Title: COAGULATION TOOL

Abstract: A coagulation tool having an electrical connection and at least one electrode that is connected with the electrical connection wherein the electrode comprises: an electrode body which is applicable as a handle for the coagulation tool, an adapter which is firmly mounted with one end of the electrode body wherein one part of the adapter projects from the electrode body, an exchangeable top part which is attachable with the projecting part of the adapter, so that electrical current is transferable in series to the electrode body, the adapter and the top part and from the top part directly to a medium to be coagulated.
COAGULATION TOOL

FIELD OF THE INVENTION

The present invention relates to the technical field of a coagulation tool and in particular to a coagulation tool with an exchangeable top part. In particular the present invention relates to a bipolar coagulation forceps with detachable top parts and to top parts, which may be used for the coagulation tool, in particular bipolar coagulation forceps.

BACKGROUND OF THE INVENTION

A method that is often used in microsurgery and neurosurgery is electrocoagulation. With this method a coagulation of tissue or clotting of blood is achieved by means of electrical current at precisely defined locations. In general, during coagulation process colloidal medium is shifted from sol-state (solution state) to gel-state (flocculation state). An example for this is haemostasis during a surgery. For that purpose two electrodes are arranged at both sides of a blood vessel to be coagulated. When an electrical current is supplied through electrodes there is an interaction of electrical energy with medicated tissue. The result is a protein denaturation or scorching of tissue proteins, which is combined with a cell death and a contraction of the tissue. In case the electrodes are sufficiently small (active surface arranging from few mm² or less) precise working is allowed in an exactly defined area between the electrodes.

In Figure 1 the principle of a monopolar coagulation technique and in Figure 2 the principle of a bipolar coagulation technique are schematically illustrated. With monopolar technique, see Figure 1, an active electrode 1 is set onto a coagulation medium 3, e.g. tissue. A neutral electrode 2 arranged on the opposite side of medium 3 offers a much more great contact area to medium 3 in comparison with active electrode 1. This results in a high current density in transition area 5 between active electrode 1 and tissue 3 so that the medium is destroyed or cut or coagulated. In comparison with a cut by means of a scalpel this technique is advantageous since a germ conveyance is avoided and the medium is prevented from damage. A coagulation rate of a cutting area depends on a
shape of electrode and type of incision. In bipolar technique, see Figure 1, two poles (forceps) are used. A neutral electrode is not necessary. Contacting of a medium (tissue) to be coagulated results in a relatively high current density at forceps tips during current flow so that with sufficient high current flow a coagulation of tissue is achieved between both tips of the forceps.

Bipolar forceps according to prior art are made from stainless steel at working ends of the forceps, firmly attached at both branches of forceps. However, during coagulation phase often necrosis (burns) may come up. This means that during coagulation process too much tissue is destroyed and too much liquid may explosively escape from cells, wherein e.g. during haemostasis collagen is converted into glucose and glutin at temperatures above 80 degrees Celsius, resulting in a sticking of generated coagulate to the electrode. After relative short operating time sticking residuum of tissue collects at the tips of the electrodes wherein the residuum intensively effects a transition resistance between electrode and tissue making a successful coagulation much more difficult. Furthermore, charred residuum of tissue may very poorly be removed from ends of forceps. Consequently, such a coagulation tool has to be completely exchanged after a relative short operating time in order to achieve a sufficient success during coagulation procedure in practice. Further problems are damages of isolation coating in the region of tips of forceps, which on the one hand emerge from high temperatures during coagulation procedure. On the other hand necrosis residuum on the surface of forceps is often removed by means of small metal brushes or abrasive paper wherein damaging of the isolation coating is difficult to prevent. Therefore, bipolar forceps cleaned in this way are often damaged after a short operating time such that they have to be procured or repaired at high costs.

In order to achieve the high requirements in micro surgery and neurosurgery with respect to electrocoagulation there have been various attempts in past years in order to solve the above-mentioned problems. A first attempt has been an improvement of electric generator e.g. by variation of kind of current or amplitude characteristics. Therewith a generation of sticking tissue residuum may be decelerated. However, this results in a relative
complicated current generator which is cost intensive and does not belong to a naturally equipment of microsurgical or neurosurgical departments.

