TROCAR FOR BIOPSY

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Application December 23, 1946, Serial No. 717,980
In Cuba February 13, 1946

6 Claims. (Cl. 128—2)

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This invention relates broadly to certain improvements in instruments for obtaining tissue from a body and in its more specific aspects it relates to an instrument involving a style or trocar operatively combined with a cannula for penetration into a body to extract tissue therefrom for a biopsy, and the nature and objects of the invention will be readily recognized and understood by those skilled in the arts to which it relates in the light of the following explanation and detailed description of the accompanying drawings illustrating what we at present believe to be the preferred embodiments and mechanical expressions of our invention from among various other forms, arrangements, combinations and constructions, of which the invention is capable within the spirit and scope thereof.

A device of the character of this invention is utilized for obtaining tissue from the human or animal body so that the tissue may thereafter be examined, and the instruments of this nature of which we are aware and which are generally now in use cause considerable discomfort to the patient due to the fact that the prior devices are of considerable diameter resulting in a puncture or opening which is large and obviously not desirable. Because of their construction and operating mechanism the penetrating and extracting instruments now known and in use must be formed of relatively large diameter with the resultant ill and undesirable effects. It is therefore a primary object of our invention to provide an instrument for extracting tissue from a body which instrument is of relatively small diameter so as to cause the least possible discomfort to the patient.

It is a further purpose of our invention to provide an instrument for tissue extraction which, due to the nature of its construction, will cause relatively little damage to the tissue of the body.

Another purpose of our invention is to provide an instrument for extracting tissue which is operable by the operator thereof to incisively cut off a section of tissue for removal from the body.

A further characteristic of our invention resides in the provision of means in an instrument of this nature whereby the operator may, at any time desired, actuate mechanism to cut off a section of tissue.

With the foregoing general objects, features and results in view, as well as certain others which will be apparent from the following explanation, the invention consists in certain novel features in design, construction, mounting and combination of elements, as will be more fully and particularly referred to and specified hereinafter.

Fig. 1 is a view in sectional elevation of the style which forms a part of the invention.

Fig. 2 is a view in elevation of the style illustrated in Fig. 1, but rotated less than 90° from the position of Fig. 1.

Fig. 3 is a view in elevation of the cannula which forms a part of the invention.

Fig. 4 is an end view of the operating ends of the style and cannula when combined in operative positions.

Fig. 5 is a view in elevation of the style and cannula when combined in operative positions. Fig. 6 is a view through the device, the style and cannula being combined.

The device or instrument involved in this invention comprises two major elements, a cannula and a style, the latter being adapted to be received within the cannula, and the instrument includes means actuable by the operator for cutting off a section of tissue.

Referring to the accompanying drawings, wherein we have used the numeral 7 to designate the cannula which includes a major tubular body portion of substantially the same diameter throughout the length thereof, and a base 9 which is of greater diameter than the major body portion, the base provides a socket for receiving a portion of the style as will be explained and clarified hereinafter. The cannula at the end thereof opposite to the widened or base portion 9 is sharpened, and this sharpened edge or end of the cannula provides, what we shall term the “operating end.”

Adjacent but removed from the sharpened edge of the operating end of the cannula three perforations 6’ are formed which are as disclosed particularly in Figs. 3 and 5 of the drawings. Two of the three perforations 6’ are formed in the cannula in side by side relation, or in substantially the same horizontal plane, while the third of the three perforations 6’ is disposed below the side by side perforations and at equal distances from each of said side by side perforations.

The extended base or widened diameter portion 9 of the cannula 7 is provided with a prolongation 4’ which extends downwardly therefrom and is provided with an engraving, sign or indicating medium 10 on its external surface. The indicia as well as the prolongation
are mounted and provided on the widened base 9 with a ring 5, although it is to be understood that the method may be employed.

The style which I have designated in its entirety by the numeral 4 comprises in effect a penetrating needle which is slightly longer than the cannula 7 so that the upper or operating end of the style projects beyond and free of the cannula operating end and then the style is introduced thereinto in operative position.

The operating end 2 of the style 4 is of less diameter than the major body portion thereof so that a step or shoulder between the operating end and the major body portion is provided. The operating end 2 of the style is provided with a beveled edge to provide a penetrating point 1 so that it may be introduced into the tissue with facility. The base of the style 4 is of greater diameter than the major body portion thereof as will be apparent from consideration of the drawings, and this widened base mounts or carries a handle 6 so that the instrument may be easily manipulated by the operator thereof. The handle 6 is formed with a pointed notch 5 in the upper edge thereof, the point of said notch being directed toward the major body portion of the style.

