May 21, 1929. S. H. GROFF 1,714,220

SURGICAL INSTRUMENT

Filed March 27, 1926

Fig. 1.

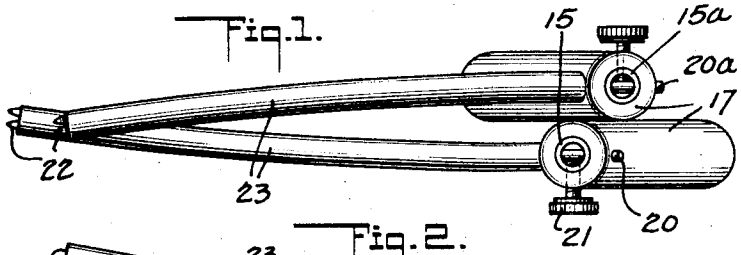


Fig. 2.

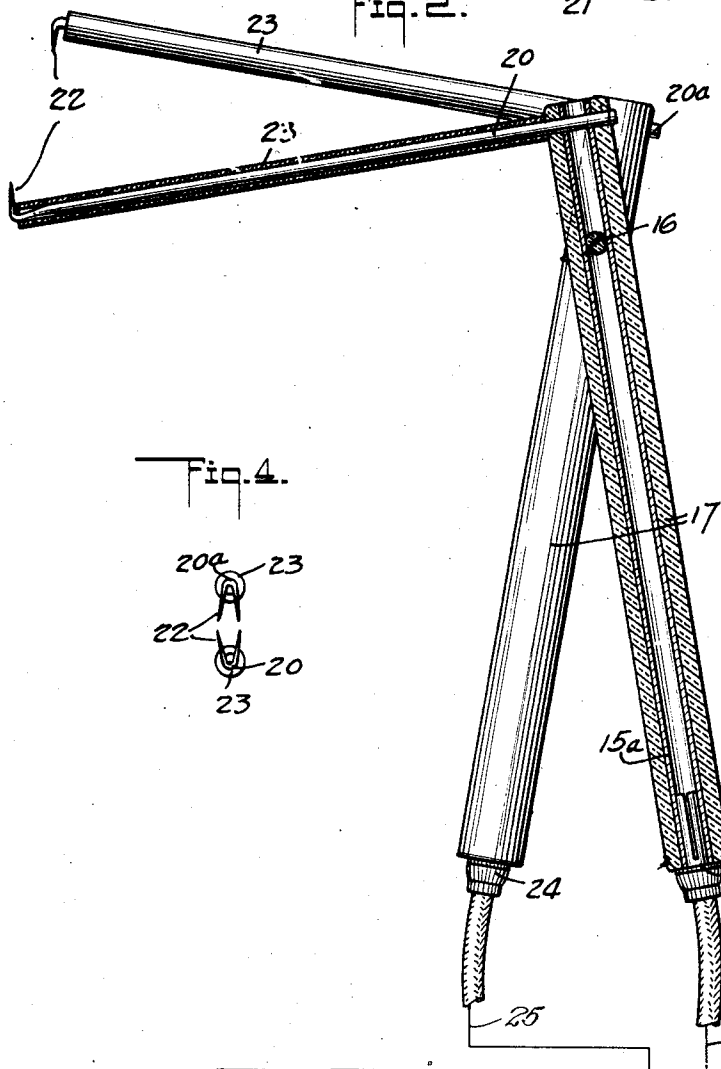


Fig. 3.

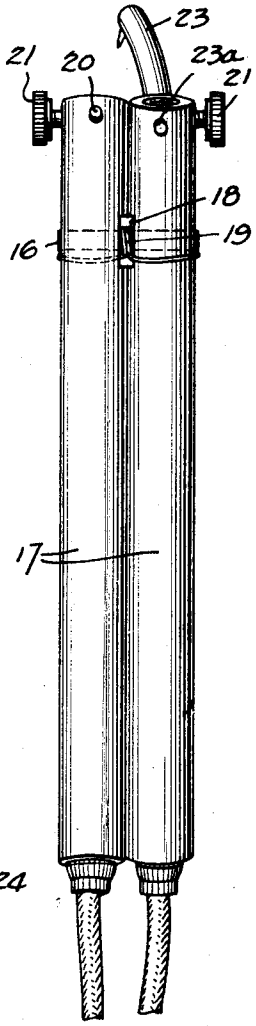


Fig. 4.

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UNITED STATES PATENT OFFICE.

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SURGICAL INSTRUMENT.

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My invention relates to surgical instruments of that general character used in diathermy and the like where electricity is employed to heat and thus destroy the tissue as in the removal of tonsils.

In such instruments as heretofore proposed the body of the patient is included in the electrical circuit in a manner to constitute one terminal of the circuit while the instrument constitutes the other terminal. By reason of this arrangement, the patient is subjected to considerable pain during the operation even where local anæsthesia is used and which is attributable to the repeated piercing of the tonsil or other tissue with the instrument necessary to complete the removal of the tonsil, and the passage of current through the body.

It is a purpose of my invention to provide a surgical instrument of the above described character which, in its association with a source of current, is capable of being applied to the tonsil or other tissue to the exclusion of current passing through the body of the patient and the direct and sole application of current to the tonsil, whereby the heating of the tissue and its destruction are greatly facilitated and the pain incident thereto greatly lessened.

