Dec. 23, 1941. S. FARRER ET AL 2,267,399

ELECTRIC CIRCUIT INTERRUPTER

Filed May 17, 1940

Fig. 2.

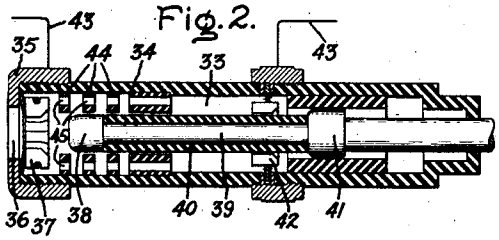


Fig. 1.

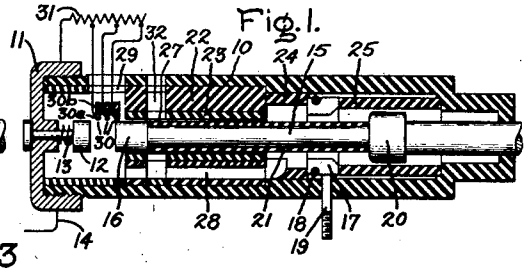


Fig. 3

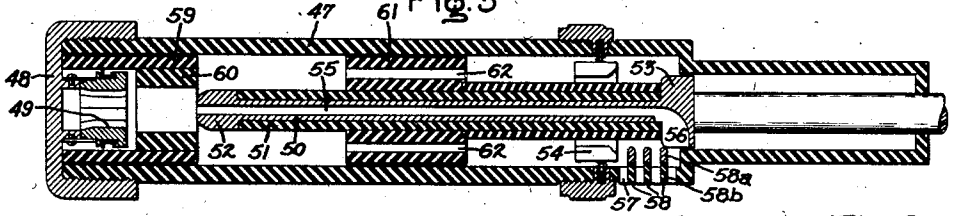


Fig. 4.

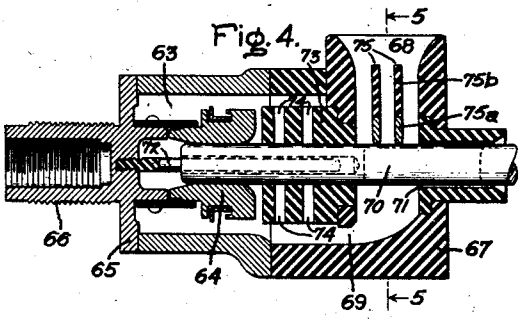


Fig. 5.

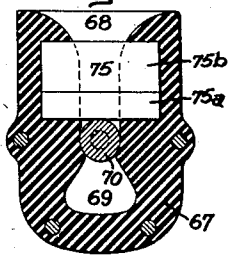


Fig. 6.

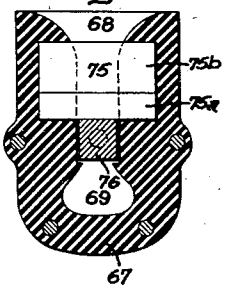


Fig. 7.

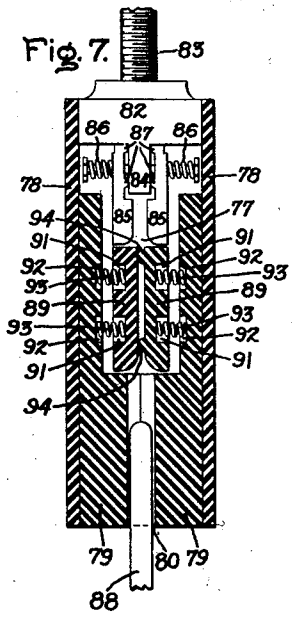
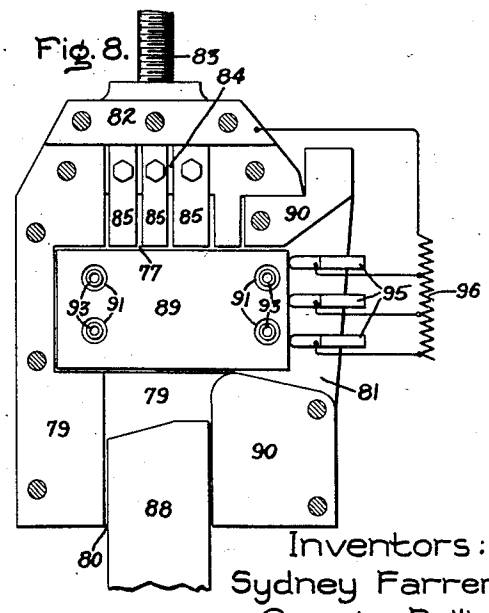


