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3,204,636

FUNIS CLAMP

Original Filed March 19, 1958

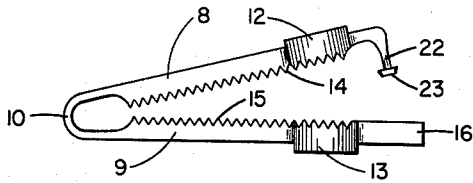


Fig. 1

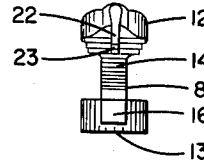


Fig. 3

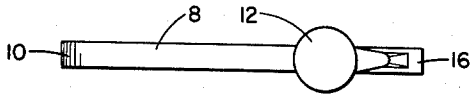


Fig. 2

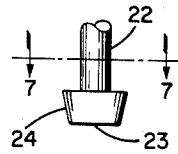


Fig. 6

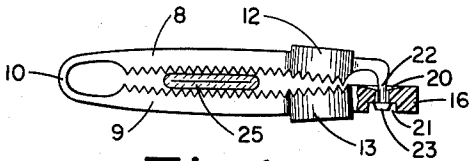


Fig. 4



Fig. 7

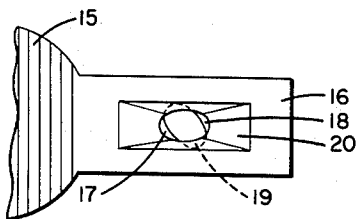


Fig. 5

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3,204,636

FUNIS CLAMP

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14 Claims. (Cl. 128—346)

This application is a continuation of our copending application Serial No. 722,516, filed March 19, 1958, now abandoned.

This invention relates to clamping devices, and more particularly to devices of such type which may be used by the surgeon, as a funis clamp.

A principal object of the invention is to provide a funis clamp which can be quickly and easily applied by the surgeon with one hand and which does not require the use of a tool for its application.

Another object of the invention is to provide a funis clamp which is fabricated of a single piece so as to have no moving parts and which, therefore, can be quickly and effectively sterilized.

A still further object of the invention is to provide a funis clamp of the type described, which is self-adjusting once operatively positioned and functions to automatically maintain a sufficient pressure on the cord or other material being clamped even though the latter has shrunk or diminished in size.

Another object of the invention is to provide a clamp which has incorporated therein a positive locking feature so that the clamp automatically locks itself once set in operative position thereby preventing accidental removal of the clamp before the expiration of a predetermined time.

A still further object of the invention is to provide a funis clamp, of the type described which, due to its unique simplicity of design, can be manufactured inexpensively and therefore can be marketed as a disposable item.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein:

FIGURE 1 is a side elevational view of the novel clamp constituting this invention.

FIGURE 2 is a top plan view of the device.

FIGURE 3 is an end view of the device.

FIGURE 4 is an elevational view of the device shown in operative position securing therein material to be clamped such as an umbilical cord.

FIGURE 5 is an enlarged fragmentary plan view of the free end of one arm of the device.

FIGURE 6 is an enlarged fragmentary elevational view of the free end of the other arm of the device.

FIGURE 7 is a sectional view taken along lines 7—7 of FIGURE 6.

The device constituting this invention comprises a pair of arms 8 and 9 secured together at their one end by a hinge portion 10 which is arcuately shaped in order to equalize the stress imparted thereto. The arms 8 and 9 are each provided with thumb depressor surfaces 12 and 13, respectively. The arms 8 and 9 are further provided with a plurality of teeth 14 and 15, respectively, which are disposed so that the teeth 14 mesh with the teeth 15. The arm 9 has at its free end a flattened extension 16 having an oval-shaped hole 17 extending

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therethrough in the form of a spiral configuration. The hole 17 has, therefore, an entrance 18 having a longitudinal axis angularly disposed relative to the longitudinal axis of its exit 19. It is preferable that the angular relation between the longitudinal axes be approximately 45 degrees.

A tapered guide notch 20 is provided in the inner surface of the extension 16 and communicates with the entrance 18. A recess 21 is provided on the outer surface of the extension 16 and communicates with the exit 19.

A lateral projection 22 is formed at the free end of the arm 8 and terminates in an oval-shaped button 23 having tapered sides 24.

In using this novel device to clamp an umbilical cord, such as the cord 25 as is illustrated in FIGURE 4, the surgeon should, with the clamp in an open position, locate the cord so that it is positioned between the arms 8 and 9 and as near the hinge portion 10 as is practical. With the clamp in one hand the surgeon may then exert pressure by depressing the thumb depressor surfaces 12 and 13. This can best be accomplished by using the thumb and forefinger. The arms 8 and 9 are thereby moved into a closed position and the teeth 14 and 15 function to prevent any slippage between the cord and the arms 8 and 9.

