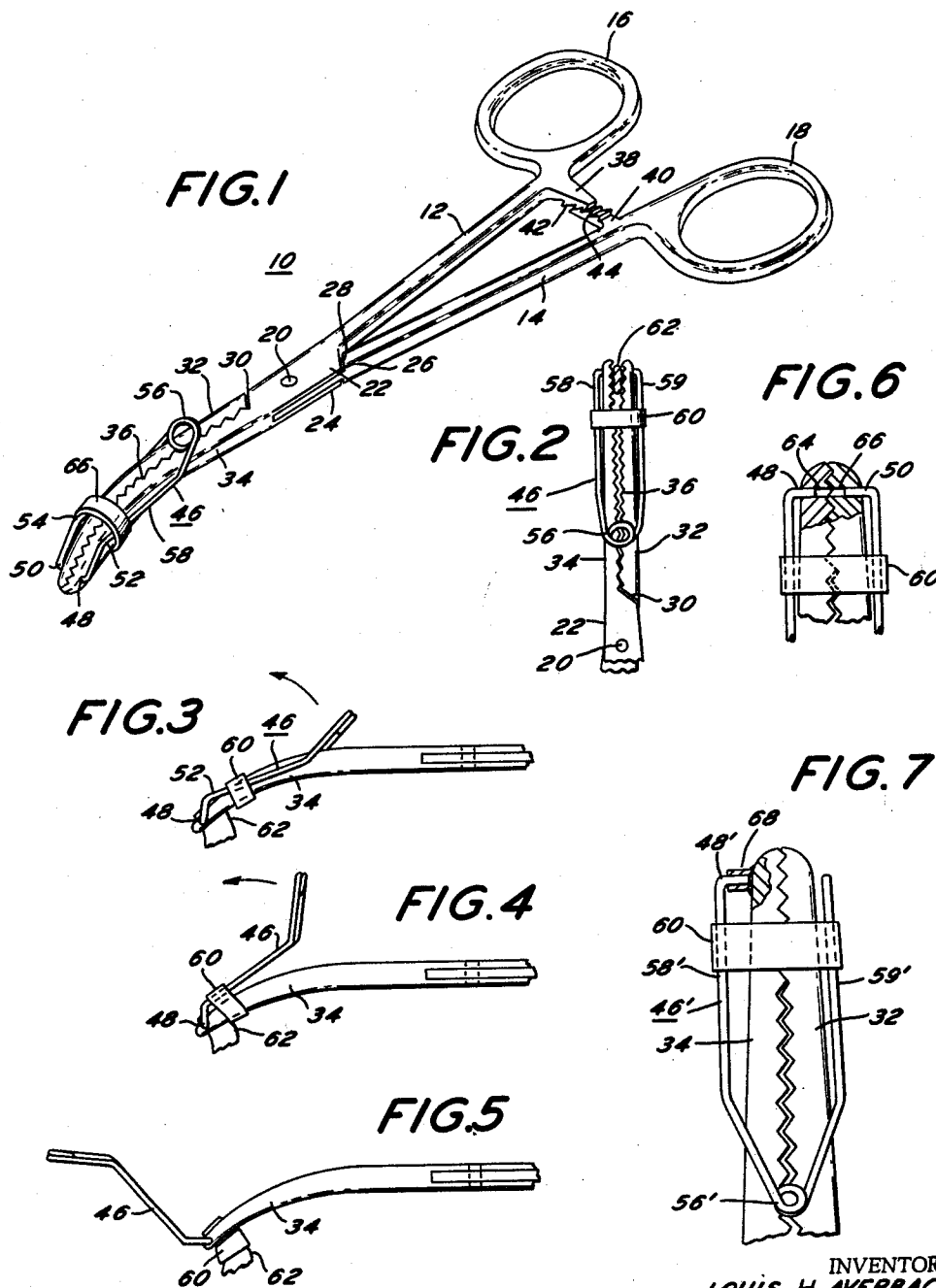


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UMBILICAL CORD LIGATION DEVICE

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1

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In general, this invention relates to a new and improved automatic device for tying the umbilical cord, and more particularly to a simple ligation device which will tie the umbilical cord with an elastic band without the umbilical cord stump coming in contact with the operator's hands.

In the past, the bleeding of the umbilical stump has been a serious problem in modern obstetrics. Many methods of cord ligation have been tried without any one method proving to be universally satisfactory. The most common method has been the tying of the umbilical cord with cotton cord. However, this was not satisfactory. These cords required retying because of the bleeding of the umbilical cord. As the umbilical cord shrank, the cotton cord loosened and it failed its purposes.

