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(12) **United States Patent**
Chang et al.

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(45) **Date of Patent:** **Apr. 2, 2019**

(54) **COMPOSITE WARM-KEEPING TEXTILE
STRUCTURE AND METHOD FOR
MANUFACTURING THE SAME**

USPC 428/292.1, 108, 110, 111, 196; 264/112
See application file for complete search history.

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(56) **References Cited**

U.S. PATENT DOCUMENTS

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* cited by examiner

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 394 days.

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Lowe, P.C.

(57) **ABSTRACT**

(21) Appl. No.: **14/994,968**

A method for manufacturing a composite warm-keeping textile structure includes the steps of: applying an elastic gripper-puffing mechanism to perform puffing operations upon opened cotton fibers for forming at least one puffy fiber agglomerate; applying the elastic gripper-puffing mechanism to grab unit fiber agglomerates from the puffy fiber agglomerate and further to drop the unit fiber agglomerates onto a first cloth layer on an operational platform; vibrating the operational platform to have the unit fiber agglomerates to be evenly distributed over the first cloth layer, so that the unit fiber agglomerates are formed as a fiber agglomerate distribution layer adhered onto the first cloth layer; and, having a second cloth layer to cover the fiber agglomerate distribution layer, so that the first cloth layer and the second cloth layer clamps together the fiber agglomerate distribution layer in between to form the composite warm-keeping textile structure.

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(65) **Prior Publication Data**

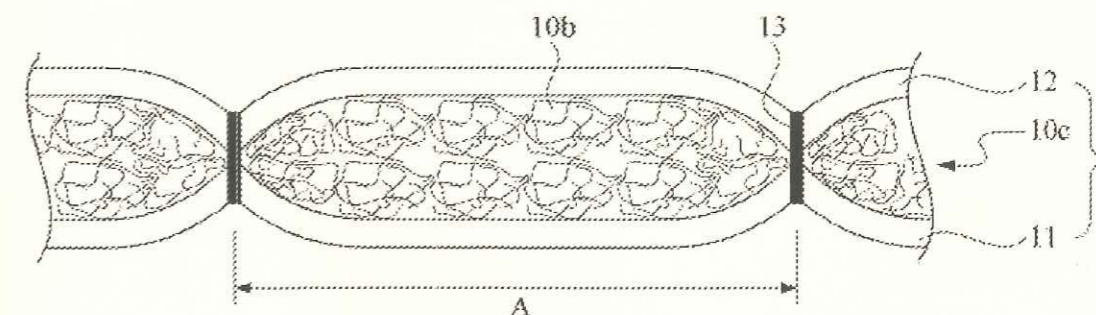
US 2017/0198415 A1 Jul. 13, 2017

(51) **Int. Cl.**
D01F 6/92 (2006.01)
D05B 3/00 (2006.01)
D05B 11/00 (2006.01)
A41D 31/00 (2019.01)

(52) **U.S. Cl.**
CPC **D05B 11/00** (2013.01); **A41D 31/0038**
(2013.01); **B32B 2250/20** (2013.01)

(58) **Field of Classification Search**
CPC D01F 6/92; D05B 3/00; D10B 2501/00

11 Claims, 17 Drawing Sheets



Maintenance Fee Notice

If the application for this patent was filed on or after December 12, 1980, maintenance fees are due three years and six months, seven years and six months, and eleven years and six months after the date of this grant, or within a grace period of six months thereafter upon payment of a surcharge as provided by law. The amount, number and timing of the maintenance fees required may be changed by law or regulation. Unless payment of the applicable maintenance fee is received in the United States Patent and Trademark Office on or before the date the fee is due or within a grace period of six months thereafter, the patent will expire as of the end of such grace period.

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If the application for this patent was filed on or after June 8, 1995, the term of this patent begins on the date on which this patent issues and ends twenty years from the filing date of the application or, if the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121, 365(c), or 386(c), twenty years from the filing date of the earliest such application ("the twenty-year term"), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b), and any extension as provided by 35 U.S.C. 154(b) or 156 or any disclaimer under 35 U.S.C. 253.

