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(12) **United States Patent**
Thomas

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(54) **COMPOSITE TENSION ROD TERMINAL SYSTEMS**

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(51) **Int. Cl.⁷** **B63H 9/04**

(52) **U.S. Cl.** **114/108**; 403/268; 403/334

(58) **Field of Search** 114/108, 105, 114/112; 403/268, 269, 333, 334, 361, 41; 365/174, 189.01, 185.01, 185.23, 226, 230.06

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Primary Examiner—Lars A. Olson

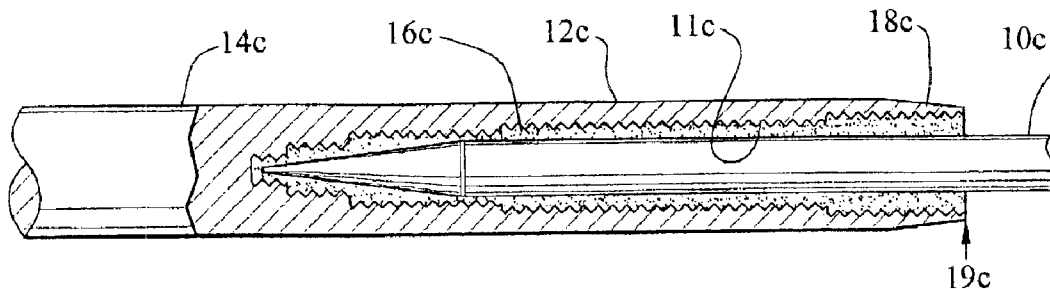
(74) *Attorney, Agent, or Firm*—Pearne & Gordon LLP

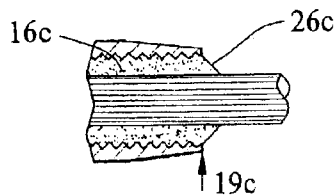
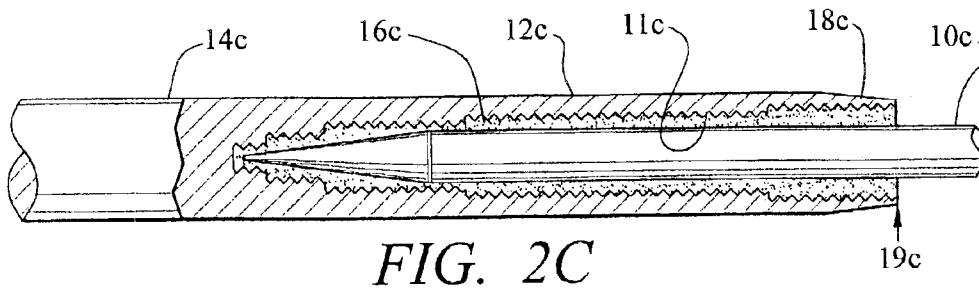
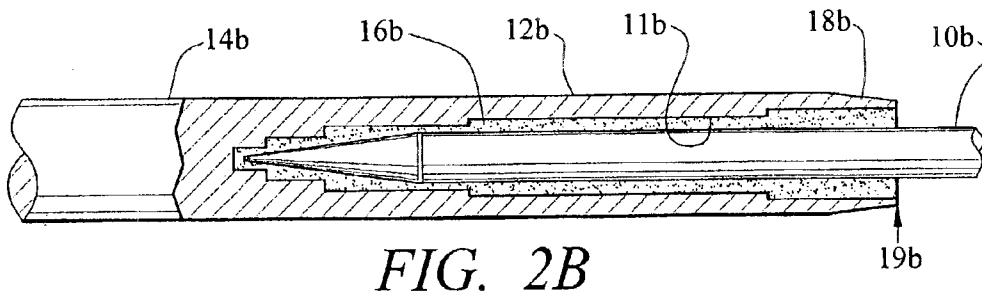
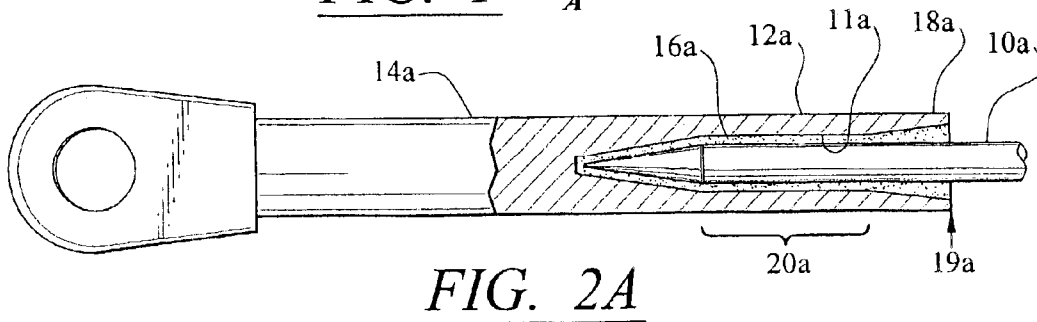
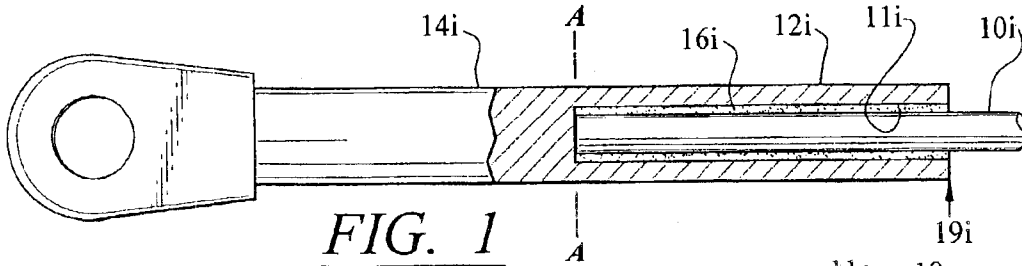
(57) **ABSTRACT**

