

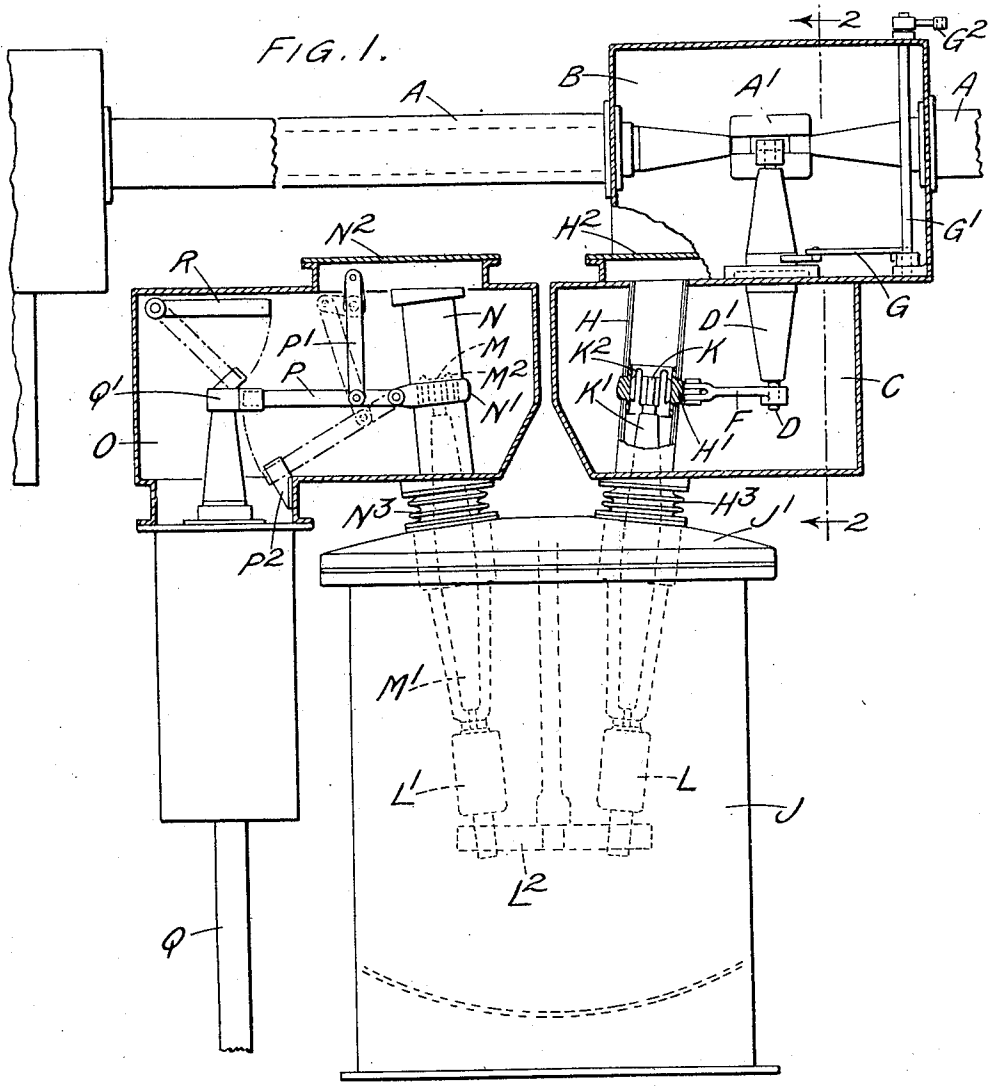
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J. CHRISTIE
ELECTRIC SWITCH GEAR

