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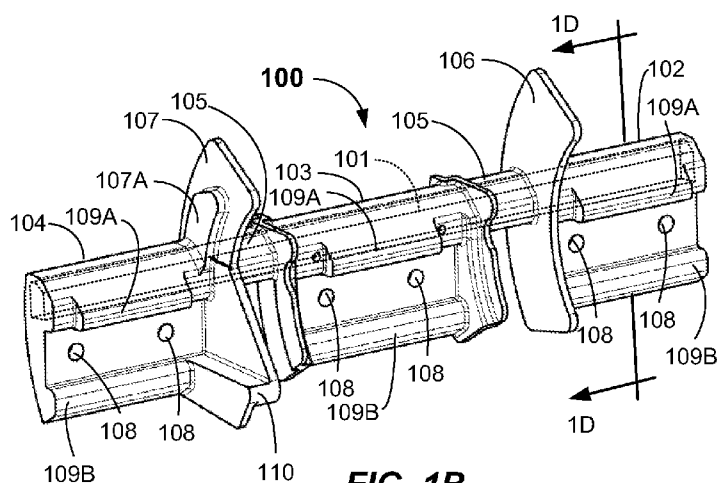
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28 February 2013

(54) Title: LIMIT STOP APPARATUS, CIRCUIT BREAKERS INCLUDING LIMIT STOPS, AND METHODS OF USING SAME

**FIG. 1B**

(57) **Abstract:** A limit stop apparatus for a multi-pole electrical contact assembly is disclosed. The limit stop apparatus interconnects crossbars of respective contact assemblies wherein one or more contact arms are pivotable relative to each crossbar. The limit stop apparatus is configured to engage the one or more contact arms on a same side of the one or more contact arms containing moveable electrical contacts. In one or more embodiments, the limit stop apparatus has a connecting bar with limit stops having arc shields molded to the connecting bar, wherein the arc shields can be phase-to-phase arc shields and contact-to-component arc shields. Circuit breakers and multi-pole electrical contact assemblies having a limit stop apparatus, and methods of operating the multi-pole electrical contact assembly are disclosed, as are other aspects.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/024269

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01H9/34 H01H33/08 H01H71/10
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)
H01H

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	US 3 133 164 A (DENNISON WILLIAM G ET AL) 12 May 1964 (1964-05-12)	1,4
Y	column 2, line 44 - column 5, line 74; figures 1-12	2,3,5
Y	----- EP 0 008 989 A1 (MERLIN GERIN [FR]) 19 March 1980 (1980-03-19) page 5, line 16 - line 20; figure 3	2
Y	----- US 4 061 896 A (CLANCY JOHN F ET AL) 6 December 1977 (1977-12-06) column 4, line 51 - column 5, line 3; figure 1	3
Y	----- US 3 132 225 A (SWINEHART MERLE R) 5 May 1964 (1964-05-05) column 5, line 69 - column 6, line 18; figures 1,10	5
	----- -/-	



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

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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.
X Y A	EP 1 858 041 A2 (EATON CORP [US]) 21 November 2007 (2007-11-21) paragraph [0017] - paragraph [0023]; figures 1-4	6-8,13, 15,18,19 9,20 10-12, 14,16,17
Y	----- US 3 243 558 A (LINK DONALD A ET AL) 29 March 1966 (1966-03-29) column 1, line 41 - column 4, line 69; figures 1,4,5 -----	9,20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/024269

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: 1-5

A limit stop apparatus, comprising:
a connecting bar; and arc shields molded to the connecting bar, the arc shields comprising phase-to-phase arc shields and contact-to-component arc shields.

2. claims: 6-20

A multi-pole electrical contact assembly or a circuit breaker comprising:
a plurality of electrical contact assemblies, each electrical contact assembly having a crossbar and one or more contact arms pivotable relative to the crossbar; and
a limit stop apparatus coupled to the crossbar of each electrical contact assembly, wherein the limit stop apparatus has limit stops configured and adapted to engage the one or more contact arms on a same side of the one or more contact arms containing moveable electrical contacts and a method of operating such a multi-pole electrical contact assembly

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/024269

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3133164	A	12-05-1964	NONE
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US 3243558	A	29-03-1966	NONE