C. C. BADEAU.

AUXILIARY CARBON CONTACT CIRCUIT BREAKER

APPLICATION FILED JULY 27, 1909.

1,026,296. Patented May 14, 1912.

Fig. 1.

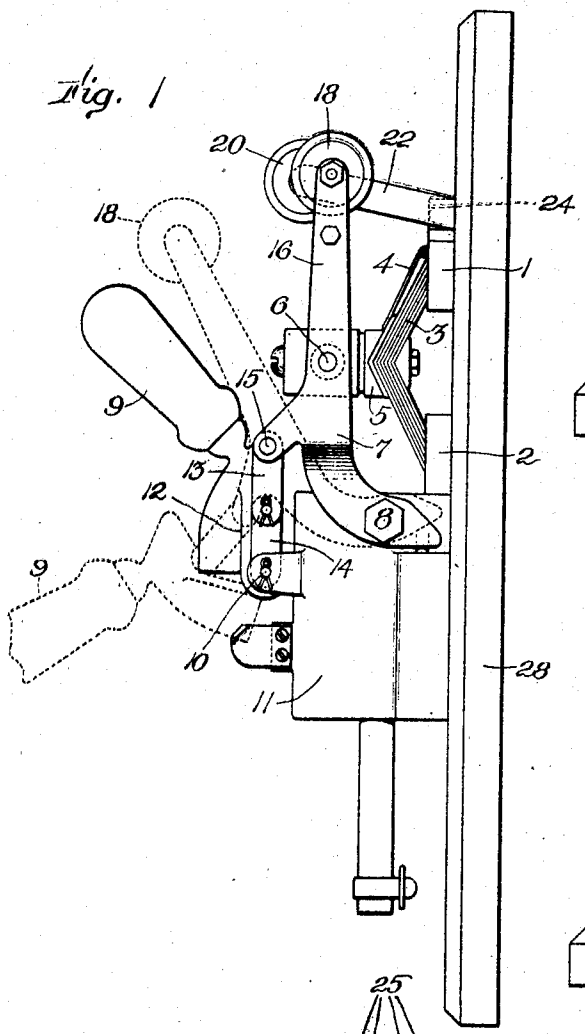


Fig. 2.

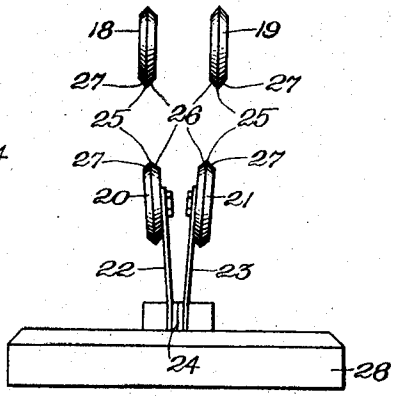


Fig. 3.

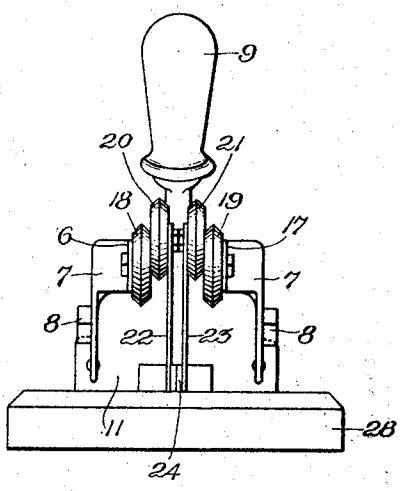
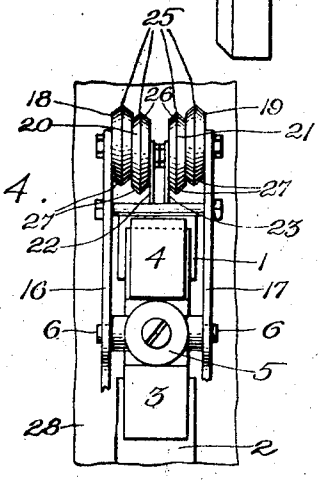


Fig. 4.



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UNITED STATES PATENT OFFICE.

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AUXILIARY CARBON-CONTACT CIRCUIT-BREAKER.

1,026,296. Specification of Letters Patent. Patented May 14, 1912.

Application filed July 27, 1909. Serial No. 509,919.

To all whom it may concern:

Be it known that I, CHARLES C. BADEAU, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Auxiliary Carbon-Contact Circuit-Breakers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In the usual circuit breaker the auxiliary or secondary contacts make maximum contact when closed, said contact decreasing or in other words the resistance increasing as the circuit breaker opens.

