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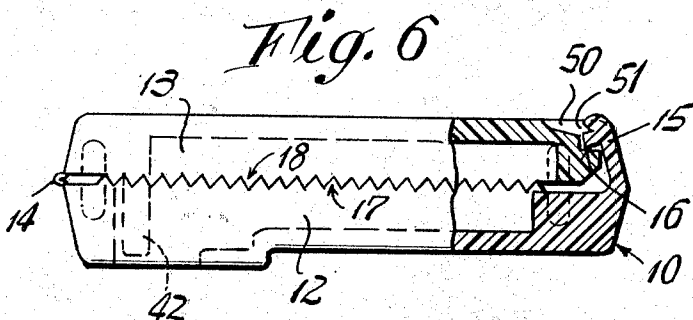
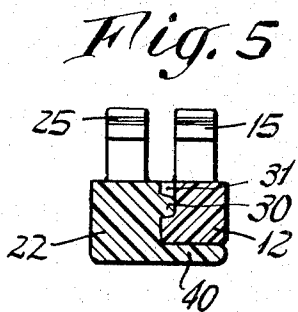
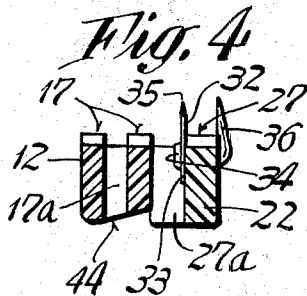
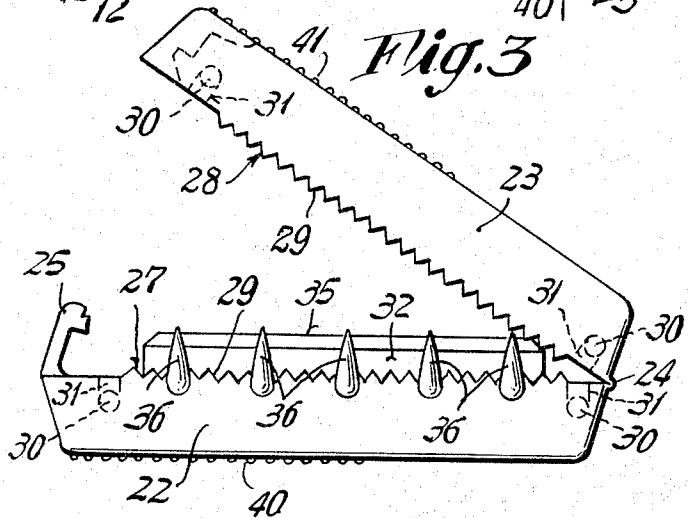
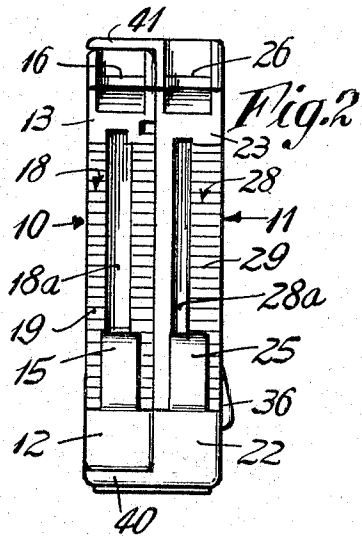
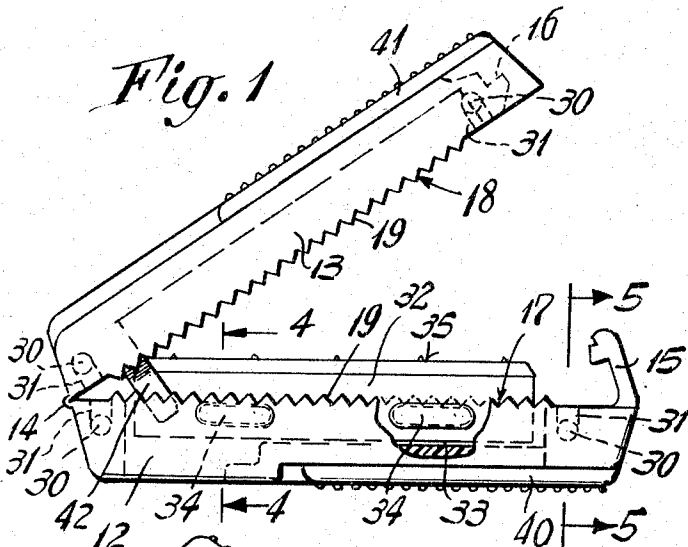
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3,323,208

