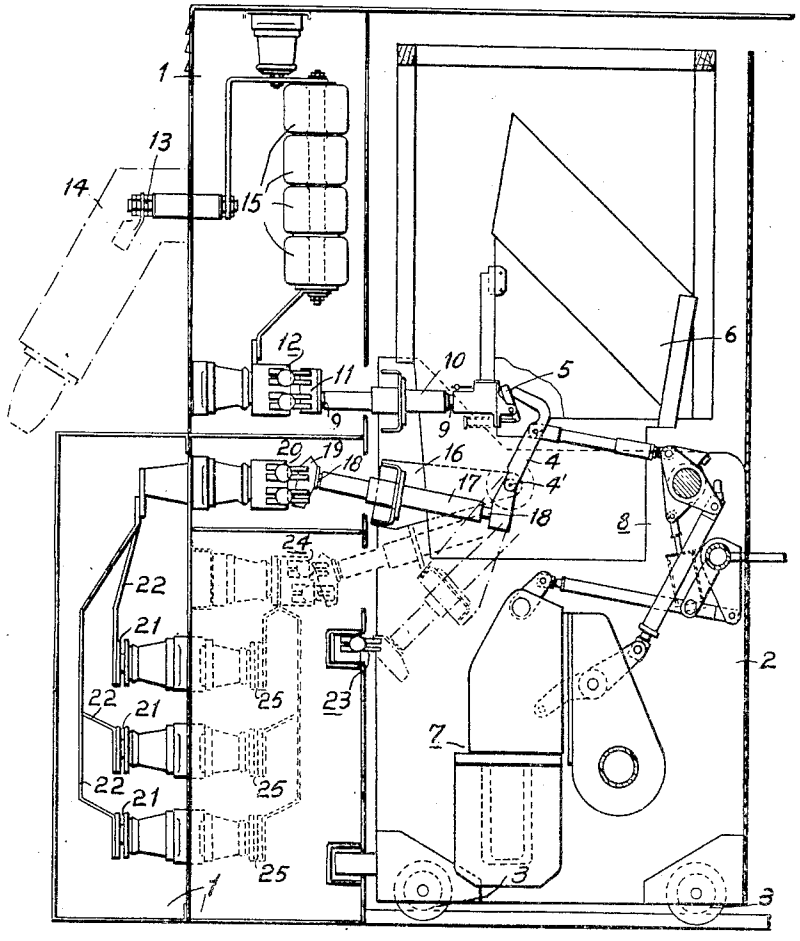
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SWITCHGEAR

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INVENTOR

George Wilson Davidson

By Morris & Bateman

ATTORNEYS

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SWITCHGEAR

George Wilson Davidson, Davyhulme, England, assignor to Metropolitan-Vickers Electrical Company Limited, London, England, a British company

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This invention relates to switchgear of the draw-out, cabinet, or truck type, namely in which one portion of the gear including a set of components arranged for connection through pairs of co-operating, so-called isolating, contacts with a set of components in another portion of the gear, can be withdrawn from said other portion to permit maintenance or adjustment, which isolating contacts of each pair are carried respectively by the two portions of the gear so that on such withdrawal the isolating contacts of each pair separate thereby to disconnect (isolate) the one set of components from the other. The invention is particularly but not exclusively concerned with such switchgear including a circuit interrupter, especially a circuit interrupter of the air-break kind having a hinged moving contact or contacts.

In switchgear of the above type one portion thereof, usually the withdrawable portion, often includes what will be termed isolator arms (namely elongated conductive members mounted on the one portion in electrical connection with the set of components therein and extending, usually through insulating bushings, towards the other portion) which at their outer ends carry respective isolating contacts for engagement, when the two portions of the gear are together, with co-operating isolating contacts on the alternate portion. Thus where a circuit interrupter is incorporated in the switchgear this is usually included in the withdrawable portion with its co-operating fixed and moving contacts in permanent electrical connection with respective isolator arms also mounted in the withdrawable portion and extending towards the other portion.

Hitherto such isolator arms have been substantially fixed in position in the appertaining portion of the gear, and where it has been desired to make provision for the set of components in the one portion to be selectively connected to different components in the other portion, for instance for one side of a circuit interrupter in the withdrawable portion to be selectively connected to different busbar sections in the other portion, this has been done by providing a suitable selector switch between the isolating contacts and the different busbar sections or other components, or by providing a separate isolator arm and associated pair of isolating contacts for each of the busbar sections or other components together with suitable switching means for selecting through which isolator arm and pair of contacts connection is effected.

