L. D. CRONINGER.
AUTOMATIC CUT-OUT.
APPLICATION FILED JUNE 18, 1920.

1,400,870. Patented Dec. 20, 1921.

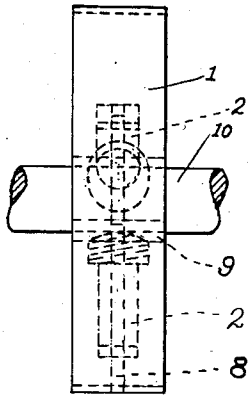

Fig. 1.

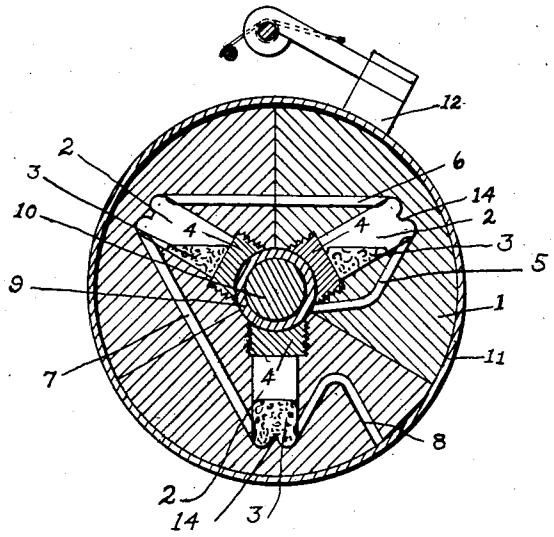

Fig. 2.

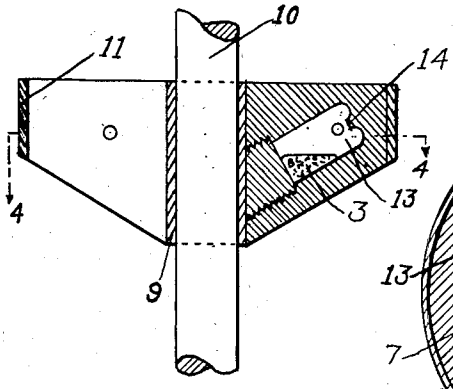

Fig. 3

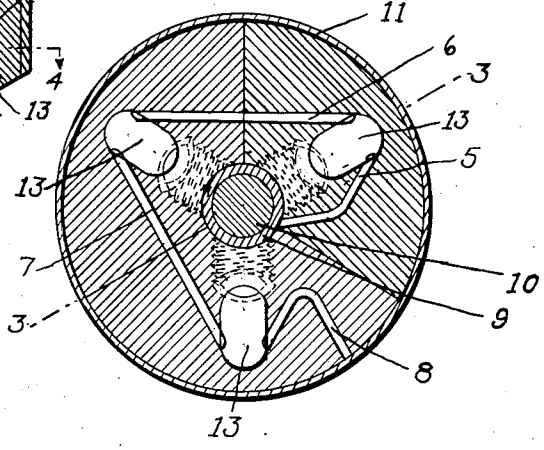

Fig. 4

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AUTOMATIC CUT-OUT.

1,400,870. Specification of Letters Patent. Patented Dec. 20, 1921.

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To all whom it may concern:

Be it known that I, LORENZO DOW CRONINGER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Automatic Cut-Outs, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to automatic cut-outs for electric circuits, and while designed primarily for use with a storage battery and generator, it may be used with electrical apparatus of various kinds.

One object of the invention is to provide a simple, efficient device to automatically break the circuit when the generator, or other apparatus, stops, or drops below a predetermined speed.

A further object of the invention is to provide a device of this kind in which the movable part, or parts, will not be liable to stick and thus allow the circuit to remain closed.

A further object of the invention is to provide a cutout of such a character that the circuit will be broken with certainty in any position in which the device may stop.

Other objects of the invention will appear as the device is described in detail.

In the accompanying drawings Figure 1 is an elevation of a device embodying my invention; Fig. 2 is a sectional view taken centrally through the device of Fig. 1 transversely to its axis; Fig. 3 is a sectional view of a slightly modified form of the invention taken on the line 3—3 of Fig. 4; and Fig. 4 is a section taken on the line 4—4 of Fig. 3.

In these drawings I have illustrated one embodiment of my invention, together with a slight modification thereof. In both forms the device comprises a supporting structure, or body portion, mounted for rotatory movement and which carries a conductor. This conductor is divided into two or more sections, and the outer ends of two of the sections are connected with the external circuit, in any suitable manner, and the inner ends of the sections are arranged adjacent one to the other and have parts forming contacts. Where there are more than two sections the contacts are arranged in pairs and the several pairs of contacts are spaced apart. Movably mounted on the supporting structure are one or more bodies of conducting material, one for each pair of contacts, which are so supported and arranged that they will be moved by centrifugal force, when rotary movement is imparted to the supporting structure, into engagement with the contacts of the respective pairs of contacts, thus closing the circuit through the several sections of the conductor and, consequently, through the external circuit. The construction may take various forms and it will be understood that those here shown have been chosen for the purpose of illustration only.

