

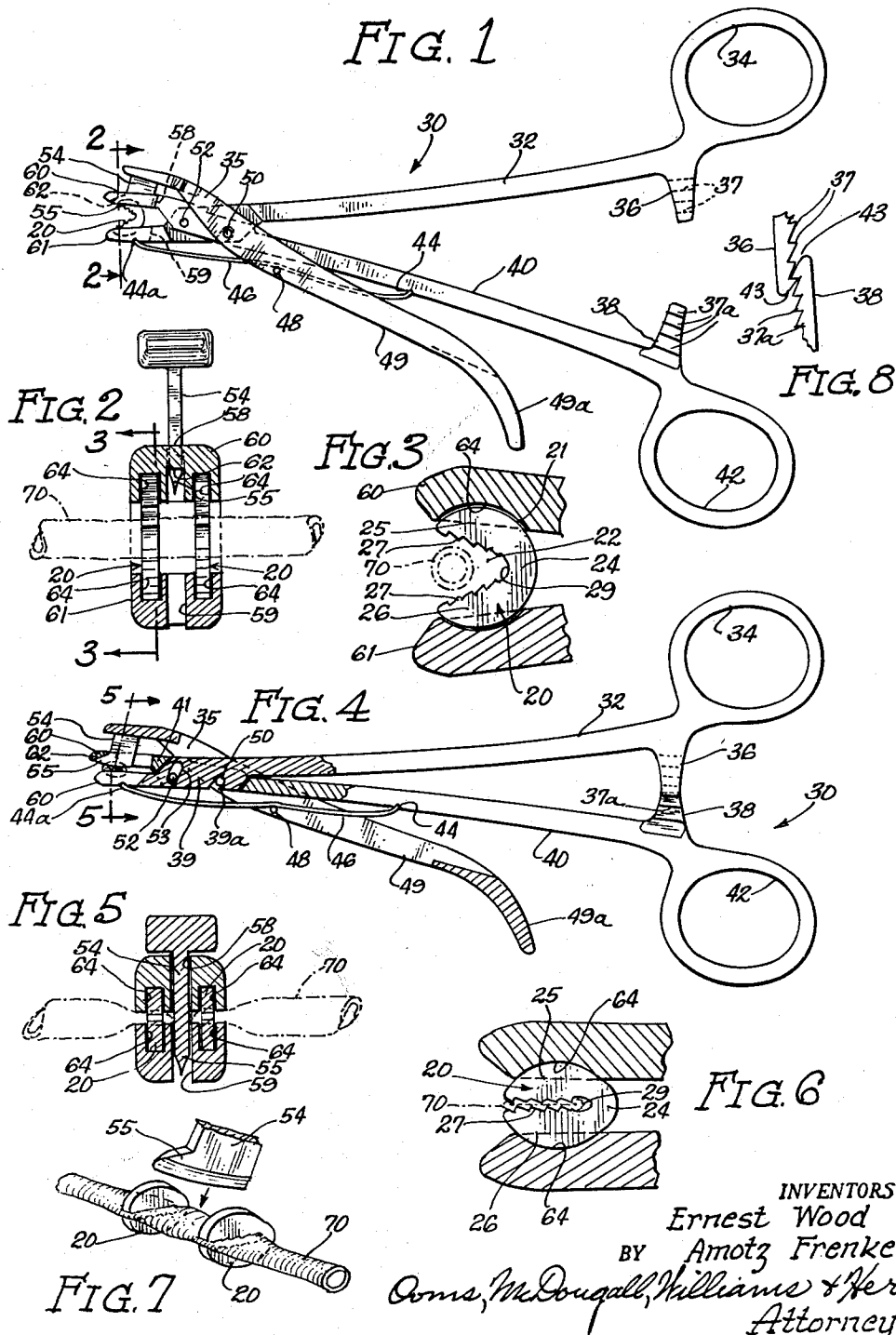
March 30, 1965

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3,175,556

DISSECTOR-OBSTRACTOR APPARATUS

Filed July 26, 1960



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3,175,556

DISSECTOR-OBSTRUCTOR APPARATUS

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Filed July 26, 1960, Ser. No. 45,446
6 Claims. (Cl. 128—305)

This invention relates in general to surgical devices and more specifically relates to a system, apparatus, and arrangements for clamping and severing blood vessels.

In essence the present invention incorporates a novel blood vessel clamp structure, a device by means of which the clamp structure is applied to a blood vessel and the vessel severed whereafter the device is disengaged while the severed ends are retained closed to blood flow.

