Feb. 5, 1929. 1,700,745

T. E. MURRAY, JR., ET AL

SWITCH BOX

Filed March 12, 1926 5 Sheets-Sheet 1

Fig. 1.

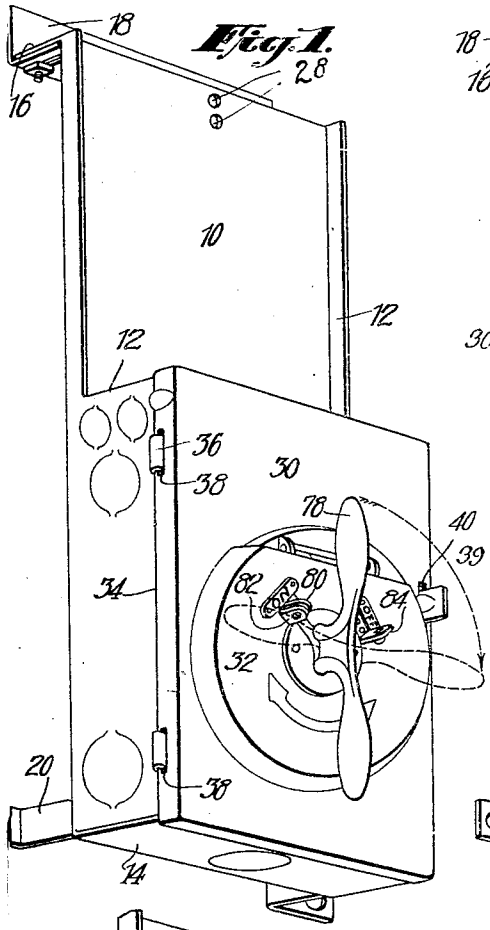


Fig. 2.

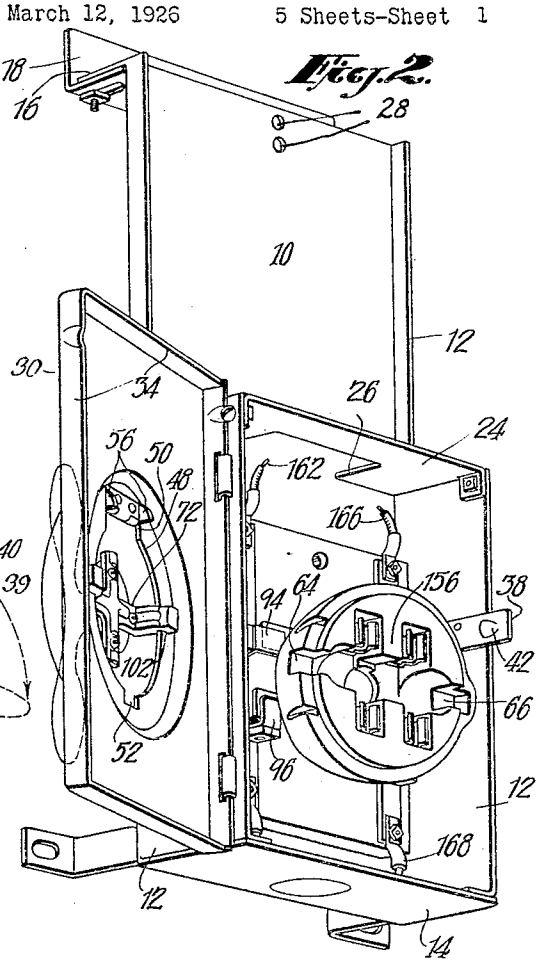
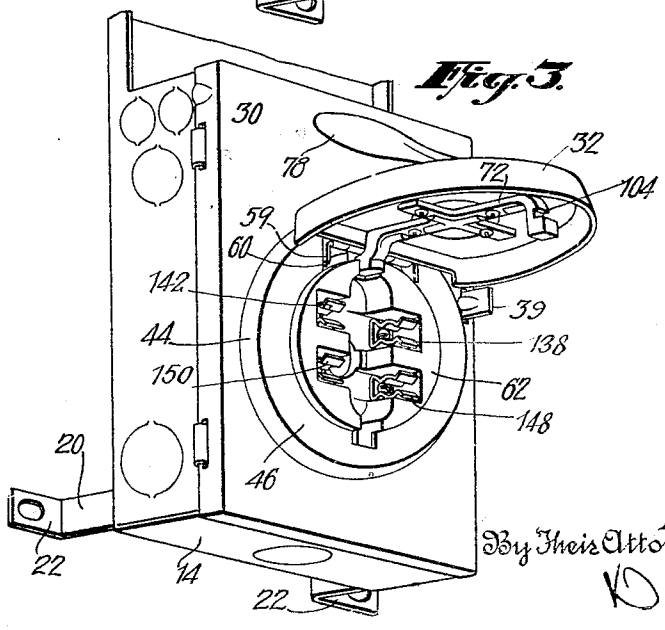


Fig. 3.



Inventors
THOMAS E. MURRAY, JR.
ALBERT B. RYPINSKI.
By their Attorney
W. Anthony Reiss

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T. E. MURRAY, JR., ET AL

SWITCH BOX

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Fig. 5.

