

[54] **CIRCUMCISION SURGICAL TOOL**

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[58] Field of Search. **128/305, 306, 309, 128/318, 319; 30/134, 135**

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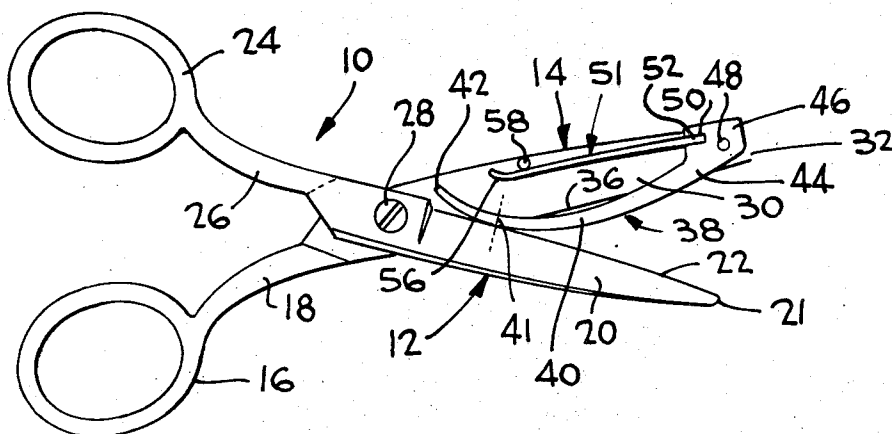
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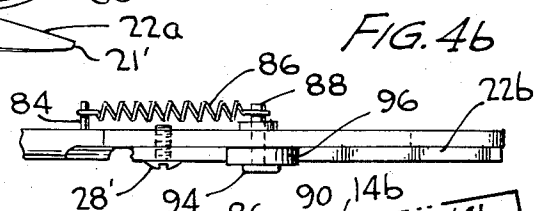
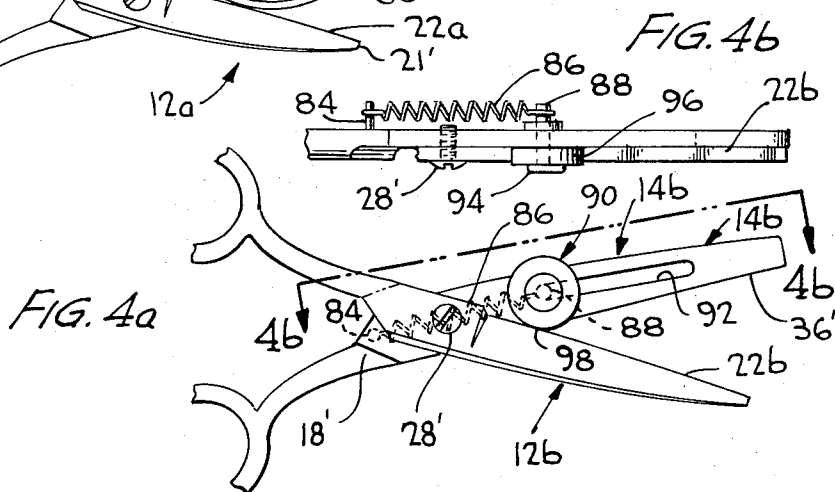
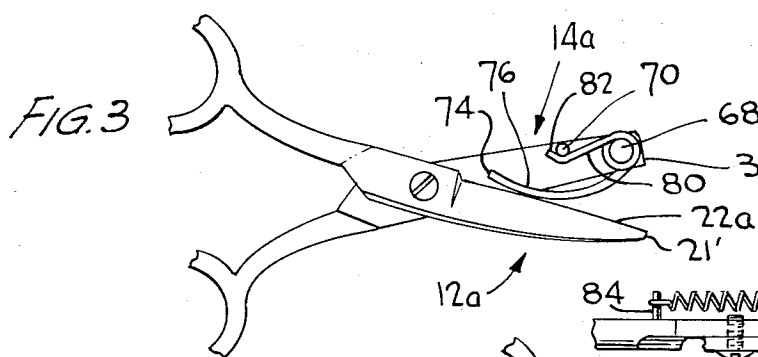
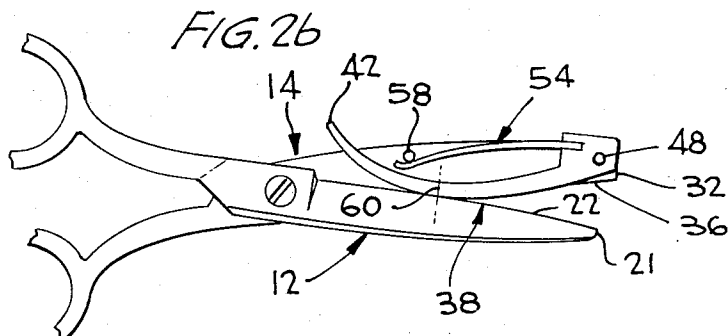
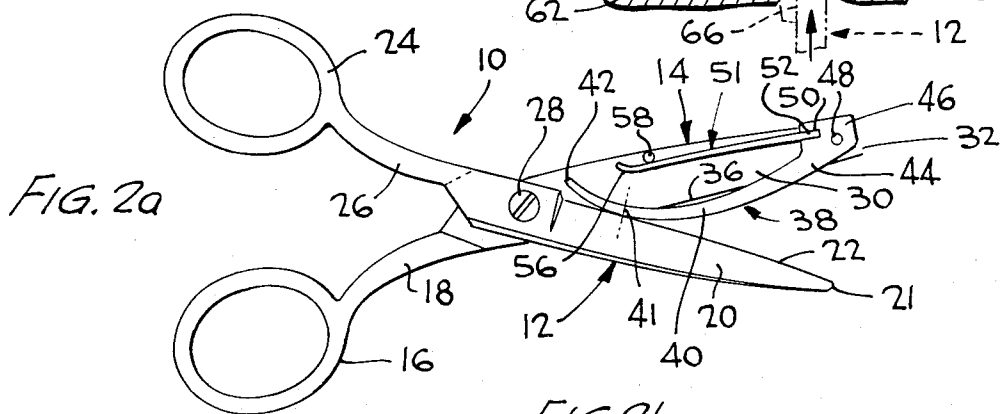
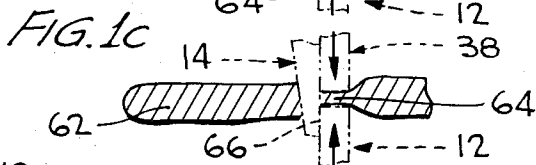
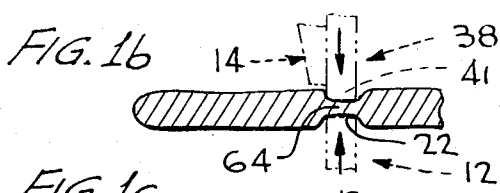
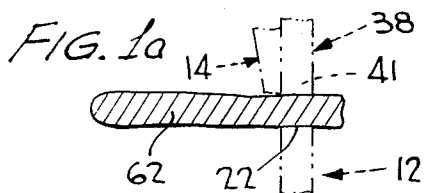
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ABSTRACT