A further attempt to prevent overheating of tissue to be coagulated has been done by deriving a switch-off criterion for the electrical current from an increase of tissue resistance or from initiating an electrical spark between coagulation electrode and tissue. However, it has been discovered that increase of resistance that yields from sufficient dehydrated tissue represents a relatively unreliable criteria for switching off of current since the exact moment is often not precisely enough known and hardly reproducible. Using such a technique that is furthermore cost intensive often leads to the consequence that the current is switched off not until a burning has happened and a firmly bonded tissue residuum at the forceps tips has been produced.

A further attempt has been a continuous saline irrigation for tissue and forceps in order to cool coagulation area and to prevent sticking of tissue on forceps tips. However, the supply of liquid is not always desired due to surgical reasons, and in these cases necrosis may not always be prevented so that the forceps have to be exchanged completely or repaired with much effort.

Following these attempts partly an improvement of a coagulation success may be achieved. However, either highly developed and costly current generators or complex instruments for coagulation are required.

Thus, it is an object of the present invention to provide a coagulation tool having a long operating life, is cost-saving and applicable with little effort while a proper usability is achieved.

The object of the present invention is achieved by providing the embodiments characterized in the claims, and described further below.

SUMMARY OF THE INVENTION
The present invention is directed to a coagulation tool having an electrical connection and at least one electrode which is connected with the electrical connection wherein the electrode comprises:

- an electrode body which is applicable as a handle for the coagulation tool,
- an adapter which is firmly mounted with one end of the electrode body wherein one part of the adapter projects from the electrode body,
- an exchangeable top part which is attachable with the projecting part of the adapter, so that electrical current is transferable in series to the electrode body, the adapter and the top part and from the top part directly to a medium to be coagulated. This is advantageous since in case of a firmly bonded tissue residuum at the top part of the coagulation tool only the top part instead of the complete coagulation tool has to be exchanged. Instead of efforts to prevent firmly bonded tissue residuum it is assumed that such residuum may be hardly avoided wherein in case of existence of firmly bonded tissue residuum only a cheap and small top part has to be exchanged. Therewith the coagulation tool life is multiple increased.

According to a further advantageous embodiment of the invention the coagulation tool comprises a top part which comprises a first end provided for contacting with the medium to be coagulated and a second end provided for contacting the adapter. This is advantageous since the first end may comprise various shapes and geometries as appropriate according to each application wherein the second end may comprise a design irrespective of application so that only one type of adapter is necessary for various shapes of top parts.

According to a further advantageous embodiment of the invention the coagulation tool comprises a top part that is provided with a clamping device at its second end. This is advantageous since by means of a clamping device a clamping force on the adapter is achievable, so that a relatively low transition resistance between top part and adapter may be obtained. Therewith, a safe current conduction from adapter to top part is achievable. Furthermore, by means of a clamping device a simple exchange of a top part from adapter is allowed without complex mounting or adjustment.
According to a further advantageous embodiment of the invention the coagulation tool comprises a top part that is provided with a clamping device at its second end wherein the clamping device comprises clamping branches which are arcuated and arranged symmetrically to each other in longitudinal direction of the top part. Therewith, in case of a too weak clamping force simple cold forming of the clamping branches so that a low transition resistance between adapter and top part is achievable may effectively increase the pressing force of the clamping branches with the electrode.

According to a further advantageous embodiment of the invention the coagulation tool comprises an adapter that comprises a first end that is formed on one side essentially convex and on the corresponding opposite side essentially concave. This is advantageous since therewith an antitwist protected positioning of the top part is achievable.

According to a further advantageous embodiment of the invention the coagulation tool comprises a top part that is provided with an electrically insulating coating material at its second end. This is advantageous since therewith only the first end of the top part is available for current conduction to the medium to be coagulated and therewith a relatively small exactly defined location of coagulation and a precise working is achievable.

According to a further advantageous embodiment of the invention the coagulation tool comprises a coating material which projects from the second end of the top part such that with a top part attached on the adapter electrically conductive areas of the adapter are covered. This is advantageous since coagulation in areas outside of forceps tips, e.g. coagulation by touching the adapter, is effectively prevented.

According to a further advantageous embodiment of the invention the coagulation tool comprises an electrode body that is provided with an electrically insulating coating material. This is advantageous since the complete tool except the electrical connection for current supply and not insulated areas of the top part is electrically insulated and an undesired coagulation in areas beside forceps tips providing contacting with a medium to be coagulated is prevented.
According to a further advantageous embodiment of the invention the coagulation tool comprises an electrode body, which is provided with at least one recess in longitudinal direction of the electrode body. This is advantageous since on the one hand saving of material and weight and on the other hand a simplified grip of the coagulation tool is allowed. When the recess is provided with a sufficient length effective lever arm of the tool may be altered during gripping whereby precision in gripping is influenced.