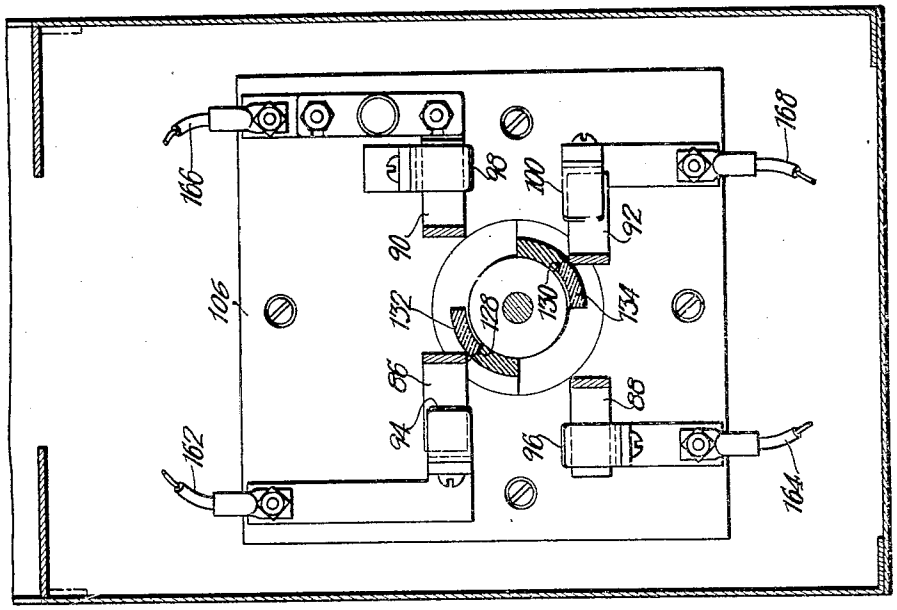
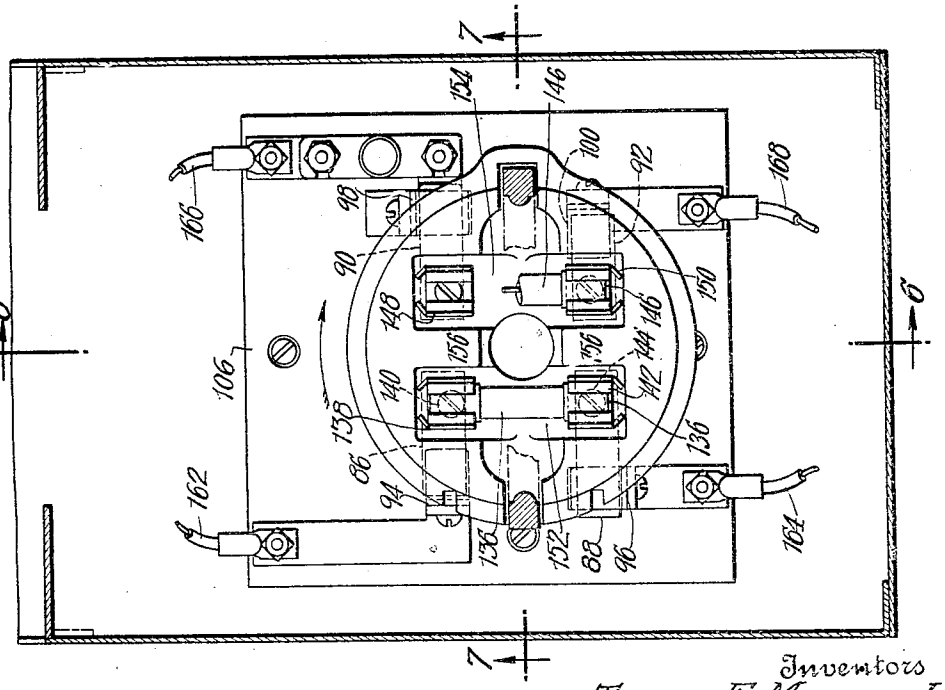


Fig. 4.



Inventors
THOMAS E. MURRAY JR.
ALBERT B. RYPINSKI.
By Their Attorney
D. Anthony Weiss

Feb. 5, 1929.

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T. E. MURRAY, JR., ET AL

SWITCH BOX

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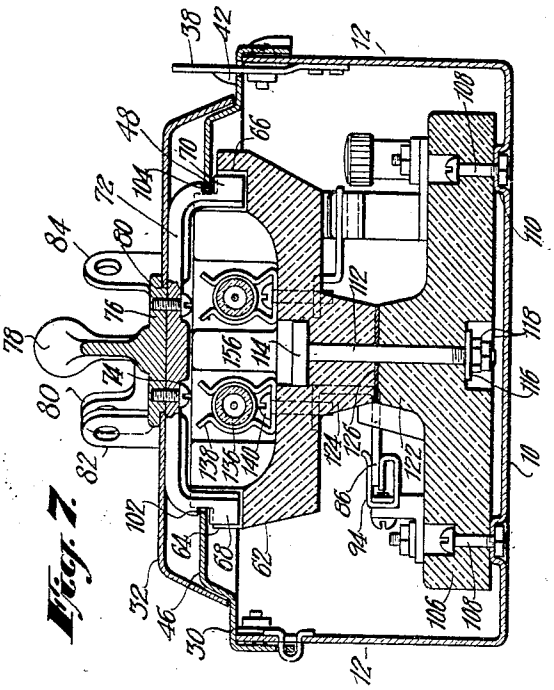


Fig. 7.

