July 7, 1959 R. L. COOPER 2,893,378

SURGICAL RETRACTOR APPARATUS

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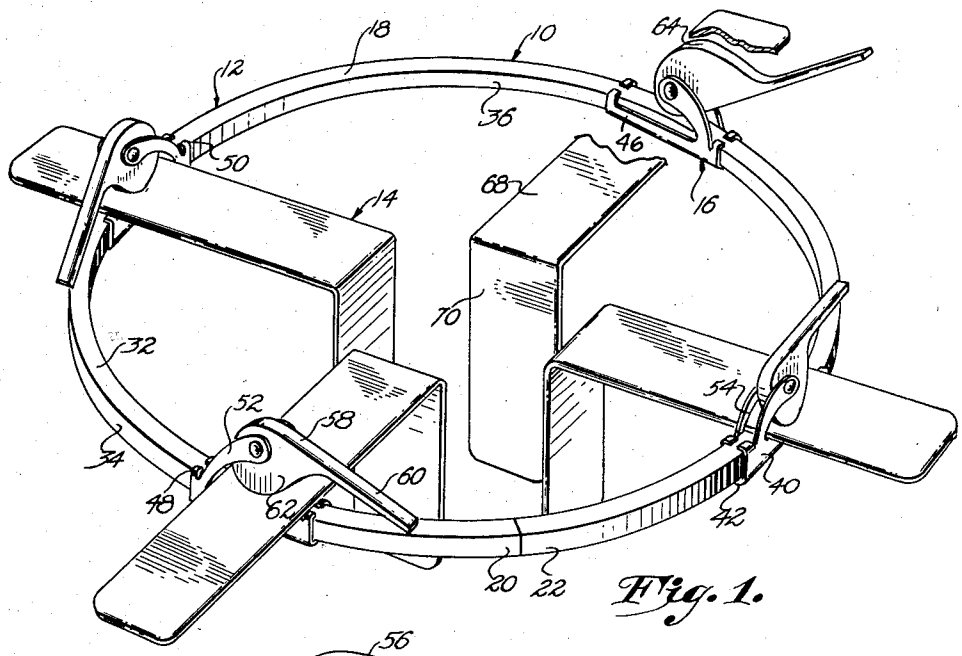


Fig. 1.

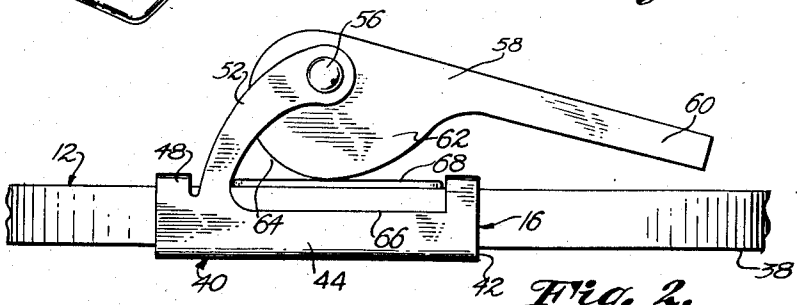


Fig. 2.

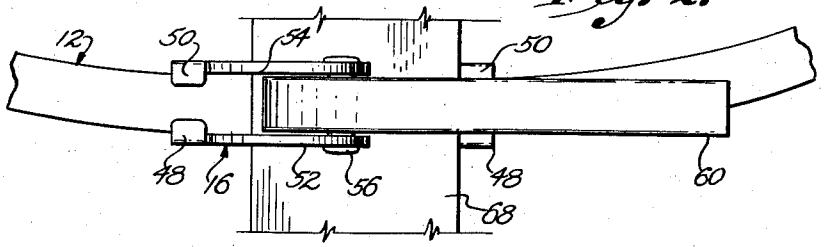


Fig. 3.

