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(US). **MCCORMICK, Larry, Leroy** [US/US]; 21603
Devonshire Street, Number 103, Chatsworth, CA 91311
(US). **VEGA, Edwin, E.** [US/US]; 5251 Calatrana Drive,
Woodland Hills, CA 91364 (US). **COURTNEY, Craig,
W.** [US/US]; 7631 Wiscasset Drive, West Hills, CA 91304
(US).

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(74) Agent: **STERNFELS, Lewis, B.**; Law Offices of Clark D.
Gross, 12304 Santa Monica Blvd., Suite 300, Los Angeles,
CA 90025-2593 (US).

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(71) Applicant (*for all designated States except US*): **NEA
ELECTRONICS, INC.** [US/US]; 9259 Eton Avenue,
Chatsworth, CA 91311 (US).

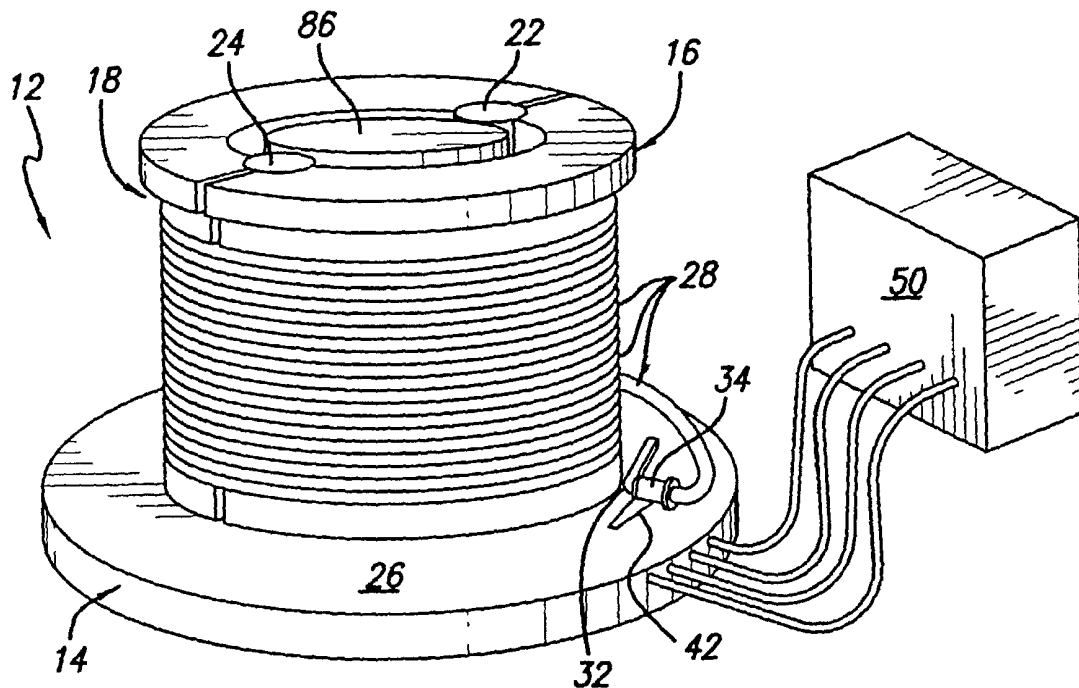
(72) Inventors; and

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(75) Inventors/Applicants (*for US only*): **RUDOY, Edward**
[US/US]; 4625 Wolfe Way, Woodland Hills, CA 91364

[Continued on next page]

(54) Title: FRANGIBLE ACTUATOR WITH REDUNDANT POWER SUPPLY



(57) Abstract: A device for restraining and then quickly releasing objects, comprising two half-spools (16, 18) that are held in place by a coil spring (28). The spring is attached at one end to one of the half-spools and at another end is held in place by a frangible wire (42), which is in turn connected to redundant power supplies (48, 52). Insulation is provided by coating a base portion (26) with aluminum oxide and attaching an insulator hub (34) to the end of the spring held by the frangible wire. Cut-outs (98, 102) within the coils are provided to maximize separation force.

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patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/03556

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B64G1/64 H02J1/10 F16B21/16

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 7 B64G H02J F16B

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 practical, search terms used)
 EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 598 041 A (WILLIS SCOTT C) 28 January 1997 (1997-01-28)	1
Y	the whole document	2-4, 16
X	GB 2 067 034 A (BRITISH AEROSPACE) 15 July 1981 (1981-07-15) abstract figures 1,3 page 1, column 1 page 3, line 22 - line 100	1
Y	DE 196 49 739 A (DAIMLER BENZ AEROSPACE AG) 4 June 1998 (1998-06-04)	2-4, 16
A	the whole document	6
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*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</p> <p>*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</p> <p>*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.</p> <p>*Z* document member of the same patent family</p>
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Date of the actual completion of the international search 28 September 2001	Date of mailing of the international search report 02. 10. 2001
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Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Calvo de Nõ, R
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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>SHI F ET AL: "INTEGRATED POWER SYSTEMS WITH FAULT TOLERANT ATTRIBUTES" APEC. ANNUAL APPLIED POWER ELECTRONICS CONFERENCE AND EXPOSITION, US, NEW YORK, IEEE, vol. CONF. 12, 23 February 1997 (1997-02-23), pages 443-447, XP000736215 ISBN: 0-7803-3705-0 column 443, paragraph 1 - paragraph 4; figure 1</p> <p style="text-align: center;">---</p>	1
A	<p>US 4 057 260 A (SIGOTT SIEGFRIED) 8 November 1977 (1977-11-08) abstract figure 1 column 3, line 15 - line 16</p> <p style="text-align: center;">-----</p>	6

INTERNATIONAL SEARCH REPORT

international application No.
PCT/US 01/03556

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

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

see additional sheet

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.:

1-4, 6, 16
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.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4,16

Redundant power supply and its use in a frangible actuator

2. Claim : 5

Frangible actuator with insulator hub

3. Claim : 6

Frangible actuator with at least one depression section

4. Claims: 7-8

Frangible actuator comprising steel at least partially coated with aluminum oxide

5. Claims: 9-10

Frangible actuator with at least one restraining pin

6. Claims: 11-12

Frangible actuator

7. Claims: 13-15

Frangible actuator with at least one restraining channel

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/03556

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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