(No Model.)

C. W. LARSON.

ELECTRIC AUTOMATIC CIRCUIT BREAKER.

No. 522,527. Patented July 3, 1894.

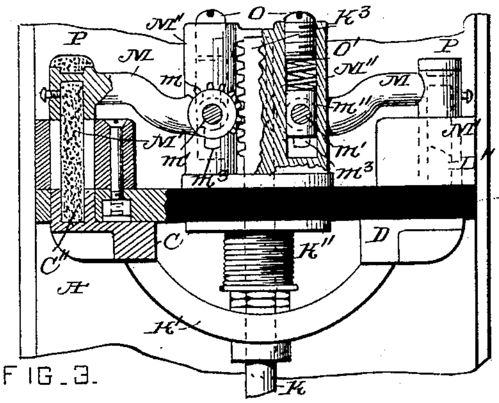

FIG_3.

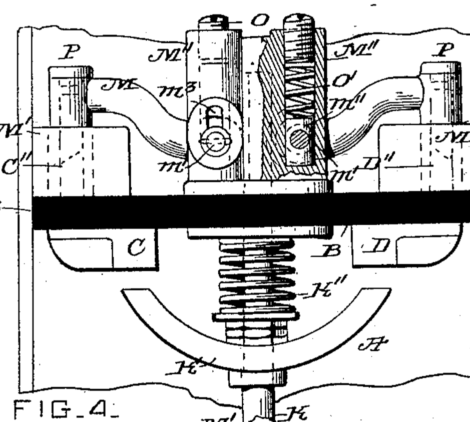

FIG_4.

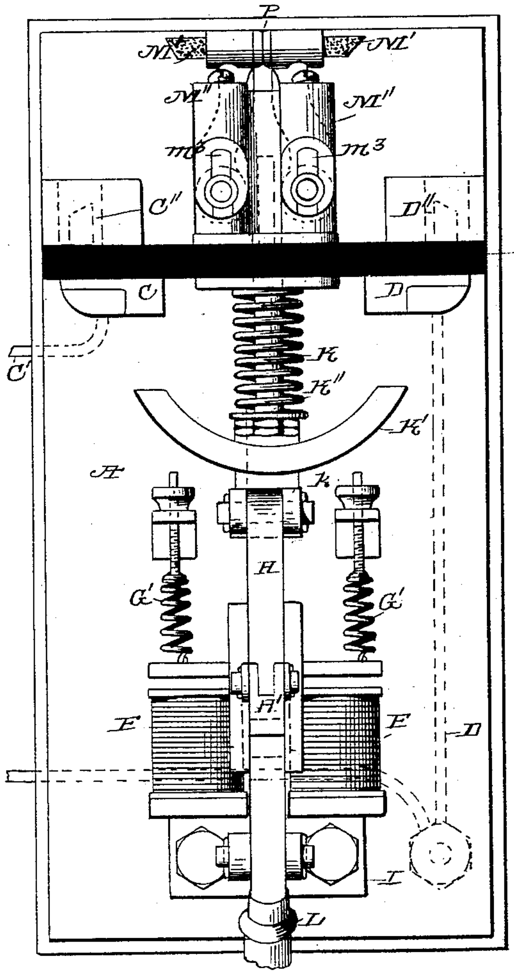

FIG_1.

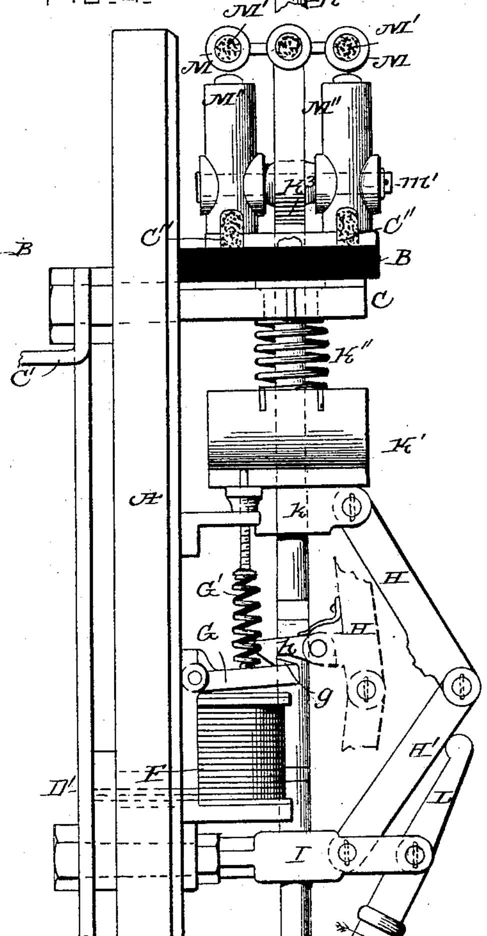

FIG_2.

