

United States Patent

Piper et al.

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[54] ELECTRICALLY HEATED HYPODERMIC NEEDLE

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[58] Field of Search. 128/303.1, 303.18, 404

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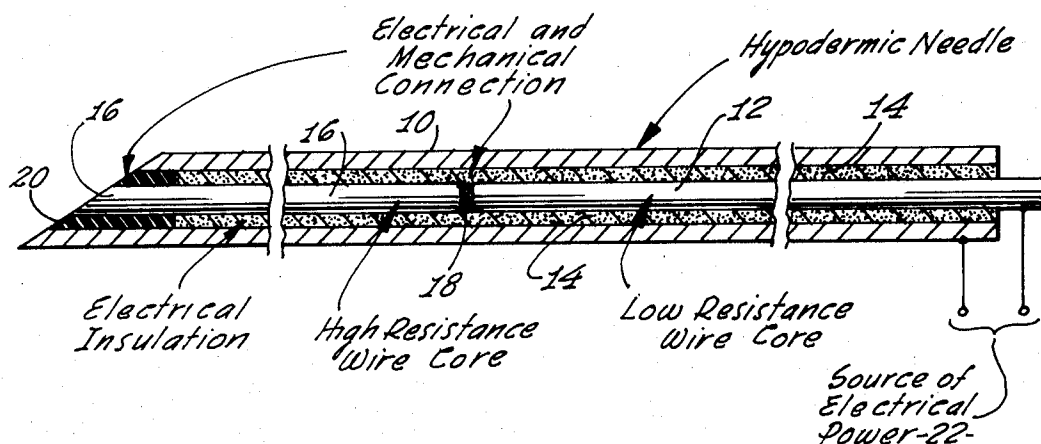
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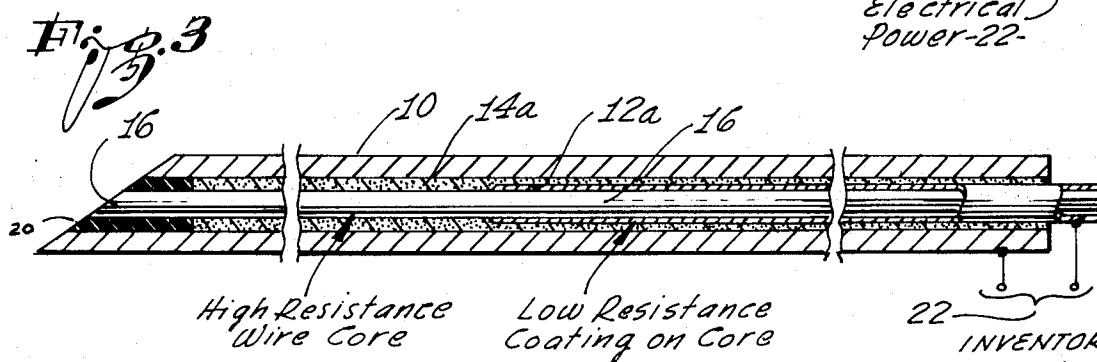
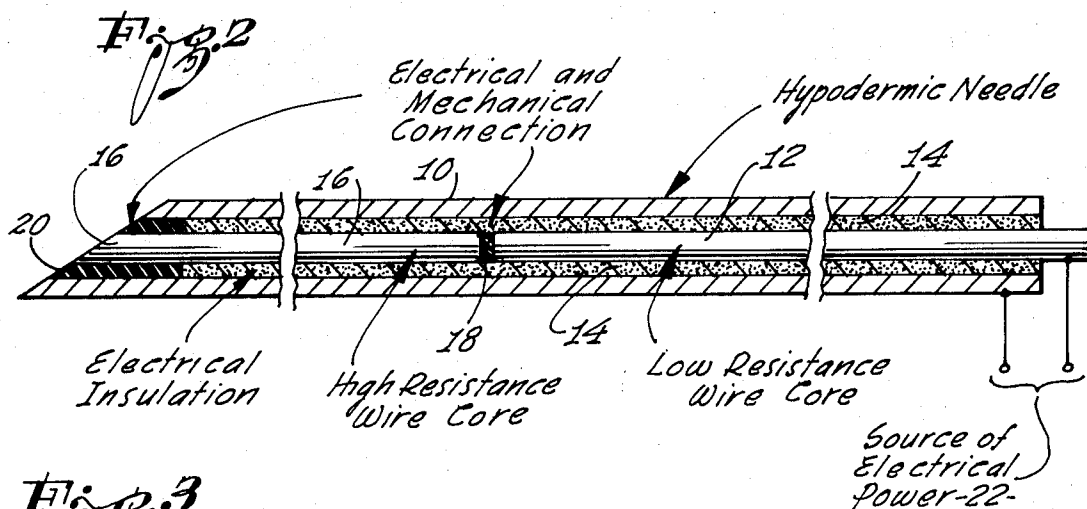
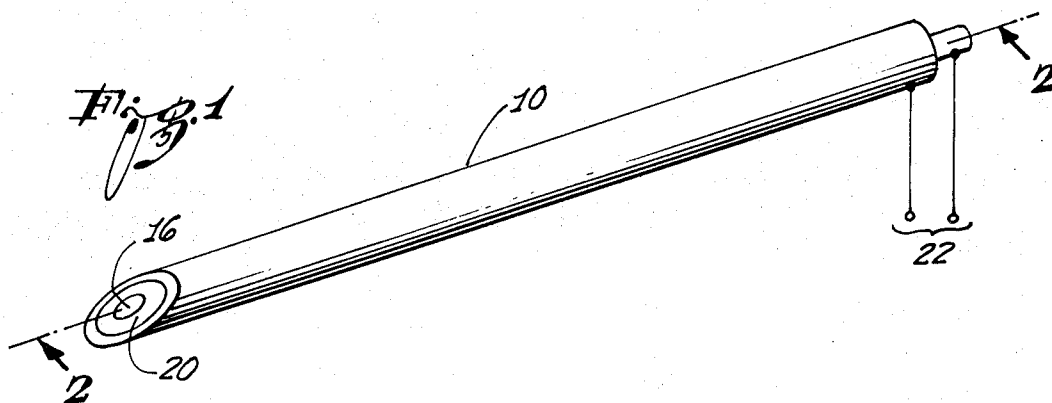
Primary Examiner—Channing L. Pace

