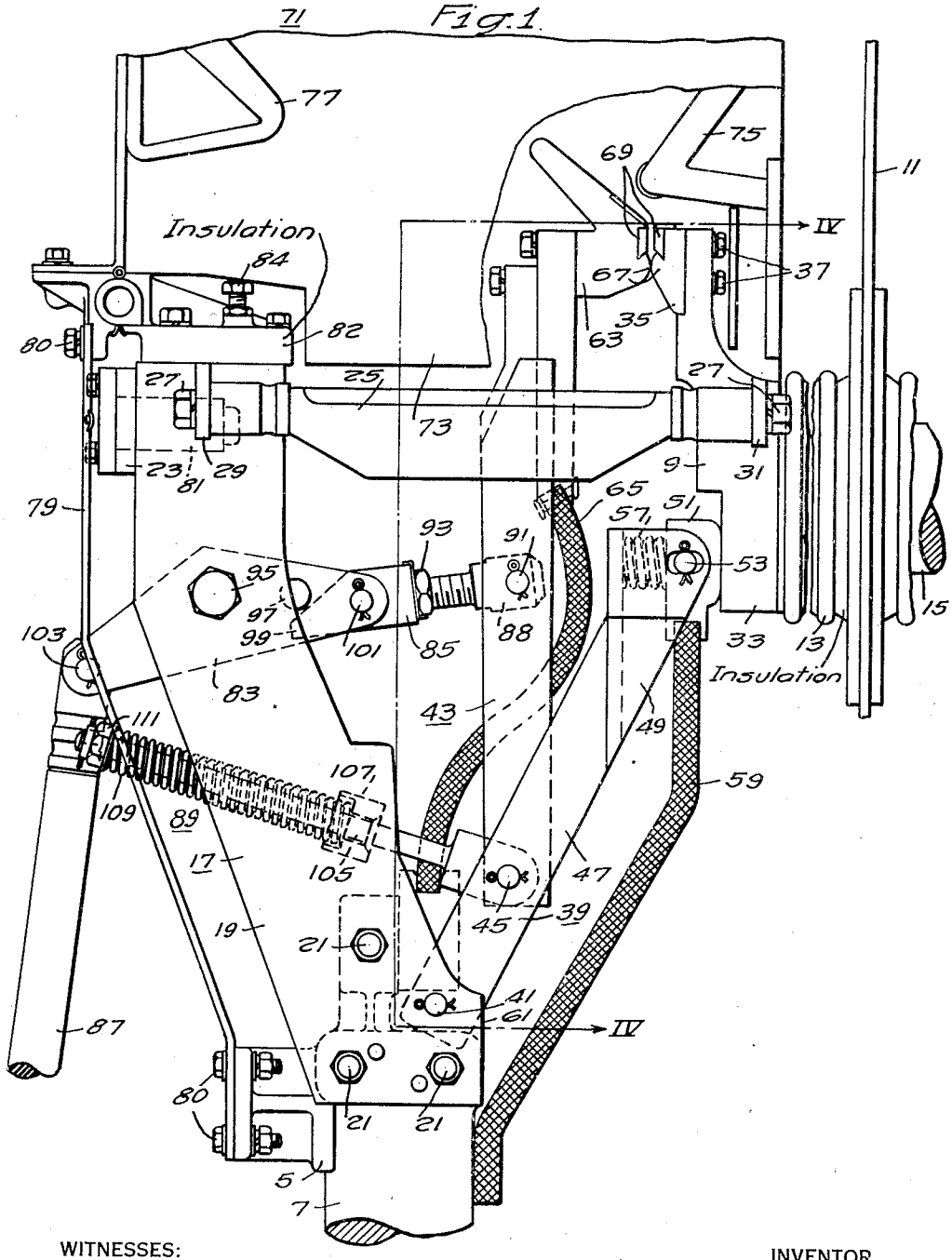
May 5, 1942. J. M. CUMMING 2,281,752

CIRCUIT BREAKER

Filed July 27, 1939 4 Sheets-Sheet 1

Fig. 1.




WITNESSES:

