

(No Model.)

A. J. WURTS.
CIRCUIT BREAKER.

No. 570,212.

Patented Oct. 27, 1896.

Fig. 1.

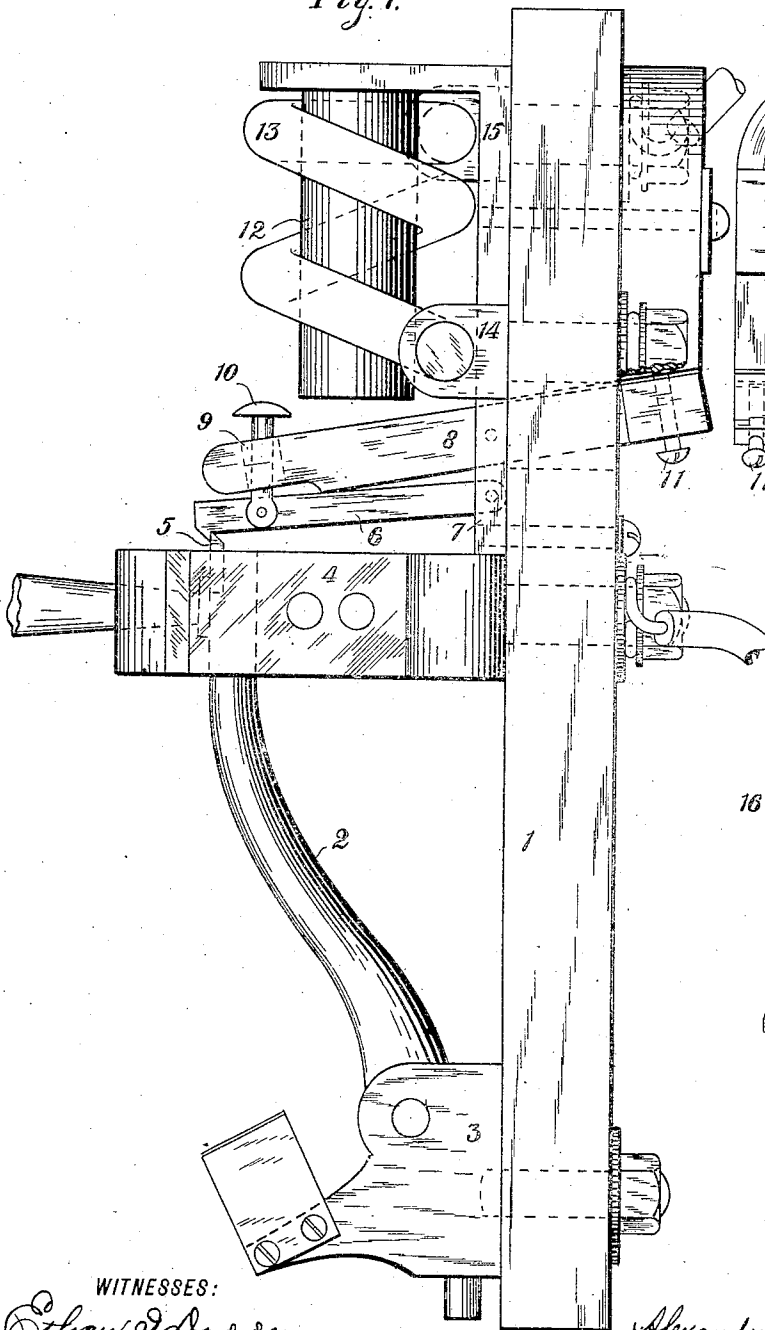


Fig. 2.

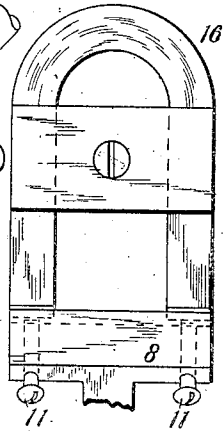
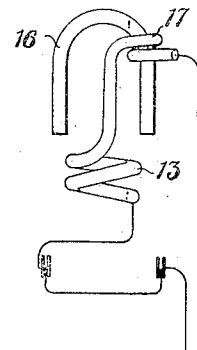


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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SAME PLACE.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 570,212, dated October 27, 1896.