Since the cord stump is an important focus of many types of infection, the best possible type of ligation should be used.

Some of the criteria which should be considered in adapting a method of ligation of the umbilical cord are as follows: (1) hemostasis should be complete and immediate; (2) the umbilical cord should not come in contact with contaminants from the operator's hands; (3) the method must be adaptable to all sizes of umbilical cords; (4) the method must be quick; (5) the method should be easy to perform; and (6) the tying device should be disposable, of negligible weight, and harmless to the surrounding skin of the infant.

Therefore, it is the general object of this invention to provide a new and better automatic device for tying the umbilical cord.

Another object of this invention is to provide a new and better device for tying the umbilical cord which can be incorporated in standard surgical equipment.

A further object of this invention is to provide a better and more simple method of and apparatus for tying the umbilical cord which utilizes short lengths of elastic tubing.

A still further object of this invention is to provide a new and better automatic device for tying the umbilical cord which will be operative without the operator's hands coming into contact with the cord.

Further objects will appear hereinafter.

For the purpose of illustrating the invention, there are shown in the drawings forms which are presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a perspective view of a Kelly clamp adapted in accordance with the principles of the present invention for tying umbilical cords.

FIGURE 2 is a top plan view of the device shown in FIGURE 1.

FIGURE 3 is an end view of the automatic device of the present invention in position prior to tying of the umbilical cord.

FIGURE 4 is a showing of the automatic device of FIGURE 3 in the middle of a tying operation.

FIGURE 5 is a further showing of the device of FIGURES 3 and 4 after the umbilical cord has been tied.

FIGURE 6 is a partially broken away view of the tip of the automatic device shown in FIGURES 1-5.

FIGURE 7 is a partially broken away view of the tip of a second embodiment of the present invention.

In FIGURE 1, there is shown one embodiment of

2

an automatic device 10 built in accordance with the principles of the present invention.

The device 10 is essentially a Rochester clamp which has been modified in order to form the automatic device of the present invention. The device 10 includes a pair of handles 12 and 14 having integral finger holes 16 and 18 respectively at the ends thereof. The handles 12 and 14 pivot about a suitable rivet 20. The handle 12 has a slot 26 therein forming two planar portions 22 and 24 through which the central portion 28 of handle 14 passes.

A stop 30 is provided on the edge of central portion 28 to limit the movement of planar portion 22 of handle 12. The extensions of handles 12 and 14 on the opposite side of rivet 20 are curved to form left and right clamp jaws 32 and 34. These curved clamp jaws have mating teeth 36 so as to better grip an object therebetween.

To lock the jaws 32 and 34 in place, there are provided suitable extensions 38 and 40 of finger grips 16 and 18 respectively. The extensions 38 and 40 have suitable buttress-type teeth 42 and 44 respectively thereon which teeth can mate to lock the handles 12 and 14 in a particular position. The clamp, as described, is a standard Rochester or Kelly clamp utilized in surgical practice. Other types of clamps which could perform the same functions may be utilized in accordance with the teachings of the present invention.

A suitable spring-type lever clip 46 is provided which can be pivotally mounted on the tip of the jaws 32 and 34 by clip pivots 50 and 48 respectively. These pivots mount the clip 46 for rotative movement about the tips of the jaws 32 and 34.

The clip 46 has raised parallel portions 52 and 54 adjacent the pivotal connections 48 and 50 respectively. The raised portions 52 and 54 are formed on wire-like arms 53 and 59 joined at the center thereof by a spring 56. The spring 56 maintains the pivots 48 and 50 in suitable recesses in the tips of jaws 34 and 32 respectively.

An elastic band 60 is then placed over the tips of jaws 34 and 32 and the raised portions 54 and 52 of clip 46. The band 60 is formed by cutting a three millimeter length of latex tubing. The band is then washed and made sterile. The entire device 10 may be sterilized by standard processes such as by autoclaving in the regular obstetrical pack or by wet sterilization in a suitable antiseptic solution. Since the band 60 is in its unstretched position, it will not be affected by the sterilization processes.

The automatic device of the present invention is utilized in the manner shown in FIGURES 2-5. First, after the delivery of a baby, at the moment the operator considers best, the umbilical cord is clamped about three centimeters from the skin level using the device 10 with the curved side of the clamp towards the infant's abdomen. In FIGURE 2, the umbilical cord has been noted by the numeral 62 and shown clamped between jaws 32 and 34.

