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F. C. WAPPLER

2,054,149

SURGICAL SNARE

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Fig. 1

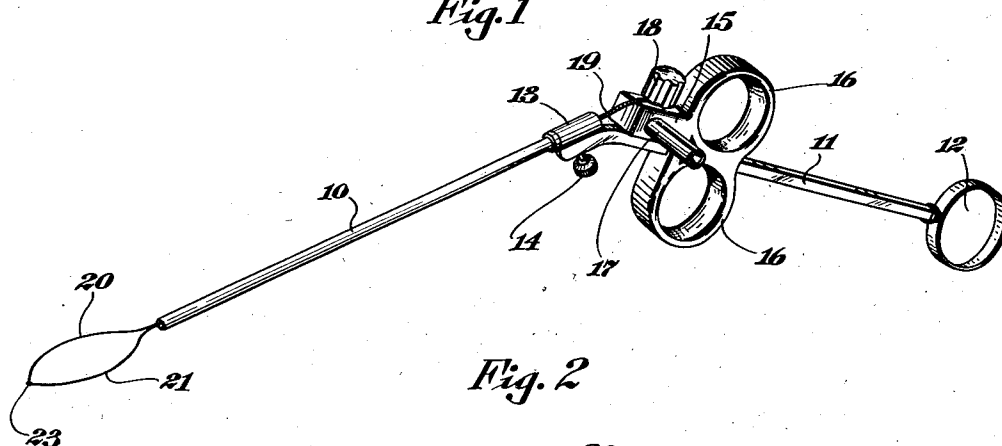


Fig. 2

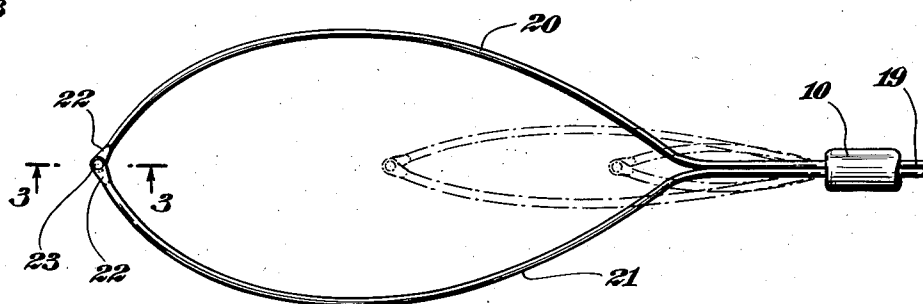


Fig. 3

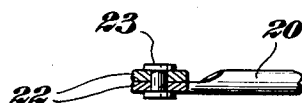


Fig. 4

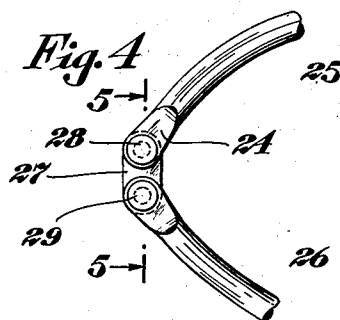
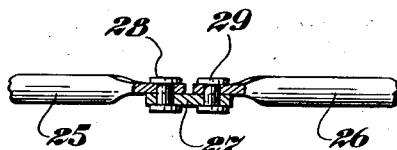


Fig. 5



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SURGICAL SNARE

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6 Claims. (Cl. 128—309)

My present invention relates generally to surgical instruments, and has particular reference to an improved snare.

Surgical snares are customarily provided in the form of a wire loop or noose formed on the forward end of an elongated body disposed within a snug tube. In removing growths or protrusions, the growth is first ensnared, and when the loop is thereupon drawn rearwardly into the tube, it gradually contracts, ultimately causing an avulsion of the ensnared body. During the rearward movement of the noose, and especially at the end of its withdrawal into the tube, the forward tip of the noose necessarily assumes a sharper and sharper curvature, until ultimately the elastic limit is passed. This results in permanently kinking the tip of the noose, rendering it incapable of further use. In fact, it is customary practice to employ snares of this character but once.

It often happens that the protrusion is not properly grasped, and that the improper engagement is not discovered until after the noose has been completely contracted and kinked. As a result, much time is wasted, not to mention the annoyance both to the operator and the patient because of the necessity to withdraw the instrument entirely from the body and furnish it with a new and unkinked noose with which another attempt may be made to properly ensnare the protrusion or growth.

