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- 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))

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(54) Title: ACTIVE MATERIAL BASED FASTENERS INCLUDING CABLE TIES AND TWIST TIES

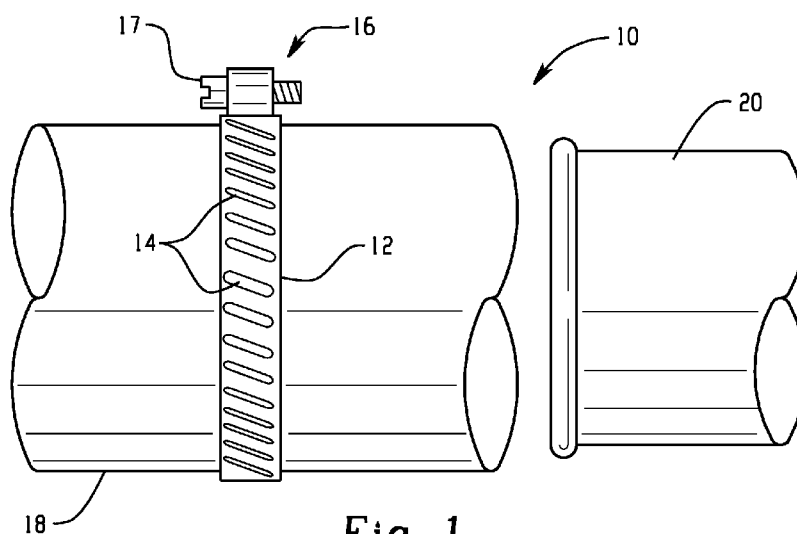


Fig. 1

(57) Abstract: Active material based fasteners that are reversible are provided. These fasteners can be in the form of, for example, cable ties and twist ties. In an embodiment, a fastener for securing an object comprises: a flexible elongated member capable of at least partially surrounding the object; and an adjustment mechanism in operable communication with the flexible elongated member, the adjustment mechanism comprising an active material capable of undergoing a change in a property upon exposure to an activation source, wherein the elongated member is configured to engage or release the object in response to the change in the property.



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A. CLASSIFICATION OF SUBJECT MATTER***F16B 2/08(2006.01)i, F16L 3/137(2006.01)i, H02G 3/30(2006.01)i, B65D 63/00(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F16B 2/08, A44B 18/00, A44C 5/12

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) and keywords: shape memory material, band, hook, loop, tie

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2003-231549 A (NEC TOKIN CORP.) 19 AUGUST 2003 See Paragraph 8 - Paragraph 13; Claim 1-3 and Figures 1-3.	1,2,12,13,15,16 8-10,14,17
Y	US 6,598,274 B1 (MARMAROPOULOS, GEORGE) 29 JULY 2003 See Column 1, Line 45 - Column 4, Line 24; and Figures 1-5.	8-10
Y	JP 11-239506 A (CITIZEN WATCH CO. LTD) 07 SEPTEMBER 1999 See Abstract.	14,17
Y	US 2005-0246873 A1 (TACHAUER, ERNESTO S. et al) 10 NOVEMBER 2005 See Paragraph 4 - Paragraph 32; and Figures 16A-16D.	8-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

12 OCTOBER 2009 (12.10.2009)

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/035963**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-10, claim 11 and claims 12-19 have a common technical feature of employing a flexible elongated member as a fastener. However, this feature lacks novelty and/or inventive step with respect to JP 2003-231549 cited in this ISR. Thus, there is no technical relationship left over the prior art among these inventions, leaving the claims without a single general inventive concept.
Hence there is lack of unity "a posteriori"(PCT Rules 13.1 and 13.2)

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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