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2,840,082

ELASTIC BAND EXPANDING DEVICE

Filed April 4, 1957

2 Sheets-Sheet 1

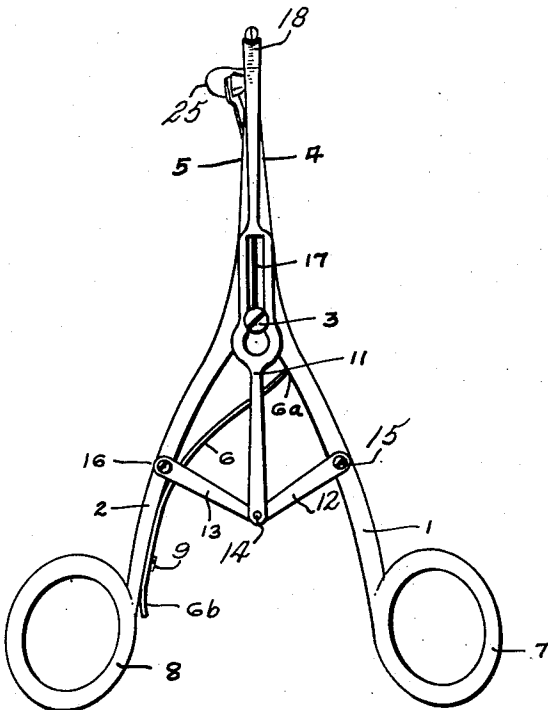


Fig. 1.

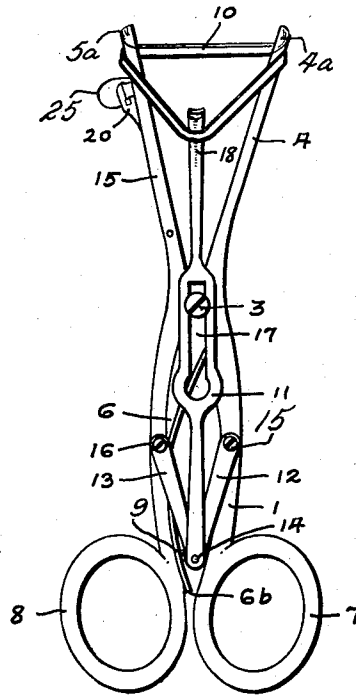


Fig. 2.

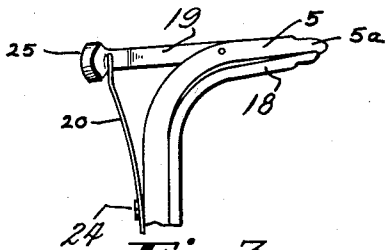


Fig. 3.

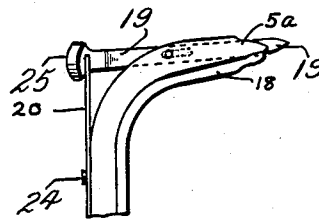


Fig. 4.

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2 Sheets-Sheet 2

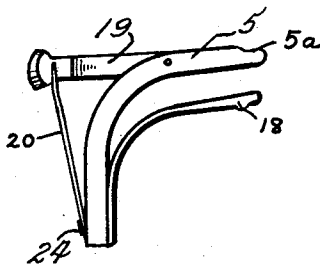


Fig. 5.

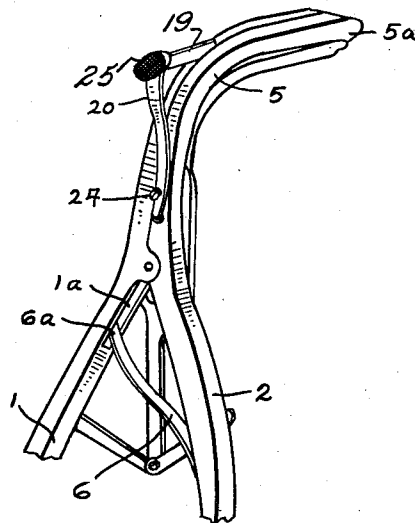


Fig. 6.

