(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 852 388 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.07.1998 Bulletin 1998/28

(51) Int. Cl.[6]: **H01H 85/54**

(21) Application number: **97203779.0**

(22) Date of filing: **03.12.1997**

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **04.12.1996 IT MI962543**

(71) Applicant:
ABB ELETTROCONDUTTURE S.p.A.
I-20137 Milan (IT)

(72) Inventor: **Jacovino, Elio**
20052 Monza (IT)

(74) Representative:
Giavarini, Francesco
ABB Ricerca S.p.A.
Viale Edison, 50
20099 Sesto San Giovanni (MI) (IT)

(54) Fuse-holder disconnector for switchboard

(57) There is described a fuse-holder for a switchboard which exhibits the mechanical characteristics required by the Standards relating to disconnectors.

A fuse-holder for a switchboard comprises an outer casing, located inside which are fixing means (a pair of clamps or equivalent means) into which the ends of the fuse, carried by a support which can move inside the casing, are inserted.

As soon as the fuse is unfastened from the fixing means by acting on the support, elastic means located inside the casing and acting on the support, distance the fuse from the fixing means so as to carry it to a distance from the fixing means not less than the minimum safety distance prescribed by the aforesaid Standards.

A preferred embodiment of the elastic means is also described.

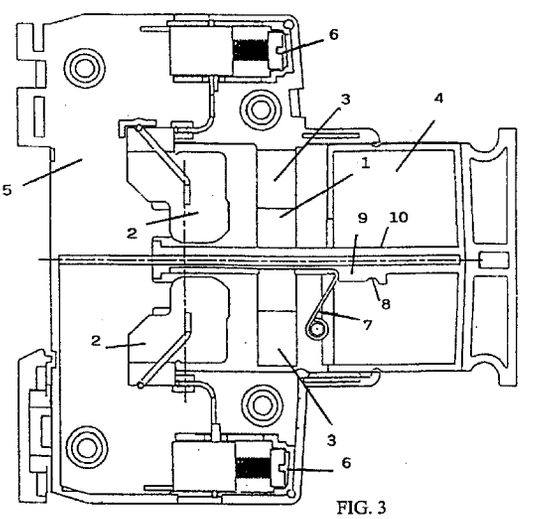

FIG. 3

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Description

The invention relates to a fuse-holder for a switchboard comprising an outer casing, a support which can move inside the casing and holds the fuse, and fixing means, preferably a pair of clamps or equivalent means, located inside the casing, into which the ends of the fuse are inserted, said fuse-holder exhibiting the mechanical characteristics required by the Standards relating to disconnectors.

Fuse-holders for switchboards are components, which are well known in the art, which normally constitute an essential element of electrical circuits (in particular of low-voltage electrical circuits) and which are generally mounted in a switchboard together with one or more thermo-magnetic circuit breakers, said fuse-holders being generally electrically and/or functionally coupled with said circuit breakers.

Such fuse-holders comprise an outer casing, located inside which are fixing means, preferably but not necessarily a pair of clamp elements, hereinafter referred to as "clamps", or equivalent means, into which the ends of the fuse are inserted, said fuse being carried by a support which can move inside the casing: the support can rotate or translate with respect to the outer casing so as to allow an operator to take the fuse out of the fuse-holder and replace it with an intact fuse, if the pre-existing fuse had "blown", and/or with a different fuse rated to "carry" a different nominal current.

Having made the replacement, the operator inserts the support fully into the outer casing until the fuse engages in the fixing means present in the outer casing.

Fuse-holders of known type have often also the function of disconnectors, i.e. the job of breaking the electric circuit into which they are inserted preferably but not necessarily when this electric circuit is not traversed by current: thus, disconnectors are known which are able to operate "under load", i.e. when the electric circuit into which they are inserted is traversed by current.

Thus, by acting on the support it is possible to extract the fuse from the fixing means of the fuse-holder, thereby breaking the aforesaid electric circuit.

The use of fuse-holders of known type as disconnectors is however generally inappropriate, since such fuse-holders do not normally exhibit the mechanical characteristics required by the Standards relating to disconnectors, namely:

- exhibiting two stable positions (disconnector closed or open);

- when the disconnector is open, a specified minimum safety distance must be guaranteed between its members.