It is an object of my present invention to provide an improved snare which obviates these disadvantages. More particularly, my invention aims to provide a noose which may be used not only once but a number of times; which is unsusceptible to the undesirable kinking above alluded to; and which is always in a condition for immediately reexpanding it after a contraction has been effected.

The characterizing feature of my present invention lies in the arrangement of a pair of arcuate wires of spring metal in a juxtaposed relation which causes them conjointly to form the noose in question, and in providing a means for articulating the ends of the wires so that kinking is prevented. By means of my present invention, a relative straightening out of the wires is capable of being accomplished without subjecting any portion of either wire to the extreme bending which results in permanently kinking and disabling it.

In brief, a snare constructed in accordance with my present invention consists of a tube which snugly but slidably accommodates an elongated

body, the body carrying at its forward end a pair of opposed, arcuate, resilient wires which are articulated at their forward ends, this assembly being coupled with a means for shifting the body longitudinally within the tube to permit the noose to be selectively and repeatedly (if necessary) exposed in open condition or withdrawn rearwardly into the tube in gradually contracting condition.

In a preferred construction, the composite noose of the present invention is formed by pivotally connecting the forward ends of the two juxtaposed spring wires. In a modification, the articulation at the forward ends of the wires is effected by means of a small link which is pivoted at its opposite ends to the forward ends of the wires, respectively.

My invention is useful in snares which rely solely upon mechanical avulsion, as well as in snares which resort either wholly or in part to the effect of electric current in removing growths.

I achieve the foregoing objects, and such other objects as may hereinafter appear or be pointed out, in the manner illustratively exemplified in the accompanying drawing, wherein—

Figure 1 is a perspective view of a snare of electrical character, embodying my invention;

Figure 2 is an enlarged view of the noose, showing it in fully expanded or open condition, and showing also the successive relative positions of the wires as the noose is contracted;

Figure 3 is an enlarged cross-sectional view taken substantially along the line 3—3 of Figure 2;

Figure 4 is a view similar to the left end of Figure 2, illustrating a modification; and

Figure 5 is an enlarged view taken substantially along the line 5—5 of Figure 4.

An elongated tube 10 is mounted upon the forward end of a rigid handle member 11 having a finger grip or loop 12 at its rear end. The tube 10 is preferably, though not necessarily, removably mounted within a sleeve 13, being held in this position by means of the nut 14.

Slidably mounted upon the handle member 11 is the complementary handle member 15 which is preferably provided with the double finger grip 16. The member 15 carries the electric terminal 17 and the removable and adjustable tightening nut 18.

Accommodated within the tube 10 is an elongated body 19, preferably of wire, and, if desired, composed of two entwined wires which discontinue their entwined relationship near the forward end of the body 19. The rear end of the

body 19 is adapted to be clamped into engagement underneath the nut 18, and the device is so constructed that the interior or conductive portion of the terminal 17 is thereby brought into electrical connection with the wire body 19.

The instrument is so constructed that the electrical connection is restricted to the body 19 and to the noose carried at its forward end, i. e., it is insulated from the tube 10. One way of accomplishing this is to construct the tube 10 of insulating material, with or without an inner metallic lining, and in forming the hand grip 16 and all parts associated therewith of insulating material.

In accordance with my invention, the body 19 carries at its forward end two opposed arcuate wires 20 and 21, composed of spring metal. These wires are arranged in opposed relationship, as shown most clearly in Figure 2, so that they form, conjointly, a noose. The wires are, during manufacture, given an initial "set" into substantially the curvature shown so that, although the resilience permits the wires to be straightened out, they always reassume the predetermined curvature illustrated in Figure 2, when they are permitted to do so.

My invention provides for an articulation of the forward ends of these wires, and a preferred construction involves a flattening of these ends, as shown at 22, and the engagement therewith of the pivot pin or rivet 23. The wires are extremely fine, and the articulation is made of a correspondingly small size so that, unless carefully scrutinized, the noose in expanded form is practically identical in appearance with the ordinary type of one-piece noose.

