

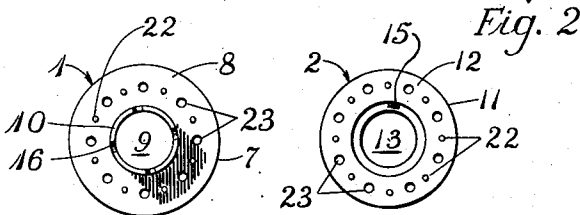
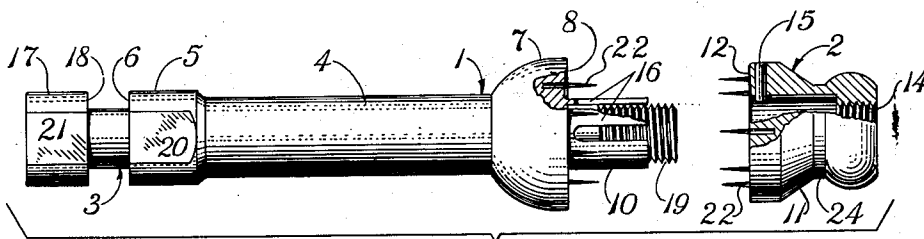
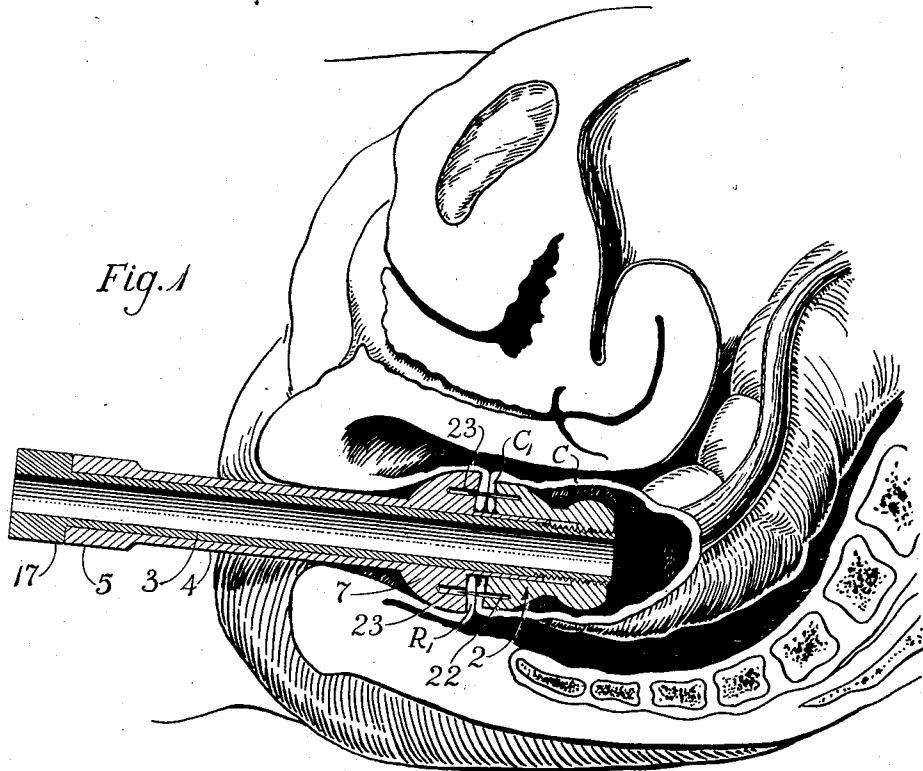
May 19, 1953

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2,638,901

SURGICAL CLAMP

Filed July 30, 1951



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2,638,901

SURGICAL CLAMP

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Application July 30, 1951, Serial No. 239,245

12 Claims. (Cl. 128—334)

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This invention relates to surgical clamps and particularly to an improved recto-colic anastomosis clamp.

It is highly desirable to carry out bowel anastomoses by clamping together intumed portions of the bowel ends and maintaining the ends so clamped until agglutination occurs at the periphery of the junction. This method, however, involves several difficulties. It is necessary that the bowel ends remain clamped for periods on the order of 7-10 days, and such periods are so long that obstruction of the bowel by the clamping means would be highly dangerous because of the accumulation of infective material in the bowel above the clamp. Also, application of the clamp, and manipulation of the clamp after it is applied, have heretofore been exceedingly difficult.

The present invention provides a recto-colic anastomosis clamp whereby the foregoing difficulties are overcome. In accordance with the invention, the clamp is so constructed as to allow ready escape of the mucoid contents of the bowel when the clamp is in place. The dangerous accumulation of infective material is thus prevented, and the bowel may be irrigated if necessary.

