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Published:

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(54) Title: GAS INSULATED SWITCHING DEVICE AND CAMERA SYSTEM FOR OPTICAL CHECK OF SWITCHING POSITION IN THE SWITCHING DEVICE

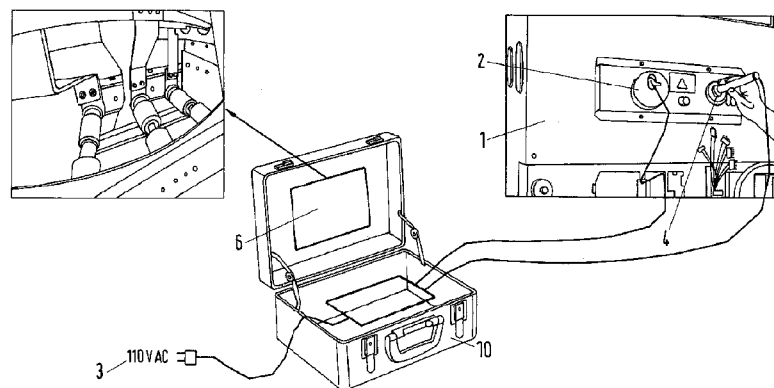


Fig.1

(57) Abstract: The invention relates to a gas insulated switching device with a gastight housing, wherein switching means are mounted in the housing, provided with an optical window on which an external camera can be positioned outside the housing on a support element in such, that the contacts and/or the contact positions of a switch or of switches can be displayed by this camera on a display screen, and with a switchable light source, which is illuminating the aforesaid area the camera is focused on to display the contact positions of a switch or switches, as well as a camera system for that, according to the preamble of claims 1 and 6. In order to use a camera system in a easier and cost effective way, considering, that direct optical control of specific switch positions are not desired oftenly, the invention is, that the camera is a portable camera which is positionable only temporarily, and the support element as well as the camera itself are provided with complementary means for the temporarily positioning of the portable camera to the support.



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**Gas insulated switching device and camera system for optical check of
switching position in the switching device**

10 The invention relates to a gas insulated switching device with a gastight housing,
wherein switching means are mounted in the housing, provided with an optical window
on which an external camera can be positioned outside the housing on a support
element in such, that the contacts and/or the contact positions of a switch or of
switches can be displayed by this camera on a display screen, and with a switchable
15 light source, which illuminates the aforesaid area the camera is focused on to display
the contact positions of a switch or switches, according to the preamble of claim 1 and
a camera system itself, according to the preamble of claim 5.

A switchgear with a camera system adapted to the switchgear housing, in order to
20 make the position of the internal of the switches visible, is shown in CA 2 274 854 C.
In this state of the art, the camera is fixed directly to the housing of switchgear, in order
to be a fixed installed part of the switchgear.
The resulting disadvantage is, that for each switchgear panel a separate camera is
need.

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So it is the object of the invention, to use a camera system in a easier and cost
effective way, considering, that direct optical control of specific switch positions are not
desired oftenly.

30 Based on that, the invention is, that the camera is a portable camera which is
positionable only temporarily, and the support element as well as the camera itself are
provided with complementary means for the temporarily positioning of the portable
camera to the support.

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"Temporarily" means for the time, when the observation of the contact position is required.

5 So important for the invention is, that the camera is not a part of the switchgear, but separated from that. So with that, in difference to the mentioned state of the art, one single camera can be used for several switch gears, because it is portable.

10 In a further embodiment, the support element and the camera are provided with complementary magnetic elements, in such, that the portable camera can be attached to the support temporarily in the aforesaid optically centered, precalibrated optical and mechanical position, in order to make the contacts and/or the contact positions of the switch or of the switches visible on a display screen.

15 "Optically centered" includes also the meaning focused to the elements which are important to observe, like the contact pieces, or indicating elements of the contact pieces fixed to the contact piece, by which the contact position can be observed.

20 In an advantageous embodiment, the complementary support elements on the support of the switching device housing are magnetic rings or elements, with interacting mechanical guiding pins and holes for a temporarily and centered predetermined reproducible positioning of the portable camera in the aforesaid position.

