

[54] COAGULATING INSTRUMENT

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[22] Filed: Oct. 15, 1969

[21] Appl. No.: 866,477

[30] Foreign Application Priority Data

Oct. 16, 1968 GermanyP 18 03 292.3

[52] U.S. Cl.128/303.17

[51] Int. Cl.A61b 17/36

[58] Field of Search128/303.1, 303.13, 303.14, 128/303.15, 303.17, 318

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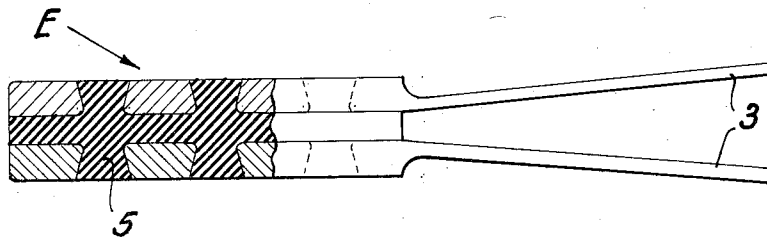
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[57] ABSTRACT

A forceps-type coagulating instrument provided with means for electrically connecting the relatively insulated blades of a forceps to a generator supplying a high-frequency voltage, for the purpose of coagulating a part held between the points of the blades of the forceps, wherein said connecting means are constituted by a push-on and pulloff connector.