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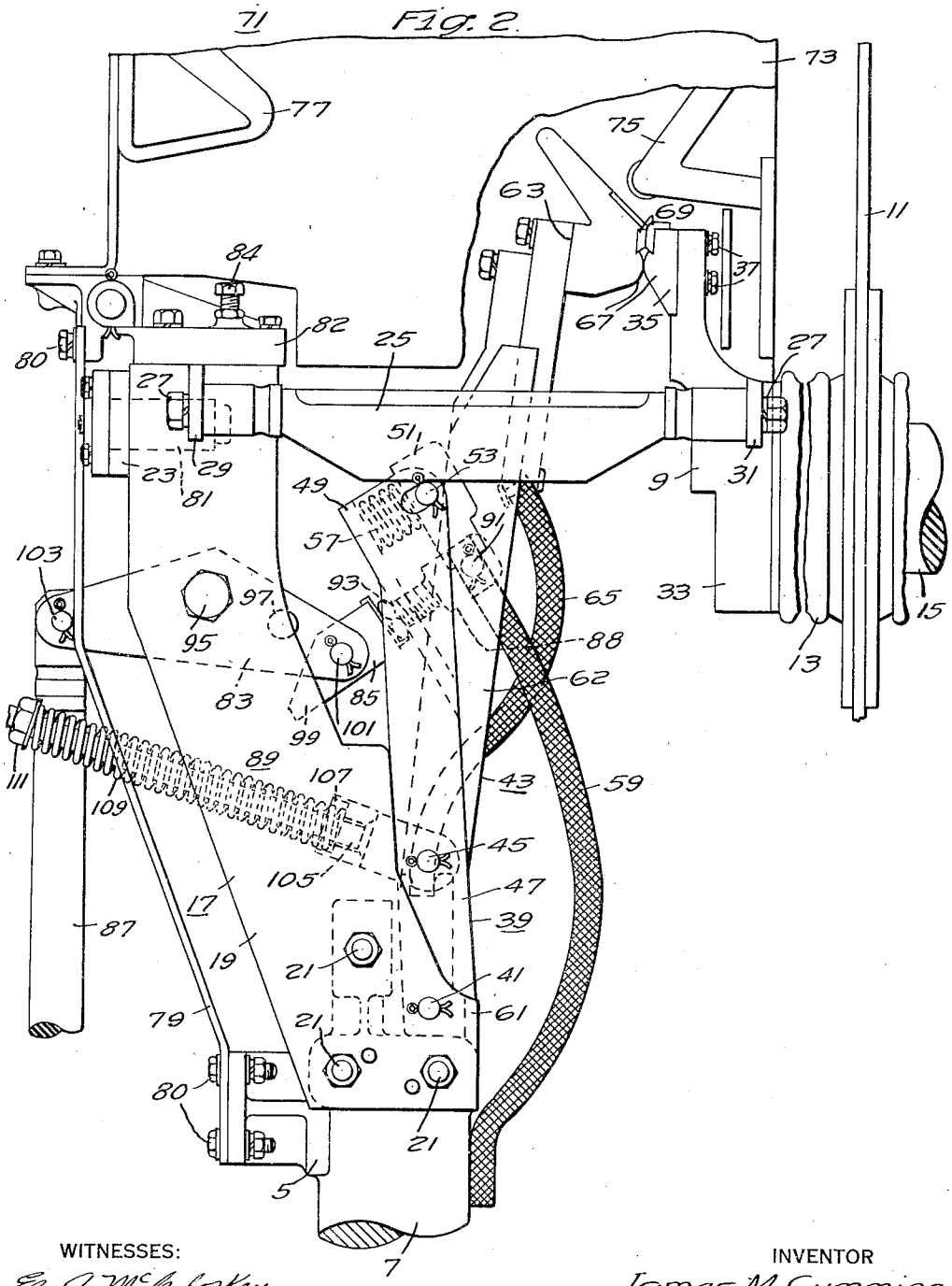
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May 5, 1942. J. M. CUMMING 2,281,752

CIRCUIT BREAKER

Filed July 27, 1939 4 Sheets-Sheet 2

Fig. 2.




WITNESSES:

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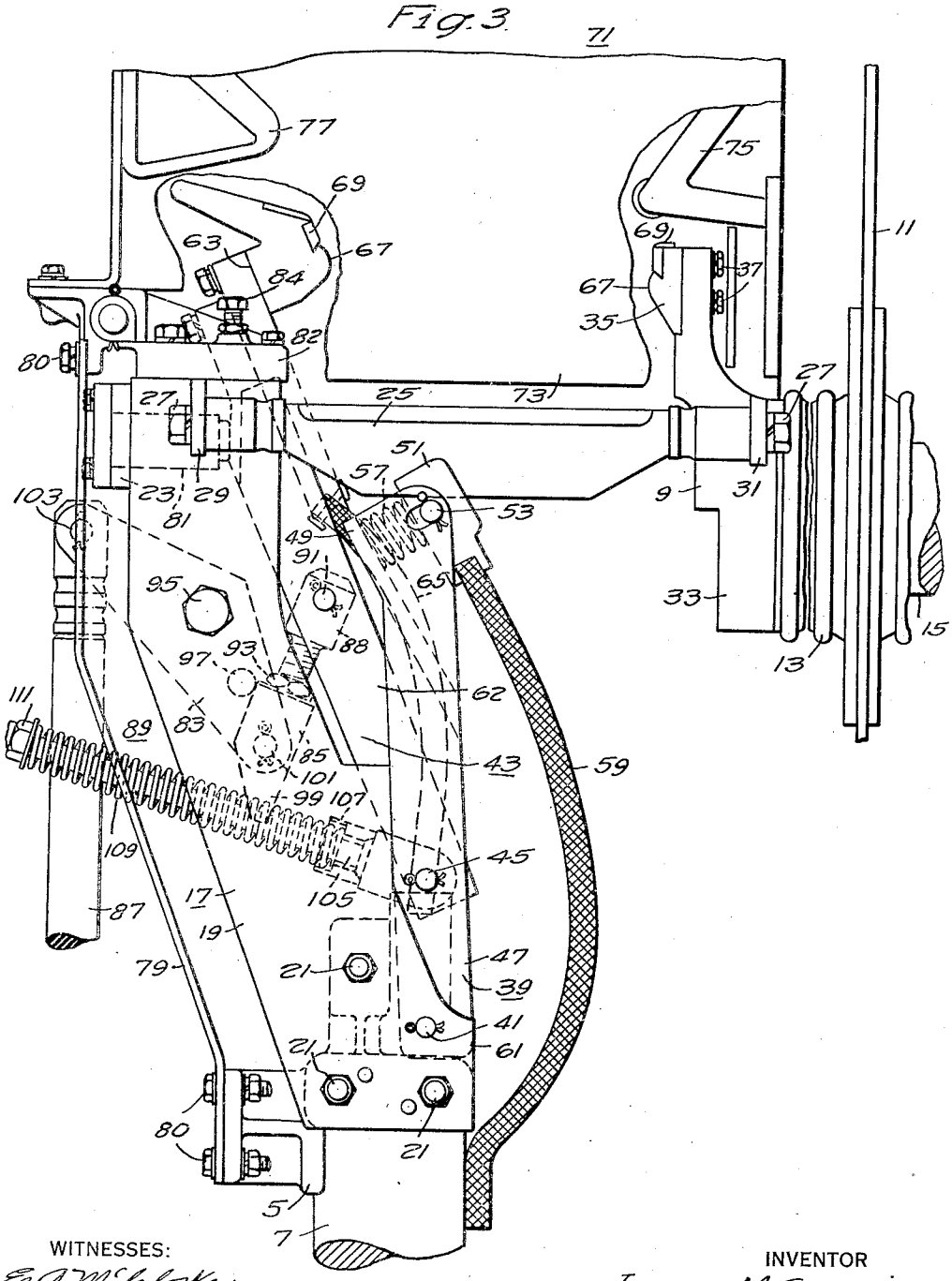
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May 5, 1942. J. M. CUMMING 2,281,752

