

Nov. 10, 1942.

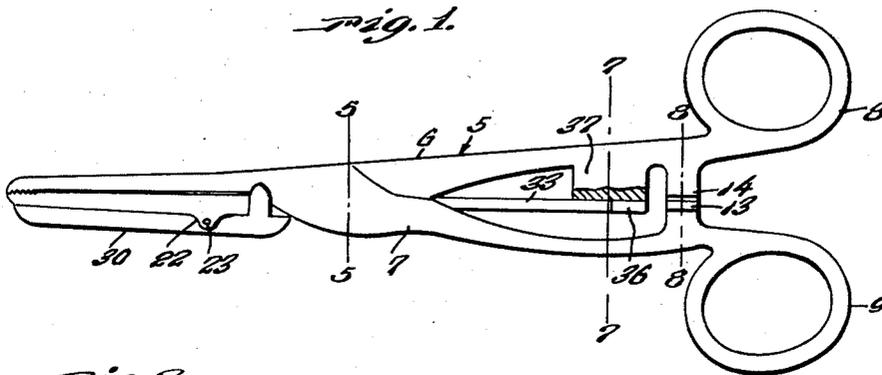
F. E. HAMBRECHT

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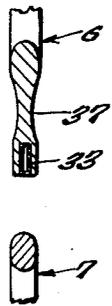
HEMOSTAT

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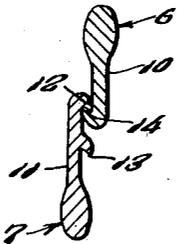
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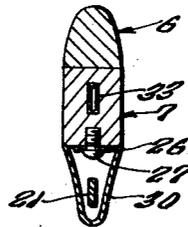
*Fig. 7.*



*Fig. 8.*



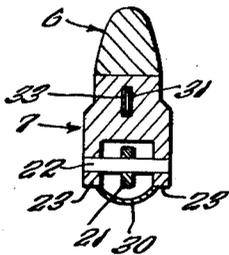
*Fig. 9.*



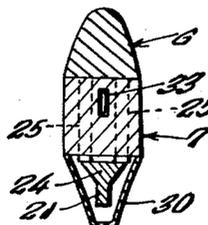
*Fig. 10.*



*Fig. 11.*



*Fig. 12.*



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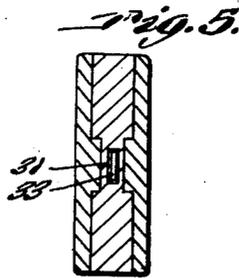
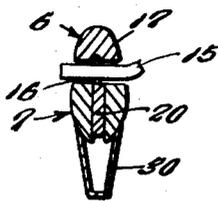
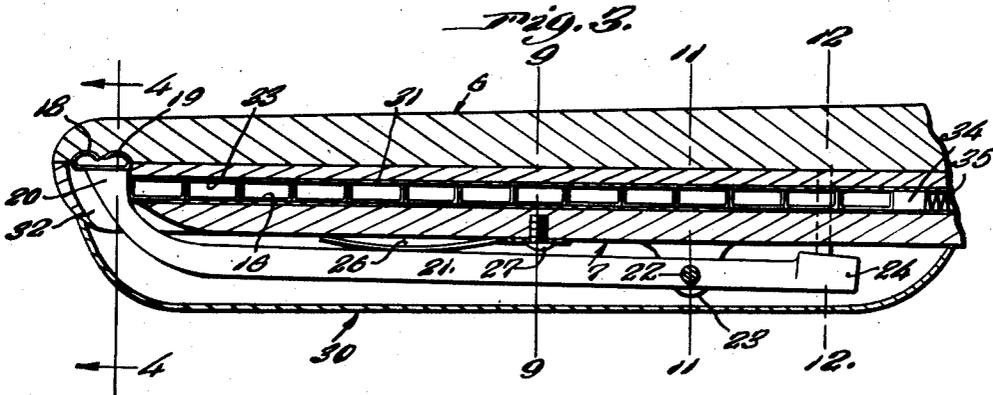
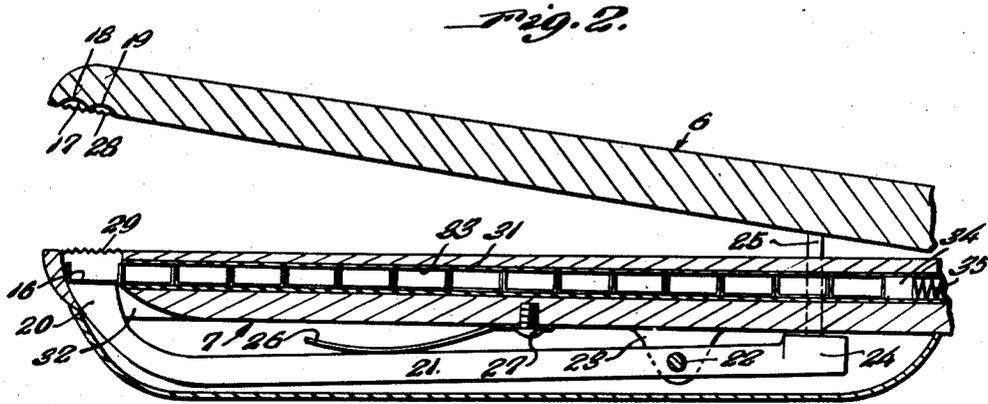
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2 Sheets-Sheet 2



