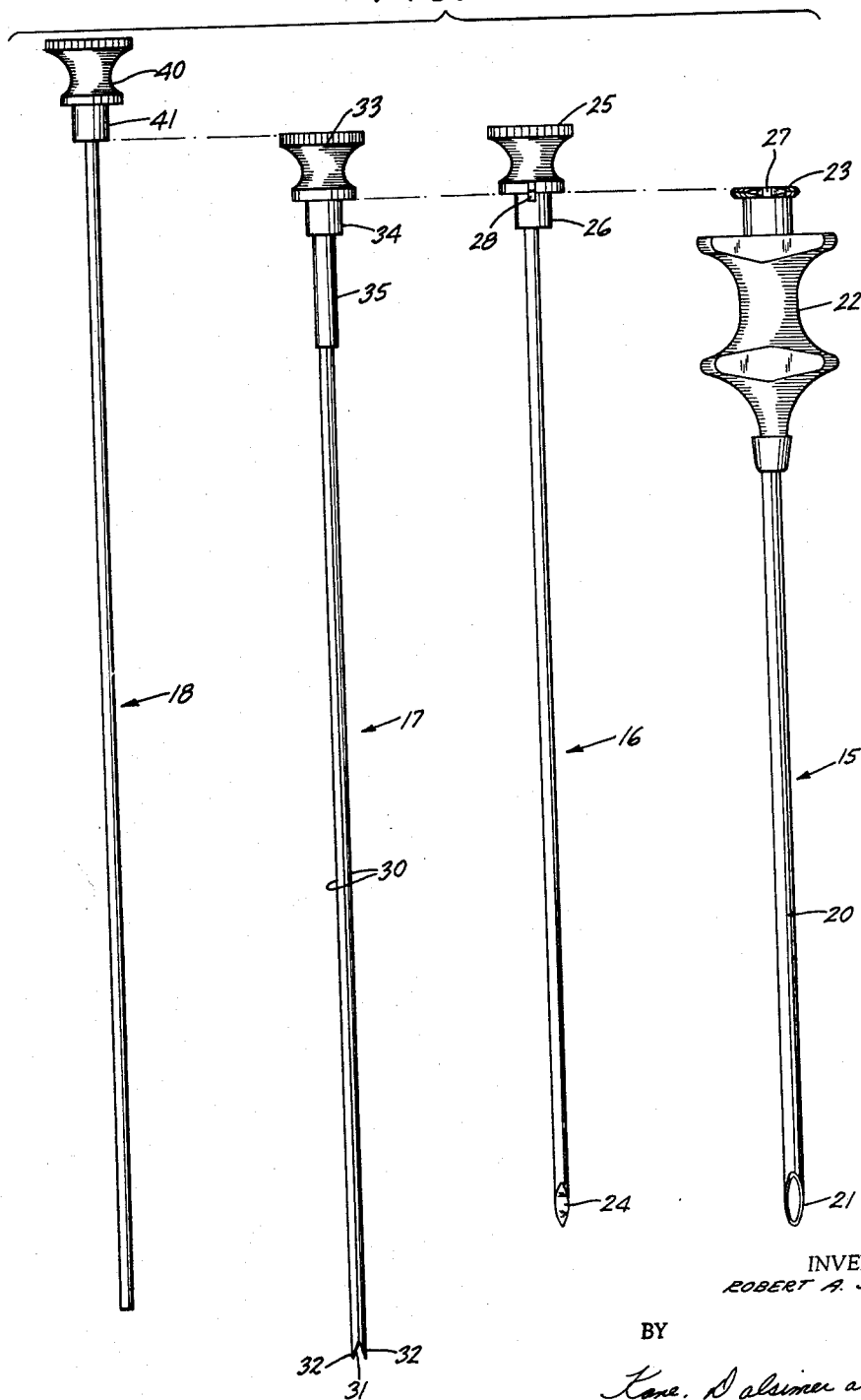


Filed March 26, 1963

SPLIT BIOPSY NEEDLE

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FIG. 