

March 29, 1932.

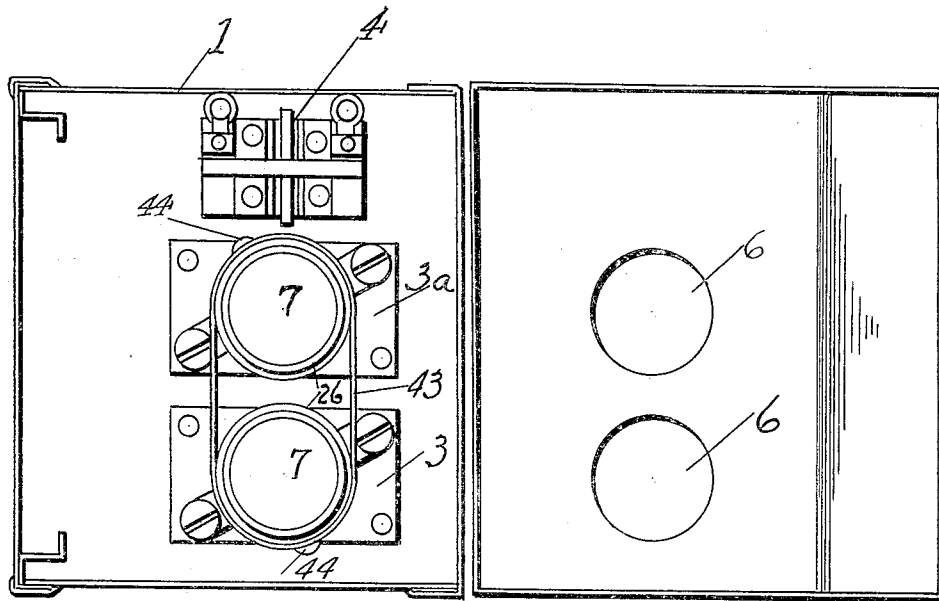
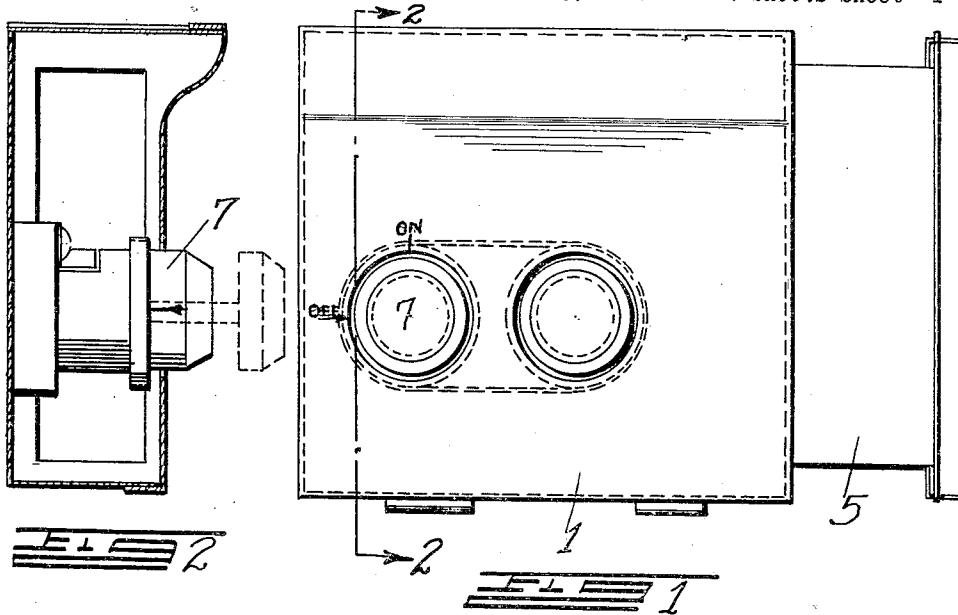
G. B. WADSWORTH