According to the present invention, in switchgear of the type set forth having one or more isolating contacts carried by (respective) isolator arms as hereinbefore defined, at least one such isolator arm is pivotally mounted in the appertaining portion of the gear so as to be selectively adjustable to different angular positions for selecting which one of two or more appropriately positioned isolating contacts on the alternate portion of the gear is engaged by the isolating contact on the pivotally mounted arm when the two portions of the gear are together, whereby to permit selective establishment of different circuits in or through the gear. The pivot axis for such pivotally mounted isolator arm may or may not intersect the general longitudinal axis thereof.

Where the switchgear includes a circuit interrupter for controlling connection of a supply conductor, namely adapted to carry a supply of electricity, to a feeder, namely a conductor arranged when such connection is made to convey electricity from the supply conductor, the pivotally mounted isolator arm may be selectively adjustable to one or other of two positions in one of which its isolating contact is positioned for engagement with a co-operating isolating contact to establish a circuit extending between the supply conductor and feeder through the interrupter, and in the other of which its isolating contact is positioned for engagement with a co-operating isolating contact connected to earth thereby to establish between the feeder and earth a circuit which will generally be arranged also to include the circuit interrupter.

Sometimes an alternative supply conductor may be provided, in which event the pivotally mounted isolator arm may be also selectively adjustable to another position in which its isolating contact is positioned to engage a further co-operating isolating contact through which to establish a circuit extending between such alternative supply conductor and the feeder through the circuit interrupter. The invention is obviously also applicable where alternative supply conductors, or possibly alternative feeders, are provided without the provision for earthing indicated above.

It is contemplated that in applying the invention to switchgear incorporating a circuit interrupter having a hinged moving contact, the isolator arm may conveniently be mounted in the same portion of the gear as includes the interrupter with the pivot axis for the isolator arm coincident with the hinge axis of said moving contact.

In order that the invention may be more fully understood reference will now be made to the accompanying drawing which in diagrammatic section illustrates the invention as applied to truck-type switchgear including a three-phase circuit interrupter of the air-break type.

Referring to the drawing, the switchgear illustrated comprises a fixed portion **1** and a truck portion **2** withdrawable from the fixed portion **1** on wheels **3**. In the truck portion **2** is mounted a three-phase air-break circuit interrupter including for each phase a hinged moving contact **4** having its hinge axis at **4'** and a co-operating "fixed" contact **5**, an arc controlling and quenching device **6** being mounted over these contacts in the usual manner. The moving contacts **4** of the several phases are arranged for actuation between their positions corresponding to the interrupter being open and closed by an operating mechanism **7** acting through any suitable linkage **8**, the actual form of the mechanism **7** and the linkage **8** being irrelevant to the present invention.

Each fixed contact **5** of the interrupter is mounted at the inner end of an isolator arm **9** which extends between the fixed portion **1** of the gear through an insulating bushing **10** rigid with the withdrawable portion **2**. At its outer end this rigidly mounted isolator arm **9** carries an isolating contact **11** which when the two portions of the gear are brought together for operation as shown engages a co-operating isolating contact **12** mounted in the fixed portion **1** in electrical connection with a terminal **13** to which an out-going line can be connected as in a cable header **14**. The connection between the isolating contact **12** and the terminal **13** may include current transformers **15** or such equipment in known manner.

In the withdrawable portion of the gear a mounting plate or other member **16** pivoted about the hinge axis **4'** of the moving contacts **4**, conveniently on the same pivot pin, supports for one phase of the interrupter an insulating bushing **17** through which extends an isolator arm **18** electrically connected at its inner end with the moving contact **4** for that phase and carrying at its outer end an isolating contact **19**. It will be noted that in the arrangement shown the pivot axis **4'** is displaced transversely with respect to the general longitudinal axis of the isolator arm **18**; these two axes could alternatively intersect. Similar bushed isolator arms **18** carrying respective isolating contacts **19** are provided for the other

phases, being carried by the same mounting member 16 or by separate mounting members similarly pivoted.

A further isolating contact 20 provided in the fixed portion 1 for each phase is connected to one of a set of three busbar sections or other conductors 21, namely one for each phase, it being appreciated that the connections 22 shown as leading to the respective conductors 21 do so from the respective isolating contacts 20 provided for the several phases and aligned with the contact 20 seen in the drawing. The conductors 21 would in use be connected to a three-phase supply. Another isolating contact 23 provided in the fixed portion 1 for each phase is connected to earth, being conveniently mounted on the earth metallic housing 1' for the fixed portion 1, while yet another isolating contact 24 for each phase may be provided with the contacts 24 for the several phases connected to respective busbar sections or other conductors 25 forming another (alternative) set which would in use be connected to an alternative supply. The fixed isolating contacts 20, 23 and, if provided, 24 are so positioned that when the two portions 1 and 2 of the gear are brought together the isolating contact 19 on the pivotally mounted isolator arm 18 engages one or other of these contacts 20, 23 or 24 as selected by previous angular adjustment of the pivoted isolator arm 18 about the axis 4' with the two portions of the gear apart. In this way, assuming the alternative set of busbars 25 to be provided, the circuit interrupter can be selectively connected between the out-going line and either the earthed contact 23 or one or the other of the busbar sets 24, 25 so that closure of the circuit interrupter will connect the out-going line to one of the alternative supplies or to earth.

