T. E. MURRAY.

SWITCHBOARD AND CUT-OUT.

APPLICATION FILED JUNE 1, 1909.

943,699.

Patented Dec. 21, 1909.

2 SHEETS—SHEET 1.

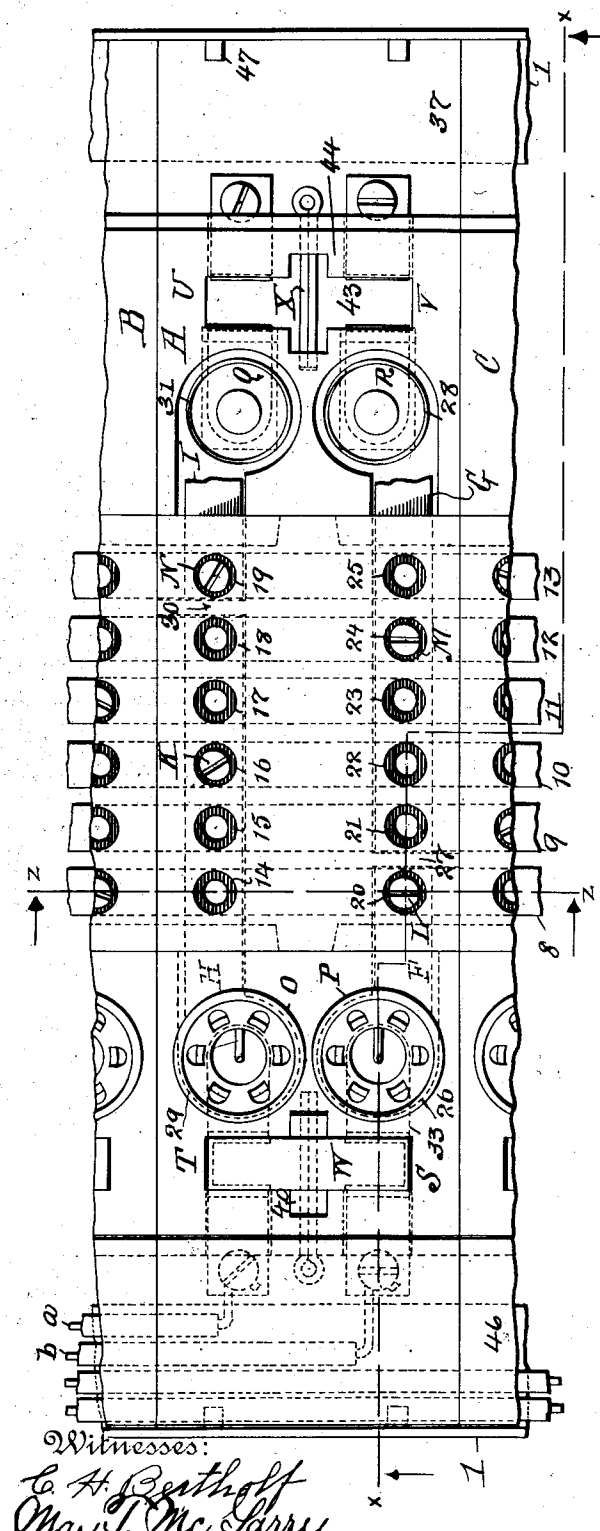

Fig. 1.

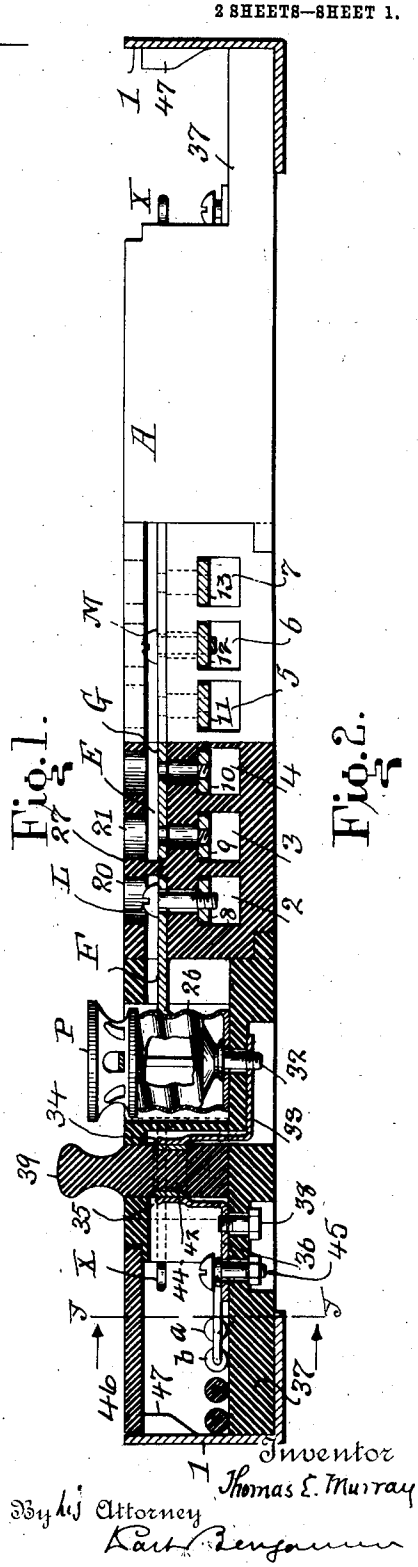

Fig. 2.