SIMULTANEOUS CLAMPING AND CUTTING MEANS

Filed Nov. 8, 1965

2 Sheets-Sheet 1



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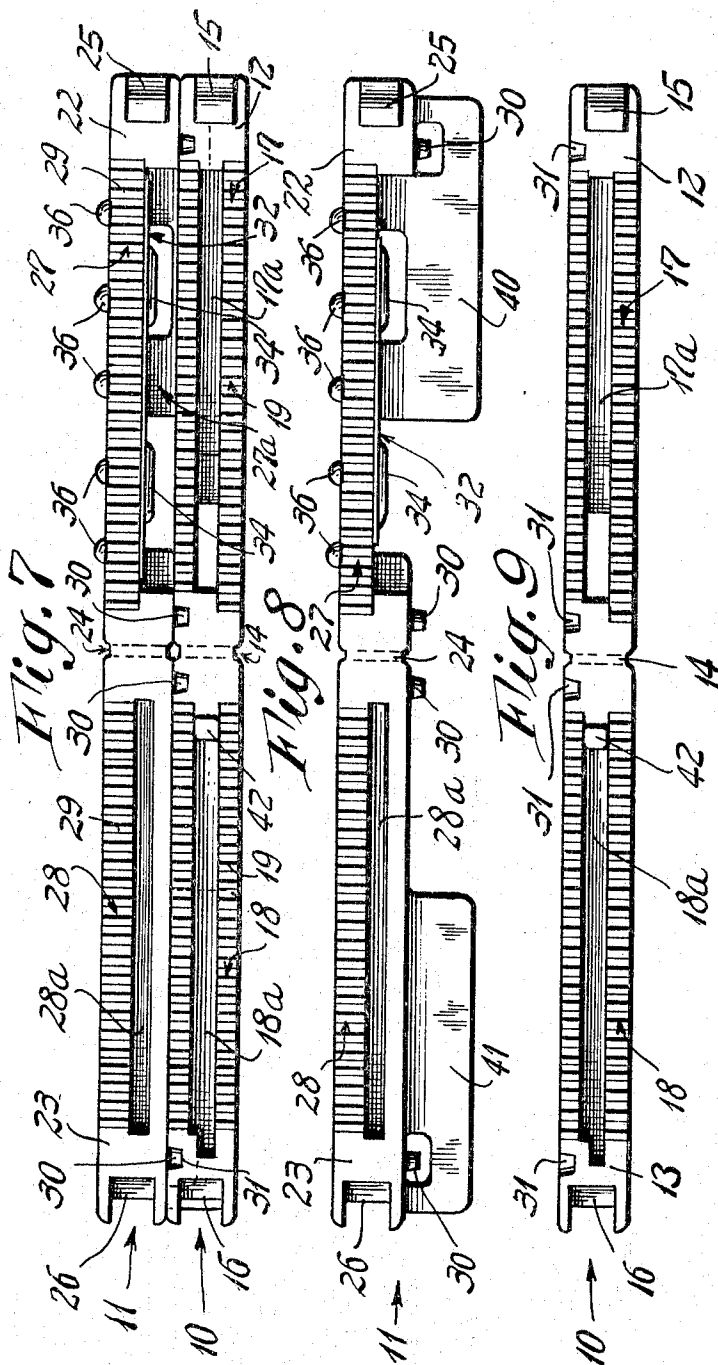
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2 Sheets-Sheet 2



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SIMULTANEOUS CLAMPING AND CUTTING MEANS

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9 Claims. (Cl. 30—124)

This invention relates to a clamping and cutting means and more particularly to a means which is well suited for use in surgery or the like.

Heretofore devices of this type have been used but because of their construction and design have not been satisfactory since they required substantial manipulation and/or were less accurate or reliable in their operation.

It is an object of the invention to provide a clamping and cutting means which is compact and of simple construction and which is easy to operate and provide an accurate and simultaneous clamping and cutting operation on a material to be cut thereby.

This is accomplished by employing a pair of clamping devices in side-by-side abutting relation, each comprising a pair of clamping elements which are hingedly connected at one end and provided with a latch means at the other end for holding the elements in clamping relation. One of the clamping devices is provided with knife means for severing the material to be clamped, as an incident to the clamping operation, with the knife means being located between the clamps and at a predetermined distance from the abutting sides of the devices to insure that a predetermined amount of material will project from the other clamping device.

A feature of the invention is the provision of finger pieces on the clamping devices for simultaneously moving the two devices into clamping and cutting relation after which the two clamping devices can be readily separated from their abutting relation with the material clamped therein.

Another feature of the invention is the provision of means for preventing the skewing of the clamping elements as they move into clamping relation and also means for preventing slipping of the material as an incident to the cutting thereof.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the accompanying drawings in which:

FIGURE 1 is a side view of the clamping and cutting means.

