G. E. PALMER.

SERVICE SWITCH MECHANISM.

APPLICATION FILED DEC. 16, 1912.

1,073,281.

Patented Sept. 16, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

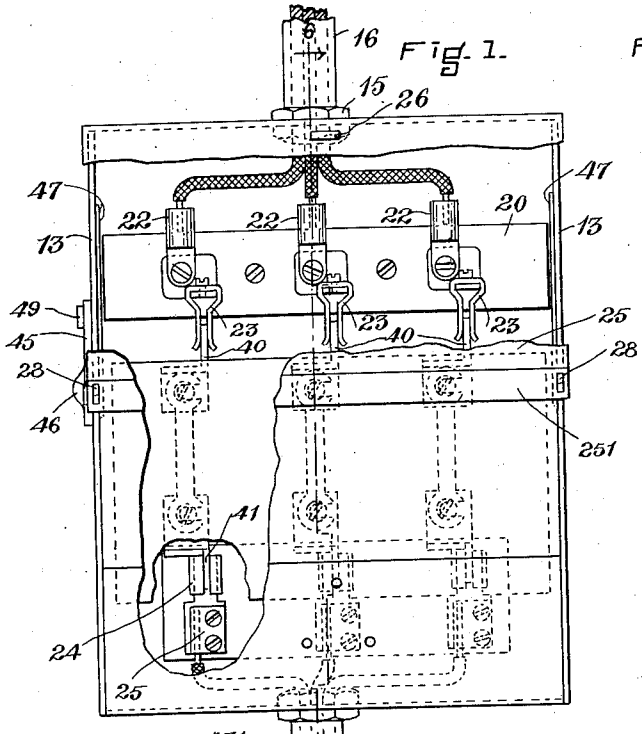


Fig. 2.

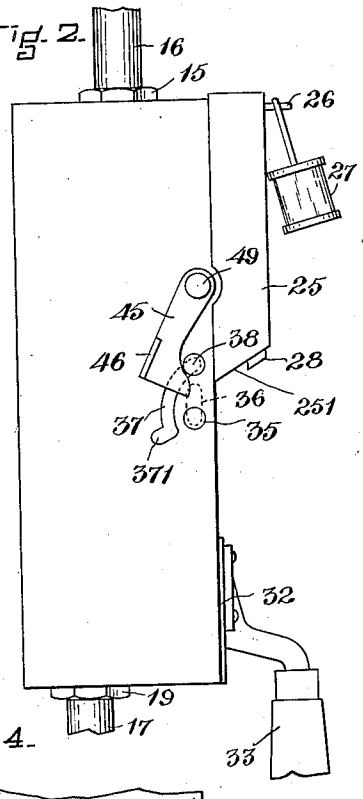


Fig. 3.

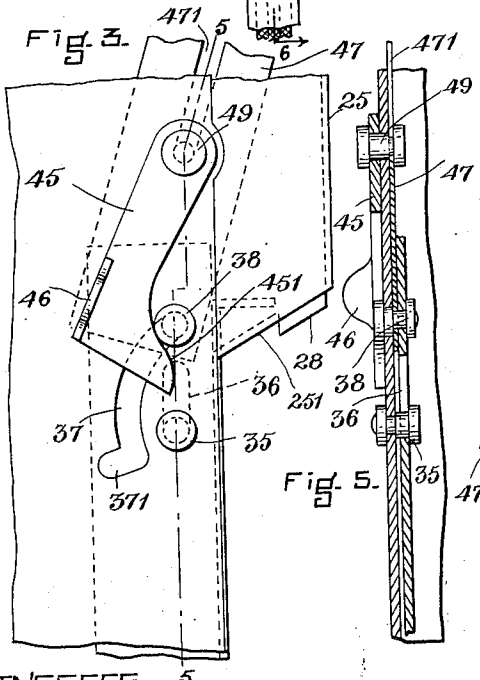
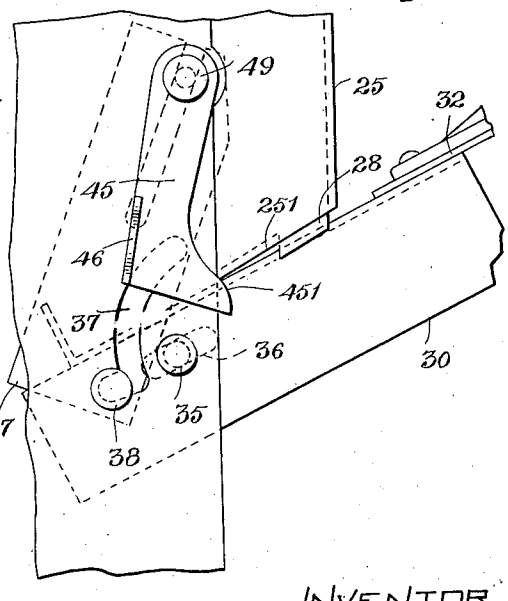