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FUSE BLOCK

Filed Feb. 13, 1928

2 Sheets-Sheet 1



INVENTOR.
George B. Wadsworth
BY
Allan Allen
ATTORNEYS

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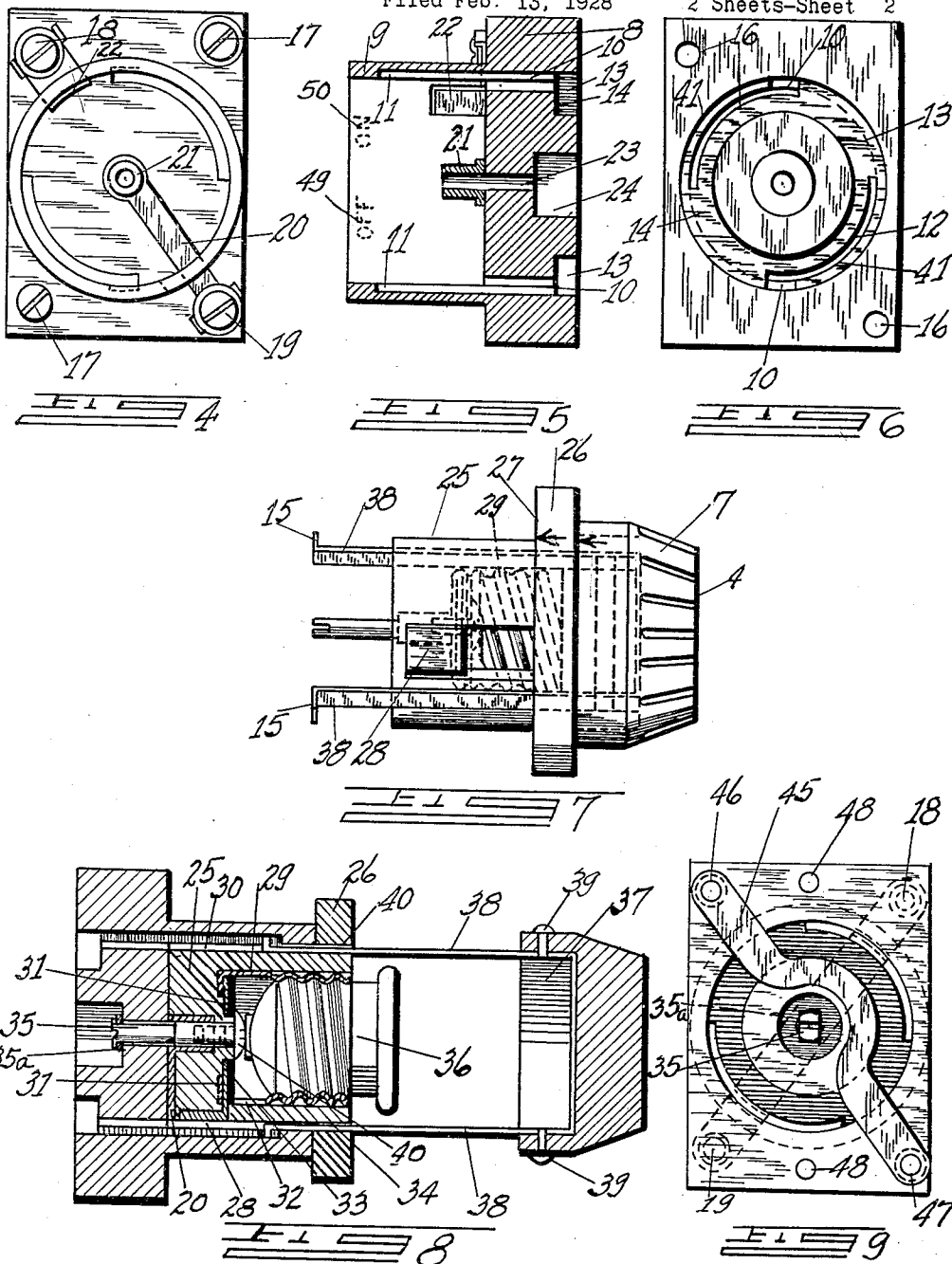
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INVENTOR.
G. B. Wadsworth
BY
Allen Allen
ATTORNEY.

