G. A. TATE.

ELECTRIC SWITCH.

APPLICATION FILED MAR. 27, 1913.

1,159,547.

Patented Nov. 9, 1915.

2 SHEETS—SHEET 1.

Fig. 1

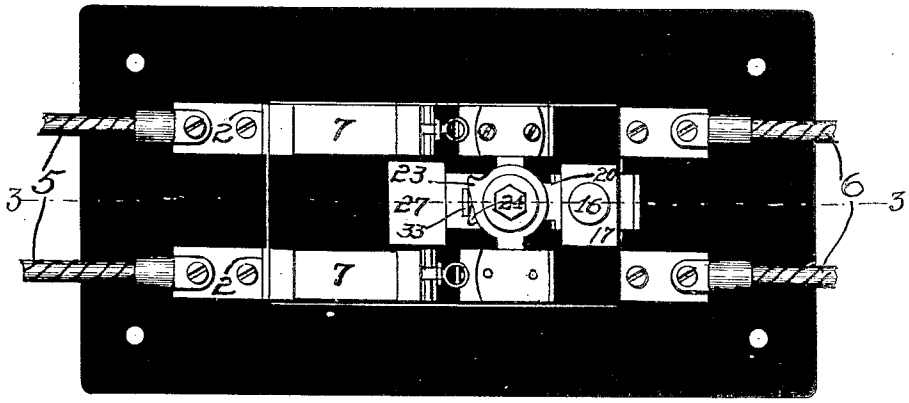


Fig. 2

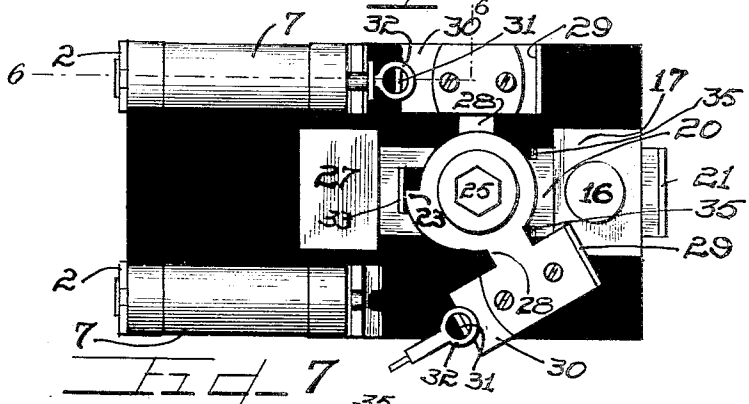
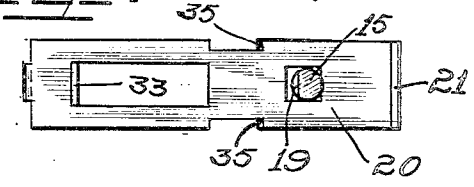