Witnesses

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UNITED STATES PATENT OFFICE.

CARL W. LARSON, OF LYNN, ASSIGNOR OF ONE-HALF TO AUGUST LANGELL, OF BOSTON, MASSACHUSETTS.

ELECTRIC AUTOMATIC CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 522,527, dated July 3, 1894.

Application filed October 17, 1893. Serial No. 488,438. (No model.)

To all whom it may concern:

Be it known that I, CARL W. LARSON, a subject of the King of Sweden and Norway, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Electric Automatic Circuit-Breakers, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in electric automatic circuit breakers for the purpose of automatically breaking the line circuit of electric motors when overloaded and thereby preventing the wire of the armature from being burned out as will hereinafter be more fully shown and described reference being had to the accompanying drawings wherein—

Figure 1, represents a front elevation of the improved switch shown open. Fig. 2, represents a side elevation of the same, also shown open. Fig. 3, represents a partial front view and section showing the switch closed; and Fig. 4, represents a similar view showing the switch in the act of being opened.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

In the drawings A. represents the base plate made of some suitable insulating material and adapted to be secured to a wall or other convenient object.

B. is a bar or bracket made of insulating material and secured to the front of the plate A. as shown, said plate being made to rest on the metal electrodes C. D. secured to the plate A. and to said electrodes are metallically connected the respective line wires C′ and D′. In the circuit of the line wire D′ is arranged the electro-magnet F. above which is arranged a pivoted armature G. which, when a normal and not excessive current passes through it, is held raised away from the said electro-magnet by the influence of a suitable spring or springs G′. G′. as shown in Figs. 1 and 2.

The armature G. has a lip or projection *g*, onto which is locked the spring pressed hook *h*, pivoted to the upper knuckle lever H. which is pivoted to a lower knuckle lever H′. The lower end of the knuckle lever H′ is pivoted to a bracket I. secured to the plate A. and the upper end of the lever H. is pivoted to a hub *k*, secured to a vertically movable rod K. which is guided in bearings in the brackets B. I. as shown. To the rod K. is secured the lateral or segmental metal circuit breaker and closer K′ which when the circuit is broken is forced downward away from the electrodes C. D. by the influence of a spring K″ arranged on the rod K. between the under side of the bracket B. and the top of the circuit breaker and closer K′ as shown in Figs. 1 and 2.

The circuit is closed by forcing the part K′ metallically in contact with the electrodes C. D. as shown in Fig. 3, and this is done preferably by means of a handle lever L. pivoted to the bracket I. and which when swung in the direction of the arrow shown in Fig. 2, causes the knuckle levers H. H′. to be brought into a vertical or nearly so direction, and locked by the hook *h*, onto the armature lip *g*, as shown in the inner position of said levers H. H′. represented in Fig. 2.

In contact with the metal electrodes C. D. are held the respective carbons C″ D″ as shown in the drawings.

The upper end of the spring pressed rod K. is provided with a toothed rack K^3, as shown in Fig. 3, the teeth of which mesh in pinions *m. m.* secured to or forming a part of the respective arms or levers M. M. to the ends of which are secured carbons M′ M′ adapted to be brought in contact with the carbons C″ D″ when the circuit is closed as shown in Fig. 3. The inner ends of the levers M. M. are pivoted to or secured to spindles *m′ m′* located in bearings *m″ m″* which are vertically yielding in sockets or guides M″ M″ secured to the brace or bracket B. and provided in their upper ends with regulating screws O. O. between which and the movable bearings *m″ m″* are located springs O′ O′ for the purpose of depressing the bearings *m″ m″* against the bottom of the sockets or guides M″ M″ when the rod K is released and for this purpose vertical slots m^3 m^3 are made through the guides M″ M″ in which the spindles *m′ m′* are vertically movable as shown in Figs. 1, 3 and 4.

P. P. are elastic bunters secured to the outer upper ends of the levers M. M. for the pur-

pose of softening the blow when said levers are released and brought in contact with each other when the circuit is broken as shown in Fig. 1.