Fig. 8.



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Their Attorney.

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UNITED STATES PATENT OFFICE

2,267,399

ELECTRIC CIRCUIT INTERRUPTER

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Application May 17, 1940, Serial No. 335,858
In Great Britain June 1, 1939

6 Claims. (Cl. 200—149)

Our invention relates to electric circuit interrupters of the fluid-blast type in which interruption of the circuit is effected by a blast of arc-extinguishing fluid through the arc drawn during circuit interruption and more particularly is an improvement on United States Letters Patent 2,146,656 granted February 7, 1939, upon an application of W. F. Skeats and assigned to the same assignee as the present invention.

It is an object of our invention to provide a new and improved air circuit breaker of the gas-blast type having a large interrupting capacity which is simple and compact and which is effective to interrupt currents of greatly varying magnitudes.

Another object of our invention is the provision of a simple and compact circuit-breaker construction embodying means for drawing a plurality of arcs in series, one of which causes the generation of the gas under pressure during circuit interruption, which is driven across the other arc to extinguish the same and interrupt the circuit.

While not limited thereto, our invention is particularly applicable to gas-blast breakers of the type wherein an arc-extinguishing gas is emitted from the walls of an arc-confining chamber under the influence of the arc and it is, accordingly, an object of this invention to provide a new and improved circuit breaker of this type.

Further objects and advantages of our invention will become apparent as the following description proceeds and the features of novelty which characterize our invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of our invention, reference may be had to the accompanying drawing in which Fig. 1 is a cross-sectional view of a circuit breaker embodying our invention, Fig. 2 illustrates another modification of our invention, Fig. 3 is a modification of the arrangement shown in Fig. 1, Fig. 4 represents still another modification of our invention, Fig. 5 is a cross-sectional view taken on line 5—5 of Fig. 4, Fig. 6 is a view similar to Fig. 5 representing a modification of the arrangement of Fig. 4, Fig. 7 is a cross-sectional view of another modification of our invention, while Fig. 8 is another view of the arrangement of Fig. 7.

Referring now to Fig. 1, we have provided in an electric circuit interrupter of the gas-blast type an arc-extinguishing structure comprising a chamber defined by a cylinder or casing of insulating material 10, which is closed at one end by means of a metal cap 11 threaded thereto on which is mounted a fixed electrode 12 projecting axially into the chamber defined by cylinder 10. Fixed electrode 12 is illustrated as being capable of limited movement against the bias of a spring 13 so as to provide the necessary wipe when cooperating with a movable electrode, to be described hereinafter, during the circuit-closing and opening operation. The cap 11 is also provided with a suitable terminal, not shown, for connecting the cap to the external electrical circuit 14.

A rod contact 15 is mounted axially within cylinder 10 and arranged for reciprocation within the latter by any suitable operating mechanism, not shown, which may be disposed outside said cylinder to open and close the circuit as desired. One end of said rod contact 15 is provided with a suitable electrode or butt contact 16 cooperating with fixed electrode or contact 12. Although we have illustrated electrodes 12 and 16 as of the butt-contact type, it will be understood by those skilled in the art that any suitable type of contacts may be used.