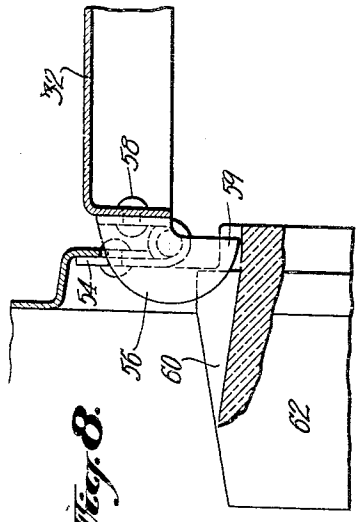


Fig. 8.

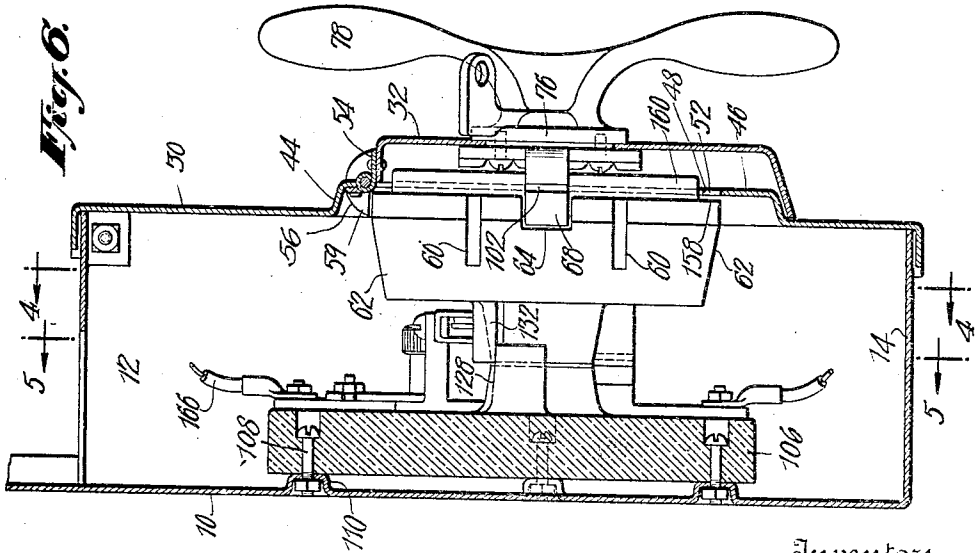


Fig. 6.

Inventors
THOMAS E. MURRAY JR.
ALBERT B. RYPINSKI.
By Their Attorney
D. Anthony Usina

Feb. 5, 1929. 1,700,745

T. E. MURRAY, JR., ET AL

SWITCH BOX

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Fig. 9.

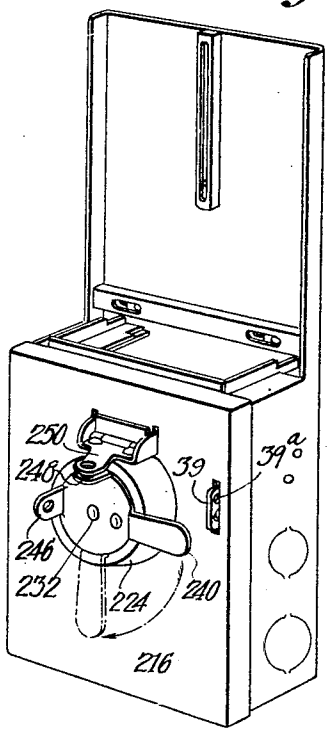


Fig. 10.

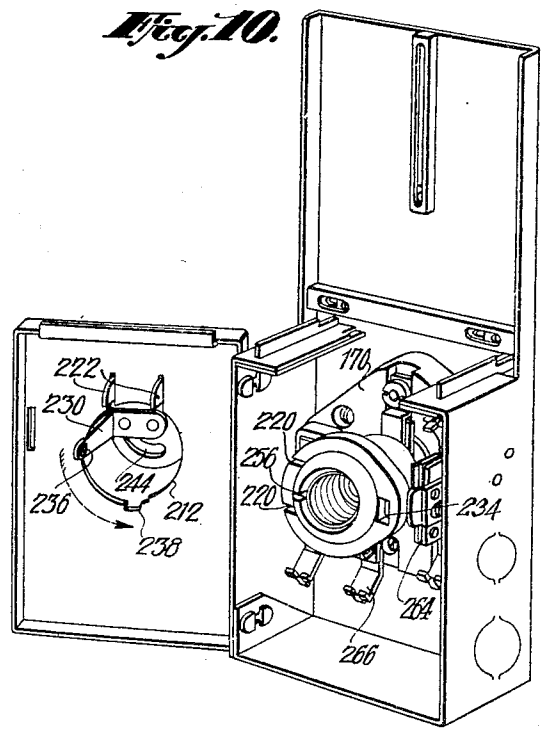


Fig. 11.

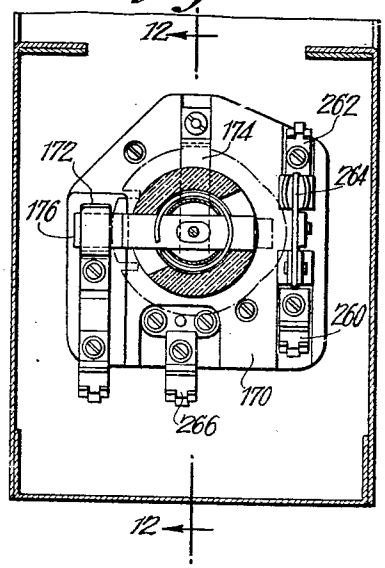


Fig. 12.