I will describe only one form of surgical instrument embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings,

Figure 1 is a view showing in top plan one form of surgical instrument embodying my invention;

Figure 2 is a view showing in side elevation and partly in section the instrument shown in Figure 1 and schematically illustrating the manner in which the instrument is supplied with current;

Figure 3 is a rear edge elevation of the instrument shown in the preceding views;

Figure 4 is a view showing in end elevation the pronged ends of the electrodes comprised in the instrument.

Referring specifically to the drawings, in which similar reference characters refer to similar parts in each of the views, my invention, in its present embodiment, comprises a pair of arms 15 and 15ª each of which is formed of a single length of tubular metal, and both of which are mounted for pivotal movement upon a pintle 16 formed of insulating material and swaged at its ends to retain the arms against displacement therefrom. Encasing sleeves 17 of insulating material surround the arms 15 and 15ª and the pintle 16 likewise extends through these sleeves, with recessed portions 18 formed in the sleeves to accommodate the coiled portion of a spring 19 mounted on the pintle and having its ends extended in opposed directions to embrace the two sleeves and in such manner as to normally urge the arms to the position shown in Figure 2.

The upper ends of the arms and sleeves are formed with openings into which are extended a pair of rods 20 and 20ª which constitute the electrodes of the instrument. These electrodes are secured within the arms by means of set screws 21 and in such manner as to allow the ready dismounting of the electrodes from the arms when desired. It is to be understood, however, that the electrodes when in applied position are firmly secured in substantially right angular relation to the arms which greatly facilitates the manipulation of the instrument and the application of the electrodes to the tissue to be treated. The free ends of the electrodes terminate in the prongs 22 which, as shown in Figure 4, are disposed at right angles to the rods and extend toward each other. In the present instance, I have shown two prongs for each electrode, but it is to be understood that any number of prongs may be employed. The rods 20, in order to prevent short circuiting of the current, are covered with sleeves 23 of insulating material, preferably rubber, the insulating material terminating short of the pronged ends so that the latter are exposed to freely penetrate the tissue being treated and to thus supply current thereto.

The lower ends of the arms 15 and 15ª are open to removably receive conducting connectors 24 for a pair of conductors 25, the latter, as schematically illustrated in Figure 2, being connected to a source of high frequency current, such as the generator 26, so that current is supplied to the electrodes 20. A switch 27 is interposed in the circuit to permit the manual control of current to the instrument, as will be understood.

In practice, the arms 15 and 15ª and their sleeves 17 constitute handles and are adapted to be received in one hand of the operator in positioning the electrodes 20 and more particularly the pronged ends 22 with respect to the tissue to be treated. For example, the electrodes may be readily inserted

into the mouth while in the expanded position shown in Figure 2, so that the pronged ends 22 may be positioned at opposite sides of a tonsil. By now contracting the hand, the arms 15 and 15ª will be actuated against the tension of the spring 19 to move the electrodes toward each other, thus causing the pronged ends 22 to move into penetrating position with respect to the tonsil. It is to be noted that the electrodes are bent laterally as shown in Figure 1, so that in the contracted position thereof the pronged ends 22 will have co-operative engagement with each other; that is to say, they will penetrate the tonsil or other tissue at opposed points and finally meet each other, thus facilitating destruction of the tissue. Following the penetration of the prongs into the tonsil, current may now be supplied to the electrodes by closing the switch 27, whereupon the tonsil will be incorporated in the circuit and the resistance offered thereby set up sufficient heat to cause the heating of the tissue and thereby the destruction of the tonsil.

Although I have herein shown and described only one form of surgical instrument embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention and the spirit and scope of the appended claims.

I claim as my invention:

1. A surgical instrument of the character described comprising a pair of crossed and pivoted arms, said arms constituting conductors but insulated from each other, and a pair of electrodes one for each of the arms, each electrode being fixed to its respective arm at an angle thereto and having at its free end prongs extending in the direction of the other electrode so as to co-operate with the prongs of the latter.

2. A surgical instrument as embodied in claim 1 wherein the electrodes are detachably secured to the arms and provided with insulating sleeves.

3. A surgical instrument as embodied in claim 1 wherein the electrodes are bent laterally to cause the prongs thereof to have co-acting engagement with each other when the arms are moved toward each other.

4. A surgical instrument of the character described comprising a pair of arms of conducting material, a pintle for operatively connecting the arms but insulated therefrom, a spring associated with the arms for yieldably urging the latter into crossed relation with respect to each other, insulating sleeves surrounding the arms, conducting rods extending substantially at right angles into the arms at one side of the pintle, set screws for detachably securing the rods in the arms, prongs on the rods, and conductors detachably connected to the arms.

5. A surgical instrument comprising pivotally connected conductors each having at one end an angularly disposed electrode terminating in a pronged extremity, with the pronged extremity of one electrode extending in the direction of the pronged extremity of the other electrode, said electrodes adapted to be passed into the mouth of a patient so as to permit their pronged extremities to be manually forced into the diseased tissue to be treated and removed, means forming a protective insulating covering for the conductors and electrodes except at the pronged extremities of the latter, whereby and when high frequency current is supplied to the electrodes the latter will be prevented from short circuiting the instrument incident to bridging of the electrodes by the teeth or other portions of the mouth, and means by which current can be supplied to the conductors.

SUTTEN HENRY GROFF.