UNITED STATES PATENT OFFICE

GEORGE B. WADSWORTH, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE GEORGE B. WADSWORTH COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO

FUSE BLOCK

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My invention concerns fuse blocks for electric circuits, and has for its object the provision of a type of fuse plug in which access cannot be had to the fuse connections or terminals while the current is turned on in the circuit. It will be understood that my invention applies to electric circuits in general and to all types of fuse blocks; but I shall describe particularly an embodiment of it adapted for use on house lighting circuits and the like.

Hitherto, the fuse blocks on house lighting circuits have been generally of the type involving a socket or series of sockets into which a fuse plug is screwed. In many cases these fuse blocks are included within a metallic box with a cover and they are sometimes included within a switch box. The connecting terminals of these fuse boxes are generally exposed so that there is more or less danger that an accidental movement will bring the operator's hand in contact therewith. Frequently persons attempting to change fuses neglect to throw the line switch into the off position beforehand, so that the operation is attended with some danger; but in any event the average householder approaches the operation of changing the fuse with trepidation. Even where contact points have otherwise been covered, the smallness of the ordinary fuse plug is such as to make readily possible the contact of the operator's hand with some charged part of the fuse plug connections. Further, if the fuse has blown, due to short circuit in the line which is still present the inserting of a new fuse is likely to result in its blowing while the operator still has it in his hand.

Heretofore so far as I am aware there have been no safeguards applied to the fuse blocks themselves of house lighting circuits which make them absolutely safe. It is an object of this invention to provide a fuse block in which there are no exposed metallic connections.

It is an object of this invention to provide a fuse block in which the fuse and its connections are inaccessible at all times when the current is turned on, whether same is located within a box or not, while at the same

time facilitating the changing of fuses by eliminating the necessity of opening a box. It is still another object of my invention to interconnect the safety device upon the fuse blocks for one or more circuits so that the operation of one will operate others. Another object is to provide a member for enclosing the fuse which moves in one direction to open and close electric contacts for the fuse and in another direction to expose and cover the fuse from external access, thus permitting me to use but one member for both purposes and yet permit me to place the switch mechanism in open position without exposing the fuses and to have the switch operation independent of the fuse exposure except form the sequential point of view.

Broadly it is my object to make changing fuse plugs a simple and easy operation, one which is absolutely safe, and one which does not involve the necessity of preliminary precautions.

These and other objects of my invention will be apparent to those skilled in the art upon reading these specifications.

In the drawings:—

Figure 1 is a top elevation of a metallic box in which my fuse blocks are preferably enclosed, showing a sheathing or housing for the connecting cables.

Figure 2 is an end elevation thereof.

Figure 3 shows the box with its hinge thrown open.

Figure 4 is a top elevation of the base of my improved block.

Figure 5 is a vertical section therethrough.

Figure 6 is a bottom elevation of the base.

Figure 7 shows an elevation of the switch mechanism and fuse plug terminal together with the protecting cover.

Figure 8 is a vertical section through my completed block showing a fuse plug mounted in the terminal and the cover raised so as to permit its withdrawal.

Figure 9 is a bottom elevation of the base showing an alternative arrangement of connections so that one fuse block will serve a complete circuit.

The box shown in Figures 1, 2 and 3 is illustrated for the purpose of showing an as-

sembly of my fuse blocks to handle a house lighting circuit and for illustrating one method of use of my device. I have shown my invention with a plug fuse, but it will be obvious that any type of fuse or circuit breaking element may be used by changing the size of the enclosing parts and providing an appropriate mounting.

