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

GASISOLIERTE SCHALTVORRICHTUNG UND KAMERASYSTEM ZUR OPTISCHEN ÜBERPRÜFUNG DER SCHALTSTELLUNG IN DER SCHALTVORRICHTUNG

DISPOSITIF DE COMMUTATION ISOLÉ PAR GAZ ET SYSTÈME DE CAMÉRA DE VÉRIFICATION OPTIQUE DE POSITION DE COMMUTATION DANS LEDIT DISPOSITIF

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Description

[0001] 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 illuminates the aforesaid area the camera is focused on to display the contact positions of a switch or switches.

[0002] A switchgear with a camera system adapted to the switchgear housing, in order to make the position of the internal of the switches visable, is shown in CA 2 274 854 A1. CA 2 274 854 A1 relates to switch panels - either monopolar or multipolar, with metal enclosure, divided into compartments or gas insulated of a switch facility, connected by means of three-switch disconnectors operating both as a circuit breaker and a ground connection, to power switches provided or not with vacuum switches and mounted, as need be, in busbar cabinets or in separate circuit-breaking cabinets, and fitted with transmitting devices for the visual recording of fixed contacts. The transmitting equipment includes a camera module which can be linked through a connection mechanism to a display unit outside the switch panel, while a lighting device mounted out of alignment relative to the camera module is provided to enable a glare-free display of the fixed busbar contacts.

[0003] In CA 2 274 854 A1, the camera is fixed directly to the housing of switchgear, in order to be a fixed installed part of the switchgear.

[0004] DE9312384U1 relates to attachment of an endoscope to the window of a switchgear.

[0005] The resulting disadvantage is, that for each switchgear panel a separate camera is need.

[0006] 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.

[0007] In an aspect, there is provided a gas insulated switching device with a gastight housing as defined in appended claim 1.

[0008] 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.

[0009] "Temporarily" means for the time, when the observation of the contact position is required.

[0010] 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.

[0011] According to the invention 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.

[0012] "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.

[0013] According to the invention 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 reproducable positioning of the portable camera in the aforesaid position.

[0014] The support element is provided as an adapter element, with magnetic elements near its periphery, and with a centering ring for the camera lens adaption.

[0015] To the invention concerns directely a Camera system for temporarily adaption to a gasinsulated switching device or a switchgear panel.

[0016] The camera is a portable camera which can be temporarily attached to a support element of a switchgear housing of the panel.

[0017] The camera system also includes or is connectable to a portable display.

[0018] So the portable observation system consist of camera, display, light source, power supply, cables and an transport box for this equipment.

[0019] The portable camera system is transported in a carrying case, and that the display is mounted directly in the carrying case.

[0020] By this, only one camera system is need for several switchgear panels.

[0021] The invention is shown in the figures.

Figure 1: Camera system in use at a medium voltage switchgear housing
Figure 2. Adapter

[0022] 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 2 can be attached temporarily, that means when needed for a sure observation of the switching contacts position of the disconnector 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 selfadjusting way, in order to be focused to the contact positions which have to displayed. Both, camera 2 and light source 4 are attachable externally to the

housing 1. Camera 2 and light source 4 are not a fixed part of the switchgear housing of the panel, but interchangeable and therefore portable.

[0023] 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 3 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 inside the case 10.

[0024] The display 6 is integrated into the upper part oft the openable case 10.

[0025] The case 10 is inside in such a way portioned, that also the portable camera 2 and the portable light 4 can be transported after the use

[0026] So the compelte system includes also the aforesaid case 10, in order to have fully transportable system.

[0027] Figure 2 shows the adapter 7. This adapter 7 is provided with magnet elements near the periphery, in order to attach this adapter as a support for the light source, in this case for example LED-elements 9 intergated into the inner opening of the adapter 7.

[0028] For the camera 2, the adapter 7 is the same, except of the integrated light source.

[0029] This adapter is the aforesaid support for the camera.

[0030] As fixation means are here used magnetic elements 8.

Claims

1. A gas insulated switching device and a portable observation system, the gas insulated switching device comprising -

   - a gastight housing (1), and
   - a gas insulated medium voltage switchgear;

   wherein, switching means are mounted in the housing (1) of the switchgear;
   wherein, the housing (1) of the switchgear comprises an optical window
   wherein, the housing (1) of the switchgear comprises support elements with magnetic rings or magnetic elements;
   wherein, the portable observation system comprises a camera (2), a portable display (6), a light source (4), a power supply (3) and a portable case (10), and wherein the portable case (10) is configured to transport the camera (2), the portable display (6), the light source (4) and the power supply (3);
   wherein, an adapter (7) for the camera (2) and an adapter (7) for the light source (4) comprise complementary magnetic means (8) to the magnetic rings or magnetic elements of the support elements; and wherein the adapter (7) for the camera (2) and the adapter (7) for the light source (4) can be attached to and detached from the support elements
   wherein, the light source (4) can be attached to the housing (1) via attachment of the adapter (7) for the light source (4) to a support element to illuminate contacts and/or contact positions of a switch or switches of the switching means through the optical window;
   wherein, the camera (2) can be attached to the housing (1) in precalibrated optical and mechanical position via attachment of the adapter (7) for the camera (2) to a support element to image the contacts and/or contact positions of the switch or switches of the switching means through the optical window;
   wherein, the portable display (6) is configured to display the contacts and/or contact positions of the switch or switches of the switching means made visible by the camera (2); and
   wherein, the light source (4) and camera (2) are electrically connected to the power supply (3).

