H. E. BORGER.

CIRCUIT BREAKER.

APPLICATION FILED NOV. 29, 1918.

1,436,693. Patented Nov. 28, 1922.

FIG 1

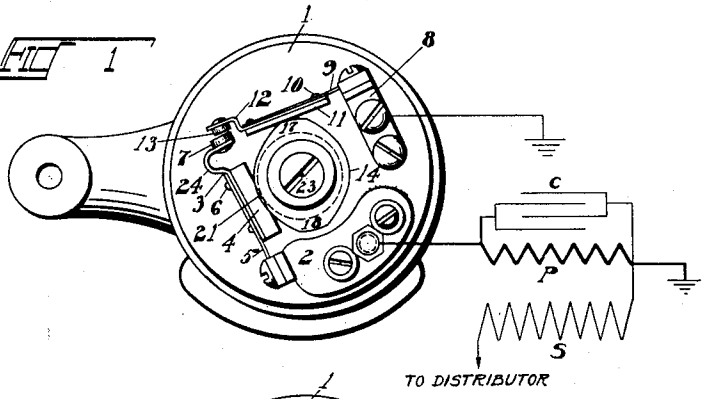


FIG 2

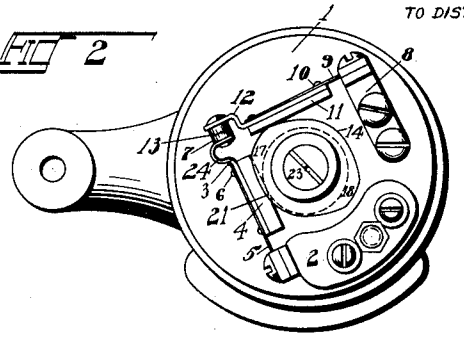


FIG 3

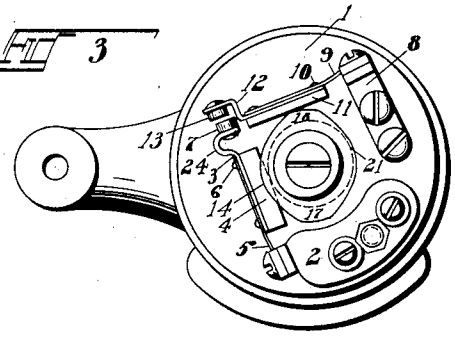


FIG 4

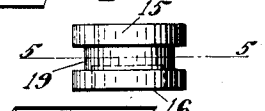
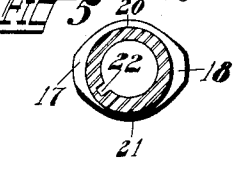


FIG 5



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UNITED STATES PATENT OFFICE.

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CIRCUIT BREAKER.

Application filed November 29, 1918. Serial No. 264,542.

To all whom it may concern:

Be it known that I, HENRY E. BORGER, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in a Circuit Breaker, of which the following is a specification.

My invention relates to circuit breakers used for breaking and making an electrical circuit, particularly the primary circuit of an ignition system, although it is to be understood that it is not limited to this particular class of work. In the operation of circuit breakers used on magnetos and in many forms of battery ignition systems, it has become practically universal to use platinum on the magnetos and tungsten in connection with the battery systems. One of the principal reasons for having to use hard metals like platinum or tungsten in the circuit breaker contacts, is found in the fact, that heretofore, the movable member of these devices has contained a large amount of inertia, so that the blows produced by the movement of the breaker arm on the contacts prevents the use of any soft metal, such as silver or gold.

Within the last year or two the speed of internal combustion engines has been materially increased and this higher speed has made it much more difficult for the circuit breakers to follow as well as increasing the trouble due to the inertia effects of the breaker on the contacts. Furthermore, due to war conditions there has been and is still a great scarcity of platinum which is highly essential in the construction of high tension magnetos used on airplanes.