8 Claims, 8 Drawing Figures



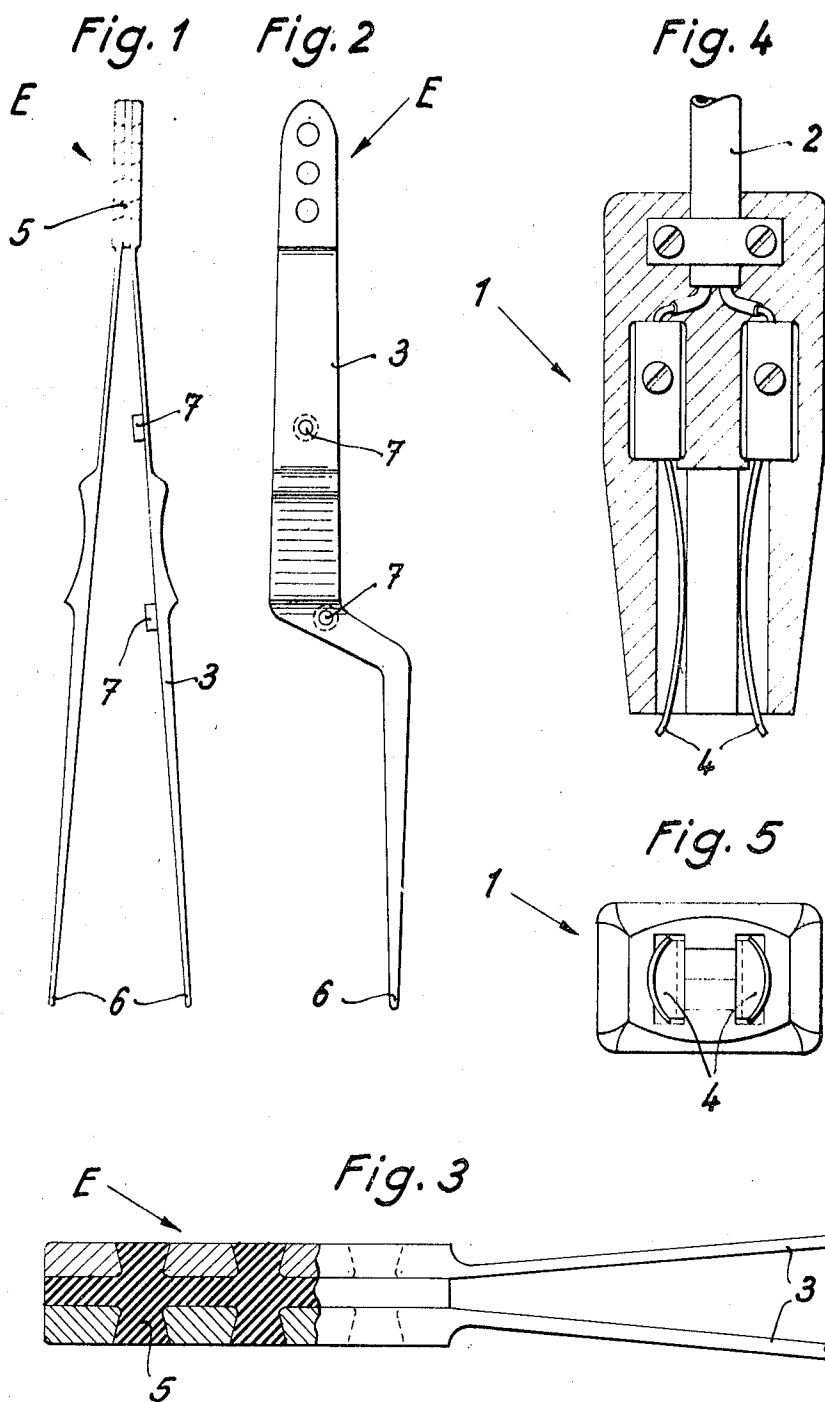


Fig. 6

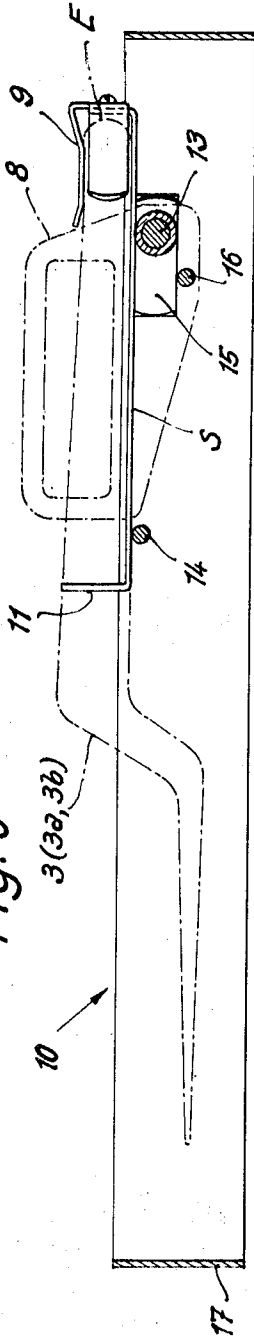


Fig. 7

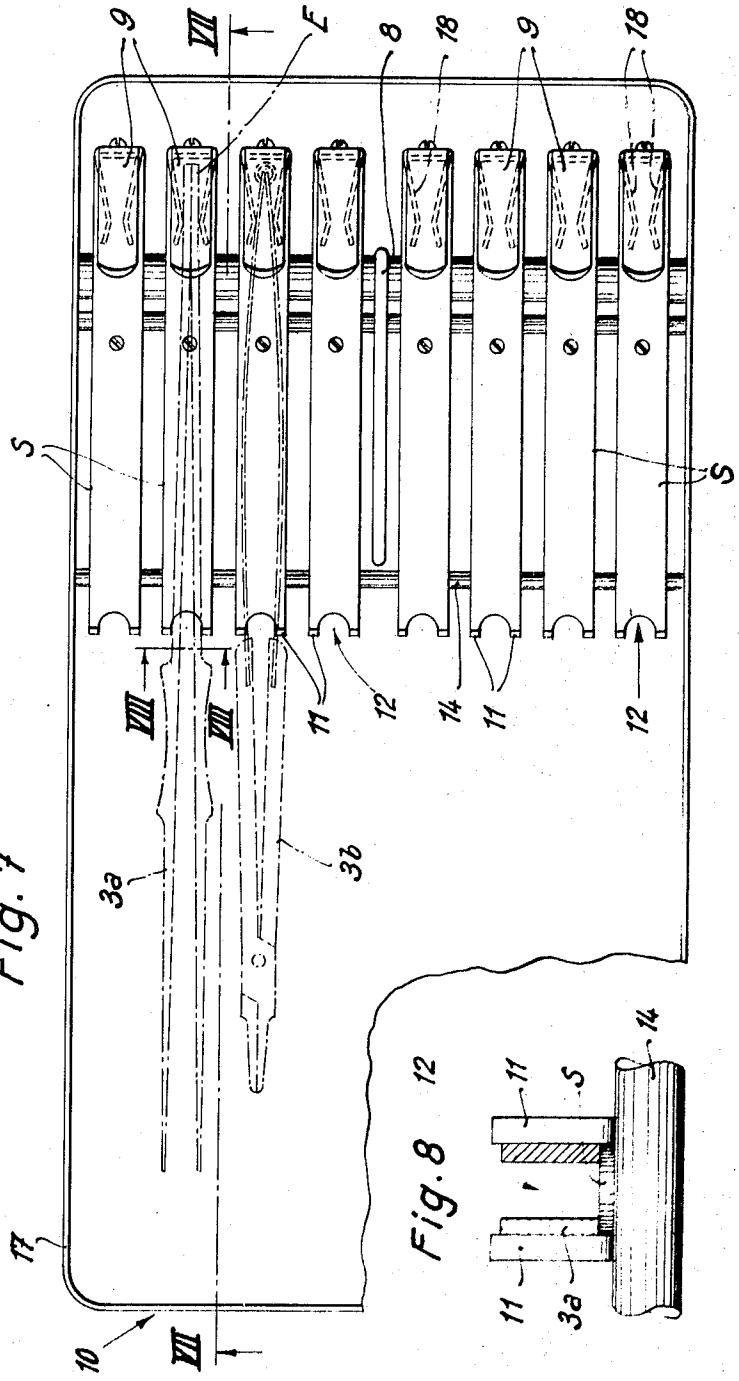
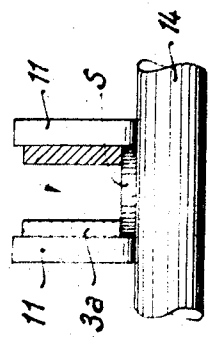


