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K. A. KAPP

2,796,065

SURGICAL CLAMPING MEANS

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FIG. 1

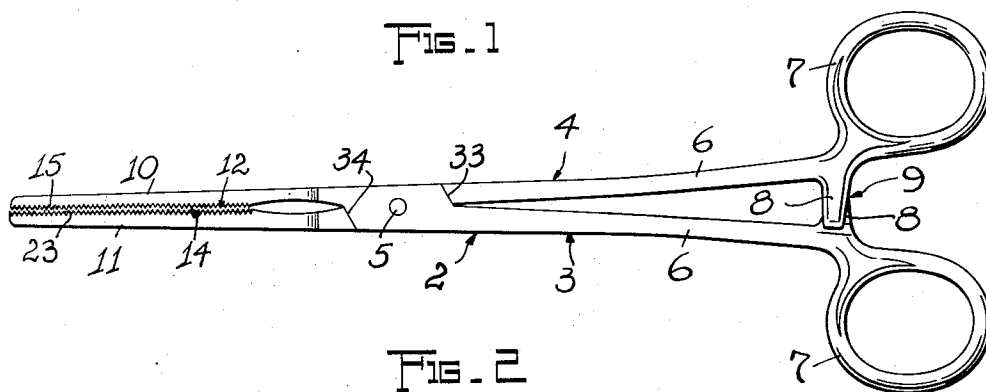


FIG. 2

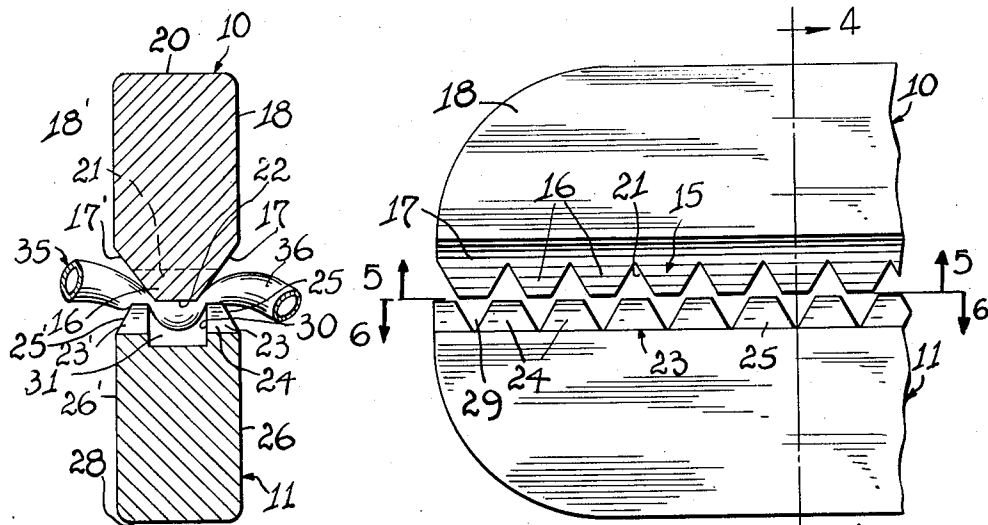
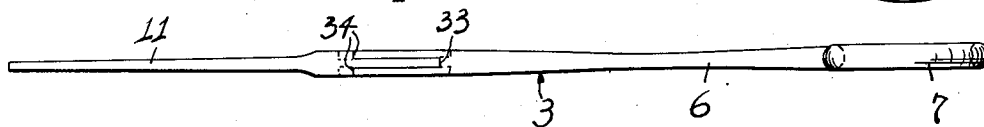


FIG. 4

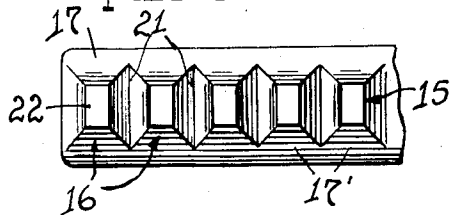
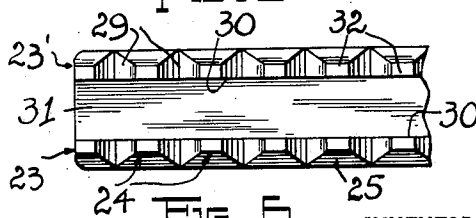


FIG. 5

FIG. 6



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SURGICAL CLAMPING MEANS

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4 Claims. (Cl. 128—346)

The present invention relates to surgical forceps and clamping devices and is particularly directed to forceps and clamping devices used in surgery to grip, clamp, restrict and coarctate tubular body vessels and tissues. Devices of this type should grip and hold tubular body vessels and tissues without damage to prevent forming of adhesions and other complications.