The anastomosis clamp of the invention is also characterized by a combination of structural features which make application and adjustment of the clamp far less difficult than has been the case heretofore. The clamp is adapted to be assembled within the bowel, with the parts of the clamp being inserted through the anus, the structure being such that positioning of the severed ends of the bowel on the faces of the clamp is readily and positively accomplished. According to the invention, clamping pressure is established and adjusted by manipulation of the clamp from below the anus. The nature of the clamp is such that, after agglutination is established, the clamp can be more readily withdrawn.

In order that the invention may be readily understood, reference is had to the accompanying drawings, which form a part of this specification, and wherein:

Fig. 1 illustrates the improved clamp fully assembled and in place to accomplish an anastomosis of the lower colon, the clamp being shown in longitudinal section;

Fig. 2 is a side elevation of the clamp, with the clamping members separated, partly in longitudinal section;

Fig. 3 is an end view of the lower clamping

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member showing the clamping face thereof; and Fig. 4 is an end view of the upper clamping member.

Referring now to the drawings in detail, it will be seen that the embodiment of the invention there shown comprises three primary parts: a lower clamping member 1, an upper clamping member 2, and a central tube 3 adapted to co-act with 1 and 2.

The lower clamping member 1 includes a shank 4 having at one end an enlarged portion 5 with a transverse shoulder 6 and at the other end a body 7 with an annular clamping face 8, Fig. 3. The clamping member 1 is tubular, being provided with an axial bore 9 extending entirely through the member. Arranged coaxially with the bore 9 is a tubular extension 10 directed away from the clamping face 8. Thus, the clamping member 1 comprises a generally tubular member with the body 7 constituting an intermediate outer enlargement.

The upper clamping member 2 comprises a body 11 having an annular clamping face 12 and an axial bore 13. A portion of the bore 13 is interiorly threaded at 14, and the bore adjacent the clamping face 12 has a diameter such that the tubular element 10 of the lower clamping member 1 may slide into and fit snugly within the bore of the clamping member 2. Extending into the bore 13 of the member 2 adjacent the clamping face 12 is a pin 15 and, to receive the pin 15, the tubular element 10 of the member 1 is provided with one or more longitudinal slots 16 open at the end of the element 10.

The tube 3 includes a plain cylindrical body portion capable of being inserted through the bores 9 and 13 and having at one end an enlarged portion 17 presenting a transverse shoulder 18 and at the other end an exteriorly threaded portion 19.

As seen in Fig. 1, when the clamp is assembled, the clamping member 1 is carried on the tube 3, being secured against axial movement in one direction by contact between the shoulders 6 and 18. The interior threads 14 of the clamping member 2 engage the exterior threads 19 of the tube 3, so that relative rotary motion between the tube 3 and the member 2 will cause the latter to be adjusted either toward or away from the clamping member 1, depending upon the direction of rotation. It will be noted that, when the pin 15 is engaged in one of the slots 16, the clamping members 1 and 2 may not rotate relative to each other. When

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this is so, the desired relative rotation between the member 2 and the tube 3 can be accomplished by holding the shank 4 and turning the tube 3. To accomplish this the end 5 of the shank and the end 17 of the tube are provided with flattened portions 20 and 21, respectively, which may be engaged by a wrench or like manual tool.

Each of the annular clamping faces 8 and 12 are provided with a series of annularly spaced projecting needles 22 and a series of annularly spaced sockets 23, the needles and sockets being so arranged that, upon proper alignment of the members 1 and 2, the needles 22 of one of the clamping faces will enter the sockets 23 of the other of the faces, and vice versa, as the two clamping members are brought together. That the needles and sockets will be aligned is assured by proper angular position of the slots 16 and pin 15.

During use of the clamp in performing an anastomosis of the type illustrated in Fig. 1, the removal of the bowel section having been accomplished in the usual manner, the clamping member 2 is inserted into the open end of the sigmoid or descending colon C and the cut edge C₁ of the sigmoid is lapped over the needles 22 of the clamping member 2. The clamping member 1 is inserted downwardly through the rectum, with the tubular element 10 extending upwardly, and the tubular element 10 is then grasped and held firmly in position while the cut end R₁ of the rectum is lapped over the needles 22 of the clamping member 1. The members 1 and 2 are then adjusted until the pin 15 enters one of the slots 16, the members 1 and 2 then being pushed together with the needles 22 entering the sockets 23. The tube 3 is then inserted through the bores 9 and 13 and rotated, while the clamping members are held from turning, to bring the clamping members 1 and 2 firmly together by action of the threaded portions 14 and 19.

