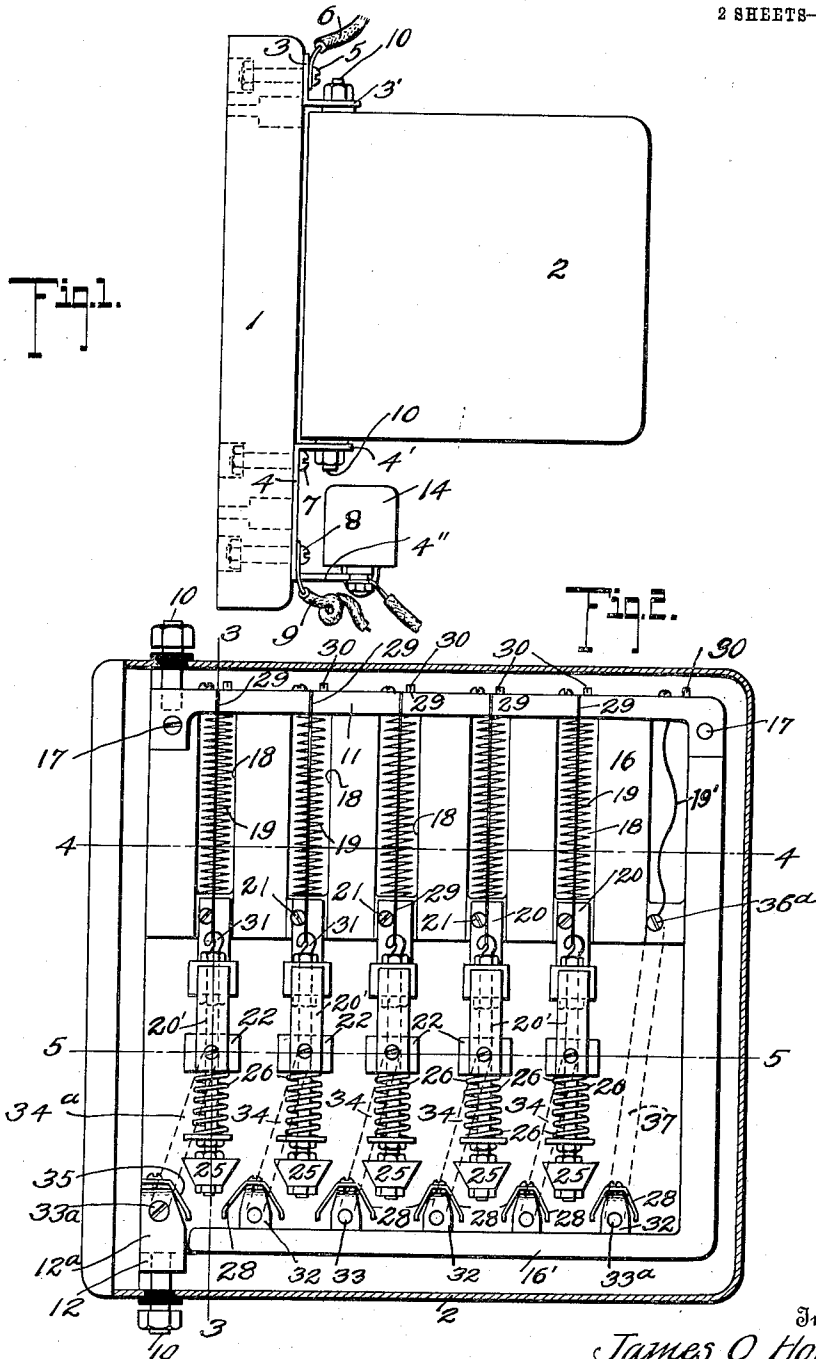


J. O. HOLTON.
ELECTRICAL PROTECTIVE DEVICE.
APPLICATION FILED JULY 30, 1912.

1,065,940.

Patented July 1, 1913.