It is the primary object of this invention to provide improved gripping and clamping means for surgical forceps and similar devices and permit gripping, holding and coarctation of tubular body vessels and tissues, blood vessels, etc., without injury or penetration of their outside walls, the clamping means including cooperating rows of frustums of pyramids of polygonal bases having the frustums arranged in offset relation with respect to each other to align frustums of one row with the spaces between frustums of another row.

Another object of the invention is the provision of improved clamping means for surgical forceps and similar devices, the clamping means including rows of frustums of pyramids of rectangular base having frustums of different rows arranged in offset relation to the frustums of another row to effect cooperation of frustums of one row with the spaces between frustums of another row and permit by bending and coarctation gripping of tubular body vessels and tissues without injury thereto by embedding the frustums in the tubular body vessels and tissues. Clamping means or jaws of the type referred to above, which include rows of frustums of pyramids arranged to each other in the manner described above, are well suited for surgical clamping devices in which the clamping jaws include lengthwise ribs and grooves to permit coarctation by bending or kinking, provided, the frustums forming the rib in one jaw and the groove in the other jaw are specifically shaped and approach of the jaws is limited to prevent biting and/or shearing action.

A further object of the invention therefor is the provision of clamping means for surgical forceps and clamping devices embodying two clamping jaws, a first one constructed by a clamping portion with converging side walls and V-shaped cross slots to provide a jaw having a single row of frustums of pyramids and a second one constructed by a clamping portion with converging side walls, V-shaped cross slots and a longitudinal groove extended lengthwise of the jaw to provide a jaw having parallel rows of frustums of pyramids, with the rows arranged in laterally and longitudinally offset relation to the frustums of the first jaws so as to extend the latter frustums opposite the longitudinal groove in the second jaw.

With the above and other objects in view, the invention has certain other marked superiorities which clearly distinguish it from presently known structures and devices of this type. These improvements or characteristics, embodying certain novel features of construction and design, are clearly set forth in the appended claims, and a preferred form of embodiment of the invention is

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hereinafter shown with reference to the accompanying drawing forming part of the specification.

In the drawing:

Fig. 1 is a plan view of a pair of surgical forceps embodying the invention.

Fig. 2 is a side elevation of the forceps shown in Fig. 1.

Fig. 3 is a substantially enlarged fragmentary plan view of the end portion of the forceps shown in Fig. 1, disclosing in detail the shape and relative position of the clamping teeth-like frustums of the two clamping jaws of the forceps.

Fig. 4 is a transverse cross section taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary side view of the frustums on the upper jaw of the forceps, the view being taken from line 5—5 of Fig. 3; and

Fig. 6 is a fragmentary side view of the frustums of the lower jaw of the forceps, the view being taken from line 6—6 of Fig. 3.

Referring now more in detail to the exemplified form of the invention shown in the drawing, reference numeral 2 denotes a forceps, the two lever members 3 and 4 of which are pivotally connected to each other in cross-over relationship by pin 5. Lever members 3 and 4 include at their one end portions 6 finger-receiving rings 7 and cooperating tooth projections 8 of a releasable latching arrangement 9. The other end portions of lever members 3 and 4 form cooperating upper and lower jaw members 10 and 11 provided with specifically constructed toothed clamping surfaces 12 and 14 on opposed top and bottom portions of the jaw members.

Upper clamping surface 12 of jaw member 10 having substantially rectangular cross section embodies a single row 15 of frustums 16 of pyramids which extends lengthwise of the jaw member in symmetrical relation to the longitudinal axis thereof. This row of frustums 16 is formed by slanted, approximately 60°, wall portions 17, 17' of side walls, 18, 18' of jaw member 10, which wall portions effect narrowing of the bottom of the jaw member to a width of about one third of the width of top 20 of said jaw member, and V-shaped grooves 21 intersecting at a right angle in laterally spaced relation to each other the bottom face and slanted wall portions 17, 17'. Each frustum 16 in row 15 is formed from a pyramid of rectangular base and includes a face 22 arranged parallel to the rectangular base.