CIRCUIT BREAKER

Filed July 27, 1939 4 Sheets-Sheet 3

Fig. 3.




WITNESSES:

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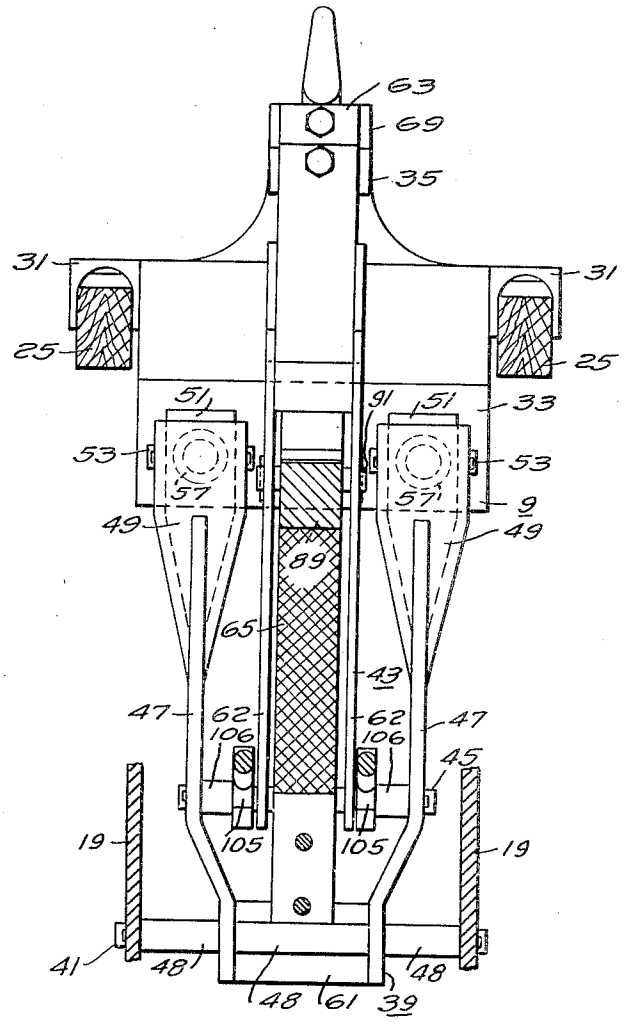
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May 5, 1942. J. M. CUMMING 2,281,752

CIRCUIT BREAKER

Filed July 27, 1939 4 Sheets-Sheet 4

Fig. 4.




WITNESSES:
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Patented May 5, 1942

2,281,752

# UNITED STATES PATENT OFFICE

2,281,752

## CIRCUIT BREAKER

James M. Cumming, Turtle Creek, Pa., assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application July 27, 1939, Serial No. 286,835

18 Claims. (Cl. 200—146)

The invention relates to circuit interrupters in general, and, more particularly, to circuit breakers for interrupting large amounts of electric power at moderate or high voltages.

In circuit breakers of the class referred to, it is very important that the contact members operate at a high speed; and where several sets of contacts per pole are employed, it is also important that the several sets of contacts operate in a definite and predetermined sequence. These conditions are desired both for liquid and air break type circuit interrupters, and when the several sets of contacts are connected either in series or parallel relation.

In circuit breakers of large current rating in which main and arcing contacts are employed, it is very important that the arcing contacts remain in engagement until the main contacts have separated a safe gap distance, and also that the arcing contacts engage during closing when the main contacts are still a safe distance apart. This is particularly important in circuit breakers of the air break type, as no provision is made for extinguishing arcs in the region of the main contacts.

An object of the invention is the provision of an improved circuit breaker mechanism which operates the contacts at a high speed and in a definite predetermined sequence.

Another object of the invention is the provision of an improved circuit breaker embodying several sets of contacts one set of which is always moved to full open circuit position before the other set is opened.

Another object of the invention is the provision of a circuit breaker having two pairs of contacts and operating means therefor operable during opening to move one pair of contacts to full open position before the second pair of contacts are separated, and operable during closing to close the second pair of contacts before the first pair are moved toward closed position.