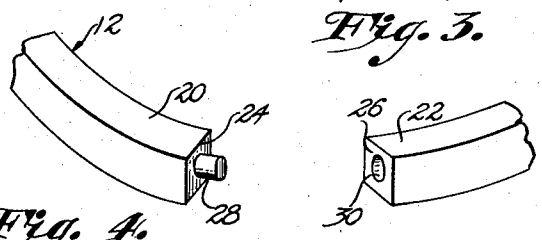


Fig. 4.

INVENTOR.
Robert Lee Cooper
BY
ATTORNEY

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SURGICAL RETRACTOR APPARATUS

Robert Lee Cooper, Warrensburg, Mo.

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3 Claims. (Cl. 128—20)

This invention relates to medical appliances and more particularly to improved surgical retractor apparatus for holding or drawing back the edges of an incision and/or the viscera exposed by such incision.

There has existed a need for some time of the provision of an efficient, practical form of surgical retractor apparatus which will perform the function of retracting the edges of a wound produced by a surgical incision, this being especially true because it is desirable that the surgeon and his assistants have the greatest access possible to the area exposed by such incision and also, that the surgical appliance free the hands of the doctors for more important duties incident to the operation other than merely holding the wound open. It can readily be seen that if such retractor apparatus can be furnished that the operation time can be materially shortened as well as allowing the surgeon to do the same amount of work with fewer assistants. When hand retraction is utilized, there is a tendency for the person performing such retraction to become weary and allow the wound to close somewhat, thereby restricting the work area for the surgeon and causing, in man instances, detrimental effects upon the patient undergoing the operation.

It is therefore the most important object of this invention to provide surgical retractor apparatus which may be quickly and easily placed in position, which will efficiently perform the required function of holding back the edges of an incision, that will allow the surgeon and his assistants free access to the exposed area, and which is instantly releasable in case of emergency which would require immediate disengagement of the retractor with the edges of the wound.

An equally important object of this invention is to provide surgical retractor apparatus which includes a flexible annulus adapted for disposition in circumscribing relationship to the incision and wherein there is provided a plurality of retractor assemblies mounted on the annulus in a manner so as to be freely shiftable longitudinally thereof but which are clampable in incision edge retracting relationship.

Another important object of this invention is to provide surgical retractor apparatus as above mentioned in which the annulus is split whereby the retractor assemblies may be quickly and easily placed on and removed from the annulus by biasing the adjacent ends of the split ring outwardly and then in opposite directions so that such assemblies may be slipped off and on the free ends thereof.

Also an important object of this invention is the provision of surgical retractor apparatus wherein the retractor assemblies include means for holding the edges of the incision back and additional structure for clamping the retraction means in a rigid position relative to the assemblies and simultaneously releasably clamping the assembly in any of a plurality of positions relative to the annulus member upon which such assemblies are disposed. Another important object of this invention relates to the provision of surgical retractor apparatus wherein

the retractors comprise generally L-shaped elements which are releasably held in place on the main annulus member by a novel clamping assembly which is of such construction that the retractor elements may be slipped into and out of the clamping assembly without movement of the annulus or any of the remaining clamping assemblies disposed on such annulus.

Also an important object of this invention is the provision of surgical retractor apparatus as alluded to above in which the clamping assemblies have a cam lever mechanism thereon which performs the dual function of clamping the L-shaped retractor element in a fixed position on the annulus while at the same time securely affixing the clamping assembly to the annulus member.

Other important objects of this invention include surgical retractor apparatus in which the main annulus member for holding the retractor elements and clamping assemblies and which is preferably a split ring has a pin disposed on one end of the annulus and extending therebeyond and the other end of the annulus member having a cavity for receiving the pin to thereby prevent lateral displacement of the ends with respect to each other; and additionally apparatus in which the clamping assembly includes a rider adapted for sliding disposition on the annulus member and which additionally includes guides for aligning the L-shaped retractor elements substantially radially of the annulus so that retraction of the edges of the wound can be made from an infinite number of angles.

