

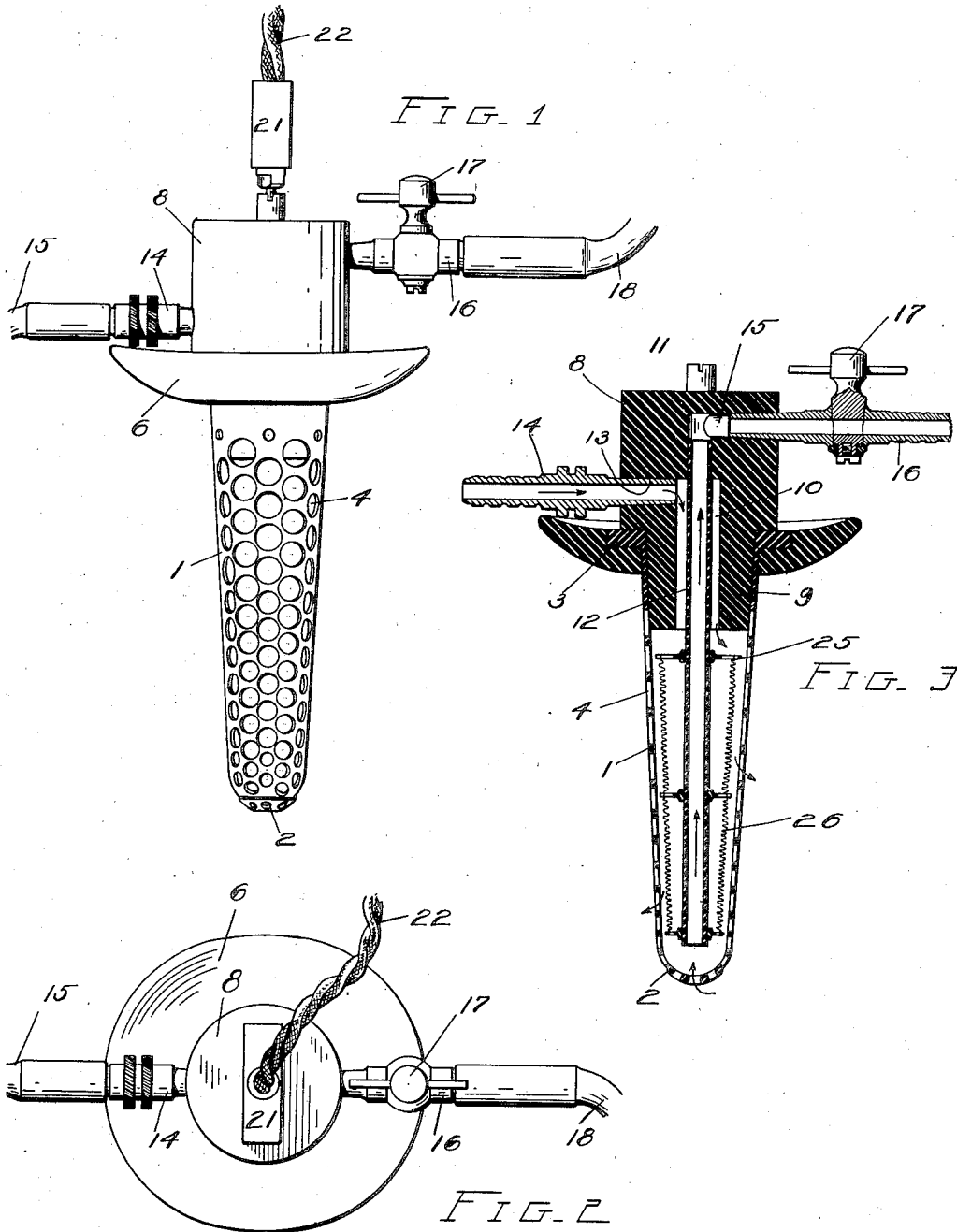
J. BANDIERI.
SURGICAL INSTRUMENT.

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1,075,002.