Another object of the invention is the provision of a circuit breaker having two movable contact assemblages per pole which are moved at high speed to open and to closed positions separately one after the other so that one is not impeded by the other.

Another object of the invention is the provision of a circuit breaker having movable main and arcing contacts in which the main contact is always in the full open position before the arcing contact can make or break the circuit.

Another object of the invention is the provision of a circuit breaker as previously described in which movement of the arcing contact assemblage to open and to closed position is unimpeded by the main contact assemblage and its mass.

Another object of the invention is the provision of a circuit breaker in which the spring means for providing contact pressure for the circuit interrupting contacts is disposed remote from said contacts.

The novel features that are considered characteristic of the invention are set forth in particular in the appended claims. The invention itself, however, both as to structure and operation, together with additional objects and advantages thereof will be best understood from the following detailed description of one embodiment thereof when read in conjunction with the accompanying drawings in which:

Figure 1 is a fragmentary elevational view partly in section of an air circuit breaker constructed in accordance with the invention, the breaker being shown in the fully closed position;

Fig. 2 is a view similar to Fig. 1 showing the position of the parts during a circuit opening operation when the main contact member has reached the full open position;

Fig. 3 is a view similar to Figs. 1 and 2 showing the position of the parts when the breaker is in the full open position; and

Fig. 4 is a fragmentary vertical sectional view taken substantially along the line IV—IV of Fig. 1, looking in the direction of the arrows.

Referring to the drawings which show a high voltage circuit breaker of the air break type embodying the features of the present invention, the reference character **5** designates a terminal casting of conducting material having a terminal stud **7** which forms the lower terminal of the circuit breaker. The terminal casting **5** and stud **7** are rigidly mounted on a main supporting frame (not shown), and insulated therefrom in any suitable manner. The upper terminal block **9** of the circuit breaker is also of conducting material and is rigidly mounted on a supporting plate **11** which forms a part of the main frame.

The terminal block **9** is insulated from the plate **11** by means of a hollow supporting insulator **13** which is preferably of vitreous insulating material. The terminal block **9** has a terminal stud **15** which extends through the hollow supporting insulator **13** and through an opening provided therefor in the plate **11**, which is of larger diameter than that of the stud **15** so that the stud is effectively insulated therefrom.

A bracket **17** is provided for supporting the cir-

cuit breaker mechanism and this bracket is rigidly secured to the terminal casting 5. The bracket 17 comprises a pair of spaced parallel steel plates 19 which are rigidly secured to the opposite sides of the terminal casting 5 by means of a plurality of bolts 21. The plates 19 are joined and braced at their upper ends by a cross bar 23, the ends of which are rigidly secured as by welding to the outer edges of the plates 19. A pair of spaced tie bars 25 of strong insulating material have their opposite ends secured by bolts 27 to a pair of ears 29 projecting from the outer sides of the plates 19 adjacent the upper ends thereof, and to a pair of ears 31 which project outwardly from the sides of the upper terminal block 9. These insulating bars 25 are disposed on opposite sides of the moving contact assemblage, and serve to brace and strengthen the circuit breaker structure.

The terminal block 9 is provided with a lower contact portion 33 forming the main stationary contact of the circuit breaker, and with an arcing contact 35 which is rigidly secured to the upper end of the block 9 by means of bolts 37.

The moving contact assemblage of the circuit breaker comprises, in general, a main contact-carrying member or arm 39 which is pivotally mounted at its lower end to the plates 19 by means of a pivot pin 41, and an arcing contact-carrying member or arm 43 which is pivoted to the main contact-carrying member 39 adjacent the pivot thereof by means of a pivot pin 45.

The main contact-carrying member 39 is generally Y-shaped and comprises two spaced arms 47, pivotally mounted at their lower ends on the pivot pin 41, the upper portions of the arms being slightly off-set as shown in Fig. 4. A plurality of spacer sleeves 48 (Fig. 4) are mounted on the pivot pin 41 for spacing the main contact-carrying member 39 from the plates 19 of the bracket 17. The upper ends of the two arms 47 have a pair of yokes 49 rigidly secured thereto and each of these yokes carries a main contact member 51 for engaging the main stationary contact 33. The main contact members 51 are mounted for limited movement relative to the yoke by means of pins 53 passing through the contact members which engage in elongated slots provided therefor in the sides of the yokes 49. Each of the main contact members 51 is biased toward the stationary contact 33 relative to the yoke 49 by means of a contact biasing spring 57 which is interposed between the bight portion of the yoke 49 and the back of the contact member 51. Each of the main contact members 51 is thus mounted for limited tilting movement in any direction so as to self-align itself with the main contact 33. The biasing springs 57 serve to provide the required contact pressure between the contact members 51 and the stationary contact 33 when the breaker is in the closed circuit position. Each of the main contact members 51 is electrically connected directly to the terminal bracket 5 by means of a flexible shunt conductor 59. The two arms 47 of the main contact-carrying member 39 are connected for movement together by means of the pivot pin 45 and also by the bridging portion 61 formed integral with the arms 47 at the lower ends thereof.

The arcing contact-carrying member 43 comprises two parallel arms 62 which are secured for movement together in the space between the arms 47 of the main contact-carrying member 39. The arcing contact-carrying member extends upwardly a considerable distance beyond the main contact members 51 and has an arcing contact 63 rigidly secured to its upper end. A flexible shunt conductor 65 electrically connects the arcing contact 63 directly to the terminal casting 5 and this shunt extends between the arms 62 which form the arcing contact-carrying member 43.

