

"A device for associating an electric component with a control and/or signalling means mounted in a switchboard opening"

The invention relates to a device for associating an electric component with a control and/or signalling device mounted in an opening in a plate in an electric switchboard. The device comprises a tubular bushing means adapted to be secured in the opening and internally receive the control and/or signalling device. It also comprises a block formed with an opening in which an end of the tubular means can be secured by resilient locking, the end extending towards the interior of the switchboard during operation. The opening is used for mechanically and/or electrically connecting the apparatus mounted in the tubular means to the component, which during operation is secured to the block on the side remote from the tubular means.

These devices are widely used in monitoring desks or casings where the switches are controlled by actuating a key or press-button or which contain a signalling means using incandescent lamps or semiconductors, either alone or combined with a switch.

US P 4 451 720, for example, discloses a control apparatus constructed as defined hereinbefore and comprising resilient means using a V-shaped spring clip engaged in the block and having two parallel arms disposed in lateral notches at the end of the tubular member so as to grip and retain it.

A comparable principle is also known from DE B 26 09 473, in which a laterally movable slide is used for mechanically locking two resilient symmetrically operating hooks.

In order to dismantle the apparatus according to the US PS, a loop of the spring has to be moved in one of the two possible radial directions for deforming the resilient arms and uncoupling them from the notches, using a tool.

This apparatus has the disadvantage of requiring an associated resilient component which, if care is not taken, may be pulled out of its recess during operation. If the recess is

shaped so as to prevent accidental pulling out, the spring may be difficult to assemble. If it is desired to exert pressure on the resilient component to avoid the aforementioned disadvantage, there are great difficulties through lack of a stable fulcrum for a tool used as a lever. Furthermore, the coupling or engagement force needs to be relatively large in order simultaneously to deform two resilient means.

The object of the invention, therefore, is to propose an apparatus comprising means for easily and rapidly securing the block to the tubular means, using the natural elasticity of the synthetic material forming the block in order to exert a snap-engagement effect without the need of a component which may accidentally be pulled out or for double elastic deformation of hooks for assembly or dismantling.

To this end, according to the invention, for the purpose of resilient locking, the block has two hooks disposed on either side of the end of the tubular means and co-operating with matching shapes thereon, a first hook being secured relative to the block whereas the second hook is carried by a slide connected integrally to the block by partitions which are resiliently deformable to enable the slide to move in a direction transversely to the axis of the tubular means, when acted upon by a tool extending into an eye formed at a projecting outer end of the slide, remote from the second hook.

In this manner, one of the hooks is moved aside simply by acting on the slide, which has an easily accessible eye, thus freely releasing or engaging the end of the tubular means in the opening in the block.

Another known control apparatus, e.g. as disclosed by German published patent application No. 2 801 074, has a cylindrical component which extends through an opening in a switchboard and is adapted to receive a switching device secured thereto by resilient lateral means and co-operates with resilient tongues integral with an external collar made of synthetic material. The

tongues extend parallel to the axis of the tubular means and engage in corresponding recesses therein, but a nut has to be used to ensure good co-operation between the recesses and the tongue, by clamping the latter.

5 The invention is also concerned with steps for efficiently holding in position and steps for making a block of synthetic material sufficiently rigid when subjected to relatively high stresses.

10 Other features and advantages of the invention will be clear from the following description.

 The accompanying drawings are by way of non-limitative examples. In the drawings:

 Fig. 1 is a diagram in axial half-section of a device according to the invention;

15 Fig. 2 is a perspective view of the tubular bushing means;

 Fig. 3 is a perspective view of the block;

 Fig. 4 is a top view of the block;

 Fig. 5 shows the block from the slide side;

 Fig. 6 is a larger-scale top view of the slide;

20 Fig. 7 is a view corresponding to Fig. 4 but when the slide has been brought into the unlocking position using the tip of a screwdriver and,

 Fig. 8 is a plan view of two blocks mounted alongside one another.

25 As shown in Fig. 1, the device according to the invention comprises a tubular bushing member 51 comprising a neck 56 mounted in an aperture 101 in a bearing plate 60. At the outside of plate 60, bushing 51 widens into a collar 55 having a
30 shoulder 102 resting on the outer surface of plate 60 with interposition of a tag 103 and a seal 104. Neck 56, which is externally threaded, co-operates with a nut 57 which bears against the inner surface of plate 60 and urges the collar towards the outer surface of the plate, thus compressing seal
35 104. A rotary control knob 106, taken as an example of a

control and/or signalling means, is rotatably mounted in known manner in the bush, which is held stationary during operation.