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To all whom it may concern:

Be it known that I, JOSEPH BANDIERI, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Improvement in Surgical Instruments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to surgical instruments and especially to that type of surgical instrument known as a syringe, and has for its particular object the provision of a device of this character suited for either rectal or vaginal use and adapted to thoroughly cleanse and efficiently disinfect that part of the body with which it is used, whereby any germs, bacteria, or other living organisms will be killed and destroyed, and any fetid or decomposing matter will be rendered innocuous. This result is attained by imparting to the fluid with which the parts are washed a sterilizing quality, and the object of this invention is to produce a device whereby this quality is imparted by the operation of the instrument itself and without the use of noxious and dangerous chemicals or drugs.

More limitedly, the object of the invention is the provision of a device of this character wherein the liquid employed is electrolyzed at the very point of use and thus broken up into substances which have a well known sterilizing effect and without any injurious action upon the tissues of the human body itself.

Other objects of the invention concern the construction and arrangement of parts whereby a simple, reliable, efficient, and cleanly device is produced, and one in which the danger of shocking or burning the patient is entirely avoided.

Generally speaking my invention may be defined as consisting of the combination of elements recited in the claims hereto annexed and illustrated in the drawings accompanying and forming a part hereof, wherein—

Figure 1 represents a side elevational view of the complete device; Fig. 2, a top plan view of the same; Fig. 3, a central longitudinal cross sectional view parallel to the plane of the paper; Fig. 4, a view similar to Fig. 3 taken at right angles thereto; Fig. 5, a transverse cross sectional view taken along the broken line 5—5 of Fig. 4 and looking

in the direction of the arrows; Fig. 6 is a diagrammatic view illustrating the preferred method of supporting the electrode wires so as to avoid short-circuiting while keeping them at substantially equal distances from each other; and Fig. 7 is a central cross sectional view through a modified form of casing, the electric features being omitted so as to provide for the free washing of the parts to be treated.

Describing the parts by reference characters, my device comprises a hard rubber cannula 1 of frusto-conical form, having the smaller end rounded as at 2 and having the larger end formed with a laterally projecting threaded flange 3. The sides and end of this cannula are formed with perforations 4 the size whereof preferably decreases from the base to the apex thereof as illustrated in Fig. 1. Secured to the larger end of the cannula, as by means of screw-threads 5, meshing with those on the flange 3, is a hard rubber convex disk 6, which is preferably oval in outline as illustrated in Fig. 2. The side of this disk opposite to the cannula one may if desired be made slightly concave as illustrated at 7. At the base of said cannula is a hard rubber block 8 preferably cylindrical in general outline and having a forwardly extending axial plug 9 adapted to enter the open larger end of the cannula and be retained therein by friction. This plug is pierced by an axial recess 10 which merges with a smaller axial recess 11, and in this latter recess is secured in any convenient manner a tube 12, preferably also of rubber and projecting substantially to the smaller end of the cannula as shown in Figs. 3 and 4. The recess 10 communicates at its inner end with a laterally opening recess 13 in which is secured a nipple 14 adapted for the reception of a flexible pipe 15 through which suitable liquid may be conveyed to the device. The recess 11 also communicates with a laterally opening recess 15, preferably opposite the recess 13, and in this latter recess is secured a nipple 16 which is preferably provided with a stop cock 17. To this nipple a flexible conduit 18 is to be attached by means of which the used liquid is discharged. Secured to the end of the block 8 are a pair of binding screws or connectors 20 adapted for the reception of a suitable connection 21 of any well known or convenient form, secured to the end of a lamp cord 22 or to any other suitable source of

electrical supply. Suitable lead wires 23 lead inwardly from these binding posts or connectors through the block 8 and plug 9, where they are connected to suitable metallic electrodes, the preferred construction and arrangement of which will now be described.

