W. S. MAYER.

AUTOMATIC INTERCHANGEABLE CIRCUIT BREAKER.

APPLICATION FILED MAY 2, 1914.

1,188,966.

Patented June 27, 1916.

FIG. 1.

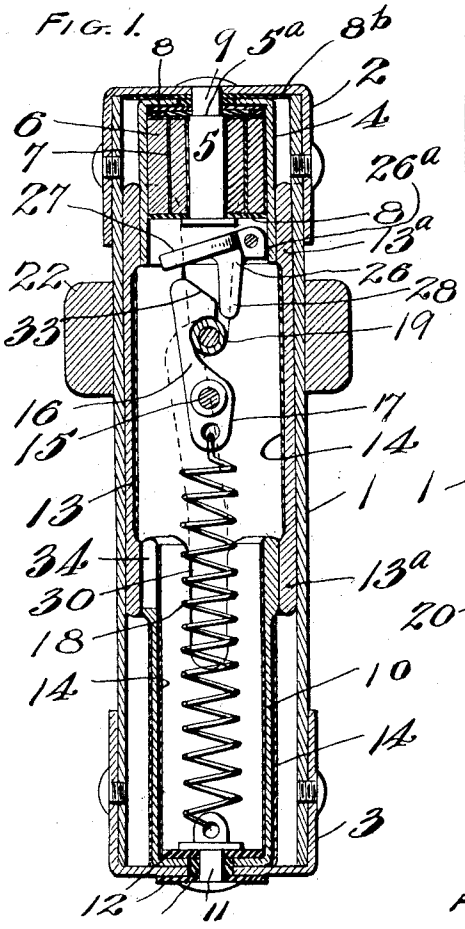


FIG. 7.

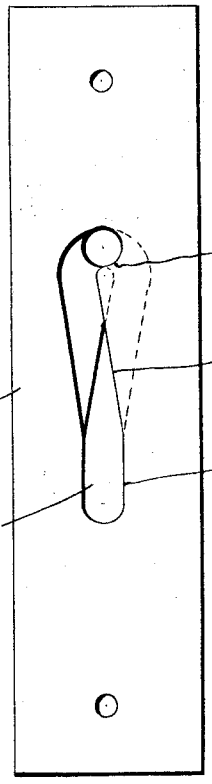


FIG. 3.

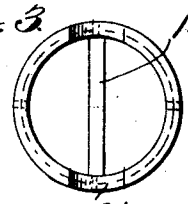


FIG. 4.

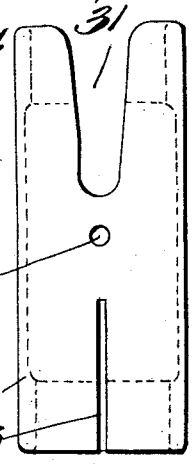


FIG. 5.

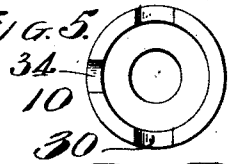


FIG. 6.

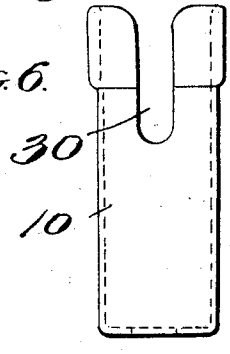


FIG. 2.

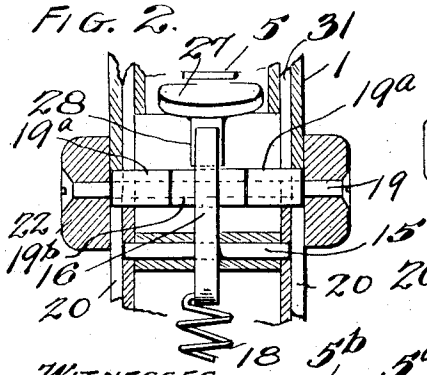


FIG. 8.

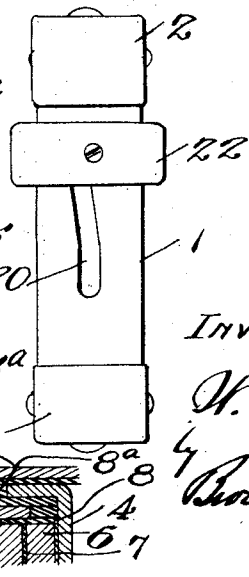


FIG. 9.

WITNESSES.

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AUTOMATIC INTERCHANGEABLE CIRCUIT-BREAKER.

1,188,966. Specification of Letters Patent. Patented June 27, 1916.

Application filed May 2, 1914. Serial No. 835,912.

To all whom it may concern:

Be it known that I, WALTER S. MAYER, a citizen of the United States, residing at Taunton, State of Massachusetts, have invented a certain new and useful Automatic Interchangeable Circuit-Breaker, of which the following is a specification.