Other important objects of the instant invention will become clear or be obvious as the following specification progresses and having reference to the drawing forming a part hereof:

Figure 1 is a perspective view of surgical retractor apparatus embodying the concepts of the instant invention, certain parts being shown fragmentarily for clarity of illustration;

Fig. 2 is an enlarged, fragmentary, side elevational view showing one of the retractor element clamping assemblies in place on the retractor annulus;

Fig. 3 is an enlarged, fragmentary, top plan view of the clamping assembly illustrated in Fig. 2; and

Fig. 4 is an enlarged, fragmentary, perspective view of the normally abutting ends of the retractor annulus showing the same in expanded position.

Surgical retractor apparatus shown perspectively in Fig. 1 of the drawings is designated generally by the numeral 10 and which has as the major component parts thereof an elongated member or annulus 12, a plurality of retractor elements 14 and a clamping assembly 16 for each retractor element 14.

Although elongated member 12 can be constructed in numerous forms, such as a square, rectangle, or substantially U-shaped, it is to be preferred that member 12 be longitudinally configured to dispose the ends thereof in facing relationship and in this respect, it has been found that an annulus 18 is the most advantageous construction for reasons hereinafter set forth. Annulus 18 may be suitably formed of a stainless steel rod which is substantially rectangular in transverse cross-section and which is bent to form a true split ring circle. Since annulus 18 is preferably formed of highly resilient material such as stainless steel, it can be appreciated that the ends 20 and 22 thereof are biased toward one another with the adjacent faces 24 and 26 in abutting relationship. Means for preventing the lateral displacement of ends 20 and 22 with respect to each other may conveniently take the form of a cylindrical pin 28 mounted on face 24 and which is receivable in a cylindrical cavity 30 formed in the end 22 of annulus 18. It can now be ascertained that when pin 28 is disposed in cavity 30 lateral displace-

ment of the ends 20 and 22 with respect to each other is prevented but, by the same token, upon biasing of the ends 20 and 22 outwardly with respect to each other and subsequent twisting of annulus 18 so that the ends 20 and 22 are disposed in opposite directions from their normal abutting position, various retractor applicanes hereinafter to be described may be slipped off and on the ends 20 and 22 disposed in their expanded position.

Inasmuch as annulus 18 is formed of a rod which is rectangular in cross-section, such annulus presents an upper or top wall 32, a pair of side walls 34 and 36 and a bottom wall 38. Slidably mounted on annulus 18 are a plurality of removable rider or clamping assemblies 16 which include a substantially U-shaped rider 40 which has a bight or bottom wall 42 which is adapted for sliding engagement with the bottom wall 38 of annulus 18. U-shaped rider 40 also includes a pair of substantially parallel, spaced legs or side walls 44 and 46 which are adapted for sliding engagement with the walls 34 and 36 respectively of annulus 18, there being provided a series of inturned ears 48 and 50 on each of the legs 44 and 46 respectively.

As clearly apparent in Figs. 2 and 3 of the drawings, the pair of ears 48 and 50 provided on each of the legs 44 and 46 respectively are preferably disposed at the outermost ends of the legs on corresponding uppermost corners thereof. Ears 48 and 50 are integral with legs 44 and 46 and are bent over in a position to slidably engage the uppermost face or wall 32 of annulus 18 to thereby retain the rider 40 upon annulus 18 but at the same time, allow sliding movement thereof along the annulus. It should be noted at this point that the space provided between legs 44 and 46 should be sufficient that the rider 40 may be easily moved along annulus 18 without any binding of the component parts, it being recognized that because of the annular shape of annulus 18, the distance between legs 44 and 46 must be somewhat greater than the cross-sectional width of the annulus 18 to allow for the curvature of the latter. Thus, in this manner rider 40 may be slipped over either of the ends 20 or 22 and will depend most usually on whether or not the surgeon prefers to insert the retractor elements from the left or right hand side.