1,843,805

Filed Feb. 21, 1931

2 Sheets-Sheet 1



Inventor,
John Christie,
Per,
Watson East, Morse & Knudde Att'ys

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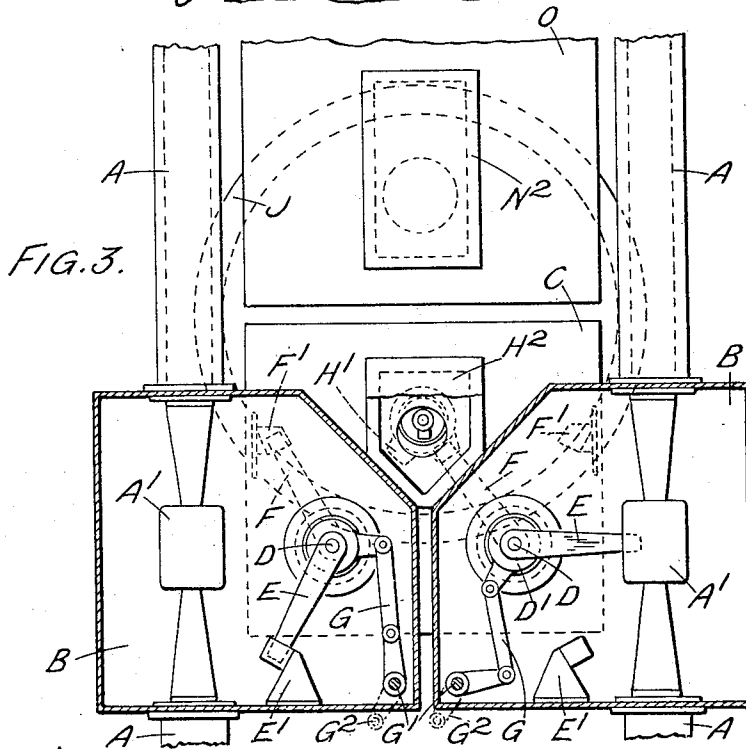
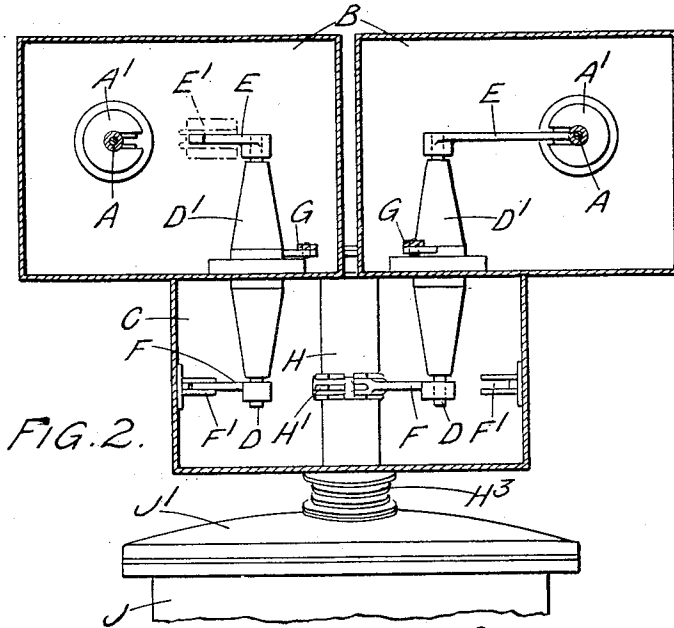
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2 Sheets-Sheet 2



Inventor,
John Christie,
Per
Winton, Scott, Moore & Grindle, Attys.

UNITED STATES PATENT OFFICE

JOHN CHRISTIE, OF SUNDERLAND, ENGLAND, ASSIGNOR TO A. REYROLLE & COMPANY LIMITED, OF HEBBURN-ON-TYNE, ENGLAND, A COMPANY OF GREAT BRITAIN

ELECTRIC SWITCHGEAR

Application filed February 21, 1931, Serial No. 517,610, and in Great Britain March 26, 1930.

This invention relates to electric switchgear of the metal-clad type, usually oil-immersed, for use in systems having duplicate busbars either of which may be placed in commission through a common circuit-breaker. In switchgear of this general type the busbars are sometimes in separate chambers and are connected through isolating or selecting switches to a common connection in an intermediate chamber, such common connection leading to the main circuit-breaker.

In duplicate busbar systems particularly with extra high voltage, it is desirable that if one bar be out of service it shall be isolated as efficiently as possible from the other bar and from the circuit-breaker, and it is therefore inadvisable to employ the common connection above referred to. Further, the use of such a common connection where the two busbars carry different voltages is inadmissible.

In switchgear according to the present invention each busbar is in a separate chamber and its connection to the main circuit-breaker is effected by a rotary member or isolating switch which makes and breaks the circuit at two points.