A principal object of my invention is to provide a device readily insertible in electric circuits for breaking the circuit upon the occurrence of an overload.

In a preferred form it may have exterior shape and dimensions substantially the same as a standard fuse to be inserted in the customary spring clips in electric circuits. This well known fuse of cartridge-like form with metallic ends to engage the metallic clips has a fusible wire which is destroyed when the current flow exceeds a certain amount, and the circuit is usually restored by removing the entire device and inserting another one with fuse wire in place.

My automatic circuit breaker is provided with means for interrupting the circuit upon an occurrence of overload and for restoring the circuit by actuating an exterior operating device. More specifically, the housing may, in an approved embodiment, be of form similar to that of the ordinary fuse cartridge and contains circuit breaking mechanism which serves to interrupt the circuit upon overload and there is provided an exterior operating device connected with the interior mechanism so that the circuit may be restored. Provision is also made for preventing the circuit from being restored if the overload condition still continues.

The invention dispenses with fuse wire and substitutes for such interrupting means, electro-mechanical devices which do not require the use of fusible elements.

A problem of considerable difficulty is involved in devising circuit breaking means of a practical nature which may be contained in small limits and may be readily inserted in a circuit, and the invention consists not only in means for carrying out the general purposes outlined above, but in the devices shown and described or their equivalents adapted for the above-described compact assembly and convenient mode of use.

I will now describe one preferred embodiment of the invention, the best that I have up to this time devised. The invention is, however, capable of embodiment in different forms and I do not limit myself to details except as claimed hereafter.

In the drawings: Figure 1 is a longitudinal section of an appliance embodying the invention, the scale being about twice the size of the device when designed for use in place of one standard size of fuse plug, the showing being made in this enlarged form for the sake of clearness. Fig. 2 is a fragmentary section of parts adjacent to the resetting ring, taken from the left of Fig. 1. Fig. 3 is a top plan of movable contact sleeve 13. Fig. 4 is a side elevation of the same. Fig. 5 is a top plan of fixed contact sleeve 10. Fig. 6 is a side elevation of the same. Fig. 7 is a side elevation of the tubular body of the housing, and Fig. 8 is a side elevation of the complete device ready for easy insertion in a circuit, for example, in the clips of a fuse block. Fig. 9 is an enlarged sectional detail of one end of the device.

Reference character 1 designates a tubular body of insulating material provided with metallic caps or end pieces 2, 3. In one end of the housing thus formed is a cup-shaped contact piece 4 and within this is an electro-magnet comprising a core 5 and a winding 6, in this instance of ribbon of metal, connected at one end to the core and at the other end to contact piece 4, the coil thus being suitably insulated by an interposed layer 7 of suitable insulating material. The ends of the coil are insulated by sheets 8 of mica, or the like. The core is further insulated from contact 4 by a bushing 8^a and the contact is insulated from cap or terminal 2 by a disk 8^b. The core piece may be secured in position by providing it with a shoulder 5^a bearing against a metal washer 5^b, this washer being insulated by washers 8 and washer 8^c. At the other end of the housing is a second fixed contact piece 10 in electrical contact with cap 3 and secured thereto by a rivet 11, the rivet, however, being insulated by disks and bushing 12 of suitable insulating material. Slidably mounted within the body 1 is a movable contact piece 13 shown in elevation in Fig. 4. The central part of the bore of this tubular contact piece is counterbored, or otherwise, inwardly-extending contacts 13^a are formed at the ends of the sleeve to engage fixed contacts 4 and 10 to complete the circuit, which runs from

one of the spring clips of a fuse block through cap 2, armature 5, coil 6, contact 4, sleeve 13 and contact 10 to cap 3 and then to the other clip of the fuse block. To break the circuit it is only necessary to move the sleeve 13 in the direction of rivet 11. The circuit is then broken at both ends of the sleeve at once and arcing is prevented by providing insulating sleeves 14 within sliding member 13 and inside and outside of contact 10, as shown.

A pin 15 is mounted within sleeve 13 and on this is pivoted a latch 16 having a downward projection 17 to which is connected spring 18. The other end of the spring is connected to the inward end of rivet 11. Ordinarily, sleeve 13 is held up in contact position against the pull of the spring by engagement of the latch with a bar 19 passing transversely through slots 20 in body 1 and connected to a slider or resetting member 22 slidably mounted on the outside of the body. The slots 20 have straight portions 23, diagonal portions 24 and lateral shoulders 25, and, normally, the bar 19 rests on these shoulders 25 in the position shown in Fig. 1 and thus retains latch 16 and maintains the sliding contact piece in contact position. Preferably, the bar 19 is provided with rollers 19^a to engage slots 20 and with a roller 19^b to engage the latch. This provision of separate rollers permits them to move in different directions under certain conditions without interfering with the intended mode of operation of the mechanism.