1



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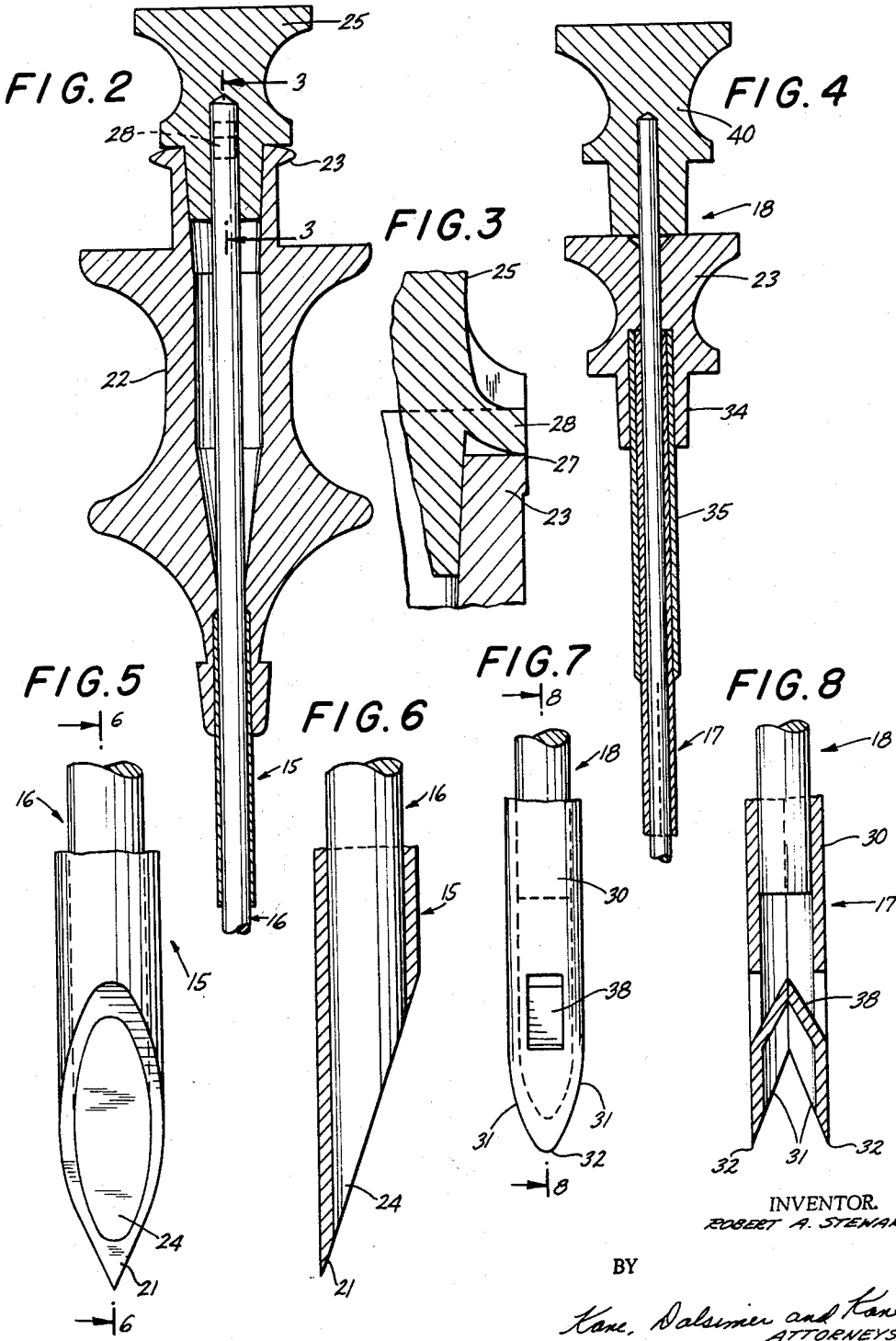
March 30, 1965