In fuse-holders of known type the operator, after having disengaged the fuse from the fixing means, can release the support in any position, without necessarily having to carry the support to a position such that the distance between the fixing means and the ends of the fuse is not less than the aforesaid specified minimum safety distance, which therefore is not guaranteed: under the Standard in force, fuse-holders of known type cannot therefore also function as disconnectors.

The subject of the present invention is a fuse-holder able to obviate the aforementioned limitation of known fuse-holders since it comprises elastic means, located inside the casing and acting on the support, which distance the fuse from the fixing means as soon as the fuse is unfastened from the fixing means, therefore carrying the ends of the fuse to a distance from the fixing means not less than the minimum safety distance prescribed by the Standards relating to disconnectors.

The subject of the present invention is a fuse-holder for a switchboard comprising an outer casing, a support which can move inside the casing and holds the fuse and fixing means, preferably a pair of clamps or equivalent means, located inside the casing, into which the ends of the fuse are inserted, said fuse-holder exhibiting the mechanical characteristics required by the Standards relating to disconnectors.

The fuse-holder of the present invention comprises elastic means, located inside the casing and acting on the support, which distance the fuse (carried by the support) from the fixing means as soon as this fuse is unfastened from the fixing means, by carrying the ends of the fuse to a distance from the fixing means not less than the minimum safety distance prescribed by the aforesaid Standards.

The invention will now be described more fully with reference to a non-limiting embodiment illustrated in the appended figures in which:

- Figure 1 shows, schematically, a cross-section of the invention with the fuse fully inserted into the fixing means;

- Figure 2 shows, schematically, a cross-section of the invention with the fuse only just unfastened from the fixing means;

- Figures 3 shows, schematically, a cross-section of the invention with the fuse the safety distance away from the fixing means;

- Figure 4 shows, schematically, a cross-section of the invention with the support fully extracted.

In the appended figures, corresponding elements will be identified with the same numerical references.

The appended figures show in cross-section a fuse-holder according to the invention, which comprises:

- the outer casing 5 consisting of two symmetric shells, preferably but not necessarily made from moulded plastic material, only one of which is visi-

ble in the appended figures;

- the support 4, which can move inside the casing 5, and carries the fuse 1;
- the fixing means, located inside the casing 5, which consist, in the embodiment illustrated here, of a pair of clamps 2 into which the ends 3 of the fuse 1 are inserted;
- the terminals 6 (each of which is electrically connected to one of the clamps 2) to which are adjoined the conductors which constitute the electric circuit to which the fuse-holder belongs; and
- elastic means, located inside the casing 5 and acting on the support 4, which distance the fuse 1 (carried by the support 4) from the clamps 2 as soon as the fuse 1 is unfastened from the clamps 2, by carrying the ends 3 of the fuse 1 to a distance from the clamps 2 not less than the minimum safety distance prescribed by the Standards relating to disconnectors.

In the preferred embodiment described here, the elastic means consists of a pair of spiral springs 7 (for clarity of description, in the figures only one spring 7 is visible) mounted inside the outer casing 5 (to which they are fixed in a manner known per se) in symmetrical positions with respect to the longitudinal axis of symmetry of the support 4.

Figure 1 shows, schematically, a cross-section of the invention with the ends 3 (seen more clearly in Figures 2 to 4) of the fuse 1 fully inserted into the clamps 2; the free end of each of the springs 7 is located in a recess 8 (seen more clearly in Figures 2 to 4) made on the front surface of the projection 9 belonging to a longitudinal rib 10 of the support 4.

In the preferred embodiment illustrated here, the springs 7 are mounted in the outer casing 5 in such a way as to be inclined towards the clamps 2 when the fuse 1 is fully inserted into these clamps: under these conditions the forces exerted by the springs 7 tend to maintain the fuse 1 in its seat and ease the insertion thereof into the clamps 2, by reducing the force required from the operator.

The action effected on the support 4 by the springs 7 when the fuse 1 is disengaged from the clamps 2 will now be described with reference to Figures 2 to 4.

