FORM 2

THE PATENTS ACT, 1970
(39 of 1970)
AND
THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

(See Section 10; rule 13)

TITLE OF THE INVENTION

"SWITCHING DEVICE AND RELATED SWITCHGEAR"

APPLICANT

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The following specification particularly describes
the invention and the manner in which
it is to be performed

CLAIMS

1. A mechanically operated switching device (1) comprising at least a movable contact (3) couplable/separable to/from a corresponding fixed contact (4); and characterized in that it comprises:
   - an operating mechanism (10) operatively associated to said movable contact (3) for coupling/separating said movable contact (3) to/from the corresponding fixed contact (4), wherein said operating mechanism (10) comprises first elastic means (11) which are suitable for providing with their release the energy to separate said movable contact (3) from the corresponding fixed contact (4);
   - at least a shunt release (100) having:
     - a member (101) movable between a first stable position and a second stable position, wherein the movement from the first stable position to the second stable position causes the operative interaction between said movable member (101) and one or more parts of the operating mechanism (10) to release said first elastic means (11);
     - second elastic means (108) which are operatively associated to said movable member (101);
     - at least a permanent magnet (109) generating a holding force (F_{II}) which is suitable for holding the movable member (101) in the first stable position, wherein the movable member (101) held in the first stable position is configured for compressing said second elastic means (108);
     - at least an electrical winding (120) which is operatively associated to the movable member (101) and to electronic means (200), wherein said electronic means (200) are configured for electrically driving the winding (120) to generate a first magnetic force (F_1) acting on the movable member (101) held in the first stable position, said first magnetic force (F_1) being suitable for causing the release of the compressed second elastic means (108) which urge the movable member (101) towards the second stable position.
2. The switching device (1) according to claim 1, characterized in that said electronic means (200) are configured for electrically driving said at least an electrical winding (120) so as to generate a second magnetic force (F_2) acting on the movable member (101) in the second stable position, said second magnetic force (F_2) being suitable for displacing the movable member (101) from the second stable position to the first stable position.
3. The switching device (1) according to claim 2, characterized in that said electronic means (200) comprise a driving circuit (201) electrically connected to said at least an electrical

winding (120) and configured for generating:

- a first current (I_1) flowing through said winding (120) so as to generate said first magnetic force (F_1);
- a second current (I_2) flowing through said winding (120) in an opposed direction with respect to said first current (I_1) so as to generate said second magnetic force (F_2).

4. The switching device (1) according to one or more of the preceding claims, characterized in that said electronic means (200) are configured for receiving and detecting at least a shunt trip command (250) and for driving said at least an electrical winding (120) to generate said first magnetic force (F_1) upon the detection of said shunt trip command (250).

5. The switching device (1) according to one or more of the preceding claims, characterized in that said electronic means (200) are configured for detecting an under-voltage condition determined by the falling of a line voltage (V_L) associated to said switching device (1) below a predetermined threshold, said electronic means (200) being configured for driving said at least an electrical winding (120) to generate said first magnetic force (F_1) upon the detection of the under-voltage condition.

6. The switching device (1) according to claim 5, characterized in that said electronic means (200) comprise at least a buck-up capacitor (107) storing the energy required to electrically drive said at least an electrical winding (120) upon the detection of said under-voltage condition.

7. The switching device (1) according to claim 5, characterized in that said electronic means (200) are configurable for provisionally disabling the electrically driving of said at least an electrical winding (120) upon the detection of the under-voltage condition.

8. The switching device (1) according to one or more of the preceding claims, characterized in that said shunt release (100) comprises counting means (220) arranged to count a delay time starting from the detection of the under-voltage condition, wherein the electronic means (200) are operatively associated to said counting means (220) and are configured for: electrically driving said at least an electrical winding (120) to generate said first magnetic force (F_1) when said counting is completed; sensing during said counting if the under-voltage condition ceases; and resetting the counting (200) upon sensing the ceasing of the under-voltage condition.

9. The switching device (1) according to claim 8, characterized in that said delay time is configurable.

10. The switching device (1) according to one or more of the preceding claims, characterized

in that said operating mechanism (10) and the movable member (101) of the shunt release (100) in the second stable position are operatively connected in such a way that the movable member (101) blocks the operating mechanism (10) and avoids the coupling between said movable and fixed contacts (3, 4).

11. The switching device (1) according to claim 9, characterized in that it comprises intervention means (300) which are accessible by an operator of the switching device (1) itself for being actuated by such operator, said intervention means (300) being operatively associated to said movable member (101) of the shunt release (100) so as to generate, when they are actuated by the operator, a force (F_3) acting on the movable member (101) held in the first stable position and suitable to cause the release of the compressed second elastic means (108).

12. The switching device (1) according to claim 10, characterized in that said interaction means (300) are mechanically operatively connected to said movable member (101), wherein said force (F_3) generated by the actuation of the intervention means (300) is a mechanical force (F_3).

13. The switching device (1) according to claim 11 or 12, characterized in that the electronic means (200) are arranged to disable the electrically driving of said at least an electrical winding (120) for generating said second magnetic force (F_2) upon the displacement of the movable member (101) to the second stable position caused by the actuation of said intervention means (300).

14. A switchgear comprising at least a switching device (1) according to one or more of claims 1-13.

dated this 02 day of May 2014.

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