2 SHEETS—SHEET 1.



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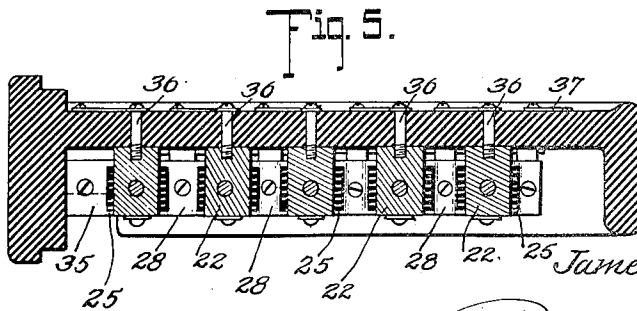
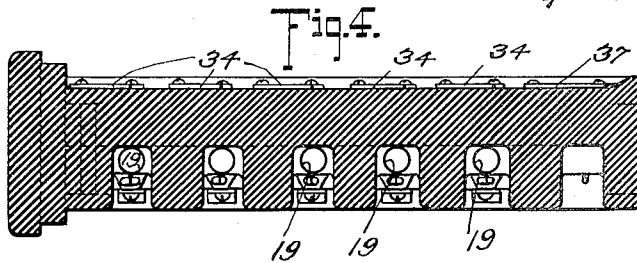
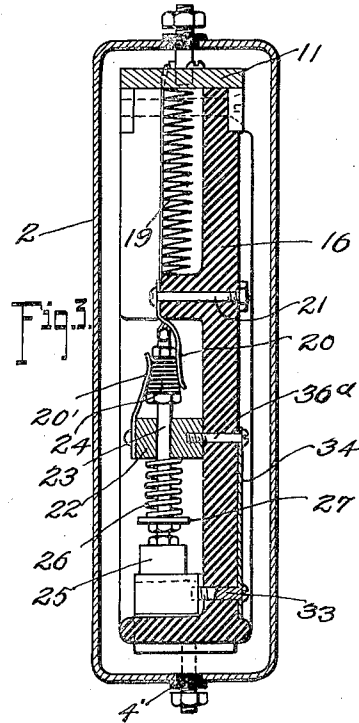
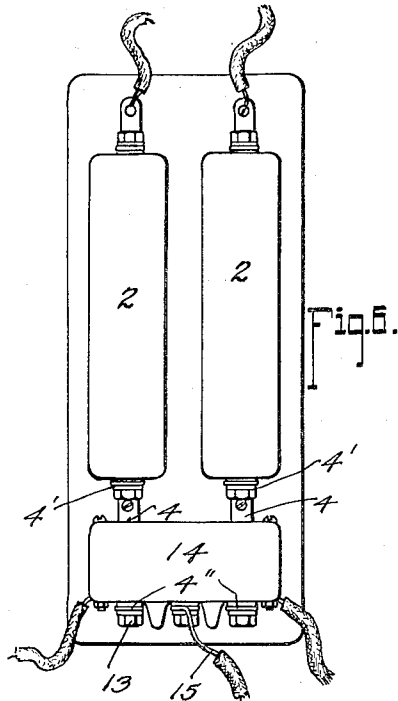
Attorneys

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2 SHEETS—SHEET 2.



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ELECTRICAL PROTECTIVE DEVICE.

1,065,940.

Specification of Letters Patent.

Patented July 1, 1913.

Application filed July 30, 1912. Serial No. 712,293.

To all whom it may concern:

Be it known that I, JAMES OLIVER HOLTON, a citizen of the United States, residing at Springfield, in the county of Greene and State of Missouri, have invented certain new and useful Improvements in Electrical Protective Devices, of which the following is a specification.

My invention appertains primarily to electrical protective devices such as are advantageously used in connection with electric circuits for the purpose of guarding the same against excess currents and abnormally high potentials.

In its broader phase the invention contemplates the provision of a peculiar excess current device forming a part of apparatus adapted to be employed on telegraph, telephone, and other electric lines or circuits, for controlling automatically the operation of fusible conductors whereby when a normal operating fuse or conductor is blown out, thus breaking the circuit, a fresh fuse will be brought into play to reestablish the circuit.

