

April 8, 1952

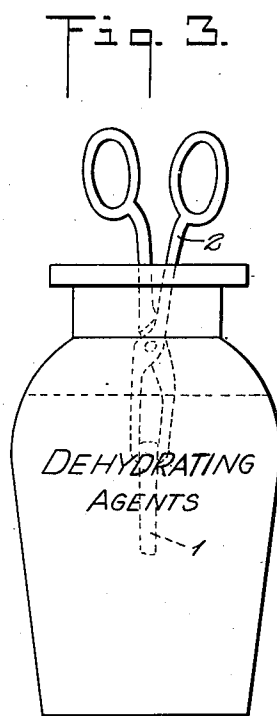
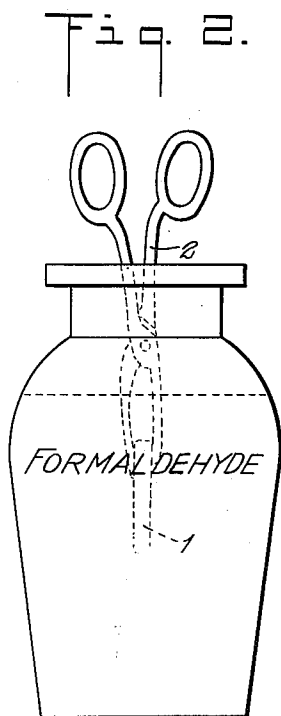
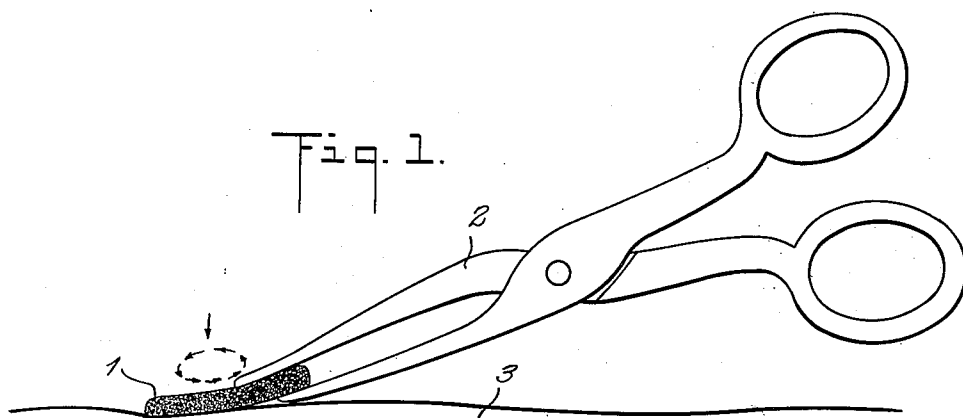
S. A. GLADSTONE

2,591,927

OBTAINING TUMOR TISSUE SPECIMEN

Filed Oct. 6, 1948

2 SHEETS—SHEET 1



INVENTOR.
SIDNEY A. GLADSTONE
BY
Kenyon & Kenyon
ATTORNEYS

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2 SHEETS—SHEET 2

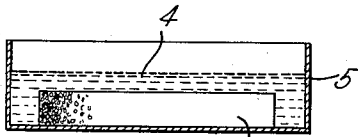


Fig. 4.

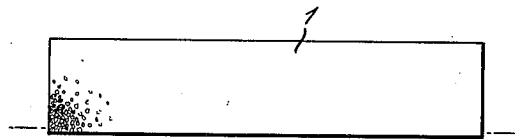


Fig. 5.

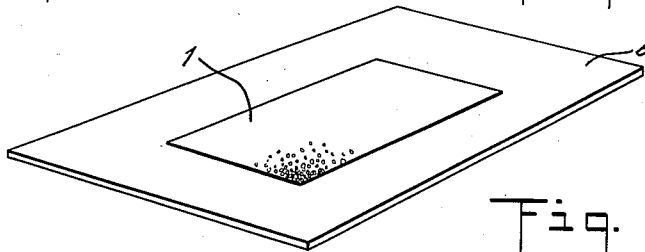


Fig. 6.

