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SURGICAL CLAMP

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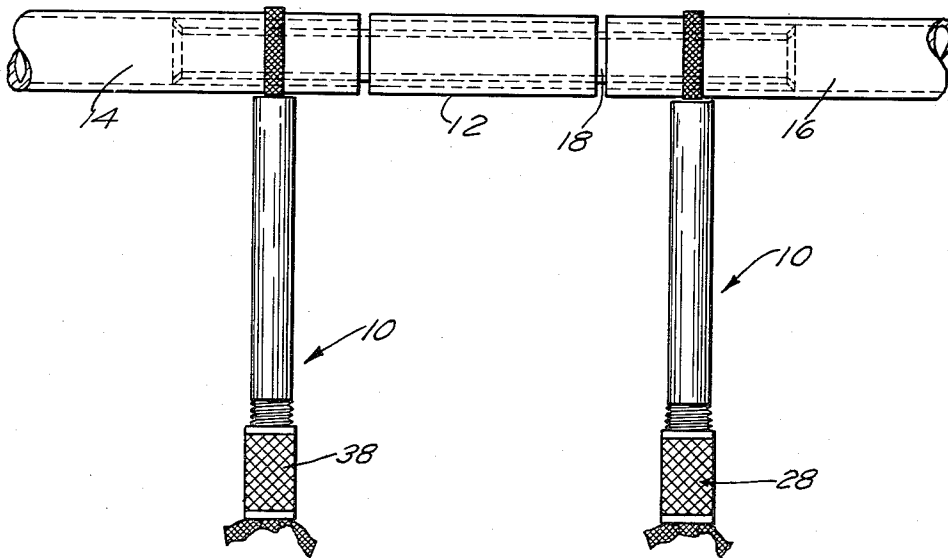


FIG. 1

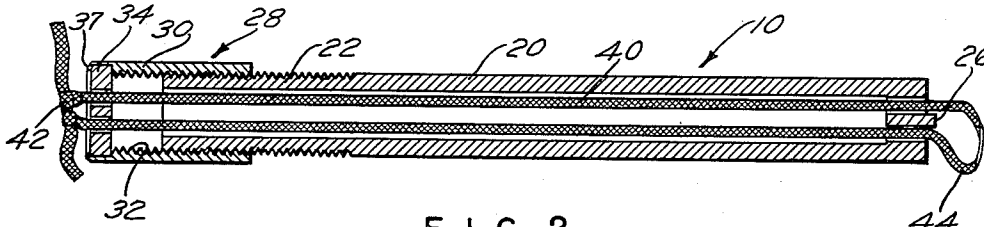


FIG. 2

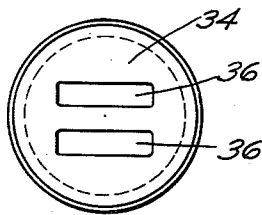


FIG. 3

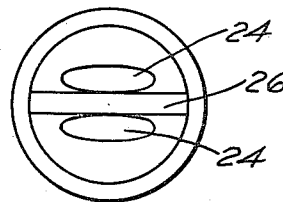


FIG. 4

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1

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## SURGICAL CLAMP

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2 Claims. (Cl. 128—346)

The present invention relates generally to a novel and improved clamp, and more particularly to a clamp adapted for use during surgical operative procedure.

A primary object of the instant invention is the provision of a clamp adapted to be used in the manner hereinafter to be described so that blood may continue to flow uninterrupted through a punctured or otherwise damaged blood vessel in the human body while a graft is being sewn or otherwise applied to the damaged vessel.

Another important object of my invention is the provision of a clamp operable to quickly and effectively clamp a blood vessel or the like to a cylindrical tubing.

A further object of this invention is the provision of a surgical clamp having means for readily varying the clamping pressure which is effected.

Still another object of my invention is the provision of a clamp of the character described wherein once the desired clamping pressure is effected, the clamp may be released without any lessening or variation of the clamping pressure, thereby freeing the hands of personnel who normally have to hold surgical clamps of the type known in the prior art.

A further object is the provision of a surgical clamp which is simple to manufacture, easy to use, and highly effective in the accomplishment of its intended functions.

Other objects, features and advantages of the invention will become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

In the drawings which illustrate the best mode presently contemplated by me for carrying out my invention:

FIG. 1 is an elevational view showing a pair of clamps constructed in accordance with the instant invention in use;

FIG. 2 is a sectional view, on an enlarged scale, of one of my clamps per se;

FIG. 3 is an end view, on an enlarged scale, looking in from the left in FIG. 2; and

FIG. 4 is an end view, on an enlarged scale, looking in from the right in FIG. 2.

Referring now to the drawings, and more particularly to FIG. 1, a pair of clamps constructed in accordance with the instant invention are generally indicated at 10. The clamps 10, as illustrated in FIG. 1, are shown in use during surgical operative procedure. More specifically, a graft 12 is being connected to a pair of blood vessel sections 14 and 16, it being understood that the blood vessel wall intermediate sections 14 and 16 has been punctured or otherwise damaged, thereby necessitating the introduction of graft 12. While the graft 12 is being applied, it is desirable that blood be permitted to continue its flow through the vessel between sections 14 and 16. In order to accomplish this, a flexible, non-toxic plastic tube 18, such as of polyvinyl, is positioned between vessel sections 14 and 16 and is clamped thereto. Thus, blood may continue its flow uninterrupted by virtue of the fact that it passes through the tube 18 while the graft 12 is being applied. Once the graft 12 has been completely applied, a slit is made in the vessel wall and the flexible tubing 18 is extracted therethrough, after which the slit is sewed up, leaving the repaired vessel ready for normal use.