Insulating cylinder 10 houses in fixed relationship therewith a second stationary contact member 17 which is disposed towards the end of cylinder 10 remote from the enclosing cap 11. Fixed contact 17 may be of any suitable type and is illustrated as comprising a plurality of members held together by means of a garter spring 18 so as to form a sleeve-type contact. A suitable connection 19 leads from stationary contact 17 to the exterior of the cylinder 10 so that connection with the external electric circuit, not shown, may be made. Rod contact 15 is provided with a movable contact in the form of a collar 20 which may be formed integrally therewith, as shown, and is adapted to engage with stationary contact 17 in the closed position of the circuit breaker. In order to provide for series breaks in the electric circuit through the circuit breaker, the movable rod contact 15 is provided with a sleeve 21 of insulating material, such as horn fiber, which evolves an arc-extinguishing gas when subjected to the heat of an arc. Insulating sleeve 21 extends between electrode 16 and collar 20 which are so arranged on rod contact 15 relative to their respective cooperating contacts 12 and 17 that the circuit is first interrupted between contact 17 and collar 20 whereby pressure is generated for extinguishing the arc later drawn between electrodes 12 and 16.

In order to aid in extinguishing the arcs drawn between the pairs of separable contacts, there are provided cylindrical masses of insulating ma-

terial 22, 23, 24, and 25 disposed within insulating cylinder 10 so that shrouded rod contact 15 moves through a closely fitting axial bore 27 provided in this mass of insulating material. Insulating material 23, 24, and 25 are preferably composed of a gas-evolving substance, such as horn fiber or the like, so as to produce an arc-extinguishing gas when subjected to the heat or contact of an arc. A suitable passage 28, substantially parallel to the axis of cylinder 10, is provided in the mass of insulating material 22 so as to interconect the pressure-generating space adjacent collar 20 with the space adjacent electrodes 12 and 16, all within insulating cylinder 10. Arc-extinguishing gas produced in the chamber adjacent collar 20 is forced through passage 28 where it is cooled by the walls of the passage and thereafter enters the space within cylinder 10 adjacent fixed contact 12.

The wall of cylinder 10 adjacent contact 12 is between the pairs of separable contacts, there so that the arc-extinguishing gas from passage 28 may be deflected by end cap 11 and driven across the arc drawn between electrodes 12 and 16. To aid in extinguishing this arc, we have provided a plurality of baffles 30 closely adjacent the path of movement of rod contact 15 and perpendicularly arranged with respect to such path, these baffles being disposed at progressively greater axial distances from fixed contact 12. Preferably, these baffles have the portions thereof adjacent the path of movement of rod contact 15 formed of a conducting material or metal 30*a* and are provided with continuations of insulating material 30*b* so as to tend to segregate the arc into a plurality of portions when driven into this baffle structure. The conducting portions 30*a* of baffles 30 are preferably connected with different tapping points of a resistance 31, one end of which is connected with the end cap 11 and the purpose of which will be set forth in greater detail hereinafter.

As a further aid in interrupting the circuit, the wall of cylinder 10 and the masses of insulating material 22, 23 are constructed to provide a radial passage 32 to the exterior of cylinder or casing 10 past which electrode 16 is eventually moved and through which a cross blast of gas may flow for causing the final interruption of the circuit.

In the operation of the above-described arrangement upon axial movement of rod contact 15 to cause separation of the electrodes, collar 20 will first be disengaged from stationary contact 17 whereby an arc will be drawn and pressure set up in the space enclosing said collar and associated contact. Furthermore, the action of the heat of the arc on gas-evolving material 25 will cause the generation of large amounts of arc-extinguishing gas under pressure, whereupon a stream of gas will flow through passage 28. By this time, electrodes 12 and 16 will have separated to draw a second arc and this gas will be deflected so as to flow across this second arc forcing it into the baffle structure comprising baffles 30. As electrode 16 moves past the conducting portion 30*a* of the first baffle 30, the arc will be urged against said conducting bar by the cross gas blast so that a portion of resistance 31 will be placed in parallel with the arc and eventually the arc current will be transferred to such portion of the resistance and the arc between electrode 12 and conducting portion 30*a* of the first baffle 30 will be extinguished. Similarly, as the end of electrode 16 moves past the conducting portions 30*a* of the other baffles 30, the arc will be urged against said conducting portions and the current transferred progressively to the other portions of the resistance 31. Finally, when electrode 16 moves past the conducting portion of the last baffle 30, which position is shown in Fig. 1, the arc will be connected in series with all of resistance 31. It will be seen that, with this arrangement, resistance is inserted in series with the arc and the value of this resistance progressively increased whereby the current which is finally interrupted is very much reduced. When electrode 16 moves past radial passage 32, the blast of gas through this passage across the arc will cause final interruption of the circuit.

