be understood that the above drawing illustrates merely a preferable embodiment of the invention and that other embodiments are contemplated within the scope of the claims hereafter set out.

In the drawing the outer guide needle, Figures 2 and 3, comprises a hollow hub 1 and a tube 2 projecting therefrom having an outer sharp bevelled end 3, with its opposite end being secured within the shoulder of said hub. The purpose of the outer guide needle is to cut through the skin and subcutaneous tissue without excising them as shown in Figure 1 and to direct the inner cutting needle to the desired position in a manner hereinafter more fully set out.

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A stylet 5 with pointed end 6 and head 7 is adapted for normal positioning within guide needle 2 as shown in Fig. 2. Said stylet is slidably positioned within said needle and is removed therefrom only after the proper penetration of said needle is accomplished, as the initial step in performing a biopsy.

Collar 8 is slidably mounted upon guide needle 2 and secured in the desired adjusted position thereon by set screw 9 which frictionally bears on said needle. The leading surface 10 of said collar is bevelled at substantially 45 degrees and acts as a guide to assure the insertion of needle 2 upon a corresponding angle relative to the outer surface of the body or limb upon which a biopsy is to be performed. As shown in Fig. 1 said bevelled portion 10 lies adjacent and substantially parallel to the outer surface of the patient's body or limb. Being adjustable said collar serves the further function of limiting the extent of penetration of the hollow guide needle 2.

Referring to Fig. 4 it is noted that stylet 5 has been removed and in its place is inserted hollow cutting needle 11 having outer tissue cutting end 12 which includes a plurality of sharpened circularly arranged "saw-like" teeth. A hollow head or handle 13 is positioned at the opposite end of needle 11 having a pair of spaced preferably knurled annular shoulders 14 to facilitate manual rotation of needle 11 to effect cutting of the tissue specimen from the surrounding tissue as said needle is manually advanced within guide needle 2 from the position shown in Fig. 4 to its final position in Fig. 5, which for purpose of illustration is approximately ten millimeters.

It will be remembered that cutting needle 11 is inserted within guide needle 2 after the latter has been inserted within the body. As viewed in Fig. 4 an indicating means 15 in the nature of a transverse demarkation or indentation is formed in the upper portion of needle 11 at a distance of ten mm., for example, from the inner edge 16 of head 13. Consequently when the indicating means 15 is in registry with the outer edge of the guide needle head 1 as in Fig. 4, it is known to the operator or user that the cutting end 12 is at the end of the guide needle, and does not extend further.

An intermediate indicating means 17 is formed in needle 11 to indicate when in registry with the outer edge of the guide needle handle, that the cutting end 12 of needle 11 has been projected 5 mm. beyond the end of said guide needle.

Furthermore when the edge 16 of handle 13 is in registry with the outer end of the guide needle

handle as in Fig. 5, the operator will know that the cutting end 12 has been inserted into the desired tissue sought 10 mm. beyond the outer end of said guide needle.

This means that the outer hollow end of the cutting needle will have encompassed a cylindrically shaped tissue specimen approximately 10 mm. in length.

Figures 4 and 5 illustrate the tissue retaining or securing needle 18 whose outer end is substantially barbed at 19, and whose opposite end has a cylindrical shank 20 terminating in handle 21.

In Fig. 4 a coiled spring 22 is positioned around shank 20 being secured at its outer end to handle 21 at point 23. Retaining needle 18 is slidably positioned within hollow cutting needle 11 and with the free outer end of spring 22 loosely bearing against the outer end surface of handle 13, the outer barbed end 19 of said retaining needle will be entirely within and adjacent the outer cutting end of needle 11.

As the next step in performing the biopsy the cutting needle 11 is positioned within its guide needle 2 as shown in Fig. 4, and rotatably turned and inwardly projected down into the tissue beyond the outer end of said guide needle to the position shown in Figure 5. It will be noted that the cutting teeth 12 on said needle are effective to separate the biopsy specimen from the surrounding tissue as said cutting needle is inwardly projected manually during its rotation.

Normally the retaining needle 18 is loosely positioned within cutting needle 11 during the cutting operation and may or may not be moved therein inwardly compressing spring 22 depending upon the technique or purpose of the operator in securing a biopsy specimen.

As viewed in Fig. 5 a cylindrical opening 24 is formed in the outer open end of cutting needle head 13 to slidably receive shank 20 forming a part of retaining needle 18 as the same is manually projected thereinto at the same time compressing spring 22.

The retaining needle 18 is of such length that with spring 22 fully compressed, the barbed end 19 thereof will extend approximately 5 mm. beyond the end of the cutting needle 11.

In normal operation it is preferable to move the retaining needle longitudinally inward of the cutting needle either before or during its insertion into the tissue to be cut away and then permitting release of the handle 21 whereby the cylindrical specimen which may be partially cut or which is to be cut is firmly retained and secured during completion of the cutting operation.