If this application was filed prior to June 8, 1995, the term of this patent begins on the date on which this patent issues and ends on the later of seventeen years from the date of the grant of this patent or the twenty-year term set forth above for patents resulting from applications filed on or after June 8, 1995, subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b) and any extension as provided by 35 U.S.C. 156 or any disclaimer under 35 U.S.C. 253.

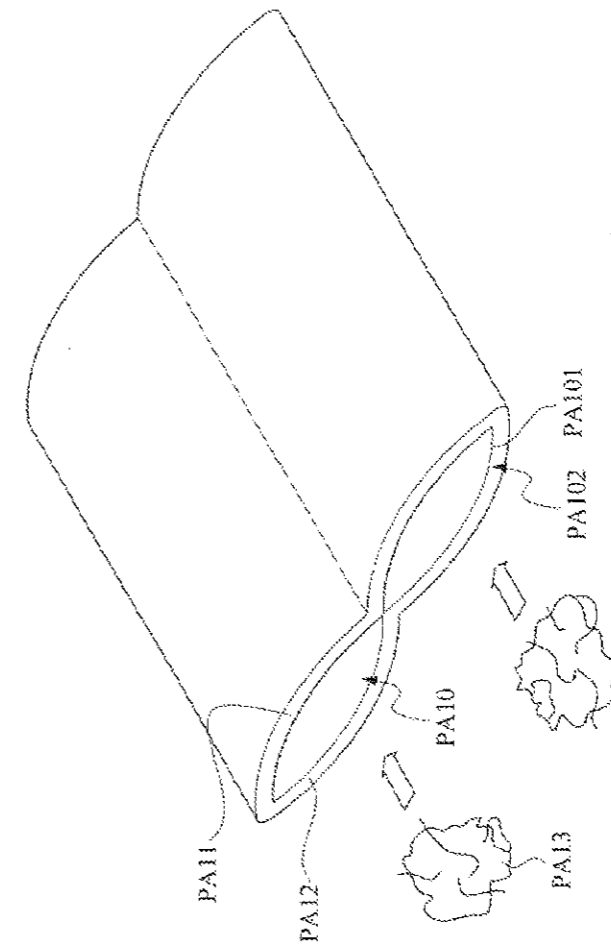


FIG. 1A (Prior Art)

