(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 430 007 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90122056.6**

(51) Int. Cl.5: **H01H 9/20**, H01R 13/707

(22) Date of filing: **19.11.90**

(30) Priority: **27.11.89 IT 2251789**

(43) Date of publication of application:
05.06.91 Bulletin 91/23

(84) Designated Contracting States:
BE DE ES FR NL Bulletin 00/1

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(54) A mechanical control device for an electric switch.

(57) This mechanical control device (1) is intended for an electric switch, in particular an automatic electric switch (I) of modular design having a front-mounted bistable set/release lever (L) and a side-mounted setting inhibit/assent slider accessible through a slot (A). The device (1) comprises a housing (3) with a modular design similar to that of the switch (I) and being adapted to be assembled laterally of the switch (I), and a release member (5) within the housing (3) provided with a peg (8) which protrudes sideways from the housing (3) and is adapted to engage with the inhibit/assent side slider of the switch (I), the release member (5) being free to move between a home position where the peg (8) holds the switch (I) slider in the setting inhibit position and a working position where the peg (8) holds the switch (I) slider in the setting assent position. The device (1) also comprises at least one pressure member (20,21) movable in a guided fashion within the housing (3) against the bias of a spring (22,23) from a home position where the pressure member (20,21) holds the release member (5) in its home position to a working position where the pressure member (20,21) allows the release member (5) to move to its working position.

Such a device (1) contains, within a modular structure similar to that of the switch (I), elements which can function in combination as a mechanical interface between a plurality of ancillary mechanical members (such as electric plugs, doors, handles, etc.) and the switch (I) to be controlled.

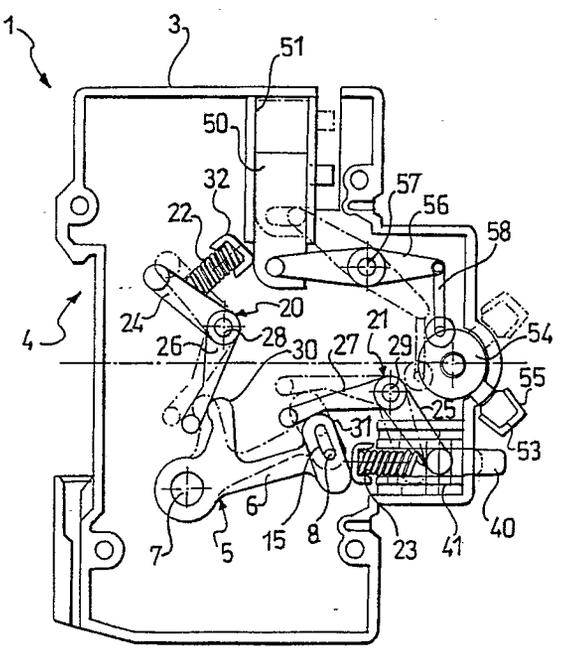

FIG.1

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This invention relates to a mechanical control device for an electric switch.

A problem to be solved with electric systems is sometimes that of linking the set/release functions of an electric switch to the positions of some ancillary equipment; for instance, the ability to set the switch may be subordinate to an electric plug being plugged in, a door being shut, a handle moved to a certain position, etc.

Conversely, a frequently occurring problem is that of linking the position of some ancillary equipment to the set/released condition of a switch; for instance, with the switch in the set position, it may be necessary to prevent mechanically an electric plug from being plugged in/out, a door from being opened, a handle from being moved, etc.

There are examples of prior solutions to the above-outlined problems for specific applications (e.g. interlocked industrial sockets of the CEE-17 type) which take into account the peculiar design of both the switch and its set/release parts, and

of the ancillary equipment affected each time. However, such specific approaches hardly suit a situation of ever-increasing acceptance of modular elements, as far as feasible repetitive, exchangeable, and interfitting one another.

The object that underlies this invention is to provide a mechanical control device for an electric switch, which can solve the above problems in a consistent manner with the requirement for exchangeability of today's modular systems.

This object is achieved, according to the invention, by a mechanical control device for an electric switch, specifically an automatic electric switch of modular design having a front-mounted bistable set/release lever and a side-mounted setting inhibit/assent slider accessible through a slot, characterized in that it comprises a housing with a modular design similar to that of the switch and adapted to be assembled laterally of the switch, a release member within said housing provided with a peg protruding sideways from the housing and being adapted to engage with the inhibit/assent side slider of the switch, said release member being free to move between a home position where the peg holds the switch slider in a setting inhibit position and a working position where the peg holds the switch slider in a setting assent position, at least one pressure member movable in a guided fashion within said housing against the bias of a spring means from a home position where the pressure member holds the release member in its home position to a working position where the pressure member allows the release member to move to its working position.