Fig. 8



COAGULATING INSTRUMENT

BACKGROUND OF THE INVENTION

This invention relates to coagulating instruments, and more specifically to a coagulating instrument of the forceps type comprising means for connecting the relatively insulated blades of a forceps to a generator supplying a high-frequency voltage for the purpose of coagulating a part held between the points of the blades of the forceps.

Such instruments are, as such, already known in the art. In such instruments the somewhat bulky construction of the connecting means of the forceps-type instrument to a generator is a nuisance. The instruments are rendered unwieldy, awkward to handle and when not in use they are difficult to store and to sterilize. Their relatively complicated arrangement also makes such instruments rather expensive.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a coagulating instrument of the forceps type, for instance for closing fine blood vessels, which is free from the above-mentioned defects.

Another object of the invention is to provide an instrument that can be conveniently and easily stored and sterilized.

Yet another object is to provide a satisfactory connection, that does not form a major obstruction, to a generator supplying a high-frequency voltage.

To attain these objects the present invention proposes a coagulating instrument of the forceps type in which the principal feature consists in that the high frequency is supplied to the coagulating forceps through a push-on and pulloff connector.

This feature permits the forceps to be very easily disconnected from its supply leads and sterilized. At the same time the design of the instrument can be of the greatest simplicity and convenience for handling.

In a particularly useful embodiment of this idea the electrical connection from the high-frequency generator to the coagulating forceps may be established by a push-on and pulloff connection of which the rear end of the forceps forms one part. The provision of special contact pins or like projections on the rear end of the instrument is thus rendered entirely unnecessary. In a preferred form of construction the rear end of the instrument may form that part of the connection which is insertable into a cooperating socket connector. This is very easy to arrange, and it can be applied to a forceps-type instrument substantially without modifying the instrument, the only requirement being the provision of an insulating insertion at the rear end of the instrument for relatively separating and insulating its two blades.

In a further development of the invention the instrument is adapted, when not in use, to be kept in a holder comprising a tiltable retaining socket resembling the electrical socket connector, for the reception and retention therein of the rear end of the instrument, said retaining socket being formed with an elongated supporting arm extending in the direction of the instrument adjacent its underside and provided at its free end with an upward offset containing a recess for the reception of the forceps blades when these are closed.

The provision of this holder facilitates keeping as well as sterilizing the instrument, which preferably consists of bright metal, without in any way interfering with or impairing the associated electrical equipment. Although such a holder may be used for keeping any forceps type of instrument it is particularly useful for use in conjunction with instruments comprising the proposed push-on and pulloff connector for the supply of high-frequency voltage from a generator, since such an instrument is directly adapted for insertion into the socket-shaped retaining member of such a holder. The extended supporting arm and its U-shaped recess permit instruments to be accommodated in such a way that they occupy minimum space. Furthermore, the proposed holder can be readily constructed to form part of a multiple holder for a plurality of instruments,

such as instruments of the forceps or pincer type having two blades or arms forced apart by interposed spring means.