FIG. 2 is an end view looking from the right in FIG. 1.

FIG. 3 is the other side view of the clamping and cutting means shown in FIG. 1.

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 1.

FIG. 5 is a sectional view taken along line 5—5 of FIG. 1.

FIG. 6 is a view of the clamping device partly in section with the device shown in clamping position.

FIG. 7 is a plan view of the assembled clamping devices.

FIG. 8 is a plan view of one of the clamping devices.

FIG. 9 is a plan view of the other clamping device.

While the present invention may be used for clamping and cutting laboratory tubing or frangible fabrics, it has particular use in clamping and cutting an umbilical cord and in clamping and cutting arteries or veins in surgical operations. To simplify the description of the present invention, the term "material" will be used herein to designate all of these materials which might be clamped and cut by the present invention.

As shown in the drawings, the clamping and cutting

2

means of the present invention comprises a pair of clamping devices 10, 11 assembled in side-by-side abutting relation. The clamping device 10 comprises a pair of elongate clamping elements 12, 13 hinged at 14 at one end and provided at their other end with a cooperating latch 15 and abutment means 16. The clamping elements 12, 13 have cooperating clamping faces 17, 18 which can be provided with mating teeth 19 to enhance the gripping action of the clamp on material placed therebetween. The clamping device 11 comprises a pair of clamping elements 22, 23 hinged at 24 at one end and provided at their other end with a cooperating latch 25 and abutment means 26. The clamping elements 22, 23 have cooperating clamping faces 27, 28 which can be provided with mating teeth 29 to enhance the gripping action of the clamp on material placed therebetween. The clamping faces 17, 18 and 27, 28 have longitudinal slots or grooves 17a, 18a, 27a and 28a therein.

The clamping devices 10, 11 are each preferably molded as one-piece units from a suitable plastic material, which is preferably sterilizable having sufficient rigidity to function as a clamp and yet sufficiently flexible to provide for hinging and latching of the clamping elements as required. One such material is a nontoxic hydrocarbon polymer such as a linear polyethylene or polypropylene or copolymers thereof.

The abutting sides of the two clamping devices are provided with a releasable connection whereby they may be normally frictionally held in assembled relation for simultaneous operation but may be separated in use when required. As shown in the drawings, the clamping device 11 has pins 30 projecting from each clamping element adjacent the hinge and the latch ends, which pins extend into elongate sockets 31 formed in the adjacent surface of the clamping device 10 so that they will be frictionally held therein and hold the two clamping devices in assembled relation during the movement thereof into clamping relation.

As shown in the drawings, the clamping device 11 is provided with knife means for cutting or severing the material disposed in the clamping device. Preferably this knife means comprises a metal blade 32 having one edge 33 anchored in the slot 27a in clamping element 22, as by lugs 34 interlocked therewith (FIG. 1) and the other edge 34, which is preferably razor sharp, extending above the clamping face and adapted to be received in the groove 28a on the element 23 so as to sever the material disposed between the clamping faces as an incident to the clamping operation. If desired the clamping element 22 can have longitudinally spaced needles 36 which project slightly above the cutting edge of the knife, to engage and/or pierce the material and prevent slippage thereof as may be present due to the pivoting of the clamping elements, about the hinged end as they move into clamping relation.

While these pins can be sharp steel or the like metal pins having one end embedded in the plastic of the clamping element, in the illustrated form of the invention they are molded integrally with the body of the clamping element. The material of the body, while having substantial rigidity so as to pierce or partially pierce the material disposed in the device, is sufficiently flexible to permit flexing of the needles, if necessary, to insure a satisfactory clamping and cutting action by the clamping device when moved into said clamping relation.

As shown in FIGS. 4 and 7, the knife blade 32 is located on the element 22 of the clamping device 11 so as to be positioned between the clamped portion of the material and at a predetermined distance from the abutting side faces of the elements 12 and 22 so that there will always be a portion or stub of the material being cut projecting from the side of the clamping device 10.

In order to insure that the clamping devices will move simultaneously into clamping position, finger pieces are formed on the clamping devices at the end remote from the hinged ends so as to extend over the two clamping devices to uniformly apply pressure thereto. While the finger pieces can be formed with one on each clamping device, in the herein illustrated form of the invention, the clamping device 11 has two lateral projections 40, 41 formed thereon, as shown in FIG. 8, so as to overlie the exterior surfaces of the elements 12, 13, as shown in FIG. 2, when the two clamping devices are assembled. This construction, when finger pressure is applied to the finger pieces, will insure simultaneous operation of the two clamps into clamping relation and the severing of the material.