By arranging the masses of insulating material 22 and 23 so as to closely confine shrouded rod contact 15, substantially all of the gas produced adjacent collar 20 is caused to flow across the arc and is available for extinction of the latter. Gas-evolving insulating material 25 is also preferably arranged to closely confine collar 20 so as to increase the arc-extinguishing gas produced.

In Fig. 2, we have shown a modification of the circuit breaker of Fig. 1 in which material of the arc-quenching gas-producing type and a shrouded rod contact are employed but which is not arranged for inserting resistance in the circuit to be interrupted. This circuit breaker also comprises an insulating casing or cylinder 34, which defines a chamber 33. One end of this chamber is closed by means of an end cap 35 provided with a central opening 36 and which houses a resilient socket contact 37 extending axially into chamber 33. This socket contact or electrode 37 cooperates with an electrode 38 mounted on the end of rod contact 39 which is arranged for reciprocation within cylinder 34 by a suitable operating mechanism, not shown. As in Fig. 1, rod contact 39 is provided with an insulating sleeve or shroud 40 preferably of gas-producing material and a collar 41 which cooperates with a suitable stationary contact 42 mounted in cylinder 34 remote from metal end cap 35 and in axial alignment with fixed contact 37. Fixed contacts 37 and 42 are suitably connected to an external circuit 43. The arrangement of contacts 37, 38, 41, 42 is preferably such that collar 41 will be disengaged from the stationary contact 42 to draw an arc before the electrode 38 mounted on the end of rod contact 39 uncovers the opening or discharge port 36 in cap 35 whereby pressure will be set up within chamber 33 by the action of the arc, which pressure is suddenly relieved upon separation of contacts 37 and 38 and a sudden discharge of the gas produced in the chamber 33 is obtained adjacent the second arc drawn.

Cylinder 34 is preferably provided with a plurality of axially spaced annular disks 44 of insulating material which are arranged adjacent fixed contact 37. These annular disks of insulating material are provided with a central opening through which rod contact 39 is adapted to move and are provided with perforations 45 through which the gas produced by the arc drawn between collar 41 and fixed contact 42 is adapted to flow axially of the cylinder 34. In this arrangement, the gas produced will flow radially on to the arc all around the latter and a progressively greater number of streams of the gas flowing in this manner will be obtained as rod

contact 39 recedes from the end cap 35 past the several disks 44 in succession.

Instead of being of circular form as illustrated, it will be understood by those skilled in the art that rod contact 39 may be of rectangular section disposed so that the gas flows in the direction of the wider dimension of said rod, that is to say, so that the width of the gas path corresponds to the narrower dimension of the rod contact, whereby the discharge outlet 36 may, because it is narrow, be comparatively small and the available arc-quenching gases more efficiently utilized for the extinction of the arc.

The operation of the circuit breaker of Fig. 2 will be understood from the description set forth in connection with Fig. 1.