Secured upon the tube 12 beyond the plug 9 are a plurality of spaced perforated non-conducting disks 25, which may conveniently be made from hard rubber, and supported in suitable apertures or notches formed in these disks are platinum wires 26 which comprise the electrodes. Referring particularly to Fig. 6 wherein the preferred arrangement of wires is shown, it will be seen that the wire from the positive terminal is first led downwardly past the edges of the disk 25, as at 26^a, until the lowermost disk is reached, thence across this disk at one side of its center to the opposite edge thereof, which it cuts preferably at a point 120 degrees from the first intersection, thence upwardly past the edges of the disks to the uppermost disk to a point 120 degrees removed from the starting point, thence across said disk to a point 120 degrees removed from the opposite side of said starting point, and lastly downwardly past the edges of the disks to an intersection with the lower disk at a point 120 degrees removed from both the former intersections. The other electrode is preferably led downwardly from the negative terminal at 26^b past the edges of the disks at a point opposite the first portion of the positive electrode, thence across the lower disk as in the first case, but keeping everywhere parallel to the positive electrode, thence upwardly by the edges of the disks across the upper disk, still parallel to the first electrode, thence downwardly and ending at the smallest disk as before. This arrangement permits the use of a large quantity of wire, with the smallest possible danger of the same being short-circuited, and with a substantially uniform resistance between all parts of the electrodes from the fact that they are everywhere substantially equidistant. The wire of which these electrodes are formed is preferably bent into a sinuous or serrate form as illustrated in Figs. 3 and 4, so as to increase its length and consequently augment the area of the electrode. A greater number of turns of the electrodes can also be employed if desired by making the intersections thereof with the disks nearer each other while maintaining the same general arrangement.

In Fig. 7 I have illustrated a modified base block 8^a, wherein the electrical features are entirely omitted, the central tube 12^a being led directly through the base of this block as illustrated at 30, and there formed for the reception of a flexible tube. The inlet nipple 14^a is secured in the side of the base block as before. This base block is prefer-

ably made of metal and secured in the cannula in the same manner, being employed when there is no need for making use of the electrical features of the device, as in the preliminary washing of the parts.

In operation the parts illustrated in Fig. 7 are first employed to wash the portions of the body to be treated with water or other cleansing fluid. The block 8^a is then replaced by the block 8, the liquid again supplied to the parts, and the electrical current turned on. The effect of the latter will be to electrolyze the liquid so as to break it up into its elements, which have a well known therapeutic and sterilizing action, the products of such decomposition being carried forward by the flow of incoming fluid into intimate contact with the portions being treated. Under ordinary conditions water may be employed with good results, the natural impurities in the water, taken with the substances dissolved thereby during its use, serving to impart sufficient conductivity for the practical operation of the device. The products of the decomposition in this case will be hydrogen and oxygen, both of which are in a nascent state and hence possess unusual activity, together with a small quantity of ozone whose beneficial nature is well understood. In case greater efficacy be desired a slightly saline solution may be used which will be broken up by the electric current into chlorin and caustic soda, both of which will be dissolved in the liquid and carried onward to the portions treated, and, though in extremely dilute solution, will exert marked beneficial properties. If desired a considerable quantity of liquid can be introduced through the device at one time, and retained therein by the disk 6, the stop cock 17 being closed. The current being turned on the strength of the solution can be increased to any desired extent by the accumulation of the products of dissociation; or the rate of flow can be regulated so that the incoming fluid will sweep slowly past the electrodes, bearing with it the cleansing and sterilizing agents. It will also be seen that the disks 25 serve as baffle plates or deflectors to divert the inflowing liquid outwardly through the perforations in the cannula and into contact with the parts undergoing treatment. This, taken in connection with the location of the electrodes closely adjacent to the cannula wall, causes the products of decomposition of the liquid to be projected upon the treated surfaces while still in nascent condition, whereby their efficiency and potency are greatly increased. The spent liquid returns to the outflow tube 12 by again entering the end of the cannula, the direction of flow at every point being well illustrated by the arrows in Fig. 3. Thus the disks 25, in addition to supporting the electrodes, also serve to im-

pede the direct passage of electrolyzed liquid from the annular chamber between the tube and cannula wall to the interior of said tube, and thus fail to come into contact with the afflicted parts. Even if the disks should be omitted and some other form of electrode support employed the converging character of the cannula walls would still serve to induce some outflow of the liquid, although, of course, in less degree.