Witnesses:

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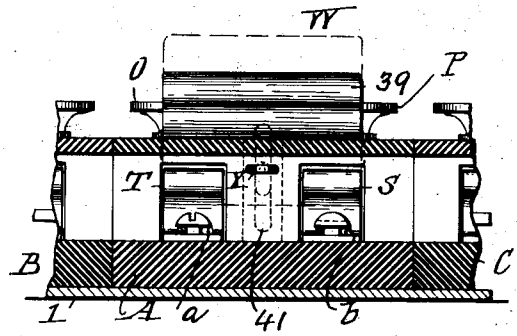

Fig. 3.

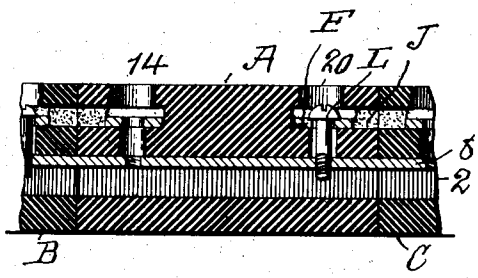

Fig. 4.

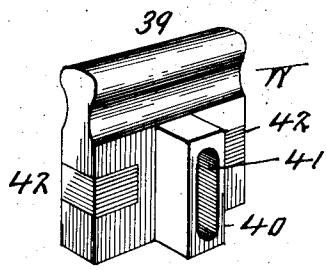

Fig. 5.

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THOMAS E. MURRAY, OF NEW YORK, N. Y.

SWITCHBOARD AND CUT-OUT.

943,699. Specification of Letters Patent. Patented Dec. 21, 1909.

Application filed June 1, 1909. Serial No. 499,314.

To all whom it may concern:

Be it known that I, THOMAS E. MURRAY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Switchboards and Cut-Outs, of which the following is a specification.

The invention is a switch board and cut-out for electrical circuit conductors, made up of a series of units, in any desired number, each unit comprising a block of refractory insulating material, containing conductors and connections as hereinafter described. The several units are disposed in juxtaposition in any suitable support, such as the flanged bars set forth, the main conductors passing through registering transverse passages in all the blocks and the pairs of local circuit conductors which may extend to one side or (as herein shown) on both sides of the group of main conductors extending through longitudinal passages crossing said transverse passages, to conduits formed at the ends of the units. In each unit are provided openings, extending inward from the outer exposed surface, in which may be inserted removable pins for establishing electrical connection between the longitudinal and transverse conductors at their points of crossing. The longitudinal conductors in each unit may be connected to removable fuse plugs disposed in separate recesses therein and between said fuse plugs and the local circuit terminals may be interposed a cut-out plug also in a separate recess in said block. The engaging device between plug and block is so constructed as to permit the plug to be sufficiently raised in its recess to break local circuit, and at the same time, to interpose the lower portion of its body, which forms a partition of insulating material so as to prevent sparking across the place of break.

In the accompanying drawings—Figure 1 is a plan view showing one complete switch unit and portions of the two similar units in juxtaposition thereto. At the right hand portion of Fig. 1, the cover 46, the fuse plugs Q, R, and the circuit connecting plug W are removed, the pin X being, however, left in place. Fig. 2 is a section on the line x, x, of Fig. 1. Fig. 3 is a section on the line y, y, of Fig. 2. Fig. 4 is a section on the line z, z, of Fig. 1, and Fig. 5 is a perspective view of the circuit closing plug.

Similar letters and numbers of reference indicate like parts.

