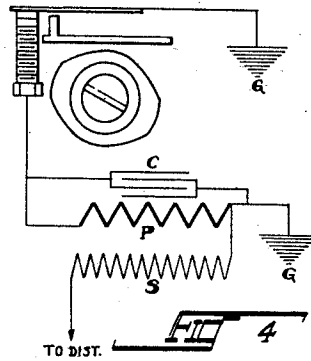
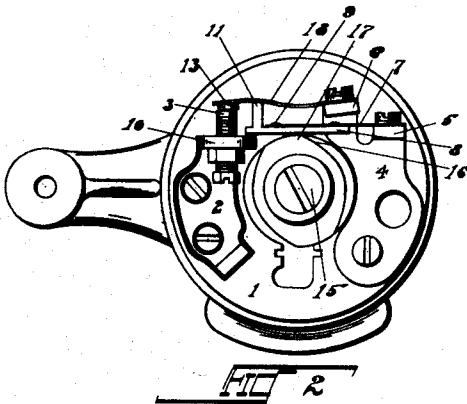
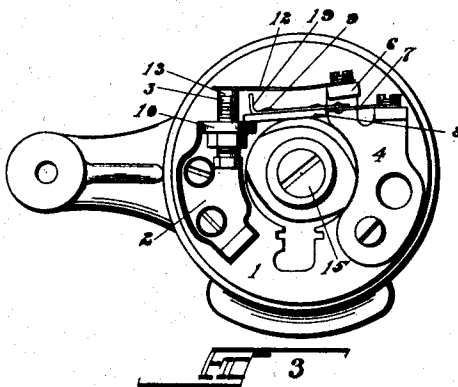


1,384,510.



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CIRCUIT-BREAKER.

1,384,510.

Specification of Letters Patent. Patented July 12, 1921.

Application filed September 9, 1918. Serial No. 253,250.

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 system. 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 have been materially increased and this higher speed has made it much more difficult for the circuit breaker to follow as well as increasing the trouble due to the inertia effects of the breaker on the contacts. Furthermore, due to the present war conditions there is a great scarcity of platinum, which is highly essential in the construction of high tension magnetos used on airplane engines.

It is the object of my invention to provide a circuit breaker in which the inertia effect of the movable member carrying one of the contacts is reduced to a minimum so that it will operate very much faster than the engine requirements and one 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 very 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 at the contacts, due to oxidization or due to com-

paratively light pressure at the contacts which necessarily follows from the use of a light, low inertia member carrying the movable contact. I have overcome all of these difficulties in my construction of circuit breaker and method of operating the same, which I have proven by letting an engine fired by a magneto having one of my improved breakers installed thereon, set for a number of days, and then priming the engine so as to be certain that fuel was present in the cylinders and then getting a start from the first cylinder going through the compression stroke. The means and method of obtaining such a result will be clear from the following description taken in connection with the specification and drawing attached thereto.

Figure 1 illustrates a breaker box carrying the elements of the preferred form of my invention.

Fig. 2 is similar to this but with the moving parts in a slightly different position, the position of one of the parts being somewhat exaggerated to illustrate more clearly the idea.

Fig. 3 is a view similar to Fig. 1 but slightly different in the cam operated element.

Fig. 4 is a diagrammatic illustration of my circuit breaker as used in one type of ignition system.

Referring now to the details wherein like numbers refer to corresponding parts in the various views, 1 is a breaker box carrying a bracket 2, which is insulated from the box 1. Bracket 2 carries an adjustable contact 3. The bracket 4 also carried by the breaker box 1, has two support arms 5 and 6. The spring 7 is fastened to the support arm 5 and carries friction element 8 preferably, though not necessarily of insulating material which may be fastened thereto in any suitable way such as by rivets 9. In Fig. 1 the element 8 has one end supported by the arm 10 of the bracket 2, a projection 11 extends upward but not in contact with the spring 12 which is attached to the arm 6. A contact 13 which coöperates with contact 3 is carried by the spring 12. As shown in Fig. 1, the spring 12 is light and flexible being given a certain amount of set to produce sufficient contact pressure between contacts 3 and 13 and at the same time holding them normally in substantial, parallel re-

relationship, that is to say, with their faces in complete contact one with the other. The springs 7 and 12 may be slotted at their ends in contact with arms 5 and 6 for alinement purposes. A cam 14 fastened to the driving shaft by a screw 15, is so designed that the approaching edge 16 comes in contact with the friction element 8 very easily and begins to raise the same, but when the high point 17 of the cam is reached the element 8 is rapidly moved at which time the projection 11 strikes the spring 12 in such a manner that the spring is flexed at the point 18 causing the contact 13 to rub slightly over the surface of the contact 3 before it finally breaks therefrom. This action is shown in Fig. 2 somewhat exaggerated in order to set forth the method of operation more clearly. This rubbing action is also obtained in the reverse direction of motion or when the contacts are closing and the slight rubbing thus produced always insures a good contact, even though an oxidizable metal, like pure silver is used. In some cases I prefer to use 95% silver and 5% platinum but I do not limit myself to any definite composition of metals, the main thing being that my breaker is adapted to use a relatively soft metal in an ignition circuit or elsewhere.

In the form shown in Fig. 3, the spring 7 has attached thereto a metal piece 19 to which the friction wearing element 8 is fastened, however, I prefer to use the construction shown in Figs. 1 and 2, in which the projection 11 is constructed of the same material as the body portion 8 whereby wearing on the spring 12 is substantially eliminated.

In Fig. 4, I have shown diagrammatically the usual high tension magneto ignition system, which briefly consists of the primary P of the generating coil connected through the circuit breaker and the secondary S leading to any suitable distributor. Since such a system is old and well known, further description is not necessary, but it will be understood that my improved circuit breaker may be utilized in various electrical circuits and I do not wish to be limited to the exact details shown in the drawings:

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

1. In a circuit breaker, the combination

of a breaker box carrying two brackets, one of which is insulated therefrom, an adjustable contact carried by the insulated bracket, said second bracket having two arms displaced laterally and longitudinally from each other, a spring having little inertia mounted on one of said arms and carrying a contact to coöperate with said adjustable contact, a spring mounted on the other arm and carrying a part normally positioned on the bracket carrying the adjustable contact and extending to a position closely adjacent the low inertia spring but not in engagement therewith and a cam for moving the spring on said other arm and said part carried thereby into engagement with the low inertia spring to open said contacts as described.

2. In a circuit breaker, the combination of a breaker box carrying a plurality of brackets one of which is insulated therefrom, an adjustable contact carried by the insulated bracket, a pair of springs carried by the second bracket, one of said springs having little inertia and carrying a contact in coöperation with the adjustable contact, the second spring of the pair carrying a part normally positioned on the bracket carrying the adjustable contact but out of contact with the low inertia spring and a cam for moving the second spring of the pair into engagement with the first spring to open said contacts.

3. In a circuit breaker, the combination of a breaker box carrying a plurality of brackets one of which is insulated therefrom, an adjustable contact carried by the insulated bracket, a pair of springs carried by the second bracket, one of said springs having little inertia and carrying a contact in coöperation with the adjustable contact, the second spring of the pair carrying a friction wearing element having one end normally resting on the bracket carrying the adjustable contact and also having a projection extending toward the low inertia spring but normally out of engagement therewith and a cam for periodically striking the friction wearing element to cause it to actuate the low inertia spring for the purpose described.

In witness whereof, I affix my signature.
HENRY E. BORGER.