In Fig. 3, we have disclosed a modification of the circuit breaker of Fig. 1 wherein the operation of the contacts is inverted. Accordingly, as in Fig. 1, we have illustrated an insulating casing 47 having one end thereof closed by a cap 48 suitably supporting a fixed contact 49 extending axially into the chamber defined by casing 47. As in Fig. 1, a shrouded rod contact 50 provided with an insulating sleeve of gas-evolving material 51 is arranged for axial movement within casing 47 and one end thereof is provided with an electrode 52 for cooperating with fixed contact 49. Rod contact 50 is also provided with a collar 53 which is arranged to cooperate with a suitable stationary contact 54. Contacts 49 and 54 are suitably connected to the external electric circuit, not shown. Electrode 52 and collar 53 are so arranged on rod contact 50 as contrasted with the corresponding parts of Fig. 1 that an arc is drawn first between electrodes or contacts 49 and 52 so as to produce a gas pressure which is used to extinguish the arc later drawn between collar 53 and stationary contact 54. Preferably, rod contact 50 is provided with a central axial bore 55 by which the arc gases are led along the rod to an opening 56 in the side of collar 53 where they are deflected to form a cross blast as is described hereinafter. Insulating cylinder or casing 47 is provided with an opening 57 in the form of an arc chute adjacent stationary contact 54 on the side thereof remote from end cap 48. Suitable baffles 58 similar to baffles 30 of Fig. 1 are disposed across discharge opening or arc chute 57 in the wall of cylinder 47. As in Fig. 1, these baffles are preferably provided with conducting portions 58*a* adjacent collar 53 and insulating portions 58*b* remote from collar 53. To aid in interrupting the arc, a resistance, not shown, similar to resistance 31 of Fig. 1 is preferably connected to fixed contact 54 and tapping points thereof are connected to the conducting portions 58*a* of baffles 58.

By means of the axial bore or passage 55 in rod contact 50, an increased tendency to arc extinction is obtained since the gases formed between electrodes 49 and 52 will be cooled and any metallic vapor produced by the arc will be condensed in flowing through this passage. Preferably electrodes 49 and 52 are closely shrouded by sleeves of gas-producing material 59 and 60. It will be seen, furthermore, that with this arrangement, the gases produced adjacent the electrodes 49 and 52 are compelled to flow through passage 55 thereby driving the arc drawn between collar 53 and fixed contact 54 into the arc chute 57 and baffle structure comprising baffles 58.

It may also be desirable to provide a flow of gas external of rod contact 50 and, accordingly, we have provided a cylinder 61 of insulating material which is mounted to reciprocate with rod contact 50. Said cylindrical block 61 is provided with one or more longitudinal passages 62 through which the gases produced adjacent contact 49 pass to the discharge outlet or arc chute 57 in casing 47. These passages 62 also serve to cool the gases produced and to condense any metallic vapor incident to the drawing of the arc between electrodes 49 and 52. As in Fig. 1, insulating material 51, 59, 60, and 61 is preferably formed of fiber or other gas-evolving material so as to produce large quantities of arc-quenching gas.

The operation of the cross-blast air circuit breaker of Fig. 3 will be obvious to those skilled in the art in view of the detailed description set forth in connection with Fig. 1.

In Figs. 1 to 3, we have disclosed air-blast circuit breakers of the type wherein two arcs in series are drawn, one to generate a gas pressure which will extinguish the other arc drawn. It will be understood by those skilled in the art that it is not essential in carrying out this invention that the arc over which the gases produced are caused to flow should be separate from the arc producing these gases. Thus, the arrangement may be such that separation of a pair of contacts results initially in drawing an arc by which gas pressure is obtained while further movement of the contacts opens passages by which the pressure is released and a flow of gas obtained across the arc for extinguishing purposes. Such an arrangement is shown in Figs. 4 and 5 wherein a fixed socket contact 64 is mounted within a chamber or enclosure 63 defined by suitable cup-shaped structure 65 having a threaded extension 66 adapted to be connected to an external electrical circuit, not shown. Cup-shaped member 65 is closed by means of a block of insulating material 67 constructed with a passage extending perpendicularly to the axis of member 65 and ending in an arc chute 68. This arc chute communicates with chamber 63 by means of a passage 69. A suitable rod contact 70 is arranged for reciprocal movement within the enclosure 63 and is adapted to cooperate with stationary or fixed contact 64. The end of rod contact 70 cooperating with contact 64 is made hollow in order to accommodate a suitable filler pencil 72 preferably made of a hard fiber or suitable artificial resin for producing arc-extinguishing gas when subjected to the action of the arc. Rod contact 70 moves through an opening 71 in the wall of insulating block 67 remote from fixed contact 64.