R. A. STEWART
SPLIT BIOPSY NEEDLE

3,175,554

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3 Sheets-Sheet 2



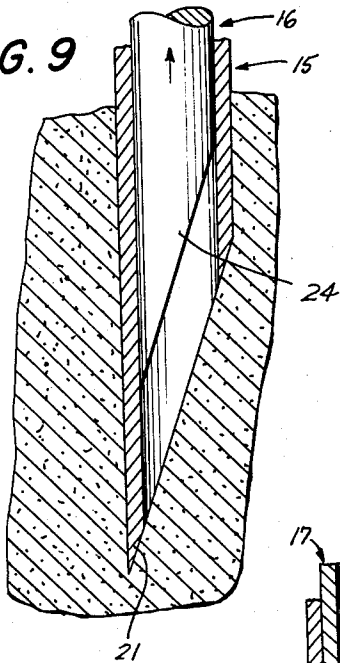
March 30, 1965

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3,175,554

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FIG. 9



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FIG. 10

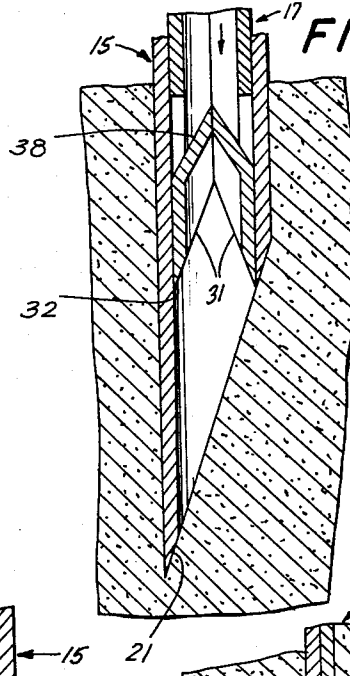


FIG. 11

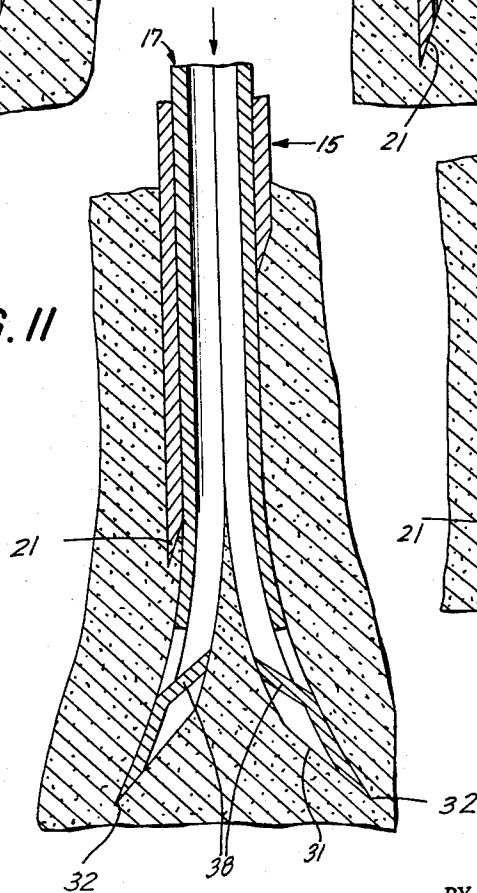
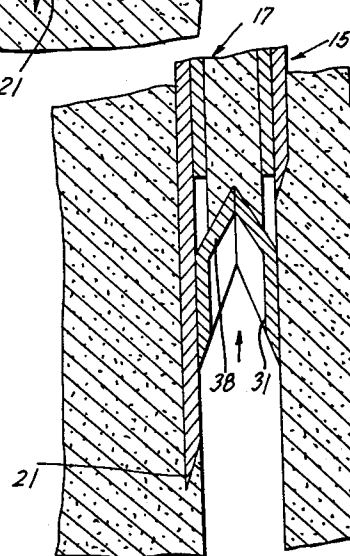


FIG. 12



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3,175,554

SPLIT BIOPSY NEEDLE

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3 Claims. (Cl. 128-2)

This invention relates to an improved split biopsy needle.

It is an object of this invention to provide an improved split biopsy needle which is so designed and constructed that the needle will spread when inserted in soft tissue and so that the needle will contract to cut and trap a biopsy when the needle is withdrawn from the tissue.