The compression exerted by the hand of the operator as above mentioned is sufficient to interlock the free ends of the arms 8 and 9. Since the oval-shaped button 23 is in substantial registration relative to the entrance 18 of the oval-shaped hole 17, it may freely enter the entrance 18 thereof and traverse the thickness of the flattened extension 16, finally emerging through the exit 19. In passing through the hole 17, the button 23 is caused to be rotated approximately 45 degrees due to the spiral configuration therein. Being that the exit 19 of the hole 17 is disposed so that its longitudinal axis is angularly related to the longitudinal axis of the entrance 18, the button 23 is locked in position and is prevented from returning back through the hole 17. It should be obvious, of course, that the physical characteristics of the lateral projection 22 cause the latter to counter-rotate so that the button 23 assumes its normal position in substantial registration with the entrance 18. The size of the button 23 is preferably slightly smaller than the size of the hole 17. Furthermore, it should be noted that the tapered sides 24 of the button 23 function to facilitate the passage of the button 23 through the hole 17. The tapered notch 20 obviously functions to guide the passage of the button 23 toward the entrance 18 of the hole 17. When the clamp is in its closed position, as can be best seen in FIGURE 4, the button 23 is accommodated within the recess 21 so that a substantially flush relationship exists between the surface of the button 23 and the outer surface of the extension 16.

The compression of the cord 25 is sufficient so as to produce hemostasis as is well known to those skilled in the art. Due to the flexible and somewhat elastic properties of the material from which the clamp is fabricated, it has the characteristic of being automatically compensating for any shrinkage in the cord 25. As the clamp is applied and compresses the cord as shown in FIGURE 4, the loop 10 becomes somewhat expanded because of the interposition of the cord between the arms. This exerts a constant clamping pressure on the cord. Thereafter, as the cord diminishes in size, the arms 8 and 9 move closer together and continue to maintain the required pressure on the cord 25. After the clamp has been in position on the cord for a predetermined period of time it may be easily removed by severing the projection 22 adjacent to the button 23, or by cutting through the substance of the hinge 10.

Although the funis clamp described herein has been

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found extremely satisfactory when fabricated of plastic, it may, of course, be produced from other materials which have the physical characteristics of being relatively flexible, elastic, and of sufficient strength. When fabricated of plastic the clamp may be produced by mass production techniques at an extremely low cost and, therefore, may be marketed as an inexpensive disposable item.

Thus, a funis clamp has been provided which can be applied by the surgeon quickly with one hand and without the necessity of utilizing other tools, such as a forceps. Furthermore, the operator does not require assistance from anyone else in its application. Since the device is a unitary piece and has no moving parts, it may be sterilized very simply. It should be noted that the interlocking mechanism incorporated in the device precludes the possibility of the arms 8 and 9 being accidentally disengaged, thereby releasing the pressure prematurely.

Although the funis clamp constituting this invention has been described herein in reference to its use as a means for clamping an umbilical cord, its scope and application is sufficiently diversified to include the clamping of other organs or materials which may require a positive action clamping device.

We claim:

1. I clamp for application to the umbilical cord of a newly born infant comprising, a V-shaped member fabricated of a flexible, resilient, relatively strong material, and formed by a pair of arms joined together at the apex of the V by an integral hinge-forming loop of substantial diameter, the free ends of the arms of said member being normally spaced apart, said arms being movable toward each other by a compressive force to clamp the cord therebetween, said hinge being expandable by said force to provide a continuing clamping force on the cord as the cord shrinks, and interengageable hook means integrally formed on the free extremity of each of said arms coacting when engaged to fixedly connect said extremities in relatively permanent fashion.

2. As an article of manufacture, a V-shaped member fabricated of a flexible, relatively strong material, an oval-shaped button carried by the free end of one arm of said member, the free end of the other arm of said member having an oval-shaped aperture extending therethrough in a spiral configuration for the reception therein of said button, said aperture having an entrance in substantial registry with said button when the device is in an open position, the exit from said aperture being angularly related to the entrance thereof.

3. As an article of manufacture, a V-shaped member fabricated of a flexible, relatively strong material, means carried by the free end of one arm of said member, the free end of the other arm of said member having an aperture extending therethrough in a spiral configuration for the reception therein of said means, said aperture having an entrance in substantial registry with said means when the device is in an open position, the exit from said aperture being angularly related to the entrance thereof, said means and said aperture each having a configuration whereby a rotational movement is imparted to said means upon a compressive force being applied to the arms of said member.

4. A device particularly applicable as an umbilical cord clamp including, a first element, a second element, means connecting said elements for oscillatory movement relative to each other, said elements being formed to provide contact between opposed faces thereof when in relatively abutting relation, one end of said first element having a hook-shaped extremity and hook engaging means in said second element including a recess within which the hook is enclosed for positive interlocking interengagement therewith when the opposed faces of said elements are in contacting relation.