Fig. 7



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3

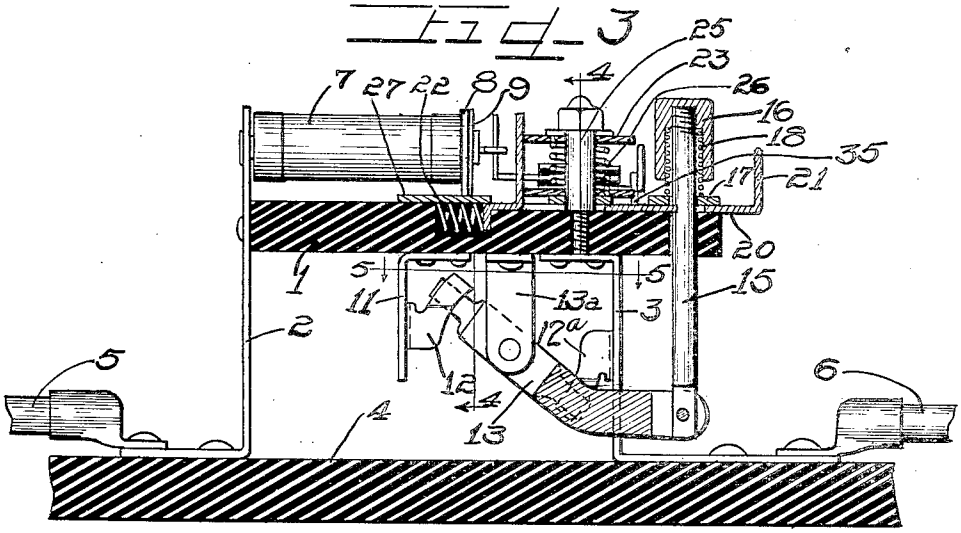


Fig. 5

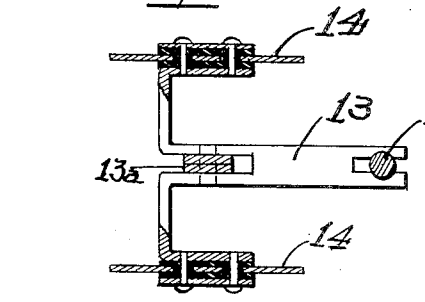


Fig. 4

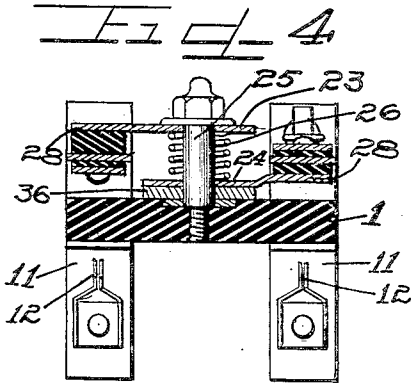
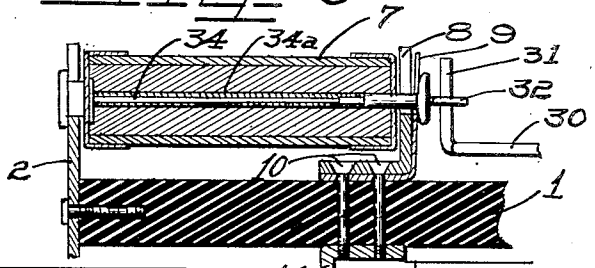


Fig. 6



Witnesses

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

1,159,547. Specification of Letters Patent. Patented Nov. 9, 1915.

Application filed March 27, 1913. Serial No. 757,117.

To all whom it may concern:

Be it known that I, GEORGE A. TATE, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Switches; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

Heretofore magnetically controlled switches, known as circuit breakers, have usually been placed in an electric circuit for protecting the machines when an overload comes on the line, and as a further protection in some instances fuses have also been inserted in the line and serve to break the circuit when the same is overloaded. However, such mechanism act independently of one another and generally only one operation takes place, either the breaking of the circuit by the magnetic switch or the blowing of the fuse.

This invention relates to an electric switch wherein each line of the circuit is broken at a plurality of points.

It is an object of this invention to provide a device adapted to break the electric circuit at a plurality of points when an overload comes thereon.

It is also an object of this invention to provide a device in which the breaking of the electric circuit due to an overload, serves to release mechanism positively disconnecting the entire circuit instantly thereafter.

It is also an object of this invention to provide a device wherein circuit breaking mechanism is adapted to be thrown into operation by the blowing of a fuse on one of the lines of an electric circuit.

It is also an object of this invention to provide means for replacing the fuse and connecting the actuating mechanism thereto of a circuit breaking mechanism, while said circuit breaking mechanism is in release or breaking position, and whereby such mechanism may be thrown into connected or closed position by hand after a new fuse has been inserted to thereby close the circuit.

It is also an object of this invention to provide a fuse operated circuit breaking mechanism whereby said mechanism may also be manually actuated without the blowing of the fuses.

It is also an object of this invention to provide a device such that an overload occurring on any line of an electric circuit will serve to throw the circuit breaking mechanism into release or open position for each of the lines of the circuit.

It is furthermore an object of this invention to construct a device in which fuses control the locking mechanism for a spring actuated switch, and wherein the blowing of any one of said fuses will cause the switch to be released into open position.

It is finally an object of this invention to provide a quick operating device which will instantly serve to break the entire circuit, and which may be easily and quickly restored to closed circuit position.

Other objects will be evident from the description.

The invention (in a preferred form) is illustrated in the drawings, and hereinafter more fully described.

In the drawings: Figure 1 is a top plan view of a device embodying my invention. Fig. 2 is an enlarged top plan view of the insulating base block, and the mechanisms thereon. Fig. 3 is a central vertical section taken on line 3—3 of Fig. 1. Fig. 4 is a section taken on line 4—4 of Fig. 3. Fig. 5 is a section taken on line 5—5 of Fig. 3. Fig. 6 is an enlarged section taken on line 6—6 of Fig. 2. Fig. 7 is a enlarged top plan view of the locking plate.