The support element is provided as an adapter element, with magnetic elements near its peripherie, and with a centering ring for the camera lens adaption.

25 In an alternative also advantageous embodiment, the complementary support elements on the support of the switching device housing are bayonet cap elements, for a temporarily and centered predetermined reproducible positioning of the portable camera in the aforesaid position.

30 To the invention concerns directly a Camera system for temporarily adaption to a gasinsulated switching device or a switchgear panel.

The camera is a portable camera which can be temporarily attached to a support

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element of a switchgear housing of the panel.

In a further advantageous embodiment, the camera system also includes or is connectable to a portable display.

So the portable observation system consist of camera, display, light source, power supply, cables and an transport box for this equipment.

In a final embodiment the portable camera system is transported in a carrying case, and that the display is mounted directly in the carrying case.

By this, only one camera system is need for several switchgear panels.

The invention is shown in the figures.

Figure 1: Camera system in use at a medium voltage switchgear housing

Figure 2. Adapter

Figure 1 shows a housing of a gas insulated medium voltage switchgear 1, with defined windows in the housing, where the light source 4 as well as the camera 1 can be attached temporarily, that means when needed for a sure observation of the switching contacts position of the disconnecter or earthing switch inside the switchgear housing. Therefore an attachable adapter 7, like also shown in figure 2, for the light source 4 as well as a further attachable adapter for the camera 2 can be fixed temporarily by magnetic means. The contures of each adapter and each window are provided complementary, so that the camera and the light source can be attached in a self-adjusting way, in order to be focused to the contact positions which have to displayed. Both, camera and light source are attachable externally to the housing. Camera and light source are not a fixed part of the switchgear housing of the panel, but interchangeable and therefore portable.

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So the camera 2 and the light source 4 can be attached to the windows of the switchgear housing 1. Light source 4 and camera 2 are electrically connected with a power source which is implemented for example in the portable case 10, where also the display 6 is located. Camera and light source are activated by the electronic means
5 inside the case 10.

The display 6 is integrated into the upper part of the openable case 10.

The case is inside in such a way portioned, that also the portable camera and the portable light can be transported after the use.

So the complete system includes also the aforesaid case, in order to have fully
10 transportable system.

Figure 2 shows the adapter 7. This adapter 7 is provided with magnet elements near the Peripherie, in order to attach this adapter as a support for the light source, in this case for example LED-elements 9 integrated into the inner opening of the adapter 7.
15

For the camera 2, the adapter 7 is the same, except of the integrated light source. This adapter is the aforesaid support for the camera.

As fixation means are here used magnetic elements 8, but also fixation means by bayonet-elements are possible.
20

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Claims

1. Gas insulated switching device with a gastight housing, wherein switching means are mounted in the housing, provided with an optical window on which an external camera can be positioned outside the housing on a support element in such, that the contacts and/or the contact positions of a switch or of switches can be displayed by this camera on a display screen, and with a switchable light source which illuminates the aforesaid area the camera is focused on to display the contact positions of a switch or switches,

characterized in that,

the camera is a portable camera which is positionable only temporarily, and the support element as well as the camera itself are provided with complementary means for the temporarily positioning of the portable camera to the support.

2. Gas insulated switching device according to claim 1,

characterized in that,

the support element and the camera are provided with complementary magnetic elements, in such, that the portable camera can be attached to the support temporarily in the aforesaid optically centered, precalibrated optical and mechanical position, in order to make the contacts and/or the contact positions of the switch or of the switches visible on a display screen.

3. Gas insulated switching device according to claim 2,

characterized in that,

the complementary support elements on the support of the switching device housing are magnetic rings or elements, with interacting mechanical guiding pins and holes for a temporarily and centered predetermined reproducible positioning of the portable camera in the aforesaid position.

4. Gas insulated switching device according to claim 1 or 2 or 3,

characterized in that

the support element for the camera as well as the support element for the light source is provided as an adapter element each, with magnetic elements near its

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peripherie, and with a centering ring for the camera lens adaption.