A surgical tool fashioned from scissors having an attached cam member for moving along the lateral face of one scissor member thereby crushing skin positioned between the cam and lateral face which seals veins and arteries along the crushed line. Scissor action follows the crushing action and severs skin along the crushed line instantaneously.

6 Claims, 8 Drawing Figures





CIRCUMCISION SURGICAL TOOL

FIELD OF THE INVENTION

The present invention relates to surgical tools, and more particularly to a scissor type tool adapted for circum-

BRIEF DESCRIPTION OF THE PRIOR ART

The prior art includes a number of surgical tools for efficiently and safely effecting a circumcision procedure. Many of the prior art tools include a first structural arrangement for crushing a ring around excess foreskin. The effect of this is to seal arteries and veins along the circular path in the foreskin. The second distinct step is to cut the skin along the crushed line to prevent bleeding. Generally, the prior art tools include exposed knife edges that can injure the glans penis. A second disadvantage resides in the necessity for executing two distinct surgical steps. That is, the crushing of skin for sealing and the subsequent cutting procedure. The extra time required to perform these two procedures extends the discomfort of the newborn baby. The major objection to the prior art tools is that uniformly these tools or procedures require the surgeon to operate blindly, without direct visual contact with the area being acted upon by the cutting tool. Consequently, in an appreciable number of instances either more or less tissue is removed than was originally intended.

