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BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
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(54) Title: ARC RUNNERS SUITABLE FOR DC MOLDED CASE CIRCUIT BREAKERS AND RELATED METHODS

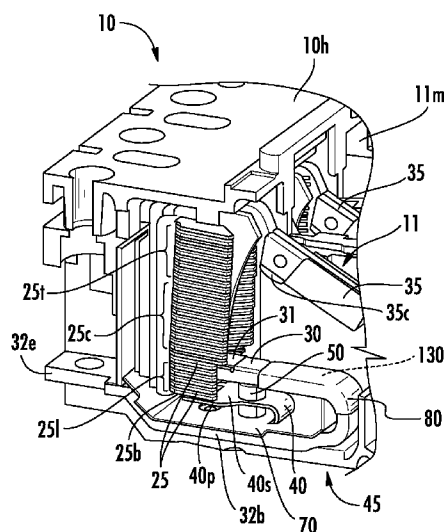


FIG. 1

(57) Abstract: Circuit breakers include an arc chamber (11) and an arc chute (12) comprising a plurality of arc plates (25) in the arc chamber. The circuit breakers also include a line conductor assembly (45) with at least one arc runner (40) attached to a line conductor (32) in the arc chamber. The arc runner (40) can extend below but adjacent to a bottom arc plate (25b) to thereby guide a respective arc into the arc chute (12).



INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/011608

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01H9/46 H01H73/18
 ADD. H01H9/34

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 4 970 481 A (ARNOLD DAVID [US] ET AL) 13 November 1990 (1990-11-13) column 3, lines 16-51; figures 2,3 -----	1,2,4, 10,11, 14,15, 17,22
X	US 5 877 467 A (ARNOLD DAVID [US] ET AL) 2 March 1999 (1999-03-02) column 2, line 57 - column 3, line 59; figures 2,3 -----	1,5-7, 11,17,22
X	FR 2 959 347 A1 (SCHNEIDER ELECTRIC IND SAS [FR]) 28 October 2011 (2011-10-28) page 6, line 24 - page 7, line 29; figures 1, 2A, 2B ----- -/-	1,4,6,7, 17,22



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

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"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

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Date of the actual completion of the international search

10 April 2014

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2014/011608

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/279734 A1 (CAROTHERS ARTHUR D [US] ET AL) 22 December 2005 (2005-12-22) paragraphs [0027] - [0032]; figures 2,3,5 -----	1,2,4, 10,11, 14,15, 17,22

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2014/011608

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.:

1-17, 22

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

International Application No. PCT/ US2014/ 011608

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-17, 22

Arc chamber of a circuit breaker wherein an arc runner has a portion residing under a bottom arc plate.

2. claims: 18-21

A line conductor assembly with a non-ferromagnetic, conductive arc runner attached to the elongate line conductor, wherein the arc runner has a special form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2014/011608

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4970481	A	13-11-1990	CA 2021603 A1 14-05-1991 US 4970481 A 13-11-1990
US 5877467	A	02-03-1999	BR 9602736 A 08-09-1998 CN 1146088 A 26-03-1997 EP 0762439 A2 12-03-1997 JP 3896175 B2 22-03-2007 JP H09168233 A 24-06-1997 US 5614881 A 25-03-1997 US 5877467 A 02-03-1999
FR 2959347	A1	28-10-2011	NONE
US 2005279734	A1	22-12-2005	NONE