No. 623,317. Patented Apr. 18, 1899.

T. B. KINRAIDE.

ELECTRICAL BREAK.

(Application filed Sept. 24, 1898.)

(No Model.)

Fig: 1.

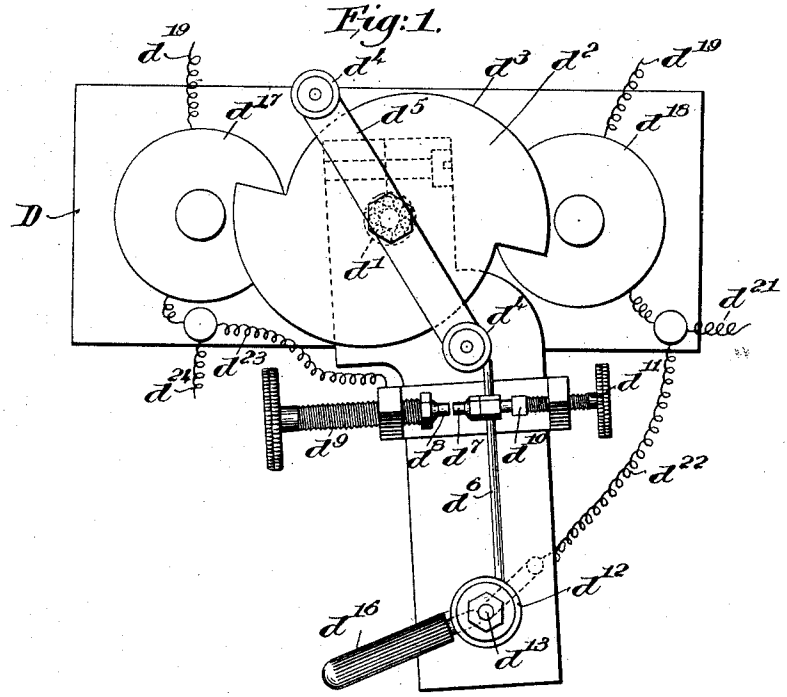
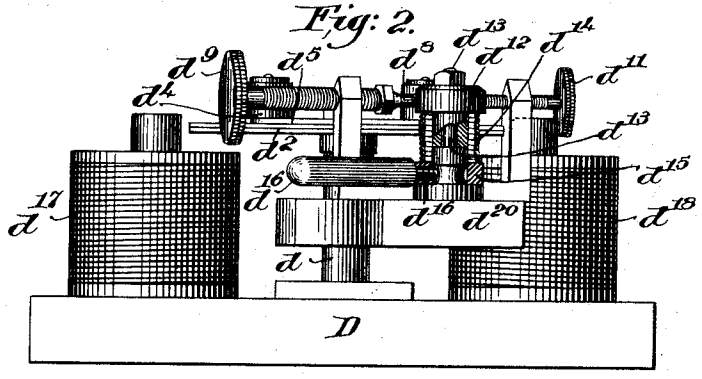


Fig: 2.



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UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF BOSTON, MASSACHUSETTS.

ELECTRICAL BREAK.

SPECIFICATION forming part of Letters Patent No. 623,317, dated April 18, 1899.

Original application filed May 5, 1898, Serial No. 679,799. Divided and this application filed September 24, 1898. Serial No. 691,757. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. KINRAIDE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric Breaks, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My present application is a division of my application, Serial No. 679,799, filed May 5, 1898.

Electric breaks as heretofore provided have been subject to considerable sparking, which is not only destructive of the apparatus, but is very objectionable in its effects on the current and system being operated, this being especially true of rotary breaks which operate by means of a brush in frictional engagement with a rotating surface. Accordingly I have invented a break in which there is no chance for arcing, as there is no surface to arc over, and also a leading object of my break is to provide a means for making an exceedingly quick break with a relatively long period of closed circuit, my break rendering it possible to regulate the period of closed circuit accurately. Many considerable advantages resulting from this construction will occur to those skilled in the art.

The details of construction and principles of operation of my improved break will be more fully pointed out in the following description, reference being had to the accompanying drawings, in which I have illustrated a preferred embodiment of my invention, and the latter will be more particularly defined in the appended claims.

In the drawings, Figure 1 is a top plan view of one form of my break. Fig. 2 shows the same in elevation.

On a suitable base D, I journal, in a central post or bearing d, a spindle d' of an iron plate or armature d^2, having two or more regions of varying mass of magnetic material, herein shown in the form of eccentric edges d^3, as clearly shown in Fig. 1.

My object is to provide regions of increasing magnetic attraction to coöperate with one or more suitable electromagnets or solenoid devices so located as to successively attract these regions of varying mass of magnetic material for rotating the armature, as will now be explained.

Mounted on or otherwise connected to rotate with the armature d^2 are one or more small antifriction-rolls d^4, two being herein shown mounted at the opposite ends of a bar d^5, clamped adjustably on the plate d^2. These rolls or circuit-interrupters are preferably of indurated fiber.

Mounted to extend into the path of the rolls d^4 is an arm, (shown as a wire d^6,) carrying a hammer d^7 to contact with an anvil d^8 on a post d^9 and limited in its movement by a fiber stop d^{10} on the end of an adjusting-screw d^{11}. The wire d^6 is carried by a hub d^{12}, loose on a pin d^{13} and held under tension by a spring-coil d^{14}, Fig. 2, fastened at one end to said hub and at its other end to a nut d^{15}, carrying an adjusting or set screw d^{16}, so that by loosening the set-screw and swinging its handle one way or the other the resistance of the arm d^6 may be varied.

