A high-voltage circuit breaker has a metal housing and at least two switching units for switching the breaker between the on and off positions. The switching units are mutually connected in series and are disposed in the housing. A centrally located support member is also provided and is rigidly connected to the switching units in the housing. At least two feed-through conductors are mounted in the housing and an electrical connector is provided for flexibly connecting the conductors to corresponding ones of the switching units so as to preclude the transfer of mechanical force therebetween.

5 Claims, 1 Drawing Figure
HIGH-VOLTAGE CIRCUIT BREAKER EQUIPPED WITH MEANS FOR PRECLUDING THE TRANSFER OF MECHANICAL SWITCHING FORCES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a high-voltage circuit breaker having at least two serially connected switching units and a centrally disposed supporting member. More particularly, the invention relates to such a circuit breaker equipped with electrical connection means at the ends of the breaker facing away from the center support that render the breaker less costly and yet enable it to withstand mechanical stress and strain to which it is subjected.

2. Description of the Prior Art

From U.S. Pat. No. 2,162,588 it is known to provide a high-voltage circuit breaker having at least two switching units connected in series as well as having a centrally disposed support and electrical connection means at the ends of the breaker facing away from the center support. The switching units of the known breakers are disposed in two switching chambers assembléd from tubes made of insulating material. The switching chambers are pivotally mounted on a central supporting insulator because of mechanical stresses. The chambers are disposed symmetrically with respect to the supporting insulator and the ends of the switching chambers facing away from the supporting insulator rest freely upon two ancillary supporting insulators. At these free ends, electrical connecting means for an open air transmission line are provided in which circuit the breaker is connected.

The known circuit breakers are rather costly because, in addition to flexibly mounting the switching chambers, the ancillary supporting insulators must be mounted at the ends of the breaker. Also, the supporting insulators and the switching chambers are assembled from two tubes of insulating material which move with respect to each other.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a high-voltage circuit breaker wherein mechanical stress and strain can be controlled at less expense. Subsidiary to this object, it is an object of the invention to provide such a circuit breaker wherein a saving is realized in material subject to mechanical and electrical shock.

It is another object of the invention to provide a high-voltage circuit breaker wherein mechanical forces are not transferred from the switching units to the ancillary supporting insulators of the breaker.

It is a feature of the invention, that the centrally disposed support is brought into the interior of a metal housing enclosing both switching units and is rigidly joined to these switching units. It is a further feature of the invention to provide flexible connecting means which do not transmit mechanical forces and which are connected to feedthrough conductor means or bushings mounted in the metal housing.

The switching units of the circuit breaker of the invention are surrounded by a metal housing which contains an insulating gas, preferably, sulphur hexafluoride. In addition, the metal housing protects the parts of the circuit breaker made of insulating material from the effects of weather and from contamination. Insulat-
to which an impedance connected in parallel must be mechanically fitted. In contrast to this construction, the switching chamber tube is eliminated by the invention. This realizes a savings in mechanical and electrical high-strength insulating material. In addition, practically the entire volume of the metal housing is available for holding an insulating medium for extinguishing the arc, especially, the already-mentioned costly insulating gas sulphur hexafluoride. Also, the impedances can be disposed closer to the switching units so that less space is required.

Although the invention is illustrated and described herein as a high-voltage circuit breaker it is nevertheless not intended to be limited to the details shown, since various modifications may be made therein within the scope and the range of the claims. The invention, however, together with additional objects and advantages will be best understood from the following description and in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

The drawing illustrates a power circuit breaker for a metal enclosed high-voltage switching installation using sulphur hexafluoride as the arc extinguishing and insulating gas. The illustrated breaker is suitable for use with voltages of 220KV or higher.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, the breaker comprises a grounded metal housing 1 which consists of a cylindrical portion 2 and three tubular supports 3, 4 and 5. The end faces of the cylindrical portion 2 are closed with covers 6 and 7.