Preferably the separate chambers each containing one of the busbars are arranged over another chamber, and passing through each busbar chamber into the chamber beneath it is a rotary member in the form of an insulating bushing surrounding a conductor having at each end a switch arm. The arm at the upper end makes connection with the busbar and that at the lower end with a conductor leading down to the main circuit-breaker. Thus, the arrangement comprises for each of the busbars what may be termed a double-ended rotary isolating switch which is capable of connecting its own busbar with the circuit-breaker or of breaking such connection at two points, one in the separate busbar chamber and the other in the intermediate chamber. It will be appreciated therefore that the isolation of either busbar can be most completely and readily effected.

A convenient practical construction according to the invention is illustrated by way of

example in the accompanying drawings, in which

Figure 1 is a front elevation parts being shown in section,

Figure 2 is a section on the line 2—2 of Figure 1, and

Figure 3 is a horizontal section taken just beneath the cover plate of the uppermost chamber.

In this arrangement the two busbars A are led into separate oil-filled chambers B, which are disposed side-by-side above a third oil-filled chamber C. Passing through from each busbar chamber B into the lower chamber C is a conductor D mounted within an insulating bushing D¹. Each conductor D carries two switch arms E F respectively at its upper and lower ends. The whole bushing D¹ with the conductor D and switch arms E F is rotatable by means of the mechanism indicated at G, G¹, G², between two positions, as clearly shown in Figure 3 wherein the right-hand conductor and bushing is shown in the operative position and the left-hand conductor and bushing in the earthed position. In the operative position the upper switch arm E engages with a contact A¹ to which the busbar is connected, and the lower switch arm F engages with a contact ring H¹ surrounding a tubular casing H in the chamber C. In the earthed position the two switch arms E F engage respectively with earthed contacts E¹ F¹ mounted on the walls of the chambers.

The tubular casing H extends from the top to the bottom of the chamber C and a detachable cover plate H² is provided over its upper end. At its lower end the casing H is provided with a flexible extension H³, which is bolted on to the cover plate J¹ of the circuit-breaker tank J. The casing H contains a conductor K surrounded by a condenser-insulator K¹. At its upper end the conductor K carries a spring contact K² engaging with the inside of the contact ring H¹, whilst at the lower end the conductor makes a plug and socket connection with one of the fixed circuit-breaker contacts L. The other fixed circuit-breaker contact L¹, which is connected to the contact L through a movable

bridging contact L^2 in the usual manner, is connected through a plug and socket connection to a conductor M surrounded by a condenser-insulator M^1 . The conductor M is mounted within a tubular casing N which passes through an oil-filled chamber O , its upper end being closed by a cover plate N^2 , and is provided at its lower end with a flexible extension N^3 . The conductor M carries at its upper end a spring contact M^2 engaging with the inside of a contact ring N^1 on the tubular casing N . The arrangement of the conductor M and tubular casing N is similar to that of the conductor K and casing H , and is such that on opening up the cover plates H^2 N^2 and unbolting the flexible extensions H^3 N^3 from the cover plate J^1 of the tank, the conductors M and K can be withdrawn upwardly to facilitate removal of the whole circuit-breaker for inspection or repair. The details of construction of the tubular casings and the withdrawable conductors do not in themselves form part of the present invention.

The contact ring N^1 is connected through a switch arm P in the chamber O to a terminal Q^1 to which the cable or feeder Q is connected, the arm P being movable by suitable mechanism indicated at P^1 from the operative position (shown in full lines) into an earthing position (shown dotted) in which it makes contact with an earthed contact P^2 on the wall of the chamber O . A further switch arm R may also be provided, which can be moved from a normal inoperative position into a position (shown dotted) in which it earths the cable terminal Q^1 .

Suitable interlocking mechanism (not shown) may be provided to prevent the two isolating switches D , E , F from occupying their operative positions at the same time, if as is sometimes the case it is desirable to prevent the two busbars A from being connected together. Interlocking mechanism may also be provided having the usual function of preventing operation of an isolating switch while the main circuit-breaker contacts L , L^1 , L^2 closed.

