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HOLDERS FOR SUTURE NEEDLES

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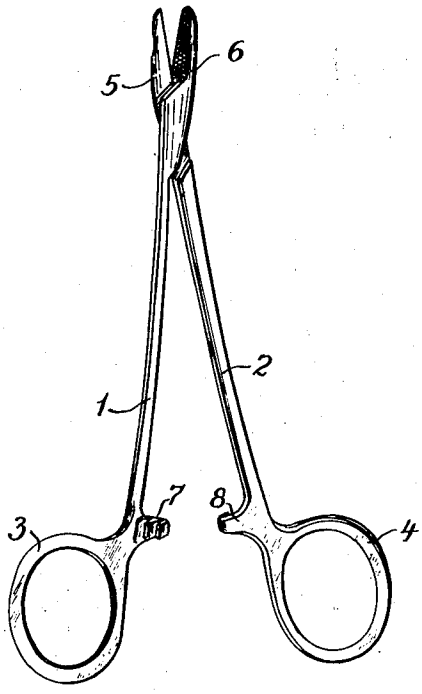


Fig. 1.

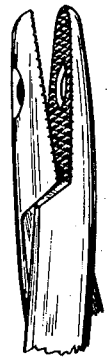


Fig. 2.

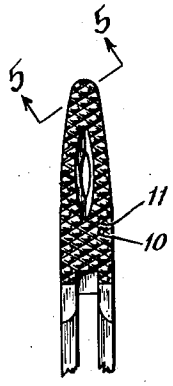


Fig. 3.

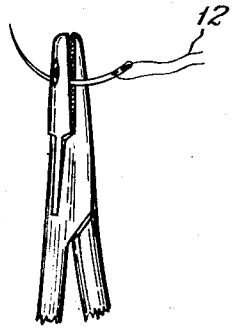


Fig. 4.

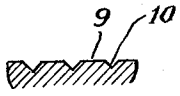


Fig. 5.

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HOLDERS FOR SUTURE NEEDLES

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6 Claims. (Cl. 128—340)

This invention relates to a holder of suture needles used by surgeons in stitching the lips or edges of wounds together, particularly after an operation or after accidental tearing or cutting of tissues.

Surgeons and physicians have experienced difficulty in holding surgical needles, particularly in that the needle tends to slip or rotate in the holder during surgical procedure in stitching the edges or lips of wounds or tissue together and also in that the needle tends to burr or roughen at the section at which it is secured to or grasped by the holder. Such burrs or indentations of the surface of needles tends to damage tissue, thereby involving longer recovery periods and unsatisfactory results from the surgeon's position. The procedure involving surgical operation on the human eye is an excellent example to illustrate past experiences.

The surgeon selects a suitable needle which is shaped on an arc of a circle varying from three-eighths to a half-inch of a circle, the point whereof may be tapered or have a cutting edge. The needle is usually of stainless steel and the jaws of the holder are likewise of stainless steel. The needle, held crosswise in the holder and locked therein, is then manipulated by the surgeon in forming sutures. The arced needle has a tendency to rotate in the holder by reason of its shape and the inability of the jaws of the holder to retain the needle in its originally adjusted position. It has also been found that the jaws of the holder will form burrs or roughen the surface of the needle which, when the needle is drawn through eye tissue, tears the tissue.

This invention has for its object to provide a holder and needle combination which will not permit rotation or slipping of the needle and will eliminate the formation of burrs or roughening on the needle surface when it is grasped by the needle holder.

In the drawings:

Fig. 1 is a side view of a needle holder with the jaws partially separated;

Fig. 2 is an enlargement of the jaw portion of Fig. 1;

Fig. 3 is a face view of one of the jaws of Fig. 2;

Fig. 4 is a view of the holder grasping a curved needle ready for use in eye surgery; and

Fig. 5 is an enlargement on the line 5—5 of Fig. 3.

The holder shown in Fig. 1 is provided with a pair of handles 1—2 having at their lower ends the finger receiving rings 3—4 and at their upper ends the jaws 5—6. The handles are provided near the rings with cooperating locking members 7—8 illustrated as a box lock in Fig. 1 with interengaging teeth for locking the jaws upon the needle when the teeth are in engagement.

The jaws 5 and 6 have formed on the inner faces thereof a series of teeth and crossing grooves arranged in diagonal rows as viewed in Fig. 3 running from right to left and from left to right. Each tooth 9 is diamond or lozenge shaped with two opposite points lying substantially in a crosswise direction to the longitudinal median line of the jaws and the other two opposite points lying in a parallel direction to said median line, as can be noted from the

enlargement in Fig. 3. The tops of the teeth are flat, as shown in Fig. 5. The teeth and intersecting grooves are formed by hand with a file manipulated in a diagonal direction from left to right forming the grooves 10 and then crosswise of the first formed grooves from right to left forming the grooves 11. The resulting pattern on the faces of both jaws 5—6 exhibits a series of hills and dales, each hill being diamond or lozenge shaped, flat on top and surrounded by intersecting dales. It will also be observed from Fig. 3 that teeth in different rows are crosswise aligned; sometimes two teeth are so aligned and sometimes three. Two teeth are formed to each square mm. of jaw surface. The grooves across their top edges are of much less width than the width of the finest surgical needle, thereby insuring that the needle will not fall into a groove and rotate.