Fig. 5.

Fig. 4.



WITNESSES.

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2 SHEETS—SHEET 2.

Fig. 6.

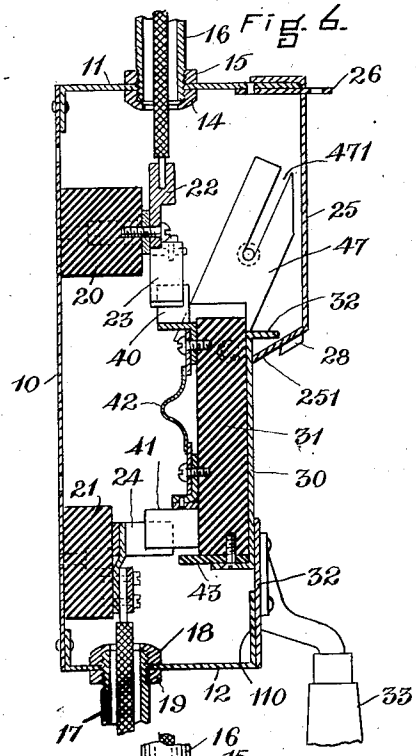


Fig. 7.

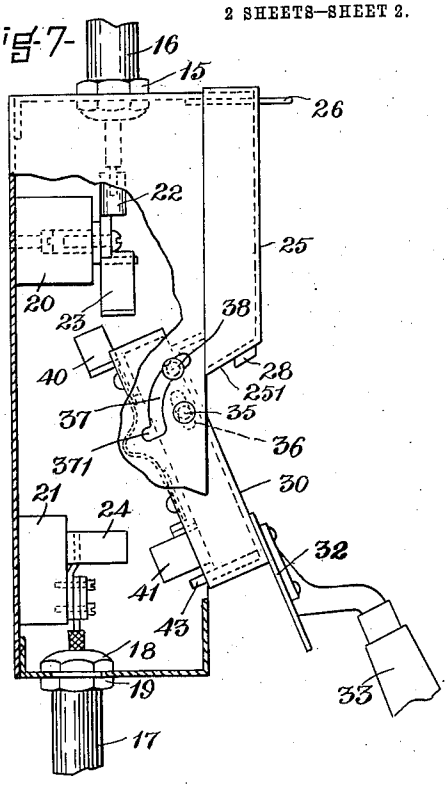


Fig. 8.