Such a device can achieve the object outlined hereinabove in that it contains, within a modular design structure similar to that of the switch, elements which can function in combination as a mechanical interface between plural ancillary mechanical members (such as plugs, doors, handles, etc.) and the switch to be controlled.

In a preferred embodiment, the device includes a pushbutton projecting forwardly from the housing and being associated mechanically with the pressure member such that the pressure member will occupy its working position as the pushbutton is held depressed. Thus, with no pressure being exerted on the pushbutton, the switch cannot be set because its side slider will be held in the inhibit position by the peg of the release member. Said pushbutton is suited, in particular, to control the positioning of a door: the door will only be pushing in the pushbutton when closed to thereby enable the switch to be set.

Advantageously, this device includes two separate pressure members, arranged to act separately on the release member. In this way, the ability to set the switch can be interlocked with the positions of two different mechanical members.

This device also includes, to advantage, an actuator movable in a guided fashion within the housing between a home or rest position and a working or operative position, by operation of external mechanical members, a front-mounted bistable lever on the housing similar to that on the switch and associated rigidly with the last-mentioned lever by means of a crosspiece, and mechanical linkage means within the housing, between the actuator and the bistable lever, whereby the actuator will either occupy its home position or its working position according to whether the bistable lever of the switch is in the set or the release position. Thus, it becomes possible to operate external mechanical members in accord with the set or the release position of the switch.

Further features and advantages of a device according to the invention will be more clearly understood from the following detailed description of a preferred embodiment thereof, to be taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is a side view of a device according to the invention, with a side wall removed to expose its interior; and

Figure 2 is a perspective view of the device in Figure 1, shown combined with a modular design automatic switch.

Generally shown at 1 in the drawings is a mechanical control device for a switch I. The switch I is a modular design, automatic electric switch having a front-mounted, bistable set/release lever L and a side-mounted, setting inhibit/assent slider (not shown in the drawings) which is accessible through a slot A.

The device 1 comprises a housing 3 having

similar shape and dimensions to the switch I. In particular, the housing 3 has a recess 4 on its rear for attachment to a mounting bracket in a manner known per se.

The device 1 also comprises, mounted within the housing 3, a release member 5 which has freedom of movement between a rest or home position (shown in full lines, Figure 1) and a working or operative position (shown in dash lines, Figure 1); the release member 5 comprises preferably a lever 6 pivoted on the housing 3 by means of a pivot 7.

The release member 5 is provided with a peg 8, mounted on the remote end of the lever 6 from the pivot 7 to jut out sideways; the peg 8 protrudes sideways out of the housing 3 through a slot 15. In normal use of the device 1 in combination with the switch I, the slot 15 would be facing the corresponding slot in the switch I through which the peg 8 engages with the side-mounted, switch setting inhibit/assent slider; specifically, with the release member 5 in its home position, the slider will be in the position inhibiting the setting of the switch I, whereas with the release member 5 in its working position, the slider will be in the position of assent to the setting of the switch I.

In addition, the device 1 comprises at least one pressure member inside the housing 3, preferably two pressure members 20 and 21, independent of each other. Each of these members is movable in a guided fashion within the housing 3 from a home or rest position (shown in full lines, Figure 1) to a working or operative position (shown in dash lines, Figure 1) against the bias of respective springs 22 and 23; when in the home position, each pressure member 20 and 21 holds, independently of the other, the release member 5 in its home position (which, as mentioned, reflects in disability to set the switch I), whereas in the working position, each of the pressure members 20 and 21 allows the release member 5 to move into its working position (which, as mentioned, reflects in assent to the setting of the switch I).

More specifically, the pressure member 20 comprises two arms 24 and 26 so made rigid together as to form a crank lever pivoted on the housing 3 by means of a pivot 28. The arm 26 is in contact engagement with a branch 30 of the lever 6 of the release member 5; the arm 24 is arranged to push the spring 22 against a seat 32 formed in the housing 3. With the arms 24 and/or 26 of the pressure member 20 there may be associated a member (not shown) to be operated from without the housing 3 to drive the pressure member by pushing the arm 24 against the spring 22; this member may vary contingent on individual requirements: as an example, it may be a rotary shaft or a slider.

The pressure member 21 comprises two arms 25 and 27 made unitary with each other into a crank lever pivoted on the housing 3 by means of a pivot 29. The arm 27 is in contact engagement with a branch 31 of the lever 6 of the release member 5; the arm 25 engages in link-motion relationship with a pushbutton 40 which fits slidably in a respective seat 41 formed in the housing 3, on the front portion thereof, such that the pushbutton 40 will project from the housing 3. The spring 23 is received at the bottom of the seat 41 and will be compressed on depressing the pushbutton 40.

