

Electrical Switch

The invention relates to an electrical switch including an arc extinguishing device.

Electrical automatic cut-out devices whose magnetic trip mechanism or circuit breaker is a so-called tilting armature trip mechanism have the problem of converting the rotary movement of the armature to the rotary movement of the movable contact lever, particularly with respect to the object of quickly opening the contact position in order to achieve a current limiting. In a known switch the rapid opening of the contact position is effected by the tilting armature acting on a push rod guided in a displaceable manner parallel to the mid axis of the magnetic core, whereby the push rod strikes the contact lever when the tilting armature attracts. This type of construction is expensive since the push rod guidance has to be designed very accurately.

15The principal patent (P 32 42 062.5) (corresponding to EP-A-0 111 662) discloses a suitable solution of this problem. However, this solution involves a switch with two contact positions separated by a wall, wherein both positions should be opened roughly simultaneously.

20The object of the invention is to realise the solution disclosed in the principal patent for the rapid contact position separation also in the case of a switch with one contact position.

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- 2 -

This objective is achieved by the electrical switch as claimed in claim 1 of the claims of this specification.

An example of the invention will now be described with reference to 5 the accompanying drawing which shows a view of a switch in accordance with the invention.

The switch comprises a housing 10 of shell-type construction, and has two housing shells (not shown in more detail). The housing includes in its lower region a recess 12 to enable the switch 10 mechanism to be snap-fitted on a U-shaped assembly bar in an installation compartment.

The switch mechanism comprises a contact position 20 formed from a movable contact member 24 and a fixed contact member 28.

A tilting armature system 32 with a yoke 33, coil 34 and a magnetic core 35 is also provided. The magnetic core co-operates with a tilting armature 104 one of whose ends is mounted at 37 on an arm 100 of the yoke 33 running parallel to the magnetic core 35.

The switch comprises a contact lever 40 on which the movable contact member 24 is formed.

10 A switch lever 45 is mounted in the housing 10 on a shaft 44, and a rod 46 is coupled to the lever eccentrically with respect to the shaft 44 and connected to the contact lever 40 via a shaft 48 passing through an eyelet 110.

15 A tension spring 50 which urges the contact lever in the 'open' direction acts on the said contact lever 40.

As can be seen from the Figure, the yoke 33 is essentially Z-shaped and has an arm 100 running parallel to the mid axis of the magnetic core 35 which transforms into an L-shaped arm 101 in which an adjustment screw 102 engages. A nut can also be provided in the region of the arm 101 into which the adjustment screw of the arm 101 can be screwed home. The nut would be loose with respect to the yoke but would be fixed in the housing so that the adjustment screw does not rotate when the nut is tightened. The vertically aligned arm 100 is extended in the form of a holding angle piece 103 whose other free arm serves to retain a thermostatic bimetal strip 60. The tip of the adjustment screw 102 presses on the inner surface of this arm with the thermostatic bimetal strip 60, by which means the tripping can be adjusted for an overload current.

30 The tilting armature 104 mounted on the vertical section 100 of the yoke 33 cooperates with a latch engagement lever 105 formed as a rotary lever. The tilting armature 104 acts directly on a lug 106 on the latch engagement lever 105, which is pivotally mounted at 41. An extension 107 is also formed on the latch engagement lever 105 that projects into the movement path of the movable contact lever 40. Rotation of the armature

(12)

104 also produces, via the lug 106 and the extension 107,
5 a rotation of the movable contact lever 40 in the same
direction. A latch engagement position 108 is also pro-
vided diametrically opposite the lug 106, against which
the contact lever 40 is pressed by means of the articulated
drive formed from the switch lever 45, rod 46 and bearing
10 48. In this connection, a leaf spring 109 is guided on the
movable contact lever against which spring the shaft 48
presses from above so that the retention and connection
between the rod 46 and contact lever 40 constitutes a
spring-actuated connection.

15 The spring 109 is considerably stronger than the spring
50 since it has to transmit the force of the spring 50, i.e.
the contact force, as well as the latch engagement force.
The eyelet 110 together with the contact lever 40 forms a
type of longitudinal hole 111, and the shaft 48 is pressed
20 by the spring 109 against the upper end, i.e. the end of
the longitudinal hole 111 situated opposite the contact
lever. In this way an optimum guidance of the articulated
drive 45/46/48/40 and a retention of this drive in a stable
position ready for tripping, and in the other, tripped position
25 is achieved. The thermostatic bimetal strip 60 acts on the
latch engagement lever 105 and rotates the latter in an anti-
clockwise direction about the shaft 41 in the event of an
overload current. The latch engagement position 108 is
thereby freed and the movable contact lever 40 can be moved
30 to the 'switch off' position under the tractive force of
the spring 50.

In a tripping event the latch engagement position is
thus first of all released and after overcoming the forward
movement due to the spacing between the extension 107 and
35 contact lever, the extension 107 acts on the contact lever.
The tilting armature remains permanently under the action
of a tension spring 150 which constantly urges the tilting
armature in the switch off position and thereby determines

the magnetic response value. A spiral spring 152 is also provided which permanently urges the latch engagement lever in a clockwise direction, i.e. presses the
5 lug 108 permanently against the contact lever 40 and thereby ensures the latch engagement.

An arc extinguishing device 61 is located adjacent
10 the contact members 24 and 28.

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CLAIMS:

1. An electrical switch comprising an electromagnetic trip device, a single fixed contact member and a single movable
5 contact member on a contact lever movable in an opening direction in response to the trip device, an arc extinguishing device located adjacent said contact members, the electromagnetic trip device comprising a pivotal magnetic armature acting via a rotary lever on the movable contact member to move it in the
10 opening direction in such a way that on rotation of the magnetic armature the rotary lever is also rotated and strikes the contact lever in the opening direction and transversely to the length of the contact lever.
2. A switch as claimed in claim 1, wherein the rotary lever
15 comprises a first lug engageable by the armature and a second lug for latching the contact lever.
3. A switch as claimed in claim 2, wherein the rotary lever comprises a pair of arms, one of which bears the second lug and also a third lug for engaging the contact lever, and the other of
20 which bears the first lug.
4. A switch as claimed in any one of claims 1 to 3, wherein the rotary lever is arranged to strike the contact lever at its mid-portion.
5. A switch as claimed in any one of claims 1 to 4 further
25 comprising a thermal trip device for moving said contact member in said opening direction.
6. An electrical switch as claimed in claim 1, substantially as hereinbefore described with reference to and as illustrated in the accompanying drawing.