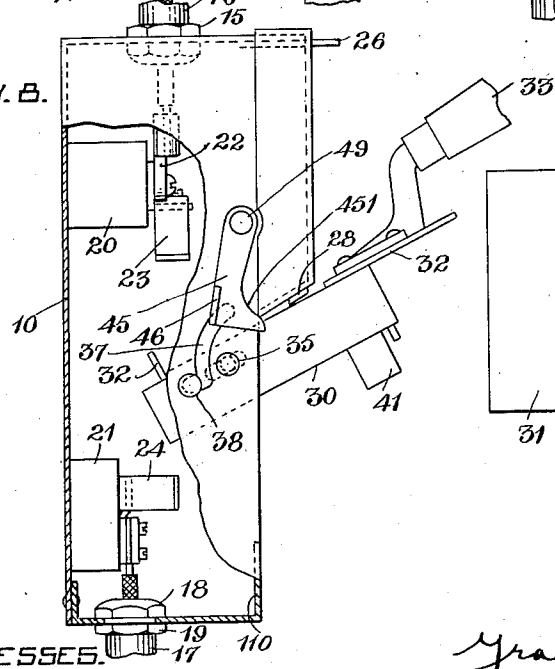
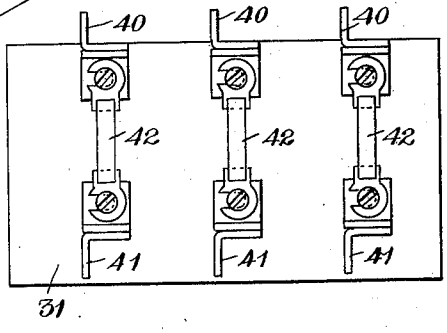


Fig. 9.



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UNITED STATES PATENT OFFICE.

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SERVICE-SWITCH MECHANISM.

1,073,281. Specification of Letters Patent. Patented Sept. 16, 1913.

Application filed December 16, 1912. Serial No. 736,960.

To all whom it may concern:

Be it known that I, GRANVILLE E. PALMER, a citizen of the United States, and a resident of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Service-Switch Mechanism, of which the following is a specification.

This invention has relation to electrical switches for the control of electrical service, where conductors are brought into a building to supply it with electricity from an external source.

According to modern practice and to fire insurance requirements, the conductors are brought into a building to a meter through conduits, so that the conductors are protected from accidental injury, and between the meter and the point of entrance of the conductors are located the service switch and fuse. It is of importance that the switch should be so constructed and protected that the customer may be able to open the switch or replace a fuse, and yet be unable to make any illicit connection with the main or service wires between their point of entrance to the building and the meter. In many places, it is the practice to inclose the service switch and the necessary fuses in a box or casing which is sealed so that it cannot be opened by the customer without breaking the seal, but such an arrangement is highly unsatisfactory. For example, in the event that the fuse is blown by an accidental short circuit or an unusual momentary overload occurring in the premises in which they are connected, causing an interruption of the service, it is difficult to maintain the seal, as the customer does not care to wait until the arrival of the authorized repair man and consequently breaks the seal to replace the fuse, leaving the casing unsealed and possibly open. Again, for one cause or another, the customer may have occasion to open the switch for a shorter or longer time because of some exigency, and should not be called upon to wait until the company selling the current could send an authorized representative to break the seal and open the switch. On the other hand, to prevent the customer from obtaining current from the conductors before they reach the meter, it is essential that some provision be made by which live conductors and switch contacts are inaccessible to the customer at all times.

The object of the present invention is to provide a service switch mechanism which will permit the customer to open the switch and inspect or replace the fuse, and in which the conduits entering the switch box and the live lugs or contacts will be sealed so as to be inaccessible to the customer whether the switch be open or closed.

A further object of the invention is to so construct the mechanism that, when the switch is closed, the fuse is concealed within the case, and, when the switch is opened, the fuse is exposed thereby, and at the same time a barrier cuts off access to the live lugs or contacts.

For various reasons of which not the least is that of economy in maintenance, it is desirable in switch boxes to employ link fuses which may be easily secured in place by a screw-driver or other suitable implement. Ordinarily, however, it is dangerous to the repairer or inspector to replace such fuses in a switch box of the ordinary construction, for the reason that, when the lid of the box is opened, the live contacts are exposed, and, if by chance electric connections should be made therewith by the dropping of the fuse in contact therewith or by the operator accidentally touching one of the live contacts and the box, an arcing will take place which may injure the repairer's eyesight and destroy the apparatus. In accordance with my invention, however, it is possible to use link fuses with absolute safety, because, in the switch mechanism which I have herein illustrated and shall subsequently describe, the fuse is located on a carrier which may be moved to electrically connect the fuse with and disconnect it from the live and meter contacts, and means are provided by which, when the carrier is moved to disconnect the fuse, the live contacts are rendered inaccessible. The particular means which I have illustrated and described comprise a sealed cover over the live contacts and a portion of the door which is so hinged that, when the door, which serves as a fuse carrier, is opened, said portion of the door is interposed as a barrier to the live contact.