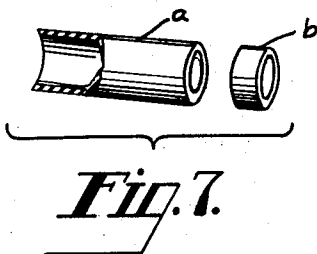


Fig. 7.

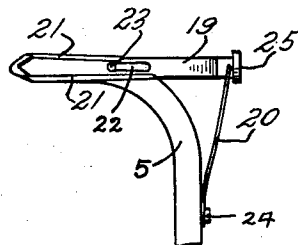


Fig. 8.

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ELASTIC BAND EXPANDING DEVICE

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1 Claim. (Cl. 128—303)

This invention relates to surgical instruments and more particularly to a device for clamping or ligating the umbilical cord of a new-born infant. The device consists of an instrument and a band or a ring of latex that is cut from a tube of the same or a like resilient material. The function of the instrument is to distend the latex band to yield a bore that readily receives the superficial stump of an umbilical cord at any pre-selected area.

The primary object of this invention is to provide a band-distending instrument having three jaws or prongs over which an elastic band can be fitted. By virtue of a controlled separation of the jaws, the elastic band is readily stretched, thus allowing for an application of the latter to the severed end of the cord with facility and dispatch.

Another object is to provide a plurality of jaws in a band-distending instrument from which a stretched band can be easily disengaged in order to have it compress or ligate an inserted umbilical cord.

A further, although unrelated object, is to provide for the mounting of a sharp knife on the inner surface of one of the jaws of the instrument. This knife, under ordinary circumstances, is confined through the action of a spring to an inconspicuous and guarded place along the surface of a jaw. In the event that an immediate tracheotomy is indicated or that stab-like penetration of another area is urgent, the sheathed knife can be quickly released for the purpose of achieving such a surgical effect.

Other objects and advantages of this invention are to provide an improved device of the character described which is easily and economically produced, which is sturdy in construction, and which is desirably efficient in operation.

With the foregoing and related objects in view, this invention consists in the details of construction and combination of parts, as will be more fully understood from the following description, when read in conjunction with the accompanying drawings in which like reference numerals apply to like parts:

Fig. 1 is a bottom plan view of the band-distending instrument designed to express a preferred embodiment of this invention and to illustrate a normal alignment of the several parts prior to a use of the instrument for its specific function.

Fig. 2 is a bottom plan view of the instrument as it is set to hold an elastic band after the latter has assumed a noticeably stretched configuration.

Fig. 3 is an enlarged and a fragmentary lateral view of the jaws and the attached knife, showing them in their normal relationship.

Fig. 4 is an enlarged and a fragmentary lateral view of the jaws and the attached knife, showing the jaws in their normal relationship and the knife in its stabbing position.

Fig. 5 is an enlarged and a fragmentary lateral view of the jaws and the attached knife, showing the jaws dispersed or spread apart and the knife in its normal relationship to the jaw to which it is attached.

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Fig. 6 is a fragmentary perspective view of the instrument, showing the relationship among the two larger jaws and their actuating spring.

Fig. 7a and b is an enlarged perspective view of the latex tube (a) and a segment (b) cut from it.

Fig. 8 is an enlarged and a fragmentary lateral view of the jaw and the knife attached to it.

Referring to Fig. 1 of the drawings, in the preferred expression of this invention, the band-stretching instrument consists of two arms 1 and 2 which coact to rotate in a scissors-like manner about a pivotal screw 3. The upper portions of arms 1 and 2 terminate in curved prongs or jaws 4 and 5 which are adapted to articulate closely into a blunt point 5a through the action of a spring 6. The lower portions of arms 1 and 2 are fashioned into oval shaped finger holds 7 and 8 which can be brought together against the action of a spring 6. Such a squeezing together of finger holds 7 and 8 induces the jaws 4 and 5 to diverge or to spread, as shown in Fig. 2.

The inner surface of arm 1 is slotted (1a) in order to accommodate the free or unattached end (6a) of the spring 6 as it slides upwardly, when the finger holds 7 and 8 are grasped together. The lower end (6b) of the spring 6 is fixedly attached to the inner surface of arm 2 by means of a screw 9. The distal ends (4a and 5a) of jaws 4 and 5 are slightly depressed in order that a latex band 10 may be securely retained against its possible slippage from the retaining jaws. Band 10 is prepared by cutting or snipping off a small section (7b) from a latex tube (7a). In Fig. 7a and 7b, the small segment and the stock tube are illustrated.