Consequently, on the completion of the cutting movement the barbed end 19 of the retaining needle, due to the expansive action of spring 22, will be within the cutting end 12 of needle 11 firmly retaining the biopsy specimen therein. It follows that removal of the cutting needle from its guide needle 2 will cause the withdrawal of the cut tissue specimen, with retaining needle acting to prevent said specimen from slipping out of the outer cutting end of the cutting needle.

Referring to Fig. 4 in normal operation with the cutting needle positioned as shown with its end adjacent the outer end of said guide needle, the retaining needle 18 is next manually projected inwardly so that its barbed end 19 will extend beyond the outer end of said cutting needle a sufficient distance to imbed itself securely within the portion of the tissue to be cut as a biopsy specimen.

This is particularly helpful where there is no

bone tissue behind the tissue sought to be cut, as said barbed end will retain the tissue sought from receding from the cutting end of the cutting needle as the latter is projected inwardly during the rotary cutting operation. It will be noted that needle 18 is only momentarily projected inwardly to grasp the tissue, and the handle is then released, and due to the expansive action of spring 22 said retaining needle will return approximately to the position shown in Fig. 4, or may project slightly beyond the outer end of cutting needle 12, having a firm grasp upon the tissue to be cut.

Referring to Fig. 6 a stylet 25 with handle 26 is shown which is adapted for positioning through hollow cutting needle 11 when the securing needle 18 has been removed. Said stylet is normally intended to force the removal from said hollow cutting needle of any of the biopsy specimen which may be left therein upon withdrawal of the retaining needle 18 from said cutting needle.

Under some conditions retaining needle 18 may not be employed, and in that case the cut biopsy specimen will be lodged in the outer end of cutting needle 11. In this case stylet 25 will be particularly effective when inserted within said needle to force the cut specimen therefrom, after said needle has been withdrawn from its guide needle.

Having described my invention, reference should now be had to the claims which follow for determining the scope thereof.

I claim:

1. A biopsy instrument comprising a sharp ended tubular sheath, a hollow shaft rotatably positioned therein, shearing means on the end of said shaft adapted to project beyond the end of said sheath, a needle slidably positioned within said shaft, and tissue gripping and retaining means upon the end of said needle associated and cooperable with said shearing means for immovably retaining the tissue during rotation and inward movement of said shearing means.

2. A biopsy instrument comprising a hollow rotatable shaft, shearing means on the end thereof, a needle slidably positioned within said shaft, and barbed tissue retaining means upon the end of said needle, said retaining means being adapted for manual projection beyond said shearing means for cooperation therewith during rotation and inward movement thereof for retaining the tissue while being sheared and removed from the surrounding tissue.

3. A biopsy instrument comprising a hollow rotatable shaft, shearing means on one end thereof, a needle slidably positioned within said shaft, barbed tissue retaining means upon one end of said needle corresponding to and associated with said shearing means, and a head upon the end of said needle normally in spaced relation to the other end of said shaft, said needle being of such length that said retaining means are normally within said shearing means, but which project beyond said shearing means when said spaced relation is reduced for cooperation therewith during rotation and inward movement thereof for retaining the tissue while being sheared and removed from the surrounding tissue.

4. A biopsy instrument comprising a sharp ended tubular sheath, a hollow shaft rotatably positioned therein and having a hollow head at one end thereof, saw-like shearing means on its other end, adapted to project beyond the end of said sheath, a needle having a head on one end thereof slidably positioned within said shaft and

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its head, and barbed tissue retaining means upon the other end of said needle associated and co-operable with said shearing means and effective to secure the tissue while being sheared and removed from the surrounding tissue during rotation and inward movement of said shearing means.

5. A biopsy instrument comprising a sharp ended tubular sheath, a hollow shaft rotatably positioned therein, shearing means on the end of said shaft adapted to project beyond the end of said sheath, a needle slidably positioned within said shaft, tissue gripping and retaining means upon the end of said needle associated and co-operable with said shearing means for immovably retaining the tissue during rotation and inward movement of said shearing means, and a spring interposed between said needle and shaft to normally maintain said retaining means within and adjacent to said shearing means.

6. A biopsy instrument comprising a hollow shaft, shearing means on one end thereof, a needle slidably positioned within said shaft, barbed tissue retaining means upon one end of said needle corresponding to and associated with

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said shearing means, a head upon the other end of said needle normally in spaced relation to the other end of said shaft, said needle being of such length that said retaining means are normally within said shearing means, but which project beyond said shearing means when said spaced relation is reduced, and a spring interposed between said head and the other end of said shaft to normally maintain said spaced relation and urging said tissue retaining means inwardly of said shearing means for retaining the tissue while being sheared and removed from the surrounding tissue.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,640,311	Dawes -----	Aug. 23, 1927
1,867,624	Hoffman -----	July 19, 1932
2,426,535	Turkel -----	Aug. 26, 1947