It will be appreciated that whereas the particular embodiment of the invention illustrated incorporates a circuit breaker of the free air-break type, the invention is equally applicable to truck-type switchgear incorporating for instance oil circuit breakers or air-blast circuit breakers such as that disclosed in United States Patent No. 2,486,127 to D. R. Davies; usually such oil or air-blast circuit breakers will not have a hinged moving contact and the pivotally mounted isolator arms may then be arranged with their pivot axes in any convenient position.

What I claim is:

1. In electrical switchgear comprising first and second portions which are withdrawable one from the other, a circuit interrupter included in the first portion and having a hinged moving contact means the hinge axis of which extends transversely of the direction of withdrawal of the one portion from the other portion, pairs of isolating contacts the contacts of each pair being carried respectively by said two portions, and supply and feed conductors included in the second portion and capable of being connected with the circuit interrupter for controlled interconnection thereby through the respective pairs of isolating contacts the contacts of which are separable on withdrawal of the one portion from the other portion of the switchgear, an isolator arm pivotally mounted on said first portion of the switchgear for pivotal adjustment between different angular positions about the same axis as that on which said moving contact means is hinged, an isolating contact carried by the isolator arm at a position thereon removed from its pivot axis, and two isolating contacts carried by the second portion of the switchgear and positioned for selective engagement by the contact on the isolator arm in different angular positions of the latter, the contact on said arm being engageable with one of said two contacts on said second portion to effectively establish a circuit through the switchgear from the supply conductor to the feed conductor through the circuit interrupter, and engageable with the other of said two contacts to establish an alternative circuit through the switchgear.

2. In switchgear comprising a first portion including a circuit interrupter having a hinged moving contact means and which is withdrawable from a second portion which includes a supply conductor and a feed conductor capable of being connected with said circuit interrupter for controlled interconnection thereby through respective pairs of isolating contacts the contacts of each pair being carried respectively by said two portions and are separable on withdrawal of the first portion from the second portion of the switchgear, an isolator arm pivotally mounted on said first portion for pivotal adjustment between different angular positions about the same axis as that on which said moving contact means is hinged, an isolating contact carried by the isolator arm at a position thereon removed from its pivot axis, and two isolating contacts carried by said second portion of the switchgear in positions for selective engagement by the contact on the isolator arm in different angular positions of the isolator arm, engagement of the contact on said arm with one of said two contacts on the second portion being effective to establish a circuit from the supply conductor to the feed conductor through the interrupter and engagement thereof with the other of said two contacts being effective to establish a circuit between the feed conductor and earth.

3. Switchgear as claimed in claim 2 wherein said circuit between the feeder and earth also includes the circuit interrupter.

4. Switchgear as claimed in claim 2 wherein a further conductor having the same function as one of the conductors mentioned is included in said second portion of the gear and wherein a third isolating contact is selectively engageable by the contact on said isolating arm in a further selected position of the latter, engagement of the contact on said arm with this third contact being effective to establish a circuit through the interrupter from said further conductor to conductor having the alternate function.

5. In switchgear wherein a first portion including a circuit interrupter having a hinged moving contact means is withdrawable from a second portion including a supply conductor a feed conductor and a further conductor having the same function as one of said first two conductors, conductors of opposite function being capable of connection with the circuit breaker, for controlled interconnection thereby, through respective pairs of isolating contacts the contacts of which are carried respectively by said portions of the gear and are separable on withdrawal of said first portion from the second, a so-called isolator arm pivotally mounted on one portion of the gear for pivotal adjustment between different angular positions about the same axis as that on which said moving contact means is hinged, an isolating contact carried by said arm at a position remote from the pivot axis, and two isolating contacts carried by the other portion of the gear and selectively engageable by the contact on said arm in different selected positions of the latter, engagement of the contact on said arm with one of said two contacts on said other portion of the gear being effective to establish a circuit through the interrupter from one of the two conductors having the same function to the conductor having the alternate function, and engagement of the contact on said arm with the other of said two contacts on said other portion being effective to establish a circuit through the interrupter from the other of the two conductors having the same function to the conductor having the alternate function.

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