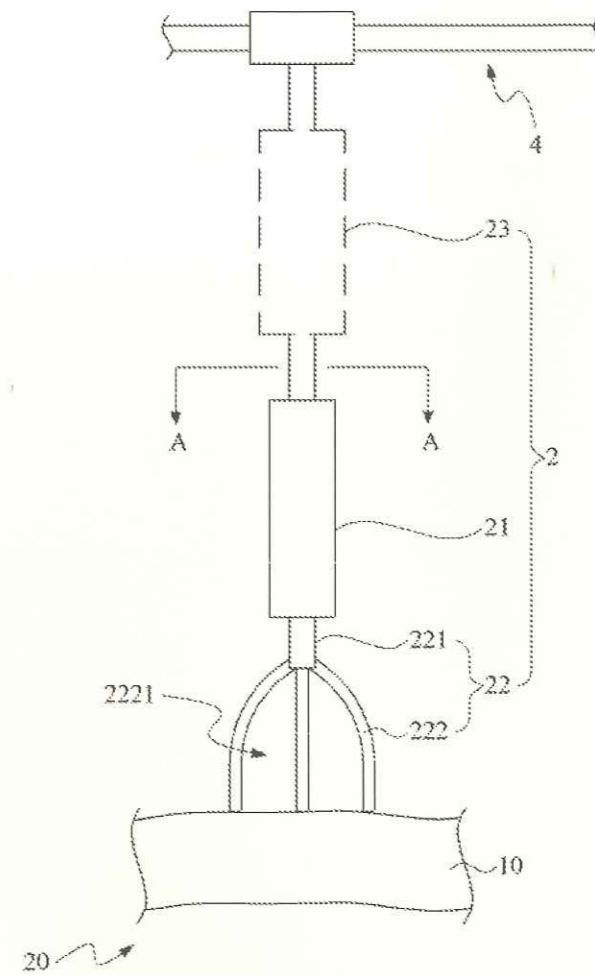


FIG. 2A

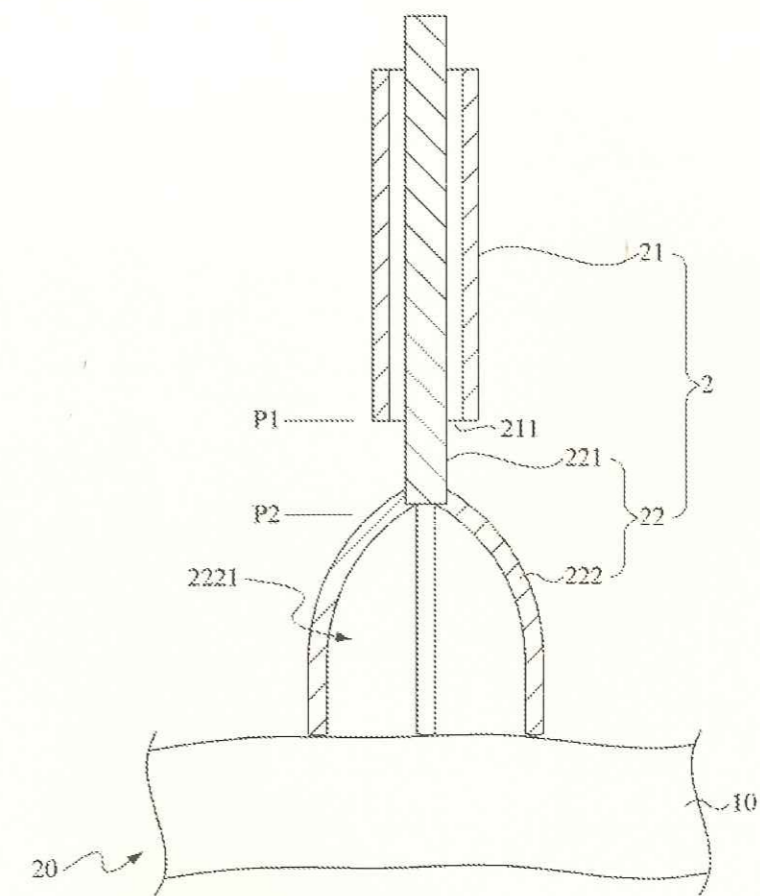


FIG.2B

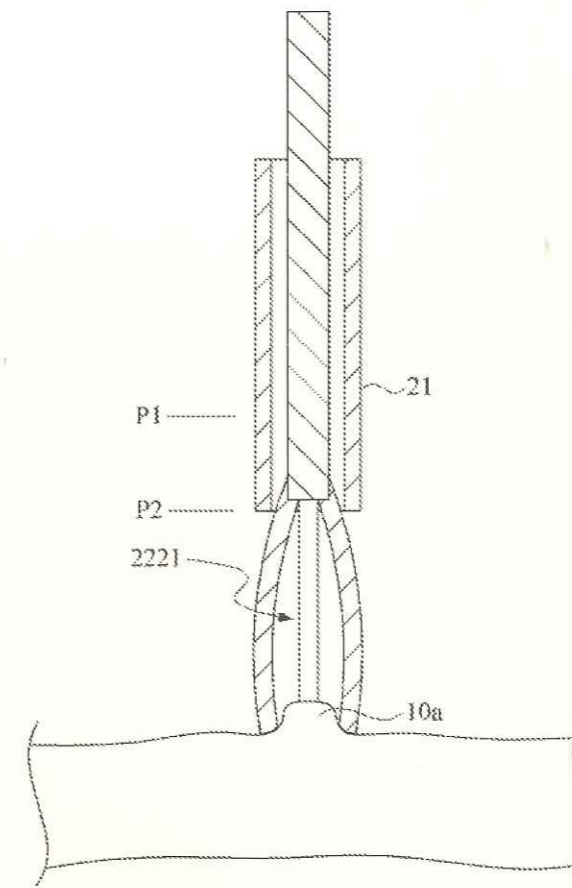