According to a further advantageous embodiment of the invention a suction-and-flush channel is mountable at the coagulation tool. This is advantageous since cooling of coagulation field is allowed and therefore life of forceps tops is extendable.

According to a further advantageous embodiment of the invention the suction-and-flush channel mountable to the coagulation tool is exchangeable. This is advantageous since cleaning of the suction-and-flush channel separate from coagulation tool is achievable and higher safety against germ conveyance is obtained.

According to a further advantageous embodiment of the invention the coagulation tool is a coagulation forceps with two electrodes which each comprise an exchangeable top part. This is advantageous since the monopolar technique and the bipolar technique may be applied.

The present invention also relates to the top parts defined above. As has already been explained the top parts are preferably provided with insulation for protection against the adapter. This insulation is used for protecting the insulation of the electrode body of coagulation tool at its electrode end and the adapter and to assure a long durability of the electrode body.

In total the exchangeable and detachable top part allows further cost savings since with an electrode body and an adapter different top parts are usable according to application and personal preference and the top parts may be exchanged during operation. Therefore, less coagulation tool basic units (electrode body plus adapter) have to be acquired. The basic unit of coagulation tool for exchangeable top parts may be provided either with non-
insulated or insulated electrode bodies, in case of bipolar coagulation forceps with non-insulated or insulated forceps branches. In general, each coagulation tool basic unit may be provided with an appropriate exchangeable top part according to respective application so that a specific coagulation tool is available.

Furthermore, the present invention relates to a coagulation tool basic unit of a coagulation tool as described above wherein the coagulation tool basic unit comprises an electrode body and an adapter as described above and is adapted to carry a top part according to the invention as described above. Preferably this coagulation tool basic unit is provided with a top part according to the invention as described above and may be used in this combination for first assembly of a coagulation tool according to the invention. Consequently, the coagulation tool according to the invention may be delivered for its first use in total including mounted top part or in component parts separated in coagulation tool basic unit and top part.

The coagulation tool basic unit of the coagulation tool according to the invention may be available in any shape and formed of metallic material or plastics that are used for medical purposes and may be used in any dimensions in length, width and diameter together with the exchangeable top parts.

As described above especially the exchangeable and detachable top parts of the coagulation tool according to the invention allow a cost-effective solution with respect to usage of only one basic unit for the coagulation tool and the eventual single use of the detachable and exchangeable top parts. These top parts may be stored and preferably sterilized in large scale in e.g. containers. Accordingly, the present invention relates further to containers comprising at least one top part according to the invention for usage in connection with the usage of one coagulation tool according to the invention as described above.

According to a further advantageous embodiment of the invention the container comprises at least one retaining element in order to keep the at least one top part in place and antitwist protected. This is advantageous since the top part may be well sterilized in
defined position. The retaining elements are formed such that the top part is safely retained during sterilization even at high temperatures.

According to a further advantageous embodiment of the invention the container is insertable in an inserting aid device such that the at least one top part arranged in the container is mountable with a supplied coagulation tool basic unit by means of the inserting aid device. This is advantageous since mounting of coagulation tool basic unit with a top part that has only a length of only e.g. 1 cm and is therefore not easy to handle and to mount precisely is facilitated.

Furthermore, the inserting aid device may be shaped in a way that a possibly sharp-edged first end of the top part is arranged from borders of the inserting aid device such that there is no danger for operator’s fingers during handling.

According to a further advantageous embodiment of the invention the container comprises a recess that is adapted to be engaged with a projection of the inserting aid device such that the container is mountable in the inserting aid device antitwist protected. This is advantageous since during insertion of the coagulation tool basic unit into the inserting aid device a safe mounting of the coagulation tool basic unit with respective top parts is achievable. A danger of a jamming between adapter and respective top is no longer given.

According to a further advantageous embodiment of the invention the container comprises at least one connecting element that is adapted to connect the container with an additional container. This is advantageous since by means of the connecting element a set of containers may be built up with a designed choice of tops which comprise possibly different shapes and geometries and the set of containers is then adapted to be easy transported and handled.

According to a further advantageous embodiment of the invention the container may be sterilized for biological medical applications and is chemically inert. This is advantageous since only materials are used which satisfy maximum specifications with respect to cleanliness e.g. in an operating room.
Furthermore, the present invention relates to an inserting aid device for the coagulation tool wherein the container is insertable into the inserting aid device. This is advantageous since by means of the inserting aid device an easy attaching of the top parts accommodated in the container is executable by means of the coagulation tool basic unit.