In accomplishing the above operative procedure, it is important that a secure, leak-proof seal be effected when the vessel sections are clamped to the interconnecting plastic tubing. The surgical clamps presently in use for

2

this purpose have proven to be generally unsatisfactory in this respect, since the clamping action is normally effected by means of the resilience of the clamp itself, whereby a tight, leak-proof seal is virtually impossible to attain. Also, where spring clamps of this type are used, continued usage usually results in a diminishing of the resilient action of the clamp, whereby it becomes less effective. Other clamps of this type in use sometimes require that the clamp be continually grasped and manipulated by certain personnel, thereby providing a cumbersome and awkward situation. By using a clamp constructed in accordance with the instant invention, all of the foregoing disadvantages inherent in prior art devices of this type are overcome.

Referring now to FIGS. 2 through 4, it will be seen that the clamp 10 comprises an elongated tube 20, externally threaded adjacent one end as at 22, and having a pair of spaced openings 24 separated by an integral bar 26 which extends thereacross. A cap member indicated generally at 28 comprises a cylindrical side wall 30 internally threaded as at 32. Cap 28 additionally comprises an end wall 34 having a pair of spaced openings 36 therein, said end wall being rotatable with respect to cylindrical side wall 30. This may be accomplished by any desirable means, although I prefer to peen over the edge of wall 30 as at 37 in order to rotatably maintain end wall 34 in its assembled position. The outer surface of cap 28 is knurled as at 38 in order that a better grip may be imparted thereto when the cap is being turned, all in a manner hereinafter to be described. Tube 20 and cap 28 may be constructed of any suitable rigid material, although I prefer to utilize stainless steel.

In operation and use, it will be understood that cap 28 is adapted to threadedly engage tube 20, as clearly shown in FIG. 2. An elongated flexible cord 40, such as umbilical tape or the like, is threaded through the device 10, and, as will be seen from FIG. 2, the cord 40 extends through the openings 24 and 36 at opposite ends of the device and is knotted exteriorly of wall 34, as at 42, whereby one large loop is formed. The portion of the loop which extends exteriorly of bar 26, as shown at 44 in FIG. 2, functions as the clamping loop, it being apparent that as the cap member 28 is unthreaded with respect to tube 20, the loop 44 will be tightened. Thus, once the article to be clamped has been inserted through loop 44, it is simply necessary to unthread cap 28 until the desired clamping pressure is obtained.

When using the clamp 10 in the manner above described, the knot 42 will normally not be tied until the approximate size of loop 44 has been determined, this, of course, being determined by the diameter of the article to be clamped. Once the approximate size of loop 44 has been obtained, knot 42 is tied, and then a relatively small degree of unthreading movement of cap 28 will result in the application of clamping pressure. Thus, it will be seen that my clamp 10 is quickly and easily adjustable to clamp a wide variety of different diameter articles, and at the same time, the clamping pressure may be easily lessened or increased until the desired degree of pressure is obtained. Once the desired degree of pressure is obtained, the device 10 may be completely released whereupon it will simply hang in position while at the same time continuing to perform its clamping function. The flexibility of cord 40, plus the fact that it almost completely encircles the circumference of the article being clamped, cooperate to insure that a complete and effective seal is obtained completely around the diameter of the clamped article. This, of course, is of extreme importance in connection with surgical operative procedure of the type hereinbefore described.

The rotatability of end wall 34 is important since, without this feature, the cord 40 would become tangled and

3

twisted during rotation of cap 28 to effect the desired clamping pressure. Since the end wall 34 is rotatable, however, turning movement of cap 28 will result only in turning of the cylindrical side wall 30, it being apparent that end wall 34 will not move appreciably, whereby openings 36 therein and the openings 24 at the opposite end of the clamp 10 will remain in substantial alignment, and hence there will be no tendency for the cord to twist or turn.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.

What is claimed is:

1. A surgical clamp comprising an elongated, open-ended, rigid tube, one end of said tube being externally threaded, the other end of said tube having means dividing said end into two distinct openings, a cap member

4

having a cylindrical, internally threaded side wall and an end wall having a pair of spaced openings therein, said end wall being rotatable with respect to said side wall, said cap making threaded engagement with said tube, whereby the overall length of the assembly may be appreciably varied by threadedly manipulating said cap and tube.

2. The surgical clamp of claim 1 further characterized in that a flexible cord defining a loop is associated therewith, said cord having its free ends connected exteriorly of said rotatable end wall, each of said cord ends extending through different of the spaced openings in said rotatable end wall and continuing completely through said rigid tube and around said dividing means, whereby the loop portion which extends exteriorly from said dividing means may be tightened by unthreading said cap with respect to said tube.

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