It will be appreciated that the improved switchgear considerably reduces the risk of both busbar circuits being placed out of action at the same time and greatly facilitates the safe inspection and repair of either of the busbars or isolating switches whilst service is maintained on the other bar.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In metal-clad electric switchgear for use in high voltage duplicate busbar systems, the combination of a circuit-breaker, two busbars to be selectively connected thereto, a separate chamber for each busbar, a third chamber adjacent to the busbar chambers, two double-ended rotary isolating switches respectively passing from the two busbar chambers

into the third chamber, and means whereby rotation of either isolating switch causes it to make or break the connection from its busbar to the circuit-breaker both in the busbar chamber and in the third chamber.

2. In metal-clad electric switchgear for use in high voltage duplicate busbar systems, the combination of a circuit-breaker, two busbars to be selectively connected thereto, a separate chamber for each busbar, a busbar contact in each such chamber, a third chamber adjacent to the busbar chambers, a contact in the third chamber connected to the circuit-breaker, two rotary isolating switches respectively passing from the two busbar chambers into the third chamber and each comprising an insulating bushing, a conductor within such bushing and a switch arm at each end of the conductor, and means whereby rotation of either isolating switch causes its two switch arms to engage with or be disengaged from the busbar contact and the contact connected to the circuit-breaker.

3. In metal-clad electric switchgear for use in high voltage duplicate busbar systems, the combination of a circuit-breaker, two busbars to be selectively connected thereto, a separate chamber for each busbar, a busbar contact in each such chamber, a third chamber adjacent to the busbar chambers, a contact in the third chamber connected to the circuit-breaker, earthed contacts in the three chambers, two rotary isolating switches respectively passing from the two busbar chambers into the third chamber and each comprising an insulating bushing, a conductor within such bushing and a switch arm at each end of the conductor, and means whereby either isolating switch can be rotated to bring its switch arms into engagement either with the earthed contacts or with the busbar contact and the contact connected to the circuit breaker.

4. In a metal-clad electric switchgear for use in high voltage duplicate busbar systems, the combination of a circuit-breaker, a tank containing the circuit-breaker, two busbars to be selectively connected to the circuit-breaker, a separate chamber for each busbar, a third chamber between the circuit-breaker tank and the busbar chambers, a conductor leading from the circuit-breaker into the third chamber, two isolating switches respectively passing from the two busbar chambers into the third chamber, and means for operating each isolating switch whereby it will connect its busbar to the conductor leading from the circuit-breaker or will break such connection at two points one in the busbar chamber and the other in the third chamber.

5. In metal-clad electric switchgear for use in high voltage duplicate busbar systems, the combination of a circuit-breaker, an oil-filled tank containing the circuit-breaker,

two busbars to be selectively connected to the circuit-breaker, a separate oil-filled chamber for each busbar, a third oil-filled chamber disposed above the circuit-breaker tank and
5 beneath the busbar chambers, a tubular casing passing through the third chamber, a conductor connected to the circuit-breaker and withdrawably mounted in the tubular casing, two rotary isolating switches respectively
10 passing from the two busbar chambers into the third chamber and controlling the connections from the busbars to the withdrawable conductor, and means whereby rotation of either isolating switch causes it to
15 break such connection both in the busbar chamber and in the third chamber.

6. In metal-clad electric switchgear for use in high voltage duplicate busbar systems, the combination of a circuit-breaker, an oil-filled
20 tank containing the circuit-breaker, two busbars to be selectively connected to the circuit-breaker, a separate oil-filled chamber for each busbar, a third oil-filled chamber disposed above the circuit-breaker tank and beneath the busbar chambers, a busbar contact
25 in each busbar chamber, a tubular casing passing through the third chamber, a contact on such casing within the third chamber, a conductor connecting such contact with the circuit-breaker and withdrawably mounted
30 in the tubular casing, earthed contacts in the busbar chambers and in the third chamber, two rotary isolating switches respectively passing from the two busbar chambers into the third chamber and each comprising
35 an insulating bushing, a conductor within such bushing and a switch arm at each end of the conductor, and means whereby either isolating switch can be rotated to bring its switch arms into engagement either with the earthed contacts or with the busbar contact and the contact on the tubular casing.

In testimony whereof I have signed my name to this specification.

45 JOHN CHRISTIE.

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