A further object is the provision of an improved biopsy needle of the above type which is of relatively simple and inexpensive construction and which is so designed as to insure positive cutting and trapping of the biopsy as the needle is withdrawn from the tissue.

My invention contemplates the provision of an improved split biopsy needle which is adapted to be inserted through an outer needle into the soft tissue where the biopsy is to be taken. The outer end of the biopsy needle is bifurcated and is provided with a pair of tabs projecting towards each other from diametrically opposite sides of the split needle at an angle away from the bifurcated end. As the needle is inserted into soft tissue, the bifurcated end spreads; as the needle is withdrawn the end is contracted bringing the tabs into engagement with each other so as to cut and trap a biopsy.

In the accompanying drawings:

FIG. 1 shows a complete biopsy set including a split biopsy needle embodying my invention;

FIG. 2 is an enlarged longitudinal sectional view of the upper portion of the outer needle having the fitted stylet inserted therein;

FIG. 3 is a detailed sectional view in the direction of the arrows on the line 3-3 of FIG. 2;

FIG. 4 is a detailed longitudinal sectional view of the upper portion of the split needle having a stylet inserted therein;

FIG. 5 is an enlarged detailed view of the lower portion of the outer needle having the fitted stylet inserted therein;

FIG. 6 is a detailed longitudinal view partially in section at right angles to FIG. 5 in the direction of the arrows on the line 6-6 of FIG. 5;

FIG. 7 is a longitudinal detailed view of the lower portion of the split needle having a stylet inserted therein;

FIG. 8 is a detailed longitudinal view partially in section at right angles to FIG. 7 in the direction of the arrows on the line 8-8 of FIG. 7;

FIG. 9 is a detailed longitudinal view partially in section of the lower portion of the outer needle inserted in soft tissue with the fitted stylet being withdrawn;

FIG. 10 is a similar detailed sectional view of the lower portion of the outer needle inserted in soft tissue with the split needle being inserted therethrough;

FIG. 11 is a view similar to FIG. 10 with the split needle shown as inserted into the soft tissue beyond the outer needle and with the bifurcated end of the split needle being spread apart; and

FIG. 12 is a similar detailed sectional view showing the split needle being withdrawn from the tissue into the

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outer needle and with the biopsy cut and retained in the split needle.

FIG. 1 shows a biopsy needle set including a split biopsy needle embodying my invention thus the numeral 15 represents the outer needle which is inserted into the tissue to the required depth and through which the split needle is inserted in order to take the biopsy. The numeral 16 illustrates a fitted stylet to be assembled inside the outer needle as it is inserted into the tissue. The numeral 17 shows my improved split needle and the numeral 18 shows a stylet for insertion inside the split needle.

My invention is concerned with the construction of the split needle 17 and the split needle may be used with an outer needle and stylets of known design.

The outer needle 15 comprises a cannula 20 pointed at its lower end as shown at 21. A suitable hub 22 is secured to the upper end of the outer needle as by solder. The hub 22 is preferably provided with a fitting such as the Luer fitting 23 whereby the needle may be supported in a suitable needle mounting.

The outer needle 15 is slightly larger in diameter than the split needle 17 so that the split needle 17 may be inserted therethrough, also it is slightly shorter in length so that the split needle may be projected beyond the pointed end of the outer needle to penetrate the tissue where it is desired to obtain the biopsy.

Fitted stylet 16 is of a diameter to snugly fit in outer needle 20. It is formed of solid stock and is provided at its lower end with a point 24 conforming with the point 21 of the needle. The upper end of the fitted stylet is provided with a handle portion 25 having a hub 26 which will fit within the fitting 23 at the upper end of the outer needle.