[57] ABSTRACT

A surgical instrument is provided in the form of a hypodermic needle, the tip of the needle being heated by passing an electric current through a resistance wire within the needle adjacent its tip. The needle has particular utility for medical purposes, and is used, for example, to destroy blood vessels or tissue.

7 Claims, 3 Drawing Figures





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ELECTRICALLY HEATED HYPODERMIC NEEDLE

BACKGROUND OF THE INVENTION

A medical need often arises for the destruction of small veins, and this is achieved simply and effectively by the surgical instrument of the invention. In the practice of the invention, a needle is inserted percutaneously into a vein, and electric current is passed through the needle at a rate sufficient to heat its tip. This results in immediate destruction of the vein and subsequent disappearance thereof.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view, on an enlarged scale, of a surgical instrument in the form of a hypodermic needle constructed in accordance with the invention;

FIG. 2 is a side section taken along line 2—2 of FIG. 1; and

FIG. 3 is a side section, like FIG. 2, of a modified embodiment of the invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

The surgical instrument illustrated in the FIGS. 1 and 2 of the drawing includes a usual hollow hypodermic needle 10 which may, for example, be a No. 27 needle having a 16 mil outer diameter and a 9 mil inner diameter, the needle being composed, for example, of surgical steel. A wire 12 of low resistance and high electrical conductivity is positioned coaxially within the hypodermic needle 10, the conductor 12 being insulated from the needle by any appropriate electrical insulation designated 14.