Application filed August 31, 1895. Serial No. 561,118. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER JAY WURTS, a citizen of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Circuit-Breakers, (Case No. 662,) of which the following is a specification.

My invention relates to automatic circuit-breakers or switches; and it has for its object to provide a device of this character which shall be particularly adapted for use upon electric cars or in other relations in which there is liable to be more or less jarring or jolting of the apparatus, which tends to disarrange its parts.

It is usually desirable and oftentimes necessary in the use of circuits carrying heavy currents under high tension to employ circuit-breakers which will automatically interrupt the circuit whenever the current, for any reason, increases beyond a predetermined limit, this interruption of the circuit being usually effected through the agency of an electromagnet of some sort, the winding of which is included in the circuit to be interrupted, and which, when the current exceeds the amount desired, attracts an armature, which in turn either opens the circuit directly or withdraws a latch or fastening device from the movable member of the switch, which is in turn automatically opened either by the action of gravity or a spring. When such automatic devices are employed upon electric cars, the jarring or jolting is liable to be at times so great as to move the armature from its normal position to such a degree as to effect a premature opening of the circuit. In order to overcome this difficulty, I have devised the apparatus shown in the accompanying drawings, in which—

Figure 1 is a side elevation of a circuit-breaker constructed in accordance with my present invention, and Fig. 2 is a detail view of an auxiliary magnet and a portion of its armature. Fig. 3 is a diagram of the circuits of a circuit-breaker of slightly-modified construction.

Reference being now had to the drawings in detail, 1 is the insulating base-plate on which the operative parts of the circuit-

breaker are mounted, and 2 is the arm which carries the movable switch-contacts at one end and at the other end is pivoted in a block 3, bolted to the base-plate 1.

The main movable and stationary contacts are not fully shown in the drawings, except diagrammatically in Fig. 3, but they may be of the usual construction. These devices are obscured by the part 4, which is intended to represent shunt-contacts and their spring-supports, such as are set forth in my application Serial No. 561,117, of even date herewith.

Projecting from the movable contact member is a catch 5, with which engages a latch 6, the latter being pivoted to the plate or bracket 7 or other suitable stationary portion of the device. The plate or bracket 7 is bolted to the base 1, and pivoted thereto, approximately at its center of gravity, is an armature 8, provided at its front end with an opening 9, through which extends a headed pin 10, the body of which has a diameter somewhat less than that of the perforation 9. This pin 10 is connected at its lower end to the latch 6 and is of sufficient length so that the front end of the armature 8 may be moved up a considerable distance before coming into contact with the head of the pin to raise the latch out of engagement with the catch 5.

The armature is preferably substantially T-shaped, as shown, and its rear end is provided with two screws 11 or other suitable devices which may be adjusted to project a greater or less distance beyond the upper face of the armature, as may be found desirable in practice. The plate or bracket 7 extends forward at its upper end at right angles to the main portion, and this extension supports a magnetizable core 12. The plate or bracket 7 is preferably constructed of iron, in order that a good magnetic circuit may be provided for the coil 13, which is wound about the core. 12 and is attached at its two extremities to the binding-posts 14 and 15. The binding-post 15 extends through the base-plate 1 and has one of the terminals of the main circuit connected to it, as shown. The post 14 also extends through the base-plate and has connected to it a wire which leads to one of the stationary switch-contacts, as indicated more

clearly in Fig. 3. Bolted to the rear of the base 1 is a permanent magnet 16, the poles of which are located in proximity to the rear end of the armature 8 when it is in its elevated position and in such a position that the projecting ends of the screws 11 may engage therewith.