As shown in the drawings: 1, indicates an insulating base block suitably supported by current carrying bars 2 and 3, which may be attached to an insulating panel 4, of a switchboard. The line terminals 5, and 6, are shown connected to the bars 2, and 3, in the usual manner. The bars 2, are extended up above the base 1, and provided with slots to receive therein the extremity of the fuses 7. The other ends of each of said fuses are supported by means of the uprights 8, which, together with the adjacent spring members 9, are secured upon the base

by means of the screws or bolts 10. Said screws 10, also serve to support the extended members 11, thereby completing an electric circuit between the members 8, and said members 11. Rigidly secured on each of said members 11, are the resilient contact members 12, each forming one pole of a double throw knife switch.

The knife switch comprises a T shaped member 13, which has secured and insulated therefrom at its ends, knife blades 14, and a centrally downwardly extending member 13ª, secured on the base 1, affords a pivotal support for said member 13. The central extremity of said member 13, is slotted, and pivotally connected therein is an actuating rod 15, which is provided at its upper end with a recessed cap or button 16. Engaged therein and bearing downwardly upon the face plate 17, is a spiral compression spring 18, which tends to thrust said rod 15, upwardly, in which position the knives 14, will be out of contact with the contact members 12.

For the purpose of retaining the switch in closed position or that with the actuating rod 15, depressed, said rod is provided with a notch 19, which is adapted to be engaged by a slidable locking plate 20, angled at its end 21, to afford means for manual actuation of the same. As shown in Fig. 3, said plate 20, is slidably mounted in a recess or groove in the base plate 1, and its inner end is angled downwardly and projects into an enlarged recess in the face plate in which is engaged the spiral compression spring 22, which normally thrusts said plate outwardly with one side of an aperture therein engaging in the notch 19, in the push rod 15, thereby locking the same and retaining the switch in closed position. Means are provided for automatically retracting said locking plate when one of the fuses is blown. This comprises spring actuated cams 23, and 24, which are pivotally mounted upon the stud 25, said cam members being connected one to another by means of the spiral spring 26, which is of greater strength than the compression spring 22. A cover plate 27, is provided on the base plate over the recess inclosing the spring 22, said plate also serving as a guide and retaining means for the locking plate, similar to the guide face plate 17, secured over said locking plate near its end and through which the push rod 15, extends. Before connecting the spring 26, to the cams 23, and 24, said spring is initially tensioned such as to tend to rotate said cam members in opposite directions. Each of said cam members is provided with the extended arm 28, having a lip 29, thereon to facilitate manual operation of the same. Mounted thereon and insulated therefrom in one case above the arm 28, and in the other below said arm 28, of the respective cams, are hook plates 30, having upwardly extending projections or hooks 31, thereon. When the device is in normal condition with the switch closed, the eyes 32, forming a part of the fuses, engage over said projection 31, thus holding the cams in the position shown in Fig. 1. However, when one of the fuses blows, as shown in Fig. 2, the eye 32 is released and the spring 26, rotates the respective cam through a small arc, said cam bearing against an inwardly struck portion 33, of the locking plate 20, to retract said plate and release the switch.

As shown more clearly in Fig. 2, the locking plate is adapted to slide in the groove in the base plate 1, and the stud 25, projects through the aperture afforded therein by an inwardly struck portion 33, which projects upwardly a sufficient distance to be contacted by either the cam 23 or 24.

The fuse supports 2, and 8, are slotted to permit ready insertion and removal of a fuse. The fuse comprises a cylindrical insulating and fireproof casing 7, within which, and secured at one of its ends is a hollow fuse wire 34ª, which at its other end is attached to the eye 32, and reinforced by means of a thread 34, running longitudinally on the inside of the hollow or tubular fuse 34ª, or, if preferred, secured on the outer surface of a solid fuse wire, in either case such that the thread receives the tension or pull at the fuse ends, and not the fuse wire. However, the fuse wire conducts the current and when the current becomes so great as to cause melting of the fuse, the heat also burns the thread, thus releasing the eye 32, which, being attached to the hook 31, will be pulled out of the casing 7, and the cam be permitted to rotate. The amplitude of movement of each of said cams as the same are sprung into releasing position for the switch, is limited by projecting portions 35, which are struck upwardly from the edges of said locking plate 20.

