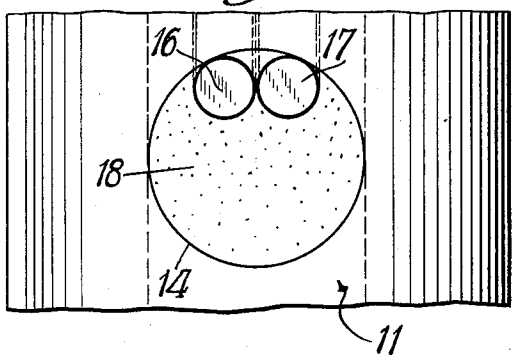
Feb. 9, 1960 H. FLECK 2,924,213

ELECTRICAL PROBE

Filed March 17, 1958

Fig. 3.



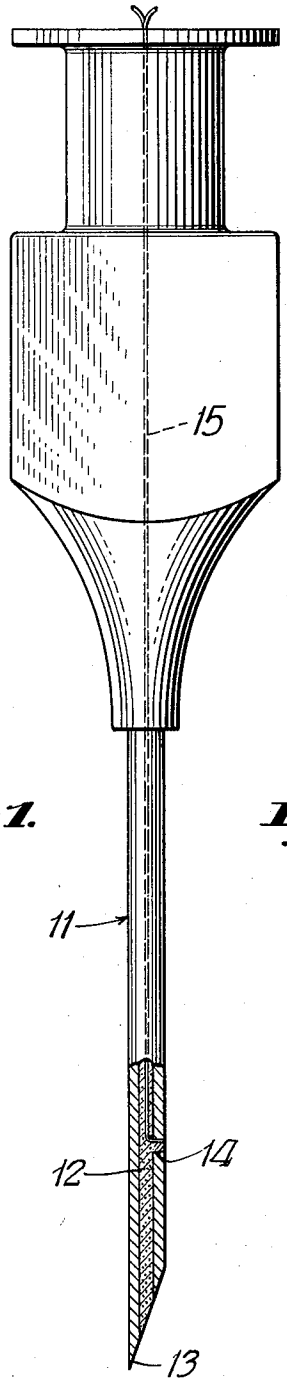


Fig. 1.

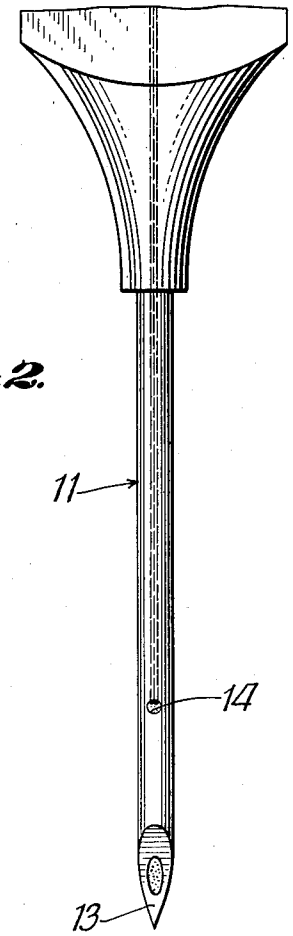


Fig. 2.

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ELECTRICAL PROBE

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1 Claim. (Cl. 128—2.1)

This invention relates to the art of recording and more particularly to a probe for picking up minute electrical alterations occurring in muscle fibres as an aid in the determination of defects therein.

As conducive to an understanding of the invention, it is noted that where it is desired to record action potentials, i.e., electrical alterations occurring in a single active muscle fibre, to determine the condition thereof, it is necessary that the wave pattern caused by such electrical alterations from a muscle fibre of unknown condition be compared with the wave pattern from a muscle fibre of known or healthy condition which acts as a standard.

Where a probe is inserted into the body and the probe has two electrodes across which the electrical alteration or potential change is developed, as electrical impulses moving through muscle fibres pass the electrodes, if the dimensions of the electrodes are relatively large and engage more than one active muscle fibre, due to the interaction of the electrical impulses from the plurality of muscle fibres, no standard wave pattern can be developed.

Furthermore, where the probe of the above type is inserted into the body of the person whose muscle fibres are to be tested, and more than one muscle fibre is engaged by the electrodes, the resultant wave pattern will also have no utility in determination of disease or deterioration of any single muscle fibre, due to interaction of the electrical impulses from the plurality of muscle fibres engaged by the electrode.

Where, in an attempt to minimize the area of the electrodes, a pair of wires are passed longitudinally through the bore of a needle to the conventional beveled entry end thereof, as the ends of the wires must conform to the bevel at the end of the needle so that they do not protrude and rip the tissue as the needle is forced through the skin, the ends of the wires will have a substantially oval contour providing a wider contact area than would be provided with a circular end of diameter equal to the minor axis of the oval, with the disadvantages above set forth.

It is accordingly among the objects of the invention to provide an electrical probe that may readily be fabricated at relatively low cost, and is strong and durable and not likely to become deranged in use and that may readily be inserted into tissue of a patient and which has electrodes that have a minimum spacing therebetween and a minimum surface area and do not protrude beyond the surface of the needle so that they will not rip the tissue of the patient, as the needle is inserted, and which will permit recording of electrical alterations occurring in a single active muscle fibre.

According to the invention, these objects are accomplished by the arrangement and combination of elements hereinafter described and particularly recited in the claim.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a longitudinal view of the probe partly in cross section,

Fig. 2 is a front elevational view thereof, and

Fig. 3 is an enlarged detail view showing the electrodes.

Referring now to the drawings, the probe may comprise a conventional hypodermic needle 11 which has a bore 12 extending longitudinally therethrough, the entry end of the needle being beveled to a sharp point as at 13 to facilitate entry through the tissue of the patient.

The needle 11 adjacent its entry end 13 has an opening or bore 14 extending laterally into the longitudinal bore 12.

Extending through the bore 12 is a pair of insulated wires 15, preferably of the enamel coated type and of extremely small diameter in the order of 30 microns. The wires 15 also extend through the lateral bore 14 and are cut off flush with the outer surface of the needle at right angles to the axis of the wire to define two circular electrodes 16 and 17 of uniform diameter.

In order to retain the electrodes 16, 17 in fixed position, the bores 12 and 14 are filled with suitable material such as plastic 18 or the like.

With the construction above described, since the surface area of the circular electrodes 16, 17 is very small and since the interelectrode distance or spacing therebetween is also very small, being limited only by the thickness of the insulation on the wires, which is in the order of one micron, it is apparent that the potential change between the two electrodes, as electrical impulses pass through a single muscle fibre past the electrodes, can be ascertained.

The probe thus described is used in recording the wave pattern resulting from the potential change across the two electrodes as electrical impulses pass through a single known healthy muscle fibre.

By making a relatively large number of tests an average wave pattern resulting from a corresponding number of healthy individual muscle fibres can be determined and used as a standard against which is compared the wave pattern from a single unknown muscle fibre to ascertain deterioration or disease thereof.

As many changes could be made in the above article, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claim, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

As an article of manufacture, a needle having a bore extending longitudinally therethrough, said needle being pointed at one end and having a lateral bore between its ends extending into said longitudinal bore, a pair of insulated wires extending through said longitudinal bore and the lateral bore, the ends of said wires extending through said lateral bore being circular in cross section and flush with the outer surface of said needle and defining a pair of electrodes spaced by a distance substantially equal to the thickness of the insulation on said wires, and means to retain said electrodes in fixed position in said transverse bore.

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