FIG.2C

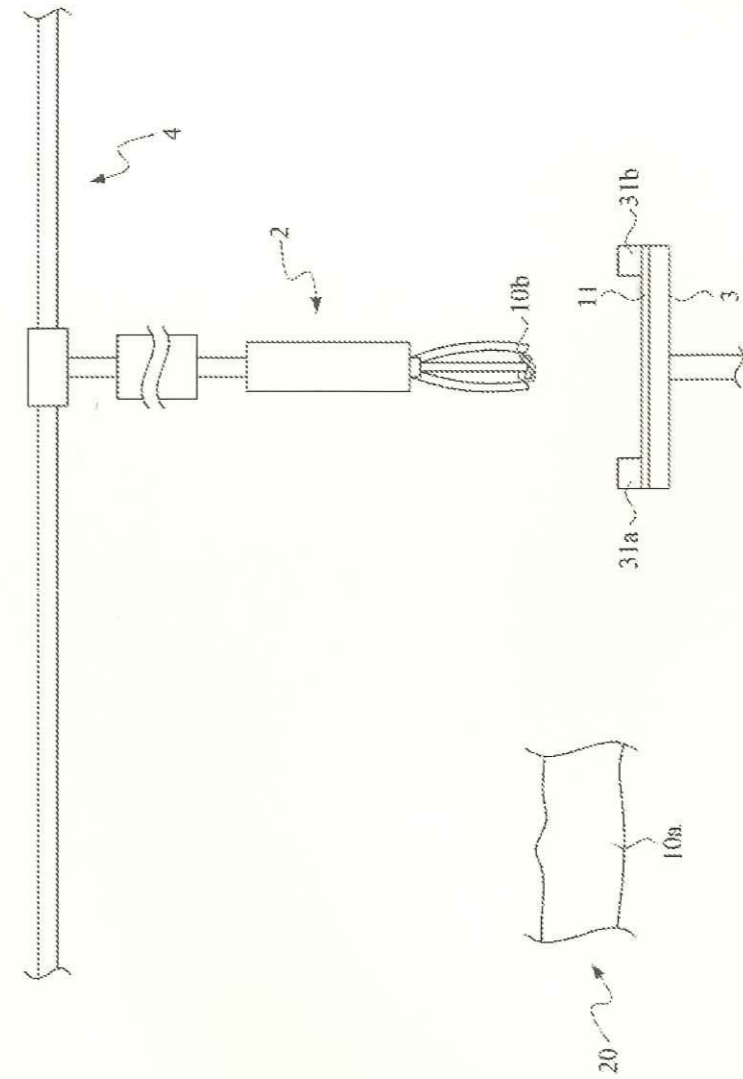


FIG.3B

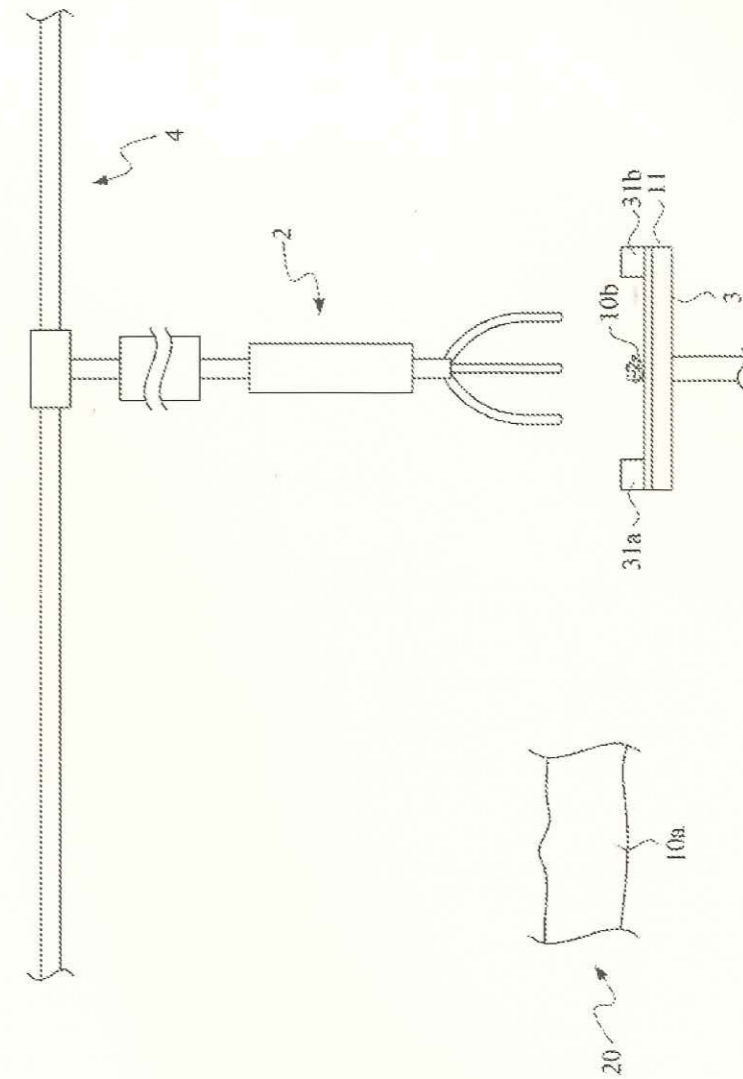


FIG.3C