Each unit is composed of a block A of refractory insulating material, such as porcelain, of substantially parallelogram form and constructed to be received between the flanges of a pair of fixed holding bars 1. A number of similar units as B, C, may be placed side by side between the bars 1 and in this way a composite switch-board and cut-out, adapted to any number of local circuits, may be built up. In the middle portion of each block A is formed a number of parallel transverse passages 2, 3, 4, 5, 6, 7, preferably rectangular in cross section. The passages in one unit as A register at their ends with the similar passages in the adjacent units B, C, and in each of the passages is inserted a metal strip conductor, as 8, 9, 10, 11, 12, 13. These conductors extend through the registering transverse passages of the units which are placed together. In the opposite longitudinal edges of each unit as A, are formed longitudinal passages, here in the form of recesses D, E. In each of these recesses are laid two metal conducting strips F, G or H, I, placed end to end. The strips F, G or H, I, therefore, cross all of the strips 8, 9, 10, 11, 12, 13. After the strips F, G or H, I are inserted in the recesses D, E, said recesses may be filled with cement flush with the edge of the block, as shown at J, Fig. 4. In the solid portion of the block above the strips F, G, H, I are made circular openings 14, 15, 16, 17, 18, 19 and 20, 21, 22, 23, 24, 25, each opening being directly above the point of crossing of a strip F, G, H or I over the transverse strips 8, 9, 10, 11, 12, 13. In these openings are inserted headed screw connecting pins K, L, M, N, each pin passing loosely through an opening in a strip F, G, H or I and being secured in a threaded opening in one of the strips 8, 9, 10, 11, 12 or 13. The strip F is connected at one end to a threaded metal socket 26 which is disposed in a recess in the block A. The strip G is separated from strip F by a partition 27, Fig. 2, and is connected at its outer end to a threaded metal socket 28 in another recess in block A. The strip H is connected to a metal socket

29, similar to 26, disposed in another recess in block A. The strip I is separated from strip H by a partition 30, and at its outer end is connected to a threaded metal socket 31, similar to 28, in another recess in block A. The strips F and I are short and respectively cross the transverse strips 8 and 13. The strip G crosses over the strips 9, 10, 11, 12, 13. The strip I crosses the strips 8, 9, 10, 11, 12.

In each of the threaded metal sockets 26, 28, 29, 31 is inserted a threaded fuse plug O, P, Q, R, the metal shell of which makes electrical connection with said socket. One terminal of the fuse strip in the plug connects in the usual way with said shell, and the other terminal connects with a threaded pin 32 which passes through a hole in the bottom of block A and enters a threaded opening in a horizontal metal plate 33 which enters a recess on the bottom of block A, and has its end 34 bent upwardly to form one part of a spring clip S, the other part of said clip being formed by the bent up end 35 of a plate 36 which is secured on the upper side of a projection 37 extending from block A, by means of the screw bolt 38. The connections with each of the metal sockets 26, 28, 29, 31 is the same, so that two pairs of spring clips, S, T and U, V are formed at each end of block A.

In order to establish electrical connection between the arms of each pair of spring clips at will, I provide a plug W of porcelain having an upwardly projecting knob 39 extending above the block A, and on each side a projection 40. An elongated vertical slot 41 extends through said projections and body of the plug. At each end of the plug is a countersunk metal plate 42 which extends over the edge and inwardly on each side of the plug, Fig. 5. In the block A is made a suitably formed recess 43 having side grooves to receive projections 40, in which recess the plug W is inserted, so that the metal plates 42 will respectively enter between and establish electrical connection between the arms of the clips S, T. Through the end wall 44 of the block A is inserted a pin X which passes through the slot 41 and enters the block on the other side. When it is desired to break connection between the clip arms, the plug W is raised upwardly, sufficiently to withdraw the plates 42 from between said arms, but is prevented from being wholly removed by the pin X (see dotted lines Fig. 3). When the plug is thus raised, the body portion thereof, below the plates 42, comes between the clip arms, thus filling the air space otherwise between them and preventing sparking due to break of contact. The plug at the opposite end of block A is similarly constructed and arranged and serves to break connection in like manner between the arms of clip U, V.

Local circuit wires *a*, *b* are connected to the outer arms of clips S, T, and similar circuit wires (not shown) are connected to the outer arms of clips U, V, by means of headed bolts 45, Fig. 2. The circuit wires rest upon the projections 37 at each end of the block A. The spaces immediately above these projections and included between the end walls of the block and the flanges of the bars 1 unitedly form a continuous passage (when the units are put together) for the reception of the circuit wires from the several units, as shown in dotted lines Fig. 1. The end spaces of each unit are provided with removable covers 46 which rest upon shoulders formed on the end walls of the block and lugs 47 on the inside of the flanges of bars 1. Considering the circuit wires *a*, *b*, it will now be obvious that by inserting a screw connecting pin K into any one of the openings 15, 16, 17, 18, and a similar screw connecting pin L into the opening 20, I may establish circuit from any strip, 9, 10, 11, or 12, through fuse plug O to circuit breaking plug W to wire *a*, and return from wire *b* to circuit breaking plug W to fuse plug P to pin L and strip 8. In Fig. 1 the pin K is shown, for example, in the opening 16, thus establishing circuit with strip 10. Similarly on the other side of the unit block A, I may establish circuit by pin M from any strip, 9, 10, 11, 12, as for example 11 as shown, and return by pin N connecting with strip 13. Or, in other words, the strips 9, 10, 11, 12 being regarded as positive and the strips 8 and 13 as negative, I may establish two local circuits, in either of which may be included any one of the positive strips, by the insertion of the connecting pins in the proper openings.

