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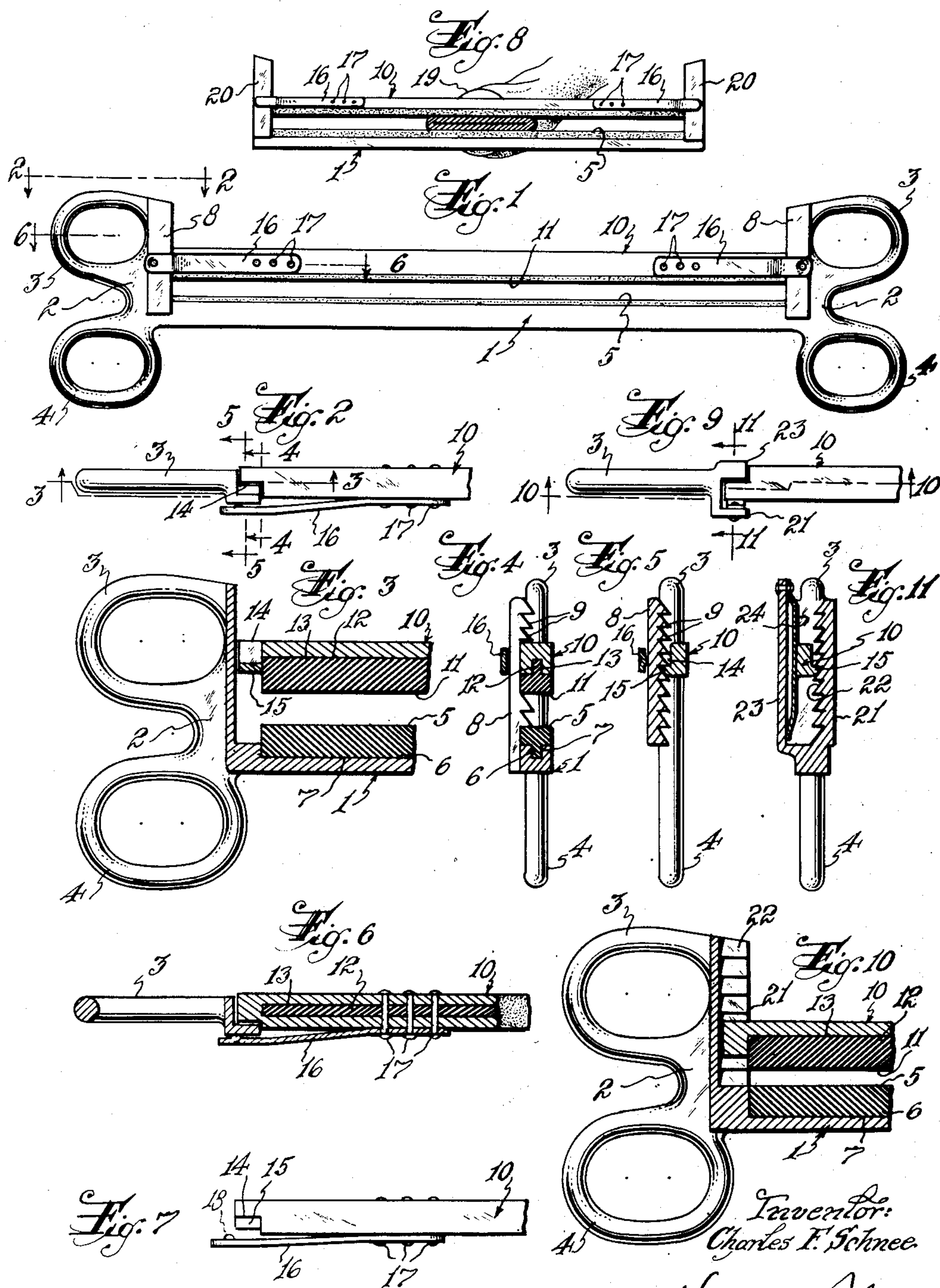
C. F. SCHNEE