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# UNITED STATES PATENT OFFICE

2,301,622

## HEMOSTAT

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Application March 3, 1942, Serial No. 433,242

6 Claims. (Cl. 128—325)

The invention relates to an improved hemostat of the straight Rochester-Pean, Rankin, or Kelly types, and the primary object of the invention is to provide a hemostat in which the functions of holding the cut end of the blood vessel and applying a metal clip to tie the same, in a single continuous motion, thereby saving time in the operation, avoiding including excess tissue in the bite of the hemostat, and providing a tie which will not slip or come loose, and of metal better tolerated by the tissue than the conventional ligature.

Other important objects and advantages of the invention will be apparent from a reading of the following description taken in connection with the appended drawings, wherein a preferred embodiment of the invention is shown for illustrative purposes.

In the drawings—

Figure 1 is a general left hand side elevational view of the improved hemostat with a portion thereof broken away to show internal structure.

Figure 2 is an enlarged fragmentary vertical longitudinal sectional view taken through the left hand portion of Figure 1 and showing the upper jaw in open position.

Figure 3 is a view similar to Figure 2 but showing the upper jaw in closed position and showing the clip compressing rocker arm with its operative end elevated to compress and close the clip against the distal portion of the upper jaw of the hemostat.

Figure 4 is a transverse vertical sectional view taken through Figure 3 along the line 4—4 looking toward the left in the direction of the arrows, and showing the cut end of a blood vessel in the act of being clipped in accordance with the present invention.

Figure 5 is an enlarged transverse vertical sectional view taken through Figure 1 along the line 5—5.

Figure 6 is a side elevational view of one of the individual metal clips.

Figure 7 is a transverse vertical sectional view taken through Figure 1 along the line 7—7.

Figure 8 is a transverse vertical sectional view taken through Figure 1 along the line 8—8.

Figure 9 is a transverse vertical sectional view taken through Figure 3 along the line 9—9.

Figure 10 is a top plan view of the clip sheath partly broken away to show the position of the spring therein.

Figure 11 is a transverse vertical sectional view taken through Figure 3 along the line 11—11.

Figure 12 is a transverse vertical sectional view taken through Figure 3 along the line 12—12.

Referring in detail to the drawings, the numeral 5 generally designates the present hemostat which has the general form and arrangements of the types of hemostats referred to above including the upper jaw 6, the lower jaw 7 equipped with corresponding handles 8 and 9, adjacent which are located the ratchet components 10 and 11. In the present instance the lower component 11 is provided with two vertically spaced hooks 12 and 13, respectively, to be engaged by the hook 14 in the manner indicated in Figure 8 of the drawings. When the handles 8 are closed to engage the hook 14 with the upper hook 12 the jaws 6 and 7 are closed at their distal ends sufficiently to hold the blood vessel 15. When the hook 14 is engaged with the lower hook 13 the distal ends of the jaws are sufficiently closed to clamp the vessel 15 and apply and close the metal clip 16 by turning the opposite ends thereof laterally inwardly and downwardly as indicated in Figure 3 of the drawings upon the blood vessel, thereby completing the action of the present device.

For the purpose of turning over the ends of the clip the distal end of the upper jaw 6 is provided with a longitudinal slot 17 in its inner face adjacent the distal terminal, the said slot being provided with longitudinally spaced recesses 18 and 19, respectively, seen in Figure 3 of the drawings, to individually accommodate the end portions of the clip 16 as the clip is forced upwardly by the flat head 20 on the upturned distal end of the longitudinal rocker arm 21 which is pivoted adjacent its opposite end on a pivot 22 carried by and between a pair of brackets 23 depending from the underside of the lower jaw 7. The said opposite end of the rocker arm 21 is provided with a transverse prominence 24 from which project laterally spaced vertical pins 25 which work vertically through suitable openings provided in the lower jaw 7 on opposite sides of its longitudinal middle. A leaf spring 26 having its rearward end secured as indicated by the numeral 27 to the bottom of the lower jaw 7 just forward of the brackets 23 yieldably forces the rocker arm 21 downwardly so that its head 20 is normally in the depressed position illustrated in Figure 2 of the drawings and the pins 25 occupy the elevated positions also shown in that figure. The upper ends of the pins 25 are positioned to be engaged and depressed by the upper jaw 6 as the upper jaw 6 is closed, so as to move the head 20 of the rocker arm 21 upwardly to

deform and clamp the clip 16 as illustrated in Figure 3 of the drawings. As indicated in Figure 2 of the drawings the meeting surfaces of the distal ends of the jaws are serrated as indicated by the corresponding numerals 28 and 29 to hold the vessel 15, the serrations in each case being located along opposite sides of the meeting surfaces of the jaws and laterally outwardly with respect to the slot 17.