So far as I am aware, I am the first to have rendered the live contacts inaccessible when the fuse carrier is moved into position to permit the replacement or inspection of the fuse.

In carrying out the invention, I employ,

in the illustrated embodiment thereof, a box or casing, in one end or portion of which are located the terminals of the incoming or live service wires and the main or live lugs or contacts, and in another end or portion of which are located the terminals of the meter or feeder connections and the feeder lugs or contacts with which they are connected. The live main terminals are concealed and protected by a removable cover which is normally sealed. The movable contacts and the fuses are secured to the inner side of a cover or door so hinged to the box that, when the cover is closed, the switch is closed and the fuses are concealed, and that, when the cover is swung open, a portion thereof is interposed as a barrier or partition between the two sets of terminals, the switch is opened and the fuses are brought forward to an accessible position. The cover is so formed and mounted that it must be closed before the switch and fuses are thrown into circuit.

It is evident from the foregoing that the invention may be embodied in a variety of forms and that the particular embodiment which is illustrated and which I shall now describe may be greatly changed or modified without departing from the spirit and scope of the invention.

Referring to the drawings,—Figure 1 represents a front elevation of the switch mechanism, the handle for the hinged door or cover being omitted for the sake of clearness, and the sealed cover being broken away. Fig. 2 represents a side elevation of the same. Fig. 3 represents an enlarged side elevation of a portion of the casing and illustrates the lock for holding the hinged cover from accidentally closing when it has been opened. Fig. 4 shows the same parts with the hinged door or cover open. Fig. 5 represents a section on the line 5—5 of Fig. 3. Fig. 6 represents a section through the mechanism on the line 6—6 of Fig. 1. Fig. 7 illustrates a side elevation with the casing broken away to show the parts in the positions which they assume when the hinged door is nearly closed. Fig. 8 represents a similar view with the hinged door and the switch open. Fig. 9 represents a form of block which may be secured to the hinged cover and which carries the movable switch members and the fuses.

The box or casing is preferably made of metal and it may be cast or else made of drawn sheet metal. As illustrated, it is formed of stamped and bent sheet metal. As shown, it is substantially rectangular in front elevation and is provided with a rear wall 10, end walls 11 and 12, and side walls 13, 13. Secured in an aperture in the end wall 11, by means of a bushing 14 and lock nut 15, is the usual conduit 16 for the service wires which are carried into the building; and into the opposite end 14 there is secured a similar conduit 17 by a bushing 18 and lock nut 19 for the conductors which extend to the meter.

Within the box and to the rear wall 10 thereof are secured insulating blocks 20, 21 which are separated or spaced apart, as shown in Figs. 6 and 7, and to which are secured the terminals of the conductors and the stationary lugs or contact members of the switch. As shown in Fig. 1, the particular mechanism illustrated is employed in connection with the three-wire system and consequently there are three terminals 22 on the block 20, each of the terminals being electrically connected with one of the switch lugs 23. On the block 21 are located the corresponding switch lugs 24 and the terminals 25 to which are connected wires or conductors leading to the meter. Each switch lug is illustrated as being formed of a pair of resilient arms or fingers, between which a movable knife member may be inserted, but it is evident that other forms of switch contacts or lugs may be utilized. I desire to call attention, however, to one feature of the construction, to wit, that the fingers of the lugs 23 extend substantially in parallelism with the rear wall 10, whereas the corresponding fingers of the lugs 24 are arranged perpendicularly to the wall 10. The two insulating blocks with their attached connections are located in separate portions of the box. Over the block 20 and the terminals and lugs carried thereby is placed a removable cover 25. It is formed at its upper end with an aperture to receive a staple 26, to which may be secured a seal 27, as shown in Fig. 2. At its lower end, the cover is provided with apertures to receive ears 28 formed on the side walls 13 of the box. When the cover is secured in place, as shown in Fig. 2, it cannot be removed without breaking the seal. When it is removed, however, the interior of the upper portion of the box, containing the live terminals and switch lugs, is open to inspection. Preferably the end wall 11 extends from the base wall 10 farther than the end wall 12, and the upper portions of the side walls are correspondingly extended, and consequently the removable cover 25 is dish-shaped and the apertures for the lugs 28 are formed in the inclined portion 251 thereof, see Fig. 6.

