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[Continued on next page]

(54) Title: REMOTE CONTROL AND OPERATION OF LV DISTRIBUTION NETWORKS

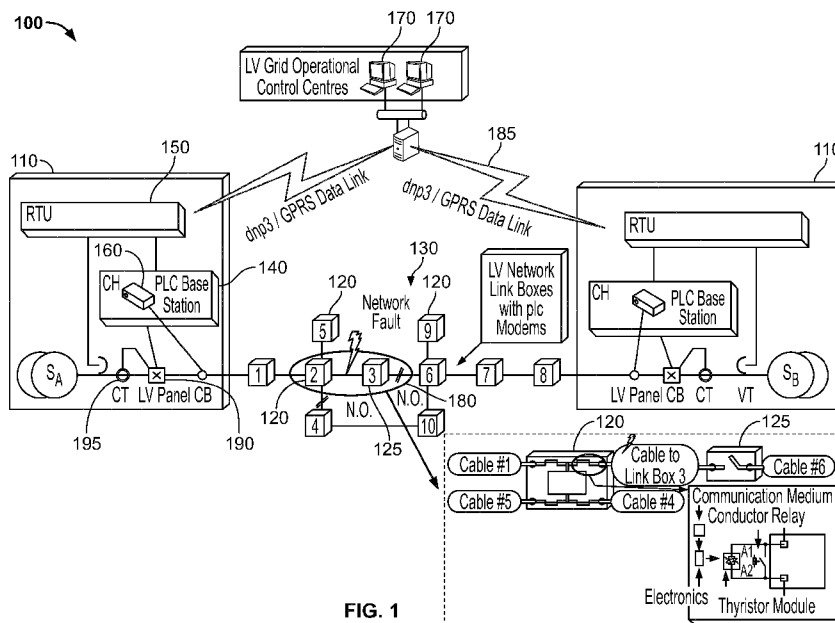


FIG. 1

(57) Abstract: A Low Voltage, "LV", network automation system is provided which enables utilities to remotely identify location of LV faults on their networks, isolate these faults and re-energising the healthy LV circuit by remote control. The hardware for this system is designed to be retrofitted into existing LV switchgears and panels which enables the network change over to be done cost effectively and with minimum interruption to the network. The system also enables utilities to monitor load flows on the LV networks and identify circuits which are overloaded and gives control room operator options for redistribution of network load where possible.





SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *of inventorship (Rule 4.17(iv))*

- *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))*

**(88) Date of publication of the international search report:**

6 December 2012

INTERNATIONAL SEARCH REPORT

International application No  
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A. CLASSIFICATION OF SUBJECT MATTER  
INV. H02J13/00 H01H9/54  
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)  
H02J H01H H03K

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.
Y	EP 0 034 467 A1 (SCHLUMBERGER ELECTRONICS UK [GB]) 26 August 1981 (1981-08-26) page 1 - page 21; figures 1-6 -----	1-3,5,8, 12-18
Y	EP 0 089 515 A1 (WESTINGHOUSE ELECTRIC CORP [US]) 28 September 1983 (1983-09-28) page 2, line 1 - page 25, line 8; figures 1-8 -----	1-3,5,8, 12-18
X	WO 98/31086 A1 (TEN HOLTER CONSULTANCY [NL]; TEN HOLTER RONALDUS PAULUS MAR [NL]) 16 July 1998 (1998-07-16) -----	4,6,7, 10,11
Y	page 6, line 21 - page 21, line 17; figures 1-33 -----	5,8,9
Y	GB 2 113 025 A (HOWARD MICHAEL SHMUEL) 27 July 1983 (1983-07-27) page 14, line 16 - line 106; figure 17 -----	9
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Further documents are listed in the continuation of Box C.

See patent family 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 application or patent 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>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search  10 October 2012	Date of mailing of the international search report  25/10/2012
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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, Fax: (+31-70) 340-3016	Authorized officer  Drabko, Jacek
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/056217

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 818 710 A (LEVAN SUU MAURICE [FR]) 6 October 1998 (1998-10-06) column 1, line 14 - column 4, line 46; figures 1,2	1-3, 12-18
A	----- WO 2008/052162 A2 (COOPER TECHNOLOGIES CO [US]; BANTING JOHN FREDERICK [US]; MUENCH FRANK) 2 May 2008 (2008-05-02) paragraph [0019] - paragraph [0068] -----	1-3, 12-18

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2012/056217

## 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: 1-3, 12-18

A disconnect switching device, comprising: a latching relay (220) for connecting and disconnecting an AC power signal to a load; a thyristor module (210) connected in parallel with the latching relay (220); and a control unit (260) for controlling a switching operation of the thyristor module (210) and of the latching relay (220); wherein the switching operation is controlled by the control unit (260) using a power line carrier control signal (265) transmitted from a remote terminal unit (150).

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2. claims: 4-11

A single phase circuit breaker device, comprising: a thyristor switching device for connecting and disconnecting an AC power signal to a load; and an overcurrent protection device (710) connected in series with the thyristor switching device; wherein the overcurrent protection device (710) is adapted to disconnect the AC power signal from the load when a fault current condition occurs at a current value that is above a predetermined threshold value.

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## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/056217

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