

MAINS ELECTRICAL OUTLET

The present invention relates to a mains electrical outlet and more particularly to such an outlet provided with manual switching facilities.

5 Mains electrical outlets are housed in standard size boxes and are usually either one-gang or two-gang. Attempts have been made in the past to provide switched electrical outlets with fault protection in the form of residual current devices but all previous attempts have either resulted in the need for nonstandard sized outlets or else the use of a two-gang box for a one-gang RCD protected outlet. There is thus a need for a switched electrical outlet which has
10 RCD protection but which will fit in a standard size housing.

The present invention proposes to provide a switched mains electrical outlet which utilises the normal electrical contact assembly for making and breaking the power contacts together with a normal construction of manually operable switching means. However, the linkage between these two elements is
15 a controllable coupling operating in response to a fault detection mechanism. In a preferred embodiment, the controllable coupling is in the form of an axial clutch which is capable of axial movement in the presence of a fault condition to thereby effectively disengage the mains contacts from the manually operable switch member to permit the mains contacts to open but when there is no fault condition
20 the mains contact operating mechanism is locked to the operation of the manually operable switch member.

In order that the present invention be more readily understood, an embodiment thereof will now be described with reference to the accompanying drawings in which:

25 Figure 1 shows a diagrammatic representation of the overall assembly;

Figure 2 shows a sketch of a manually operable member used with the assembly shown in Fig. 1; and

Figure 3 shows an exploded perspective view of a part of the assembly

shown in Figure 1.

The preferred embodiment of the present invention is designed to result in a switched electrical outlet which has RCD protection built in but which occupies a standard outlet box. In order to meet these requirements, the preferred embodiment utilises as far as possible normal operating mechanisms but replaces
5 the normal fixed linkage between the manually operable switch on the outlet and the actual mains contact mechanism with a controllable coupling mechanism.

Referring to the diagrammatic sketch shown in Fig. 1, the normal mains contact operating mechanism is indicated by the reference numeral 10. The
10 mechanism consists of a contact carrier 12 carrying contacts 14 which in normal operation are biased by a biasing means 15 to a normally open condition with respect to fixed contacts 16. The contact carrier is arranged to rotate in a plane normal to the plane of the paper in Figure 1.

A manually operable switch mechanism is generally indicated by
15 reference numeral 18 and consists of a rocker switch 19 which is of the usual bistable type resulting from the use of an over-centre spring arrangement "where the rotational force required to overcome the spring to turn from on to off is greater than the rotational force exerted by the biasing spring 15, such that the switch system as a whole is also bi-stable for as long as the device is untripped.

20 Between the manually operable mechanism 18 and the switch contact mechanism 10, is provided a controllable coupling mechanism 20 in the form of an axial clutch. The axial clutch is formed by a plate member 21 which faces a side wall 22 of the contact carrier 12. The facing surfaces 21,22 are provided with one or more inter-engaging projections and recesses; the projections 22a being shown in
25 more detail in Figure 3. The plate 21 is arranged to be movable by the manually operable mechanism 18 in a rotational direction in and out of the paper as seen in Figure 1 but is capable of transverse or axial movement i.e to the left and right as shown in Figure 1 under the control of a fault detection system indicated generally by the reference numeral 22.

In the preferred embodiment, the arrangement is such that the fault detection mechanism 22, in the absence of a fault, causes the plate 21 to be held in engagement with the surface 22 on the contact carrier 12 so that movement of the manually operable mechanism 18 will also move the contact carrier 12 to open or close the power contacts. This is achieved by interposing a movable member 23 between a surface 24 provided on an extension 25 to the plate 21 and a relatively fixed surface 26. The member 23 interposed between the surface 24 and fixed member 26 prevents any axial movement of the plate 21. However, when a fault condition is detected, the member 23 is withdrawn which allows relative movement between the members 24 and 26 which thus permits the plate 21 to move axially as a result of interaction between the projections and recesses on the contact carrier 12 and plate 21. The projections of recesses have angled engaging surfaces which are designed so that the biasing means 15 exerts a sufficient rotational force on the contact carrier 12 to force the plate away from the surface 22 when the moveable member 23 is not interposed between the surface 24 and fixed surface 26.

The above described arrangement thus results in the mains contacts becoming open but without operating the mechanism 18 to cause it to revert to an "off" position also. It is a requirement that a manual flag 30 be provided with all RCD devices in order to accurately indicate the status of the power contacts and due to the fact that in the present mechanism the manually operable switch is not moved to an "off" position by the detection of a fault, it is proposed to provide the flag within the manually operable switch itself by providing a window in the top of the switch as shown in Figure 2. A flag is connected to the contact carrier 12 and is arranged to be exposed in the window when the switch member is in the "on" position and the contacts are also closed. In the event of the contacts opening due to a fault, the flag either disappears or is replaced by a different colour flag to indicate that the socket is non-operative.

A further advantage of the above arrangement is that in order to reset

a socket which has been tripped by a fault condition, all that is required is that the switch rocker 19 be returned to the "off" position and then placed into the "on" position again. If the fault has been cleared in the meantime then the switch will reset. However, if the fault is still present the operation of the rocker switch will
5 have no effect on the contact carrier 12 due to the fact that the plate 21 will simply move axially as it also moves rotationally in response to operation of the rocker 19.

As an additional indication, it is possible to provide a further visual or audible indication that the socket has tripped due to a fault condition and this can
10 be done in any convenient way having regard to the space limitations.

In order to provide a better indication of the actual construction of the important parts of the present mechanism attention is directed to Figure 3 which shows in an exploded perspective view a portion of the contact carrier 12 with the flag attached as well as the controlled coupling member. Rather than repeat the
15 above description the same reference numerals have been used in Figure 3 as have been used in Figure 1. The arms 31 engage the rocker switch 19 and cause the contact carrier to move with the rocker switch 19 in the absence of a fault.



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CLAIMS:

1. A switched mains electrical outlet comprising power contacts, means for opening and closing the contacts, a manually operable switching means, and
5 a linkage between the power contacts and the switching means characterised in that the linkage is capable of adopting one of two modes of operation, and a fault detection arrangement is provided for controlling the mode of operation adopted by the linkage whereby to permit the contacts to open or to remain open in the presence of a fault.
- 10 2. An outlet according to claim 1, wherein the linkage is in the form of a controllable clutch, whereby in one mode of operation the movement of the switching means is transferred to the means for opening and closing the contacts and in the other mode of operation the movement of the switching means is not
15 transferred to the opening and closing means.
3. An outlet according to claim 1 or 2, and comprising means for indicating whether the power contacts are open or closed.
- 20 4. An outlet according to claim 3, wherein the indicating means is in the form of a mechanical element which is visible to a user when the contacts are closed.
5. An outlet according to any one of claims 1 to 4, wherein the manually
25 operable switching means is in the form of a rocker.
6. An outlet according to claim 5, wherein the rocker is provided with an aperture through which the indicating means is visible.



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7. An outlet according to claim 5 wherein the linkage includes a movable member for linear movement into and out of engagement with the means for opening and closing the contacts.
- 5 8. An outlet according to claim 7, wherein the means for opening and closing the contacts is arranged to rotate between positions for opening and closing the power contacts.
- 10 9. An outlet according to any one of the preceding claims, wherein the detection arrangement includes an electrically operable device arranged to control the conditions of the linkage.
- 15 10. An outlet according to claim 9, wherein the electrically operated device comprises a solenoid, the armature of which is arranged to engage the linkage to permit operation of the means for opening and closing the contacts using the manually operable means.

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