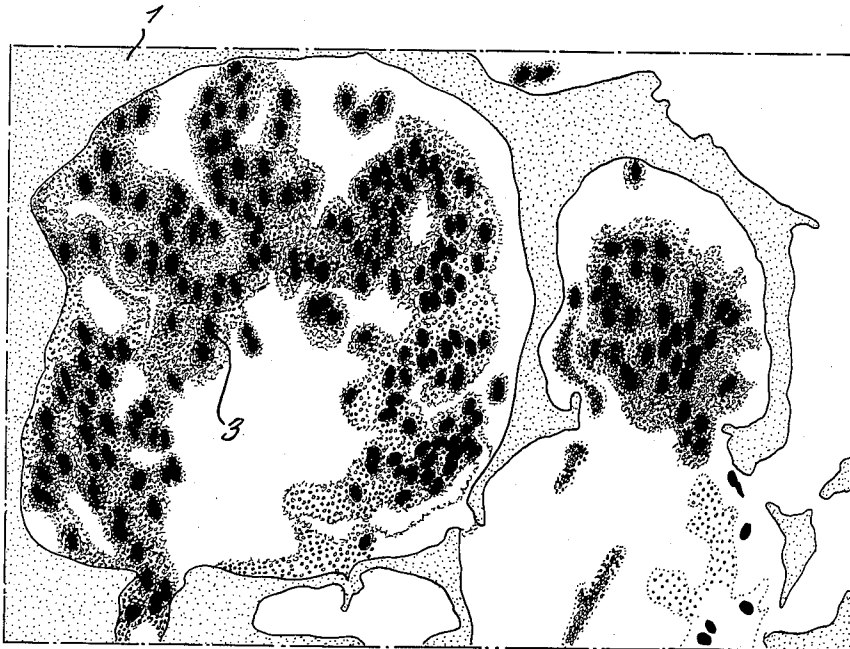


Fig. 7.

INVENTOR.
SIDNEY A. GLADSTONE
BY
Kenyon & Kenyon
ATTORNEYS

UNITED STATES PATENT OFFICE

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OBTAINING TUMOR TISSUE SPECIMEN

Sidney A. Gladstone, Paterson, N. J.

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9 Claims. (Cl. 128—2)

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This invention is concerned with the problem of obtaining tissue from a tumor carried by a patient. Pathologists require such tissue for their determinations of whether tumors are malignant.

Heretofore, it has been usual to excise a specimen from the tumor. This is very painful for the patient and in many instances is extremely dangerous, such as when bleeding cannot be stopped or sterile conditions cannot be satisfactorily maintained. No other practice heretofore existed for obtaining living tissue from a tumor.

One object of the present invention is to obtain living tissue from a tumor for examination by a pathologist without excising a specimen from the tumor. Another object is to provide a new means for removing the tissue and permitting its processing and examination in a manner easily followed by pathologists. Other objects may be inferred from the following.

The present invention is based on the discovery that when a sponge is rubbed over a tumor of the type that might be suspected as being malignant, the interstices or pores, or cavities of the sponge pick up or absorb small particles of tissue which are retained or held with the sponge functioning as a carrier. The sponge may be processed for microscopic examination by a pathologist in the same fashion he would process a tissue specimen excised from a tumor. The appearance of the tissue carried or absorbed by the sponge, under the microscope, has been found to be such that a pathologist has no serious difficulty in diagnosing the tumor type or condition.

Although many kinds of sponges may be used with varying degrees of success, a new form of sponge has been developed in connection with the above technique. This is a fine pore cellulose sponge having an average cavity or pore size ranging from .01 to .10 of an inch, which is sterile and which is insufflated with a powdered agent for coagulating blood and serum which is normally absorbed with the tissue. The sponge dimensions depend on the location and accessibility of the tumor. The sponge may be of the type commercially known as a fine pore cellulose sponge. The cavities or pores are provided by blown cellulose bubbles and these have blown-out ruptures providing entrances to them. Thus the cavities or pores are able to pick up, absorb or entrap the tissue when the sponge is rubbed on the tumor.