Preferably adjacent the periphery of the armature d^2 I place attracting means, herein shown in the form of solenoids or electromagnets d^{17} d^{18}, connected with the main or other source of current by wires d^{19}, which enter the solenoids at their inner terminals, so that as the magnets d^{17} d^{18} are energized they attract the armature or plate d^2, and by the increasing pull exerted thereon on account of the eccentric surfaces d^3 they cause the plate to rotate with a speed only checked by the striking of the interrupters d^4 against the end of the arm d^6, said rolls being placed relatively to the highest points of the surfaces d^3, so that they cut off the current just before said highest points get opposite the propelling-magnets, thereby permitting the momentum of the plate or armature d^2 to carry said highest points beyond the magnets sufficiently to prevent the latter exerting any retarding influence on the rotation of the break.

Preferably I mount the anvil and hammer on a swinging ledge or carrier d^{20}, journaled on the post d, so that I am enabled to regulate the speed of the break simply by swinging the carrier d^{20} one way or the other. The same effect may be obtained by shifting the

roll or rolls d^4 on the plate d^2, provided they are carried, as preferred, on a bar d^5, so that they can be shifted. This adjustment cannot of course take place while the apparatus is in operation, and therefore for instantaneous regulation of the apparatus I provide the swinging carrier d^{20}.

A movement of the carrier from right to left causes the current to be broken before the armature has reached its point of greatest attraction, and as it is moved farther toward the left the pull on the armature exerted by the magnets is diminished more and more, and the speed of rotation of the armature is correspondingly reduced, thereby reducing the number of breaks and at the same time lengthening the time which the circuit being interrupted is closed.

I place the arm or wire d^6 slightly tangential to the armature, as will be seen viewing Fig. 1, in order that the rolls d^4 may strike the extreme end thereof with least friction, striking outward instead of square against the end. The arm d^6 is connected to the main or branch therefrom at d^{21} by means of any suitable conductor d^{22}, and the anvil d^8 has a connection d^{23} to the delivery end d^{24} of the circuit, as will readily be understood.

In operation the magnets being energized attract the eccentric surfaces or other varying masses of magnetic material, so as to cause the armature to rotate over to the left, Fig. 1, the circuit being completed at d^7 d^8 until the very moment when the interrupter d^4 strikes the free end of the arm d^6, whereupon the circuit is instantaneously broken, and as this time occurs slightly before the highest points or places of greatest attraction of the armature come opposite the solenoids the latter are rendered inactive merely during the moment when the momentum of the armature is carrying the latter by the solenoids, so as to bring the region of least magnetic mass again opposite the solenoids in position for the latter, upon becoming active by the making again of the circuit, to renew their pull upon the armature, and thereby continue its rapid revolution. This action is rapidly repeated at every make and break of the instrument.

I prefer to provide opposite solenoids in order to render the device perfectly balanced and smooth-running, although it will be understood that variations in this and in all other details of my invention may be made.

By the use of my invention the time-period of closed circuit may be made as considerable as desired. With any usual break this would be impossible, for the reason that in order to give an equivalent period of closed circuit the brush would of necessity remain upon the surface of the break so long as to heat frictionally the surfaces, so as to produce a constant arc, ultimately destroying the break as well as the efficiency of the circuit. In my break there is not only no chance for it to arc, as there is no surface for it to arc over, but the break itself is so exceedingly quick that there is not even a spark at the time of break, but there is merely occasionally a residual spark upon the closing of the break.

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

1. An electric break comprising a rotating member, an electromagnet, a break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the center of rotation of said member, substantially as described.

2. An electric break comprising a rotating member, an electromagnet, a break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the center of rotation of said member, and means for varying the time of interruption of said break device relatively to the point of highest attraction of said eccentric surface, substantially as described.

3. An electric break comprising a rotating member, an electromagnet, a spring, a break device, means to vary the resistance of said break device, and means driven by said rotating member for interrupting said break device, said rotating member presenting a surface of attraction to said magnet eccentric to the center of rotation of said member, and means for varying the time of interruption of said break device relatively to the point of highest attraction of said eccentric surface, substantially as described.

4. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and an interrupter driven by said rotating member for interrupting the break device, substantially as described.

5. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and an interrupter carried by said rotating member for interrupting the break device, substantially as described.

6. An electric break comprising a rotating member having regions of varying mass of magnetic material producing regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a pivoted roll carried by said rotating member for interrupting the break device, substantially as described.

7. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a pivoted roll carried by said rotating member for interrupting the break device, and means

for adjusting said roll on said rotating member, substantially as described.

8. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a bar fixed on said rotating member and provided with rolls pivoted thereon at its opposite ends in line with and to interrupt said break device, substantially as described.

9. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and an interrupter carried by said rotating member for interrupting the break device, said break device being mounted on a carrier movable concentrically to said rotating member, substantially as described.

10. An electric break comprising a rotating member having regions of increasing magnetic attraction, an electromagnet adjacent said rotating member, a break device, and a revolving interrupter driven by said rotating member, said break device including a yielding arm projecting obliquely into the path of said interrupter, substantially as described.

11. An electric break comprising an arm carrying a hammer, an anvil opposite said hammer, said arm being yieldingly supported and provided with means for regulating the tension or resistance thereof, an interrupter for engaging the free end of said arm, and automatic means operated by the current being broken for driving said interrupter, substantially as described.

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

THOMAS B. KINRAIDE.

Witnesses:
GEO. H. MAXWELL,
ALEXANDER C. PROUDFIT.