Referring to Figure 3 it will be seen that in the box 1 I have mounted two of my fuse blocks designated as 3 and 3a. The box may also include the ordinary meter testing plugs and mounting therefor which I have designated by the numeral 4. The plugs also form no part of my invention. The box 1 is preferably of janned sheet metal, and is made so that the sides thereof are removable. Two or more boxes may therefore be joined together by a sheet metal housing or sheath for the connecting cables which I have designated as 5 in Figure 1. The cover of my box will have holes therein 6 through which project the covers of my fuse connectors. These covers I have designated wherever they appear in the drawings as 7. Broadly understood this specific embodiment of my invention comprises a single pole switch of the barrel type in which in the outside cylindrical section there is a contact while the inside cylindrical section bears a similar and complementary one. It will be obvious that the rotation of the inner cylindrical section may bring these contacts together thereby completing a circuit or may separate them for the purpose of breaking the connection.

The inside cylindrical section of my switch is constructed also so as to provide a terminal for the fuse plug. Over this terminal and over the fuse itself inserted therein there is a cover or sheath which prevents access to the terminal and to the fuse excepting when the switch has been turned into the off position, when the cover may be removed. This entire construction will be more fully pointed out hereinafter.

In Figure 5 it will be seen that I provide a base 8 for my fuse block and a cylindrical barrel portion 9 extending upwardly therefrom. Portions 9 and 8 may be separate but are preferably of one piece of insulated material such as bakelite or other molded insulation or porcelain. A slot 10 extends from the base and up the side of the barrel nearly to the top thereof where it terminates in a shoulder 11. Two or more of these slots are generally provided. In the base proper, as will be seen in Figure 6, these slots terminate in semi-circular grooves 12. A circular channel 13 is provided in the base as can be seen in plan in Figure 6 and in section in Figure 5. This circular groove is wider than the grooves 12 and forms a shoulder 41 for purposes which will hereinafter be described. The slot 10 is wider than the semi-circular groove 12.

The purpose of these slots and grooves is to cooperate with the cover retaining members 15 (Fig. 7) as will be fully explained. I have shown holes 16 (Fig. 6) through which pass screws 17 (Fig. 4) for the purpose of fastening the base to the box or other support. In the opposite corner of my base I have provided terminal connections 18 and 19. The connection 19 has a metallic member 20 by which current is connected to a boss 21 to which an electrical contact is made with the central contact member of fuse plug as I shall describe. I prefer to have the terminal 19 connected with the house side of the lighting circuit. The terminal 18 is connected with a switch point or terminal 22 which is concave on its inner face and cooperates with a complementary point or terminal on the inner barrel section of my switch. Beneath the boss 21, and connecting with a hole therein, I provide a hole 23 in my base, terminating in a larger hole or opening 24 for convenience.

The inner barrel section of my switch, as can be seen by reference to the elevation in Figure 7 or the section in Figure 8, consists of a barrel portion 25 of insulating material surmounted by a cap 26 preferably also of cylindrical section but larger in diameter than the portion 25. This leaves a shoulder 27 which will abut the top of the outer barrel section 9 of my switch. Upon the insulating barrel section 25 I mount a terminal or switch point 28 the outer surface of which is convex. This point is positioned so that when my switch is assembled a rotation of the section 25 will cause the terminal 28 to be rotated into or out of contact with the complementary terminal 22 thereby making or breaking the connection between terminal 18 (connected to the line side of the circuit) and the fuse connection.

The section 25 is hollowed out as shown in Figures 7 and 8 to accommodate the threaded outside terminal of the ordinary fuse connector. I have designated this threaded metallic part as 29. The lower ends thereof are bent over as at 30 and over them is placed a circular metallic member 31 which is a part of or which is connected to the terminal 28 as is very clearly shown in Figure 8. In order to accommodate the connection between this terminal and the ring the threaded member 29 is cut away for a distance as at 32. Overlying the ring member 31 is a disk of insulation 33. The central portion of the base of the cavity which accommodates the fuse connection is perforated and a screw 34 the head of which forms the central terminal of the fuse connection, is threaded into a rod 35 which passes through the boss 21 making connection therewith. I have indicated a fuse plug 36 screwed into the fuse connection. The lower end of the rod 35 is split and to

attach the parts together is apart over a washer 35a.