The two arcing contacts 35 and 63 are provided with intermediate contact portions 67 and with arcing tips 69 formed of a suitable arc resisting conducting material. The arcing contact-carrying arm 43 is moved in such a way during opening of the circuit breaker that the arcing tips 69 only are in engagement at the time the arcing contacts separate so that the arc is always drawn between the tips 69 of these contacts.

An arc extinguishing structure 71 is mounted adjacent the upper end of the circuit breaker for the purpose of extinguishing arcs drawn between the arcing contacts 35 and 67 during interruption of the circuit. The arc extinguishing structure may be of any suitable type but is preferably of the type fully described in Patent No. 2,100,743, issued to F. P. Johnson, November 30, 1937, and assigned to the assignee of the present invention. Briefly, the arc extinguishing structure comprises means forming an arc chamber 73, a stack of arc extinguishing plates (not shown) arranged horizontally at the upper end of the arc extinguishing structure, into which the arc is moved and extinguished during interruption of the circuit, electromagnetic means (not shown) for moving the arc into the arc extinguishing plates and around in the plates, and a pair of arc transfer horns 75 and 77 to which the arc is transferred upon opening of the arcing contacts 35 and 67. The details of the arc extinguishing structure have not been shown, as they are not believed necessary for a complete understanding of the present invention. For these details, reference may be had to the above mentioned patent. The inner arc transfer horn 75 is mounted with its tip adjacent the stationary arcing contact 35, and the outer arc transfer horn 77 is mounted at the outer end of the arc extinguishing structure in a position adjacent that of the movable arcing contact 67 when the breaker is in full open position.

The inner arc transfer horn 75 is electrically connected to the upper terminal block 9, and the outer arc transfer horn 77 is electrically connected to the lower terminal casting 5 by means of a pair of shunt conductors 79 which are secured to the arc extinguisher and to the terminal casting by means of bolts 80. The arc extinguishing structure 71 is secured at its lower left-hand end to an insulating block 82 on the upper end of the mechanism supporting bracket 17 by means of a screw 84, and the upper right-hand end of the arc extinguishing structure is secured to and insulated from the plate 11 in any suitable manner.

The counterclockwise opening movement of the main contact-carrying arm 39 is limited by the offset portions of the arms 47 thereof which engage the inner edges of the bracket plates 19 when the main contact-carrying member 39 reaches full open position as shown in Fig. 3. A resilient bumper stop 81 is mounted on the cross bar 23 of the mechanism supporting brackets 17 for the purpose of limiting opening movement of the arcing contact-carrying arm 43 and for absorbing shocks when this arm is moved to open circuit position.

The previously described mounting arrange-

ment of the moving contact assemblage cooperates with the operating means of the circuit breaker which will now be described to provide for a very high speed operation of the moving contact members, and also insures that the contacts open and close in the desired sequence. The operating means for opening and closing the circuit breaker comprises, in general, a pair of levers 83 and 85 forming an operating toggle, an operating rod 87 of insulating material, and a pair of spring means 89 for biasing the main contact-carrying arm 39 to open circuit position and for providing contact pressure for the arcing contacts.

The operating rod 87 is adapted to be connected to any conventional type of power-operating mechanism which is operable to move the rod downwardly to close the circuit breaker and upwardly to effect opening of the circuit breaker.

The lever 85 forms the inner link of the operating toggle and is provided with a threaded adjustable I-member 88, the I portion of which is pivotally connected to the arcing contact-carrying arm 43 at a point substantially midway between the ends of the arm 43 by means of a pivot pin 91. The outer end of the threaded I-member 88 is threaded into the block portion of the lever 85 and provides a means for adjusting the effective length of the lever or link 85, the I-member being retained in adjusted position by means of a lock nut and washer assembly 93.

The lever 83 which forms the outer link of the operating toggle is pivotally mounted on the mechanism supporting bracket 17 between the side plates 19 thereof by means of a pivot bolt 95 which extends transversely through the plates 19. The lever 83 is comprised of two parallel plates which are rigidly secured for movement together about the axis of the pivot bolt 95, and the two plates forming the lever 83 are connected by a stop pin 97 which is adapted to be engaged by an extension 99 of the lever 85 to prevent upward collapse of the toggle when the toggle is in extended position as it is when the breaker is in closed circuit position. The inner ends of the plates forming the lever 83 are pivotally connected to the toggle lever 85 by means of a knee pivot pin 101 and the outer ends of the two parallel plates forming the lever 83 are pivotally connected to the upper end of the operating rod 87 by means of a pivot pin 103.