5. A device particularly applicable as an umbilical cord clamp including, a first bar element, a second bar element swingingly connected thereto, opposed faces of said bar

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elements being disposed in relatively abutting relation when closed, one end of the said first bar element having an integral hook extremity, a recess within said second bar element adjacent an end thereof, said hook extremity being formed to overlap and engage within said recess to provide a positive fixed relation of said elements.

6. A device particularly applicable to an umbilical clamp including, a first generally rectangular element of a relatively elongated nature, a second generally rectangular element swingingly connected to said first element, said first element having a hook extremity formed integral therewith, said elements being of a resilient material, spaced projections on one surface of one of said elements for relative abutment with the other element on swinging thereof, a recess in the opposite surface of said second element, the hook extremity of said first element being adapted to interengage in the recess of said second element on flexing thereof to permit the passage of said second element, whereby said hook on the first element is positively locked within said second element so as to resist any effort to move said second element therefrom.

7. A device particularly applicable as an umbilical cord clamp including, a first bar element, a second bar element connected to said first bar element at one of its extremities and adapted to lie in contacting abutting relation with the first bar element and to nest within the other extremity thereof, and interengageable hook means integrally formed on the free extremity of each of said bar elements coacting when engaged to fixedly connect said extremities in relatively permanent fashion.

8. A device particularly applicable as an umbilical cord clamp including a pair of superimposed elements inter-connected at one extremity thereof, interengaging male and female portions at the other extremity thereof, said female portion having means integral therewith for overlapping and containing the male portion against lateral and vertical displacement, said containing means and said male element having complementary surfaces which upon engagement interlock to a degree proportionate to efforts to displace said male element from said female element.

9. A device particularly applicable as an umbilical cord clamp including a first bar-like element, a second bar-like element connected to said first element, integrally connected means on said second element for containing one end of said first element, means integral with said first element and said second element for interlocking on containment of said one end of said first element to resist movement of said second element relative said first element to a degree proportionate to efforts to relatively move said elements.

10. A device particularly applicable as an umbilical cord clamp including, a first element, a second element, said first and second elements being fabricated of a flexible, non-metallic, relatively strong material, means connecting said elements for oscillatory movement relative to each other, said elements being formed to provide contact between opposed faces thereof when in relatively abutting relation, one end of said first element having a hook-shaped extremity and hook engaging means in said second element including a recess within which the hook is enclosed for positive interlocking substantially unopenable interengagement therewith when the opposed faces of said elements are in contacting relation.

11. A device particularly applicable as an umbilical cord clamp including, a first bar element, a second bar element swingingly connected thereto, said first and second bar elements being fabricated of a flexible, relatively strong plastic material, opposed faces of said bar elements being disposed in relatively abutting relation when closed, one end of the said first bar element having an integral hook extremity, a pair of spaced sides on said second bar element defining a recess therebetween and within said second bar element adjacent an end thereof,

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said hook extremity being formed to overlap and engage within said recess to provide a positive fixed relation of said elements, said sides preventing lateral disengaging movement of said hook.

12. A device particularly applicable to an umbilical clamp including, a first generally rectangular element of a relatively elongated nature, a second generally rectangular element swingingly connected to said first element, said first element having a hook extremity formed integral therewith, said elements being of a flexible, relatively strong plastic material, spaced projections on one surface of one of said elements for relative abutment with the other element on swinging thereof, a recess in the opposite surface of said second element, the hook extremity of said first element being adapted to interengage in the recess of said second element on flexing thereof to permit the passage of said second element, whereby said hook on the first element is positively and substantially unopenably locked within said second element, the sides of said recess serving to resist any reasonable effort to move said second element therefrom.

13. A device particularly applicable as an umbilical cord clamp including, a first bar element, a second bar element connected to said first bar element at one of its extremities and adapted to lie in contacting abutting relation with the first bar element and to nest within the other extremity thereof, said first and second bar elements being fabricated of a flexible, nonmetallic, relatively strong material, and interengageable hook means integrally formed on the free extremity of each of said bar elements having means for preventing lateral rela-

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tive movement of said bar elements, said hook means coacting when engaged to fixedly and substantially unopenably connect said extremities in relatively permanent fashion.

14. A device particularly applicable to the umbilical cord of a newly born infant comprising, a member fabricated of a resilient, relatively strong plastic including, a pair of arm elements, hinge means joining said elements together at one end and adapted to allow said elements to swing toward and away from each other to clamp said cord therebetween, the other end of one of said elements having an extending hook-like portion and the other end of said other element having a recess located in the side remote from the cord clamping side, said recess being adapted to receive said hook-like portion therewithin in positive substantially unopenable interengagement whereby said cord is safely clamped and held between said elements during hemostasis.

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