The hinged cover, which carries the movable switch members and the fuses, is indicated at 30. Its side and lower edges are inturned to inclose a block 31 of insulating material and its upper edge is outturned as at 32 so as to extend into the removable cover 25. Secured to the cover or door 30 is a plate 32 which constitutes an extension thereof and which overlaps a front wall 110 formed on the lower portion of the box. A

handle 33 is secured to the exterior of the hinged door or cover, as shown in Figs. 2, 6 and 7.

The door or cover is hinged between the side walls of the box or casing by pivot lugs 35 extending through the latter into slots or grooves 36 formed in the side edges of the cover. The side walls of the box are also formed with curved slots 37 into which project pins or lugs 38 extending outwardly from the door or hinged cover. These slots are eccentric with respect to the pivot lugs or pins 35, being struck on a relatively long radius, so that, when the door is swung outwardly, it is moved longitudinally and also outwardly from the box. In order that the door may be held open when it has reached the limit of its outwardly swinging movement, the slots are laterally extended at their lower ends, as at 371, and the door may be moved rearwardly so that the lugs 38 may be caused to enter therein. In closing the door, it is necessary to first draw it forward and then swing it about the pivots 35. It will be observed from Fig. 8 that, when the door is open, a portion thereof is interposed between the two sets of stationary switch lugs and constitutes a barrier which effectively prevents access to the lugs 23 and the terminals 22, and that, as a result, a customer or unauthorized person cannot make connection with the live portions of the circuit so as to improperly abstract current therefrom.

Supported upon the block 31 is the movable switch, which, in the present case, consists of the two sets of knife contact members 40, 41, those at 40 extending perpendicularly to those at 41 as shown in Fig. 6. The members 40, 41 of each pair are connected by any suitable form of fuses. I have shown ordinary flat bar fuses at 42 which will serve the purpose, but it will be understood that they may be replaced by any other form which suggests itself to the manufacturer.

The door 30, being mounted to move as hereinbefore described, swings through an arc of approximately 120° from its completely closed position to its completely open position, and, when so opened as shown in Fig. 8, presents the inner face thereof with the fuses and the knife lugs at the front portions of the box where they are easily accessible for inspection or for replacement of parts. It will be noted, by an examination of Figs. 5, 6 and 7, that the first portion of the movement of the door or hinged cover causes a more rapid separation of the contacts 40, 41 from the stationary lugs 23, 24 than would be possible by a mere rotative movement of the door about its axis. The contacts 40 move downwardly and inwardly away from the lugs 23, and those at 41 move downwardly and outwardly away from the lugs 24. This disengagement of the movable contacts of the switch from the stationary contacts or lugs occurs rapidly and with a relatively slight rotative movement of the swinging door, and the separation is complete before the door has moved enough to permit access to the interior of the box or casing, as shown in Fig. 7. To all intents and purposes, the door is still closed when in this position, although the switch is opened and the circuit to the meter is broken. In moving the door from its completely open position as shown in Fig. 8 to its closed position, it will be seen that the opening into the box is entirely closed before the switch reaches that position which places the fuses in circuit, so that, in the event of a short circuit or other trouble on the line, the operator is protected from injury by the blowing of the fuse as soon as the switch is closed. As a matter of construction, the door is provided with a strip of insulating material 43 at the lower end of the block 31 which projects inwardly to some extent beyond the inner face of the block and which extends across the slight crack between the door and the wall 110 when the door is in the position shown in Fig. 7.