The spring means 89 for biasing the main contact-carrying member 39 in a counterclockwise direction to open circuit position comprises a pair of I-bolts 105, the I portions of which are pivotally engaged with the pivot pin 45 on either side of the arcing contact-carrying member 43, suitable spacer sleeves 106 being provided on the pivot pin 45 for spacing these members from the arms 47. The cylindrical or bolt portions of the I-bolts 105 extend through guide lugs 107 which are secured to the inner sides of the plates 19 of the circuit breaker mechanism supporting bracket 17. A pair of compression springs 109 are mounted on the cylindrical or bolt portions of the I-bolts 105 and are held in tension between the guide lugs 107 and lock nut and washer assemblies 111 secured to the outer ends of the I-bolts 105. The guide lugs 107 are provided with openings of larger diameter than the cylindrical portion of the I-bolts 105 to accommodate for the slight lateral movement of the I-bolts during opening and closing of the circuit breaker as the pivot pin 45 moves in a short arc about the main pivot pin 41. The tensioned springs 109 exert a relatively strong biasing force tending to move the I-bolts 105 outwardly toward the left so as to bias the pivot pin 45 and the main contact-carrying member 39 in a counterclockwise direction about the main pivot pin 41, and also strongly bias the arcing contact-carrying arm 43 in a clockwise direction about the pivot pin 91 until the opening movement of the main contact-carrying member is stopped. The springs 109 thus maintain the arcing contacts in engagement during opening movement of the main contacts, and also provide the required contact pressure for the arcing contacts. It will be noted that the springs 109 are disposed remote from the arcing contacts in a position where they cannot be affected or damaged by the arc or heat produced in the current carrying parts. The springs 109 are also disposed in a location where there is sufficient free space available so that the spring may be made as large as is desired. This is an important advantage as larger springs are required to provide for larger current rating and interrupting capacity. This is necessary in order to give the required contact pressure and to prevent these contacts from blowing open on heavy overloads and short circuits.

The operation of the circuit breaker is as follows: Fig. 1 shows the main and arcing contacts in the fully closed position, and the contact-carrying arms are held in this position by the toggle comprising the levers 83 and 85 which are in the extended position. The required contact pressure is supplied for the main contacts by the biasing springs 57 and for the arcing contacts by means of springs 109. To open the circuit breaker, the operating rod 87 is moved upwardly causing the toggle comprising the levers 83 and 85 to break in a downward direction. During the first part of this movement, the main contact-carrying arm 39 is moved in a counterclockwise direction about the main pivot pin 41 to the full open position. During this movement of the main contact-carrying arm 39 to its full open circuit position, the arcing contact 67 remains in engagement with the arcing contact 35. This results from the fact that the biasing springs 109 exert a relatively strong biasing force acting to bias the arcing contact-carrying arm 43 in a clockwise direction about the pivot pin 91 as this pin moves towards the left until the main contact-carrying arm 39 reaches the full open position and is stopped in that position. During this movement, the arcing contact-carrying arm 43 fulcrums on the stationary arcing contact 35 due to the biasing action of the springs 109, causing the contact 67 to remain in engagement with the stationary contact 35, thus maintaining the circuit closed through these contacts. As soon as the main contact-carrying arm 39 reaches full open circuit position and is stopped by its engagement with the bracket 17, the continued upward movement of the operating rod 87 causes further downward collapse of the operating toggle and moves the arcing contact-carrying arm 43 in a counterclockwise direction about the pivot pin 45 which is now stationary, to open circuit position, as shown in Fig. 3. At the instant that the arcing contacts begin to separate, only the tip portions 69 of these contacts are in engagement so that the arc in the arc chamber 73 is drawn very close to the arc transfer horns 75 and 77. Also, the current path through the current conducting parts and the arc is curved in a convex direction upwardly toward the arc extinguishing structure and the arc transfer horns. This greatly facilitates transfer of

the arc to the horns 75 and 77 and minimizes possibility of any arcing taking place outside of the arc extinguishing structure.

To close the circuit breaker, the operating rod 87 is moved downwardly causing the toggle comprising the levers 83 and 85 to be moved from their collapsed to their aligned or extended position. During the first part of this movement, the arcing contact-carrying arm 43 is moved in a clockwise direction about the pivot pin 45 which remains stationary due to the fact that the arcing contact-carrying arm is lighter than the load exerted by the biasing springs 109. Immediately after the arcing contact 67 engages the stationary arcing contact 35, the continued closing movement of the operating means then causes the main contact-carrying arm 39 to be moved in a clockwise direction about the main pivot pin 41 to closed circuit position against the biasing action of the springs 109. During this closing movement of the main contact-carrying arm 39, the arcing contact-carrying arm 43 fulcrums about the stationary arcing contact 35 and is moved to the fully closed position, as shown in Fig. 1. When the contact-carrying arms 39 and 43 reach the fully closed position, the operating toggle 83—85 is in the fully extended position and maintains the breaker closed.

From the above description, it will be seen that the mounting arrangement of the moving contacts and the operating means therefor provides for a very high speed operation of the contacts. By reason of the location of the pivot centers and the application of the operating forces, the main contact members 51 are moved at a speed a number of times greater than the speed of movement of the pivot pin 45. Similarly, and to even a greater extent, the arcing contact 67 is moved at a speed a number of times greater than the speed of movement of the pivot pin 91. The speed of movement of the arcing contact 67 is also increased by reason of the fact that the operating toggle 85 has already partially collapsed before the arcing contact 67 is moved so that the toggle operates to move the pivot pin 91 at a much greater speed at this time than when the toggle first begins to collapse. It will also be noted that the speed of movement of the arcing contact-carrying arm is not impeded by the main contact-carrying arm and its mass. This also materially aids in obtaining high speed operation of the contacts. Another important advantage provided by the invention is that it insures that the main contact member is moved to the full open circuit position before the arcing contacts begin to operate. This cooperates with other features of the invention to minimize the possibility of any arc taking place between the main contacts of the breaker.