A protective housing generally designated 30 extends along and is attached to the lower jaw 7 and has length, width and formation only sufficient to adequately enclose and protect the rocker arm 21 and the adjacent lower part of the said lower jaw.

The lower jaw is formed internally and longitudinally with the vertical elongated rectangular bore 31 which opens through the distal end of the jaw into an irregularly-shaped opening 32 and through which the head 20 of the rocker arm 21 moves to sever one of the clips 16 from a battery or connected series of such clips and elevate the clips above the bore 31 and into engagement with the lower side of the blood vessel 15 and the clip deforming slot 17, as illustrated in Figure 3 of the drawings. The clips 16 are joined in a series or battery by light soldering connecting adjacent clips and the series or battery is slidably placed in a rectangular tubular sheath 33 fitting in the bore 31. Also operating in the said sheath is a conformably shaped sliding head 34 which is on the forward end of an expanding spring 35 whose rearward end terminates in a plate 36 secured to the bottom of a dependency 37 on the upper jaw 6, as illustrated in Figure 1 of the drawings. It is to be noted that the sheath 33 emerges from the lower jaw 7 at an intermediate point and extends along the bottom of the dependency 37 to which it is secured. The spring operates the head 34 behind the last one of the clips of the series or battery so as to force the clips forwardly to dispose one at a time of the clips in the position shown in Figure 2 of the drawings, ready for application to the blood vessel and clamping thereon in the manner described.

Although there is shown and described herein a preferred embodiment of the invention, it is to be understood that the application of the invention is not limited thereto, beyond the scope of the subjoined claims.

Having described the invention, what is claimed as new is:

1. A hemostat comprising an upper jaw, a lower jaw, means pivotally connecting the jaws, handles on the rear ends of said jaws adapted to be compressed toward each other to close the distal ends of the jaws, a longitudinal metal clip magazine on said lower jaw with its forward end communicating with a vertical opening formed through the distal end of the lower jaw and long enough to permit one clip at a time to emerge from said magazine into said opening, projecting spring means urging a plurality of the clips forwardly toward emergence in said opening, a longitudinal rocker arm pivoted inter-

mediate its ends on a horizontal axis to the lower part of said lower jaw, said arm having a head on its forward end operating vertically in said opening, projection on the rearward end of said arm extending thereabove, return spring means normally depressing the forward end of said magazine whereby a clip can emerge into said opening and upon the upper surface of said head, and said projection extends above said lower jaw to be engaged and depressed by the closing of the upper jaw, the distal end of said upper jaw being formed in its under surface with a longitudinal slot formed with longitudinally spaced bowed areas in its top, said clip being U-shaped, and said jaws being arranged to be closed by operation of said handles to bring the distal ends of the jaws toward meeting relation and clamp a blood vessel therebetween and cause the head on the rocker arm to rise in said opening and elevate the metal clip so that its arms rise on opposite sides of the vessel and are turned inwardly upon the vessel by engagement with said bowed areas of the top of the slot, whereby the clip is clamped on the vessel.

2. A hemostat according to claim 1 wherein said return spring means operates upon opening of the jaws to depress the head on the rocker arm to a point below the magazine so as to permit said projecting spring to push a single one of the clips into place in said opening for subsequent use.

3. A hemostat according to claim 1 wherein the handled ends of said jaws are equipped with ratchet means comprising an upper hook on the upper jaw and two vertically spaced lower hooks on the lower jaw, said jaws being closable to a first position in which said upper hook engages the upper one of the lower hooks and in which the meeting distal ends of the jaws close only sufficiently to hold the blood vessel, said jaws being further closable to a second position in which said upper hook engages with the lower one of the lower hooks and in which the meeting distal ends of the jaws are substantially completely closed and a clip is clamped on the held vessel.

4. A hemostat according to claim 1 wherein said magazine comprises a bore formed in the lower jaw, a tubular sheath in said bore within which the longitudinally arranged series of metal clips slide.

5. A hemostat according to claim 1 wherein said magazine comprises a bore formed in the lower jaw, a tubular sheath in said bore within which the longitudinally arranged series of metal clips slide, said projecting spring means comprising a head slidable in said sheath and engaging the rearmost clip and a longitudinal expanding spring having a forward portion in said sheath in operative engagement with said head, and anchoring means engaged by the rearward portion of said spring.

6. The structure and arrangement of parts as shown and described.

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