In practicing the invention in its presently preferred form the above described sponge in a dry condition is rubbed over the tumor carried by the patient. Judgment is needed in determining the rubbing pressure. However, no great amount of skill is required since a rubbing pressure light enough to avoid hurting or

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materially annoying the patient or aggravating his condition, is sufficient to entrap or absorb the tissue in the pores of the sponge.

The sponge carrying the tissue may then be processed just as though it were a piece of tissue excised from the patient. That is to say the sponge may be promptly immersed in formaldehyde to stop any further growth and to harden the tissue. Then, usually at a subsequent time in the laboratory, the sponge may be immersed in a dehydrating agent, impregnated with paraffin, sliced by a microtome and placed on a microscope glass for microscopic examination by the pathologist. Selective acting stains may be used in the usual fashion to visually develop or contrast the tissue structure.

The accompanying drawings illustrate the foregoing as follows:

Fig. 1 shows the rubbing step;

Fig. 2 shows the immersion in formaldehyde; Fig. 3 the dehydrating;

Fig. 4 the impregnation with or immersion in paraffin;

Fig. 5 shows the sponge after solidification of the paraffin;

Fig. 6 represents the piece from the microtome on the microscope glass; and

Fig. 7 shows the structure of the sponge and tissue as it appears under the microscope.

In Fig. 1 a sponge 1 is shown being held by forceps 2 and rubbed on a tumor 3 with a generally circular motion accompanied by downward pressure as indicated by the arrows. Reciprocatory motion may also be used. As previously indicated the amount of pressure used depends on judgment. Very light pressure might be used if the rubbing time is long enough and the maximum pressure used need not be sufficient to hurt or annoy the patient unduly. Sometimes a sopping or sponging action is sufficient. Preferably the sponge is the special sponge already disclosed. As a result of this step various small sized pieces of tumor tissue are entrapped or absorbed in the fine interstices, pores or cavities of the sponge. The blood and serum coagulating agent insufflated in the sponge promptly coagulates absorbed blood and serum carried with or actually carrying the tissue into the sponge. The sponge being sterile, there is little chance for infection since the amount of tissue removed is extremely slight. No incision is made at all.

In Fig. 2 the sponge 1 is shown immersed in a bottle of formaldehyde. This step may be carried out promptly after the absorbing step and is for the purpose of killing the tissue and hardening its structure. It may be the same type of fixing that is done in the case of an excised specimen.

Thereafter, usually in the laboratory, the re-

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mainder of the processing is carried out. In Fig. 3 the sponge is shown immersed in a dehydrating agent which may be alcohol, acetone or the like. Next the sponge is immersed in heated molten paraffin 4 in a pan 5 with the side of the sponge that was rubbed on the tumor down on the bottom of the pan. After cooling the paraffin solidifies into a cake embodying the sponge as generally indicated by Fig. 5. This cake may be easily handled by a microtome for slicing, as represented by the broken line shown, in the same manner that an excised tumor specimen is sliced to produce tissue thin enough for microscopic examination by transmitted light. The usual practice of staining with various stains for developing the tissue structure may be followed after the slice of tissue has been floated on the microscope glass.

The final result is the microscope glass 6 carrying the microtome slice 7 ready for microscopic examination by a pathologist.

It is important to note that all of the foregoing steps are familiar to pathologists excepting for the fact that instead of using an excised specimen, with its attendant pain and dangers to the patient, a suitable sponge is simply rubbed firmly on the tumor and then handled in the manner of an excised specimen.

