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M. R. PECK

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FENESTRATED ENDOSCOPIC TUBE

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Fig. 1

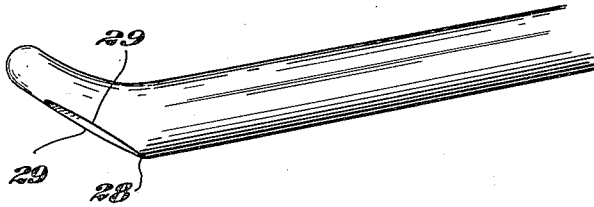


Fig. 2

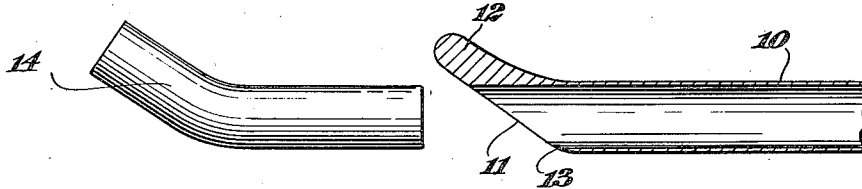


Fig. 3

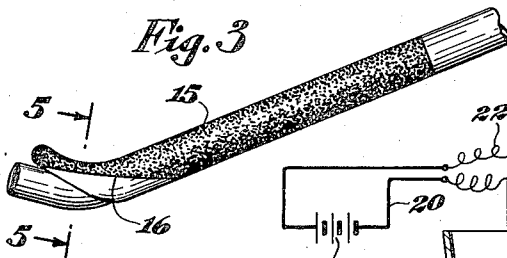


Fig. 4

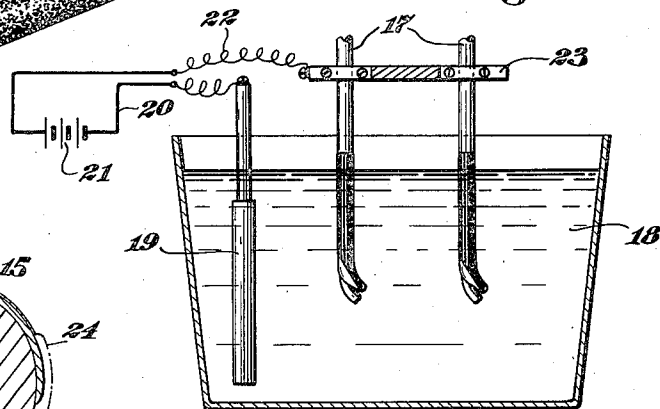


Fig. 5

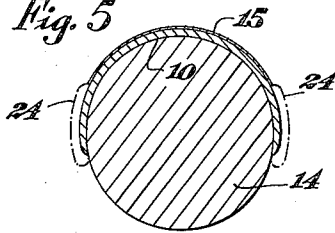


Fig. 6

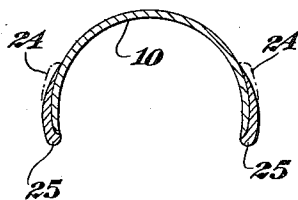
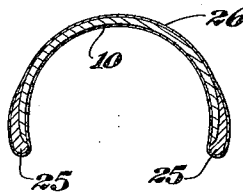


Fig. 7



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FENESTRATED ENDOSCOPIC TUBE

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Application April 9, 1935, Serial No. 15,497

3 Claims. (Cl. 128—4)

My present invention relates generally to surgical instruments, and has particular reference to endoscopic tubes or sheaths.

It is a general object of the invention to provide an improved fenestrated endoscopic tube in which undesirable sharp edges of the fenestra are effectively blunted and rendered harmless, in a new and unique manner.

While I have herein illustrated and shall hereinafter describe a tube or sheath having an oblique fenestra, because of the fact that it is this type of construction which ordinarily embodies the sharpest and most dangerous edges, nevertheless it will be understood that the invention is not restricted to this specific type of tube or fenestra.

It is almost universally a requirement of an endoscopic sheath that it be as small as possible in exterior diameter, yet as large as possible on the interior. Stated otherwise, the calibre of the tube should always be kept to a minimum, and the lumen to a maximum. Efforts to accomplish this dual objective lead, necessarily, to the employment of thinner and thinner material for the wall of the tube. This, in turn, however, renders more and more dangerous and undesirable the edges of any fenestra that is formed in the tube, especially the rear and side edges of an oblique fenestra.

It is a feature of my present invention to provide a new and unique method of dulling the edges of a fenestra of a sheath of this type, and the resultant sheath is characterized by a fenestra edge or margin which is unobtrusively, yet in a highly efficient manner, blunted.

I have found that the art of electroplating lends itself admirably to the accomplishment of the present general objective, and a sheath constructed in accordance with my present invention is characterized by having a fenestra whose margin is electroplated. More particularly, an endoscopic tube of the present improved character has an electrodeposit on its outer surface, marginally around the fenestra; and the electrodeposit is ground or polished down so that it is of gradual diminished thickness, with the thickest portion at the fenestra edge.