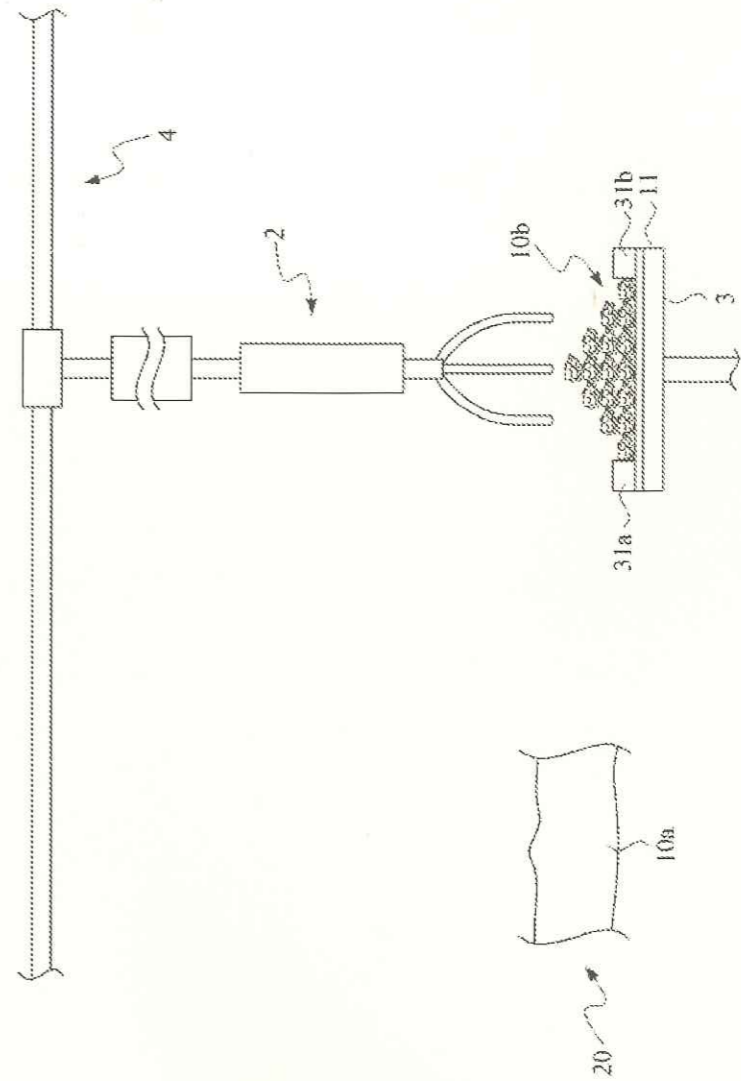


FIG.3D

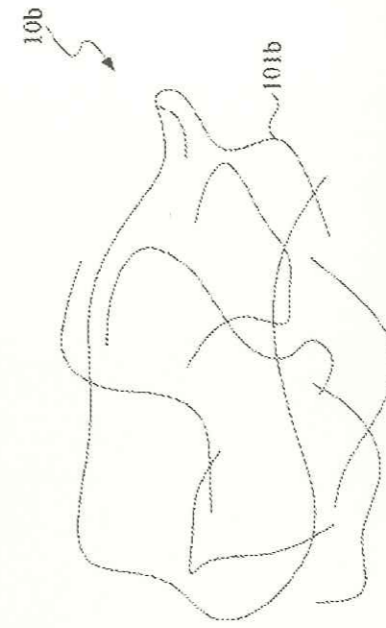


FIG. 3E

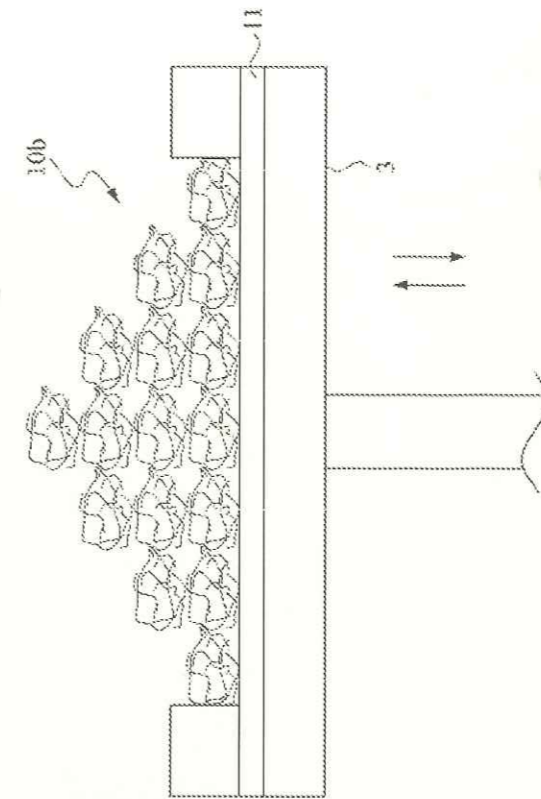