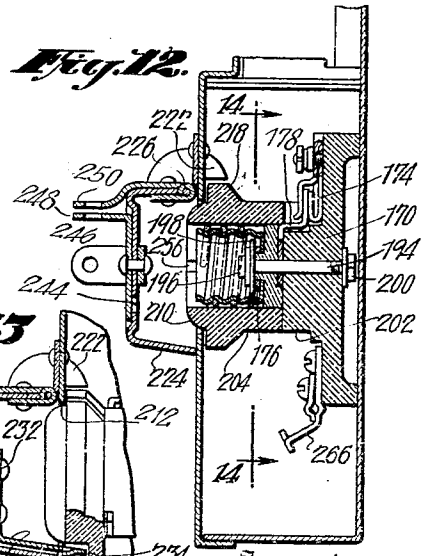
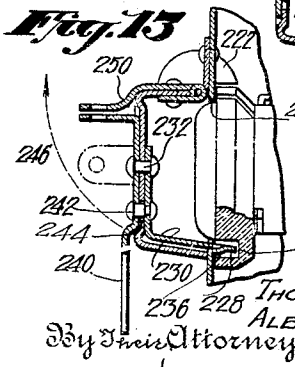


Fig. 13.



Inventors
THOMAS E. MURRAY JR.
ALBERT B. RYPINSKI.
By Their Attorney
D. Anthony Weiss

Feb. 5, 1929. 1,700,745

T. E. MURRAY, JR., ET AL

SWITCH BOX

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Fig. 14.

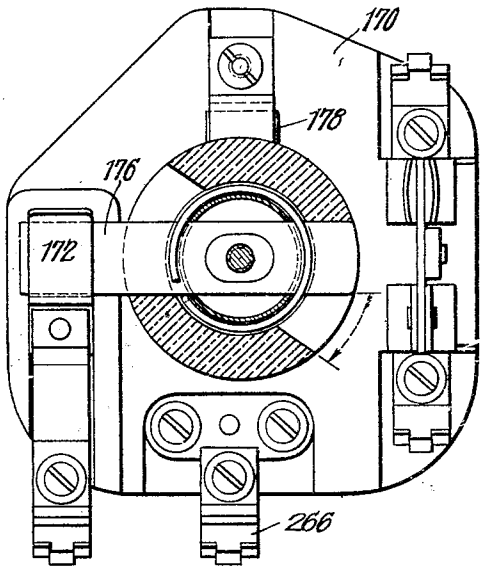


Fig. 15.

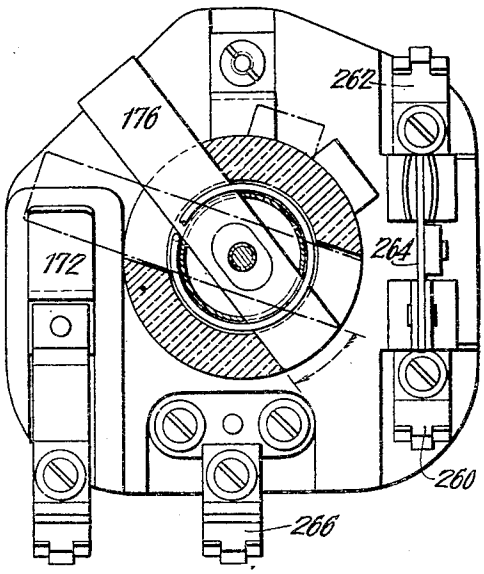


Fig. 16.

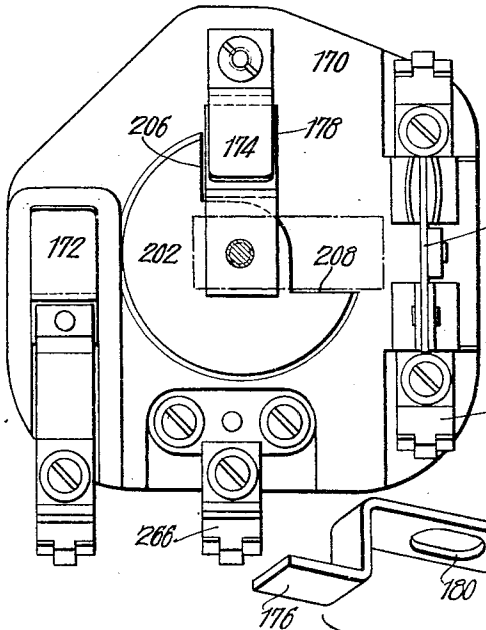
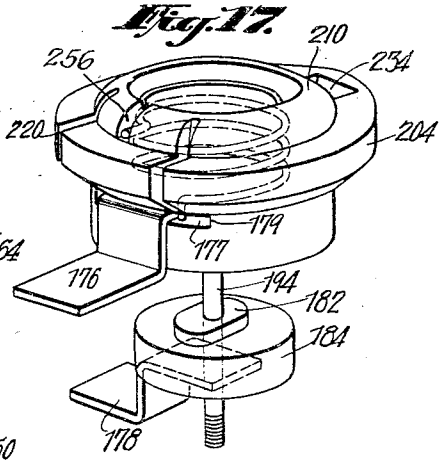


Fig. 17.