When the fitted stylet is inserted in the outer needle it fits snugly therein with the hub 26 engaged in the fitting 23 and with the pointed end 24 closing the pointed end 21 of the needle. Suitable means are provided in order to maintain the points 24 and 21 in proper registry and alignment when the parts are thus assembled together. For this purpose I provide a small notch 27 in the flange of the fitting 23. I also provide a small projecting lug 28 on the side of the hub 26 beneath the handle portion 25. The lug may be formed by blanking out a small portion of the flange of the lower portion of handle 25 and displacing it downwardly as shown. The lug 28 and the notch 27 are formed in proper alignment with each other so that when the fitted stylet and the outer needle are assembled together in the manner shown in FIGS. 2 and 3 the lug may be inserted in notch 27 with the result that the point of the stylet will be in proper alignment with the point of the needle as shown in FIGS. 5 and 6.

The split biopsy needle 17 consists of an elongated cylindrical tube slightly smaller in diameter than the outer needle 15 so that it may be inserted therethrough. It is also of greater length so that the lower end thereof may be projected beyond the lower end of the outer needle to penetrate the tissue from which the biopsy is to be taken.

The split needle is formed of two semi-cylindrical sections 30 extending at least for a portion of the length of the needle to the lower end thereof. In the illustrated embodiment the two semi-cylindrical sections extend for the entire length of the needle and they form two complementary halves. Each section has a pair of edges which

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normally engage each other for the entire length of the needle to a short distance from the lower end thereof. At the lower end of each semi-cylindrical section the two edges are disposed at an angle as shown at 31. In other words the two edges of each section converge towards each other and diverge away from the edges of the other section as shown most clearly in FIGS. 1 and 8 forming a bifurcated end portion of the split needle terminating in points 32 at the center of the peripheral edge of each section.

The upper end of the split needle is provided with a suitable handle portion 33 having depending hub sections 34 and 35 which engage within the fitting 23 and hub 22 of the outer needle when the split biopsy needle is assembled therewith.

When the split biopsy needle is projected beyond the outer needle into soft tissue the bifurcated ends of the split needle particularly the angularly disposed edges 31 cause the two ends of the split needle to spread apart as shown in FIG. 11. To help in this action and also in order to cut off and retain the biopsy within the split needle I provide each of these sections with an angularly disposed tab 38. The tabs are spaced a short distance from the lower bifurcated end of the needle. They are formed by being blanked out of the side wall of each needle section and they are then deformed inwardly and upwardly at an angle extending away from the pointed end of the needle and towards each other.

When the end of the needle is contracted with the side edges of the two sections in engagement with each other, the end edges of the tabs are similarly in engagement with each other.

Thus it will be seen that when the end of the split needle is projected beyond the outer needle into soft tissue the angularly disposed side edges 31 of the needle sections and the angularly disposed tabs 38 perform a camming action causing the two ends of the needle to diverge or spread as shown in FIG. 11. Thereafter when the split needle is retracted back into the outer needle as shown in FIG. 12 the constricting action of the outer needle together with the camming action of the upper faces of the tabs 38 cause the two ends of the split needle to contract into engagement with each other. The tabs 38 will then engage each other and cut off the tissue and retain the biopsy within the split needle.

A stylet 18 may also be provided for the split needle. The stylet is in the form of a solid rod of a diameter to fit within the split needle and of a length to extend to a short distance above the tabs 38. The stylet is provided with a suitable handle 40 at its upper end having a small depending hub 41.

It will be understood that the handle 33 and depending hub portion have a bore or opening extending there-through communicating with the interior of the split needle. The stylet 18 may be assembled therewith by inserting the stylet 18 through the opening in handle 33 into the split needle until the hub portion 41 rests in the handle 33. The stylet 18 may be inserted in the split needle during its initial insertion into the outer needle, it may also be used in cleaning the split needle.

In using my improved split biopsy needle I first insert the fitted stylet 16 into the outer needle 15 with the lug 18 in engagement with the socket or recess 27. The initial perforation may be made through the skin into the tissue by means of a trocar or may be made directly by the outer needle having the fitted stylet therein. When the end of the outer needle has been inserted to the point where it is desired to obtain the biopsy the fitted stylet is then removed from the outer needle, as shown in FIG. 9.