One of the severe problems in surgical procedures arises from the necessity to sever various blood vessels while preventing excessive blood flow from the severed ends so that subsequent operative steps may be taken immediately. In approaching this problem many procedures have been derived, all of which are complex and have required cumbersome apparatus, time consuming procedures, and skillful manipulations. As may be appreciated, the time presently involved in clamping numerous blood vessels and the skill necessary to perform the same may in certain cases preclude a necessary operation or restrict the number of persons capable of performing the same. In addition, any delay or error during the course of an operation may have complicating or serious consequences and the possibility of such occurring, of course, multiplies with the number of vessels that must be clamped and the consequent length of the operation, wherefore it is exceedingly important to both reduce the time involved in clamping and severing blood vessels and eliminate the need for exacting and cumbersome manipulations.

To solve these problems, at least one and preferably a pair of clamps are provided which can be held within the jaws of a scissors or pliers-like instrument called a dissector-obstructor and which is in the nature of a hemostat. The instrument, hereinafter referred to as the dissector or dissector-obstructor will be described in its preferred practice for use with a pair of spaced clamps but it will be understood that it can be equally employed for strangulation of a blood vessel with but a single clamp. The instrument is operated for squeezing the clamps upon the blood vessel to close the blood vessel at two different locations whereafter a knife carried by the dissector is operated to dissect or sever the blood vessel between the two clamped portions. The dissector is then removed to enable another vessel to be severed in a like manner, while the clamps continue to hold the severed ends of the vessel closed.

As may be appreciated, the clamps are of comparatively minute dimensions and comprise a configuration of novel design whereby they may be received and carried by the dissector, applied to a blood vessel, and operated into a clamping position to maintain the blood vessel clamped, and thereafter disengaged from the dissector to permit the dissector to be used again for clamping another vessel.

The dissector in turn is of an unusual design that permits the clamps to be carried in a novel posture whereby they are placed in a semi-circling position about a blood vessel, and operated to clamp the vessel whereafter a knife blade carried by the dissector is operated to descend between the clamps for severing the blood vessel. The dissector is then withdrawn leaving the vessel clamped and in turn engaged with a novel loading structure with which it cooperates to be recharged with clamps for a succeeding clamping and severing operation.

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It may be seen from the above description that the entire process of clamping the severing blood vessels has both been simplified and accelerated.

After the dissector is charged, the surgeon simply engages the jaws carrying the clamps with a blood vessel to be clamped and operates the dissector to squeeze the clamps tightly over the vessel. The jaws are latched in a position dependent on the pressure exerted thereon to permit the surgeon to operate a knife lever carried by the dissector while the jaws are latched. The knife lever is operated to sever the vessel and the dissector thereafter unlatched and withdrawn to be reinserted in the loading device for another charge of clamps.

The entire procedure is simplicity itself and one that permits a great number of vessels to be quickly and securely tied or clamped within a minimum time period and with practically no training in the use of the equipment, thereby largely eliminating the need for complex, skillful, time consuming manual manipulation.

It is therefore an object of the present invention to provide a dissector-obstructor for use in surgical operations.

It is another object of this invention to provide an improved hemostat which functions to both clamp a blood vessel and sever the blood vessel and/or permit the removal of the hemostat while the vessel remains clamped.

It is another object of the present invention to provide an improved clamp structure for blood vessels.

It is another object of this invention to provide a clamp structure which may be carried into engagement with a blood vessel clamped in position on the blood vessel and thereafter disengage from the dissector.

With the foregoing and other objects in view which will appear as the description proceeds, the invention comprises a novel system and certain novel features of construction, arrangement and combination of parts are provided hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of this invention, there is illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when considered in connection with the following description, this invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

In the drawings:

FIG. 1 is a side elevation of the dissector-obstructor;

FIG. 2 is a sectional view taken along the line 2—2 in FIG. 1 to illustrate the jaw section of the dissector poised for clamping a blood vessel;

FIG. 3 is a side elevation taken along the line 3—3 in FIG. 2 for the similar purpose;

FIG. 4 is a view similar to FIG. 1 with the exception that the dissector is shown in clamping position and partially broken away to illustrate certain internal constructions;

FIG. 5 is a sectional view taken along the line 5—5 in FIG. 4, but with the knife blade operated to sever a clamped vessel;

FIG. 6 is a side sectional view of one jaw showing a clamp in substantially its clamping position;

FIG. 7 is a perspective view showing the blood vessel clamped and the knife poised to sever the same;

FIG. 8 is a partial view showing the manner in which the dissector latch operates.