2,659,371

SURGICAL CLAMP

Filed Nov. 27, 1951

2 Sheets-Sheet 1



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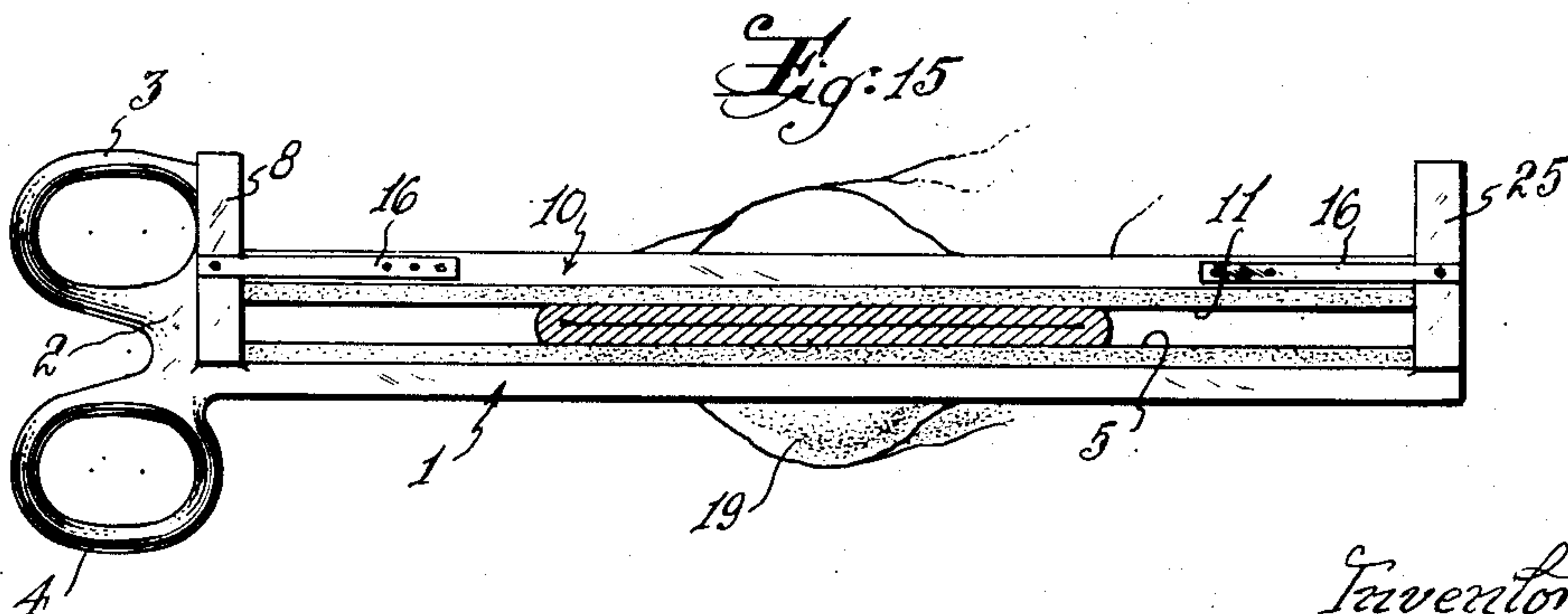
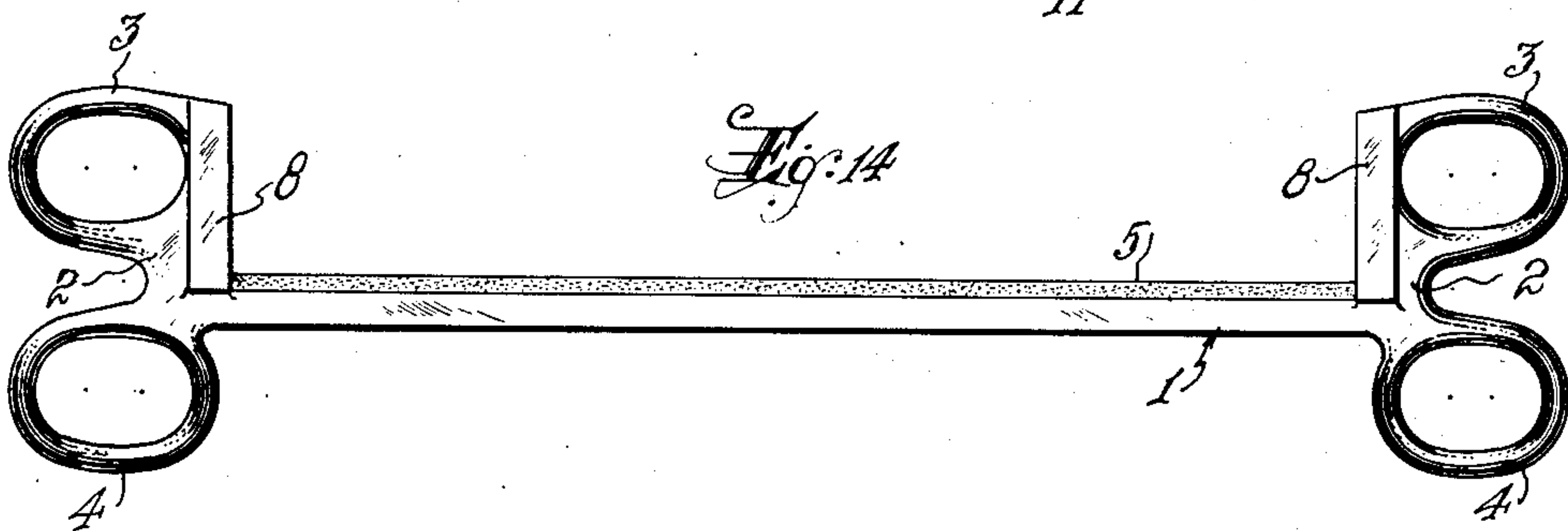