It will therefore be seen that I have produced a device capable of cleansing and sterilizing with great thoroughness the parts of the body with which it is used. It will also be appreciated that while I have necessarily described my invention in detail, these details may be departed from considerably without impairing the efficacy of the device or avoiding the scope of the claims hereto annexed.

Having thus described my invention, what I claim is:

1. In a device of the character described, the combination, with an annular cannula having a perforated outer wall, of a central tube in said cannula and forming with said outer wall an annular space, a liquid supply connection communicating with said annular space, electrodes mounted within said annular space in the path of the liquid discharged therethrough, means for supplying electric energy to said electrodes, and means for withdrawing through said central tube at a point beyond said electrodes the liquid so supplied through said annular space.

2. In a device of the character described, the combination, with an elongated hollow body having perforated walls, of a tube extending through said body from a point within and adjacent to one end to a point without the other end thereof, and forming with the wall of said body an annular space, the end of said tube being open at the point where it terminates within said hollow body, and the passageway between said annular space and the open end of said tube being obstructed, electrodes supported within said annular space, means for admitting liquid to said annular space at the point removed from the open end of said tube, and means for permitting or preventing the escape of liquid through said tube.

3. In a device of the character described, the combination, with an elongated hollow body having a perforate wall, of a tube extending through said body from a point adjacent to and within one end of said body to a point without the other end thereof, the first end of said tube being open and the walls of the tube imperforate, and said tube forming with said hollow body an annular space or chamber, means for supplying liquid to said annular space at a point removed from the open end of said tube, obstructing means in said annular space between said

liquid inlet means and the open end of said tube and adapted to divert outwardly through the perforations of the cannula wall the entering liquid, electrodes within said annular space in the path of the liquid current, and means for supplying electric energy to said electrodes.

4. In a device of the character described, the combination, with an elongated perforated body having one end substantially closed, of a laterally extending disk secured about the open end of said body, a block removably secured to the larger end of said body, an axial tube projecting from said block to a point adjacent the closed end of said body, means for supplying liquid through said block to the annular space between said body and said tube, electrodes carried by said tube in the path of said incoming liquid, connections carried by said block for conveying electric current to said electrodes, and means for withdrawing said liquid from the outer end of said tube.

5. In a device of the character described, the combination with a hollow elongated body having a closed end, the sides and closed end of said body being formed with perforations, of a block secured to the larger end of said body and having an axial recess, a tube carried by said block and projecting through said recess and extending substantially to the closed end of said body, the end of said tube being open and the walls of said tube being spaced from those of the recess, means for supplying liquid to the base of said recess whereby the same may be discharged into the annular space between said body and said tube, electrodes in such annular space, terminal connections carried by said block, and means for withdrawing liquid from the outer end of said tube.

6. In a device of the character described, the combination with a hollow elongated body having a closed end, the sides and closed end of said body being formed with perforations, of a block removably secured to the open end of said body, a tube carried by said block and extending substantially to the closed end of said body, the end of said tube being open and the walls of said tube being spaced from said body to define an annular recess, means for supplying liquid to the base of said recess, spaced wires carried by said tube in the annular space between the tube and said body and forming electrodes, and means for supplying electric current to said wires.

7. In a device of the character described, the combination, with a hollow elongated body having a closed end and perforated walls, of a tube projecting axially through said body from a point adjacent to the closed end thereof, a plurality of spaced supporting members carried by said tube within said body, a pair of spaced wire electrodes carried

by said supporting members, and means for supplying electric energy to said electrodes.

8. In a device of the character described, the combination with a hollow elongated
5 body having a closed end and perforated walls, of a tube projecting axially through said body from a point adjacent to the closed end thereof, a plurality of spaced supporting members carried by said tube within said
10 body, a pair of spaced electrodes carried by said supporting members, said electrodes

being formed of undulate wires, whereby their effective length is increased and means for supplying liquid to the annular space between said tube and the body and for with- 15 drawing the same through said tube.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

JOSEPH BANDIERI.

Witnesses:

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ALBERT C. MITTENDORF.