Secured to insulating block 67 within the enclosure 63 is a cylindrical body 73 of gas-producing material of any suitable type such as fiber or the like which is provided with a central perforation through which rod contact 70 is adapted to move while being engaged or disengaged from stationary contact 64. Cylindrical body 73 and socket contact 64 practically fill the enclosure 63 defined by cup-shaped structure 65 and insulating block 67. A plurality of radial passages 74 are provided in cylindrical body 73 extending from the center to the periphery thereof, the purpose of which will be hereinafter described.

Rod contact 70 moves with only a very small clearance through the bore of the gas-producing material 73 and the passage 69 leading to arc chute 68 so that the inner surfaces of said passages are closely adjacent the sides of the contact rod, as best shown in Fig. 5. It will be seen that, with this arrangement upon retrac-

tion of the rod contact 70 from the stationary contact 64, an arc will be drawn which will act upon the gas-producing material making up the filler pencil 72 and the cylindrical body 73, thereby producing considerable quantities of arc-quenching gas. This gas will be retained within the enclosure 63 until the end of the rod contact 70 moves into the passage 69 leading to arc chute 68 when the flow of gas in passage 69 is deflected so as to be directed across the arc into arc chute 68 to extinguish the same. Suitable baffles 75 which comprise a metal portion 75a adjacent contact rod 70 and an insulating portion 75b remote from rod contact 70 are provided. As in Fig. 1, the conducting portions 75a of baffles 75 may be associated with different tapping points of a resistance, not shown, the end of which would be electrically connected to stationary contact 64. It will be seen from Figs. 4 and 5 that we have provided an arrangement wherein the arc-extinguishing gas or fluid generated around contact 64 is prevented from passing across said arc until there has been a predetermined separation of the contacts whereby interruption of the arc may take place without danger of restriking.

Although in Figs. 4 and 5, rod contact 70 has been indicated as of circular cross section, it could just as well be of rectangular cross section. In Fig. 6, we have shown a rod contact 76 of rectangular cross section associated with a circuit breaker otherwise identical with that shown in Figs. 4 and 5. In either case, a very small clearance is provided between the rod contact and the bore through which this rod contact moves. The operation of the circuit breaker illustrated in Figs. 4 to 6 will be obvious to those skilled in the art.

Difficulty has been experienced in the past in providing circuit interrupters of the above-mentioned type which effectively operate to interrupt currents of both high and low values. When the evolution of a gas from insulating members is depended upon to produce an arc-quenching gas, it has often been found that arcs of low-current value are incapable of evolving a sufficient amount of gas whereas, if the space within which the gas is produced is decreased, arcs of high-current values develop such destructive pressures that the confining structure will be damaged. Accordingly, in Figs. 7 and 8, we have disclosed a cross-blast circuit breaker having a single break similar to the one shown in Fig. 4 which overcomes the difficulty just mentioned. A suitable arc-confining chamber 77 is provided which is defined by means of a pair of side plates 78 which are disposed parallel with and closely adjacent to one another, being secured together by blocks or plates of insulating material 79. Fig. 8 is a side view of the circuit breaker of Fig. 7 with one of the plates 78 removed. Chamber 77 is provided with a rectangular aperture 80 at one end and an opening and arc chute 81 disposed substantially midway along one side of the structure. The end of chamber 77 remote from aperture 80 is closed by means of a fixed contact assembly 82 comprising an extension 83 adapted to be connected to an external electrical circuit, not shown and a central depending tongue 84 extending into chamber 77. A plurality of contact fingers 85 are suitably mounted on each side of this depending tongue 84 and biased toward one another by spring means 86. In order to assure good electrical contact between depending tongue 84 and contact fingers 85, suitably raised contact surfaces 87 may be provided on each of the fingers 85 adjacent depending tongue 84.

