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(71) Applicant: **EATON INTELLIGENT POWER LIMITED** [IE/IE]; 30 Pembroke Road, Dublin 4, D04 Y0C2 (IE).

(72) Inventors: **ARORA, Sonal**; Ward No. 10, Agrawal Lodge Road, Manendragarh, Chhattisgarh, 497442 (IN). **KOTHE, Aarti**; 91 MURARJI PETH SOLAPUR, SOLAPUR, MAHARASHTRA, 413001 (IN). **KADAM, Nilesh**; Gulmohar Helios Kharadi, Pune Maharashtra, 411014 (IN). **JAIN, Mayank**; 144-A, Pocket-E, LIG Flats, GTB Enclave, Nand Nagari, Delhi, 110093 (IN). **JAIN, Ragini**; A2-1204, Gera Song of Joy, Gera Greensville Kharadi, Pune, Maharashtra, 41 1014 (IN).

(74) Agent: **NOVAGRAAF GROUP**; Chemin de l'Echo 3, 1213 Onex / Geneva (CH).

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(54) **Title:** CONTROL SYSTEM FOR SEPARABLE LOAD-BREAK ELECTRICAL CONNECTORS

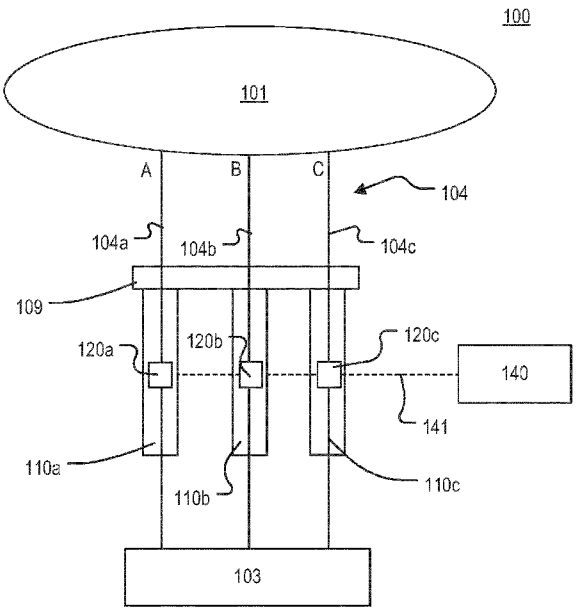

FIG. 1

(57) **Abstract:** An apparatus includes: a plurality of separable load break devices, each separable load break device including: a resettable current interruption device associated with operating states, the operating states including at least a first operating state that prevents current flow in the resettable current interruption device and a second operating state that allows current flow in the resettable current interruption device; a switch control configured to control the operating state of the resettable current interruption device; a connection interface configured to mechanically connect the load break device to a separate electrical device and to electrically connect the resettable current interruption device to the separate electrical device; and an electrical interface configured to electrically connect the resettable current interruption device to a load. The apparatus also includes a control system configured to provide electrically ganged operation of the plurality of load break devices.

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[Continued on next page]

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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))*

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A. CLASSIFICATION OF SUBJECT MATTER
INV. H02H3/26 H01H33/02 H01H9/54 H01H33/00
ADD.

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)
H02H H01H G08C

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)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/028968 A1 (COOPER TECHNOLOGIES CO [US]; ROCAMORA RICHARD G [US] ET AL.) 16 March 2006 (2006-03-16) page 3, line 20 - page 17, line 14; figures 1-6	1-19
A	US 2019/296542 A1 (KROMREY TIMOTHY MARK [US] ET AL) 26 September 2019 (2019-09-26) paragraph [0020] - paragraph [0089]; figures 1-6	1-12

☐ 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 another 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	Date of mailing of the international search report
25 May 2023	06/06/2023

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Nieto, José Miguel

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2022/025537

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:

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 fees, this Authority did not invite payment of additional fees.

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-12

apparatus comprising a plurality of separable load break devices and a control system, each separable load break device comprising a resettable current interruption device, a switch control, a connection interface, an electrical interface

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2. claims: 13-18

control system configured to control a plurality of load break devices, the control system comprising a power supply module, the power supply module comprising a boost module, an energy storage apparatus, one or more electronic processors and an electronic memory, the processors access information, determine wether a fault exists and control the load break devices.

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3. claim: 19

method comprising receiving an indication of one or more properties of electrical power flow in a plurality of separable load-break electrical connectors, analyzing the indication of the one or more properties to determine whether a fault exists in any of the plurality of separable load-break electrical connectors and if a fault exists in any of the separable load-break electrical connectors, commanding a switch control in each of the separable load-break electrical connectors to open a resettable current interruption device in the separable load-break electrical connector

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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PCT/EP2022/025537

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2006028968 A1	16-03-2006	AU 2005282732 A1	16-03-2006
		AU 2010202171 A1	17-06-2010
		BR PI0514913 A	24-06-2008
		CA 2579046 A1	16-03-2006
		EP 1789941 A1	30-05-2007
		EP 2278569 A2	26-01-2011
		US 2006084419 A1	20-04-2006
		WO 2006028968 A1	16-03-2006
US 2019296542 A1	26-09-2019	AU 2019238802 A1	15-10-2020
		BR 112020019200 A2	05-01-2021
		CA 3094032 A1	26-09-2019
		CN 111886665 A	03-11-2020
		DE 112019000964 T5	07-01-2021
		US 2019296542 A1	26-09-2019
		WO 2019179664 A1	26-09-2019