In the practical embodiment of the invention a plurality of fuses are provided, suitably incased as desired, and one of these fuses is normally in the circuit with which the invention is employed, the other fuses being cut out of said circuit and therefore normally inoperative so far as their current conducting function is concerned. A peculiarly mounted operating member normally acted upon by a spring is provided for each fuse, and the function of said member is to operate certain contacts when its cooperating fuse is burned out, whereby a succeeding or second fuse is automatically connected into the circuit or rendered operative, the said circuit previously temporarily broken by the burned out fuse being thus reestablished.

An essential feature of the invention resides in the employment of an inflammable connector associated with the operating member of each fuse to hold the latter in a predetermined position, said connector being adapted to be burned or disintegrated simultaneously with the burning out of its fuse, thereby to release the operating member aforesaid to permit the latter to act in the manner hereinbefore suggested.

While my invention is used preferably in connection with a lightning arrester, the latter being adapted to ground charges of

abnormally high potential by which a fuse may be burned out, I do not propose to be limited to the use of a specific type of arrester, since my invention comprises instrumentalities that under some certain conditions need not be employed with a current grounding device such as will be hereinafter generally referred to.

My invention also involves a special construction of fuses and a peculiar assemblage of the same whereby the successive operation of the fuses is obtainable under conditions which will be more fully presented in the following detailed description and by reference to the accompanying drawings, in which—

Figure 1 is a side view of a fuse box, lightning arrester and supporting base, showing electrical conductors consisting of circuit wires operatively connected with the respective parts; Fig. 2 is a sectional view of the fuse box, bringing out more clearly the arrangement of the several fuses and their parts located therein; Fig. 3 is a transverse sectional view, taken on the line 3—3 of Fig. 2; Fig. 4 is a horizontal sectional view, on the line 4—4 of Fig. 2; Fig. 5 is a view similar to Fig. 4, taken on the line 5—5 of Fig. 2; Fig. 6 is a front view, showing more fully the parts carried by the base illustrated in Fig. 1; Figs. 7 and 8 are detailed perspective views of certain of the brackets which support contact plates.

Describing the invention specifically: 1 denotes the base of the device, the same being made of porcelain or suitable insulating substance; supported upon the base 1 are the fuse boxes 2, the term "box" as used herein contemplating broadly a casing in which the mechanism or parts cooperating with the fuses, as well as the fuses themselves, are inclosed. Each fuse box or casing 2 is supported upon the base 1 by an upper bracket 3 and a lower bracket 4, the upper bracket 3 being secured to the base by a binding screw-bolt 5, which is connected with a conductor 6, while the lower bracket 4 is connected to the base by a screw-bolt 7 and a second binding screwbolt 8, the latter having conductor 9 attached thereto. The bracket 4 has an upper arm 4' directly attached to the box 2 beneath the latter, and a similarly arranged arm 3' of the bracket 3 is secured to the box 2 at the uppermost portion of the same. Suitable posts 10 are

directly connected with the parts 3' and 4' and constitute metallic conductors, the uppermost post leading through the box 2 to a suitable point of connection with a bar 11, while the lowermost post 10 leads through the box 2 at the bottom of the latter and is attached to an abutment 12, of conducting substance.

The bracket 4 has a lowermost arm 4'' which extends outwardly to engage with a binding post 13 of a lightning arrester 14, a ground conductor 15 leading off from said lightning arrester.

It may be noted here that a fuse box 2 with inclosed excess current devices and fuses will be connected into each side of a main line circuit, and for practical purposes the conductors 6 and 9 above mentioned are terminals of one side of such a circuit. As shown clearly in Fig. 6, the lightning arrester 14 is common to both of the fuse boxes 2, the arrester being supported by the lower arms 4'' of the two brackets 4 provided for the boxes 2 in the manner above described.

The various parts located in each fuse box 2 will now be described, and since the parts are the same in respect to both fuse boxes, one only of the latter will be particularly referred to.