The device 1 further comprises an actuator 50, in the form of a slide movable in a guided fashion within a respective seat 51 formed in the housing 3, between home and working positions as external mechanical members (not shown in the drawings) are operated which may be, for example, a latch mechanism for locking an electric plug in a tap. A bistable lever 53, similar to the lever L of the switch I, is provided on the front of the housing 3; the lever 53 is mounted on a drum 54 journalled within the housing 3 and rigidly associated with the lever L of the switch I by means of a crosspiece 55.

Provided inside the housing 3 between the actuator 50 and the bistable lever 53 is a mechanical linkage arrangement whereby the actuator 50 will either occupy its home position or working position, according to whether the bistable lever L of the switch I was in its set or release position. This arrangement comprises a rocker arm 56 and a connecting rod 58; the rocker arm 56 is pivoted on the housing 3 by means of a center pivot 57, and engages on the one side with the actuator (a in link-motion relationship, and is pivoted on the other side to the connecting rod 58; the connecting rod 58, besides being pivoted to the rocker arm 56, is connected pivotally to the drum 54 as well, on the remote end thereof from the lever 53.

This device 1 operates as follows.

In the rest condition with the switch I in its release position and no mechanical action applied to the pressure member 20 and the pushbutton 40, the components of the device 1 will occupy their respective home positions shown in full lines in Figure 1. In particular, the springs 22 and 23 are urging the pressure members 20 and 21 to so act on the release member 5 as to hold it in its home position; as a result, the peg 8 will hold the side-mounted, switch I setting inhibit/assent slider in the inhibit position. Further, the actuator 50 will also occupy its home position (which corresponds with the positioning of the external members driven by the actuator sought under the rest condition).

In this rest condition, the switch I cannot be set because the side-mounted slider is in the inhibit position; actually, the lever L may be moved to the setting position, but not held there, and anyhow,

would make no electric contact.

As either pressure member, 20 or 21, e.g. member 20, is acted upon (by performing the action contemplated for that pressure member, such as the plugging in of an electric plug), the pressure member 20 shall move to its working position, indicated by broken lines in Figure 1; however, this would not yet enable the switch I to be set because the release member 5 is still held in the home position by the other pressure member 21, thereby the side slider of the switch I is still in the inhibit position.

By acting simultaneously on both pressure members 20 and 21 (that is performing the action contemplated for the pressure member 20 while holding the pushbutton 40 depressed), the pressure members 20 and 21 will be driven to their working positions, indicated by broken lines in Figure 1; this allows the release member 5, presently freed, to move to its working position as entrained by the side slider of the switch I, if and when the switch I is set. Concurrently with the switch setting, the actuator 50 is also brought to its working position (resulting in the desired mechanical action, such as the locking of an electric plug in a tap by means of a latch). The device 1 is now operative.

In this operative condition, the mechanical action disallowed by the positioning of the actuator 50 (such as pulling an electric plug off its tap) could not be performed.

If in this operative condition just one of the actions on the pressure members, 20 or 21, is wanting (because the action contemplated for the pressure member 20 or the pressure on the pushbutton 40 is discontinued), the release member 5 is returned to its home position by the action of the spring 22 and/or 23. Consequently, the side slider of the switch I will be moved to the inhibit position, thereby the switch I itself is immediately released.

Thus, the desired function of mechanical control of the switch I is ensured with the intermediary of the device 1. The modular design housing 3 affords utmost simplicity of installation in modular electric systems, while not only retaining all the advantages of modularity for the system, but also transferring such advantages to the mechanical control function; in particular, while the device 1 described and illustrated by way of example in the foregoing as equipped with two pressure members and one actuator, contingent on specific demands, a mechanical control device may be employed which includes a different number of pressure members and/or actuators. In addition, a device of this type can be readily replaced either on the occurrence of damages or in the event that changed requirements for the electric system call for a more complex device.

Claims

1. A mechanical control device (1) for an electric switch, specifically an automatic elelctric switch (I) of modular design having a front-mounted bistable set/release lever (L) and a side-mounted setting inhibit/assent slider accessible through a slot (A), characterized in that it comprises a housing (3) with a modular design similar to that of the switch (I) and adapted to be assembled laterally of the switch (I), a release member (5) within said housing (3) provided with a peg (8) protruding sideways from the housing (3) and being adapted to engage with the inhibit/assent side slider of the switch (I), said release member (5) being free to move between a home position where the peg holds the switch slider in a setting inhibit position and a working position where the peg (8) holds the switch slider in a setting assent position, at least one pressure member (20,21) movable in a guided fashion within said housing (3) against the bias of a spring means (22,23) from a home position where the pressure member (20,21) holds the release member (5) in its home position to a working position where the pressure member (20,21) allows the release member (5) to move to its working position.