5. Gas insulated switching device according to claim 2,

characterized in that,

5 the complementary support elements on the support of the switching device housing are bayonet cap elements, for a temporarily and centered predetermined reproducible positioning of the portable camera in the aforesaid position.

- 10 6. Gas insulated switching device according to one of the aforesaid claims,

characterized in that,

the light source is implemented in a separate adapter which is also portable and can be attached to a window in the housing of the switchgear.

- 15 7. Camera system for optical check of switching position in a gas insulating switching device according to one of the aforesaid claims,

characterized in that,

the camera is a portable camera which can be temporarily attached to a support element of a switchgear housing or panel.

- 20 8. Camera system according to claim 7,

characterized in that,

the camera system also includes a portable display.

- 25 9. Camera system according to claim 7 and 8,

characterized in that,

that the portable camera system and/or the light source is transportable in a carrying case, and that the display is mounted directly in the carrying case.

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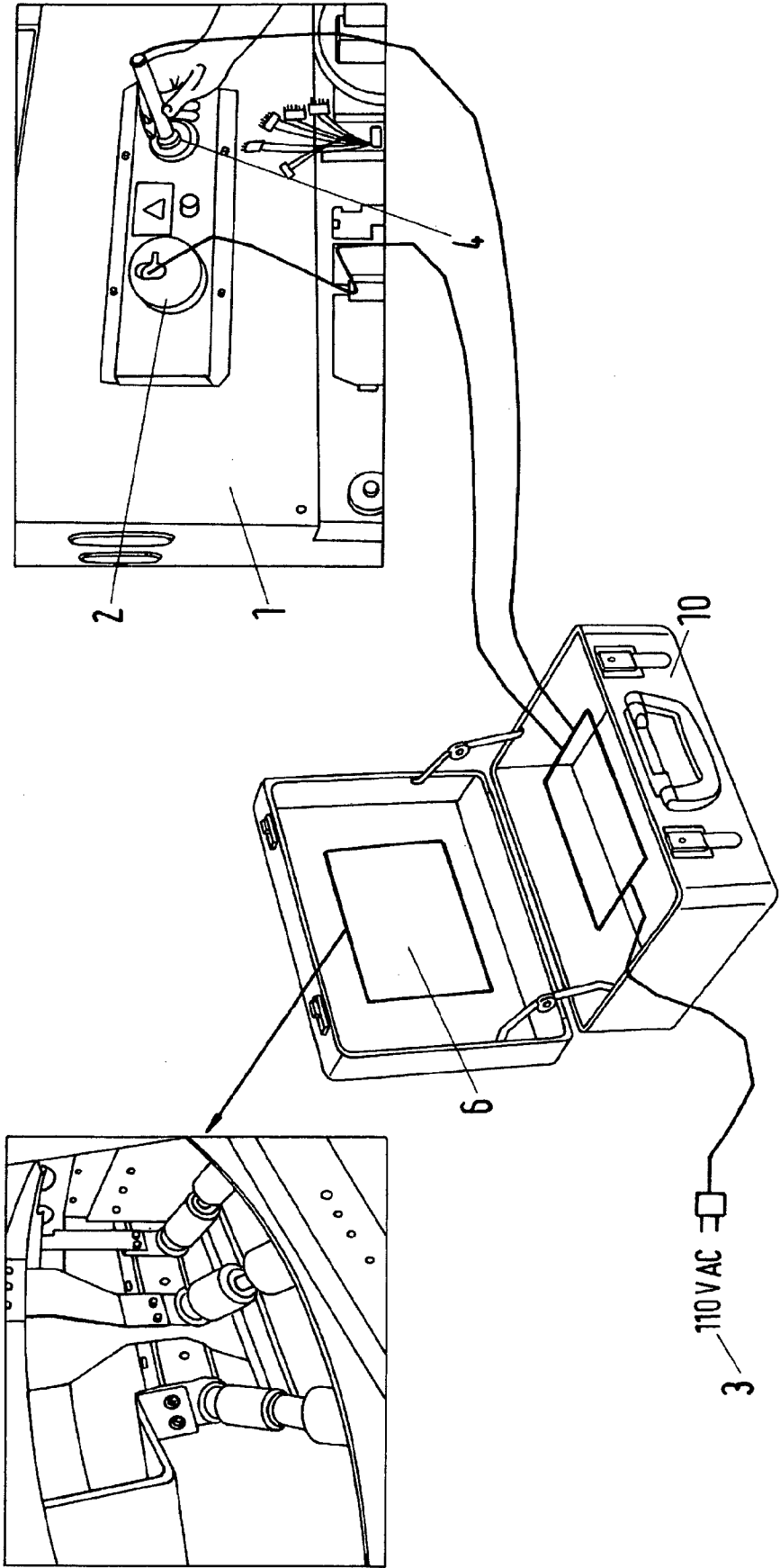