The bar 11 arranged horizontally in the fuse box 2 at its upper portion is made of brass or other conductive substance, and extends over a supporting body 16 made of insulation, preferably porcelain, suitable screws 17 fastening the parts 11 and 16 together. Upon one side thereof the body 16 is provided with a plurality of recesses or channels 18, in which are ranged choke or heat coils 19, the upper ends of said coils being suitably attached to the bar 11, while the lower ends are connected with contact plates 20, secured to the body 16 by fastenings 21. The contact plates 20 have resilient downwardly extending portions arranged in spaced relation to other conductors 25 which are secured by blocks 22 of conducting substance. Each block 22 is provided with a vertical opening constituting a guide in which an operating member 23 is mounted, said operating member bearing at its upper end a contact 24 and at its lower end a contact 25, both of said contacts being of somewhat wedge shape. Beneath the adjacent block 22 the operating member 23 is encircled by a coiled spring 26, the upper end of which bears against the block 22, and the lower end of which bears against a disk or washer 27 carried by the member 23. The normal tension of the spring 26 is designed to force the operating member 23 downwardly, so as to move the contact 24 from engagement with the plates 20 and 20' and to move the contact 25 into engagement with contact plates 28 support-

ed above a ledge 16' of the body 16. The action of the spring 26 to force its operating member 23 downwardly in the manner above mentioned is resisted or prevented normally by the provision of a connector 29, the upper end of which is attached by a screw 30 to the bar 11, while the lower end of the connector is secured to a hook 31 at the upper extremity of the member 23; in other words, each operating member 23 is normally held by its connector 29 in an upraised position wherein the contact 24 engages with the contact plates 20 and 20' while the contact 25 is spaced from the lower contacts 28. The connector 29 is made of inflammable material, consisting preferably of a silk thread or cord, and passes through the adjacent coil 19 so as to rest in contact with the coiled portions of the latter.

The contacts 28 are supported by L-shaped brackets 32 secured to the insulating body 16 by means of screws 33 passing through the latter and attaching in proper position upon the body 16, certain conducting plates 34. The abutment 12 before mentioned is carried by a bracket 12^a, which is somewhat equivalent to each bracket 32, a contact plate 35 being supported by the upper end of the bracket 12^a in a manner similar to the way in which the contact plates 28 are carried by the brackets 32, and conducting plate 34^a equivalent to conducting plates 34 is secured at its lower end to the body 16 by a screw 33^a.

The blocks 22 above referred to are attached to one side of the insulating body 16, by means of screws 36, and said screws 36 secure the upper ends of the conducting plates 34 to the other side of said body 16. The purpose of this arrangement of the conducting plates, attachment screws, and contact plates will now be presented, attention being directed however to the fact that the bracket 32 of the contact plate 28 at the upper end of the box 2 has its screw 33 connected with a conducting plate 37, somewhat similar to conducting plates 34 but considerably longer. The plate 37 is attached at its upper end to the insulating body 16 by a screw 36^a.

Referring particularly to Figs. 2 and 3 of the drawings, it will be apparent that current entering the fuse box 6 and upper post 10 will pass along the bar 11 to the first fuse or heat coil 19, traverse the length of said coil to the contact plate 20, passing thence by the contact 24 and contact plate 20' of the first coil 19, through the block 22, screw 36, plate 34^a, screw 33^a, bracket 12^a and abutment 12, to the lower post 10 and out through the conductor 9. Under the above conditions it will be apparent that the first or innermost fuse or coil 19, and excess current parts associated therewith, 130