Figure 2 shows, schematically, a cross-section of the invention in which the support 4, partially extracted from the outer casing 5 by the operator, has undergone a translation (of greater amplitude than the so-called "travel of disengagement" of the fuse 1 from the clamps 2) such as to unfasten the ends 3 of the fuse 1 from the clamps 2, which ends touch (or can touch) the clamps (to which they are in any event very close) but are no longer retained by the clamps 2; the distance between the clamps 2 and the ends 3 of the fuse 1 is in any event much less than the minimum safety distance prescribed by the Standards relating to disconnectors and, in a fuse-holder of known type, remains unchanged if for any reason the operator releases the support 4.

In a fuse-holder according to the invention, because of the translation of the support 4 the free end of each of the springs 7 has become dislodged from the recess 8 made in the corresponding projection 9 and rests against the flank 11 (seen more clearly in Figures 1, 3 and 4) of the said projection 9, the distance of which from the centre of the recess 8 is greater than the so-called "travel of disengagement" of the fuse 1 from the clamps 2: if for any reason the operator releases the support 4, the action of each of the springs 7 on the flank 11 of the corresponding projection 9 causes the further translation of the support 4 required to carry the ends 3 of the fuse 1 to a distance from the clamps 2 not less than the minimum safety distance prescribed by the Standards relating to disconnectors.

Figure 3 shows, schematically, a cross-section of the invention in which the action of the springs 7 has extracted the support 4 from the outer casing 5 so as to carry the ends 3 of the fuse 1 to a distance from the clamps 2 not less than the minimum safety distance prescribed by the aforesaid Standards: the springs 7 have accomplished their task and are (or could be) unloaded.

In a fuse-holder according to the invention the support 4 (released by the operator after having unfastened the fuse 1 from the clamps 2) is therefore positioned automatically in such a way as to satisfy the Standards relating to disconnectors.

Figure 4 shows, schematically, a cross-section of the invention in which the operator has extracted the support 4 fully from the outer casing 5: as the support 4 passes from the position of Figure 3 to that of Figure 4, the free end of each of the springs 7 runs (almost) without friction in a seat 12 formed in the corresponding rib 10 of the support 4.

When the support 4 has been fully extracted from the casing 5 and the operator exerts a pressure on the support 4 so as to re-insert the fuse 1 into the clamps 2, the free ends of the springs 7 run firstly in the seats 12 until they lodge against the flanks 11 of the projections 9; the further translation of the support 4 "loads" the springs 7 whose free ends (when the distance to the travel end of support 4 is not greater than the so-called "travel of disengagement" of the fuse 1 from the clamps 2) are carried to the front surface of the corresponding projection 9; at the end of travel of the support 4 the free end of each of the springs 7 is positioned in the corresponding recess 8, as may be seen in Figure 1.

The invention has been described with reference to a non-limiting embodiment in which the support 4 is able to translate with respect to the outer casing 5 but, without departing from the scope of the invention, it is possible for a person skilled in the art to make according

to the invention an isolating fuse-holder in which the support 4 rotates with respect to the outer casing 5 and/or an isolating fuse-holder able to operate "under load".

Again without departing from the scope of the invention it is possible for a person skilled in the art to make any modifications and enhancements suggested by normal experience and by natural progress in the art to the isolating fuse-holder for switchboard which is the subject of the present invention.

Claims

1. Fuse-holder for switchboard, comprising at least one outer casing (5); a support (4), which can move inside the said outer casing (5) and is able to hold a fuse (1); fixing means (2), located inside the said outer casing (5), into which the ends (3) of the said fuse (1) are inserted and terminals (6) electrically connected to the said fixing means (2); characterized in that it furthermore comprises elastic means (7), located inside the said outer casing (5) and acting on the said support (4), which are able to distance the said fuse (1) from the said fixing means (2) as soon as the said fuse (1) is unfastened from the said fixing means (2) by acting on the said support (4), the action of the said elastic means (7) carrying the said ends (3) of the said fuse (1) to a distance from the said fixing means (2) not less than a specified minimum safety distance.

2. Fuse-holder according to Claim 1, characterized in that the said fixing means (2) consist of a pair of clamp elements.

3. Fuse-holder according to Claim 1, characterized in that the said elastic means (7) consist of a pair of spiral springs mounted inside the said outer casing (5) in symmetrical positions with respect to the longitudinal axis of symmetry of the said support (4).