By virtue of its simplicity the proposed instrument can be easily and reliably connected up to a high-frequency generator by means of the proposed connector and at the same time it is also adapted to be kept in a frame provided with retaining sockets resembling the socket of the proposed electrical connector, and the instruments can be readily sterilized while they are inside such a holder.

BRIEF DESCRIPTION OF THE DRAWINGS

In order that the details and important features of the invention may be more readily understood, an embodiment of a coagulating forceps according to the invention and of a holder will now be described by way of example and with reference to the accompanying drawings, in which:

FIG. 1 is a front elevational view of a coagulating forceps according to the invention;

FIG. 2 is a side elevation of the same instrument;

FIG. 3 is a part sectional view, on a larger scale, of the rear end of the instrument;

FIG. 4 is a longitudinal section of the socket for forming the electrical connection between the rear end of the instrument and a high-frequency generator;

FIG. 5 is an end-on view thereof;

FIG. 6 is a longitudinal section taken on the line VI—VI of FIG. 7;

FIG. 7 is a plan view of a multiple holder which may be kept for instance in a case or the like, and

FIG. 8 is a larger scale section taken on the line VIII—VIII of FIG. 7 of a supporting arm for forceps-type instruments, the drawing showing the blades of such an instrument in cross section.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A push-on and pulloff connector generally indicated by reference numeral 1 and connected by a cable 2 to a high-frequency generator not shown in the drawings is adapted to be attached to the end E of a forceps-type coagulating instrument 3.

In the illustrated embodiment the instrument 3 comprises two forceps blades, each formed with a pointed end 6 and with an offset to improve convenience of handling as well as vision when using the instrument 3.

With particular reference to FIG. 3 it will be understood that the rear end E of the instrument is smooth and lacks any kind of projection, although it forms a pair of terminals for high-frequency energy supplied through the connector 1. Advantageously the connector 1 has the form of a socket for the reception of the smooth end of the instrument 3. The contact elements inside the socket of the connector 1 are designed simultaneously to function as clamping springs 4 for tightly holding the connector 1 on the instrument 3.

For relatively insulating the blades of the forceps a plastics or like insulating insertion 5 is interposed between the rear ends of the blades which fit into the socket of the connector 1. Conically widening bosses on the insertion penetrate the ends of the blades at suitable points like rivets. The two blades are thus held together besides being relatively insulated.

The described instrument 3 primarily permits fine blood vessels to be closed by coagulation during surgical operations. The energy is supplied through the cable 2 and the connector 1 to the blades of the instruments 3. When the pointed ends 6 of the blades make contact by touching or through a body held between the two points the required heat for coagulation is generated. The form of the power required permits bright metal forceps to be used without any effect on the user.

On the inside of one of the blades of the bright metal instrument 3 two spacing members 7 of insulating material prevent the two blades from touching except at their extreme pointed ends 6. Possibly one such spacing member 7 may be sufficient. A major advantage afforded by the invention is that the con-

connector 1 permits a forceps-type instrument 3 to be connected to a high-frequency source without the need of special terminal pins or the like on the instrument 3. It is sufficient for one of the clamping spring contacts to make contact with each of the instrument blades at the rearward end E for the instrument 3 to be in functional order for use. This affords the further advantage that the instrument 3 can be very easily kept and also sterilized.

According to another feature of the invention the instrument 3 when not in use may be inserted into a holder 10 provided with a tiltable retaining socket 9 substantially similar in construction to the connector 1 for the reception of the rear end E of the instrument, the underside of the retaining socket 9 being respectively formed with a supporting arm S extending in the lengthwise direction of the instrument and at its free end provided with an upwardly bent portion 11 defining a U-shaped recess 12 for the reception and location of the closed blades of the forceps. This is more particularly shown in FIGs. 7 and 8. Preferably the retaining sockets 9 may be constructed in a manner resembling the connector 1, since according to the invention the instrument 3 is not required to have any projections or the like for establishing the necessary connections to the high-frequency generator. In the embodiment illustrated in FIG. 7 the holder 10 is specially adapted for the reception of a plurality of other forceps-type instruments having blades that are urged apart by spring force. Several coagulating forceps or similar instruments 3a and 3b can be kept in the holder 10. For instance a carrier 8 permits the entire holder 10 to be quite easily suspended inside a sterilizer or the like. The retaining sockets 9 together with their supporting arms S are mounted on a common shaft 13 which permits each socket and arm to be tilted into the vertical. The removal of an instrument from the holder 10 without interfering with the other instruments is thus very conveniently possible.