Lower clamping surface 14 of jaw member 11, shaped and dimensioned similar to clamping jaw 10, embodies two rows 23, 23' of frustums 24 extended lengthwise of the jaw member in symmetrical laterally offset relation to the longitudinal axis thereof. Rows 23, 23' of frustums 24 are formed by slanted, approximately 60°, wall portions 25, 25' of side walls 26, 26' of jaw member 11, which wall portions effect narrowing of the top of the jaw member to a width of about one fourth of the width of bottom 28 of said jaw member, and V-shaped grooves 29 intersecting at a right angle in laterally spaced relation to each other the top face and slanted wall portions 25, 25'. V-shaped grooves 29 intersect the vertical side walls 30 of a longitudinal channel 31 of rectangular cross section in the top portion of jaw member 11, channel 31 being slightly deeper than V-shaped grooves 29 and wider than faces 22 of frustums 16. Each frustum 24 of rows 23, 23' is the lower portion of one half pyramid of rectangular base and includes a top face 32 arranged parallel to the rectangular base.

Lever members 3 and 4 of the forceps include at 33 and 34 stop shoulders adapted to arrest in predetermined position further movement of jaw members 10 and 11 toward each other and prevent shearing of the tubular vessels or tissues bent and coarcted by frustums 16 and

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24, coarctation and bending being due to lateral and longitudinal offsetting of frustums 16 and 24 with respect to each other.

Coarctation and bending of a blood vessel by clamping jaws constructed in accordance to the invention is shown in Fig. 4 of the drawing in which blood vessel 35 is gripped, bent and coarcted by frustums 16 and 24 of upper and lower jaw members 10 and 11. As shown, jaw members 10 and 11 have been arrested in the manner described above, faces 22 and 32 of frustums 16 and 24 being embedded in the outer wall 36 of blood vessel 35 so as to be kinked and coarcted by the relation of frustums 16 and 24 with respect to each other. Bending and coarctation of blood vessels by jaw members 10 and 11 will take place in a series of places, as the rows 15, 23 and 23' include approximately 26 to 30 frustums per inch and effect holding, bending and coarctation of tubular body vessels and tissues in longitudinal and laterally spaced areas. Preferably, the top surface edges of the frustums are slightly dulled and when embedded in outer walls of tubular body vessels and tissues will engage spaced areas thereof without penetration or damage.

Having thus described my invention, what I claim is:

1. In surgical clamping means a pair of cooperating jaw members mounted to be shifted toward and away from each other, the first one of said jaw members including a clamping surface having a single row of pyramidal frustum-shaped teeth and the second one of said jaw members including a clamping surface having two parallelly spaced rows of pyramidal frustum-shaped teeth arranged in symmetrical relation to the row of teeth of the first clamping surface, and a channel of rectangu-

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lar cross section arranged between said two rows of pyramidal frustum-shaped teeth.

2. A surgical clamping means as described in claim 1, including stopping shoulder means arranged to positively stop movement of the jaw members toward each other before the single row of pyramidal frustum-shaped teeth of the first jaw member enters the rectangular channel of the second jaw member.

3. A surgical clamping means as described in claim 1, wherein the side faces of the pyramidal frustum-shaped teeth of the first one of said jaw members are slanted at an angle of approximately sixty (60) degrees.

4. In a pair of surgical forceps including a pair of pivoted lever members having finger rings at their one ends and jaw members at their opposite ends the improvement of a single row of pyramidal frustum-shaped teeth in one of the jaw members, two parallel rows of pyramidal frustum-shaped teeth in the other one of the jaw members arranged in symmetrical relation to the row of teeth in the first jaw member, a longitudinal slot of rectangular cross section between the said two parallel rows of pyramidal frustum-shaped teeth, and stopping shoulders on said lever members arranged to positively stop movement of the jaw members toward each other when such members are extended substantially parallel to each other and the clamping faces of their frustum-shaped teeth are extended in substantially the same plane to provide space in said slot for clamped, kinked and coarcted tissue.

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