2. The gas insulated switching device and the portable observation system according to claim 1,
   wherein, the support elements comprise mechanical guiding pins and holes for reproducable positioning of the camera (2).

3. The gas insulated switching device and the portable observation system according to claim 1 or 2,
   wherein, the support element for the camera (2) as well as the support element for the light source (4) is provided as an adapter element each, with magnetic elements near its periphery, and with a centering ring for the camera lens adaption.

4. The gas insulated switching device and the portable observation system according to claim 1,
   wherein the display (6) is mounted directly in the carrying case (10).

5. The gas insulated switching device and the portable observation system according to claim 1,
   Wherein, the power supply (3) is implemented in the portable case (10).

Patentansprüche

1. Gasisolierte Schaltvorrichtung und tragbares Beobachtungssystem, wobei die gasisolierte Schaltvorrichtung umfasst:

- ein gasdichtes Gehäuse (1), und
- eine gasisolierte Mittelspannungs-Schaltanlage;

wobei Schaltmittel im Gehäuse (1) der Schaltanlage montiert sind;
wobei das Gehäuse (1) der Schaltanlage ein optisches Fenster aufweist;
wobei das Gehäuse (1) der Schaltanlage Stützelemente mit Magnetringen oder Magnetelementen aufweist;
wobei das tragbare Beobachtungssystem eine Kamera (2), eine tragbare Anzeigevorrichtung (6), eine Lichtquelle (4), eine Stromversorgung (3) und einen Tragekoffer (10) umfasst, und wobei der Tragekoffer (10) zum Transportieren der Kamera (2), der tragbaren Anzeigevorrichtung (6), der Lichtquelle (4) und der Stromversorgung (3) ausgelegt ist;
wobei ein Adapter (7) für die Kamera (2) und ein Adapter (7) für die Lichtquelle (4) komplementäre magnetische Mittel (8) zu den Magnetringen oder Magnetelementen der Stützelemente umfassen; und wobei der Adapter (7) für die Kamera (2) und der Adapter (7) für die Lichtquelle (4) an den Stützelementen angebracht und von diesen abgenommen werden können, wobei die Lichtquelle (4) am Gehäuse (1) über die Befestigung des Adapters (7) für die Lichtquelle (4) an einem Stützelement befestigt werden kann, um Kontakte und/oder Kontaktpositionen eines Schalters oder von Schaltern der Schaltmittel durch das optische Fenster zu beleuchten;
wobei die Kamera (2) in einer vorkalibrierten optischen und mechanischen Position über die Befestigung des Adapters (7) für die Kamera (2) an einem Stützelement am Gehäuse (1) angebracht werden kann, um die Kontakte und/oder Kontaktpositionen des Schalters oder der Schalter des Schaltmittels durch das optische Fenster abzubilden;
wobei die tragbare Anzeigevorrichtung (6) dazu ausgelegt ist, die durch die Kamera (2) sichtbar gemachten Kontakte und/oder Kontaktpositionen des Schalters oder der Schalter des Schaltmittels anzuzeigen; und
wobei die Lichtquelle (4) und die Kamera (2) elektrisch mit der Stromversorgung (3) verbunden sind.

2. Gasisolierte Schaltvorrichtung und tragbares Beobachtungssystem gemäß Anspruch 1,
wobei die Stützelemente mechanische Führungsstifte und Löcher zum reproduzierbaren Positionieren der Kamera (2) umfassen.

3. Gasisolierte Schaltvorrichtung und tragbares Beobachtungssystem gemäß Anspruch 1 oder 2,
wobei sowohl das Stützelement für die Kamera (2) als auch das Stützelement für die Lichtquelle (4) jeweils als Adapterelement mit Magnetelementen in der Nähe seines Umfangs und mit einem Zentrierring für die Kameraobjektivadaption versehen ist.

4. Gasisolierte Schaltvorrichtung und tragbares Beobachtungssystem gemäß Anspruch,
wobei die Anzeigevorrichtung (6) direkt im Tragekoffer (10) montiert ist.

5. Gasisolierte Schaltvorrichtung und tragbares Beobachtungssystem gemäß Anspruch 1,
wobei die Stromversorgung (3) im Tragekoffer (10) implementiert ist.