In the particular embodiments of the invention here illustrated the supporting structure, or body portion, is in the form of a disk like structure which is preferably formed of a moldable insulating material, such, for example, as bakelite. As shown in the present drawings, this body is formed in sections, there being in the present instance three sector like sections. In this body I provide one or more cavities 2, which extend outwardly from points near the center of the body portion and which form guideways for the bodies of conducting material. The conducting material may be of any suitable character and, in the present instance, I have employed a fluid conductor, such as mercury. In this construction each of the sector like parts of the body is provided with a single radial cavity which terminates short of the periphery of the body and is closed at its inner end, after the mercury has been placed therein, by a plug 4, which as here shown is screw threaded into the end of the cavity and which may be cemented therein to effectually prevent any leakage of the mercury from the cavity. The conductor is preferably molded in the body of insulating material and comprises four sections, as shown at 5, 6, 7 and 8. The sections 6 and 7 of the conductor, which cross the lines of division between the sector like sections of the body, are divided into two parts and the ends of the two parts are flush with the edges of the sector like sections of the body so that when these sections are brought together the ends of the two parts of the conductor sections will be brought into contact one with the other. Each section of the conductor has one end provided with a part extending through the wall of one of the cavities and forming a contact and in the present instance the end of the conductor itself extends into the cavity. These contact parts are preferably arranged near the outer ends

of the cavities and, as here shown, are on opposite sides of the respective cavities. The sections 5 and 8 of the conductor are connected at their outer ends with the external circuit. This may be accomplished in any suitable manner which will maintain the connection during the rotation of the cutout. In the present instance, the body portion is provided with a bushing 9 by means of which the device may be mounted upon a shaft 10 which is connected with one side of the circuit, and the outer end of the conductor section 5 is electrically connected with this bushing. Where the device is used with a generator and a storage battery the storage battery may be grounded upon a metallic supporting frame, or structure, and the circuit thus established through the shaft. The body portion is provided on its periphery with a metallic rim, or band, 11, which serves not only to bind the several sections of the body portion firmly together but also serves as a connecting medium between the outer end of the section 8 of the conductor and the other side of the external circuit which, in the present instance, is shown as comprising a brush 12 bearing upon the metallic rim.

It will be apparent that, when the device is rotated about its axis, the body of conducting material, or mercury, 3, in each cavity, will be moved outwardly by centrifugal force and brought into engagement with the contacts at the outer end of that cavity and will be maintained in this engagement so long as the device rotates at a speed sufficient to produce the necessary centrifugal force. When the device stops or the speed of rotation falls below a predetermined point, which is determined by the weight of the conducting material, the conducting material in one or more of the cavities will move out of engagement with the contacts of that cavity, or those cavities, thereby causing the circuit through the internal conductor to be broken at one or more points and thus interrupting the flow of current through the external circuit. In that form of the device shown in Figs. 1 and 2, the structure is designed for rotation about a horizontal axis and the three cavities are spaced equal distances apart and so arranged that in any position in which the device may stop one or more of these cavities will have its outer end arranged above a horizontal plane passing through the axis of rotation, and consequently, the conducting material in such cavity, or cavities, will move toward the inner end, or ends, thereof and out of engagement with the contacts, thus making it certain that the circuit will be broken when the rotation of the cutout ceases, regardless of the position in which it stops. It is only when the device is rotated at a speed sufficient to produce the necessary centrifugal force that the conducting material in all three cavities will be held at the outer ends of the respective cavities to complete the circuit.

In Figs. 3 and 4 I have shown a slightly modified form of the device designed for rotation about a vertical axis. In this form of the device the construction is the same as that above described with the exception that the cavities 13 are arranged with their outer ends above their lower ends so that the conducting material therein will tend at all times to move downwardly, toward the inner ends of the cavities and out of engagement with the contacts. When the device is rotated about its vertical axis the centrifugal force will move the conducting material outwardly, as above described, and the contacts will be closed and the circuit completed. In this form of the device a single cavity may be employed if desired because each cavity is always in such a position that the conducting material will flow away from the contacts when the rotation of the cutout is interrupted.

When mercury is used as the conducting material I prefer to provide the outer end of each cavity with an inwardly extending projection 14 which is spaced from the side walls of the cavity and greatly reduces the liability of the mercury to adhere to the end wall of the cavity and thus bridge the contacts after the cutout has stopped. There is little likelihood of the mercury adhering in this manner regardless of the construction of the cavity, but with the projection arranged as shown it is practically impossible for the mercury to adhere to the end of the cavity after the movement of the cutout has stopped, and, consequently, the circuit will be broken with certainty when the cutout has stopped.