4. Fuse-holder according to Claim 3, characterized in that, when the said ends (3) of the said fuse (1) are fully inserted into the said fixing means (2), the free end of each of the said spiral springs (7) is located in a recess (8) made on the front surface of a projection (9) belonging to a longitudinal rib (10) of the said support (4).

5. Fuse-holder according to Claim 3, characterized in that, when the said ends (3) of the said fuse (1) are fully inserted into the said fixing means (2), the said spiral springs (7) are inclined towards the said fixing means (2).

6. Fuse-holder according to Claim 4, characterized in that, in response to a translation of the said support (4) of greater amplitude than the travel of disengagement of the said fuse (1) from the said fixing means (2), the said free end of each of the said spiral springs (7) is dislodged from the said recess (8) made on the said front surface of the said projection (9) belonging to the said longitudinal rib (10) of the said support (4) so as to rest against the flank (11) of the said projection (9), the distance of the said flank (11) of the said projection (9) from the centre of the said recess (8) being equivalent to the amplitude of the said translation of the said support (4) and in that the action of the said spiral springs (7) on the said flank (11) of the said projection (9) carries the said ends (3) of the said fuse (1) to a distance from the said fixing means (2) not less than the said specified minimum safety distance.

7. Fuse-holder according to Claim 6, characterized in that, during the further translation of the said support performed by the operator so as to extract the said support (4) fully from the said outer casing (5), the said free end of each of the said spiral springs (7) runs in a seat (12) formed in the said rib (10) of the said support (4).

8. Fuse-holder according to Claims 4 to 7, characterized in that, when the said support (4) has been fully extracted from the said outer casing (5) and the operator exerts a pressure on the said support (4) so as to insert the said ends (3) of the said fuse (1) into the said fixing means (2),

   - the said free end of each of the said spiral springs (7) runs in the said seat (12) until it lodges against the said flank (11) of the said projection (9);
   - the further translation of the said support (4) loads the said spiral spring (7);
   - when the distance from the travel end of the said support (4) is not greater than the said travel of disengagement of the said fuse (1) from the said fixing means (2), the said free end of each of the said spiral springs (7) is carried onto the said front surface of the said projection (9), over which it runs until it is positioned in the said recess (8).