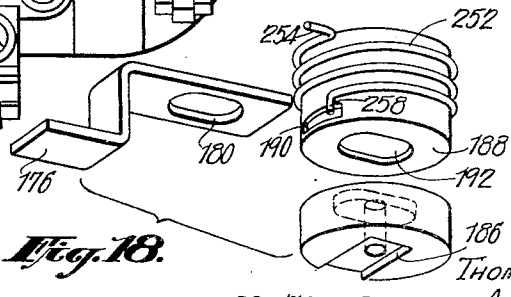


Fig. 18.

Inventors
THOMAS E. MURRAY JR.
ALBERT B. RYPINSKI.
By Their Attorney
D. Anthony Mura

Patented Feb. 5, 1929. 1,700,745

UNITED STATES PATENT OFFICE.

THOMAS E. MURRAY, JR., OF BROOKLYN, NEW YORK, AND ALBERT B. RYPINSKI, OF LAURELTON, NEW YORK; SAID RYPINSKI ASSIGNOR TO THOMAS E. MURRAY, OF BROOKLYN, NEW YORK.

SWITCH BOX.

Application filed March 12, 1926. Serial No. 94,135.

This invention relates to improvements in switch boxes having associated therewith a protective fuse or fuses, the switch boxes having means for permitting access to the fuses without giving access to the other parts of the switch enclosed in the box. While not limited thereto, the switch boxes of our invention are well adapted for use as so-called service entrance switches customarily placed on the service side of the watt meter used for measuring the current furnished the consumer.

The invention will be readily understood from the following specification when read in connection with the accompanying drawings in which—

Fig. 1 is a perspective view of the switch box showing in full lines the position of the switch operating handle when the current is turned on and in dotted lines the position to which the handle is turned in cutting off current;

Fig. 2 is a perspective view of the switch box of Fig. 1 showing the main cover swung to open position so as to give access to the switch terminals;

Fig. 3 is a perspective view of the switch box showing a supplemental cover opened to give access to the fuses without permitting access to the switch parts;

Fig. 4 is a front view of the switch box of Fig. 1 with the front cover sectioned off, the view being approximately on section line 4—4 of Fig. 6;

Fig. 5 is a section approximately on line 5—5 of Fig. 6;

Fig. 6 is a section on line 6—6 of Fig. 4;

Fig. 7 is a horizontal section on line 7—7 of Fig. 4;

Fig. 8 is a fragmentary detail illustrating means for preventing movement of the switch blades when the supplemental cover is in the open position shown in Fig. 3;

Fig. 9 is a perspective view of a modified form of switch box;

Fig. 10 is a perspective view of the box of Fig. 9 with the main cover swung open;

Fig. 11 is a front view of the switch box of Fig. 9 with the front cover sectioned off;

Fig. 12 is a section on line 12—12 of Fig. 11;

Fig. 13 is a detail view showing the supplemental cover of Fig. 12 swung to a different position;

Fig. 14 is an enlarged view of part of the switch mechanism, the view being taken on line 14—14 of Fig. 12;

Fig. 15 is a view similar to Fig. 14 illustrating the quick breaking action of the switch blade;

Fig. 16 is a view similar to Fig. 14 but showing another switch blade located in a lower plane than that indicated in Fig. 14;

Fig. 17 is a perspective view of a carrier for the switch blades and fuse;

Fig. 18 is a perspective view showing a group of certain parts which form part of the assembly shown in Fig. 17.

Referring first to Figs. 1 to 8 inclusive, 10 is a back plate of the switch box, 12 integral side plates and 14 a bottom plate. At the top of the plate 10 a flange 16 is bent rearwardly and to this is bolted or otherwise secured an attaching bracket 18. Near the bottom of the box a bracket 20 is secured, this bracket having lugs 22 formed with suitable screw holes for fastening the box in position. A top plate 24 is riveted or otherwise permanently secured to the sides 12, this top plate being formed with a cut away portion 26 of sufficient size to permit the entrance of the lower portion of the watt meter which is secured to the back plate 10 in any suitable manner, for example, by a bolt passing through the holes 28.

All of the switch terminals, switch mechanism and protective fuses are located within the walls of the switch box and the design of the box is such that access to the switch parts and terminals can only be had when the main cover is opened. Normally, this cover is closed and a seal of some sort is put on it to prevent consumers from tampering with the switches. This main cover is only intended to be opened by employees of the power company. The main cover has secured thereto a supplemental cover which may be opened at will by the consumer for the purpose of replacing fuses.

In the drawings, the main cover is indicated as a whole by numeral 30 and the supplemental cover by numeral 32. The main cover is provided on its four edges with suitable flanges 34 which in closed position overlap the top, bottom and side walls 24, 14 and 12 of the box. The main cover 30 is hinged to one side wall 12, the connection being conven-

iently made by straps 36 which pass through slots 38 and are bent around as shown. A suitable spring latch 39 passes through a slot 40 formed in the front face of the cover and a portion 42 of this latch is punched up to form an engaging tooth. The punching of this tooth provides an opening through which a wire seal can be inserted. Or as indicated in Fig. 9, the latch 39 may be provided with an opening 39[a] for the insertion of the hasp of a padlock.