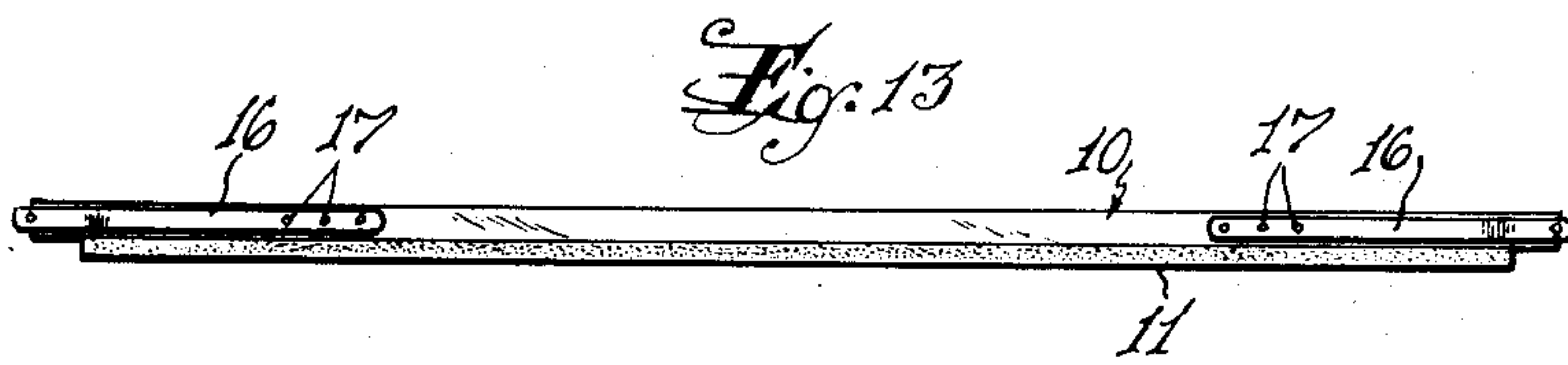
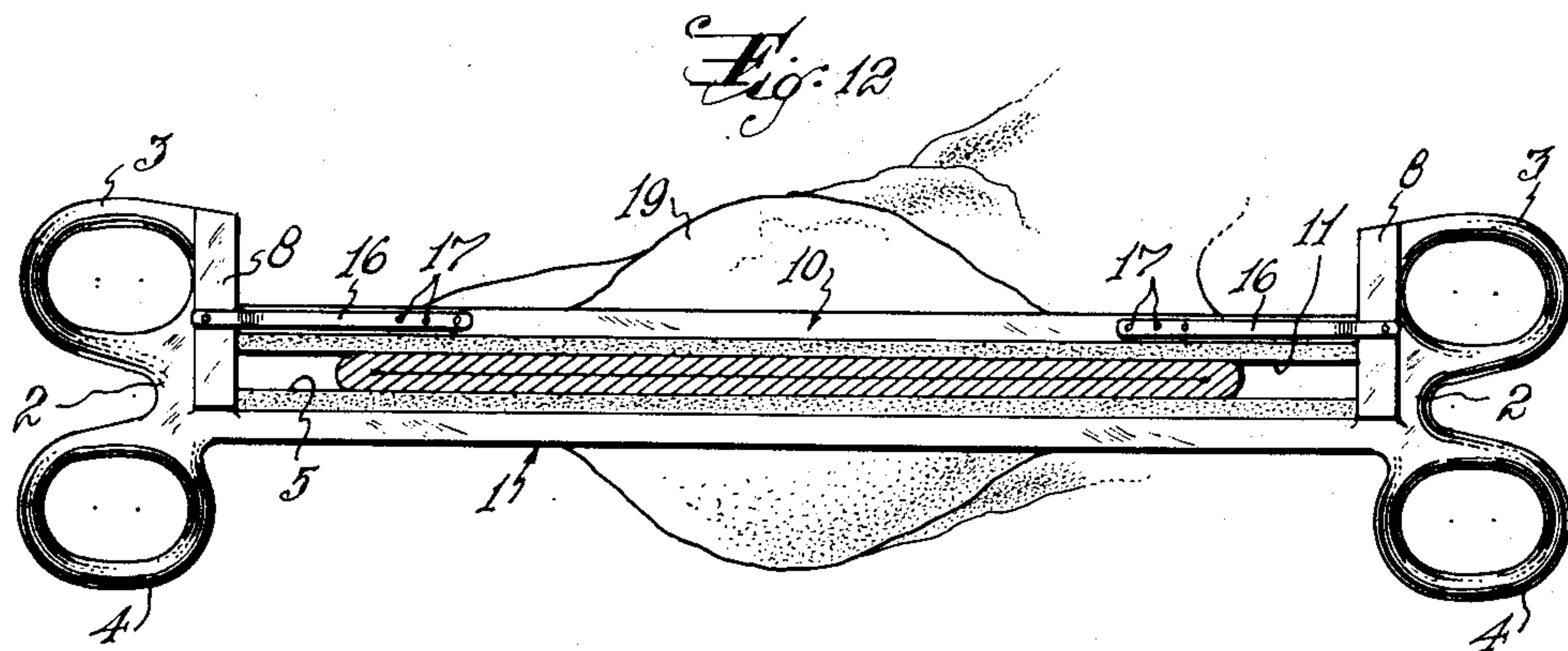
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# UNITED STATES PATENT OFFICE