At the time of the operation, only an initial firm clamping pressure is desired, and this can be obtained by turning the tube 3 as far as possible with the fingers. After 3-5 days have elapsed, the clamp is further tightened by means of wrenches applied to the flattened portions 20 and 21. This procedure is continued at appropriate time periods until the tissue of the lapped ends C₁ and R₁ is completely crushed through and sloughed off. When the clamp can be freely turned within the bowel, the process is complete, and the entire clamp is then withdrawn through the anal sphincter.

As seen in Fig. 1, the clamp in operative position does not block the bowel; the contents of the bowel may pass through the open tube 3, and irrigation may be accomplished as required. Thus, the use of a proximally placed colostomy may be completely avoided.

The body of the clamping member 2 is provided with an exterior annular groove 24 to allow the clamping member to be held firmly by the fingers when inserted in the bowel. The maximum diameter of the body 7 is made greater than that of the clamping member 2, so that the bowel lumen at the point of joinder will be adequate for easy withdrawal. In actual practice, a difference in diameter of 0.5 centimeter has been found to be adequate when the maximum diameter of the body 7 is 3.0 centimeters.

The tubular extension 10, in addition to providing means to establish an interengageable key

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and slot connection between the two clamping members, serves to seal off the space between the clamping faces 8 and 12, thus preventing the tissue of the bowel ends from being impacted in the threads 14 and 19.

It has been stated that the clamping faces 8 and 12 are annular, and this term is used in the sense that the faces are ring-like and surround the central bore or lumen of the device. While the faces 8 and 12 are shown lying in planes substantially at right angles to the central axis of the clamp, it is of course satisfactory to employ clamping faces which are not at right angles to the axis of the clamp.

It is highly desirable that the clamping faces effect crushing and shearing of the inturned bowel ends as cleanly as possible immediately adjacent the area of agglutination. For this reason, the faces 8 and 12 are dishd slightly, as seen in Fig. 2, so that, as the clamping force is increased, the greatest clamping pressure is applied at the peripheries of the clamping faces.

I claim:

1. In a recto-colic anastomosis clamp adjustable from below the anal sphincter of the patient when in use, the combination of a central tube of such length as to extend from within the colon to a point below the anal sphincter and provided at one end with an exteriorly enlarged portion presenting a transverse stop shoulder; a first clamping member including a body portion with an annular clamping face, and an extended shank terminating in a transverse shoulder directed away from said face, and an axial bore, said first clamping member being positioned on said tube with its transverse shoulder facing the stop shoulder of said tube; a second clamping member including an annular clamping face and an axial bore, said second clamping member being positioned with its face directed toward that of said first clamping member and with its bore embracing said central tube, and manually operable means including said tube for establishing relative axial adjustment of said second clamping member along said tube to vary the spacing between said clamping faces.

2. In an anastomosis clamp, the combination of a first clamping member having a shank, a body with an annular clamping face directed away from said shank, and an axial bore; a second clamping member having a body with an annular clamping face and an axial bore, the body of said first clamping member having a greater diameter than the body of said second clamping member; a central tube, said clamping members being positioned with their clamping faces directed toward each other and with said tube extending through said bores; and stop means securing one of said clamping members against axial movement on said tube in a direction tending to separate said faces, the other of said clamping members being threadably connected to said tube whereby relative rotation between said tube and said other clamping member is effective to adjust the spacing between said faces.

3. In a recto-colic anastomosis clamp, the combination of a tube having an exteriorly located stop member at one end and an exteriorly threaded portion at the other end; a first clamping member having a shank terminating at one end in a stop shoulder and at the other end in a body portion having an annular clamping face directed away from said shank, said first clamping member having an axial bore and being slid-

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ably positioned upon said tube with said shoulder facing said stop member; a second clamping member comprising a body portion having an annular clamping face and an interiorly threaded axial bore, said second clamping member being positioned on said tube with its interior threads engaging the exterior threads of said tube and with its clamping face directed toward that of said first clamping member whereby relative rotation between said tube and said second clamping member in one direction forces said clamping faces together; and means for securing a severed bowel end over each of said clamping faces when said faces are spaced apart.

4. In a recto-colic anastomosis clamp, the combination of a pair of opposed clamping members each having an annular clamping face and an axial bore, one of said clamping members having an extended shank terminating in a transverse shoulder opposite the clamping face thereof, the bore of the other of said clamping members being interiorly threaded, and a central tube extending through the bore of said one clamping member and terminating at one end in an exteriorly threaded portion engaging the interior threads of the bore of said other clamping member, said tube being provided at its other end with an exteriorly positioned stop member facing the transverse shoulder of said one clamping member, and said shank being of such length as to extend through the rectum of a patient when said clamp is in place within the colon.