Fig.1

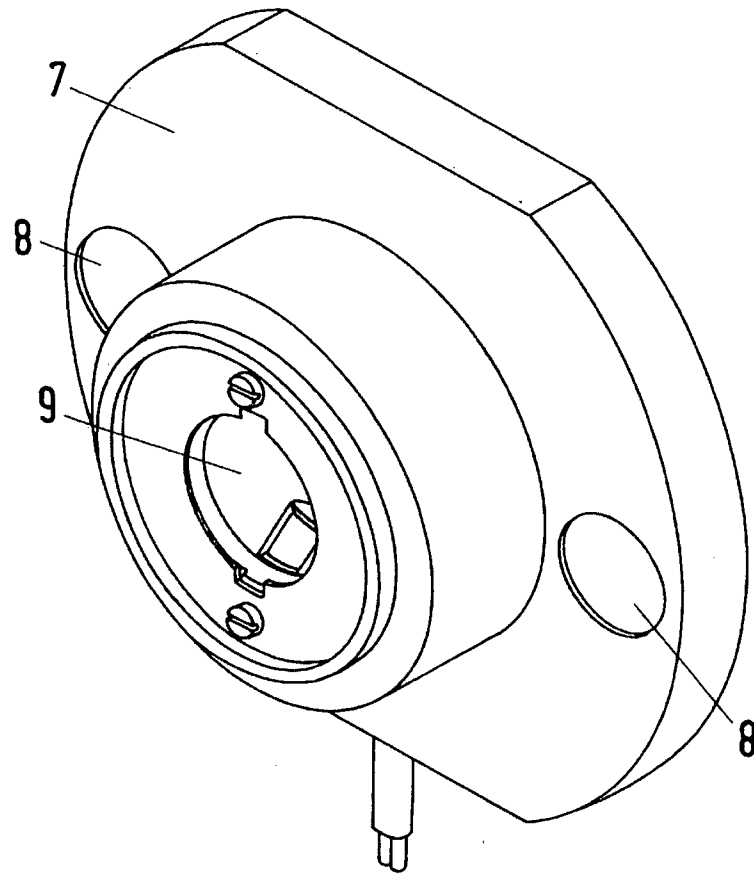


Fig.2

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2014/000490

A. CLASSIFICATION OF SUBJECT MATTER

INV. H02B13/035 H02B1/30
 ADD. H01H1/00 H01H9/02

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)

H02B 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CA 2 274 854 A1 (SIEMENS AG [DE]) 18 June 1998 (1998-06-18) cited in the application figure 2	1-9
Y	----- DE 93 12 384 U1 (SIEMENS AG [DE]) 7 October 1993 (1993-10-07) claims 1-4; figures 1,2	1-9
A	----- WO 2007/093575 A1 (SIEMENS AG [DE]; KUEMMEL MICHAEL [DE]; MUELLER HANS-JOACHIM [DE]) 23 August 2007 (2007-08-23) figure 2 -----	1-9



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CA 2274854	A1	18-06-1998	CA 2274854 A1 18-06-1998
			DE 19653683 C1 18-06-1998
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WO 2007093575	A1	23-08-2007	NONE