The style 4 is of generally cylindrical configuration with the exception that it is provided with a flattened surface 3 extending longitudinally from the base to the operating end, the point of the notch 5 being disposed in the handle 6 that it is directed toward the flat or plane surface 3 of the style. The alignment of the notch and the plane or flat section 3 of the style is for a specific purpose which will be pointed out hereinafter.

As we have hereinbefore stated, the cannula 7 is adapted to receive therein in operative position the style 4 and it is necessary desirable that the style be particularly positioned relative to the cannula. When the style is in operative position it must be positioned so that the flat surface 3 of the style faces toward the perforations 6 which are provided in the operating end of the cannula. The operator of the device is enabled to properly position the style in the cannula by lining up surface 3 with the indicia 10; the point of notch 5 being aligned with the surface 3 aids in proper positioning.

The means which is actuated by the operator of the instrument for cutting off a section of tissue comprises a preferably metallic thread 11, although it is to be understood that a thread or filament of vegetable fiber may be used or any other thread which is capable of cutting through tissue.

The thread is combined with the style and cannula by taking one end thereof and inserting it into one of the two upper or side by side perforations 6' in cannula 7. This end of the thread is then turned within the cannula so as to form a loop and is inserted from the inside through the other of the two side by side perforations 6'. The two lengths of the thread which extend through the side by side perforations 6' on the outside of cannula 7 are then introduced into the third or lower perforation 6' to extend into the cannula. These two lengths of thread are sufficient to extend the length of the cannula and emerge therefrom at the base as particularly illustrated in Figs. 5 of the drawings. When the style is introduced into the cannula the operator of the instrument maintains the thread 11 so slight tension so that it lies against the interior surface of the cannula adjacent the perforations. With the thread in this position the style may be introduced into the cannula and the thread will not cause any obstruction to the introduction of the style.

With the style so introduced into the cannula the thread loop at the upper end thereof is passed behind the operating end 2 of the style into position surrounding the latter and resting upon the shoulder or step between the major body portion of the style and the operating end thereof.

With the instrument arranged as described it may be sterilized and is then in readiness for penetration into the body.

When the sterilization has been completed the instrument is introduced by the operator into a body and passes through the different anatomical formations until it reaches the tissue which it is desired to extract. The style is then withdrawn and the cannula is pushed forward to the necessary extent, this penetration being facilitated due to the sharpened edge of the operating end of the cannula.

The cannula is maintained in this inserted or penetrated position, whereupon the operator of the instrument slightly draws or tensions the ends of the thread 11 which extend free and out of the cannula operating end, and when the thread has been drawn sufficiently so that the loop thereof, which is at the operating end of the cannula, lies upon the interior surface of the cannula it will be evident that a section of tissue will have been cut by the drawing of the loop of the thread through the tissue towards the interior walls of the cannula. The operator of the instrument then holds the ends of the thread taut and the cannula is withdrawn from the body bringing with it the cylinder or section of tissue which has been cut by the loop of the thread.

It will be understood that the kind and length of the instrument of this invention may be varied depending upon the tissues on which the biopsy is desired to be performed, and in accordance with the depth of the tissue within the body which is desired to be reached.

We claim:

1. An instrument for obtaining samples of tissue from a body, including in combination, a style and a cannula, the style and the cannula having sharpened operating ends adapted to penetrate and cut a section of tissue of the body preparatory to extracting the section of tissue therefrom, the style in operative position disposed within the cannula with both ends of the style extending beyond the cannula ends, means operatively associated with the operating ends of the style and cannula and extending through the cannula and out of the opposite end thereof for actuation by the operator of the instrument for cutting the inner end of the section of tissue for the extraction thereof from the body.

2. An instrument for obtaining samples of tissue from a body, including in combination, a style and a cannula, the style and the cannula having sharpened operating ends adapted to penetrate and cut a section of tissue of the body preparatory to extracting the section of tissue therefrom, the style in operative position disposed within the cannula with both ends of the style extending beyond the cannula ends, the relative shapes of the style and cannula being such that a longitudinally extending unobstructed space occurs between the style and the cannula, means operatively associated with the operating ends of the style and the cannula and extending through the space between the style and cannula and out of the opposite end of the latter for actuation by the opera-
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tor of the instrument for cutting the inner end of the section of tissue for the extraction thereof from the body.

