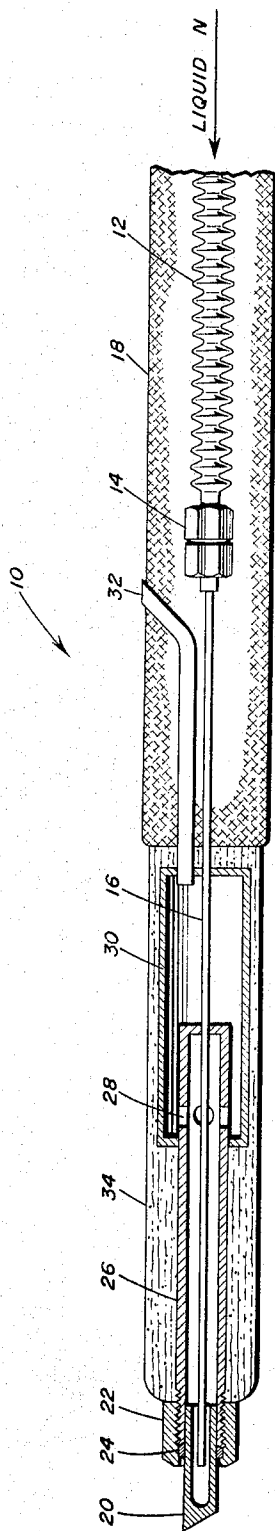


Aug. 16, 1966

S. B. STEINBERG
CRYOSURGERY PROBE DEVICE

3,266,492

Filed Sept. 6, 1963



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3,266,492

CRYOSURGERY PROBE DEVICE

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Filed Sept. 6, 1963, Ser. No. 307,208

4 Claims. (Cl. 128—303)

This invention relates generally to surgical instruments, and more particularly it pertains to a cryosurgical probe device with interchangeable tips.

The art of cryosurgery or locally freezing living tissue has become an important aid to the treatment of many diseases including brain disorders and cancer.

It is an object of this invention, therefore, to provide a surgical probe of the liquid gas freezing type which is capable of deep or shallow work of all kinds.

Another object of this invention is to provide a tissue freezing instrument which is small and light weight for easy manipulation and which can be readily adapted for relatively small or large area treatment by quick interchange of tip.

To provide a highly efficient surgical tool tip arrangement for extreme cold application to tissue, is yet another object of this invention.

Still other objects of this invention are to provide a tissue freezing instrument which has great mobility, such that the user of the instrument may move it about from one area to another, and, additionally, it may be retracted due to the holding device similar to that of a dental drill holder.

These and other objects and attendant advantages of this invention will become more readily apparent and understood from the following detailed specification and accompanying drawing.

In the drawing, reference numeral 10 indicates generally the surgical instrument incorporating the novel features of this invention.

This instrument 10 is intended for connection to a source of liquid gas such as nitrogen (N₂) which is conducted over a thermally insulated convoluted flexible tube 12 of stainless steel. This tube 12 is joined by means of a union 14 to a small diameter stainless steel delivery tube 16. The union 14 and flexible tubing 12 is covered with expanded plastic insulation 18 such as Dow "Styrofoam" for example.

The delivery tube 16 axially traverses the length of the instrument 10 to be loosely received within the hollow interior of a tool tip 20. This tip 20 may take many forms depending on the prospective use, with a wedge type being illustrated.

The tips 20 are easily interchanged on the instrument 10 by means of a nut 22 which threads on an expansion chamber shell 26 and incorporates a clamping ferrule 24 which embraces the tip 20.

Chamber shell 26 is coaxial with the delivery tube 16, the latter entering the former through a closed end wall.

Near this same end wall, there are provided a plurality of holes 28 which allow the vaporized gas in the expansion chamber shell 26 to escape into an exhaust manifold 30 therearound.

An exhaust line 32 connected to the manifold 30 discharges to the atmosphere or to a vacuum line (not shown) paralleling the liquid gas tube 12.

The previously mentioned tips 20 are made of sterling silver which is an excellent conductor of heat. Therefore, the full cooling effect of the liquid gas as it vaporizes and expands on leaving the end of the delivery tube 16 can be fully utilized at the application end of the tip 20. Temperatures as low as minus 100 degrees centigrade are quite readily attainable.

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To protect the hand of the surgeon from the cold, the shell 26 and manifold 30 are covered with an insulating cover 34 of balsa wood which also provides a non-slipping finger grip surface.

Obviously many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A surgical tool comprising insulating handle means having an axial passage, a tubular member mounted within said axial passage recessed from one end of said handle means and extending from the other end thereof, needle tip means removably secured to the extending end of said tubular member and having an interior passage communicating with the interior of said tubular member, and delivery tube means extending longitudinally within the interior of said tubular member and extending and opening into said interior passage for supplying a cooling medium thereto for cooling said needle tip means.

2. The surgical tool of claim 1 and additionally another tubular member defining an expansion chamber mounted within said axial passage and having its interior communicating with the interior of said first mentioned tubular member and means communicating the interior of said other tubular member with the exterior of said surgical tool.

3. The surgical tool of claim 1, wherein said needle tip means extends from the interior of the extending end of said tubular member and said extending end has external threads, a ferrule member is provided encompassing said needle tip means, and means including a nut engaging said external threads and clamping said ferrule member against said needle tip means is provided to secure said needle tip means to said tubular member.

4. A surgical tool comprising insulating handle means having an axial passage, a first tubular member mounted within said axial passage recessed from one end of said handle means and extending from the other end thereof, the extending portion of said first tubular member having external threads, needle tip means removably positioned within said extending portion and extending therefrom, means engaging said threads of said first tubular member and clamping said tip means to the extending portion thereof, a second tubular member defining an expansion chamber mounted within said handle means and encompassing the end of said first tubular member contained therein, said tip means having an interior passage communicating with the interior of said first tubular member and said first tubular member having spaced apertures in its lateral surface communicating with the interior of said second tubular member, exhaust means connecting the interior of said second tubular member with the exterior of said surgical tool, and delivery tube means extending longitudinally within the respective interiors of said first and second tubular members and the interior passage of said tip means to supply a cooling medium thereto.

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