2,659,371

## SURGICAL CLAMP

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5 Claims. (Cl. 128—346)

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This invention relates to surgical clamps for use in operations on the human body.

A prime object of the present invention is to provide a surgical clamp especially suitable for operations on the gastro-intestinal tract of the human body, i. e. subtotal gastrectomy or enterostomies.

Another object of the invention is to provide a surgical clamp that will cause hemostasis without causing a crushing devitalization of the cut edges of the muscles.

Another object is to provide a surgical clamp that evenly distributes the pressure across any sectioned portion of bowel causing hemostatic pressure without causing devitalization of the portion across which the clamp is applied.

Another object is to provide a surgical clamp that is adapted to clamp any viscus for the purpose of end-to-end anastomosis without first severing the viscus.

Other objects and advantages of the present invention are to provide a surgical clamp that permits the placing of the serosal sutures more accurately in a line; that facilitates the placing of the final row of musosal sutures; that does not injure or devitalize the tissue of the organ of the human body being operated upon or being held by the clamp; that permits resuturing of the muscles; that permits a fine adjustment of the pressure on the organ being operated upon; that is adapted for use in every type of bowel resection or anastomosis; and that is simple and rugged in construction, economical to manufacture and highly efficient in use.

The invention will be better understood from the description thereof to follow taken in connection with the accompanying drawings, in which

Figure 1 is a front side elevational view of a surgical clamp embodying one form of my invention.

Figure 2 is a plan view of one end thereof looking downwardly in the direction of the arrows at the ends of the line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view taken on the plane of the line 3—3 of Figure 2.

Figure 4 is a vertical sectional view taken on the plane of the line 4—4 of Figure 2.

Figure 5 is a vertical sectional view taken on the plane of the line 5—5 of Figure 2.

Figure 6 is a horizontal sectional view taken on the plane of the line 6—6 of Figure 1.

Figure 7 is a top plan view of one end of the movable bar.