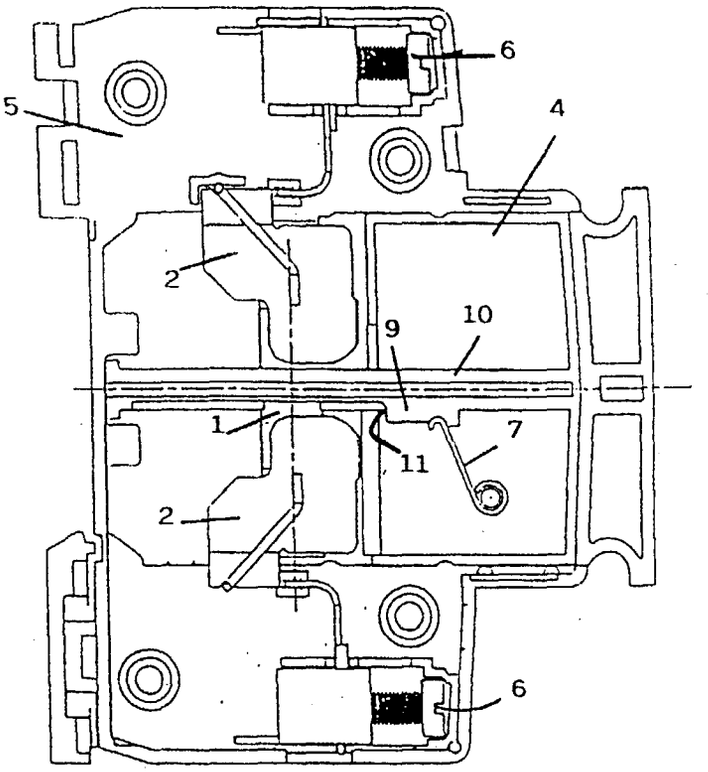

FIG. 1

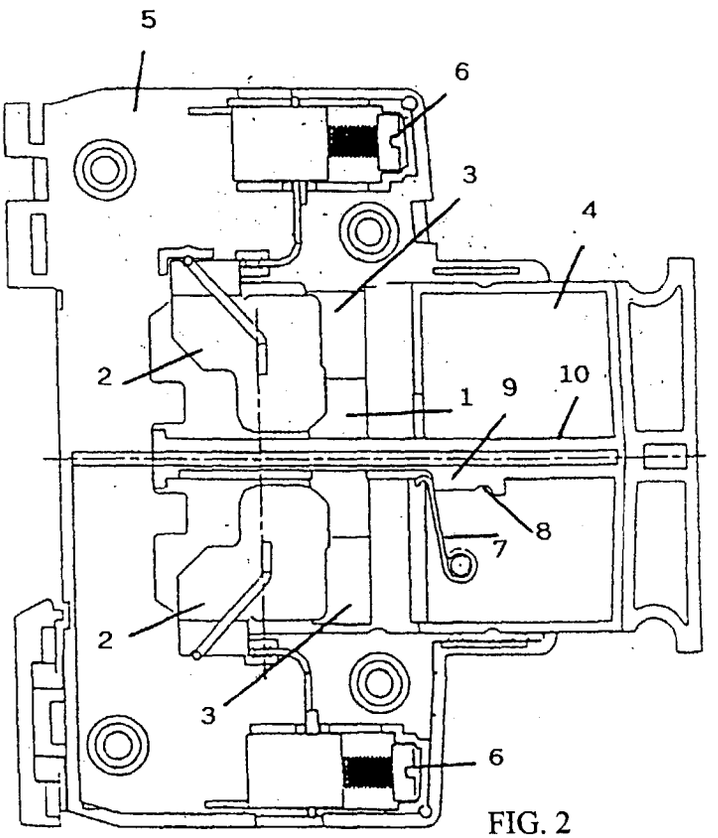

FIG. 2

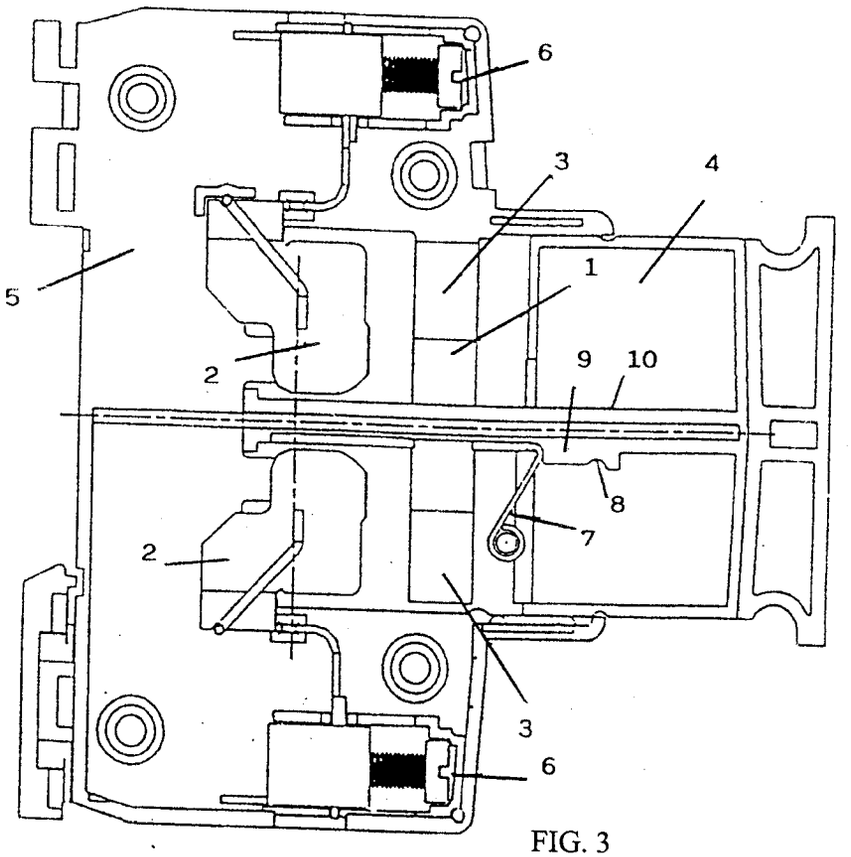

FIG. 3

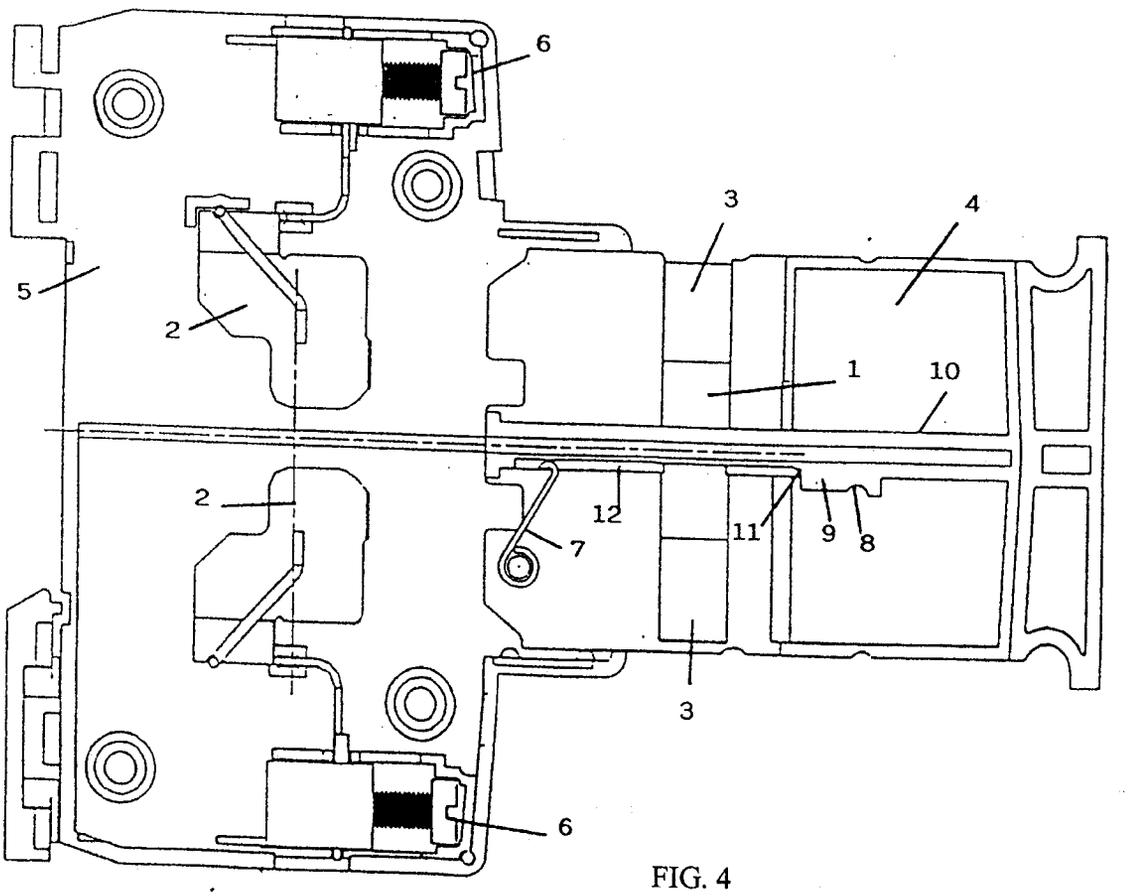

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 3779

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	GB 581 048 A (VERNON HOPE) * page 2, line 90 - line 103 * * page 3, line 9 - line 20 * * claim 1; figures * ---	1,2 3	H01H85/54
A Y	DE 11 78 131 B (LA TÉLÉMÉCANIQUE) * column 5, line 42 - column 6, line 12 * ---	1,2 3	
X	EP 0 067 914 A (CHANG CHIEN CHEN) * abstract; figures * ---	1,2	
X	DE 87 16 273 U (KLAUS BRUCHMANN) * figures 7-12 * * page 18, last paragraph - page 19, paragraph 1 * ---	1,2	
X	US 2 842 640 A (R. S. RAGAN) * figures * * column 3, line 20 - line 36 * ---	1,2	
A	DE 33 03 471 A (SIEMENS AG) * the whole document * -----	1,2	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 March 1998	Desmet, W

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