Secured on each of the current carrying bars 3, similar to the contact fingers 12, are the contact fingers 12ª, which are disposed diametrically opposite said fingers 12, such that the knife blades 14, of the switch will serve to engage all of said contact fingers simultaneously. A bearing or face plate 36, is provided over the recess in the base plate 1, covering the slidable locking plate 20, therein, in order to space the lower cam 24, away from the upper surface of said base plate.

The operation is as follows: When the device is in closed position, the blade carrying member 13, is in the position shown in Fig. 1, with the actuating rod 15, depressed and the locking plate 20, engaging the notch

therein to hold the same retracted. However, when one of the fuses blows due to an overload upon the line, the respective cam is thereby released, as shown in Fig. 2, and under the impelling force of the spring 26, is rotated through a small arc sufficient to cause the cam to retract the locking plate 20, thereby releasing said actuating rod 15, and causing the switch under the impulse of the spring 18, to be opened at its four points. Before the switch is again closed, a new fuse is inserted and the cam member retracted and attached to the eye of the fuse, the spring 9, on the fuse support serving to insure a positive electrical connection and insuring retainment of the fuse in the support therefor. The button 16, is then depressed and as the notch 16, therein passes said locking plate 20, said plate engages therein under the impulse of the spring 22. It is obvious that the spring 26, must be stronger than the spring 22, in order that the cam actuated by said spring 26, may retract the plate 20, against the force of the spring 22, when said cams are released. If it is desired to open the circuit prior to the blowing of a fuse the operator merely thrusts the locking plate 20, inwardly by pressing upon the extension 21, and the push rod 15, is thereby released without releasing the cams 23 or 24.

It is obvious that details of the construction may be varied to a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted otherwise than necessitated by the prior art.

I claim as my invention:

1. In a device of the class described a spring actuated switch, a slidable plate locking the same in closed position, and fuse operated means for retracting said plate to permit opening of the switch.

2. In a device of the class described a spring actuated switch, slidable spring impelled means retaining the same in closed position, and fuse controlled spring actuated cam members adapted to retract said retaining means to permit opening of said spring actuated switch.

3. In a device of the class described a spring operated switch, spring actuated locking means to retain the same in closed position, spring impelled cams adapted to retract said locking means, and fuses adapted when blown to release said cams to cause retraction of said locking means to in turn permit opening of the spring operated switch.

4. In a device of the class described a switch, spring impelled slidable means locking the same in closed position, fuses adapted to permit retraction of said locking means when one of said fuses is blown, and means impelling said switch into open position with the release of said locking means.

5. In a device of the class described a switch, slidable means retaining the same in closed position, a spring acting normally to open said switch and fuse controlled spring actuated members for retracting said retaining means to permit said switch to move to open position.

6. In a device of the class described a four point switch, means acting normally to impel said switch to open position, mechanism retaining the switch in closed position, a plurality of spring impelled elements acting when released to retract said locking mechanism to release said switch to open position, and a plurality of fuses, the blowing of any one of which will cause release of said spring impelled elements.

7. In a spring impelled four point protective switch of the class described a plurality of fuses, a plurality of spring impelled actuating cam members controlled by said fuses and a slotted spring impelled slidable locking member operated by any one of the cam members to open said switch when any one of said cam members is released by its ruptured fuse.

8. In a spring impelled protective switch of the class described means locking said switch in closed position, and independently operatable spring connected cams one of which when released adapted to retract said locking means to permit opening of the switch.

9. In a device of the class described, a spring actuated switch, slidable means acting to lock the same in closed position, a pair of spring impelled and spring connected cams acting when released to retract said slidable means against the impulse of its spring, a plurality of fuses, respective ones of which act to hold one of said cams against the impulse of its spring, and means associated with said fuses to relieve the fusible portion thereof from stress in holding said cams.

10. In a device of the class described a spring actuated switch, a spring actuated recessed locking member retaining said switch in closed position, upwardly directed flanges formed on said locking member, a pair of fuses, upper and lower cam members adapted to be connected with said fuses, both of said cam members bearing against one of the flanges on the locking member, and a strong normally tensioned spring separating said cam members and impelling the same when any one of said fuses is blown to retract said locking member to release said switch to open position.

11. In a device of the class described a fuse comprising a casing having an eye inserted in one end thereof, fusible means

within said casing and connected to said eye, combustible means within said fusible means to receive and withstand tension at the fuse ends, and a resilient spring member insuring a positive electrical connection and retainment of the fuse in a support therefor.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

GEORGE A. TATE.

Witnesses:

CHARLES W. HILLS, Jr.,

LEON REIBSTEIN.