According to a further advantageous embodiment of the invention the inserting aid device is adapted to be sterilized for biological-medical applications and is chemically inert. For this purpose e.g. the material PEEK may be used which is in addition mechanically abrasion resistant and satisfies maximum specifications with respect to cleanliness in e.g. operating rooms.

Furthermore, the present invention relates to a system or surgical instruments which comprise a coagulation tool according to the invention, a top part according to the invention and/or a coagulation tool basic unit according to the invention as described above, and/or a container as described above and/or an inserting aid device as described above and/or common devices and instruments such as electrical power supply, monitoring devices and/or connecting cables.

Brief Description of the Drawings

The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

Figure 1 is a schematic diagram of mode of operation of monopolar technique;

Figure 2 is a schematic diagram of mode of operation of bipolar technique;

Figure 3 is a schematic diagram of an embodiment of the electrode body with adapter and top part according to the invention;
Figure 4A is a detail of a first end of the adapter according to the present invention;

Figures 4B to 4D are side views of various embodiments of a top part according to the present invention;

Figures 4E to 4G are top views of various embodiments of a top part according to the present invention;

Figure 4H is a schematic diagram of a front view of an embodiment of the top part according to the present invention;

Figure 4I a schematic diagram of a front view of a further embodiment of the top part according to the present invention in a non-attached state and in a state attached with an adapter according to the present invention;

Figure 5 are a top view, front view and perspective view of an embodiment of the adapter according to the present invention;

Figure 6 are a top view, front view, side view and perspective view of an embodiment of a top part according to the present invention;

Figure 7 is a perspective view of an embodiment of a container according to the present invention;

Figure 8 is a perspective view of an embodiment of an inserting aid device for a container according to the present invention;

Figure 9 is an embodiment of a bipolar coagulation forceps according to the present invention;

Figure 10 is a further embodiment of a bipolar coagulation forceps according to the present invention.
DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Hereinafter, preferred embodiments of the present invention will be described with reference to the accompanying drawings. In the following description and drawings the same reference numerals are used to designate the same components and so a repetition of the description of the same components will be omitted.

In Figure 2 a bipolar coagulation forceps 6 is illustrated wherein their both branches operate as electrodes. Electrical current is conducted from a current generator 8 via an electrical connection 7 in one of the branches of the forceps and from this to tissue 3 to be coagulated. The current flows through the tissue 3 to the other distal end of the other branch of the forceps back to the current generator. The zone of the electrode where is the contact area of the distal end of the electrode to a tissue 3 is called working part. This working part is thermally particularly charged during current passage. Charred tissue residuum on the basis of disadvantageous variables during current conduction usually stick or bond very well on the working part surface and operate as an insulator.

According to the present invention the working part is formed as an exchangeable top part, see Figure 3. In Figure 3 an electrode body 1 is illustrated wherein an adapter 92 is firmly attached e.g. by interference fit with the electrode body. The electrode body 1 constitutes with the adapter 92 a coagulation tool basic unit. In the embodiment illustrated in Figure 3, on the first end 921 of adapter 92 a top part 9 is attached such that the first end 921 of the adapter 92 is brought in contact with the second end of the top part 9. Preferably the contact is achieved by clamping. The second end of the top part is provided with an electrically insulating coating material 10, which preferably projects over the second end of the top part to such an extent that an electrically conductive area of the adapter is covered if the top part is attached on the adapter 92. It is advantageous that the insulation fits so tightly at the adapter and electrode body and its insulating coating 11, respectively, that an external liquid cannot enter any more at position A, see Figure 3. Therewith a leakage current may be prevented. The first end 91 of top part 9 may be provided with various shapes and geometries, see Figure 4. In Figures 4B to 4G each an embodiment of
a top part is illustrated. In Figure 4B an embodiment of a top part 9 is illustrated, wherein the first end 91 of top 9 is strip like formed and its second end 93 is provided with a clamping device. The clamping device is formed that it may be attached on the adapter 92 by means of a transition fit or an interference fit. The force for removing the top part from the adapter ranges preferably from 5 to 10 N.