BRIEF DESCRIPTION OF THE INVENTION

The present invention incorporates crushing action and skin severing action in a single tool which effects both surgical steps almost simultaneously. The invention is fashioned from the basic scissor design which we are all familiar with. A cam member cooperates with the knife edge of one scissor so as to crush excess foreskin as the scissor handles are closed. The scissors operate in their usual manner to cut along the crushed line immediately after the crushing action occurs. Accordingly, the requisite sealing and cutting actions take place together as the scissor handles are closed.

The present surgical instrument is designed to have flattened ends and cutting edges that are not exposed to the glans penis thereby preventing injury thereto. Therefore, the present circumcision instrument offers increased safety, convenience, and efficiency when compared to available tools. In the preferred embodiment of the tool, the crushing and cutting members are made small enough so that the lower blade (the upper surface of which forms the anvil for cooperation with the moveable cam member) can be inserted directly between the glans and the excess foreskin thereby permitting the surgeon to have absolute visual contact with the area of the operation at all times.

Although the foregoing discussion relates to the utilization, it is to be stressed that the tool has applications in other skin and tissue removal procedures. However, for illustrative purposes, the circumcision application will be discussed.

The above-mentioned objects and advantages of the present invention will be more clearly understood when considered in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1a illustrates the position of the crushing and cutting members relative to skin to be removed.

FIG. 1b indicates the crushing procedure being performed by the tool on the skin.

FIG. 1c is similar to that of the previous figure but shows the completion of severing action by the tool.

FIG. 2a is a plan view of a first embodiment of the present surgical tool when in an open position.

FIG. 2b is a view similar to that of FIG. 2a but indicates the movement of certain components as the tool is closed.

FIG. 3 is a plan view of a second embodiment of the invention.

FIG. 4a is a plan view of a third embodiment of the present invention.

FIG. 4b is a partial elevational view taken along a view line 4b-4b in FIG. 4a.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings and particularly to FIG. 2a, the first embodiment of the present invention is generally indicated by reference numeral 10. The tool there illustrated is fashioned from scissors having physically connected scissor members 12 and 14. The scissor member 14 includes the usual finger grip 16 that appends to an intermediate section 18. The intermediate section 18 extends to a cutting portion such as is present with conventional scissors.

The scissor member 12 likewise includes a cutting portion 20 that extends outwardly to a blunted end 21 that will not injure the delicate glans penis during a circumcision operation. The cutting portion 20 has the usual knife edge 22.

The other scissor member 12 also has a finger grip 24 from which the intermediate portion 26 appends. As with the usual scissor, a screw 28 serves as a pivotal connection through the scissor members 12 and 14.

Considering the scissor member 14, the cutting portion 30 extends outwardly to a squared off blunt end 32 that is particularly designed to prevent damage to the glans penis. A knife edge 36 is formed along the lower edge of the cutting portion 30, in the usual manner.

An arcuate elongated cam element 38 is pivotally attached to the outward end of the scissor member 14. The purpose of this cam is to cooperate with the knife edge 22 of the scissor member 12 and cause crushing of skin positioned between the scissor members. This crushing action seals the skin just before being cut and prevents bleeding from veins and arteries. As illustrated in FIG. 2a, the cam 38 contacts the knife edge 22 of the scissor member 12 at a point 41 which indicates the point of contact between these tool components when the scissors are opened. This indicates the start position in a circumcision operation. The cam 38 is arcuate and has an upturned blunt end 42 that gradually widens at the midsection 40 to the cam end portion 44. This end portion appends to a generally rectangular end 46 that is large enough to allow pivotal mounting to the squared off end 32 of the scissor member 14. The pivotal connection can be the conventional pivot 48. The arcuate shape of the cam 38 has been designed to allow for rolling of the cam 38 along the cutting edge 22 of scissor member 12.