Figure 8 is a front side elevational view, on a

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reduced scale, of a surgical clamp embodying a modified form of the invention and showing an umbilical cord clamped in position.

Figure 9 is a top plan view of one end of a surgical clamp embodying another modified form of the invention.

Figure 10 is an enlarged horizontal sectional view taken on the plane of the line 10—10 of Figure 9.

Figure 11 is a vertical sectional view taken on the plane of the line 11—11 of Figure 9.

Figure 12 is a view similar to Figure 1 but showing a viscus clamped in position.

Figure 13 is a front side elevational view of the movable clamping bar shown in Figure 12.

Figure 14 is a front side elevational view of the fixed clamping bar shown in Figure 12.

Figure 15 is a front side elevational view of a surgical clamp embodying still another modified form of the invention.

Referring to the drawings in detail and particularly to the form of the invention shown in Figures 1 to 7, inclusive, the surgical clamp here illustrated comprises an elongated lower clamping bar 1 terminating at each end in an enlarged portion 2 extending at right angles to the bar. The enlarged portions are formed with integral upper and lower fingerholds 3 and 4, respectively, for manipulating the clamp.

Bar 1 is provided with an upper face portion 5 of resilient material, such as rubber, which is removably secured along the top surface thereof by a central flange 6 extending along the inner surface of the face portion fitted into a central slot 7 extending along the top surface of the bar. Each of the enlarged portions of the bar is formed at one side with a flange offset outwardly from the plane of the bar and forming a ratchet bar 8. On the inner surface of this offset ratchet bar are teeth 9 as shown in Figures 4 and 5. The ratchet bars extend from approximately the tops of the lower fingerholds 4 to the tops of the upper fingerholds 3.

An upper clamping bar 10 is movable to and from the lower fixed bar 1. The movable bar is of substantially the same length as the lower fixed bar and of the same shape in cross-section as shown in Figure 4. Bar 10 is provided with a rubber face portion 11 along its bottom surface removably secured thereon by a central flange 12 fitted into a central slot 13 along said bottom surface. At each end, the movable bar is cut away as indicated at 14 and formed on the inner surface of this cutaway portion at its lower end is a ratchet tooth 15 adapted to mesh with the teeth 9 on the adjacent ratchet bar 8. The tooth



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15 at each end is biased into meshing position with the ratchet teeth on the ratchet bar by an elongated flat spring 16 secured at one end to the front of the movable bar by rivets 17 passing through the bar and through flange 12. The other free end of the spring is offset outwardly and extends beyond the end of its supporting bar where it overlies and presses against the outer surface of the ratchet bar. The spring may have a rounded protuberance 18 on its inner surface adjacent its outer end to engage the outer surface of the ratchet bar to facilitate sliding movement of the movable bar along the ratchet bars. The ratchet bars 8 thus serve as guide bars for the movable clamping bar 10 and, if desired, the outer surface of each ratchet bar 8 may be formed with a groove to guide the protuberance when sliding.

The outer surfaces of the rubber face portions 5 and 11 of the fixed and movable clamping bars, respectively, may be ribbed longitudinally, if desired, to enhance their holding properties.

In use, the movable clamping bar 10 may be moved along the ratchet bars 8 by grasping the bar with the fingers and moving it sidewise against the action of springs 16 until its teeth 15 are clear of the teeth 9 on the ratchet bars. Bar 10 may then be moved along the ratchet bars for proper spacing to permit application of the clamp onto the part of the stomach or intestines being operated upon, such as the viscus 19 shown in Figure 12, or for exerting sufficient pressure on said part to firmly clamp it in place between the clamping bars. The ratchet installations at the ends of the clamp guide the movement of the movable clamping bar so as to ensure an exact parallel relation between the clamping bars and furthermore permit a fine adjustment of the pressure on the part of the human body being operated upon, such as the stomach or intestines, so as to insure a leak-tight clamping of the opposite walls thereof. After surgery, the umbilical cord is released by manually moving the movable clamping bar 10 away from the fixed bar.

The form of clamp shown in Figure 8 is similar in construction to the form as shown in Figure 1 excepting that the lower fixed bar 1 is not enlarged at its ends to provide fingerholds. In this form, the ends of the lower fixed clamping bar 1 are formed with integral offset ratchet bars 20, similar to the ratchet bars 8, extending upwardly from the upper edge thereof.