I achieve the foregoing objects, and such other objects as may hereinafter appear or be pointed out, in the manner illustratively exemplified in the accompanying drawing, wherein—

Figure 1 is a perspective view of the forward end of a fenestrated sheath of the present character;

Figure 2 is an exploded view showing the sheath

in cross-section, together with the plug inserted therein prior to the electroplating step;

Figure 3 is a perspective view of the plugged sheath, prior to the electroplating;

Figure 4 is a diagrammatic view showing the step of electroplating two sheaths;

Figure 5 is an enlarged cross-sectional view taken substantially along the line 5—5 of Figure 3;

Figure 6 is a view similar to Figure 5 after the electrodeposit has been polished down; and

Figure 7 is a view similar to Figure 6, showing the article completed.

For illustrative purposes, I have shown in Figure 2 a sheath 10 whose forward end is cut at an oblique angle to provide an obliquely forward fenestra 11. A beak 12 has also been shown.

The tube or sheath 10 may be of circular or oval cross-section, depending upon requirements, and the fenestra 11 is, in either event, of substantially elongated, elliptical shape. The rear edge 13, and the side edges adjacent to this rear edge, are potential danger points in the insertion and use of the finished sheath because of the sharpness of these edges. This is especially true where the wall of the tube 10 is made of extremely thin metal.

For the purpose of effectively blunting these edges, without decreasing the lumen of the tube, I provide for the electrodeposition of a thickening or blunting layer on the outer surface of the fenestra margins.

In a preferred method of carrying out the invention, a plug 14 is first inserted into the fenestra 11, as indicated in Figure 2, and this plug may be of any suitable material, such as rubber. After it has been inserted, I apply a coating of paint or lacquer 15 to the sheath, to serve as a mask, as indicated in Figure 3. The lacquer extends rearwardly for a substantial distance, and the forward edge 16 of the mask conforms substantially to the contour of the fenestra, but preferably extends along a plane forming a more obtuse angle with the axis of the tube than the fenestra itself.

After one or more sheaths have thus been preliminarily treated, they are suspended, as shown at 17, in an electroplating bath 18. I prefer to form a copper electrodeposit on the tubes, and with this object in view I suspend within the bath an electrode 19 of copper. Any other suitable or desired material may, however, be employed. The electrode 19 is connected, as at 20, with a suitable source of current 21; and the other terminal of the current source is con-

nected, as at 22, to a conductive framework 23 which supports the sheaths 17 rearwardly of the painted or lacquered portions. The latter portions should extend rearwardly to a sufficient degree to permit the sheaths to be suspended in the bath with the rear edges of the painted portions above the level of the electroplating fluid.

The electroplating procedure produces an electrodeposit upon the unmasked surfaces of the sheaths, and the current density and duration of treatment will obviously depend upon the thickness of electrodeposit desired. I prefer to provide a thickness which is just sufficient, after polishing, to deprive the potentially dangerous fenestra edges of their inherent sharpness.

In Figure 5, I have illustrated the sheath of Figure 3 prior to the electrodeposition, and the dot-and-dash lines 24 represent approximately the nature of the electrodeposit which is formed in the bath of Figure 4. The paint or lacquer is then removed, by means of any suitable solvent, and the electrodeposit is ground and polished into substantially the cross-sectional shape shown in Figure 6. It will be observed that the electrodeposit is caused to embody a gradually diminishing thickness, with the thickest portion 25 at the fenestra edge. The deposit, in other words, tapers away from the fenestra edge and merges, at the remote portions thereof, into smooth continuity with the external surface of the sheath 10.

The final step is to provide a coating on the entire sheath, either by nickel plating, chromium plating, or in any other suitable or desired manner for the purpose of providing a uniform outer coating on the tube and concealing the electrodeposit. This outer coating is shown at 26 in Figure 7.

The resultant sheath has been illustrated, in perspective, in Figure 1, but this figure by it-

self does not clearly depict the blunted nature of the fenestra edges. Suffice it to say that the rear edge portion 28 and the side edges 29 are effectively and efficiently dulled by virtue of the electrodeposit. The outer coating conceals the actual point of application of the electrodeposited layer, and the resultant instrument is devoid of any noticeably protruding parts or areas. Upon close examination, however, and by feeling the fenestra edges, the resultant dulling or blunting is readily manifested. Needless to say, the sheath is in this respect superior to ordinary endoscopic tubes, less likely to cause injury, and hence safer to use.

It will be understood that changes in the details, herein described and illustrated for the purpose of explaining the nature of my invention, may be made by those skilled in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is, therefore, intended that these details be interpreted as illustrative, and not in a limiting sense.

Having thus described my invention, and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. An endoscopic tube having a fenestra whose margin is thickened by an electrodeposit.

2. A fenestrated endoscopic tube having on its outer surface, marginally around the fenestra, an electrodeposit of gradually diminishing thickness with the thickest portion at the fenestra edge.

3. A fenestrated endoscopic tube having on its outer surface, marginally around the fenestra, an electrodeposit of gradually diminishing thickness with the thickest portion at the fenestra edge, and an outer uniform coating on the tube concealing said electrodeposit.

MYRLE R. PECK.