It being desirable that some portion or portions of the armature should be maintained substantially at the point of magnetic saturation, I prefer to make the screws 11 of magnetizable metal.

The operation of the device is as follows: While a normal current only passes through the circuit the attractive force exerted upon the front end of the armature 8 by the magnet 12 13 will be insufficient to move the armature from the position shown in the drawings. Furthermore, inasmuch as the armature is pivoted approximately at its center of gravity, a force such as gravity or sudden jars, or any force acting equally upon both ends of the armature, will not tend to displace it for the reason that its moments are equal. The armature can therefore be displaced only by means of the local action of the magnet 12 13. The function of the permanent magnet 16 is twofold, *i. e.*, it provides a load for the armature which is adjustable through the adjustment of the screws 11 and against which the magnet 12 13 acts, and it also holds the armature in a fixed position until the instant of critical current, when immediate release occurs. The function of this load differs from that of the weights provided in circuit-breakers heretofore in use in that it does not have the property of inertia except in a very limited degree.

In the old form of weighted armature, where the property of inertia exists, it frequently happens that with a slowly-increasing current through the critical current the armature will be raised comparatively slowly and thereby fail to acquire sufficient momentum to release the detent. This is due to the inertia of the armature and the time required to accelerate this motion. With the balanced armature and permanent magnet for load not only is the inertia greatly reduced, but when the armature is released from the permanent magnet it passes at that end from a strong magnetic field into a rapidly-weakening one and at the other end from a weak field into a rapidly-increasing field, thereby securing rapid acceleration, even though the current be slowly increased through the critical amount.

It is obvious that an electromagnet of proper strength may be employed instead of the permanent magnet shown, and hence I desire to be understood that my invention is not limited to any specific form or type of magnet for accomplishing the desired result.

In Fig. 3 I have shown diagrammatically an arrangement of circuits in which the main wire of the circuit is given one turn around

one leg of the permanent magnet at 17, this arrangement being employed in order to keep the magnetization of the magnet 16 at an approximately constant value. The apparatus, except as regards this means for producing constant magnetization of the auxiliary magnet, is intended to be substantially the same as that shown in Fig. 1 of the drawings.

It will be understood that while I have shown and described a specific form of circuit-breaker my invention is not limited to such a specific form and arrangement, but may be applied to an apparatus of different construction, if desired.

I claim as my invention—

1. In an automatic circuit-breaker, the combination with a latch for the movable member, and means for withdrawing the same comprising an electromagnet and its armature, of a magnet acting in opposition to said electromagnet to prevent accidental or premature withdrawal of the latch.

2. In an automatic circuit-breaker, the combination with a latch for the movable member and means for withdrawing the same comprising an electromagnet and an armature pivoted approximately at its center of gravity, of a magnet acting in opposition to said electromagnet to prevent accidental or premature withdrawal of the latch.

3. In an automatic circuit-breaker, the combination with a latch for the movable member, and means for withdrawing the same comprising an electromagnet and an armature pivoted approximately at its center of gravity, of a permanent magnet acting upon said armature in opposition to said first-named magnet to prevent accidental or premature withdrawal of the latch.

4. In an automatic circuit-breaker, the combination with a latch for the movable member and means for withdrawing same, comprising an electromagnet and an armature pivoted approximately at its center of gravity and having a lost-motion connection with the latch at one end and adjustable projections at the other end, of a magnet the poles of which are engaged by said adjustable projections.

5. In an automatic circuit-breaker, the combination with a latch for the movable member and means for withdrawing the same comprising an electromagnet and a pivoted armature connected at one end to said latch, of a permanent magnet the poles of which are adjacent to the other end of the armature when the breaker is closed, and means for electrically energizing said magnet.

In testimony whereof I have hereunto subscribed my name this 29th day of August, A. D. 1895.

ALEXANDER JAY WURTS.

Witnesses:

JNO. A. SCHIMPF,

H. C. TENER.