It is the object of my present invention to provide a circuit breaker having a secondary contact which provides a minimum resistance to prevent arcing at said secondary as the circuit breaker is opening, having a position of maximum contact and hence minimum resistance as the main contacts reach open position. Preferably I provide carbon secondary contacts, and these are preferably in the form of disks set edgewise so as to come flat against each other and be capable of being turned so as to bring a fresh separating or breaking point into operation when desired, or in other words the point of rupture is renewable simply by turning the disks. Preferably also these disks are provided with a sharp peripheral edge, which reduces to a minimum the tendency to arc upon separation. Preferably these flat carbon contacts are set vertically edgewise parallel to the plane of their movement, and also preferably they are mounted in pairs and mounted for mutual yielding when engaging each other.

My invention, which is especially designed for use with mains carrying currents of very high volume and tension and usually for a considerable distance, from large generating plants, is to be distinguished from relatively small hand operated switches for controlling currents of much lower voltage and current. In the present circuit breaker, which is of considerable size and is to be opened after being released by an automatic tripper, it is of the utmost importance that the secondary or final opening contacts be arranged for facile operation and so as to be not subject to clogging or obstruction by fouling of the engaging surfaces. I therefore consider the provision of the slidable carbon plates in the combination set forth an especially valuable feature as distinguished from certain constructions heretofore used in switches involving a carbon block arranged for slidable engagement with a metallic plate, such a construction being liable, if used in a high tension automatic circuit breaker, to stick, by reason of fouling of the metallic surface.

The constructional details of my invention will be pointed out further and the invention set forth more at length in the following description, taken in connection with the accompanying drawings, and the invention will be further defined in the claims.

In the drawings, Figure 1 shows in side elevation a circuit breaker embodying my invention; Fig. 2 is an end view showing the normal relation of the secondary contacts to each other when the circuit breaker is open, most of the parts of the circuit breaker being omitted so as to illustrate more clearly the carbon contact feature; Fig. 3 is a view substantially similar to Fig. 2 showing the parts in the closed position of the circuit breaker; and Fig. 4 is a top plan view of the contact portion of the circuit breaker.

My invention is applicable to a wide variety of circuit breakers, the type herein shown comprising stationary contact blocks 1, 2, a laminated bridge contact 3 coöperating therewith, and an auxiliary metal shunt contact 4, these together constituting the primary contacts carried by a support 5 secured at 6 in a switch lever 7 pivoted at 8 on fixed supports and operated by a handle lever 9 pivoted at 10 to a tripping coil case 11, said lever having shoulders 12 to engage toggle links 13, 14 pivoted to each other at their meeting ends and at their opposite ends pivoted at 10 to said case and at 15 to said switch lever 7.

Extending forward from the switch lever 7 are arms 16, 17 provided at their outer ends with carbon contacts 18, 19 in position to coöperate with similar carbon contacts 20, 21, herein shown as supported by spring conductors 22, 23 secured at their lower ends to a stationary auxiliary contact block 24. The four carbon contacts 18–21 are shown as identical in shape and size, each having a sharp peripheral edge 25 and adjacent beveled surfaces 26 and preferably 27, and centrally pivoted so as to be capable of be-

ing rotated when it is desired to bring fresh surfaces into operative position. These contacts are preferably arranged so that when closed the movable contacts 18, 19 pass below the relatively stationary contacts 20, 21 or nearer to the switch bar 28 than said relatively stationary contacts, as clearly shown in Figs. 1 and 3.