It is desirable to include spring means between the scissor members 12 and 14 for maintaining these members in a normally opened position. Toward this end, a notch 50 is formed in the enlarged end 46 and the cam 38. The notch receives an end 52 of an elongated spring member 54 that is slightly upturned at the outer

end 56 thereof for embracing a short post 58. The intermediate length of the resilient spring member 54 flexes between the notch 50 and the post thereby biasing the cam 38 against the knife edge 22 of scissor member 12. The end of spring member 54, received in notch 50, can be permanently positioned within the notch by conventional techniques including press fitting or spot welding.

Referring to FIG. 2b, the near closed orientation of the scissor members will be seen. As clearly illustrated in this figure, the contact point between cam 38 and scissor member 12 has shifted outwardly along the length of the scissor member 12. The new point of contact is indicated by reference numeral 60. Attention is called to the flexing of the spring member 54 during this more closed position of the scissor member. When the cam member 38 reaches the post 58, further closing of the scissor is stopped.

Now that the basic structure of the first embodiment has been explained, the physical action of the scissor with respect to skin will be discussed.

Referring to FIG. 1a, excess foreskin 52 is illustrated as being positioned between the cam 38 (contact point 41) and the knife edge 22 of scissor member 12. FIG. 1a illustrates the start position where no pressure is brought to bear upon the scissors. After, the second scissor member 14 gently contacts the excess foreskin 62 which is to be severed.

As the finger grips 16 and 24 are slowly brought together, the resulting effect on the foreskin is illustrated in FIG. 1b. The cam 38 and oppositely positioned scissor member 12 compress the foreskin at 64 and crush this portion of the skin thereby sealing the veins and arteries in the foreskin to prevent subsequent bleeding. At this position, there is no shearing action between scissor members 12 and 14.

However, as illustrated in FIG. 1c, immediately after the skin is crushed, the second scissor member 14 moves into shearing relationship with the scissor member 12 thereby causing a severing of the skin exactly upon the crushed skin line. The shearing position of the scissor members is indicated by numeral 66.

FIG. 3 illustrates a second embodiment of the present invention. A basic scissor structure has been altered to permit easy insertion between the glans and the foreskin. This has been accomplished by reducing the cutting portion of the scissors to approximately one to 1½ inches in length. Further, the cam member of the first embodiment (FIGS. 2a and 2b) is changed to a flexible band that is attached to the scissor member 14a in a manner simplifying the ultimate construction of the tool. By using the flexible band 72 as a cam, a separate spring member, such as 54, is not necessary, as in the case of the first embodiment. It is preferable that this and other cams be fabricated from surgical stainless steel. Other metals could be used for this function as well as could a myriad of plastic materials. In fact, the latter materials, or a combination thereof, may be preferable where it is intended for the instrument to be disposed of after a single operation. If a plastic such as Teflon were employed, an all plastic embodiment could be made which would depend upon the inherent resiliency of material for the camming action. But if a more rigid plastic such as polystyrene were used, then the camming action could be provided by having a series of relatively thin joints between the camming member and the upper anvil member. These relatively thin

members could shear progressively as the crushing action proceeds.

The term "cam" is not intended to be limited to the embodiments illustrated, but is intended to be used in the broader sense of an element of the instrument that cooperates with one flat of the anvil surfaces of a shear element to provide a crushing action. The crush point remains a fixed interval ahead of the moving shear point.

Considering the specific structure of the second embodiment of FIG. 3, a short post 68 is permanently attached near the end of scissor member 14a. Again the end of this scissor member is squared off to form a blunt end 32'.

The band that constitutes the cam 72 includes a blunt end 74 adjacent the pivot point of the scissors. The intermediate length 76 of the band is uniform in size and generally arcuate in form to permit efficient rolling action of the cam 72 against the knife edge 22a of the scissor member 12a. The outward end portion of the band encircles the post 68 and extends along a short connecting length 80 to a short post 70 that forms an abutment. The end 82 of the band is turned upwardly to embrace the post 70. The intermediate length 80 of the cam band 72 biases the cam 72 against the knife edge 22a of the scissor member 12a. The operation and function of the second embodiment illustrated in FIG. 3 is identical to the previous embodiment as already explained.