Mounted on one end of rider 40 and forming an integral part of the legs 44 and 46 respectively are a pair of elongated arcuate lever brackets 52 and 54 which receive a normally horizontal pivot pin 56 at the uppermost ends thereof. Pivotally mounted upon pivot pin 56 between brackets 52 and 54 is an elongated cam lever 58 having a relatively narrow longitudinally extending handle 60 and nodule portion 62 which in turn has a longitudinal cam surface 64 thereon.

Each of the legs 44 and 46 has a cut-out portion 66 in the uppermost longitudinal edge thereof and which extends from bracket 52 to ear 48 in leg 44 and from bracket 54 to ear 50 in leg 46, the cut-out portions 66 preferably being of longitudinal length equal to the width of retractor elements 14 so as to serve as guides to cause elements 14 to be disposed in a radial position with respect to annulus 18 when placed in position in clamping assembly 16. Also of note is the fact that the uppermost portion of annulus 18 extends beyond the uppermost edge of the sides 44 and 46 respectively for a purpose which will become clear later.

Having further reference to the retractor elements 14, it can be seen in Fig. 1 of the drawings that such elements preferably comprise a series of L-shaped elements having a normally horizontal portion 68 and a vertical extension 70 which is most usually disposed at an angle of 85° to the portion 68. It is to be noted that the portion 68 and extension 70 of elements 14 may be of any length but for the purposes of the instant invention, it is desirable that the portions 68 be of substantially the same width as the distance between brackets 52 and 54 and the ears 48 and 50 respectively which form the outer limits of cut-out portion 66. Thus when portion 68 is disposed in cut-out 66, the brackets 52 and 54 and ears 48 and 50 serve as guides which cause the elements 14 to be disposed substantially radially to annulus 18. As clearly shown in Fig. 2 of the drawings, elements 14 are disposed in clamping assembly 16 with the lowermost face of portion 68 located on the upper wall 32 of annulus 18 and within the cut-out portion 66. Thus the cam lever 58 is adapted to be swung about pivot pin 56 in a manner such that cam surface 64 frictionally engages the uppermost face of portion 68 to thereby clamp element 14 in a rigid position relative to clamping assembly 16 while simultaneously causing the bottom wall 42 to frictionally engage the bottom wall 38 of annulus 18 whereby rider 40 is securely clamped to the annulus 18. Thus it is now recognizable that clamping assembly 16 performs the dual function of rigidly holding elements 14 in a designated position while simultaneously causing the rider 40 to be clamped in a set position relative to annulus 18.

It can be seen in Fig. 3 of the drawings that the longitudinally extending handle 60 of assembly 16 is disposed in a position whereby the same is substantially tangential to the curvature of annulus 18 and therefore, can be grasped easily and quickly by the surgeon in case the need arises to shift the position of retractor element 14.

The manner in which surgical retractor apparatus 10 is utilized by a particular surgeon can, of course, be varied but it has been found that the following procedure is advantageous. Various sizes of rings or annuluses 18 may be provided for the retractor assemblies 16, the circular shape shown in Fig. 1 being preferable for certain types of operations, but it is to be noted that even if a circular annulus 18 is employed, the diameter of such circles may be varied to suit the particular conditions being met. Thus, if an operation is to be performed on the side of a patient or other similar surfaces, the annulus 18 could be bent to conform to a curved surface. In other words, instead of annulus 18 lying in one plane, the ring may be bent so that it lies in numerous planes in such a manner that it will fit or lie on the curved surface of the patient at that area in which the incision is to be made.

After the surgeon has selected the particular annulus which is most suitable for the particular type of incision to be made and in the designated area, the ends 20 and 22 of annulus 18 are biased apart and then moved outwardly relative to each other so that a plurality of clamping assemblies may be slipped over the ends 20 and 22, the number of such assemblies 16 being placed thereon of course depending upon the size of the incision and the viscera which it is desired to be held in a certain place. Although clamping assemblies 16 could of course be placed on annulus 18 after the operation was in progress, it is manifest that it is most desirable to place such assemblies 16 on the ring prior to making of the incision and placement of elements 14 for the reason that it is usually not desirable to disturb the retractor assembly once the operation commences.