In the interior 10 of the cylindrical portion 2 are two like switching units 11 and 12. The switching units 11 and 12 are electrically connected in series and each unit includes two stationary electrodes 13 and 15. The electrodes 13 and 15 are hollow and serve as nozzles for the flow of extinguishing medium. The electrodes are joined by a movable switching sleeve 14 in the closed position. In this position, the current circuit extends from the stationary electrode 13 which is to be viewed as a stationary switching contact part through the switching sleeve 14 to electrode 15. The electrode 15 in turn leads the current from the switching sleeve 14 in the manner of a sifting contact and directs the current to the stationary metal housing 16. The metal housing 16 is disposed centrally between the two switching units 11 and 12. A hollow supporting insulator 20 made of casting resin engages the metal housing 16. The insulator 20 is rigidly joined with the metal housing 16 at its high-voltage end. The grounded end of the insulator 20 extends into support 4 and is rigidly secured to a cover 21 which is part of the housing of a switching drive 22.

The switching drive 22 is a double action hydraulic drive and provides a reciprocating movement for a drive rod 24 made of insulating material in a direction along the axis of insulator 20. The drive rod 24 is guided in metal housing 16 at the location designated by reference numeral 25. With this movement, two angle levers 26 and 27 are set into motion in mutually opposite directions. The angle levers 26 and 27 are coupled with the movable switching sleeve 14 of switching units 11 and 12 via rods 28. The rods 28 are joined with a blast cylinder 30 which is pulled over a stationary blast piston 31 when the breaker is opened, so that the sulphur hexafluoride compressed in the manner flows through hollow switching contact parts 13 and 14 and extinguishes the arc.

At the end of the switching units 11 and 12 facing away from the support 20, there is secured a rounded metal cap 33 that supports the stationary switching part 13. This metal cap 33 is joined to the metal housing 16 via a control capacitor 35. The control capacitors 35 are connected electrically in parallel to the switching units 11 and 12 and serve to insure an even distribution of voltage to both switching units. The control capacitors are manufactured with casting resin so that they are not only self-supporting, but also, are able to withstand mechanical forces. Individually, the capacitors are to be viewed electrically as component impedances which are spatially disposed symmetrically with respect to switching units 11 and 12.

The metal caps 33 are joined to the conductor 37 of feed-through conductor means or bushings 38 via insertion contacts 36 which serve as flexible electrical connections free of forces. The conical insulating body of the feed-through conductor means 38 is designated by reference numeral 39. The insertion contacts 36 have respective conducting end portions 41 and 42 that widen to have a spherical-like shape. The end portions 41, 42 are electrically joined via contact laminations 43. The contact laminations 43 are subject to the action of leaf springs 44 which are braced against a cylindrical housing 45. This insures a freely movable and good electrically conducting connection, so that no mechanical forces whatsoever from the switching units are transmitted to the feed-through structure 38. The only rigid mechanical connection between the metal cap 33 supporting the stationary switching contact part 13 and the slide contact 15 on the metal housing 16 is formed by the impedances 35. Also, if instead of the impedances or in addition thereto, a switching chamber tube 40 is installed which encloses the switching units as indicated on the right side of the drawing by dashed lines, the circuit breaker according to the invention can be constructed with fewer and simpler parts made of insulated material which are protected by the metal housing 1 against the effects of weather.

What is claimed is:

1. High-voltage circuit breaker comprising a metal housing having an inner wall, at least two switching units for switching the breaker between on and off positions, said switching units being mutually connected in series and being disposed in said housing so as to be everywhere spaced from said inner wall thereof, a centrally located support member rigidly connected to said switching units in said housing thereby constituting the exclusive support of said switching units in said housing, at least two feed-through conductor means mounted in said housing, and electrical connection means for flexibly connecting said feed-through conductor means to corresponding ones of said switching units so as to preclude the transfer of force therebetween.

2. The circuit breaker of claim 1, said electrical connection means comprising at least two insertion contact sets for respectively connecting said feed-through conductor means to corresponding ones of said switching units.
3. The circuit breaker of claim 2, each of said insertion contact sets comprising two elongated conductors longitudinally aligned along a common axis, each of said elongated conductors having spherical-like end portions, and electrical coupling means surrounding and contacting said end portions for mutually electrically connecting the same.

4. High-voltage circuit breaker of claim 1 wherein said support member has a passage extending there-through, and wherein said breaker comprises a drive rod disposed in said passage and connected to said switching units.

5. High-voltage circuit breaker of claim 1, each of said switching units comprising a first stationary contact part, a second slide contact part, a movable switching member slidably engaging said second contact part and bridging said contacts when said switching units are in the closed position, and a plurality of impedances rigidly connected across said contacts.