In Figure 4E an embodiment of a strip like end 91 of top 9 is illustrated in top view. Such a strip like small end of a top part may be used for haemostasis and adhesiolysis. According to application the respective ends of a top part may be formed differently. In Figure 4C the one end of the top part is provided with a geometry of a L-shaped hook while the top part illustrated in Figure 4D is provided with an end of a round shaped hook. A strip shaped end may also be provided with a recess, see Figure 4F. Such an embodiment is appropriate for a coagulation of uterine tube and a coagulation of appendix. A further embodiment of the top part is illustrated in Figure 4G, wherein the top part is comprised of a fork shaped end.

In another embodiment the clamping device of the second end 93 of adapter 9 may be formed circular shaped, see Figure 4H, wherein in this embodiment the respective adapter 92 is preferably a pin. Due to small work tolerances between adapter 92 and end 93 of top part 9 a safe clamping effect may not always reliably be assured. Therefore, according to another embodiment of the invention the clamping device is provided with two clamping branches, see Figure 4I. If the work tolerances are exceeded the branches may be deformed in cold state by means of a tool such as pliers so that sufficient high clamping forces are achievable allowing a low transition resistance between adapter 92 and second end 93.

If the second end of the top part is provided with a clamping device having clamping branches, see Figure 4I, the adapter is preferably designed that its first end on one side is formed essentially convex and on the other opposite side essentially concave. Therewith touching points P1, P2, P3 are constituted between a second end of the top part and a first end of the adapter wherein at each touching point a clamping force operates. By means of the convex/concave design of the adapter in combination with the clamping branches it is
reached that the top part may only be attached to the adapter in one position and furthermore the top part is mounted antitwist protected.

If the second end 93 of adapter 9 is provided with an electrical insulation 10, the resting free space between the insulation and the adapter or top part may be filled by means of a sealing compound 12. Therewith it is achieved that only the electrically non-insulated, free first end 91 of the top 9 is available for transition of current into tissue during an operation of the coagulation tool. For this reason a coagulation happens only in the zone of end 91 of top 9.

A detailed illustration of an embodiment of the adapter is shown in Figure 5. The distal end 921 of adapter 92, see Figure 3, is preferably oriented slightly conical in direction to the mean part of adapter 92, having the result that the distal end of top part 9 to be attached, see Figure 4I, is attachable with a proper clamping effect. In Figure 6 an embodiment of the respective top part 9 as described above is illustrated.

In Figure 7 an embodiment of a container 20 with a top part 9 contained therein by means of retaining elements 21 is illustrated. The container 20 can store two top parts 9, wherein only one top part 9 is illustrated in the left part of the container. In this embodiment the retaining elements 21 are snap elements, formed e.g. as a hook. In order to properly retain a top part preferably multiple retaining elements are provided for one top part. In collaboration with retaining walls 22 only one position in the container for each top part 9 is possible. The container 20 comprises numerous openings 23 that are provided for good passing of vapour for sterilization through the container 20 so that a good sterilization effect of top part 9 is achievable.

By means of an insertion aid device 26, see Figure 8, the distal end 921 of each adapter 92 may be connected easily, quickly and safe with the respective top parts 9 retained in the container 20. For this reason the container 20 consists of two recesses 24 in which each a respective projection 27 of the insertion aid device 26 may be engaged so that the container 20 is mounted antitwist protected in the insertion aid device 26. By means of a
connecting element 25 one container may be connected with a further container so that a set of containers is constituted.

In Figure 9 a first embodiment of a bipolar coagulation forceps 6 according to the invention is illustrated wherein at each forceps branch one top part 9 is attached. The forceps branches are provided with an insulating coating 11 and the second end 93 of each top part is provided with an insulating coating 10.

In Figure 10 a further embodiment of a coagulation tool as a bipolar coagulation forceps according to the invention is illustrated (top parts not attached), wherein the handle of forceps is provided with recesses 28 in order to allow a better gripping.

The coagulation tool in the two-pole type may be formed instead of a forceps as nippers, if appropriate.

Due to small dimensions of top part 9 according to the embodiments described above and the design as a sheet metal such a part is relatively cost-effective. Therefore, top part 9 may be used as "one-way top part " so that an unused and new top part may be applied for each operation without significant increase of the costs of the total coagulation tool.