The end of neck 56 remote from collar 55 is secured and removably fixed in an opening 5 extending through a block 1, which therefore operates inside the switchboard.

An electric component 107, e.g. a switch or set of switches, is secured to the surface of the block remote from the tubular member 51. A means 108 for actuating the component engages in opening 5 and is acted upon by a cam 109 secured to knob 106. Accordingly, knob 106 can be operated from the exterior of the switchboard so as to actuate the switch 107 inside, the connection between the two being made through the tubular component 51 and the opening 5 in block 1.

Neck 56 (Fig. 2) has two diametrically opposite notches 53 which, when assembled, engage corresponding projections 52 of opening 5 so as to prevent the tubular member 51 from rotating relative to the block 1 around the axis XX' of the tubular member.

Neck 56 has two skirts 54 between the two notches 53 and each has a locking recess 44 on its outer surface, adapted to cooperate with matching locking means borne by block 1, when a shoulder 43 on neck 56 inside the skirts 54 is pressed against the surface 42 of block 1 facing collar 55 (Figs. 1 - 3).

The means for locking the block 1 comprise two hooks 2, 14 which project radially towards the interior of opening 5 from the periphery thereof and at diametrically opposite positions offset by 90° from the positions of projections 52. The two hooks have surfaces facing collar 55 which move apart for the purpose of snap-engagement fitting.

Hook 2, i.e. the first hook, is substantially rigidly secured to the rest of the block. It is made in one piece therewith, by moulding plastics.

The second hook 14 is borne by a slide 6 connected to the rest of the block by three partitions 7, 8, 9, in planes parallel

to the axis XX' of opening 5 and tubular component 52 (when in position).

The three partitions can be resiliently bent round an axis parallel to axis XX', thus enabling slide 12 to move in a direction F.O. (Fig. 6) which is transverse to the axis X'X and corresponds to radial motion of the second hook 14.

Partitions 7, 9 are disposed on either side of slide 12 and are connected thereto near hook 14. When inoperative, they together form an obtuse angle extending radially towards the interior of opening 5. Partition 8 is disposed on the same side of slide 6 as partition 7 but further from axis X'X, near the periphery of block 1. Partition 8 is parallel to partition 7 and thus co-operates therewith to form a deformable parallelogram between slide 12 and the rest of block 1, thus helping to guide slide 6.

Partitions 7, 9 extend across substantially, and preferably exactly, the entire thickness (H) of the block, measured parallel to axis X'X. On the other hand, partition 8 extends over only part (h) of this thickness, leaving the rest of the thickness free for a cross-member 16 connecting two corner regions 17, 18 of the block so as to reinforce it and more particularly to complete its shape as a rigid one-piece frame.

Near its end remote from axis X'X, the slide is formed with an eye 11 superposed on an eye 26 in the cross-member 16 but leaving a slight offset between eyes 11 and 26 (Fig. 4) when partitions 7 - 9 are inoperative or when slide 12 is in the locking position, so that the edge of eye 11 remote from axis XX' is nearer the aforementioned axis than the corresponding edge of eye 26.

As Fig. 7 shows, eyes 11 and 26 are adapted to receive a tool 10 such as the tip of a screwdriver. When the user turns the screwdriver, one edge of the tool (the left edge in Fig. 7) is prevented by eye 26 from escaping towards the axis X'X whereas the other edge presses against the corner of eye 11 and urges

slide 6 in the opposite direction to axis X'X. The user can thus move valve 6 by the lever effect using screwdriver 10, when eye 26 serves as a fulcrum for the lever.

5 As a result of the parallelogram having two opposite sides formed by partitions 7 and 8, slide 6 moves almost parallel to its original position.

10 During this motion, partitions 7 - 9 bend and become compressed. When the tubular component 51 is in position, partitions 7 - 9 remain under slight residual compression and bending.

15 As shown by chain-dotted lines in Fig. 4, the region of the slide formed with eye 11 and the region of cross-member 16 formed with eye 26 extend beyond component 107 and form a projection 12, 29 relative to the rectangle in which block 1 is otherwise inscribed.