The umbilical cord is then stripped in a direction away from the infant and a standard Rochester or Kelly clamp is applied about three centimeters from the device 10. The umbilical cord is then cut between the clamps close to the device 10. At this point, the device 10 and the umbilical cord 62 are in the position shown in FIGURE 3.

The clip 46 is then moved in a counterclockwise direction as shown by the arrow in FIGURE 3. The band 60 is stretched as the clip 46 rotates about pivots 48 and 50. As shown in FIGURE 5, once the band 60 stretches beyond the raised portions 54 and 52, it passes over the tips of the jaws 32 and 34 to clamp the umbilical cord 62. Since the band 60 is elastic in nature, the shrinking of the umbilical cord 62 will not cause

bleeding. The intrinsic nature of the elastic band causes it to contract as the umbilical cord shrinks, thus maintaining constant constriction which prevents seepage from the stump.

If desired, the obstetrician may prefer not to strip the umbilical cord prior to ligation. Contamination of the umbilical stump from the hands can be avoided by not stripping to the point of ligation.

In FIGURE 6, there is shown the mounting of the pivots 48 and 50 in suitable holes 64 and 66 drilled through the tips of jaws 34 and 32 respectively. It should be noted that by utilizing a spring-type clip 46, it is not necessary to secure the pivots 48 and 50 in the recesses 64 and 66 as the spring 56 will maintain them in place whether the handles 12 and 14 are open or closed.

As an alternative, the embodiment shown in FIGURE 7 may be utilized in which a new clip 46' has been utilized in place of the clip 46. The clip 46' is mounted on a suitable cup 68 welded to the tip of jaw 34. The clip 46' has only a single pivot 48' adapted to fit within the cup 68. One side wire 53' of the clip 46' is exactly similar to the side wire 53 of clip 46. A second side wire 59' is also provided and shaped in the same manner as wire 59 of clip 46. The side wires 53' and 59' are joined at the end opposite from the tip of the jaws by a suitable spring 56'. As shown in FIGURE 7, an elastic band 60 can be placed on the clip 46' in the same manner as was discussed with respect to FIGURES 1-6. The shape of the clips constitutes a means for maintaining the elastic band in place over the clip and jaws.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specifications as indicating the scope of the invention.

I claim:

1. An umbilical cord ligation device comprising a clamp, said clamp having relatively movable gripping jaws for clamping the end of an umbilical cord, an elastic band ejector clip, said clip being pivotally mounted about the tip of at least one of said jaws about an axis perpendicular to the longitudinal axis of said jaws, said clip having a first position when said clip is resting against said jaws, said clip including means for maintaining an elastic band placed over said clip and jaws in place when said clip is in said first position, said means being additionally operative to expand the elastic band and move a portion of the elastic band over the tips of said jaws when said clip is pivoted from said first position.

2. The device of claim 1 wherein said clip includes two wire-shaped arms associated with each of the gripping jaws, said wire-shaped arms being joined at the end opposite from the tips of said jaws by a spring member, said spring member being adapted to bias said wire-shaped arms toward each other.

3. The device of claim 1 wherein said clamp has two jaws, the shape of said clip constituting said maintaining means, said clip including a wire-shaped member for each of said jaws, said wire-shaped members being substantially similar in shape, at least one of said wire-shaped members being pivotally secured to its associated jaw at the tip thereof, said wire-shaped members resting on one side of said jaws when said clip is in said first position, said wire-shaped members having a portion immediately adjacent the tip of said jaws raised above the plane of the side of said jaws on which said clip is resting in said first position.

4. The device of claim 3 wherein said jaws have aligned recesses therein at the tips thereof, said wire-shaped members having extensions at the ends thereof adjacent the tips of the jaws, said extensions being adapted to fit in said recesses to provide pivotal movement of said clip about the tips of said jaws.

5. An umbilical cord ligation device comprising a clamp, said clamp having relatively movable gripping jaws for clamping the end of an umbilical cord, an elastic band ejector clip, said clip being pivotally mounted about the tip of at least one of said jaws for rotation about an axis substantially perpendicular to the longitudinal axis of said jaws, said clip having a first position wherein said clip is alongside said jaws, said clip being adapted to be maintained in said position by an elastic band extending around said clip and jaws, said clip having a portion thereof operative to expand the elastic band and move the elastic band over the tips of said jaws when said clip is pivoted from said first position.

6. An umbilical cord ligation device in accordance with claim 5 wherein said clip is removably coupled to said jaws whereby said clip may be readily removed from said jaws.

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