Various kinds of sponges have been used in practicing the invention, as exemplified by cotton gauze, synthetic rubber sponge, natural sea sponge, blotting and tissue paper sponge, gelatin sponge and cellulose sponges of various pore sizes. Cellulose sponge has the advantage that particles do not break off easily during the rubbing step and no difficulties are introduced during subsequent processing. Cellulose sponge is not soluble in any of the materials customarily used to process an excised specimen and such as may be used in practicing this invention, and no operational difficulties are introduced during the operation of the microtome. For practical reasons the color of the sponge should preferably be white since it permits easy visual determination of when the sponge has absorbed or picked up an adequate amount of matter from the tumor.

Fig. 7 shows, as well as can be done with pen and ink, the microscopic structure of the sponge and tissue at about 400 X magnification. The cellular structure of the sponge 1 is easily distinguished from the characteristic appearance of the tissue 3, shown as cancerous. A competent pathologist has no material difficulty in examining the tissue entrapped or absorbed in the pores or cavities of the sponge. It is to be emphasized that the tissue represents living tissue obtained directly from the tumor. Therefore, it has the characteristic appearance of living tissue obtained by excising a specimen from the tumor.

I claim:

1. A method for obtaining tissue from a tumor, including the step of contacting a sponge on the surface of the tumor to collect tissue in the interstices of the sponge, wherein said sponge is insufflated with a powdered agent for coagulating blood and serum, prior to said rubbing.

2. A method for obtaining tissue from a tumor, including the step of contacting a sponge on the surface of the tumor to collect tissue in the interstices of the sponge, wherein said sponge is insufflated with a powdered agent for coagulating blood and serum, prior to said rubbing, and with said sponge comprising a fine pore cellulose sponge.

3. A method for examining a tumor to deter-

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mine its type or condition, said method comprising rubbing a sponge on the surface of the tumor to absorb tissue in the interstices of the sponge, treating said sponge to condition it for slicing, and slicing said sponge after said conditioning to form a specimen adapted for microscopic examination thereof.

4. A method as defined by claim 3 wherein said sponge is insufflated with a powdered agent for coagulating blood and serum, prior to said rubbing.

5. A sponge adapted to collect tissue from a tumor by contact therewith and which is sterile and insufflated with a powdered agent for coagulating blood and serum, said sponge being a fine pore cellulose sponge.

6. A device for obtaining tumor tissue for microscopic examination, said device comprising a spongy mass of sterile elastic material containing a large number of pores or cavities for absorbing and retaining the tissue when rubbed on the tumor, with said material having adequate structural strength to resist material disintegration or fragmentation when rubbed on the tumor and having a composition insoluble in the agents used to process excised tissue specimens for microscopic examination and having physical properties permitting clean severance by a microtome, and with a substantial number of said pores or cavities ranging from .01 to .10 of an inch in size and dispersed throughout at least one surface of said mass, said mass being adapted to be rubbed on a tumor and thereafter processed for microscopic examination in the manner of an excised tumor specimen.

7. A sponge adapted to collect tissue from a tumor by contact therewith and which is sterile and insufflated with a powdered agent for coagulating blood and serum, said sponge being a fine pore cellulose sponge having a structure providing an average cavity size ranging from .01 to .10 of an inch.

8. A sponge adapted to collect tissue from a tumor by contact therewith and which is sterile and insufflated with a powdered agent for coagulating blood and serum, said sponge being a fine pore cellulose sponge having a structure providing an average cavity size ranging from .01 to .10 of an inch and provided by blown cellulose bubbles with blown-out ruptures providing entrances thereto.

9. A method for examining a tumor to determine its type or condition, said method comprising rubbing a sponge on the surface of the tumor to absorb tissue in the interstices of the sponge, and dehydrating said sponge, impregnating said sponge with molten paraffin and allowing the paraffin to solidify and form the sponge into a solid cake, and slicing said cake to form a specimen adapted for microscopic examination thereof.

SIDNEY A. GLADSTONE.

REFERENCES CITED

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

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2,465,357	Correll	Mar. 29, 1949

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