Thereafter, the split needle either with or without stylet 18 assembled therewith is inserted through the outer needle until the bifurcated lower end of the split needle is adjacent the point of the outer needle as shown in FIG. 10. If the stylet has been assembled with the

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split needle it is then removed. Thereafter the split needle is further inserted through the outer needle to cause the bifurcated lower end to penetrate into the flesh or tissue from which it is desired to obtain the biopsy as shown in FIG. 11. The camming action resulting from the angularly disposed edges 31 and from the tabs 38 causes the lower end of the split needle to spread apart, also as shown in FIG. 11, so that tissue is disposed between the split end of the needle.

Thereafter, the split biopsy needle is withdrawn back into the outer needle in the manner shown in FIG. 12. The compressive force exerted by the outer needle on the split biopsy needle together with the camming action of the upper surfaces of the tabs 38 cause the lower end of the split needle to contract into engagement with each other. Simultaneously, the upper edges of the tabs 38 shift into engagement with each other so as to sever or cut the tissue and trap the biopsy within the split needle. The split needle can then be withdrawn and the biopsy subjected to examination in the usual manner.

It will thus be seen that I have provided an improved split biopsy needle of relatively simple and inexpensive construction and which when inserted through the outer needle into the tissue will spread so as to envelop a portion of the tissue. Upon withdrawal the ends of the needle will be drawn together so as to sever the tissue and trap and retain a biopsy within the split needle.

It should be understood of course that modifications may be made in the illustrated and described embodiment of my invention without departing from the invention as set forth in the accompanying claims.

I claim:

1. A split biopsy needle comprising an elongated tubular needle having a handle portion at one end and split longitudinally into two complementary semi-cylindrical sections at least for a portion of its length and extending to its opposite end, with said sections being each formed with a pair of longitudinal edges which engage the edges of the other section except at the opposite end, and with said edges on each section being disposed at an angle converging towards each other and diverging from the edges of the opposite section adjacent said opposite end to form a bifurcated end provided with two points respectively on the outer peripheries of said sections and with each of said sections being formed with tabs adjacent the points with the opposite faces of both tabs projecting at an angle away from the points into engagement with each other, said angularly disposed tabs having their upper edges formed at a relatively sharp acute angle to provide means for cutting the biopsy as said split biopsy needle is withdrawn, said angularly disposed portions of the edges of the sections and said tabs serving as cams to spread said sections as the needle is inserted and said tabs serving to bring said sections into engagement and to cut and hold the biopsy as the needle is withdrawn.

2. A split biopsy needle for insertion through an outer hollow needle into soft tissue for the purpose of taking a biopsy specimen which comprises: an elongated tubular needle of smaller diameter than said outer needle and of greater length so that it can be projected through the outer needle to project beyond the end thereof, said biopsy needle having a handle portion at one end and being split longitudinally into two complementary semi-cylindrical sections at least for a portion of its length and extending to its opposite end, with said section being each formed with a pair of longitudinal edges which engage the edges of the other section except at the opposite end, and with said edges on each section being disposed at an angle and converging towards each other and diverging from the edges of the other section adjacent said opposite end to form a bifurcated end provided with two points respectively on the outer peripheries of said sections and with each of said sections being formed with a tab adjacent the point with the opposite faces of the

5 tab and projecting at an angle away from the point into engagement with the tab on the other section, said angularly disposed tabs having their upper edges formed at a relatively sharp acute angle to provide means for cutting the biopsy as said split biopsy needle is withdrawn from said hollow tube, said angularly disposed portions of the edges of the sections and said tabs serving as cams to spread said sections as the needle is inserted in tissue beyond the end of the outer needle and said tabs and outer needle serving to bring said sections and tabs into engagement with each other and to cut and hold the

6 biopsy as the needle is withdrawn from the tissue into the outer needle.

3. A split biopsy needle as set forth in claim 2 in which said tabs are formed from the material of the side wall of the sections.

References Cited by the Examiner

UNITED STATES PATENTS

2,219,605	10/40	Turkel	-----	128—2
3,001,522	9/61	Silverman	-----	128—2

LOUIS R. PRINCE, *Primary Examiner.*