FIGS. 4a and 4b illustrate a third embodiment of the present invention. In this embodiment, rather than an arcuate cam, a roller is used in conjunction with a guide slot which permits the roller 90 to roll along the knife edge 22b of the scissor member 12b thereby accomplishing the crushing action as previously explained with the cams of the prior two embodiments. In the case of the third embodiment, a separate spring is used to urge the roller against the scissor member 12b thereby biasing the spring members in a normally opened position. In the specific structure of the third embodiment (FIGS. 4a and 4b), a post 84 extends perpendicularly from the intermediate portion 18' of the scissor member 14b. This post serves to mount one end of a coil spring 86. The opposite end of the spring is mounted to a post 88 that forms the central axis of roller 90. To guide the roller's travel, an elongated slot 92 is formed in a central portion of the scissor member 14b. The post 88 is positioned in the slot and rides along the slot length. As shown in FIG. 4b, the roller includes an annular element 96 that is fastened to the post 88 by enlarged head element 94 integrally formed with the post 88. As shown in FIGS. 4a and 4b, the spring 86 normally biases the roller 90 toward the pivot point 28'. The roller 90 rides along the cutting edge 22b of the scissor member 12b. The contact point between the roller 90 and the knife edge 22b is generally indicated by reference numeral 98.

In operation of the third embodiment, as the finger grips of the scissors move toward each other, the scissor member 12b exerts a displacing force against the roller 90 and forces the roller to roll outwardly along the slot 92. Therefore, in effect, the roller 90 serves as a cam and achieves the same function as the cams of the previously described embodiment. The roller cam 90 first crushes excess foreskin which is immediately followed by shearing of the foreskin by the scissor members 12 and 14b.

From the above description, it will be appreciated that the present surgical tool, manifested by its several embodiments, represents an advance over prior art devices of its type. Its near simultaneous crushing and cutting action during a single squeezing of the scissors produces an efficient, safe and shortened circumcision operation. Above all, the preferred embodiment illustrated in FIG. 3, i.e., a left handed scissor type instrument having a relatively short, thin blade portion adapted for insertion between the glans and the foreskin, has the distinct advantage of permitting the operation to proceed, for the first time, under the full control of the surgeon who has complete freedom of vision of the tissue in the operational area.

Again, it is stressed that although the structure of the present invention has been discussed relative to a circumcision operation, the tool is not limited solely to this operation.

It should be understood that the invention is not limited to the exact details of construction shown and described herein for obvious modifications will occur to persons skilled in the art.

Wherefore I claim the following:

1. A surgical tool comprising:

- a. a first elongated member having a cutting edge;
- b. a second elongated member pivotally connected to said first member intermediate the ends of both, said second member having a flat surface and a cutting edge, said cutting edge cooperating with the cutting edge on said first member to produce a continuous shearing action on a piece of tissue interposed between them, said shearing action occurring at a point that advances from the pivotal connection towards an end as one of said members is pivotally moved towards the other of said members; and

c. means mounted on said first member in contact with said flat surface of said second member for

progressively and continuously crushing between said first and second members the capillaries of said piece of tissue being sheared just prior to said continuously advancing shear point.

2. The subject matter of claim 1 wherein the means mounted on said first elongated member comprises an arcuate element pivotally mounted and positioned to roll on the flat edge of the second elongated member.

3. The subject matter of claim 2 wherein a biasing means consisting of a spring element is connected between a connection point on the first member and a point on the arcuate element.

4. The structure of claim 3 wherein the arcuate element has a notch formed therein adjacent a point pivotally connecting the arcuate element to the first member, the notch receiving one end of the spring element, the opposite end of the spring element abutting the connection point which constitutes a fixed projection for causing flexing of the spring element.

5. The subject matter of claim 1 wherein the means mounted on said first elongated member is a flexibly yieldable arcuate element having a first end portion positioned to roll on the flat of the second elongated member, the biasing means comprising:

- an intermediate portion coiled around a fixed point on the first elongated member; and
- a second end portion abutting a second fixed point on the first elongated member in a manner biasing the first end portion against the flat of the second elongated member.

6. The structure of claim 1 wherein the means mounted on said first elongated member comprises a roller having an axial support mounted in a track formed in said first elongated member, whereby the axial support moves in the track as the shearing action proceeds, thus resulting in maintained contact between the roller and the flat on the second elongated member.

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