Should it be desired to stabilize the movement of the clamping elements as the clamping devices are moved into clamping relation, a stud 42 can be provided on the clamping element 13 adjacent the hinge 14 to project therefrom and into the groove 17a in the element 12 to engage the walls thereof and prevent skewing of the elements as they move about the hinge means, thus producing an accurate and controlled clamping and cutting means.

After the clamping and cutting means has been operated and it is desired to separate the clamping devices and the severed material clamped therein, they can be moved laterally sideways away from one another for separation. To facilitate this lateral movement, the clamping devices can have one or more finger grip portions on the exterior thereof. As illustrated, the clamping device 10 has an undercut portion 44 on the lower side thereof, FIG. 4, by which it may be gripped by the fingers to move it into separated position.

The clamping devices of the present invention are normally expandable and disposable. However, under some circumstances it may be desired to release the clamping devices so that they can be sterilized and reused. To this end the clamping devices are each provided with a shallow recess 50, as shown in FIG. 6, located adjacent the latch to enable the fingernail or the like to be inserted in a notch 51 on the latch member to readily release it from the abutment and out of latching relation.

The device when used to clamp and cut the umbilical cord is applied to the cord with the clamping device 10 located adjacent the skin of the baby. Pressure is applied to the finger-piece means to cause the clamping devices to simultaneously move into clamping relation and the knife means to sever the cord. The two clamping devices are then moved laterally to separate them with the clamping device 10 remaining on the baby with a stub of the cord of a predetermined length, as determined by the location of the knife means to the abutting sides of the clamping devices, projecting from the clamping device. This stub will prevent release of the cord from the clamp due to shrinkage thereof. The clamping device 11 remains with the placenta.

When used to remove a damaged part of an artery, devices of the present invention are applied to the artery on each side of the damaged part thereof with the clamping device 11 facing the damaged part. The devices are operated and separated with the clamping devices 11 being removed with the damaged part of the artery and the clamping devices 10 remaining with the artery and having predetermined stub portions of the artery projecting from the facing sides thereof to be joined or otherwise connected.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A clamping and cutting means for simultaneously clamping and cutting a material comprising two separable clamping devices assembled in side-by-side abutting relation with the abutting sides of the clamping devices being

provided with cooperating releasable means holding them in abutting relation, each comprising a pair of elongate clamping elements having a hinged connection at one end with said elements having cooperating clamping faces and latch means at the other end for holding said elements in clamping relation, cooperating finger-piece means on said clamping devices to extend for the full width of said side-by-side clamping devices and located on the exterior thereof whereby pressure applied thereto will simultaneously move the two clamping devices into clamping relation, and knife means on one element of one of the clamping devices and having a sharp cutting edge projecting above the clamping face of said element and into cooperative relation with a slot formed in the other clamping element whereby material disposed between the elements of said clamping device will be severed incident to the clamping thereof.

2. The invention as defined in claim 1 wherein the finger-piece means comprises a lateral extension on each of the elements of one clamping device remote from the hinged end thereof and projecting therefrom and overlying the exterior of the other clamping device.

3. The invention as defined in claim 1 wherein the cooperating releasable means on the abutting sides of the clamping devices comprise cooperating pin and socket means on each element located adjacent the hinged end and the latch ends thereof to frictionally hold the devices together whereby said devices are normally retained in assembled relation for uniform simultaneous movement and are readily separable upon lateral outward force applied thereto.

4. The invention as defined in claim 1 wherein one of said clamping devices is formed with a recess in the exterior surface thereof to provide a finger grip for assisting in the separation of said clamping devices.

5. The invention as defined in claim 1 wherein the latch means is provided with finger-engaging notch means exposed when in latched position to enable the latch means to be readily released from latching position.

6. The invention as defined in claim 1 wherein the knife means is disposed on the one clamping device at a predetermined distance from the abutting sides of the clamping devices whereby a predetermined portion of the severed material projects from the abutting side of the other clamping device.

7. The invention as defined in claim 1 wherein the element of the clamping device having the knife thereon is provided with a plurality of spaced needles extending therealong and projecting above the cutting edge to engage and hold the material against slipping during the cutting thereof by the knife incident to the movement of the elements to clamping relation.

8. The invention as defined in claim 1 wherein the elements of one clamping device are provided on the clamping faces thereof adjacent the hinge with a projecting member on one element passing into a slot in the other element to prevent relative lateral movement of said assembled elements during movement of the clamping device into clamping relation whereby accurate location of the clamping devices on the material is achieved.

9. The invention as defined in claim 8 wherein said projecting member on the one element has frictional engagement with the walls of the slot in the other element to hold said elements in a normal separated relation for application and preventing inadvertent movement of the elements into latched relation.

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