2. A device according to Claim 1, characterized in that it comprises a pushbutton (40) protruding forwardly from the housing (3) and being associated mechanically with the pressure member (21) such that the pressure member (21) will be in its working position as the pushbutton (40) is held depressed.

3. A device according to Claim 1, characterized in that it comprises two discrete pressure members (20,21) acting separately on the release member (5).

4. A device according to Claim 1, characterized in that it comprises an actuator (50) movable in a guided fashion within the housing (3) between a home position and a working position by operation of external mechanical members, a front-mounted bistable lever (53) on the housing (3) similar to that (L) on the switch (I) and being rigidly associated with the last-mentioned lever by means of a crosspiece (55), and means (56,57,58) within the housing (3) of mechanically linking the actuator (50) and the bistable lever (53), whereby the actuator (50) will either occupy its home position or its working position according to whether the bistable lever (L) on the switch (I) occupies its setting

or releasing position.

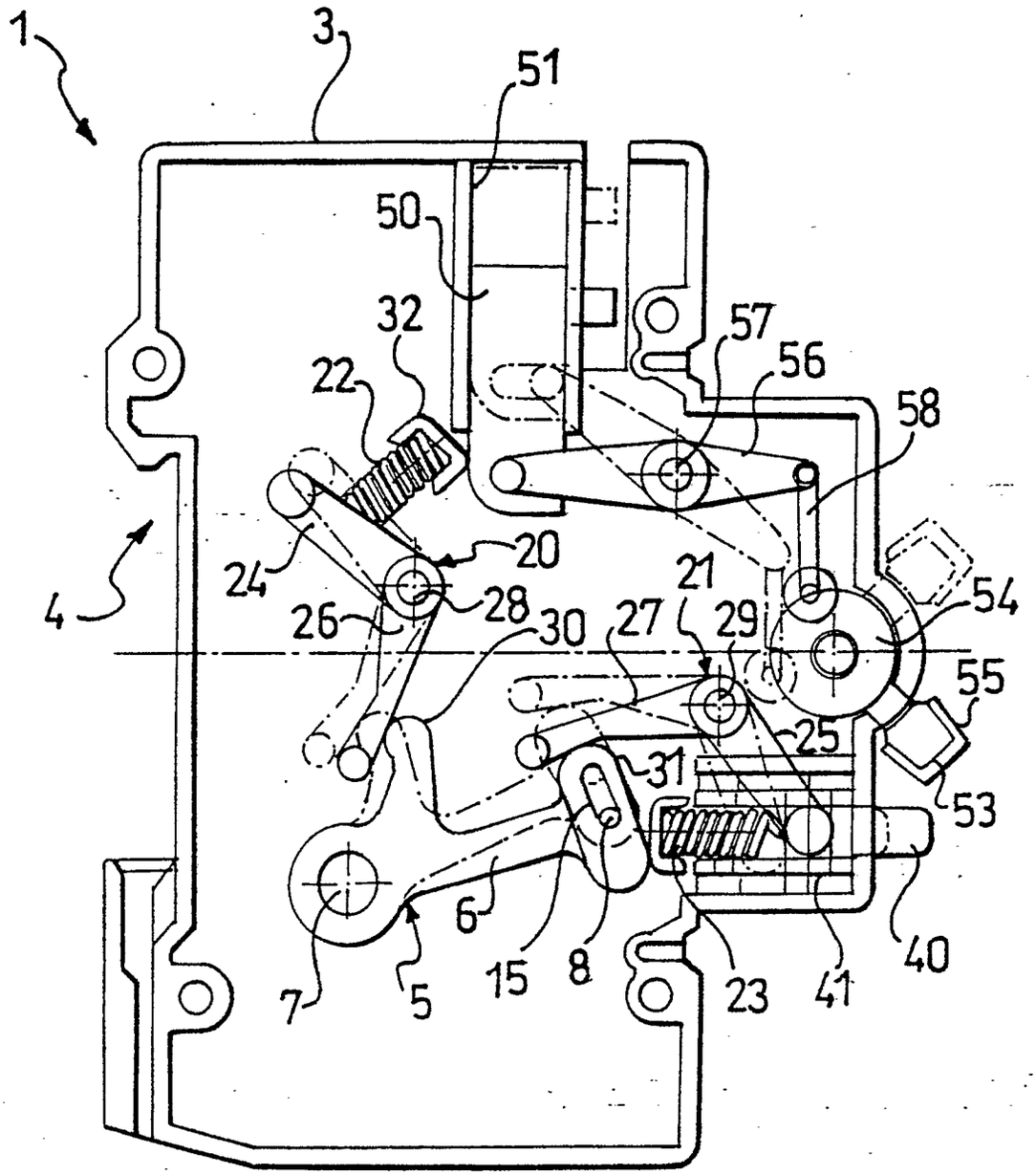
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FIG.1