At approximately the central portion of the main cover the metal thereof is pressed outwardly in the form of a hollow boss indicated at 44. The front wall 46 of this boss is cut away to form a substantially circular opening indicated at 48 with notched portions 50 and 52 located beyond the circle. The supplemental cover 32 is of substantially frustoconical form and is of such diameter that it fits over the hollow boss 44 when in closed position as indicated in Figs. 6 and 7. The supplemental cover 32 is provided with hinges 54 which are accommodated within the cut away portion 50. The supplemental cover is also provided with locking lugs 56 formed with a bent piece of metal secured to the upper edge of the supplemental cover by rivets 58. The shape of each lug 56 is such that when the supplemental cover 32 is raised to open position as illustrated in Figs. 3 and 8 the ends 59 of said lugs will enter notches 60 formed in the periphery of a carrier member 62 which supports the switch blades and fuses to be hereinafter more fully referred to. When the supplemental cover 32 is swung to closed position as indicated in Figs. 2 and 6, the extremities 59 of the locking lugs will be swung to such position that they will clear the periphery of the carrier 62.

The carrier 62 is provided with other notches 64 and 66 for engagement with the ends 68 and 70, respectively, of a driver 72 which is secured by means of screws 74 or the like to a hub 76 of an operating handle 78 which hub is shouldered down as shown in Fig. 7 and journalled in an opening in the front wall of the supplemental cover. The hub 76 carries an upstanding perforated lug 80 which is adapted at different times to coact with lugs 82 and 84 secured to the front face of the supplemental cover. When the lug 80 contacts with lug 82 as indicated in full lines in Fig. 1, the switch blades 86, 88, 90 and 92 carried by the carrier 62 will engage their respective terminal contacts 94, 96, 98 and 100. If desired, a padlock hasp may be passed through the openings in the lugs 80 and 82 to lock the switch in closed position. Alternatively, the switch may be locked open by swinging the handle 78 to the dotted position to Fig. 1 and engaging the padlock or the like with the lugs 80 and 84. The driving connection between the carrier 62 and the handle 78, it is understood, is through the driver 72, the ends 68 and 70 of which press against the side walls of the notches 64 and 66 when the handle is turned. The driver 72 also serves to lock the supplemental cover 32 to the main cover when the switch carrier member 62 is in position in which the blades make contact with the terminal jaws. This locking feature is best illustrated in Figs. 2, 3 and 7 wherein it is seen that the ends 68 and 70 of the driver are provided with notches 102 and 104 which straddle the front wall of the main cover 30. When the operating handle 78 is turned in position to break contact between the blades 86, 88, 90 and 92, and contact jaws 94, 96, 98 and 100, the driver 72 will be swung to such position that the ends thereof will swing into alignment with the cut away portions 50 and 52 and thus permit the supplemental cover to be swung open.

The contact jaws 94, 96, 98 and 100 are all rigidly secured to a base 106 of suitable dielectric material. This base in turn is secured to the back plate 10 of the switch box by suitable bolts 108, the base preferably being spaced from the surfaces of the wall by inwardly projecting bosses 110 through which the securing bolts 108 pass.

The carrier 62 is pivotally secured to the base 106 by means of a bolt 112 having an enlarged head 114 seated in a recess formed in the carrier. The opposite end of the bolt is screw threaded and provided with a washer 116 and lock nuts 118 located in the recess formed in the base. The base 116 and carrier 62 are provided, respectively, with bosses 122 and 124 and a washer 126 is interposed between the bosses to eliminate friction between the parts, these parts frequently being made of porcelain or other dielectric compounds. The boss 122 has portions thereof cut away so as to form stop shoulders indicated at 128 and 130 in Fig. 5 which are adapted to coact with lugs 132 and 134 projecting from the carrier. These lugs and stops permit the carrier to turn through an angle of approximately 90° as will be understood.

The switch blades 86, 88 are electrically connected with one another by means of a fuse 136 of the cartridge type which at one end engages the clip 138 which makes circuit through the screw 140 secured to the blade 86. The opposite end of the fuse 136 engages a clip 142 which is electrically connected by means of screw 144 with the switch blade 88. Similarly, a fuse 146 engages clips 148 and 150 connected respectively with the switch blades 90 and 92. The fuses and clips just referred to are preferably located in cavities such as indicated at 152 and 154. Thus they are separated by the barrier portions indicated at 156. This prevents the likelihood of any metallic object being inadvertently bridged across the fuse clips of opposite polarity and thereby causing a

short circuit. It is to be noted that the fuses and the clips are physically isolated from the switch blades, the latter being located on one side of the carrier and the former being located in cavities on the opposite side of the carrier. This arrangement prevents a consumer from tampering with the switch blades or connections. As a further means of preventing unscrupulous persons from inserting a wire or thin tool between the main cover and the carrier so as to make a connection with the switch terminals, the carrier is shouldered as indicated at 158 in Figs. 6 and 7 and a portion of reduced diameter indicated at 160 projects through the opening 48 formed in the face of the main cover. The diameter of the portion 160 is just a trifle smaller than the diameter of the opening 48, hence, when the main cover is closed it will be very difficult to insert a thin tool, and any such tool or wire inserted would strike the shoulder 158.