I find it desirable to prevent the door from swinging into position to close the switch accidentally in case the operator loses his grasp upon the handle 33 in the act of opening the door, and I therefore provide a swinging latch 45 which is pivoted to the side wall of the box and lies against the outer face thereof as shown in Fig. 8. This latch lies in the path of the pin or lug 38, as shown in Figs. 3 and 4, and, when the door is open, is moved outwardly by the engagement of the pivot with the curved edge 451. As soon as the pivot leaves the curved edge, the latch swings into the position shown in Figs. 4 and 8, so that its end will engage the pin 38 and prevent the door from closing far enough to close the switch. As a matter of detail, the latch 45 may be provided with a lug 46 which the operator may grasp to move it into an inactive position to permit the closing of the switch. This latch is useful when the box is arranged in the position shown upon the drawing, but it will be understood that the box may be used up-side-down; that is, so that the door 30 will be swung outwardly and downwardly instead of outwardly and upwardly in case it is found desirable to have the circuit wires enter from below instead of from above. When the position of the box is thus reversed, the latch is unnecessary, and, in such event, the lateral extension 371 of the slots 37 may be omitted. I provide means for preventing access to the interior of the box through the slots 37. Such means may take any suitable form. As shown, they consist

of sliding guards 47 placed against inner faces of the side walls and pivoted to the lugs 38. These bars are slotted, as shown at 471, so that they may be guided by pins 49, one of which is used to pivot the latch 45. When the door is closed, the slots are covered by side walls of the door itself, but, when the door is opened, the guards are slid down so as to close the slots.

It will be quite apparent to those skilled in the art that the invention disclosed herein possesses many advantages which it will not be necessary for me to refer to in detail. In the particular embodiment of the invention which I have described, the arrangement and mounting of the door is such that, with a relatively small amount of rotation about its axis, the movable switch members are separated by an accelerated movement practically simultaneously from their coacting fixed members, and further that, when the door is opened, it is moved outwardly bodily so as to bring the fuses to a position where they are easily accessible. The pivoting of the door between its ends provides for a portion thereof being interposed as a barrier between the customer and the live service wires and the terminals and switch lugs to which they are connected. Thus the box may be considered as comprising two compartments, in one of which the service or electrified terminals and switch lugs are arranged and in the other of which the meter or feeder terminals and switch lugs are arranged, there being a special sealed cover for the first-mentioned compartment, and the latter compartment being accessible to the customer by a hinged door.

The stationary contacts with which the outgoing conductors are connected, and which are exposed when the door is open, I have termed "meter" contacts, or "feeder" contacts, for the purpose of distinguishing them from the main contacts which are supposed to be always electrified, and hence these terms are not used as limitations. Of course said "meter" contacts may be included in any circuit which it is desired to control by the switch or fuse.

Having thus explained the nature of my said invention and described a way of making and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is;

1. A service switch mechanism, comprising a box, separated stationary contacts therein, a door carrying a switch member arranged to engage the stationary contacts when the door is fully closed, and means for mounting said door to cause the opening of the switch and the interposition of said door between said stationary contacts when said door is opened.

2. A service switch mechanism, comprising a box, separated stationary contacts therein, a door pivoted between its ends to the box and adapted to be opened to expose the interior of the box and a switch member carried by said door and arranged to engage said contacts when said door is closed, and to be exposed when the door is opened.

3. A service switch mechanism, comprising a box, separated main and feeder stationary contacts therein, a sealable cover for covering the main contact, a hinged door for covering the feeder contact, switch members carried by said door, and adapted to engage said contacts, and means by which the door when opened interposes a barrier to the main contact.

4. A service switch mechanism, comprising a box, main stationary contacts, feeder contacts, said contacts being disposed in opposite portions of the box, a sealable cover for concealing the main contacts, a hinged door normally concealing the feeder contacts and means whereby said door when opened interposes a barrier to said main contacts and exposes the feeder contacts.

5. A service switch mechanism, comprising a box, a main stationary contact, a feeder contact, said contacts being disposed in opposite portions of the box, a sealable cover for concealing the main contact, a hinged door normally concealing the feeder contact, means whereby when the door is opened it interposes a barrier to said main contact and exposes the feeder contact, and a switch member movable concurrently with the door and engaging said contacts only when the door is closed.