Tracing the path of the current in my fuse block it may be imagined as passing through the terminal 18 to the switch point 22; thence through the switch point 28 to the threaded section of the fuse connection; thence through the fuse plug 36 to the central terminal of the fuse connection 34; thence through the rod 35 to the boss 21, and thence through the bar 20 to the terminal 19.

I provide a cover 7 of insulating material shaped as will be seen somewhat like a portion of the knob of a radio dial and hollowed out as at 37 (Fig. 8). This cover when placed down over the fuse plug 36 not only prevents access thereto but covers all exposed portions of the fuse connections. I support my cover by metallic arms 38 which are thin strips. They may be conveniently made of a single piece of metal bent into a U-shape the end of which is caused to enter the cover and is riveted therein as shown at 39. On the bottom of the portions 38 there are shoulders or offsets 15 formed by bending over portions of the metal. The arms 38 pass through slots 40 in the cap member 26.

In Figure 7 I have shown the cover 7 with its metallic arms 38 and the inner barrel section of my switch assembled with the cover in the closed position so that the lower portions of the arms 38 extend down below the bottom of the inner barrel section of the switch. It will be clear that by pinching together slightly the arms 38 they can be brought together so as to permit assembly of the switch. This is done in such a way that the portions 15 will be caused to lie in the slots 10 and the natural springiness of the metal will cause the abutment 15 to impinge the shoulders 11 if one attempts to withdraw the inner barrel section of the switch. In other words the inner barrel section can only be withdrawn by the converse of the procedure I have just described for its insertion; and as long as the inner barrel section of the switch remains in place as shown in Figure 8, the cover 7 may be partially withdrawn but only until the abutments 15 impinge against the shoulders 11. I make my arms 38 long enough so that when the cover 7 is withdrawn as far as it will go there will be sufficient room between the cover 7 and the cap 26 to permit the operator to insert or withdraw the fuse plugs 36. It will further be seen that so long as the cover 7 is withdrawn the inner barrel of the switch cannot be rotated for the reason that the offsets 15 lie in the slots 10 and prevent this rotation. The switch is assembled in such a way that when the cover 7 is withdrawn and the inner barrel locked against rotation the switch point 28 will not be in contact with the switch point 22 and the circuit will therefore be broken. When it is desired, however, to rotate the switch so as to make

contact the cover 7 must be pushed in as far as it will go. This causes the offsets 15 to pass down the slots 10 until they enter the enlarged portion 13 thereof in the base. Thereupon the members 38 will lie in the circular grooves 12 and the inner barrel of the switch and the cover may be rotated as far as these grooves will permit. The grooves 12 are, as has been pointed out, narrower than the enlarged groove 13 and there is a shoulder 41 shown in Figure 6 against which the offsets 15 will now impinge. Consequently while the switch is in the "on" position the cover 7 cannot be withdrawn so as to give access to the fuse plug and fuse connections. To sum up the action of this mechanism it will be seen that I have provided a barrel switch containing a fuse plug which is covered by a cover 7; and that I have provided means whereby cover 7 cannot be withdrawn to permit access to the fuse plug while the switch is in the "on" position, and means whereby when the switch is in the "off" position and the cover withdrawn the switch cannot be rotated so as to bring it into the "on" position. The switch is rotated by means of the cover 7 acting from the arms 38 and I have shown this cover knurled as at 42 for the convenience of the operator.