are normally included in the circuit of the conductors 6 and 9. In the event of an abnormally high potential charge or discharge being received by the circuit including the conductors 6 and 9, instead of the current passing spirally along the coiled portions of the first heat coil 19, said abnormal current will arc from coil to coil of the normally operating part 19, thereby heating the latter to a red heat. The heating of the coil 19 in this manner will not only burn out the same, breaking the electrical connection established thereby between the parts 11 and 20, but the inflammable connector 29 will be simultaneously burned or disintegrated, thereby releasing the operating member co-acting with the normally operative member 19. As said operating member 23, which is the first one in the box 2, is released, it is quickly moved downwardly by the action of its spring 26, thereby disengaging the contact 24 from the plates 20 and 20', and engaging the contact 25 with the adjacent contact plates 28 and 35. This operation immediately cuts into the circuit the second fuse or heat coil 19 of the device, so that the current now entering at the upper post 10 will pass along the bar 11 to the second coil 19, from thence downwardly through the second operating and conducting member 23, the second block 22, the first of the conducting plates 34, the screw 33 for the lower bracket 32, contact plate 28, contact 25 of the first operating member 23, contact plate 35, bracket 12^a, abutment 12, to the lower post 10, and out through the conductor 9. It will be apparent that should the exigency arise, upon the occasion of an abnormal current passing over the circuit in which the second fuse or coil 19 has been introduced by the automatic operation incidental to the fusing out of the first fuse, the second fuse will be disintegrated in the same manner as the first one, and the operation of the second operating member 23 will automatically introduce the third or succeeding fuse into the circuit, thereby reestablishing the latter. This operation will be carried on as long as there are unused fuses in the fuse box, and it is contemplated that any suitable number of fuses may be employed, according to the desire of the user or requirements of the particular electrical apparatus, system or line with which the invention may be utilized. It is immaterial which side of the circuit or line the abnormally high potential charge may be received upon, as the fuses of the fuse box 2 applied to that part of the circuit will readily operate automatically to guard against the breaking of the circuit.

The lightning arrester 14 has been above referred to generally, and it may be noted that the high potential current by which a fuse or coil 19 is burned out will be con-

ducted by the bracket 4 of each fuse box to the arrester 14, from which the current will be grounded by the conductor 15, this operation taking place instantaneously with the burning out of the fuse and just previously to the reestablishment of the circuit by which the normal current passing there-through is carried on by the conductor 9 in the manner described before.

It will be understood from the foregoing that the operating member 23 virtually constitutes circuit making and breaking device, especially does it perform the function of a circuit maker.

While the foregoing presents clearly the essential features of my invention, I do not wish to be restricted to the details of construction described hereinbefore and illustrated in the drawings, as I contemplate variations in my invention consistent with the broader spirit thereof and within the scope of the claims hereto annexed.

Having thus described the invention, what I claim as new is:—

1. An electrical protective device comprising a plurality of fuses, an operating member normally connected with one of said fuses, contact means intermediate said operating member and the other of said fuses normally inoperative, a spring for imparting longitudinal movement to said operating member when the fuse with which it is connected is burned out, whereby to render the contact means aforesaid operative, and a connector of non-conducting material normally restraining the operating member from movement under the action of the spring.

2. An electrical protective device comprising a bar constituting a conductor, fuses connected at one end with said bar, contacts connected with the other ends of the fuses, an operating member associated with each fuse and having contacts at its opposite ends, one of which is normally in contact with a contact of the associated fuse, and the other of which is inoperative, a second conductor, contacts carried by the last-mentioned conductor for coöperation under abnormal condition with the normally inoperative contacts of the operating members, and means for causing movement of an operating member when its associated fuse is burned out to disconnect the one contact of said member from the fuse and to connect the other contact of said member with coöperating contacts on the second-mentioned conductor.

3. An electrical protective device comprising a bar constituting a conductor, fuses connected at one end with said bar, contacts connected with the other ends of the fuses, an operating member associated with each fuse and having contacts at its opposite ends, one of which is normally in

contact with a contact of the associated fuse, and the other of which is inoperative, a second conductor, contacts carried by the last-mentioned conductor for coöperation under abnormal condition with the normally inoperative contacts of the operating members, a spring adapted to impart longitudinal movement to an operating member when its associated fuse is burned out to disconnect the one contact of said member from the fuse and to connect the other contact of said member with coöperating contacts on the second-mentioned conductor, and means other than the fuse coöperating with each operating member to normally restrain the same.