In position of rest the supporting arms S rest on a transverse rod 14 and the bearing mounts 15 of the retaining sockets 9 rest on a similar transverse rod 16. It will be seen that the holder 10 is fitted into a surrounding frame 17 of which only a fragment is shown in FIG. 7.

As already described, the plain end E of the instrument is insertable into one of the retaining sockets 9 which may conveniently contain clamping springs 18 in the form of leaf springs, resembling the clamping springs 4 inside the electrical connector 1, for gripping the end of the instrument. Preferably the leading ends of the springs facing the end of the instrument prior to its insertion may be bent outwards away from each other. This arrangement is simple and permits the end of an instrument 3, 3a or 3b to be easily inserted into the socket 9 for retention in the holder 10 after the retaining socket 9 has been pivotably raised with its mouth pointing upwards. Moreover, the U-shaped recesses 12 in the supporting arms permit the instruments to be accommodated in the holder within a minimum of space.

The proposed coagulating forceps are outstandingly suitable for closing fine blood vessels in a simple and easy way without the need of clips. Another advantage is that the proposed coagulating forceps can be stored in a space-saving way, besides being adapted to be connected to a high-frequency generator by the simplest of means.

Finally, it may be mentioned that the features and structural

details disclosed in the accompanying drawings may be used severally and in any combination within the scope of the present invention.

What is claimed is:

- 5 1. A coagulating instrument of the forceps type comprising, in combination, a pair of mating blades, of electrically conductive metal, having pointed forward ends to define a forceps; means, including a layer of dielectric material interposed between the facing inner surfaces of said blades at their rear ends, uniting said blades at their rear ends, whereby the rear ends of the blades constitute electrically isolated relatively elongated electrical contacts of a first electrical connector element; and a second electrical connector element engageable with said first element and having a pair of electrically isolated contacts each engageable with a respective one of said first-mentioned electrical contacts, said second electrical connector element being arranged for connection to a source of high-frequency electrical potential; one connector element forming a plug and the other a socket, and said connector elements being engaged and electrically interconnected by plugging one connector element into the other.
2. An instrument as set forth in claim 1, wherein the rear end of the instrument is insertable into a socket of said second connector.
- 25 3. An instrument as set forth in claim 2, wherein said socket of the connector contains spring contacts which serve to grip said rear end of the instrument and to retain it inside said socket.
4. An instrument as set forth in claim 3, wherein the rear ends of the two forceps blades are relatively insulated by an interposed layer of dielectric material formed with coned plug-shaped bosses which pass through apertures in the ends of the blades.
5. An instrument as set forth in claim 4, wherein the instrument is made of bright metal and the inside of one of said forceps blades is provided with a spacing projection of insulating material to prevent said two forceps blades from touching except at their pointed, free forward ends.
6. An instrument as set forth in claim 2, adapted, when not in use, to be retained in a holder including a tiltable retaining socket member corresponding to said second connector; said socket member having, on its underside, an elongated supporting arm extending in the direction of an instrument inserted into said socket member; said elongated supporting arm being formed, at its free end, with an upwardly bent projection defining a U-shaped recess for reception of said forceps blades of said instrument when in a closed position.
7. An instrument as set forth in claim 6, wherein said holder comprises a plurality of said socket members for simultaneously receiving a plurality of forceps-type instruments having blades resiliently biased apart.
8. An instrument as set forth in claim 6, wherein said socket member has instrument clamping springs in the form of leaf springs resembling contact springs of said second connector; the rear end of said instrument being free of external projections to permit insertion of the rear end of said instrument into said socket member; the leading ends of said leaf springs, facing in a direction opposite to the direction of insertion of an instrument into said socket member, having free end portions bent outwardly away from each other.

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