FIG. 4A

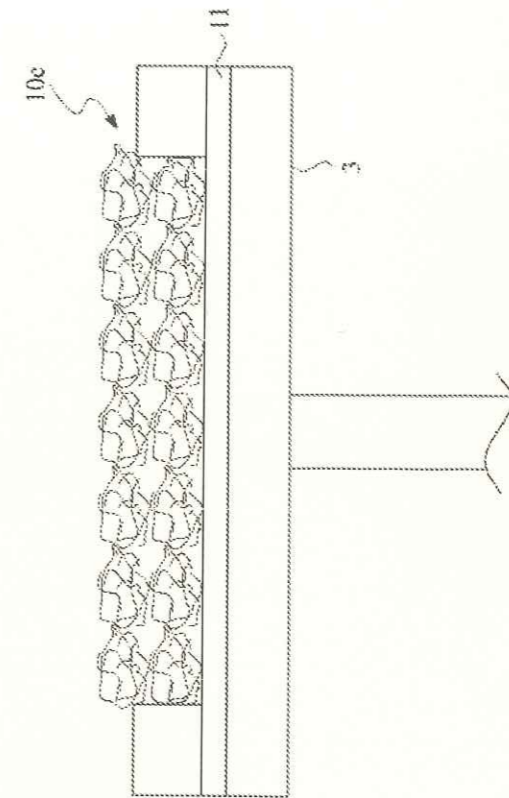


FIG.4B

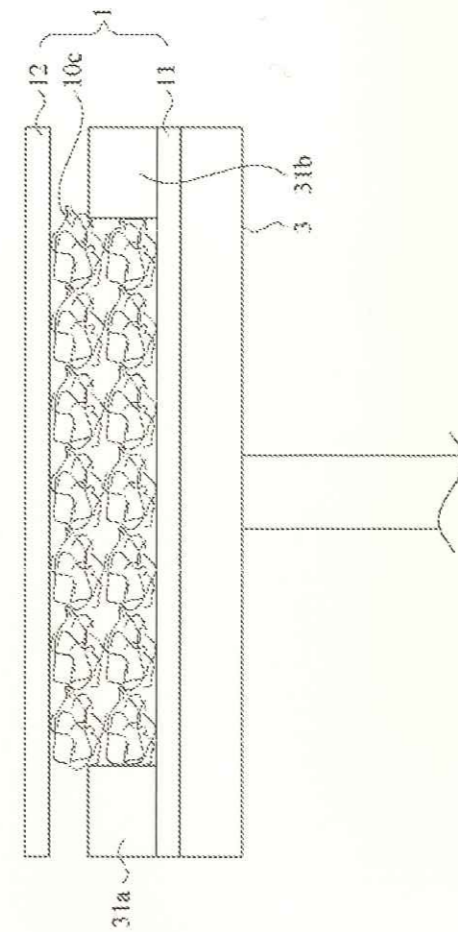


FIG. 5