It is the object of my invention to provide a circuit breaker in which common soft metals, such as silver or gold, or a combination of the two, or other metals which are plentiful may be used. By the use of such soft metals for the breaker contacts, I have reduced the expense of the breaker materially, since the scarcity of platinum has increased the price thereof to an abnormal point. Where pure silver alone is used, trouble may be expected on the contacts, due to oxidization or due to comparatively light pressure at the contacts which necessarily follows from the use of a light, low inertia member carrying one of the contacts. I have overcome these difficulties in my construction of circuit breaker and method of operating the same by arranging both of the contacts on separate movable members, one of which is moved so as to rub the contacts together without separating the contacts or opening the circuit while the other member, preferably of low inertia is operated to separate the contacts. The member which operates to separate the contacts being of low inertia is capable of operating much faster than the engine requirements. The means and method of obtaining the results will be clear from the following description taken in connection with the drawing attached hereto, in which—

Figure 1 illustrates a breaker box carrying the elements of the preferred form of my invention, also showing diagrammatically the wiring for a high tension magneto.

Figure 2 is a view of the breaker box and elements contained therein, same as shown in Figure 1 but in a different position of operation.

Figure 3 is similar to Figure 1 except the operating parts are in a position of 180° difference from that shown in Figure 1.

Figure 4 is a plan view of a preferred form of contact actuating means.

Figure 5 is a section on the line 5—5 of Figure 4.

Referring now to the details, wherein like numbers refer to corresponding parts in the various views, 1 is a breaker box carrying an insulated bracket 2 to which is fastened, by resilient member 5, a movable member 3 carrying a friction wearing plate 4. As shown the parts 3, 4 and 5 are held together by any suitable means, such as rivets 6. The movable member 3 is preferably provided with a goose neck end 24 upon which is carried the contact 7. A bracket 8 is carried on the breaker box 1 and to this bracket is fastened a resilient member 9 to which is attached by rivets 10 a friction wearing plate 11 and a member 12 carrying a contact 13 adapted to cooperate with the contact 7. 14 is a cam having preferably two sections 15 and 16 each with corresponding lobes 17 and 18. Positioned between the sections 15 and 16 is another cam 19 having a low point 20 and a high point 21, the eccentricity of the cam 19 being relatively small and substantially uniform. Preferably the sections 15 and 16 and the part 19 are made up of one piece

constituting a unitary structure. By reference to Figures 1, 2 and 3, it will be seen that the part 4 of the movable member 3 operates on the cam 19 between the sections 15 and 16, which, therefore, serve as guides for the movable member 3. It will be understood that the cam 14 is fastened to an operating shaft in any suitable manner, such as by a key in keyway 22 and a screw 23 adapted to draw the cam onto the driving shaft which is usually tapered. The part 11 is preferably wider than the parts 9 and 12 so as to be engaged by both of the cam sections 15 and 16, but it is to be understood that the parts 9, 10, 11 and 12 are very light so as to respond rapidly to the action of the cam lobes 17 and 18 to open and close the circuit at the contacts 7 and 13. The circuit which I have preferred to show in connection with the breaker consists of a primary P and secondary S and condenser C which constitute the generating elements of a high tension magneto.

Referring now to the method of operation of my invention, it will be seen, with reference to Figure 1, that the lobe 17 has moved the contact 13 out of engagement with the contact 7 which is displaced in position with reference to the contact 13 due to the high point 21 of the cam 19 acting against the part 4 carried by the movable member 3. As soon as the lobe 17 passes from under the movable member 12 this quickly returns to its normal position and likewise the member 3, rubbing the contacts 7 and 13 together. As the cam 14 turns, the low part 20 of the cam 19 allows the movable member 3 to move in the opposite direction to that shown in Figure 1, rubbing the contacts 7 and 13 in a different direction directly after which the lobe 18 strikes the member 11 separating the contacts again. As previously stated, the eccentricity of the cam 19 is small and consequently the slight rubbing of the contacts thus produced always insures a good contact, even though an oxidizable metal, like pure silver, is used, without producing any excessible wear of the contacts.

In some cases, I prefer to use a small percentage of platinum with the silver or gold, or a combination of both but I do not limit myself to any definite composition of metals, the main thing being that my circuit breaker is adapted to use a relatively soft metal whether the breaker be used in an ignition circuit or in some other arrangement.