In the modification of the invention shown in Figures 9 to 11, inclusive, the fixed and movable bars 1 and 10, respectively, are similar to the fixed and movable bars of the form of Figure 1. The enlarged portions 2 of the fixed bar 1 however are modified. Each enlarged end portion 2 is formed on one side with an integral offset ratchet bar 21 similar in construction to the ratchet bars 8, with teeth 22 on its inner surface. On the opposite side of each enlarged end portion is an integral flange 23, of the same length as the ratchet bar 21 but offset outwardly in the opposite direction from bar 21. An elongated flat spring 24 has one end riveted to the upper end of the flange 23, its other end being free and reaching to the lower end thereof. In this form, the tooth bearing ends of the movable clamping bar 10 are interposed between the ratchet bar 21 and the flange 23 as shown in Figures 9 and 11, with the springs 24 bearing against the toothed ends of the movable bar and pressing the teeth 15 of said bar into meshing engagement with the teeth 22 on the ratchet bar 21.

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In Figure 15 a form of improved clamp is illustrated in which the lower fixed clamping bar 1 is enlarged and formed with fingerholds 3 and 4 at one side or end only. The other opposite end of the fixed bar is provided with an integral upstanding ratchet bar 25 such as shown in the form of Figure 8.

In both of the forms shown in Figures 8 and 15, the clamp can easily be manipulated by grasping the movable or fixed clamping bar or both with the fingers.

It will be seen that I have provided a surgical clamp that evenly distributes pressure across any sectioned portion of bowel, giving hemostatic pressure without causing devitalization of the portion across which the clamp is applied. This makes it possible to place the serosal sutures more accurately in a line, and with the removal of the clamp it is now possible to use the margin which was in the clamp for placing the final row of mucosal sutures. This is not possible with the majority of intestinal clamps now in use since the portion of bowel which was in the clamp must be cut away because it has been devitalized by the crushing action of the clamp. It may be noted, however, that a crushing action may be obtained with the improved clamp, if desired.

The improved clamp also has especial use where large muscles have been cut across and which later, in closing the wound, must be resutured. In such cases, the improved clamp will give hemostasis without causing a crushing devitalization to the cut edges of the muscles. This is important in restoring the continuity of the muscle when closing the wound.

Changes in details of construction might be made without departing from the principle of the invention.

What I claim is:

1. A surgical clamp including a fixed clamping bar, a movable clamping bar, said fixed clamping bar having a guide bar projecting perpendicularly thereto from each end thereof and said movable bar being slidable longitudinally of and guided by said guide bars toward and away from said fixed clamping bar, said guide bars and said movable clamping bar carrying coacting elements of ratchet mechanisms for holding the movable clamping bar in adjusted positions relatively to the fixed clamping bar, and finger loops at each end of said fixed clamping bar for manipulating the clamp.

2. A surgical clamp including a fixed clamping bar, a ratchet bar extending at right angles and connected at one end to each end of the fixed bar, teeth on one surface of each of said ratchet bars, another clamping bar movable longitudinally of and guided by said ratchet bars toward and away from said fixed bar, a tooth on each end of said movable bar to mesh with the teeth on said ratchet bars, said movable bar also being laterally movable relatively to said ratchet bars, and means for biasing the movable bar toward and holding it in contact with said ratchet bars.

3. A surgical clamp as defined in claim 2 wherein the last named means comprises an elongated spring engaging each end of the movable clamping bar for biasing the movable clamping bar toward the ratchet bars.

4. A surgical clamp as defined in claim 3 wherein said elongate spring has one end connected to the movable bar and its other end slidably contacting the corresponding ratchet bar.

5. A surgical clamp as defined in claim 2 wherein said fixed clamping bar has enlarged portions



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at both ends thereof, said ratchet bars are formed integrally with said enlarged portions, and with the addition of a flange formed integrally with each of said enlarged portions and offset laterally therefrom, said flanges being disposed in opposed relation to the respective ratchet bars, and wherein the ends of said movable bar are disposed between said flanges and said enlarged portions, and the last-named means includes an elongated spring on the inner surface of each of said flanges pressing the movable bar toward the corresponding ratchet bar to hold the teeth on the movable

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bar in engagement with the teeth on the ratchet bars.

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