The operation of the device will be readily understood from the foregoing description and it will be apparent that I have provided a very simple and highly efficient cut out which will automatically close the circuit and maintain the same closed so long as the cutout continues to rotate at an appreciable speed and which will automatically interrupt the circuit with certainty as soon as the cutout stops, or moves at a speed less than the predetermined speed. The arrangement of the guides, or cavities, for the conducting material is such that one of these will always be in such a position that the conducting material will automatically move away from the contacts when the movement of the cutout ceases. It will be further apparent that the device has no moving parts except the conducting material and that this material is of such a character and so mounted that it can not stick but will always be capable of free movement within the cavities. Consequently, the efficiency of the de-

vice will not be impaired by long continued use.

It will be obvious that the supporting structure, or body portion, may be constructed in various ways and that the character of the conducting material and the manner in which the same is guided into and out of engagement with the contacts may vary greatly from that here shown, and I, therefore, wish it to be understood that I do not desire to be limited to the details of construction herein shown and described, as various modifications may occur to a person skilled in the art.

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

1. In a device of the character described, a rotatable body portion having an outwardly extending cavity, a conductor carried by said body portion and comprising two sections, each section having a part extending through the wall of said cavity in the outer end thereof and forming a contact, and a body of conducting material mounted in said cavity and movable by centrifugal force into engagement with said contacts.

2. In a device of the character described, a rotatable body portion formed of insulating material and having an outwardly extending cavity, a conductor embedded in said body portion and comprising two sections, each section having a part extending through the wall of said cavity in the outer end thereof and forming a contact, and a body of conducting material mounted in said cavity and movable by centrifugal force into engagement with said contacts.

3. In a device of the character described, a body portion having a plurality of outwardly extending cavities, a body of conducting material mounted in each of said cavities, a conductor comprising a plurality of sections, a part of said conductor sections having at their ends parts forming contacts and extending into the respective cavities and two of said conductor sections having at one end a part forming a contact and extending into the respective cavities and having their other ends connected with an external circuit, said cavities being so arranged that the conducting material in at least one of them will move by gravity out of engagement with said contacts when said device is stationary in any position.

4. In a device of the character described, a body portion rotatable about a substantially horizontal axis and having a plurality of radial cavities spaced substantially equal distances apart, a conductor connected with an external circuit and comprising a plurality of sections having parts extending into the respective cavities near the outer ends thereof and forming contacts, each of said cavities having two such contacts, and a body of conducting material supported in each of said cavities and movable by centrifugal force into engagement with the contacts for that cavity.

5. In a device of the character described, a body portion of insulating material having a plurality of outwardly extending cavities, a conductor molded into said body portion and having separated parts extending into the respective cavities to form contacts, each of said cavities having two such contacts, and a body of conducting material supported in each cavity and movable by centrifugal force into engagement with the contacts thereof.

6. In a device of the character described, a rotatable body portion having an outwardly extending cavity, a metal bushing arranged centrally of said body portion, a metallic band extending about the periphery of said body portion, a conductor connected at its ends with said rim and said bushing and having parts extending into the outer end portion of said cavity and forming contacts, and a body of conducting material mounted in said cavity and movable by centrifugal force into engagement with said contacts.

7. In a device of the character described, a rotatable body portion comprising a plurality of sections rigidly connected one to the other, said body portion having an outwardly extending cavity, a conductor carried by said body portion and having parts extending into the outer portion of said cavity to form contacts and conducting material mounted in said cavity and movable by centrifugal force into engagement with said contacts.

8. In a device of the character described, a rotatable body portion formed of a plurality of sector like sections each having formed therein an outwardly extending cavity, a conductor embedded in said sections and having portions extending into the outer end portions of the respective cavities to form contacts, and conducting material mounted in the respective cavities and movable by centrifugal force into engagement with said contacts.

9. In a device of the character described, a rotatable body portion having an outwardly extending cavity, a projection extending into said cavity from the outer end wall thereof and spaced from its side walls, a conductor carried by said body portion and comprising two sections, each section having a part extending through the wall of said cavity near the outer end thereof and forming a contact, and a quantity of fluid conducting material freely movable in said cavity.

10. In a device of the character described, a body portion mounted for rotation in a substantially horizontal plane and having a

cavity extending outwardly therefrom and having its outer end arranged above its inner end, a conductor carried by said body portion and comprising two sections, each section having a part extending through the wall of said cavity and forming a contact, and a body of conducting material mounted in said cavity and movable by centrifugal force into engagement with said contacts.

11. In a device of the character described, a rotatable body portion having a substantially radial guide, a conductor carried by said body portion and comprising two sections, each section having a part forming a contact and arranged adjacent to the outer end of said guide, and a body of conducting material movable by centrifugal force along said guide into engagement with said contacts.

12. In a device of the character described, a rotatable structure comprising a plurality of outwardly extending guides spaced apart about the axis of said structure, a conductor carried by said structure and comprising a plurality of sections having parts forming contacts, said contacts being arranged in pairs adjacent to the outer ends of the respective guides, and bodies of conducting material movable by centrifugal force along the respective guides into engagement with said contacts, said guides being so arranged relatively to the axis of said structure that in any position of said structure the outer end of at least one of said guides will be elevated above the inner end thereof to permit the conducting material to move by gravity away from its contacts.

In testimony whereof, I affix my signature hereto.

LORENZO DOW CRONINGER.