Fingers 85 provide the stationary contact which cooperates with a moving rod contact 88 comprising a flat strip of conducting material which is arranged to move through the aperture 80 in the enclosure 77. In the closed circuit position, rod contact 88 is adapted to be moved between the two sets of contact fingers 85 and the required contact pressure is obtained by virtue of compression springs 86.

A pair of movable flat plates 89, which are formed of a suitable gas-producing material, is mounted within the enclosure 77 and extend entirely across the space therein. These plates 89 are disposed immediately beneath the contact fingers 85. A plurality of circular recesses 91 are provided on the outer faces of gas-producing plates 89 which correspond with similar recesses 92 in the adjacent plates 79 so as to accommodate compression springs 93, which urge the gas-producing plates 89 toward one another. Suitable stops 94 are provided to limit the movement of these plates toward one another. The upper end of rod contact 88 is rounded and the cooperating edges of gas-producing plates 89 are chamfered so that, when the moving contact is moved upwardly, the gas-producing plates 89 will be forced apart so that rod contact 88 may engage with the fixed contact comprising fingers 85. The free space between side plates 78 may be filled with additional plates 90 of gas-producing material. As in Fig. 4, a plurality of baffles 95 are provided in arc chute 81 which preferably have the portions thereof adjacent rod contact 88 formed of a metal connected to suitable tapping points on a resistance 96 having one end thereof connected to the fixed contact assembly 82.

In the operation of the apparatus disclosed in Figs. 7 and 8, retraction of the moving rod contact 88 from the fixed contact assembly 82 causes an arc to be drawn. When the rod contact has been withdrawn from between gas-producing plates 89, they are urged toward one another so as to leave only a small space between said plates. The arc is thus trapped between the plates so that it will have an increased effect in evolving the arc-quenching gas from plates 89. Since the plates 89 extend into the arc chute 81, the gas stream resulting from the above-described operation is discharged as a blast forcing the arc into the baffle structure in a manner described in connection with Fig. 1. As will be understood by those skilled in the art, should any excess gas pressure arise within the structure due to breaking circuit on heavy current, such excess pressure will result in the gas-producing plates 89 being forced away from one another against the biasing springs 93 to relieve the pressure.

As will be understood by those skilled in the art, the insulating materials for producing an arc-quenching gas may be of any suitable kind, for example, resins, vulcanite, fiber, ebonite, halogenated diphenyl ketones or dibenzyls, methyl methacrylate, and other available materials.

While we have described certain particular embodiments of our invention, it will be obvious to those skilled in the art that various changes and modifications may be made without departing from our invention and we, therefore, aim in the appended claims to cover all such changes

and modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. In a circuit-interrupting device comprising an arc chamber including a plurality of spaced annular fixed electrodes mounted therein in axial alignment, an elongated rod contact of conducting material having spaced contact portions separated by a sleeve of insulating material arranged for axial movement in said chamber, said contact portions being spaced to engage said fixed electrodes in the closed circuit position and separable therefrom so as to draw arcs between said contacts and electrodes, means formed of gas-evolving insulating material for generating a gas and developing a pressure in said chamber under the influence of one of said arcs defining a passageway in said chamber for leading said gas in a direction substantially parallel with the axis of said chamber, and deflecting means for causing a blast of said gas to flow across said other arc to extinguish the same.