A special feature of advantage of my device is that it exposes none of the circuit conductors, but simply a slab of porcelain having the openings for the insertion of the connecting pins, and with nothing but the upper ends of the fuse plugs and the handles of the circuit breaking plugs protruding therefrom. It will also be observed that each of the conducting strips is separately inclosed in a passage in the block A, and that the fuse plugs and cut-out plugs are also each disposed in a separate recess in said block.

I claim:

1. A block of refractory insulating material, mutually crossing circuit conductors, each separately inclosed in said block, and means operable from the exterior of said block for electrically connecting said conductors within said block and at their crossing points.

2. A block of refractory insulating material, mutually crossing circuit conductors, each separately inclosed in said block, and removable means operable through openings

in said block and located at the crossings of said conductors for electrically connecting said conductors at their crossing points.

3. A block of refractory insulating material having separate tubular passages mutually crossing and openings located at the crossing points and extending inward from a surface of the block to the innermost passages, circuit conductors in said passages, and removable means disposed in said openings for electrically connecting said conductors at said crossing points.

4. A solid block of refractory insulating material, a plurality of transverse circuit conductors separately inclosed in tubular passages in said block, two longitudinal circuit conductors also separately inclosed in tubular passages in said block and crossing said first named conductors, removable means disposed in openings in said block, located at the crossing points of said conductors, for electrically connecting said conductors at said points, metallic sockets disposed in separate recesses in said block, each connected to an end of one of said longitudinal conductors and also to a circuit terminal, and removable fuse plugs in said sockets.

5. A block of refractory insulating material, a plurality of transverse circuit conductors separately inclosed in said block, two longitudinal circuit conductors separately inclosed in said block and crossing said first named conductors, removable means disposed in openings in said block located at the crossing points of said conductors for electrically connecting said conductors at said points, two metallic sockets disposed in separate recesses in said block and each connected to one end of one of said longitudinal conductors, two spring clips disposed in a separate recess in said block, one arm of each clip being electrically connected to one of said sockets and the other arm to a circuit terminal, a removable plug of refractory material entering said clip recess, and contact plates on opposite edges of said plug respectively closing circuit between the arms of said spring clips.

6. In an electric cut-out, a block of refractory insulating material having a recess, two pairs of spring arms forming circuit terminals disposed therein, a plug of refractory insulating material entering said socket and having a vertical slot, contact plates on opposite edges of said plug, and a pin entering said block and extending through said slot: the said slot being of length sufficient to permit said plug to be raised to withdraw the contact plates thereon from between said spring arms.

7. In an electric cut-out, a block of refractory insulating material having a recess, two pairs of spring arms forming circuit terminals disposed therein, a plug of refractory insulating material entering said socket and having a vertical slot, contact plates on opposite edges of said plug and at a distance from the lower edge thereof, and a pin entering said block and extending through said slot: the said slot being of length sufficient to permit said plug to be raised to withdraw the contact plates thereon from between said arms and to bring the body of said plug below said plates into position between said arms.

8. In an electric cut-out, a block of refractory insulating material having a recess with a vertical groove in each side thereof, pairs of circuit terminals in and at opposite ends of said recess, a plug of refractory insulating material having contact plates at opposite edges establishing circuit with said terminals and projections on its sides entering said grooves, and a fixed pin on said block entering a vertical slot formed in said projections: the said plug having sufficient play in said recess to permit of its being raised therein to break contact between said terminals.

9. The combination of a solid block of refractory insulating material, of a plurality of transverse circuit conductors, two longitudinal circuit conductors crossing said transverse conductors, removable contact pins for establishing circuit between said longitudinal conductors and said transverse conductors at their crossing points, a removable fuse plug electrically connected to one end of each of said transverse conductors, circuit terminals, and a removable cut-out plug interposed between said terminals and said fuse plugs: the said conductors being inclosed in separate tubular passages in said block, and the said fuse plugs and cut-out being disposed in separate recesses in said block.

10. The combination of a supporting frame, a plurality of solid blocks of refractory insulating material disposed in juxtaposition in said frame, each of said blocks having a plurality of parallel transverse tubular passages, said passages registering to form continuous passages through all of said blocks and each block having two parallel longitudinal passages crossing said transverse passages, circuit conductors in said longitudinal passages, continuous circuit conductors extending through said registering transverse passages, and in each block removable means operable from the exterior of the block for electrically connecting the transverse and longitudinal conductors therein at their crossing points.

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

THOMAS E. MURRAY.

Witnesses:
MAY T. MCGARRY,
GERTRUDE T. PORTER.