Although a preferred embodiment on the present invention has been described for illustrative purposes those skilled in the art will appreciate that various modifications, additions and substitutions are possible without departing from the scope and spirit of the invention as disclosed in the accompanying claims.
REFERENCE LIST FOR FIGURES 1 TO 10

1  active electrode (electrode body)
2  neutral electrode
3  coagulation medium (tissue)
4  electrical field
5  transition area active electrode to coagulation medium
6  bipolar coagulation forceps
7  electrical connection
8  current generator
9  top part
91  first end of top part 9
92  adapter
921  first end of adapter
93  second end of top part 9
10  electrical insulating coating of top part
11  electrical insulating coating of electrode body
12  sealing compound
20  container
21  retaining element
22  retaining wall
23  opening
24  recess
25  connecting element
26  insertion aid device
27  projection
28  recess
What is claimed is:

1. A coagulation tool having an electrical connection and at least one electrode that is connected with the electrical connection wherein the electrode comprises:
   - an electrode body which is applicable as a handle for the coagulation tool,
   - an adapter which is firmly mounted with one end of the electrode body wherein one part of the adapter projects from the electrode body,
   - an exchangeable top part which is attachable with the projecting part of the adapter, so that electrical current is transferable in series to the electrode body, the adapter and the top part and from the top part directly to a medium to be coagulated.

2. Coagulation tool according to claim 1 wherein the coagulation tool comprises a top part which comprises a first end provided for contacting with the medium to be coagulated and a second end provided for contacting the adapter.

3. Coagulation tool according to claim 2 wherein the top part is provided with a clamping device at its second end.

4. Coagulation tool according to claim 3 wherein the clamping device comprises clamping branches which are arcuated and arranged symmetrically to each other in longitudinal direction of the top part.

5. Coagulation tool according to any one of claims 1 to 4 wherein the adapter comprises a first end which is formed on one side essentially convex and on the corresponding opposite side essentially concave.

6. Coagulation tool according to any one of claims 4 or 5 wherein the top part is provided with an electrically insulating coating material at its second end.

7. Coagulation tool according to claim 6 wherein the coating material projects from the second end of the top part such that with a top part attached on the adapter electrically conductive areas of the adapter are covered.
8. Coagulation tool according to any one of claims 1 to 7 wherein the electrode body is provided with an electrically insulating coating material.

5

9. Coagulation tool according to any one of claims 1 to 8 wherein the electrode body is provided with at least one recess in longitudinal direction of the electrode body.

10. Coagulation tool according to any one of claims 1 to 9 wherein a suction-and-flush channel is mountable at the coagulation tool.

11. Coagulation tool according to claim 10 wherein the suction-and-flush channel is exchangeable.

12. Coagulation tool according to any one of claims 1 to 11 wherein the coagulation tool is a coagulation forceps with two electrodes which each comprises an exchangeable top part.

13. Top parts for a coagulation tool according to any one of claims 1 to 12.

20

14. Coagulation tool basic unit which comprises an electrode body and an adapter according to any one of the claims 1 or 5 and is adapted to carry a top part according to claim 13.

15. Container for at least one top part according to claim 13.

25

16. Container according to claim 15 wherein the container comprises at least one retaining element in order to keep the at least one top part in place and antitwist protected.

17. Container according to claims 15 or 16 wherein the container is insertable in an inserting aid device such that the at least one top part arranged in the container is mountable with a supplied coagulation tool basic unit by means of the inserting aid device.
18. Container according to any one of claims 15 to 17 wherein the container comprises a recess that is adapted to be engaged with a projection of the inserting aid device such that the container is mountable in the inserting aid device antitwist protected.

19. Container according to any one of claims 15 to 18 wherein the container comprises at least one connecting element that is adapted to connect the container with an additional container.

20. Container according to any one of claims 15 to 19 wherein the container may be sterilized for biological-medical applications and is chemically inert.

21. Inserting aid device for the coagulation tool according to any one of claims 1 to 12 wherein the container according to any one of claims 15 to 20 is insertable into the inserting aid device.

22. Inserting aid device according to claim 21 wherein the inserting aid device is adapted to be sterilized for biological-medical applications and is chemically inert.

23. System comprising a coagulation tool according to any one of claims 1 to 12, a top part according to claim 13 and/or a coagulation tool basic unit according to claim 14 and/or a container according to any one of claims 15 to 20 and/or inserting aid device according to claim 21 or 22 and/or electrical power supply, monitoring devices and/or connecting cables.
Fig. 5A

Maß abstimmbar um Abzugskraft der Pizzetenspitze 5-10N zu erhalten!

Fig. 5B

0.3 x 45°

Fig. 5C

Teil graffrei!

SUBSTITUTE SHEET (RULE 26)
Maße abstimmbare mit Elektrode um Abzugskraft 5-10N zu erhalten!

Spitzenform kann sich ändern!

Nicht bemäßte Radien R=0.3mm Teil gratfrei!