Referring now to FIG. 1 it will be seen that the dissector generally indicated at 30 comprises a pair of elon-

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gate lever elements 32 and 40 joined by a pivot pin 52 to permit a scissors or pliers-like movement of the respective jaws 61 and 60. As may be seen in FIG. 4, pin 52 is engaged in a slot 53 extending through a narrowed portion 39 of element 32 behind its jaw 61 for a purpose which will become apparent. The pin 52 is mounted between the two arms 41 of a bifurcated portion extending from lever element 40 to its jaw 60. This bifurcated portion also engages the narrowed portion 39 having slot 53 therein. At one end of the members 32 and 40 are respective finger grips 34 and 42 arranged to receive, for example, a thumb and forefinger respectively to permit manipulation or pivoting of elements 32 and 40. For some persons, of course, the index finger is used in preference to the forefinger, thus leaving the forefinger free to operate the knife lever 49, to be described. Adjacent each finger grip 32 and 42 and projecting toward each other are latch elements 36 and 38 respectively each carrying a series of opposing serrations, detents, teeth, or steps 37 and 37^a respectively. The elements 36 and 38 each have a respective beveled or rounded end 43 thereon, as seen in FIG. 8, which permits the elements 36 and 38 to be transversely displaced for engaging each other as the members 32 and 40 are moved towards each other. This enables any one of the steps 37 to engage with respective steps 37^a as shown in FIGS. 4 and 8 to hold elements 32 and 40 in a desired one of a plurality of operated clamping positions.

Each element 40 and 32 carries at its other end a respective jaw 60 and 61 already mentioned. The jaws 60 and 61 are each provided with pairs of spaced apart recesses 64 each recess in facing relationship to a respective recess in the other jaw. The jaws 60 and 61 are adapted to engage a clamp 20 between each pair of facing recesses as seen in FIGS. 2, 3 and 5. Between the spaced apart recesses in each jaw there is an aperture 58 and 59 respectively each arranged to receive the knife blade 54. The aperture 59 in the jaw 61 is actually a slot that extends to the end of the jaw 61 to permit the knife blade 54 and the integrally formed stop 55 carried thereon to completely descend therethrough. The aperture 58 in the other jaw 60 is dimensioned to just accommodate the blade 54 and is extended as a recess 62 to the end of jaw 60 as perhaps best seen in FIGS. 2 and 4. This permits the top wall of recess 62 to engage stop 55 while enabling the knife edge formed on the bottom of knife 54 and the stop 55 to be withdrawn into a safe position.

The knife blade 54 is carried by a knife lever 49 which has a bifurcated portion 35 engaging over bifurcated portions 41 and pivotally mounted on the elongate lever elements 32 and 40 at pin 50 extending through portions 41. Pin 50 is mounted similarly to pin 52 in that it engages in a corresponding recess or slot 51 in portion 39. Portion 39 is at this point provided with a lip 39^a that may engage pin 50 when arms 32 and 40 are separated to a predetermined position to prevent unnecessarily wide separation. Knife lever 49 is normally biased to hold the stop 55 against the top wall of recess 62 by the flat leaf spring 46. The spring 46 is engaged under tension between the shoulders of recesses 44 and 44^a in lever element 40 and jaw 61 respectively to exert pressure against the pin 48 carried by the lever 49. The pressure against pin 48 tends to rotate lever 49, the knife blade 54 and stop 55 clockwise so that stop 55 is firmly seated in recess 62 and abuts the top wall thereof in jaw 60. The spring 46 being tensed between the walls of the respective recesses 44 and 44^a and being restrained by pin 48 tends to rotate jaws 60 and 61 towards each other whereby a secure clamping pressure is applied for holding clamps 20 in position between the jaws.

In FIGS. 2 and 3, front and side views of a clamp 20 are shown engaged in the jaws 60 and 61 of the dissector 30. It will be noted that the clamps 20 are each largely disc shaped with the circular outer periphery 21 inter-

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cepted by a recess 22 extending beyond the point from which a radius is extended to periphery 21. In effect this leaves each clamp 20 as formed by the respective areas between cords intercepting the arc of a circle and joined by the narrow wall portion 24 holding the two segments 25 and 26 united. The foregoing is given by way of illustration but not by way of limitation, it being understood that the clamp members may be of other shapes having a slot extending inwardly from one edge for entrance of the vessel to be strangled and which is deformable to diminish the slot and clamp the vessel therein.

The sides of the recess 22 are each provided with a series of teeth or serrations 27. Thus the pressure exerted on the outer periphery 21 across one diameter by jaws 60 and 61 serves to force the segments 25 and 26 towards each other to bring the teeth 27 into engagement with a blood vessel 70 therebetween somewhat as shown in FIGS. 5, 6 and 7. The teeth 27 on one segment 25 engage between the teeth 27 on the other segment 26 to provide a very restricting clamp on an artery or vein as indicated by the blood vessel 70. In the clamping position it will be seen that the clamp 20 assumes a largely oblate or elliptical shape as the two segments 25 and 26 pivot towards each other about the inner edge of segment 24, which edge may be provided with slightly enlarged cutout portion 29 to facilitate this operation.