A composite tension rod is received in the sleeve portion of a shank that forms part of a terminal fitting, and is spaced from the shank sleeve and connected thereto by a potting resin. The shank sleeve wall tapers out from thin at its distal end to thick at the bury depth of the rod. The rod is tapered outwardly from a point of minimum diameter at its inner end to its full diameter a given distance from the end. The shank sleeve and rod have complementary dual tapering along said length such that as the diameter of the rod along said distance increases, the wall thickness of the shank sleeve decreases. The resin layer and the rod are secured to each other against relative longitudinal movement, as are the resin layer and the shank sleeve.

In another aspect of the invention, a tension rod sleeve is fixed to the tension rod and extends over the distal end of the shank sleeve and along all or a majority of the length of the shank sleeve. The rod sleeve is tapered so that its wall thickness decreases to a minimum in the vicinity of the proximal end of the shank sleeve, or the rod sleeve, as it extends along the shank sleeve, is divided, or divides, into two halves or bands which join to form loop extending around a loop-engaging, convex, fiber-turnaround face formed on the terminal fitting. Such face extends transversely from one side to the other of the fitting.

32 Claims, 5 Drawing Sheets





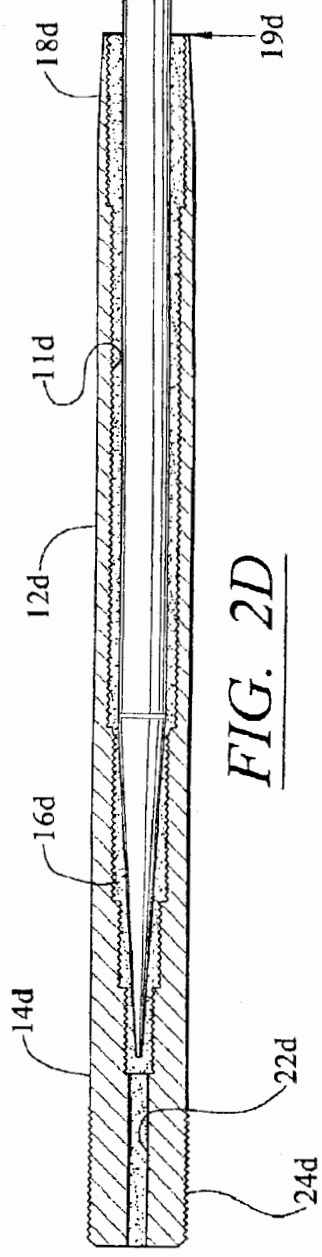


FIG. 2D

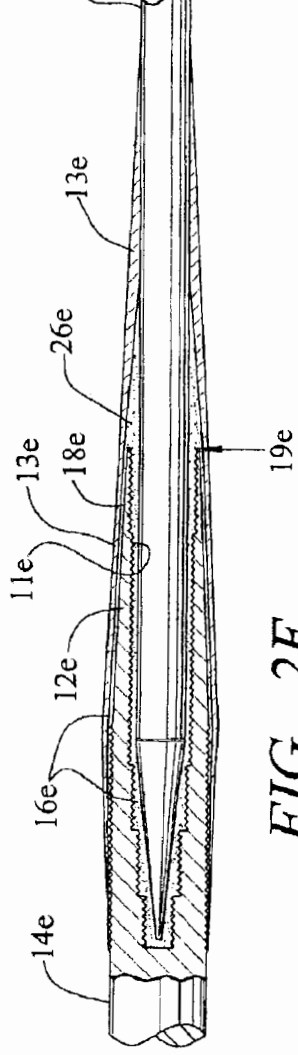


FIG. 2E

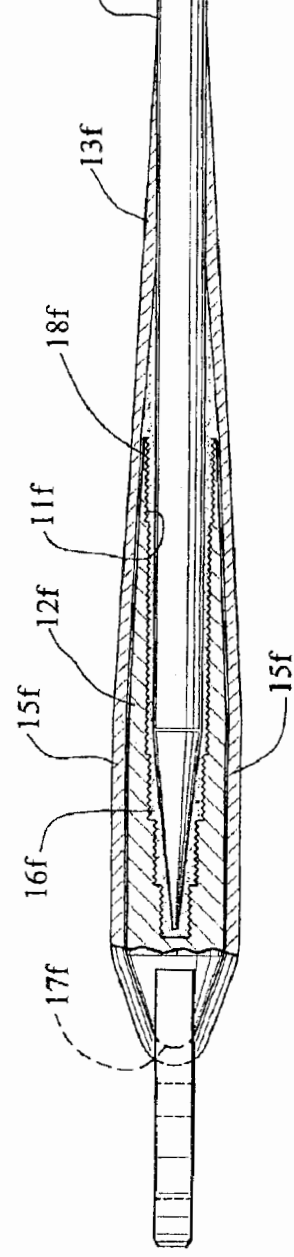


FIG. 2F-1

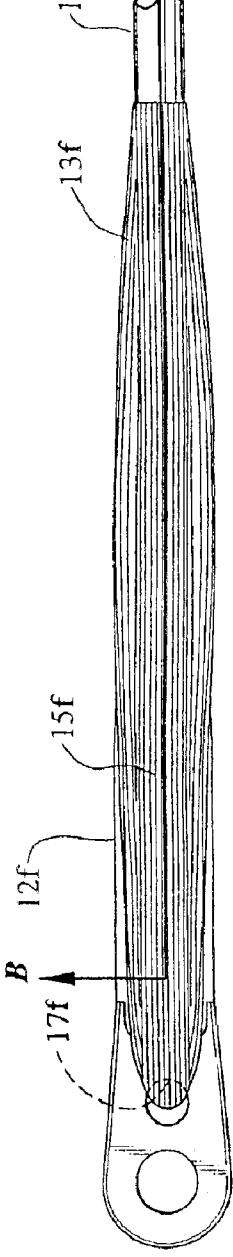


FIG. 2F-2

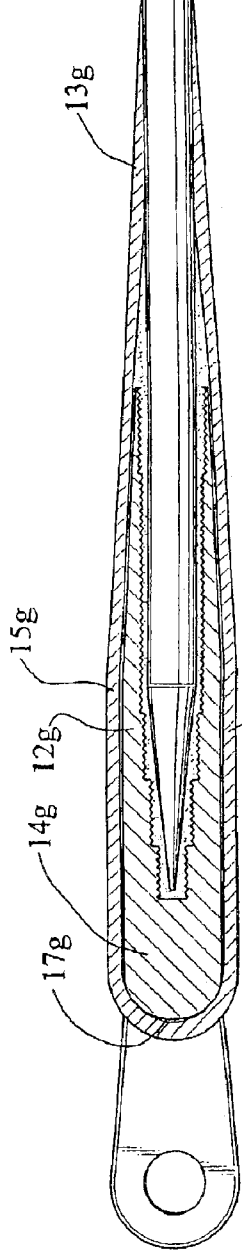


FIG. 2G-1

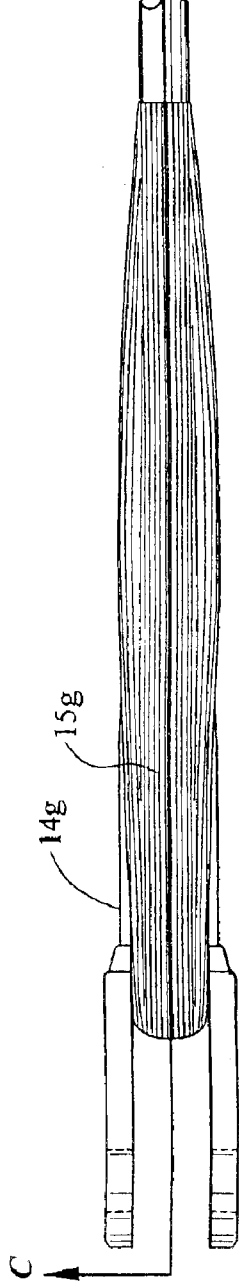
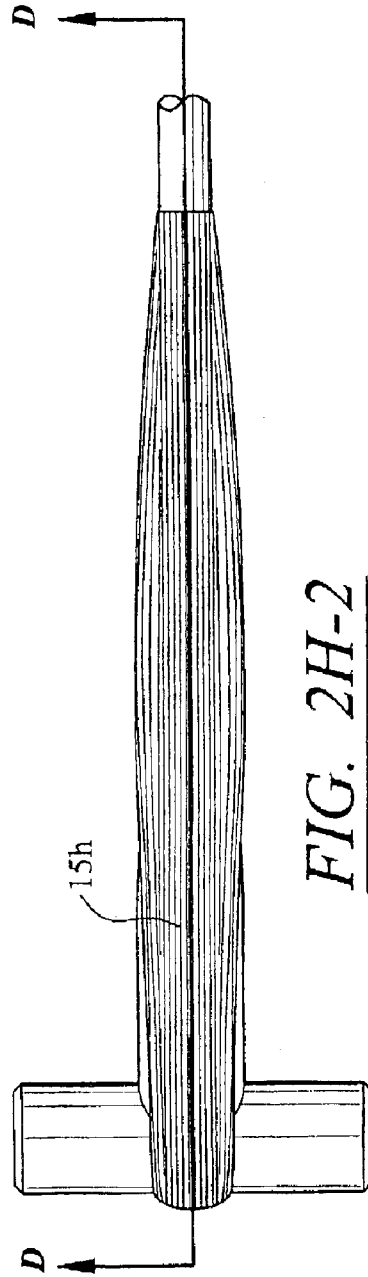
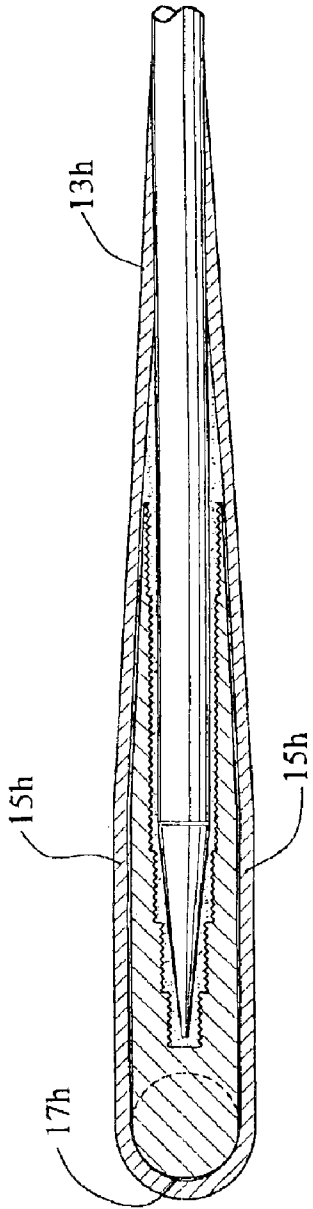


FIG. 2G-2



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