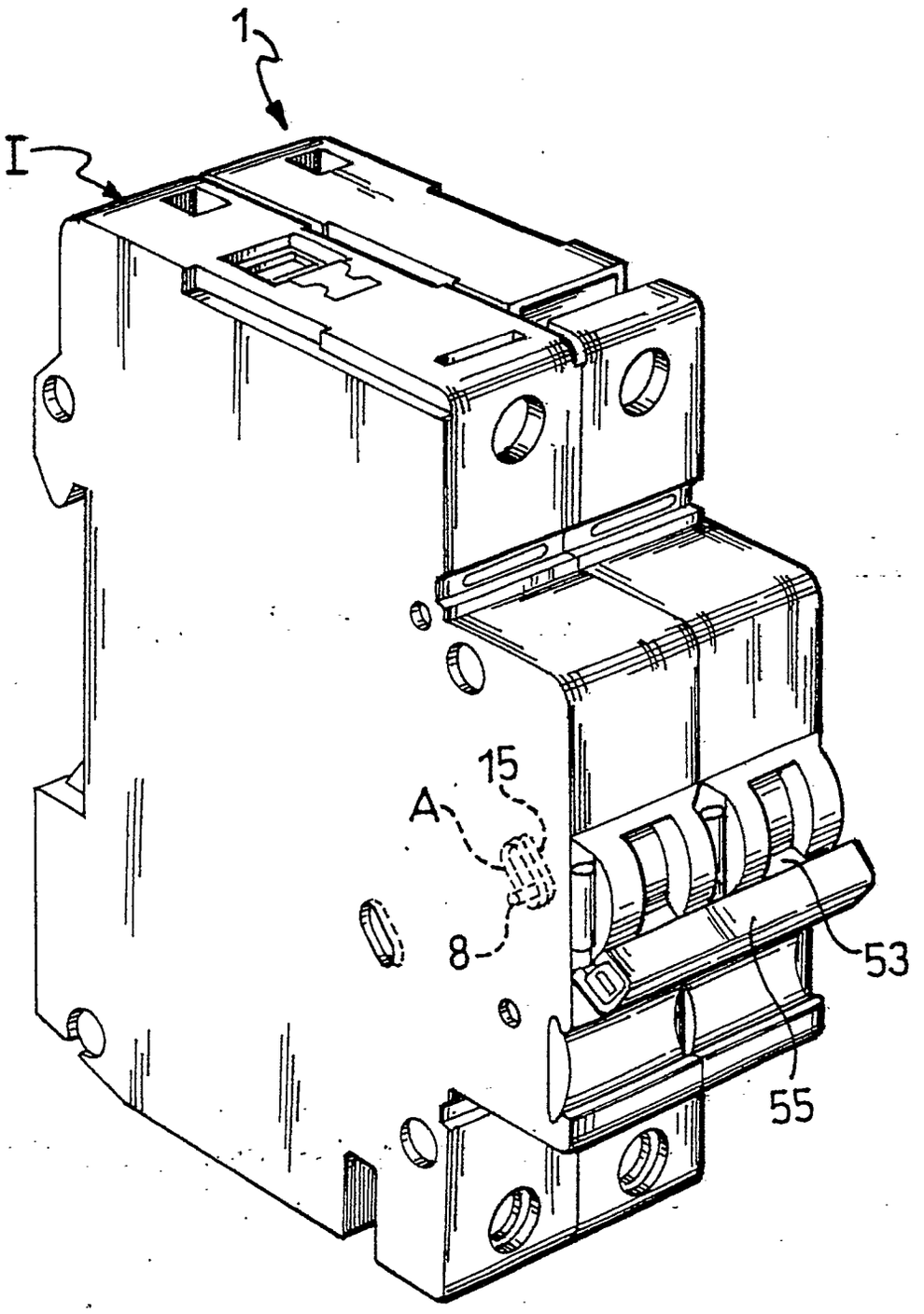

FIG.2