The invention also provides a circuit breaker in which the spring means for providing contact pressure for the circuit interrupting contacts is disposed remote from these contacts. This is an important advantage as it prevents the contact pressure springs from being affected or damaged by the arc or heat produced in the current carrying parts, leaves the interrupting contacts and space adjacent these contacts free of encumbrance by the springs, and allows larger and more powerful springs to be used thus allowing the current rating and interrupting capacity of the breaker to be increased.

Although the invention has been disclosed as embodied in a circuit breaker of the air break type, it will be understood that the principles thereof are applicable to breakers of other types, such, as, for example, oil circuit breakers.

While the invention has been disclosed in accordance with the provision of the patent statutes, it is to be understood that various changes in the structural details thereof may be made without departing from the spirit of the invention. It is desired, therefore, that the language of the appended claims be given the broadest reasonable interpretation permissible in the light of the prior art.

I claim as my invention:

1. In a circuit breaker, contact means including a first pivoted contact arm, a second contact arm pivoted at one end to an intermediate point of said first contact arm, a fixed stop engageable by said first contact arm to determine the full open circuit position of said arm, operating means for moving said contact arms to open and to closed circuit position, said operating means being operable in one continuous movement during a circuit opening operation to first cause movement of said first contact arm to full open circuit position against said fixed stop and to then cause movement of said second contact arm to open circuit position.

2. In a circuit breaker, contact means including a first pivoted contact arm, a second contact arm pivoted at one end to an intermediate point on said first contact arm, a fixed stop engageable by said first contact arm to determine the full open position of said first contact arm, operating means for moving said contact arms to open and to closed circuit position including an operating member operatively engageable with said contact means, said operating means including means operable during a circuit opening operation to first cause movement of said first pivoted contact arm to full open position against said fixed stop at a speed greater than that of said operating member, and means to then cause movement of said second contact arm to open circuit position also at a speed greater than that of said operating member and while said first contact arm remains stationary in full open position.

3. In a circuit breaker, contact means including a first pivoted contact-carrying arm, a second contact-carrying arm pivoted to said first contact-carrying arm at a point intermediate the ends of said first contact-carrying arm, operating means operatively engageable with said second contact-carrying arm intermediate the ends thereof for moving said contact-carrying arms to open and to closed circuit position, and spring means biasing said first contact-carrying arm to open circuit position.

4. In a circuit breaker, a first contact-carrying arm pivotally mounted adjacent one end, a second contact-carrying arm pivoted to said first contact-carrying arm at a point intermediate the ends of said first arm and adjacent the pivot of said first arm, operating means for moving said contact-carrying arms to open and to closed circuit positions including an operating member engageable with said second contact-carrying arm at a point intermediate the ends thereof, and spring means connected to the pivot connection of said second contact carrying arm with said first contact carrying arm for biasing said first contact-carrying arm to open circuit position.

5. In a circuit breaker, a first pivoted arm, a contact carried by the free end of said arm, a second arm pivoted at one end to said first arm

at a point intermediate the ends thereof and adjacent the pivot of said first arm, a contact carried by the free end of said second arm, operating means for moving said contact-carrying arms to open and to closed circuit positions including a member engageable with said second arm at a point intermediate the ends thereof, and spring means biasing said first arm to open circuit position, said operating means being operable during a circuit opening operation to first cause movement of said first arm to open circuit position followed by movement of said second arm to open circuit position unimpeded by said first arm, and operable during a circuit closing operation to cause movement of said second arm to closed circuit position unimpeded by said first arm followed by movement of said second arm to closed circuit position.

6. In a circuit breaker, a first pivoted arm, a contact carried by the free end of said arm, a second arm pivoted at one end to said first arm at a point intermediate the ends thereof and adjacent the pivot of said first arm, a contact carried by the free end of said second arm, operating means for moving said contact-carrying arms to open and to closed circuit position including a toggle pivotally connected to said second arm at a point intermediate the ends of said second arm, and spring means biasing said first arm to open circuit position.

7. A circuit breaker having a main current carrying contact movable about one axis, and a movable arcing contact through which the current is shunted upon opening of said main contact, said arcing contact being movable about a different axis from said main contact, a fixed stop for determining the full open circuit position of said main contact, operating means operable during a circuit opening operation to first cause movement of said main contact to full open circuit position during which said arcing contact remains in closed circuit position and for then causing movement of said arcing contact to open circuit position.

8. A circuit breaker having main current-carrying contacts and arcing contacts through which the current is shunted upon opening of said main contacts, a fixed stop for determining the full open circuit position of said main contacts, operating means operable during a circuit opening operation to first cause movement of said main contacts to full open circuit position during which said arcing contacts remain closed, and for then causing movement of said arcing contacts to open circuit position during which said main contacts remain stationary in full open position, and operable during a circuit closing operation to first cause closing of said arcing contacts during which said main contacts remain stationary in full open circuit position and for then causing closing of said main contacts.

9. In a circuit breaker, a first pivoted arm carrying a main contact, a second pivoted arm carrying an arcing contact through which the current is shunted upon opening of said main contact, a fixed stop engageable by said first pivoted arm for determining the full open circuit position of said first pivoted arm, operating means operable in one continuous movement during a circuit opening operation to first cause movement of said main contact-carrying arm to full open circuit position against said fixed stop during which said arcing contact maintains the circuit closed, and for then causing movement of said arcing contact-carrying arm to open circuit position while said main contact carrying arm remains stationary in the full open position.