Revendications

1. Dispositif de commutation isolé au gaz et système d'observation portable, le dispositif de commutation isolé au gaz comprenant :

- un boîtier étanche au gaz (1), et
- un appareillage de commutation de tension moyenne isolé au gaz ;

dans lequel des moyens de commutation sont montés dans le boîtier (1) de l'appareillage de commutation ;
dans lequel le boîtier (1) de l'appareillage de commutation comprend une fenêtre optique ;
dans lequel le boîtier (1) de l'appareillage de commutation comprend des éléments de support avec des bagues magnétiques ou des éléments magnétiques ;
dans lequel le système d'observation portable comprend une caméra (2), un écran portable (6), une source de lumière (4), une alimentation électrique (3) et une valise portable (10), et dans lequel la valise portable (10) est configurée pour transporter la caméra (2), l'écran portable (6), la source de lumière (4) et l'alimentation électrique (3) ;
dans lequel un adaptateur (7) pour la caméra (2) et un adaptateur (7) pour la source de lumière (4) comprennent des moyens magnétiques complémentaires (8) aux bagues magnétiques ou aux éléments magnétiques des éléments de support ; et dans lequel l'adaptateur (7) pour la caméra (2) et l'adaptateur (7) pour la source de lumière (4) peuvent être fixés aux et retirés des élé-

ments de support ;
dans lequel la source de lumière (4) peut être fixée au boîtier (1) par le biais d'une fixation de l'adaptateur (7) pour la source de lumière (4) à un élément de support pour éclairer des contacts et/ou des positions de contact d'un commutateur ou de commutateurs des moyens de commutation à travers la fenêtre optique ; dans lequel la caméra (2) peut être fixée au boîtier (1) dans une position optique et mécanique pré-étalonnée par le biais de la fixation de l'adaptateur (7) pour la caméra (2) à un élément de support pour capturer des images des contacts et/ou des positions de contact du commutateur ou des commutateurs des moyens de commutation à travers la fenêtre optique ;
dans lequel l'écran portable (6) est configuré pour afficher les contacts et/ou les positions de contact du commutateur ou des commutateurs des moyens de commutation rendus visibles par la caméra (2) ; et
dans lequel la source de lumière (4) et la caméra (2) sont raccordées électriquement à l'alimentation électrique (3).

2. Dispositif de commutation isolé au gaz et système d'observation portable selon la revendication 1, dans lequel les éléments de support comprennent des broches de guidage mécaniques et des trous pour un positionnement reproductible de la caméra (2).

3. Dispositif de commutation isolé au gaz et système d'observation portable selon la revendication 1 ou 2, dans lequel l'élément de support pour la caméra (2) et l'élément de support pour la source de lumière (4) sont fournis chacun en tant qu'élément adaptateur, avec des éléments magnétiques près de sa périphérie, et avec une bague de centrage pour l'adaptation de l'objectif de la caméra.

4. Dispositif de commutation isolé au gaz et système d'observation portable selon la revendication, dans lequel l'écran (6) est monté directement dans la valise de transport (10).

5. Dispositif de commutation isolé au gaz et système d'observation portable selon la revendication 1, dans lequel l'alimentation électrique (3) est mise en œuvre dans la valise portable (10).