On the side remote from slide 6, block 1 has a recess 27 having a shape matching the projection. This enables the blocks in a switchboard to be brought very close together, as shown in Fig. 8.

20 Block 1 is in the shape of a rectangle having a major axis of symmetry YY' extending through the two hooks 2, 14 whereas the minor axis ZZ' of the rectangle extends substantially through two elements 22, 23 fitted into the block so as to increase its rigidity and bear threaded apertures 24, 25 for securing the component.

25 The tubular means 51 can be attached to block 1 simply by force-fitting one into the aperture 5 in the other.

30 For the purpose of dismantling, eyes 11, 26 are engaged by the tip of a screwdriver moving along component 107, even without removing it. The lever effect is produced as previously described, and block 1 is simultaneously brought towards oneself, relatively to member 51.



CLAIMS

1. A device for associating an electric component (107) with a control and/or signalling apparatus (106) mounted in an opening (101) in a plate (60) of an electric switchboard, the device comprising a tubular bushing means (51) for securing in the opening (101) and internally receiving the control and/or signalling apparatus (106), and also comprising a block (1) formed with an opening (5) in which an end of the tubular means (51) can be secured by resilient locking means, the end extending towards the interior of the switchboard during operation, and the opening (5) being used for mechanically and/or electrically connecting the apparatus (106) mounted in the tubular means (51) to the component (107), which during operation is secured on the block (1) on the side remote from the tubular means (51), characterised in that, for the purpose of resilient locking, the block (1) has two hooks (2, 14) disposed on either side of the end of the tubular means (51) and co-operating with matching shapes (44) thereon, a first hook (2) being secured relative to the block (1) whereas the second hook (14) is carried by a slide (6) connected integrally to the block (1) by partitions (7 - 9) which are resiliently deformable to enable the slide (6) to move in a direction (F.0) transversely to the axis (XX) of the tubular means (51), when acted upon by a tool extending into an eye (11) formed at a projecting outer end (12) of the slide, remote from the second hook.

2. A device according to claim 1, characterised in that the partitions comprise at least one partition (7, 9) on each side of the slide (12), and the planes of the partitions (7, 9) are made slightly convergent so that if the slide (6) moves towards the position for unlocking the second hook (14), the partitions (7, 9) undergo bending and compression, and remain under residual compression when the second hook (14) is in the locking position (F).



3. A device according to claim 1 or 2, characterised in that the partitions comprise a partition (9) on one side of the slide (6) and two substantially parallel partitions (7, 8) on the other side of the slide (6).

4. A device according to claim 3, characterised in that, out of the three partitions, a pair of partitions (15) disposed on either side of the slide (6) has a height (H), measured parallel to the axis (XX'), which is substantially equal to the thickness of the block (1), whereas the other partition (8), which is more remote from the second hook, has a smaller height (h), thus enabling a cross-member (16) disposed near slide (6) to connect two corner regions (17, 18) of the block (1) and convert it into a frame in one piece.

5. A device according to claim 4, characterised in that the cross-member (16) has a region (1^a) facing the eye (11) and serving as a fulcrum for a tool (10) for exerting a lever effect for moving the slide (6) and the second hook (14) radially outwardly.

6. A device according to claim 5, characterised in that the region has an opening (26) which extends through a projection (29) of the cross-member (16) and is offset with respect to the position of the eye (11) when the second hook is in the locking position (F).

7. A device according to any one of claims 1 to 6, characterised in that the block, on the side remote from the slide, has a recess (27) matching the shape of a projection (12) formed by the slide at the eye (11), so that two blocks (1) can be mounted close to one another with the projection (12) of one slide engaging the recess (27) in the other block (1).

8. A device according to any of claims 1 to 7, characterised in that the opening (5) in the block and the adjacent end of the tubular means (51) have matching shapes (52, 53, 54) so as to prevent them from rotating relative to one another around the axis (X'X) of the tubular means (51).



9. A device according to any one of claims 1 to 8, characterised in that the block (1) has a rectangular shape in which the major axis of symmetry (YY') extends through the two hooks (2, 14) whereas the minor axis (ZZ') of the rectangle extends substantially through two elements (22, 23) fitted into the block so as to increase its rigidity and bear threaded apertures (24, 25) for securing the component.

10. A device for associating an electric component with a control and/or signalling apparatus, substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.