When the present snare is used, the noose is engaged over the protrusion, and the hand grip 16 is then moved rearwardly along the handle 11. This is customarily accomplished by inserting the thumb into the hole 12 and inserting the forefinger and the middle finger into the two holes of the grip 16. The rearward movement of the body 19 through the tube 10 causes the noose to approach and ultimately enter into the forward end of the tube 10, and this in turn causes the two wires 20 and 21 to be gradually adjusted or deformed into a relatively straight condition. This is indicated by the two sets of dotted lines in Figure 2, indicating, illustratively, certain successive positions of the noose during the withdrawal thereof into the tube. It will be observed that the noose is thus caused to contract both longitudinally and laterally, and this contraction is exactly what is desired in causing a tightening engagement and ultimate severance of the protrusion that is ensnared. It should be noted, however, that this gradual contraction of the noose does not involve any undue deformation of either of the wires, the articulation at the forward ends permitting the wires to adjust themselves without kinking at the tip of the noose. When the operation is completed, the wires 20 and 21 are almost entirely accommodated within the tube 10, the noose being thus capable of contraction to the maximum possible degree.

The outstanding advantage of the present construction lies in the fact that by shifting the hand grip 16 forwardly again, the noose is permitted to emerge from the forward end of the tube in full, reexpanded condition, ready for a repetition of the procedure. With the ordinary type of snare, this would be impossible, and a repetition of the operation would require a complete removal of the permanently deformed or kinked

noose and the replacement thereof by a fresh unlinked noose.

Although the invention may be used without any electrical auxiliaries, the illustrated snare is preferable, and the application of a suitable current to the terminal 17 permits the contraction of the noose to be accompanied by any desired type of electric treatment. A coagulating high-frequency current, for example, may be caused to pass through the noose during its contraction around a protrusion. In such an event, one terminal of a suitable source of high-frequency current is connected to the terminal member 17, and the other terminal of the current source is either grounded or is similarly brought into electrical connection with an indifferent portion of the body which is being treated.

In Figures 4 and 5 I have illustrated a modification in which the forward ends 24 of two opposed, arcuate, resilient wires 25 and 26 are articulated together by means of a separate link 27. This link is extremely small and may have its opposite ends pivoted, as at 28 and 29, to the forward ends of the wires, respectively. In withdrawing a noose of this character into a tube, the link 27 serves as a convenient means for limiting the amount by which the wires 25 and 26 may be withdrawn. In this form, as in the preferred embodiment, no permanent deformation of the wires takes place, the articulation permitting a relative adjustment which leaves the wires in their original springy condition and permits them immediately to reassume their normal expanded relationship when they are projected forwardly out of the tube.

It will be understood that a snare of the character illustrated may, if desired, be used with any other suitable or customary apparatus, such as an outer sheath, a telescope, an illuminating lamp, or the like; but such auxiliary parts do not enter into the present invention.

In general, it will be understood that changes in the details, herein described and illustrated for the purpose of explaining the nature of my invention, may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is, therefore, intended that these details be interpreted as illustrative, and not in a limiting sense.

Having thus described my invention, and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. In a surgical snare, an elongated body carrying at its forward end a pair of opposed arcuate wires of spring metal conjointly forming a noose, means articulating the forward ends of said wires, a tube snugly but slidably accommodating said body therein, and means for longitudinally adjusting said body within said tube so as to expose the noose in open condition or withdraw it rearwardly in gradually contracting condition.

2. In a surgical snare, an elongated body carrying at its forward end a pair of opposed arcuate wires of spring metal conjointly forming a noose, means articulating the forward ends of said wires, a tube snugly but slidably accommodating said body therein, an electric terminal at the rear of said tube, and means for establishing an electrical connection, insulated from the tube, between said noose and said terminal.

3. In a surgical snare, an elongated body carrying at its forward end a pair of opposed arc-

- uate wires of spring metal conjointly forming a noose, means articulating the forward ends of said wires, a tube snugly but slidably accommodating said body therein, an electric terminal at the rear of said tube, means for establishing an electrical connection, insulated from the tube, between said noose and said terminal, and means for shifting said body longitudinally within the tube without impairing said connection.
4. In a surgical snare, an elongated body carrying at its forward end a pair of opposed arcuate wires of spring metal conjointly forming a noose, and means pivotally connecting the forward ends of said wires to permit an articulated adjustment of the wires to take place when the noose is contracted.
5. In a surgical snare, an elongated body car-

rying at its forward end a pair of opposed arcuate wires of spring metal conjointly forming a noose, means pivotally connecting the forward ends of said wires, and a tube snugly but slidably accommodating said body therein, whereby a rearward movement of the body will cause said wires to straighten as they are withdrawn into the tube, thereby causing a gradual contraction of the noose in both length and breadth.

6. In a surgical snare, an elongated body carrying at its forward end a pair of opposed arcuate wires of spring metal conjointly forming a noose, and a link pivotally connected at its opposite ends to the forward ends of said wires, respectively.

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