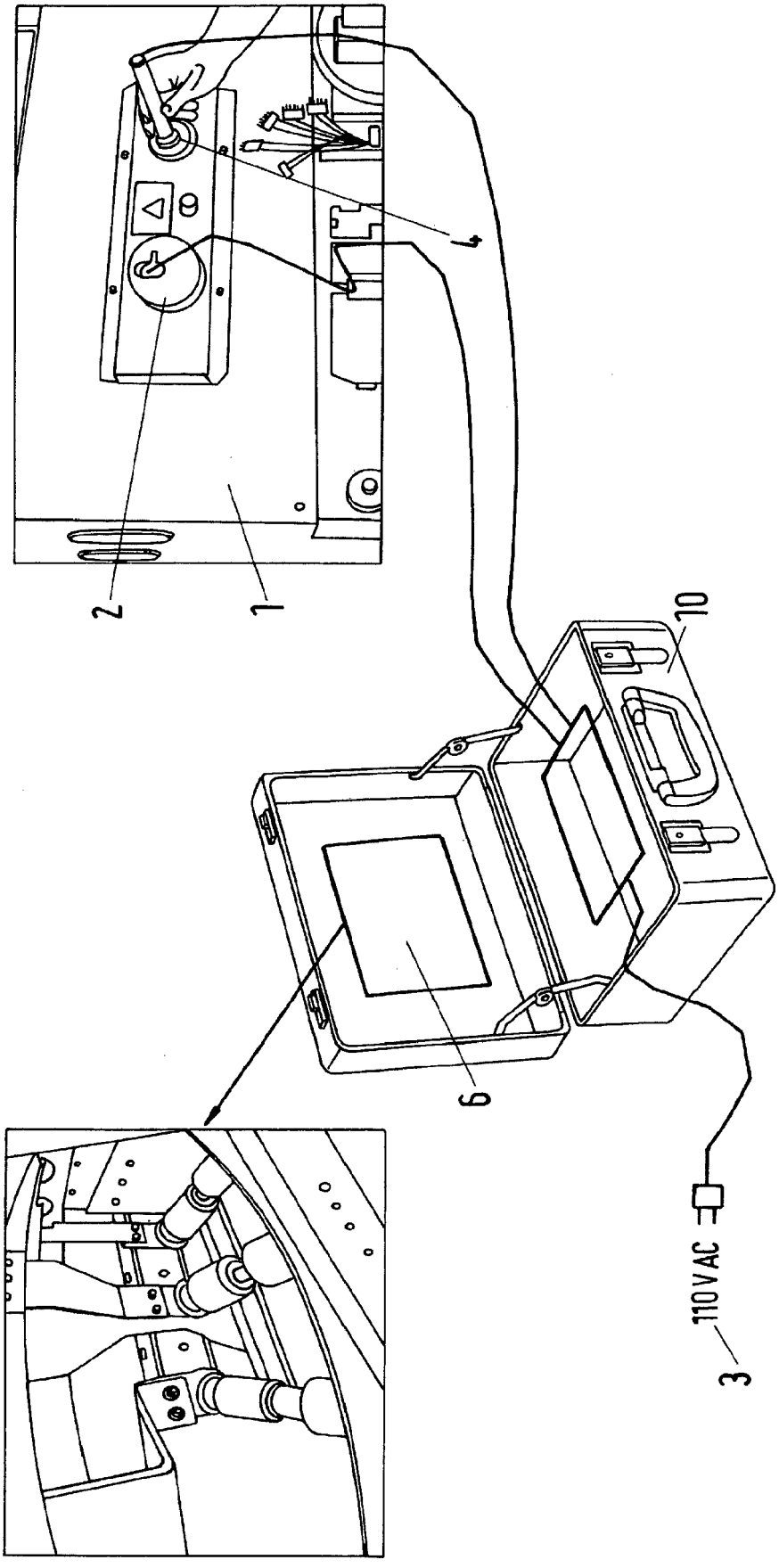

Fig.1

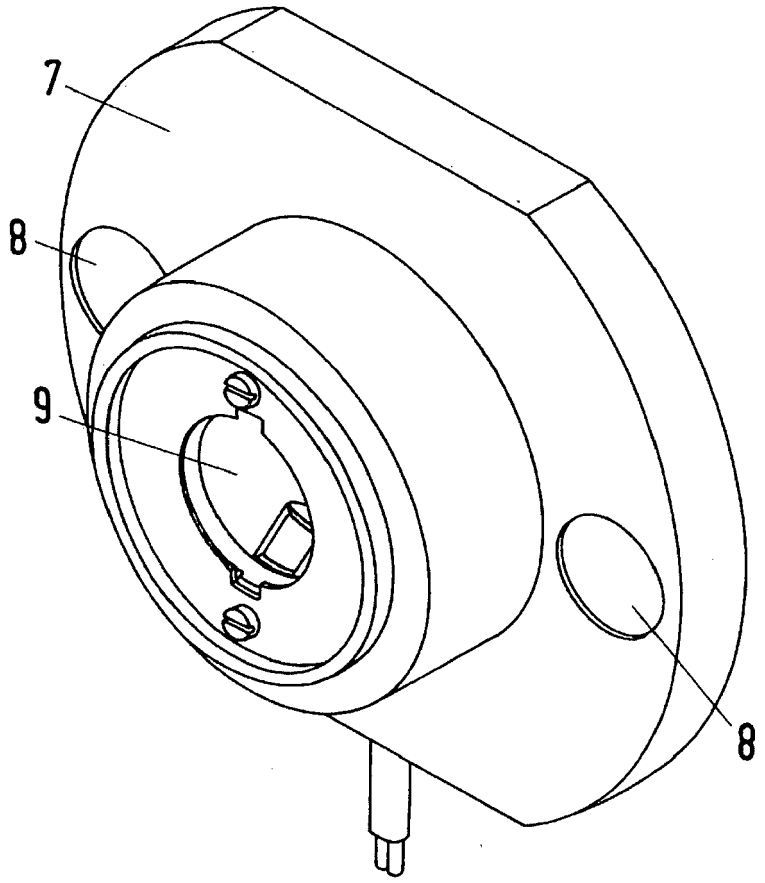

Fig.2

REFERENCES CITED IN THE DESCRIPTION

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- DE 9312384 U1 **[0004]**