After placement of the annulus 18 having the clamping assemblies 16 thereon in position on the patient's body where the incision is to be made, the surgeon makes such incision whereupon the operating handles 60 of each assembly 16 are moved upwardly so that a retractor element 14 may be slipped into position within cut-out portion 66 and on the uppermost wall 32 of the annulus 18. As the retractor element 14 is placed in position in clamping assembly 16, the vertical extension 70 is placed in the correct retracting position against the edge of the incision and then portion 68 of the element 14 is pulled through assembly 16 until the proper retraction upon the edge of the incision is obtained, whereupon the cam lever 58 is swung downwardly to cause the cam surface 64 to bias the portion 68 into engagement with annulus 18 and also securely affix rider 40 to the annulus 18. From the fore-

going it can be perceived that there is now presented surgical retractor apparatus in which the retractor elements **14** may be quickly and easily placed in position in retracting relationship by mere movement of handles **60** upwardly and downwardly to thereby release and engage the retractor elements **14**, and thus each element **14** is independently shiftable and individually removable at the will of the surgeon or his assistants.

Although it is contemplated that the component parts of surgical retractor apparatus **10** be constructed of stainless steel, which may be easily cleaned and is of durable construction, it is manifest that various types of retractor elements **14** may be employed and especially is this true as to the extension **70** of elements **14** which may be conveniently formed of malleable material, so that such extensions **70** may be suitably formed to conform with the particular incision which is being held open or the viscus which it is desired to be held in place by element **14**. Also, because of the fact that elongated member **12** is preferably annular in configuration, it can be appreciated that the retractor elements **14** can be disposed in an infinite number of positions relative to the center of the incision and therefore, retraction can be accomplished in any desired direction.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A device for releasably and adjustably clamping a surgical retractor element to an elongated member of rectangular cross-section, said device comprising an elongated rider assembly having a bottom wall adapted to slidingly engage the lower face of the member when the assembly is on the latter, a pair of side walls adapted to slidingly engage the side faces of the member when the assembly is on the latter, and an inturned ear on each side wall respectively adjacent each end thereof respectively, said ears being disposed in spaced, opposed pairs and adapted to slidingly engage the upper face of the member when the assembly is on the latter, there being an open space between said pairs of ears for exposing a stretch of the member and for receiving a part of the element upon said stretch of the member; and a cam lever mechanism swingably mounted on the assembly and having a cam surface adapted to clampingly engage said part of the element oppositely to the engagement of the latter upon the member when the element is received upon said stretch and the mechanism is swung to an operable position.

2. A device for releasably and adjustably clamping a surgical retractor element to an elongated member, said device comprising an assembly shiftably mounted on the member for movement longitudinally of the latter, said assembly including parts slidably engaging the member on one transverse side thereof and structure extending from said parts around the opposite transverse side of the member; and shiftable means having a single actuating mechanism for releasably clamping the element in any of a plurality of positions relative to the assembly and simultaneously releasably clamping the assembly in any of a plurality of positions relative to the member, said means including a swingably mounted lever having a cam surface thereon, said surface being engageable with the element when the latter is disposed between the member and the lever for clamping the element relative to the member when the lever is in an operable position.

3. A device for releasably and adjustably clamping a surgical retractor element to an elongated member, said device comprising a rider assembly shiftably mounted on the member for movement longitudinally of the latter, said assembly having parts substantially surrounding said member and in sliding engagement with the outer surfaces thereof, there being an open space in said assembly for exposing a stretch of the member and for receiving a part of said element upon said stretch of the member; and mechanism swingably mounted on the assembly for engaging said part of the element and clamping the same between said mechanism and the stretch of the member when the mechanism is swung to an operable position.

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