Referring now to Figure 3 I have shown two of my fuse blocks side by side in a metallic box. In this figure the covers are indicated at 7 and the cylindrical caps at 26. Around these cylindrical caps is passed a continuous band or belt 43 which is preferably made of metal, as for instance, thin sheet copper. This belt coacts with the members 26 with the effect of a belt upon two pulleys. It is fastened to both of the members 26 by bolts or screws 44 so that there may be no slippage. It will be obvious that a rotation of one of the members 7 will cause a complementary rotation of the other; and when the operator, desiring to change the blown fuse in a circuit, rotates one of the covers 7 to permit its withdrawal, he has at the same time rotated the other and he can change both of the fuses in one operation. It should be pointed out that the same circular slots 12 comprise approximately a quadrant of a circle so that a quarter of a turn of rotation being sufficient for the operation of the switch mechanism is all that the device permits, although more than a quarter turn could be provided for. It will further be obvious that instead of the belt 43 I may otherwise operatively connect the switch blocks as by spur gears.

The operation of my device will now be clear. There is presented to the operator, instead of the familiar and formidable array of bare connections, cables and fuse blocks, only an iron box 1, in the lid of which there are two openings permitting two cover members 7 to project therethrough. The oper-

ator grasps one of the covers, which is generally knurled for the purpose as shown at 42 in Figure 7, and makes a quarter turn. Thereupon, having the assurance that the current is off, he withdraws the cover 7 and inserts a new fuse plug 36 as may be required. It will be noted that the action of the cover of the box cooperates with my device to this extent; that it overlies the cap portions 26 so as to prevent the partial withdrawal of the inner barrel section of the switch when the cover is withdrawn, but as stated the washer 35a holds the inner barrel section of my switch in place, so as to make the action of my fuse plug entirely independent of the cover of the fuse box. Also, instead of placing my fuse blocks in a box, I may use them independently with small individual guards or covers for the line terminal connections, or I may so construct the base that these terminals are covered and use my fuse block independently of any external guard at all. In such a block, I prefer to provide indicia on the base and the cover to indicate the position of the switch, and these indicia may conveniently comprise the words "Off" and "On" (49 and 50 in Fig. 5) inscribed upon the outer barrel section and a cooperating arrow or mark on the cover 7. Or I may make one of my fuse blocks serve a complete circuit. In Figure 9 I have shown a bottom plan view of the base, for this purpose, on which I provide, in addition to the terminals 18 and 19 (as shown in Fig. 4) two terminals 46 and 47 in the opposite corners of the block. I connect these by a strap connector 45, bowed as indicated to avoid the parts 35 and 35a. Centrally disposed holes 48 in this construction accommodate the fastening screws or bolts 17. The strap 45 is preferably embedded in the base, the base being appropriately hollowed for the purpose, and as is the usual practice, a sealing compound may be poured over it. I thus have a fuse block with four terminals, which will accommodate an entire circuit, although as shown, it contains but a single fuse.

I have thus described one general embodiment of my invention; but I do not desire to be limited to the specific construction which I have illustrated. Various modifications of the construction are fully within the power of those skilled in the art to construct without departing from the principle of my invention. Thus it will be seen that different types of switches may be substituted for the barrel switch which I have shown and described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a fuse block for electric circuits, a fuse connection, a switch, and operating means for said switch comprising a cover for said fuse connection, said means adapted to move in one direction to operate said switch,

and in another direction to uncover said fuse connection and means to retain the cover in attachment with the block in all positions.

2. In a fuse block for electric circuits, a fuse connection, a switch, and operating means for said switch comprising a cover for said fuse connection, said means adapted to move in one direction to operate said switch, and in another direction to uncover said fuse, means to retain the cover in attachment with block in all positions and means to prevent the simultaneous movement thereof in both directions.

3. In a fuse block for electric circuits, a fuse connection, a switch, and operating means for said switch comprising a cover for said fuse connection, said means adapted to move in a rotary manner to operate said switch, and in a reciprocating manner to uncover said fuse connection and means to retain the cover in attachment with the block in all positions.

4. In a fuse block, a base of insulating material comprising the outer section of a barrel switch with contact point and terminal, an inner section of said switch with cooperating contact point, a fuse connection in said inner section connected with said cooperating contact point and through a central contact with a second terminal on said base, an operating handle for said switch comprising a cover for said fuse connection and withdrawable therefrom to permit access thereto, members on said handle operably connecting it with the inner section of said switch, stops on said members cooperating with means in said base and said switch to limit the withdrawal of said cover, to prevent the operation of said switch when said cover is withdrawn, and to prevent the withdrawal of said cover when said switch is in the "on" position.

5. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to said terminals, and an operating handle for said switch comprising a cover for said fuse connection and means for slidably but non-detachably retaining said cover.

6. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to

said terminals, and an operating handle for said switch comprising a cover for said fuse connection, arms on said cover operably connecting it with said inner section stops on said arm, grooves in said outer section in which said stops slide to permit withdrawal of said cover and to prevent the operation of said switch while said cover is withdrawn.

7. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to said terminals, and an operating handle for said switch comprising a cover for said fuse connection, arms on said cover operably connecting it with said inner section stops on said arms, grooves in said outer section in which said stops slide to permit withdrawal of said cover and to prevent the operation of said switch while said cover is withdrawn, circular slots in said base for said arms to permit rotation of said inner section while said cover is in place, and shoulders on said grooves cooperating with said stops to prevent withdrawals of said cover while said arms lie in said slots.

8. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to said terminals, and an operating handle for said switch comprising a cover for said fuse connection, arms on said cover operably connecting it with said inner section stops on said arms, grooves in said outer section in which said stops slide to permit withdrawal of said cover and to prevent the operation of said switch while said cover is withdrawn, circular slots in said base for said arms to permit rotation of said inner section while said cover is in place, and shoulders on said grooves cooperating with said stops to prevent withdrawal of said cover while said arms lie in said slots, a cylindrical cap on said inner section, and means for holding said inner section in place during withdrawal of said cover.

9. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said

switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to said terminals, and an operating handle for said switch comprising a cover for said fuse connection, arms on said cover operably connecting it with said inner section stops on said arms, grooves in said outer section in which said stops slide to permit withdrawal of said cover and to prevent the operation of said switch while said cover is withdrawn, circular slots in said base for said arms to permit rotation of said inner section while said cover is in place, and shoulders on said grooves cooperating with said stops to prevent withdrawal of said cover while said arms lie in said slots, a cylindrical cap on said inner section, a belt connected to said cap whereby motion imparted to said belt will rotate said inner section providing said cover is in place, and means for holding said inner section in place during withdrawal of said cover.

10. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to said terminals, and an operating handle for said switch comprising a cover for said fuse connection, arms on said cover operably connecting it with said inner section stops on said arms, grooves in said outer section in which said stops slide to permit withdrawal of said cover and to prevent the operation of said switch while said cover is withdrawn, circular slots in said base for said arms to permit rotation of said inner section while said cover is in place, and shoulders on said grooves cooperating with said stops to prevent withdrawal of said cover while said arms lie in said slots, a cap on said inner section provided with teeth, a gear engaging said teeth, whereby motion imparted to said gear will rotate said inner section providing said cover is in place, and means for holding said inner section in place during withdrawal of said cover.

11. In a fuse block, a base of insulating material comprising the outer section of a single-throw, single pole barrel switch, two line terminals on said base, one connected to a switch point in said outer section, the other connected to a centrally disposed boss in said outer section, an inner section of said switch, terminals thereon comprising a switch contact point and a connection to said boss, a fuse connection in said inner section connected to said terminals, and an operating handle for said switch comprising a cover

for said fuse connection, arms on said cover operably connecting it with said inner section stops on said arms, grooves in said outer section in which said stops slide to permit
5 withdrawal of said cover and to prevent the operation of said switch while said cover is withdrawn, circular slots in said base for said arms to permit rotation of said inner section while said cover is in place, and
10 shoulders on said grooves cooperating with said stops to prevent withdrawal of said cover while said arms lie in said slots, said connection to said boss comprising a bifurcated rod passing therethrough and through
15 a hole in said base, a washer placed on said bifurcated rod and said bifurcations bent apart over said washer.

GEORGE B. WADSWORTH.

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