In use, when the circuit breaker is open as shown in dotted lines, Fig. 1, the handle is moved from dotted line position to closing position for closing the circuit breaker, which then assumes the position shown in full lines, Fig. 1, the carbon contacts passing from their open position, Fig. 2, to their closed position, Figs. 3 and 4. As the movable contacts move forwardly, their inner beveled surfaces wedge against the outer beveled surfaces of the stationary contacts and spring the latter toward each other so as to bring the adjacent sides of the respective contacts into parallelism, further closing movement of the movable contacts serving to slide the said adjacent parallel sides over each other in flat contact with each other until the contacts assume the position shown in Figs. 3 and 4. When the circuit breaker opens, the bridging contact 3 first leaves the main contacts 1, 2 in usual manner, followed by the auxiliary metal shunt contact 4, and finally the secondary carbon contacts separate, but instead of separating in usual manner by having a maximum-contact closed position which is gradually lessened as the contacts move therefrom to fully open position, they first slide from the partially overlapped position shown in Fig. 1 to coincident overlapping position, so that, at substantially the moment when the primary contacts have reached circuit breaking position, said secondary contacts have reached maximum-contact position, the inner sides or flat surfaces of the movable disks 18, 19 bearing in direct co-extensive engagement with the outer sides or flat surfaces of the stationary disks 20, 21. The spring supports 22, 23 and in securing this maximum contact and minimum resistance. This gives not only perfect contact, but said minimum resistance at the time when the most perfect free path for current is desirable, when the main contacts are just separated. After the main contacts have just separated, the further opening movement of the switch, or outward swing of the switch lever 7, 16, 17 serves gradually to separate the movable carbon disks 18, 19 from the yielding stationary disks 20, 21, and as they arrive at the point of separation, their beveled surfaces slide in contact with each other and finally the separating movement takes place at the sharp edges 25 and at mutually tangential points thereof, thereby reducing to a minimum the tendency to arc. By turning the disks on their pivots, new arcing edge-surfaces may be brought into operative position as desired. Preferably also the disks are made reversible as shown.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an electric circuit breaker, primary and secondary contacts having fixed and movable elements, supporting means for the fixed elements, and carrying means for the movable elements, said secondary contacts having the fixed and movable elements thereof of like dimension in the direction of relative movement and being mounted for flatwise sliding frictional engagement, and the contacts being mounted on said supporting and carrying means so that as the primary contacts separate the secondary contacts have substantially complete engagement of their opposing flatwise extending surfaces with undiminished frictional pressure, and the members comprising the secondary contacts being arranged so that further movement of said carrying means gradually diminishes the secondary contacting surfaces to final separation.

2. In an electric circuit breaker, primary and secondary contacts having fixed and movable members, supporting means for the fixed contacts and carrying means for the movable contacts, said secondary contacts being composed of flat plates of like dimension in the direction of relative movement mounted for flatwise sliding frictional engagement and being held from their outer sides only so as to leave the opposing sides free for full contacting engagement, said secondary contacts being mounted and arranged relative to the primary contacts so as to have substantially full surface engagement with undiminished pressure as the primary contacts separate.

3. In an electric circuit breaker, primary and secondary contacts having fixed and movable members, supporting means for the fixed members and carrying means for the movable members, one of the members of the primary contacts being a yielding one and relatively mounted for increasing contacting pressure as the circuit breaker is moved to fully closed position, and said secondary contacts being composed of flatwise frictionally engaging plates of like dimension in the direction of relative movement arranged to occupy a position past maximum contact with the circuit breaker in fully closed position and for movement to substantially full engagement of the opposing surfaces with undiminished pressure as the pressure on the primary contacts is relieved and they are separated, the secondary contacts then gradually separating by further movement of said carrying means to final separation.

4. In an electric circuit breaker, primary and secondary contacts having fixed and movable members, supporting means for the fixed members and carrying means for the movable members, said secondary contacts being composed of flat disks of like dimension in the direction of relative movement held at their outer sides and arranged relative to the primary contacts so as to occupy positions past maximum contact with the circuit breaker fully closed, and to have their opposing faces in substantially full engagement with undiminished pressure as said carrying member is moved to separate the primary contacts.

5. In an electric circuit breaker, secondary contacts mounted for relative movement to make and break a circuit, one thereof being composed of a carbon disk arranged to engage the other contact on its lateral surface with a flatwise sliding engagement, said disk being mounted for rotatable adjustment to present fresh peripheral arcing surfaces.

6. In an electric circuit breaker, secondary contacts composed of carbon disks mounted for relative movement to make and break a circuit and for flatwise sliding engagement, said disks having axial mountings and being adjustable about their axes to present fresh peripheral arcing surfaces.

7. In an electric circuit breaker, separable main contacts, final contacts composed of cooperating carbon disks mounted edgewise in or parallel to the plane of their opening and closing movement arranged to slide in mutual flatwise contact with each other, and having sharp peripheral edges coöperating with each other in the final rupture of the circuit with a minimum tendency to arc, and switch operating mechanism, said carbon disks having a position of maximum contact following the separating movement of said main contacts.

8. In an electric circuit breaker, secondary contacts composed of carbon disks having an axial mounting at one side thereof and arranged for flatwise sliding engagement, the disks being adjustable about their axes to present fresh arcing surfaces.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES C. BADEAU.

Witnesses:
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