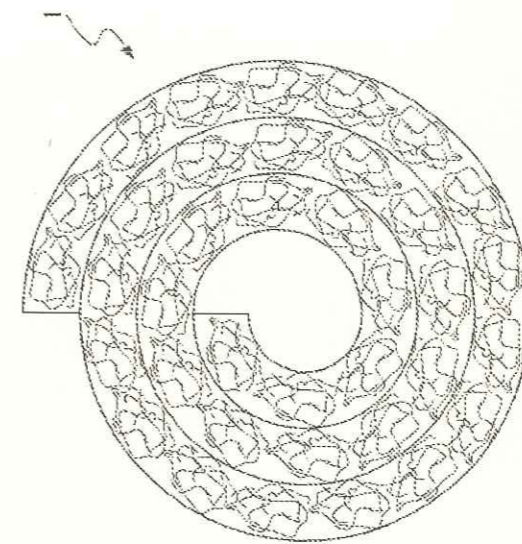


FIG. 6A

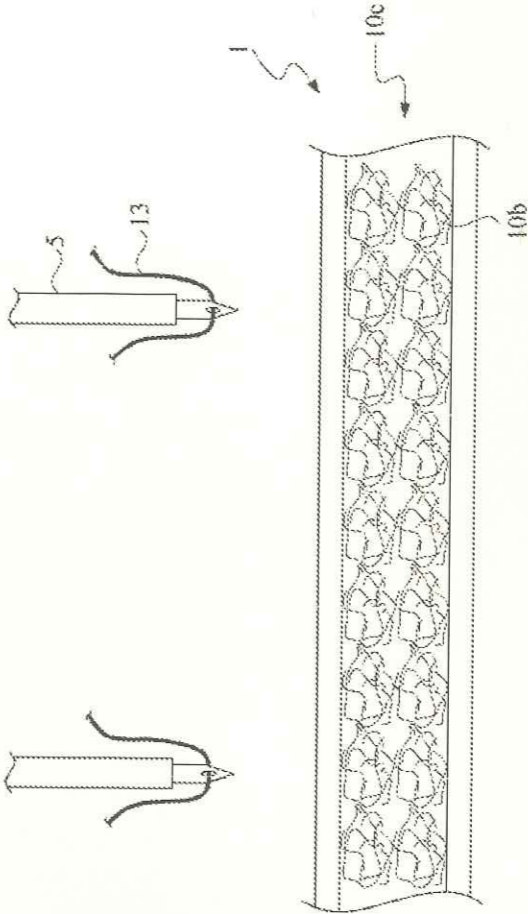


FIG. 6B

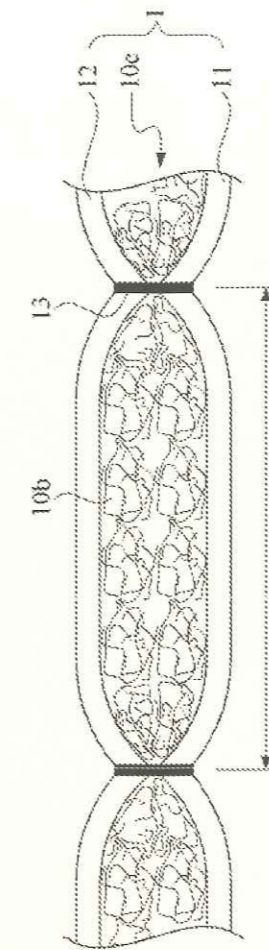


FIG.6C