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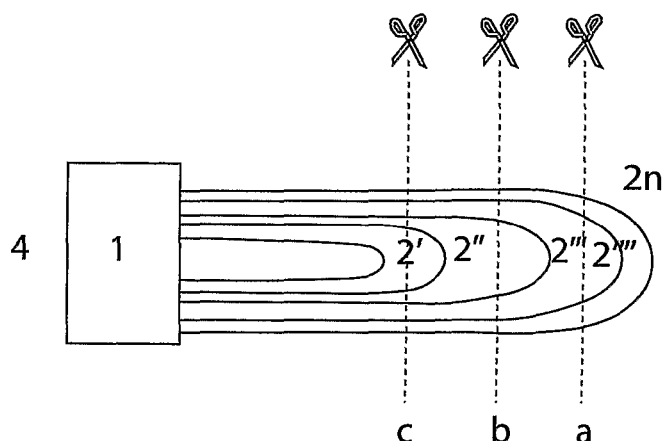
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(54) Title: FILAMENT OR TAPE WITH A SEQUENCE OF RADIOFREQUENCY IDENTIFICATION INTEGRATED CIRCUITS (RFID) HAVING INDEPENDENT ANTENNA CIRCUITS



(57) Abstract: The invention relates to a filament or tape comprising a plurality of radio frequency identification integrated circuits (RFID), each one provided with independent antenna circuits, placed in sequence on a support.

AMENDED CLAIMS**Received by the International Bureau on 24 July 2007 (24.07.07)**

- 1) Filament or tape comprising; a sequence of one or more radiofrequency identification integrated circuits (RFID tags), wherein each circuit has multiple antennas, lying on different planes whenever the geometry of the support allows it (filament).
- 2) Filament or tape comprising one or more tag circuits according to claim 1, where each antenna can have a different length.
- 3) Filament or tape comprising one or more tag circuits according to claims 1 and 2, where the multiple antennas can have common connection points with the integrated circuit.
- 4) Filament or tape comprising one or more tag circuits according to claims 1, 2 and 3, where the independency of antennas is ensured by the presence of additional electronic circuits, for instance, but not limited to, using diodes.
- 5) Filament or tape comprising one or more tag circuits according to any of the previous claims, where in the case of antennas lying on different planes the angle between planes can be constant or variable, [this claim is probably not strong enough to survive; its aim is however to attract the attention to the 'different planes'¹part]
- 6) Filament or tape comprising one or more tag circuits according to any of the previous claims, where the integrated circuit can be physically detached from the antenna.

- 7) Filament comprising one or more tag circuits according to any of the previous claims, where the filament holding the antennas lying on different planes can be made by concentric layers.
- 8) Filament comprising one or more tag circuits according to any of the previous claims, where the filament holding the antennas lying on different planes can be made folding or rolling one or more layers of any material.
- 9) fold claim 19, non uniform elasticity] ATTENZIONE COPIARE
- 10) [old claim 20, non uniform flexibility] ATTENZIONE COPIARE

STATEMENT UNDER ARTICLE 19(1)

The following statement refers to the International Search Report and the Written Opinion of the International Searching Authority established with respect to the International Application No. PCT/IT2007/000015, in the name of DEOLA-SCARDANZAN- NANETTI

We mostly agree with comments and opinions expressed therein about claims. However, we disagree on some of them. Claim 4 is about antennas kept independent using dedicated electronics, whereas figure 6B (document D1) shows physically independent antennas with separated contact points with the integrated circuit. If more than two antennas are present, to arrange separate contact points for each of them can be difficult. Present invention provides the possibility for multiple antennas to share the same contact point, maintaining their independence using dedicated electronics. Claim 7 is about two or more antennas spatially lying on different planes intersecting on filament's main axis (Application Figures 6-7), whereas figure 6B (document D1) shows two coplanar antennas ; they reside on the same flat support, so they need to be coplanar; we would like to stress the point of non-coplanar multiple antennas as one of their invention's main features. On the same line, we also would like to express their preference for either Figure 6 or 7 as the most representative one, instead of Figure 3. Claim 13 is about the detachability of the integrated circuit from the antenna; it has been rephrased in order to comply with point 7 of officer's comments. Claim 17 (constituting materials and structure) has been rephrased to comply with officer's comment. Specifically, a bigger emphasis has been given to Claim 19 (non uniform degree of tag circuit support elasticity) : we respectfully disagree with the examiner opinion, because this feature is neither implicit nor obvious in figure 20A-C (document D1) . Claim 20 (non uniform degree of flexibility) is neither implicit nor obvious in figure 20A-C (document D1) ; it constitutes an important point. An increased rigidity of the filament could be more desirable in the connection zone with the integrated circuit in order to safeguard the connection itself. Claim 25 (possible use in conjunction with gauzes) :, an application exist that uses uniplanar antenna (see next paragraphs) ; we believe that the use of the filament object of their invention could drastically improve the chances of gauze detection.

Background art: RFID tags are known, see e.g. US 6,483,473B1, and US 6,220,516 B1; a similar device with two antennas is also known (WO 2005/093900A1) . Both antennas are planar and co-planar, leaving open the problem of spatial orientation and detectability (tag antenna parallel to the magnetic field lines means no detection, because electrical current cannot be induced) . A cubic-like 3-dimensional configuration of planar antennas is known (US2005/0242959A1) that addresses this problem. However, that 3-d spatial configuration can become bulky, making it impractical for some applications .

About a possible use with gauzes, background art exists (W02005/053557A1); however, the invention therein uses conventional RFID tags with planar antenna that retains the above mentioned problem of tag's spatial orientation.

The present invention has been made taking into account the above described problems. The filament configuration with multiple antennas lying on different planes is meant to overcome the abovementioned issues.