5. In an anastomosis clamp, the combination of a central tube having at one end an exteriorly enlarged portion providing a transverse shoulder facing the opposite end of the tube, and a pair of opposed clamping members each having an annular clamping face and an axial bore, said tube being positioned within the bores of said clamping members, one of said clamping members being provided with a transverse shoulder opposite its clamping face and facing the shoulder of said tube, and said tube and the other of said clamping members having interengaging screw threads.

6. In an anastomosis clamp, the combination of a tube having an exteriorly threaded end portion and an exterior shoulder spaced axially from said end portion; a clamping member having a shank, a body portion with an annular clamping face and an axial bore extending through said shank and body portion, said clamping member being slidably mounted on said tube with the shank thereof extending toward said shoulder and said clamping face exposed toward the threaded end of said tube; and a second clamping member having an annular clamping face and a threaded axial bore, said second clamping member being threaded upon said end portion of said tube with its clamping face opposed to that of said first mentioned clamping member.

7. An anastomosis clamp comprising a tubular clamping member with an intermediate exteriorly enlarged portion having an annular clamping face arranged transversely of said tubular member and exposed toward one end thereof; a second clamping member having a transverse annular clamping face and an axial bore, said bore adjacent said last mentioned clamping face embracing said one end of said tubular clamping member, said bore also including an interiorly threaded portion; and a central tube extending through said tubular clamping member, said tube having at one end an exterior stop facing said tubular clamping member and at the other end

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a portion exteriorly threaded in engagement with the interior threads of said bore.

8. In an anastomosis clamp, a pair of opposed clamping members each having an annular clamping face and a central bore, the clamping face of one of said members being provided with a plurality of projecting annularly spaced needles and the clamping face of the other of said members being provided with a plurality of annularly spaced sockets to receive said needles, one of said clamping members having a shoulder opposite the clamping face thereof, the other of said clamping members being interiorly threaded, and a tube extending through said bores, said tube having at one end a shoulder facing the shoulder on said one clamping member and at the other end being provided with exterior threads engaging the interior threads of said other clamping member.

9. In an anastomosis clamp, the combination of a pair of opposed clamping members each having an annular clamping face and an axial bore, the clamping face of one of said members being provided with a plurality of projecting annularly spaced needles and the other of said members being provided with a plurality of annularly spaced sockets to receive said needles, a central tube extending through the bores of said clamping members, stop means securing one of said clamping members against axial movement in one direction on said tube, and manually operated means including said tube for establishing axial adjustment of said other clamping member relative to said one clamping member so secured.

10. In an anastomosis clamp, the combination of a pair of opposed clamping members each having an annular clamping face and an axial bore, the clamping face of one of said members being provided with a plurality of projecting annularly spaced needles and the clamping face of the other of said members being provided with a plurality of annularly spaced sockets to receive said needles, a central tube extending through the bores of said clamping members with one of said members rotatable thereon, said clamping members being provided with interengageable means for aligning said needles with said sockets, stop means securing one of said clamping members against axial movement in one direction on said tube, and manually operated means including said tube for establishing axial adjustment of said other clamping member relative to said one clamping member so secured.

11. In combination in an anastomosis clamp of the type described, a pair of opposed clamping members each having an annular clamping face and a central bore, the clamping face of one of said members being provided with a plurality of projecting annularly spaced needles and the clamping face of the other of said members being provided with a plurality of annularly spaced sockets to receive said needles, one of said members having a tubular extension concentric with the bore thereof and adapted to fit snugly within the bore of the other of said members, said extension including a longitudinal slot, a pin carried by said other clamping member and extending into the bore thereof to engage in said slot, the angular locations of said pin and slot being such as to cause alignment of said needles and sockets when said pin is engaged in said slot, a tube extending through the bores of said clamping members, stop means securing one of said clamping members against axial movement

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in one direction on said tube, and manually operated means including said tube for establishing axial adjustment of said other clamping member relative to said one clamping member so secured.

12. An anastomosis clamp comprising the combination of a tube having an exteriorly threaded end portion and an exterior stop member axially spaced from said end portion; a first clamping member including an annular clamping face, a stop shoulder directed away from said face, and an axial bore, said first clamping member being slidably positioned on said tube with its shoulder facing said stop member; and a second clamp member having an annular clamping face and an interiorly threaded axial bore, said second clamping member being threadably engaged over the exteriorly threaded end portion of said tube and having its face directed toward the

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face of said first clamping member; one of said clamping faces being provided with a plurality of projecting annularly spaced needles and the other of said clamping faces being provided with a plurality of annularly spaced sockets to receive said needles, and said clamping members being provided with interengageable means for aligning said needles and sockets.

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