The clamps 20 may be formed, for example, of a metal such as vitalium or other metals found safe for use in surgery; said clamps may also be formed of materials which may be absorbed by the body or associated therewith for extended periods without toxic effect; or, for example, any one of a number of plastic, proteinaceous, albuminous, carbohydrate, cellulose ethers or esters and the like materials having desirable characteristics.

The dissector 30 is prepared for use in clamping and dissecting a blood vessel 70 with clamp 20 in position of use. In brief, the finger grips 34 and 42 are respectively engaged by a thumb and forefinger or index finger and the jaws 60 and 61 of the dissector brought into engagement with a desired blood vessel. As shown in FIGS. 2 and 3, the blood vessel 70 is now within the confines of the V-shaped recess 22 in the pair of clamps 20 held by the dissector. Pressure is applied from the fingers to the lever elements 32 and 40 through the finger grips 34 and 42 to bring the levers 32 and 40 towards each other. This movement is translated to the jaws 60 and 61 to squeeze the clamp segments 25 and 26 towards each other. As the pin 50 is not fixed in slot 53 with respect to jaw 61, extensive pressure may be exerted on the clamps. During the movement of elements 32 and 40, the rounded or beveled ends 43 on latch projections 36 and 38 are engaged and cause a slight sideward or torsional movement of the lever elements 34 and 42 which is permitted both by their length and because of the material used in their construction. This enables the steps 37 and 37^a on the latch element to become engaged in succession as the pressure on lever elements 32 and 40 continues. The respective steps 37 and 37^a that are left in final engagement of course, is determined by how far the lever elements 32 and 40 are moved.

It will be noted that as the pressure is applied the clamps 20 are operated to bring the teeth or steps 27 on opposite walls of the recesses 22 into engagement to completely obstruct blood flow from the clamped portions of the vessel as may be seen in FIGS. 5, 6, and 7. At that time, the clamps 20 assume an oblate or elliptical shape as indicated by the drawing in FIGS. 6 and 7.

With the lever elements 32 and 40 and jaws 60 and 61 latched in position, the forefinger or index finger may be released from finger grip 42 and brought into engagement with the depending portion 49^a of lever arm 49 and a slight pulling pressure exerted between them. The lever arm 49 is moved counterclockwise thereby to carry the

knife blade 54 into engagement with the portion of the blood vessel between the two clamps 20 and sever the same.

As the circumferential or radial dimension of the clamps has been considerably reduced, the opening of the jaws 60 and 61 will permit their release therefrom. Thus the lever elements 32 and 40 are given slight opposite sideways or tortional movement to separate the respective engaged steps 37 and 37^a on the latch projections 36 and 38 and thereafter moved apart. The jaws 60 and 61 thus separate thereby disengaging from the clamps 20. The clamps 20 are left then clamped tightly over the respective severed ends of the blood vessel 70.

In accordance with the above, there has been shown and described herein a novel, useful, and extremely simple system arrangement for clamping and severing blood vessels which is capable of quick repeated operation without the need for excessive training or skill, but the particular embodiments described herein are not limitations upon other manners of practicing the invention.

We claim:

1. A dissector-obstructor for use in applying clamps and for severing a succession of blood vessels, the improvement comprising a pair of jaws having a common pivot and facing walls with spaced-apart recesses in each wall, said recesses being aligned with a respective recess in the other facing wall for simultaneously engaging a respective clamp between each pair of aligned recesses, a knife blade and an arm pivotally carried in association with one jaw for supporting said blade, means carried by said arm for biasing said jaws in opposing directions to securely engage each clamp, said means biasing said knife blade in the same direction as the other jaw, and a lever arm for each jaw whereby said jaws are operable in their respective biased directions and said knife blade arm is operable in opposition to its biased direction.

2. The arrangement claimed in claim 1, in which said pivot is engaged in a slot whereby it may be translated to permit the insertion of a clamp between said jaws.

3. The arrangement claimed in claim 1, in which said knife blade is located between said spaced apart recesses.

4. The arrangement claimed in claim 1 in which said one jaw has a recess in which said knife blade is engaged with one wall of said recess serving as a stop for said blade.

5. The arrangement claimed in claim 1 in which the other jaw has a recess for receiving said blade.

6. In a dissector-obstructor for use in applying clamps and for severing a succession of blood vessels, the improvement comprising a pair of jaws having a common pivot and facing walls with laterally spaced apart recesses in each wall, said recesses being aligned with a respective recess in the other facing wall for simultaneously engaging a respective clamp between each pair of aligned recesses, a knife blade and an arm pivotally carried in association with one jaw for supporting said knife blade for rocking movement between the laterally spaced apart recesses between retracted and operated positions, means for biasing said jaws in opposite directions to securely engage each clamp therebetween and for biasing said knife blade toward retracted position, and a lever arm for each jaw whereby said jaws are operable in their respective bias directions and said knife blade arm is operable in opposition to its biased direction towards operated position.

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