6. A switch box, a switch and associated fuse, and means whereby the switch and fuse are movable to open the circuit and whereby the live connections are rendered inaccessible, when the circuit is opened.

7. A switch box having an opening, a door for the opening, a switch member and an associated fuse carried by the door, and means whereby the door closes the opening before the switch member and fuse occupy an active position.

8. A switch box, a sealable cover for a portion thereof, a hinged door for another portion thereof and so pivoted between its ends thereto that when it is moved about its pivot one end thereof divides the box into two compartments, of which one is closed by said cover, contacts located in said compartments respectively, and a switch member carried by said door and arranged to engage said contacts when said door is closed.

9. A switch box, a door so hinged to the sides of the box that in being opened one end will swing into the box and the other end will swing out of the box, a switch member and fuse mounted on the inner face of said door and exposed when the door is opened,

and contacts located in the box to be engaged by the switch member when the door is closed.

10. A switch box, contacts therein, a door therefor carrying a switch member and a fuse, pivots located between the contacts for connecting the door and the side walls of the box, and means for moving the door transversely of the axes of said pivots.

11. A switch box, contacts therein, a door, pivots for hinging the door to the opposite side walls of the box, a pin and cam slot connection between the door and said box to cause the door to move transversely of the axis of said pivots outwardly from the box when the door is opened, and a switch member and a fuse mounted on the inner face of the door and exposed by the opening of the door.

12. A switch box, comprising a box, separated stationary contacts therein, a switch member pivoted between its ends to the walls of the box and having contacts on its ends to engage the first mentioned contacts, and means by which, during the initial rotation of said switch member about its axis, said member is moved transversely of the axis.

13. A switch box having rear, side, top and bottom walls, separated stationary contacts within said box, a sealed cover on the front of the box to prevent access to some of the contacts, a door normally covering the other contacts and so hinged to the side walls that when opened one end will swing out of the box and the other end will swing into the box to isolate the contacts behind the sealed cover, and fuses on the rear of said door placed in circuit with said contacts by the closing of the door and presented at the front of the box when the door is opened.

14. An open front switch box, separated stationary contacts therein, switch members having contacts to engage the stationary contacts, fuses between the switch member contacts, a door hinged to the box and carrying said switch members and fuses on its rear face, and means by which the initial movement of said door in one direction opens the switch members and cuts out the fuses without opening the box, and the final movement of the door in the opposite direction after the box is closed closes the switch members and cuts in the fuses.

15. A switch box, separated contacts therein, a pendant door hinged to the box on a transverse axis carrying a switch member and fuse, and means independent of the switch member for holding the door open with the switch member and fuse out of circuit.

16. A switch box, main and feeder contacts therein, a fuse, a fuse carrier movable to connect the fuse electrically with and disconnect it from the main and feeder contacts, and means for rendering the main contact inaccessible when the carrier is moved to disconnect the fuse electrically from the contacts.

17. A service switch mechanism comprising a box, stationary separated main and feeder contacts therein, a switch member having contacts to engage said separated contacts, a fuse between the switch member contacts, and means by which said switch member contacts may be separated from the stationary contacts and the fuse exposed without exposing the main contact.

18. A service switch mechanism comprising a box, separated main and feeder contacts therein, a carrier having contacts to engage said separated contacts, a fuse on said carrier and movable thereby into the box and out therefrom so as to be exposed, and means by which the main contact is rendered inaccessible when the fuse is exposed.

19. A service switch mechanism comprising a box, separated main and feeder contacts therein, a carrier having contacts for engaging the first-mentioned contacts, a fuse on said carrier electrically connecting said second-mentioned contacts, said carrier being pivoted to said box and movable to expose the fuse externally of said box, and means by which the main contact is rendered inaccessible when said fuse is exposed.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GRANVILLE E. PALMER.

Witnesses:
JOSEPH B. SMITH,
M. L. SCANNELL.