The entire surface of the jaws, after formation of the teeth and grooves, then has applied thereto a homogeneous covering of tungsten carbide, which comprises 85 to 93% tungsten, 5 to 10% cobalt, and 2 to 5% carbon, deposited on the teeth and groove surfaces. The covering is applied by the use of the detonation wave process involving the use of an oxidizing gas and a gaseous fuel into which the powder particles of the tungsten carbide mixture are entrained and deposited at high velocity upon the entire inner surfaces of the jaws thereby covering the teeth, the sides thereof, and the grooves with a continuous and homogeneous deposit of tungsten carbide. The jaws are heated to a temperature of approximately 500° F., but not in excess thereof, during deposit of the tungsten carbide. The high velocity, approximately from 6,000 to 9,000 feet per second, impinges the tungsten carbide particles against all the surfaces of the teeth and grooved jaws and insures a complete homogeneous deposit thereof on the hot metal and of a hardness of from 1,000 to 1,300 VPN. The tungsten carbide thus deposited permits flexibility of the jaws without fracturing or cleavage of the tungsten carbide deposit.

The teeth when formed by the hand file operation are of a height substantially equal to .004 of an inch. A tungsten carbide deposit, measuring about .005 of an inch, is made thereon, resulting in each tooth having a height of about .009 of an inch. The height of the teeth may vary from .003 to .005 of an inch when originally formed by the file operation and the tungsten carbide coating may vary from about .002 to .010 of an inch.

When a surgeon assembles the holder on a needle such as is illustrated in Fig. 4 for use in forming sutures in human eye tissue, he lays the needle crosswise between the jaws with the pointed or sharpened edge extending from one side of the jaws and the gut or stitching material end of the needle extending from the opposite side. Pressure is then brought to bear on the finger rings and the teeth 7—8 caused to interlock. Such pressure causes the jaws to firmly grasp the intermediate portion of the needle with the engaging surfaces of the needle lying upon the flattened top portion of at least two teeth lying crosswise in line, insuring against needle rotation. A high degree of pressure on the jaws is required to hold the needle at the position in which it was placed by the surgeon. In the course of imposing such pressure the jaws are slightly flexed, which does not cause fracture or cleavage of the tungsten carbide deposit. With the completion of each suture the surgeon can replace the needle in like manner in the holder and form such additional sutures as may be required. Often the suturing material 12 is quite lengthy and the advantages of non-burring or roughening or rotation of the needle are of great advantage to the patient and satisfaction to the surgeon.

We claim:

1. In a holder for surgical needles, used in forming surgical sutures in human tissue, a pair of oppositely

positioned jaws, the facing surfaces of said jaws having teeth with substantially blunt top faces, said teeth being arranged in rows running diagonally to the longitudinally median line of said jaws, each tooth being separate at all sides by portions of grooves paralleling said rows of teeth, the teeth and the surfaces of the grooves having a tungsten carbide covering thereon to a depth of between 0.002 and 0.010 of an inch.

2. In a holder for surgical needles, used in forming surgical sutures in human tissue, a pair of jaws having rows of diamond-shaped teeth formed on the inner faces thereof, said teeth arranged in rows running diagonally in both directions to the longitudinal median line of the jaws, at least two teeth in different rows being aligned crosswise, and a tungsten carbide covering on the teeth, said covering having a depth of between 0.002 and 0.010 of an inch.

3. In a holder for surgical needles as set forth in claim 1, wherein the teeth number two to each square mm. of jaw surface.

4. Tungsten carbide surgical suture needle holder jaws, having fine teeth, said teeth having blunt faces and a depth of about 0.004 of an inch, a homogeneous layer of tungsten carbide deposited on said teeth, said layer having a depth of about 0.003 to 0.005 of an inch and comprising tungsten, between 85 and 92%, colbalt, 5 to 10%, and carbon, 2 to 5%.

5. In a holder for needles, used in forming surgical sutures in human flesh, of the type having a pair of handles and a jaw on each handle, a series of teeth on the jaws, the teeth having a depth of about 0.004 of an inch and approximately two teeth to each square mm. of working

surface of said jaws, grooves surrounding each tooth, said teeth and grooves forming on the working surfaces of said jaws a series of hills and dales, the faces of the teeth being blunt, a substantially uniform and homogeneous deposit of tungsten carbide on the entire surfaces of said teeth and grooves, said deposit comprising a tungsten carbide alloy of tungsten, cobalt and carbon, said layer having a depth of about 0.003 to about 0.005 of an inch and a hardness of from 1,000 to 3,000 VPN., the tungsten carbide on said blunt surfaces having an area at least as great as the area of the underlying blunt surfaces of the teeth.

6. In a holder for surgical needles, used in forming surgical sutures in human tissue, a pair of oppositely positioned jaws, the facing surfaces of said jaws having fine blunt top faces, said teeth being arranged in rows running diagonally to the longitudinal median line of said jaws, each tooth being bordered at all sides by grooves paralleling said teeth, the teeth and grooves on all surfaces having a tungsten carbide deposit thereon.

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