While I have shown a preferred arrangement and construction of parts adapted to carry out my invention, I do not wish to be limited to the exact details shown and described as it will be apparent, to one skilled in the art, that various changes may be made without departing from the spirit of my invention and the scope of the appended claims.

Having thus described my invention, what I claim is:—

1. In a circuit breaker, the combination of, a pair of separate movable members, co-operating contacts carried on said members and a unitary cam structure engaging directly said members for independently moving the same so as to open and close said contacts and to move one upon the other while in engagement with each other.

2. In a circuit breaker, the combination of, a pair of separate movable members, co-operating contacts carried on said members arranged substantially at right angles to each other and a one piece cam directly engaging both of said members for independently moving said members, the movement of one serving to open and close said contacts and the movement of the other serving to rub the contacts one on the other.

3. In a circuit breaker, the combination of, a pair of separate movable members, co-operating contacts carried on said members and a unitary cam structure acting directly and continuously on one and intermittently on the other of said movable members so that the intermittent action on one member opens and closes said contact while the continuous action on the other member serves to rub the contacts together.

4. In a circuit breaker, the combination of a pair of separate movable members, co-operating contacts carried on said members and a cam having one portion constructed so as to move one of said members and contact thereon in such a manner that the contacts are rubbed together and another portion constructed to move the other of said members with contact thereon to cause separation of said contacts as described.

5. In a circuit breaker the combination of, a pair of separate movable members, co-operating contacts carried on said members and a cam having two portions, one portion acting to open and close said contacts and the other portion constructed to move one of said members with the contact thereon in one direction to rub the contacts together previous to the separation of said contacts by said first mentioned portion of the cam, said second mentioned cam portion in another part of its periphery allowing the said member and contact to move in a direction opposite to the direction first mentioned to rub the contacts together previous to a succeeding separation of said contacts by said first mentioned portion of the cam.

6. In a circuit breaker the combination of a pair of movable members, co-operating contacts in an electrical circuit carried on said movable members, a cam having two portions, one acting on one of said members for opening and closing the circuit at said contacts and the other portion acting on the other of said members to rub said contacts

together during the period of closure of the circuit.

7. In a circuit breaker, the combination of, a pair of movable members, cooperating contacts in an electrical circuit carried on said movable members, a cam having two similar sections acting on one of said members for opening and closing the circuit at said contacts and a cam spaced between said cam sections acting on the other of said members to rub said contacts together during the closure of the circuit, said cam sections serving also as guides for the last mentioned movable member in its movements.

8. In a magneto ignition mechanism, the combination of co-operating contacts of substantially the same area and mechanism for moving one of said contacts for producing ignition spark and for moving the other contact while said contacts are in engagement for freeing the contacting surfaces thereof of deposit, and common means for supporting and shifting said contacts.

9. In a magneto ignition mechanism, the combination of co-operating contacts, yielding means for holding the contacts in engagement, means for positively moving one of said contacts for separating the same for ignition, and means for positively moving the other contact back and forth laterally while said contacts are in engagement for cleaning the contacting surfaces of deposit.

10. In a magneto ignition mechanism, the combination of co-operating contacts, means for supporting said contacts whereby one of said contacts may be moved toward and from the other and whereby the other contact may be moved back and forth laterally of the first named contact, and mechanism for operating the same.

11. In a magneto ignition mechanism, the combination of, co-operating contacts, a spring lever for each contact and a cam having different portions operating on said levers, said levers being so disposed that the movement of one lever causes the contacts to slide laterally on each other while in engagement and the movement of the other lever causes the contacts to be moved away from each other and separated.

12. In a magneto ignition mechanism, the combination of, co-operating contacts, a spring lever for each contact and a cam having different portions operating on said levers, said levers being so disposed that the movement of one lever causes the contacts to slide laterally on each other while in engagement and the movement of the other lever causes the contacts to be moved away from each other and separated and common means for supporting the levers whereby they may be moved for timing purposes.

In witness whereof, I affix my signature.

HENRY E. BORGER.