4. An electrical protective device comprising a bar constituting a conductor, fuses connected at one end with said bar, contacts connected with the other ends of the fuses, an operating member associated with each fuse and having contacts at its opposite ends, one of which is normally in contact with a contact of the associated fuse, and the other of which is inoperative, a second conductor, contacts carried by the last-mentioned conductor for coöperation under abnormal condition with the normally inoperative contacts of the operating members, a spring adapted to impart longitudinal movement to an operating member when its associated fuse is burned out to disconnect the one contact of said member from the fuse and to connect the other contact of said member with coöperating contacts on the second-mentioned conductor, means other than the fuse coöperating with each operating member to normally restrain the same, and a connector of non-conducting material associated with each fuse and connected at one end with the conductor bar first-mentioned, and at its other end with the operating member to normally hold the latter in a position in which one of its contacts is connected with that of the fuse.

5. In an electrical protective device, the combination of a conductor bar, fuses associated therewith, a longitudinally slidable operating member coacting with one of the fuses, an electric circuit including said parts, means intermediate said operating member and the other fuse whereby on movement of the operating member the last-mentioned fuse will be automatically connected in said circuit, a spring for imparting longitudinal movement to the operating member, and a connector separate from the first-mentioned fuse for normally restraining the operating member, said connector being adapted to be disintegrated by a fuse to release the operating member.

6. An electrical protective device comprising a fuse, an operating member normally electrically connected with said fuse, means to actuate said operating member to

disconnect the same from the fuse, and an inflammable connector attached to the operating member for normally restraining the same.

7. An electrical protective device comprising a plurality of fuses, an operating member associated with each fuse and having a contact normally in electrical connection with said fuse, other contacts carried by the operating members and normally inactive, contact plates for coöperation with the last mentioned contacts, an electric circuit including conductors normally operatively connected with one of the fuses and its associated operating member, means for actuating each operating member to disconnect it from its fuse, and means normally restraining each operating member and adapted to release the latter to cause its inactive contact to coöperate with the contact plates, whereby when a normally operating fuse is burned out a succeeding fuse will be automatically connected with the conductors.

8. An electrical protective device comprising a fuse, a sliding operating member, means electrically connecting the fuse and said member, means for actuating the operating member, a normally inactive contact plate adapted to coöperate with the operating member when the same is actuated, conductors normally connected with the fuse and its associated operating member, and means separate from the fuse normally holding the operating member in a predetermined position and adapted to release said member at a predetermined time to cause coöperation thereof with the normally inactive contact plate.

9. An electrical protective device comprising a fuse, a sliding operating member, a normally active contact plate electrically connecting the fuse and said member, means for actuating the operating member, a normally inactive contact plate adapted to coöperate with the operating member when the same is actuated, conductors normally connected with the fuse and its associated operating member, means normally holding the operating member in a predetermined position and adapted to release said member at a predetermined time to permit coöperation thereof with the normally inactive contact plate, the last mentioned means consisting of a connector adapted to be rendered inoperative by burning out of the fuse, and means for actuating the operating member when released to engage it with the inactive contact plate and to render the first-mentioned contact plate inoperative.

10. An electrical protective device consisting of a body of insulating substance, a plurality of parallel fuses carried by said body, a transverse current conducting member common to and connected with said

fuses, slidable operating members associated with the fuses, and substantially in alignment therewith, detachable contact means between each operating member and its fuse, 5 conductors, one of which is connected with the conducting member above mentioned, a contact plate connected with the other conductor and normally electrically connected with one of the fuses and its associated operating member, a normally inactive contact 10 carried by each operating member, contact plates spaced from but adapted to cooperate with said inactive contacts upon operation of the operating members, means adapted to

be disintegrated by the burning out of a fuse 15 and normally holding the operating member associated with said fuse in a predetermined position, and means to move the operating member of the normally active fuse to disconnect the detachable contact means of the 20 latter and connect said operating member with its inactive contact plate.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES OLIVER HOLTON.

Witnesses:

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C. T. REDDINGTON.