2. In a circuit-interrupting device comprising a casing having an arc chute associated therewith, a pressure chamber in said casing communicating with said arc chute, means including an elongated rod contact having a pair of contact portions thereon separated by a sleeve of insulating material for drawing a plurality of arcs in said casing, one adjacent said arc chute and another in said pressure chamber, means formed of gas-evolving insulating material for generating a gas and developing a pressure under the influence of one of said arcs defining a passageway in said chamber for leading said gas in the direction of said arc chute across the arc adjacent thereto, a baffle structure in said arc chute comprising a plurality of spaced plates disposed close to and edgewise with respect to the arc adjacent said arc chute, the portion of said plates near said arc being formed of a conducting material, and a resistance including a plurality of tapping points, each connected to one of said conducting portions of said plates and so constructed and arranged that portions thereof are progressively connected in series with said arcs during the circuit-interrupting operation of said device.

3. In a circuit-interrupting device comprising an arc chamber having an arc chute associated therewith and including a plurality of fixed electrodes mounted therein in axial alignment, an elongated rod contact of conducting material having spaced contact portions separated by a sleeve of insulating material arranged for axial movement in said chamber, said contact portions being spaced to engage said fixed electrodes in the closed circuit position and separable therefrom so as to draw arcs between said contacts and electrodes, means formed of a gas-evolving insulating material for generating a gas and developing a pressure in said chamber under the influence of one of said arcs defining a passageway in said chamber for leading said gas in a direction substantially parallel with the axis of said chamber toward said arc chute, and deflecting means for causing a blast of said gas to flow across said other arc into said arc chute to extinguish the same.

4. An electric circuit breaker comprising an arc-confining chamber, a plurality of spaced fixed contacts mounted in axial alignment in said chamber, an elongated movable rod contact of conducting material having spaced contact portions separated by a sleeve of gas-emitting insulating material, said contact portions being spaced to engage said fixed contacts in the closed circuit position of said breaker and separable therefrom by movement of said rod contact in an axial direction with respect to said fixed contacts, means for generating an arc-extinguishing fluid adjacent one of said fixed contacts under the influence of the arc associated with said last-mentioned contact, means formed of gas-evolving insulating material defining a passageway in said chamber for leading said gas in a direction substantially parallel with the axis of said chamber toward another of said fixed contacts, and deflecting means for causing a blast of said gas to flow across the arc associated with said last-mentioned fixed contact to extinguish the same.

5. In a circuit-interrupting device comprising an arc chamber including a plurality of spaced annular fixed electrodes mounted therein in axial alignment, an elongated rod contact of conducting material having spaced contact portions separated by a sleeve of insulating material arranged for axial movement in said chamber, said contact portions being spaced to engage said fixed electrodes in the closed circuit position and separable therefrom so as to draw arcs between said contacts and electrodes, means for generating a gas and developing a pressure in said chamber under the influence of one of said arcs, means formed of a gas-evolving material for defining a passageway in said chamber for leading said gas in a direction substantially parallel with the axis of said chamber, and means for causing said gas to flow radially on to said other arc in a progressively greater number of streams as said rod contact moves with respect to said fixed electrodes.

6. An electric circuit breaker comprising an arc-confining chamber, a plurality of spaced fixed contacts mounted in axial alignment in said chamber, an elongated movable rod contact of conducting material having spaced contact portions separated by a sleeve of gas-emitting insulating material, said contact portions being spaced to engage said fixed contacts in the closed-circuit position of said breaker and separable therefrom by movement of said rod contact in an axial direction with respect to said fixed contacts, means for generating an arc-extinguishing fluid adjacent one of said fixed contacts under the influence of the arc associated with said last-mentioned contact, a passageway in said chamber for leading said gas in a direction substantially parallel with the axis of said chamber toward a second fixed contact, and means for causing said gas to flow radially on to said arc associated with said second fixed contact in a progressively greater number of streams as said arc associated with said second fixed contact is increased in length.

SYDNEY FARRER.
GEORGE PAILIN.

CERTIFICATE OF CORRECTION.

Patent No. 2,267,399. December 23, 1941.

SYDNEY FARRER, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, first column, line 21, strike out "between the pairs of separable contacts, there" and insert instead --provided with a suitable discharge opening 29--; page 5, second column, line 37, claim 5, before "material" insert --insulating--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 3rd day of March, A. D. 1942.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)

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