The operation is as follows: To close the circuit the handle I, is moved in the direction of the arrow shown in Fig. 2 until the pawl or hook *h*, on the knuckle levers H. H′ is locked on the armature G. in which position the circuit breaker and closer K′ is held in metallic contact with the electrodes C′. D′. and the carbons M′ M′ held in contact with the stationary carbons C″ D″ and the springs K″, O′ O′ compressed as fully shown in Fig. 3. In case the armature of the motor to which the switch is connected should become overloaded or an excessive current should otherwise be made to pass through the electromagnet F. F. the armature G. will be attracted thereto causing the pawl *h*, to be released from said armature and thus causing the rod K. to be released and forced downward by the influence of the compressed spring K″ causing the circuit between the part K′ and electrodes C. D. to be broken slightly in advance of the breaking of the circuit through the carbons C″ D″ and M′ M′ owing to the downward yielding motion of the pivots of the levers M. M. caused by the springs O′ O′ before the rack K^3 commences to swing the said arms M. M. and their carbons M′ M′ away from the stationary carbons C″ D″ thus preventing the formation of an arc at the time the circuit is broken between the part K′ and the electrodes C. D. As soon as the bearings of the arms M. M. come to a stop against the bottom of the guides or sockets M″ M″ the continued downward motion of the rod K. and its rack K^3 causes the arms M. M. and their carbons M′ M′ to move from the position shown in Figs. 3 and 4 to the position shown in Figs. 1 and 2 thus leaving the circuit broken until again closed by the motion of the hand lever I. and so on.

This improved switch is useful for direct and alternating currents of high or low potential.

For a current of high voltage I make the arms M. M. somewhat longer than for a lower voltage.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. In an automatic circuit-breaker, the combination with fixed contacts, of a sliding-rod carrying a bridging contact adapted to connect said fixed contacts, a spring acting to force said bridging contact away from the fixed contacts, an electro-magnet arranged in the circuit, a yielding armature carrying a catch, a toggle-lever fixed at one end and connected at its other end to the sliding-rod, and a hook carried by said toggle-lever and adapted to engage said catch, substantially as described.

2. In an automatic circuit-breaker, the combination with fixed contacts, of a sliding-rod carrying a bridging contact adapted to connect the fixed contacts, a spring operating to force said bridging-contact away from the fixed contacts, carbon electrodes constituting a shunt connection between the fixed contacts, an electro-magnet arranged in the circuit, a yielding armature carrying a catch, a toggle lever fixed at one end and at its other end connected to the sliding-rod, a hook carried by said toggle-lever and adapted to engage said catch, and means for separating the carbon electrodes after releasing said bridging contact, substantially as described.

3. In an automatic circuit-breaker, the combination with fixed contacts C, D, of a sliding rod K carrying a bridging contact K′ adapted to connect the fixed contacts, a spring K″ operating to force the contact K′ away from the contacts C, D, fixed carbon electrodes C″, D″ connected to the contacts C, D, levers M, M, carrying at their free ends carbon electrodes M′, M′, and at their other ends carrying pinions *m′* and journaled in yielding bearings *m″*, a toothed rack K^3 carried by the rod K and engaging said pinions, a catch for holding said contacts and electrodes in contact and an electro-magnet and armature for releasing said catch, substantially as and for the purpose specified.

4. In an automatic circuit-breaker, the combination with fixed contacts C, D, of a sliding-rod K carrying a bridging contact K′ adapted to connect the fixed contacts, a spring K″ operating to force the contact K′ away from the contacts C, D, fixed carbon electrodes C″, D″ connected to the contacts C, D, levers M, M, carrying at their free ends carbon electrodes M′, M′ and at their other ends journaled in movable bearings *m″* arranged in cylinders M″, springs O′ bearing against said bearings, pinions *m′* connected to the adjacent ends of the levers M, M, a toothed rack K^3 carried by the rod K and engaging said pinions, a catch for holding said contacts and electrodes in contact, and an electro-magnet and armature for releasing said catch, substantially as and for the purpose specified.

5. In an automatic circuit-breaker, the combination with fixed contacts C, D, of a sliding-rod K carrying a bridging contact K′ adapted to connect the fixed contacts, a spring K″ operating to force the contact K away from the contacts C, D, fixed carbon electrodes C″, D″ connected to the contacts C, D, levers M, M, carrying at their free ends carbon electrodes M′, M′ and elastic bunters P, P, and at their other ends journaled in movable bearings *m″* arranged in cylinders M″, springs O′ bearing against said bearings, pinions *m′* connected to the adjacent ends of the levers M, M, a toothed rack K^3 carried by the rod K and engaging said pinions, a catch for holding said contacts and electrodes in contact, and an electro-magnet and armature for releasing said catch, substantially as and for the purpose specified.

6. In an automatic circuit-breaker, the com-

bination with fixed contacts C, D, of a sliding rod K carrying a bridging contact K′ adapted to connect the fixed contacts, a spring K″ operating to force the contact K′ away from the contacts C, D, an electro-magnet F arranged in the circuit, a yielding armature G carrying a catch *g*, a toggle lever H H′ fixed at one end and connected at its opposite end to the sliding-rod K, a hook *h* carried by said toggle-lever and adapted to engage said catch, and a pivoted hand-lever L adapted to bear at one end against said toggle-lever to connect the contacts, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 22d day of September, A. D. 1893.

CARL W. LARSON.

Witnesses:
ALBAN ANDRÉN,
AUGUST LANGELL.