Pivoted within contact piece 4 is trigger 26 having member 27 constituting a magnet armature and another member 28 confronting one face of latch 16. The trigger-piece also has a shoulder 26^a bearing against contact thimble 4 to limit the movement of the trigger. Upon occurrence of an overload, the armature 27 is attracted by the electro-magnet and the trigger throws the latch off the bar 16; spring 18 then quickly pulls the movable contact piece away from contact position and the circuit is broken. Fixed contact sleeve 10 is provided with slots 30 to accommodate pin 15 and movable contact sleeve 13 is provided with slots 31 to accommodate bar 19. To reëstablish the contact, resetting ring 22 is rotated to free bar 19 from shoulders 25 and the ring is then moved down as seen in Fig. 1. The diagonal portions 24 of slots 20 acting upon the bar, rotate the ring again to be in alinement with slots 30 and 31, and further movement of the ring causes the bar to encounter slanting face 33 of the latch and move the latch back, and still further movement of the ring causes the latch to reëngage with bar 19. This movement of the latch is accommodated by slot 34 in contact piece 10. The resetting ring is then moved up again carrying with it the latch and contact sleeve 13, and these parts are locked in contact position again by rotating the ring at the upper end of its travel so that it again engages shoulders 25. It will be observed that it is impossible to reset the contact if an overload still continues, for the reason that in that case the armature 27 will still be attracted by the magnet and trigger 28 will throw the latch off of bar 19 as soon as the latch approaches the trigger. Safety in operation is thus effectively provided for.

Evidently, within the small space permitted within a shell or housing of the type described, careful construction and arrangement of parts is necessary to produce the above-described functions. The particular embodiment of the invention shown is the result of careful study of the conditions and is a satisfactory embodiment of the principles of the invention but evidently the particular mechanism employed can be varied greatly and still respond to the broader feature of the invention as above described.

The movable contact sleeve may be provided with slots 36 at its lower end to make it somewhat flexible, to insure the efficient engagement with contact piece 10. The upper end is made sufficiently flexible by slots 31.

I claim:

1. In an automatic quickly attachable circuit breaker, the combination of a tubular body of insulating material, metallic caps at the ends thereof, tubular fixed contact pieces within the ends of the body, a slidable contact piece to make contact with both of the fixed contact pieces, a detent pin passing through slots in the tubular body and through slots provided in the movable contact member, a latch fixedly connected to the sliding contact member by a pivot, a spring connected between a tail-piece of the latch and one end of the tubular body to actuate the latch and retract the movable contact, a reset ring slidably mounted outside the body and connected to said detent pin, an electro-magnet located within one end of the body and a trigger pivoted within one end of the body, adjacent to the magnet and having an armature to be attracted by the magnet core and a member to coöperate with the latch to release the same upon occurrence of an overload.

2. In an automatic quickly attachable circuit breaker, the combination of a tubular body of insulating material, metallic caps at the ends thereof, tubular fixed contact pieces within the ends of the body, a slidable contact piece to make contact with both of the fixed contact pieces, insulating sleeves carried by certain of the contact pieces, a detent pin passing through slots in the tubular body and through slots pro-

vided in the movable contact member, a latch fixedly connected to the sliding contact member by a pivot, a spring connected between a tail-piece of the latch and one end of the tubular body to actuate the latch and retract the movable contact, a reset ring slidably mounted outside the body and connected to said detent pin, an electro-magnet located within one end of the body and a trigger pivoted within one end of the body, adjacent to the magnet and having an armature to be attracted by the magnet core and a member to coöperate with the latch to release the same upon occurrence of an overload.

3. In an automatic circuit breaker, the combination of a tubular body having a slot provided with a lateral shoulder, metallic caps at the ends of the body, an electro-magnet adjacent to one of the caps, two fixed contacts near the ends of the body, a movable contact, a spring applied thereto, a latch connected to the movable contact, a pin passing through said slot and adapted to be engaged by the latch, an exterior resetting member connected to the pin, and a trigger actuated by the electro-magnet for tripping the latch.

4. In an automatic quickly attachable circuit breaker, the combination of a tubular body having a slot provided with a lateral shoulder, metallic caps at the ends of the body, an electro-magnet adjacent to one of the caps, two fixed contacts near the ends of the body, a movable contact provided with slots at one end, a pin passing through the slots in the movable contact and in the body, an exterior resetting ring connected to the pin, a pivot fixed to the movable contact, a latch pivoted thereon and having a member to engage said pin, a spring connected to a tail-piece of said latch and to the opposite end of the body, and a trigger pivoted adjacent to the magnet and having a member to trip the latch.

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Witnesses:
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