3. An instrument for obtaining samples of tissue from a body, including in combination, a style and a cannula, the style and the cannula having sharpened operating ends adapted to penetrate and cut a section of tissue of the body preparatory to extracting the section of tissue therefrom, the style in operative position disposed within the cannula with both ends extending beyond the cannula ends, and a tissue cutting filament movably threaded through the operating end of the cannula and looped about the end of the style, the filament extending through the cannula and out the opposite end thereof and actuable by the operator of the instrument when the style is withdrawn from the cannula to tighten the loop for cutting the inner end of the section of tissue for the extraction thereof from the body.

4. An instrument for obtaining samples of tissue from a body, including in combination, a style and a cannula, the style and the cannula having sharpened operating ends adapted to penetrate and cut a section of tissue of the body preparatory to extracting the section of tissue therefrom, the style in operative position disposed within the cannula with both ends extending beyond the cannula ends, the operating end of the cannula having perforations therethrough and a tissue cutting filament threaded through the perforations and forming a loop within the operating end of the cannula and the ends of the filament extending through the cannula and emerging therefrom at the base end thereof for actuation by the operator tightening the loop to cut the inner end of the section of tissue from the body, for extraction of the section of tissue.

5. An instrument for obtaining samples of tissue from a body, including in combination, a style and a cannula, the style and the cannula having sharpened operating ends adapted to penetrate and cut a section of tissue of the body preparatory to extracting the section of tissue therefrom, the style in operative position disposed within the cannula with both ends extending beyond the cannula ends, and the cannula being of substantially cylindrical form and the style having a flat surface extending longitudinally therealong, the cannula having perforations formed in the operating end and means extending through the perforations for cutting the inner end of the section of tissue for extrac-

tion thereof from the body, tissue, the style in operative position within the cannula adapted to be disposed with the flat surface thereof facing the perforations on the cannula, and position indicating means on the exterior of the cannula for indicating the proper position of the style within the cannula.

6. An instrument for obtaining samples of tissue from a body, including in combination, a style and a cannula, the style and the cannula having sharpened operating ends adapted to penetrate and cut a section of tissue of the body preparatory to extracting the section of tissue therefrom, the style in operative position disposed within the cannula with both ends extending beyond the cannula ends, and the cannula being of substantially cylindrical form and the style having a flat surface extending longitudinally therealong providing a longitudinally extending unobstructed space between the cannula and the style, the cannula having a pair of aligned perforations and a single perforation, spaced therefrom, formed in the operating end thereof, and a filament forming a loop within the cannula, each end of the loop threaded through the pair of perforations to extend to the exterior of the cannula and both of said exterior ends threaded through the single perforation to the interior of the cannula and extending through the space between the cannula and the style and out the end thereof opposite the operating end of the cannula, the free ends of said filament adapted to be pulled by the operator for tightening the loop to cut the inner end of the section of tissue from the body, for extraction of the section of tissue.

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REFERENCES CITED

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

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>222,267</td>
<td>Geale</td>
<td>Dec. 2, 1879</td>
</tr>
<tr>
<td>1,585,934</td>
<td>Muir</td>
<td>May 28, 1896</td>
</tr>
<tr>
<td>1,845,727</td>
<td>Slaughter</td>
<td>Feb. 16, 1932</td>
</tr>
<tr>
<td>1,867,624</td>
<td>Hoffman</td>
<td>July 19, 1932</td>
</tr>
<tr>
<td>2,090,923</td>
<td>Wappler</td>
<td>Aug. 24, 1937</td>
</tr>
<tr>
<td>2,097,039</td>
<td>Peterson</td>
<td>Oct. 26, 1937</td>
</tr>
<tr>
<td>2,188,319</td>
<td>Silverman</td>
<td>Apr. 23, 1940</td>
</tr>
<tr>
<td>2,241,481</td>
<td>Pist</td>
<td>May 13, 1941</td>
</tr>
<tr>
<td>2,426,535</td>
<td>Turkol</td>
<td>Aug. 26, 1947</td>
</tr>
</tbody>
</table>