From the above, the operation of the switch box will be readily understood. Normally, the main cover 30 will be locked in the closed position shown, for example, in Fig. 1 and the operating handle 78 will be vertically disposed. The driver 72 will be in the full line position shown in Figs. 2 and 6, therefore, the supplemental cover 32 will be locked to the main cover while the switch blades are in engagement with their respective switch jaws. If a fuse blows out, the handle 78 is turned clockwise through an angle of about 90°. This will swing the driver 72 to approximately vertical position so as to bring the ends thereof in register with the cut away portions 50 and 52. This permits the supplemental cover to be swung upward on its hinge to the position indicated in Fig. 3 so as to permit access to the fuses. In Figs. 2 and 3, the fuses have been omitted in the interest of clearness. It is perfectly safe for an inexperienced person to insert the fuses between clips because when the carrier is in the position shown in Fig. 3 the switch blades are disconnected from the switch jaws.

After new fuses have been inserted, the supplemental cover 32 will be swung downwardly and the handle 78 given a quarter turn in a counterclockwise direction. This will simultaneously lock the supplemental cover to the main cover and bring the switch blades into contact with the switch jaws. This will complete the electrical circuit on one side of the line through terminal 162, switch jaw 94, blade 86, fuse 136, blade 88, switch jaw 96, and lead wire 164. On the other side of the line the circuit will be completed through terminal 166, switch jaw 98, blade 90, fuse 146, blade 92, contact jaw 100 and lead wire 168.

In the above described embodiment of the invention we employ so-called cartridge fuses between the switch blades. In a slightly modified embodiment of the invention as shown in Figs. 9 to 18 inclusive, we employ a fuse of the screw plug type. Referring to this form of the invention the dielectric base 170 carries fixed contact jaws 172 and 174 which coact with the switch blades 176 and 178 respectively. The blade 176 is bent to the form best shown in Fig. 18 and its inner end is provided with an opening 180 adapted to fit around a boss 182 formed on a block 184 of suitable dielectric material. The underside of this block is notched out as shown at 186 to receive the inner end of the blade 178. A screw shell or socket 188 is provided for receiving a known type of screw threaded fuse plug. The side wall of the screw shell 188 is cut away at 190 to permit the passage therethrough of the inner end of the switch blade 176 and the bottom of the shell 188 is apertured as at 192 for engagement with the boss 182. The inner end of the switch blade 176 makes electrical contact with the metallic screw shell 188 as shown in Fig. 12. The switch blade 178 makes electrical contact with a central bolt 194 which has an inner head 196 adapted for coaction with the usual central button or contact of the fuse plug. The head 196 bears against an insulating washer 198 of mica or the like and a nut 200 bears on a washer which is seated against a suitable shoulder on the bolt 194 so as to hold the parts in assembled relationship.

A boss 202 projecting inwardly from the base 170 forms a seat for the block 184 and also for a carrier 204 of sleeve-like form which encloses the screw shell 188 and the block 184. The boss 202 is cut away so as to form stop shoulders 206 and 208 which coact with the switch blade 178 so as to limit the rotary movement of the carrier to approximately 90°.

The carrier 204 at its forward end is provided with a rounded portion 210 which projects through the substantially circular opening 212 formed in the front wall 214 of the main cover 216 of the switch box. The carrier 204 is also provided with a flange 218 of larger diameter than the opening 212 so as to prevent the entrance of wires or other thin objects between the wall of the cover and the carrier.

The flange 218 is provided with notches 220 which cooperate with locking lugs 222 carried by a supplemental cover 224 which is pivoted by means of a hinge 226 to the main cover 216. When the supplemental cover is lifted the locking lugs 222 enter the notches 220 and thereby prevent movement of the switch blades to closed position so long as the supplemental cover is in open position. When the supplemental cover is closed, the lugs 222 clear the periphery of the flange 218 and a projecting tongue 228 of a drive mem-

ber 230 which is pivoted at 232 in the center of the supplemental cover and enter a depression 234 formed in the carrier 204. When the supplemental cover is swung to closed position, the tongue enters the recess 234 and a projection 236 on said tongue passes freely through a notch 238. The driver 230 is actuated by a suitable operating handle 240 located on the outside of the supplemental cover, this handle being pivoted on the same stud 232 which supports the driver and being connected with the latter by means of a shouldered rivet 242 which passes freely through an arcuate slot 244 formed in the front wall of the supplemental cover. The handle 240 is provided with locking ears 246 and 248 by means of which the same can be locked to a fixed perforated projection 250 which is part of the same stamping which forms the locking lugs 222 and the hinge of the supplemental cover.

In this form of the invention it will be seen that we also provide for simultaneously locking the supplemental cover and moving the carrier which supports the switch blades so that whenever the supplemental cover is in open position, the switch blades will be out of contact with the live switch jaws.

In the modified construction we have provided snap mechanism for quickly breaking the circuit so as to avoid arcing. As best shown in Figs. 11, 12 and 18 the snap mechanism includes a helical spring 252 which is conveniently seated within the convolutions of the threads of the screw shell 188. One end 254 of this spring extends radially outward and engages the walls of a slot 256 formed in the rounded portion 210 of the carrier 204. The opposite end of the spring 252 is bent at an angle as indicated at 258 in Fig. 18 so as to press against the switch blade 176. As thus arranged when the carrier 204 is turned clockwise as viewed from the top in Fig. 17, the carrier will first move relatively to the switch blade 176, thus tending to expand the spring. The switch blade passes through a slot 177 in the carrier which is of sufficient length to permit this relative movement. When the wall 179 of this slot strikes the edge of the switch blade the same will be moved positively. The turning force exerted through the handle by the operator will be sufficient to overcome the friction between the contact jaw 172 and the switch blade 176. Thus the switch blade will be positively moved by the operator say to the dotted position in Fig. 15. It will then snap by reason of the stored energy in the spring say to the position indicated in full lines in Fig. 15, thus making the desired quick break of the circuit so as to prevent arcing.