The conductor 12 may be composed, for example, of copper wire of 4 mil diameter. The copper wire 12 terminates at a point displaced from the tip of the needle 10. A high resistance wire 16 is positioned within the needle in axial alignment with the conductor 12, the high resistance wire 16 extending from the end of the conductor 12 to a point adjacent the tip of the needle. The high resistance wire 16 may have a diameter, for example, of 3.5 mils, and it may be composed of a nickel chrome alloy.

An appropriate end fitting may be provided at the right hand end of the needle in FIGS. 1 and 2. This fitting may have any appropriate known configuration. The fitting is not shown since it does not have any significance to the present invention.

The resistance element 16 is bonded to the end of the conductor 12 by a silver braze, for example, or by other suitable means serving as an electrical and mechanical connection between the high resistance wire and the conductor 12. The other end of the high resistance wire 16 is bonded to the tip of the needle by, for example, similar means. The electrical and mechanical connection between the high resistance wire 16 and the conductor 12 designated 18, and the electrical and mechanical connection between the other end of the resistance element 16 and the tip of the needle 10 is designated 20.

The insulation 14, as shown, extends around the high resistance wire 16, as well as around the conductor 12, so that both are insulated from the needle 10, except for the connection between the end of the high resistance wire 16 and the needle 10, as designated 20.

The right-hand end of the conductor 12 and of the needle 10 may be connected to an appropriate source of electric power, either direct current or alternating current, and designated 22. Then, when electric power is applied from the source 22, the resulting electric current flows through the conductor 12 and through resistance element 16, and back to the needle 10, causing the resistance element 16 to become heated, thereby heating the tip of the needle 10.

In the practice of the invention, the hypodermic needle is inserted percutaneously into the vein of the patient, and the tip is internally heated by passing the aforesaid alternating or direct current through the high resistance wire 16 inside the needle. All or part of the needle can be heated depending on the length and place of the wire 16. The power source 22 may be controllable, so as to control the temperature of the heated portion of the needle.

Alternatively, the needle can be constructed as shown in FIG. 3 in which a high resistance wire core 14a extends the length of the needle. The high resistance wire core is coated (by means of electroplating or otherwise) with a low resistance metal 12a, such as copper or silver, except for the portion of the needle where heat is desired. The high resistance wire core 14a can be manufactured with a continuous coating which can be selectively removed prior to assembly in the needle by chemically dissolving it or by abrasion.

As mentioned above, the surgical instrument of the invention has particular utility whenever it is desired to destroy small blood vessels, veins and tissue.

It will also be appreciated that although a particular embodiment of the invention has been shown and described, modifications may be made, and it is intended in the following claims to cover all modifications which come within the scope of the invention.

What is claimed is:

1. A surgical instrument comprising: a hollow hypodermic needle having a pointed tip and composed of electrically conductive material; an elongated electrical conductor extending in coaxial relationship within said needle; electrically insulating means interposed between said conductor and said needle for insulating said conductor from said needle; an electrical resistance element mounted within said needle; and means electrically connecting said resistance element to said needle and to said conductor, so that electric current passed through said needle and through said conductor passes through said electrical resistance element to heat a portion of said needle.

2. The surgical instrument defined in claim 1, in which said resistance element is in the form of a wire positioned in axial alignment with said conductor adjacent the tip of said needle.

3. The surgical instrument defined in claim 1, in which said needle is composed of surgical steel.

4. The surgical instrument defined in claim 1, in which said elongated electrical conductor comprises a copper wire.

5. The surgical instrument defined in claim 1, in which said electrical resistance element has an elongated configuration and is disposed within said needle in axial alignment with said conductor.

6. The surgical instrument defined in claim 1, in which said resistance metal is composed of a nickel chrome alloy.

7. The surgical instrument defined in claim 1, in which said elongated electrical conductor comprises a high resistance wire coated with a low resistance metal except for that portion of the needle where heat is desired.

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