10. In a circuit breaker, a first pivoted contact-carrying arm, a main current-carrying contact resiliently mounted on the free end of said arm, a second contact-carrying arm pivoted at one end to said first arm intermediate the ends thereof, an arcing contact member carried by the free end of said second arm through which the current is shunted upon opening of the main contact, operating means for moving said contact-carrying arms to open and to closed circuit position including a member engageable with said second arm intermediate the ends thereof, and spring means biasing said first contact-carrying arm to open circuit position.

11. In a circuit breaker, stationary main and arcing contacts, a first pivoted arm carrying a main contact, a second pivoted arm carrying an arcing contact through which the current is shunted upon opening of said main contacts, said second arm being pivoted at one end to said first arm intermediate the ends thereof, a fixed stop engageable by said first pivoted arm for determining the full open circuit position of said first pivoted arm, an arc extinguishing structure including an arc horn adjacent the tips of said arcing contacts, operating means including means operable during a circuit opening operation to first cause movement of said main contact-carrying arm to full open circuit position against said fixed stop and at the same time cause said arcing contact-carrying arm to rock about said stationary arcing contact as a fulcrum to cause the arcing contacts to engage at their tips only, and means for then causing movement of said arcing contact-carrying arm to open circuit position while said first arm remains stationary in full open position.

12. In a circuit breaker, stationary main and arcing contacts, a pivoted arm carrying a main contact, a second arm pivoted to said main contact-carrying arm intermediate the ends thereof, an arcing contact carried by the free end of said second arm, an arc-extinguishing structure having an arc horn adjacent the tips of said arcing contacts, operating means for moving said contact-carrying arms to open and to closed circuit positions, including a member operatively engageable with said arcing contact-carrying arm intermediate the ends thereof, and spring means biasing said main contact-carrying arm to open circuit position, said operating means being operable during a circuit opening operation to first cause movement of said main contact-carrying arm to full open circuit position and at the same time cause said arcing contact-carrying arm to rock about said stationary arcing contact as a fulcrum to cause the tips only of said arcing contacts to engage, and to then cause movement of said arcing contact-carrying arm to open circuit position.

13. In a circuit breaker, a first contact-carrying arm pivotally mounted adjacent one end, a second contact-carrying arm pivoted to said first contact-carrying arm at a point intermediate the ends of said first arm and adjacent the pivot of said first arm, operating means for moving said contact-carrying arms to open and to closed circuit positions including an operating member engageable with said second contact-carrying arm at a point intermediate the ends thereof, and spring means adjacent the pivot connection of said arms for biasing said first contact-carrying arm to open circuit position and for provid-

ing contact pressure for the contact carried by said second arm.

14. In a circuit breaker, a first contact-carrying arm pivotally mounted adjacent one end, a second contact-carrying arm pivoted to said first contact-carrying arm at a point intermediate the ends of said first arm and adjacent the pivot of said first arm, operating means for moving said contact-carrying arms to open and to closed circuit positions including an operating member engageable with said second contact-carrying arm at a point intermediate the ends thereof, and spring means connected to the pivot connection of said second arm for biasing said first contact-carrying arm to open circuit position and for providing contact pressure for the contact carried by said second arm.

15. In a circuit breaker, a first pivoted contact-carrying arm, a main current-carrying contact carried by the free end of said arm, a second contact-carrying arm pivoted to said first arm intermediate the ends thereof, an arcing contact member carried by the free end of said second arm through which the current is shunted upon opening of the main contact, operating means for moving said contact-carrying arms to open and to closed circuit position including a member engageable with said second arm intermediate the ends thereof, and spring means remote from said arcing contact for biasing said main contact-carrying arm to open circuit position and for providing contact pressure for said arcing contact.

16. In a circuit breaker, a first pivoted contact-carrying arm, a main current-carrying contact carried by the free end of said arm, a second contact-carrying arm pivoted to said first arm intermediate the ends thereof, an arcing contact member carried by the free end of said second arm through which the current is shunted upon opening of the main contact, operating means for moving said contact-carrying arms to open and to closed circuit position including a member engageable with said second arm intermediate the ends thereof, and spring means connected to the pivot connection of said second arm for biasing said main contact-carrying arm to open circuit position and for providing contact pressure for said arcing contact member.

17. In a circuit breaker, contact means comprising relatively movable main contacts, and relatively movable auxiliary contacts through which the current is shunted upon opening of the main contacts, a fixed stop for determining the full open position of said main contacts, operating means for opening and closing said pairs of contacts including means operable during the first portion of the circuit opening operation to cause movement of said main contacts from closed to full open position at a speed greater than that of said operating means, and means operable during the remaining portion of the opening operation to cause movement of said auxiliary contacts to open position at a speed greater than said operating means.

18. In a circuit breaker, contact means including a first pivoted contact arm, a main contact carried thereby, a second pivoted contact arm, an auxiliary contact carried by said second arm through which the current is shunted upon opening of said main contact, a fixed stop engageable by said first pivoted contact arm for determining the full open position of said first pivoted contact arm, operating means for causing movement of said contact arms to open and to closed circuit position, said operating means including a first means operable during a circuit opening operation to first cause movement of the first contact arm to full open position against said fixed stop and means operable to then cause movement of the second contact arm to open position, said first means also being operable during a circuit closing operation to cause said first contact arm to remain stationary in full open position until after said operating means has moved said second contact arm to closed position.

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