Referring to Figs. 1 and 2, there is shown a third arm 11, which is movably attached to arms 1 and 2 through the medium of links 12 and 13. The latter links in turn are rotatably joined to arm 11 with a threaded axis 14 and are similarly joined to arms 1 and 2 with threaded axes 15 and 16 respectively. The central portion of arm 11 contains a punched out slot 17 in order to accommodate the reciprocating movements of said arm with respect to a pivotal screw 3, about which jaws 4 and 5 rotate to sweep through their respective limited arcs.

An inward movement together of the finger holds 7 and 8 against the action of spring 6 not only induces jaws 4 and 5 to diverge, but also simultaneously causes links 12 and 13 to converge and actuates a movement of arm 11 through the medium of its slotted section 17 and downwardly past the pivotal screw 3.

The aforementioned description of the several integral and coacting parts of the instrument of this invention gives a clear picture of the way in which its essential function is expressed without a necessity of considering too much obvious detail. A section of the latex tube, as represented in Fig. 7b, is forced over the ends of jaws 4, 5, and 18 as they come to their common junction when the instrument is in its normal position. Upon bringing the finger holds 7 and 8 together, jaws 4, 5, and 18 move apart from one another and the superimposed latex band 10 is stretched into an enlarged triangular element, as shown in 10 of Fig. 2. Through the resulting triangular opening there is passed a hemostat. The end of the umbilical cord is grasped by the operator and pulled through the band which is positioned about 3 cms. from the proximal end of the cord.

The band is then slipped off the instrument in order that it may compress the exposed cord. The latter is promptly sectioned at a point 2cms. distal to the latex band. Frequent sterilization of the instrument is unnecessary with this type of instrument, since its tip, the cut band, and the hemostat can be kept aseptically in a solution of 1:1000 aqueous benzalkonium chloride.

A knife 19 is slidably mounted on jaw 5. It is held flush against the inner surface of jaw 5 in a position of

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retraction because of the tension of spring 20. The edges 21 of jaw 5 are rolled or bent back to serve as a sheath for knife 19 when it is made to move along the inner face of the jaw. A perforated section 22 in the knife acting in conjunction with a detent 23 controls the distance of travel of the knife against the action of a spring 20. The detent 23 is mounted on the inner surface of jaw 5. Spring 20 is attached to the edge of jaw 5 with a screw 24.

With its auxiliary attachment of knife 19, the instrument is adapted to perform a tracheotomy, especially under the necessitous conditions of an emergency. For such a purpose, the instrument is laid upon a patient's throat; the button 24 is pressed deliberately and the knife 19 penetrates the soft tissue, pierces the trachea, and provides an emergency air way immediately.

Although not illustrated in the drawings, the device of this invention is also adapted to apply any type of an inflatable cuff to any tube used in the body and is particularly applicable to an endotracheal tube inflatable cuff.

Although the details of a preferred embodiment of this invention have been illustrated and described herein, yet the invention is not restricted thereto as alterations may be made without departing from the spirit and the scope of this invention as defined in the appended claim.

I claim:

An instrument for applying a resilient umbilical cord

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ligature, said ligature consisting of a band of latex tubing, comprising in combination two pivoted jaws, said jaws terminating in curved prongs adapted to be aligned contiguously through the action of a spring; said spring being fixedly attached at its lower end to one of said jaws and having its upper end free to move in a groove of second said jaw; finger holds actuating said jaws; a third jaw adapted to undergo reciprocative movement between said pivoted jaws upon their divergence and approximation; a toggle joint actuating said third jaw and connected rotatably to said finger holds; said third jaw terminating in a curved prong adapted to make contiguous alignment with said prongs of said pivoted jaws; depressed surfaces disposed on upper ends of all said prongs, said depressed surfaces adapted to engage the lumen of said latex band, to retain said band thereon with all said jaws in contiguous relationship with one another, and to maintain said stretched band thereon when all said jaws are dispersed sufficiently to admit said umbilical cord within said stretched band.

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