

(43) International Publication Date
27 September 2012 (27.09.2012)

(51) International Patent Classification:

A61B 17/70 (2006.01) A61B 17/88 (2006.01)
A61F 2/46 (2006.01) A61B 17/34 (2006.01)
A61F 2/44 (2006.01)

(21) International Application Number:

PCT/US2012/000158

(22) International Filing Date:

23 March 2012 (23.03.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/465,804	23 March 2011 (23.03.2011)	US
61/518,489	7 May 2011 (07.05.2011)	US
61/572,820	21 July 2011 (21.07.2011)	US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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(54) Title: TISSUE REPAIR WITH SPACE-SEEKING SPIRALS OF FILAMENT

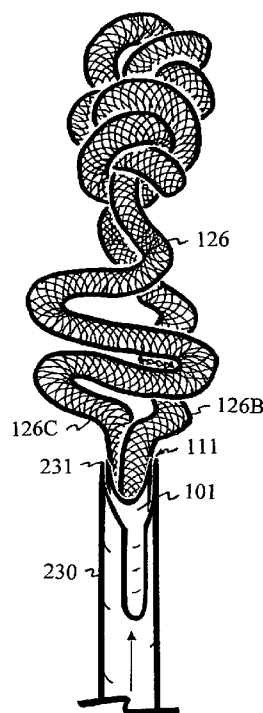


Figure 33

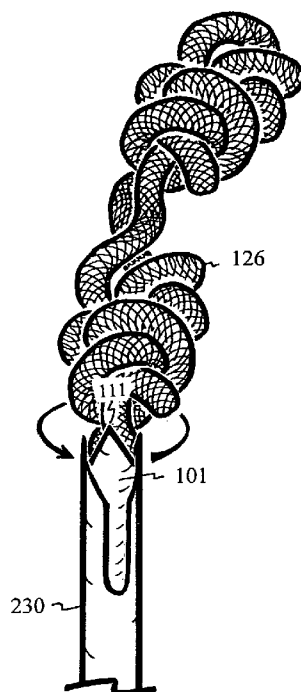


Figure 34

(57) Abstract: A distal portion of a filament (126B, 126C) is extended beyond the distal end of a needle (101) with a gripper (111). The needle with the extended filament is inserted into a cannula (230) with snagging points (231) at the distal opening of the cannula in tissue. The snagging points of the cannula hook and retain the distal portion of the filament. During partial withdrawal of the needle, a section of filament is deposited in the lumen of the cannula between the distal ends of the needle and cannula. When the needle is re-advanced, the section of filament is expelled or pushed out of the cannula into tissue. The needle is then rotated; the gripper engages and spirals the expelled filament, burrowing into tissue. The needle can further advanced to push and pack the spiral of filament deep into the tissue. The knotlike filament spiral (126) is individually formed by rotation of the needle and friction between the extended filament and tissue. The process of needle partial withdrawal, re-advancement, rotation and pushing is repeated to pack and fill the tissue with interconnecting spirals of filament to prevent migration from tissue. Spiraling of the filament driven by the rotating needle is space seeking, filling, fitting or conforming to fortify, bulk, fill, cushion or repair the tissue. Bulking with filament spirals can repair degenerated disc, urinary incontinence, fecal incontinence or other defective tissue. The filament spirals can also be used as a suture anchor deep within tissue.



Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))