The base 170 also carries terminals 260 and 262 which are connected by means of a knife switch 264 which can be operated only when the main cover 216 is open. Another supplemental terminal 266 is secured to the base but this too can only be reached when the main cover is open.

In the structures shown and above described, electrical connections to two fuses are opened upon rotation of the fuse carrier but it is to be understood that the invention may be readily embodied in switches in which only one of the two fuse terminals is disconnected by rotation of the carrier.

While we have described quite specifically the structural details of the embodiments of the invention illustrated, it is not to be construed that we are limited thereto since various modifications and substitution of equivalents may be made by those skilled in the art without departure from the invention as defined in the appended claims.

What we claim is:—

1. A switch box having a dielectric base therein, a combined switch contact and fuse carrier within the box journalled in relation to said base, a main cover formed with an opening giving access to the carrier and a supplemental cover for said opening which can only be moved to open position after said carrier is rotated to its open position, said supplemental cover being hinged to and swingable outwardly from said main cover.

2. A switch box having a rotating carrier therein, switch blades bridged by a fuse on said carrier, a cover on the switch box having an opening which gives access only to said fuse, a supplemental cover for said opening, said supplemental cover being hinged and locked against opening movement about said hinge until the switch blades have been rotated to the off position.

3. A switch box of claim 2 with the added feature that the carrier is shouldered and provided with a part projecting through the opening in said cover.

4. A switch box having a rotary carrier therein, switch blades and a fuse supported by said carrier, a cover for said switch box having an opening which gives access only to said fuse, a supplemental cover for said opening which can be moved independently when the rotary switch carrier is in the off position, and means cooperating with said carrier and locking the supplemental cover to the other cover.

5. A switch box having a rotary carrier therein, switch blades and a fuse supported by said carrier, a cover for said switch box having an opening which gives access only to said fuse, a supplemental hinged cover for said opening, and means for preventing movement of said carrier when said supplemental cover is open.

6. A switch box having a switch and fuse therein, a main cover arranged to be opened to give access to all the switch parts and terminals enclosed by the box, a movable carrier for the fuse and switch blades, a supplemental

cover hinged to the main cover and arranged to normally cover an opening in the latter through which access to only the fuses can be had, and means for locking the carrier when said supplemental cover is opened.

7. A switch box having secured thereto a base of dielectric material carrying terminal contacts, a rotary dielectric carrier having switch blades for engagement with said contacts, a fuse electrically connected with said blades but physically isolated from them by said dielectric carrier, a cover which when open permits access to said terminals and switch parts and a hinged supplemental cover swingable outwardly from the main cover and which normally encloses the part of the carrier which supports said fuse and a single handle for rotating the switch carrier and opening the supplemental cover.

8. The switch box of claim 7 including means for preventing rotation of the carrier when the supplemental cover is in open position.

9. A switch box housing a switch base having a notched carrier pivotally mounted thereon, a main cover, and a supplemental cover hinged thereto having a lug adapted to swing into a notch in said carrier when said supplemental cover is opened and a switch handle journalled on said supplemental cover.

10. A switch box housing a switch base having a notched carrier pivotally mounted thereon, a main cover, said carrier being shouldered and said main cover having an opening therein through which a reduced portion of said carrier extends, a fuse located in said carrier and switch blades electrically connected with said fuse but physically separated therefrom, a supplemental cover hinged to said main cover and means secured to said supplemental cover for simultaneously turning the carrier and locking the supplemental cover to the main cover.

11. A switch box having a base therein carrying fixed switch contacts, a combined switch and fuse carrier pivotally supported in relation to said base within the switch box, a main cover having an opening therein in alignment with said carrier, a supplemental cover hinged to the main cover having a lug adapted to swing into a notch in the carrier when the supplemental cover is opened, said carrier having one face recessed and carrying a fuse, the opposite face of said carrier having a switch blade secured thereto adapted to coact with a contact carried by said base.

12. A switch box housing a switch base having a notched carrier pivotally mounted thereon, a main cover, and a supplemental cover hinged thereto having a lug adapted to swing into a notch in said carrier when said supplemental cover is opened, said carrier having one face recessed and carrying a fuse, the opposite face of said carrier having a switch blade secured thereto and means carried by said supplemental cover for simultaneously turning the carrier and locking the supplemental cover to the main cover.

13. A switch box comprising a sheet metal back plate, side walls and a bottom wall, a front cover engaging said side and bottom walls, a switch base secured within the box and having contact jaws, a carrier pivoted on said base, switch blades and a fuse bridging the latter supported on said carrier, a supplemental cover hinged to said front cover, an operating handle journalled on the supplemental cover and a member connected thereto arranged to transmit a turning movement to said carrier and to lock the supplemental cover to said front cover.

14. A switch box, a combined switch contact and fuse carrier rotatable within said box, a main cover having an opening therein within which said carrier rotates and adapted to give access to the fuse supported by the carrier, a hinged supplemental cover for said opening swingable away from the main cover and which can only be moved to open position after said carrier is rotated to the open position.

In witness whereof, we have hereunto signed our names.

THOMAS E. MURRAY, JR.
ALBERT B. RYPINSKI.