Jan. 14, 1947. E. P. SMITH ET AL 2,414,423

CIRCUIT DISTRIBUTION BOX

Filed Dec. 1, 1944 4 Sheets-Sheet 1

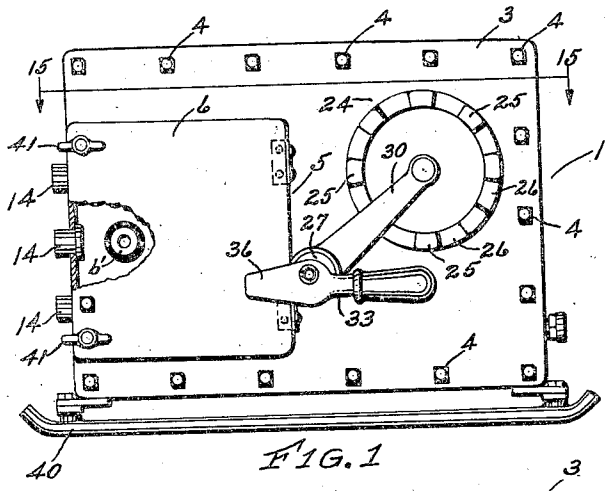


FIG. 1

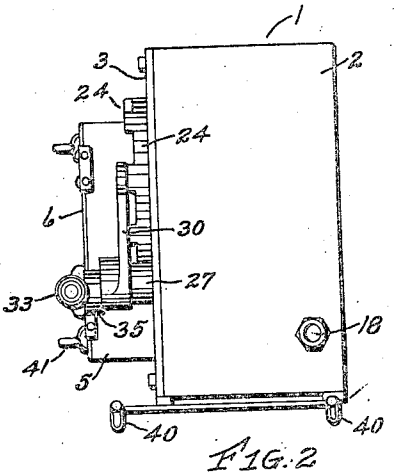


FIG. 2

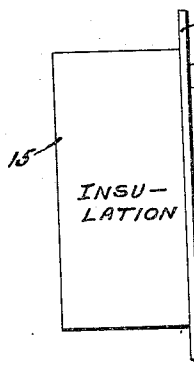


FIG. 4

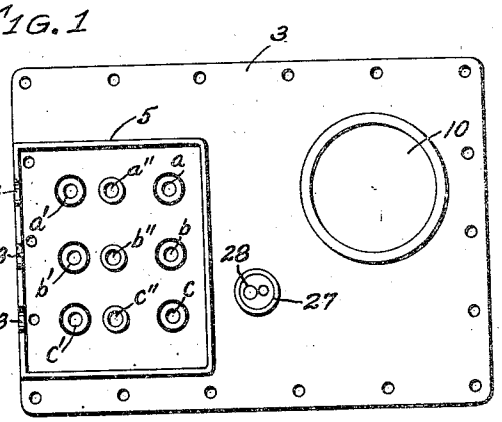


FIG. 3

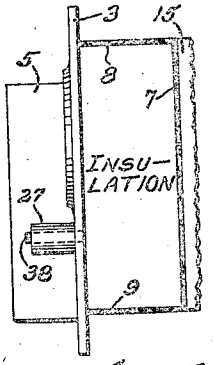


FIG. 5

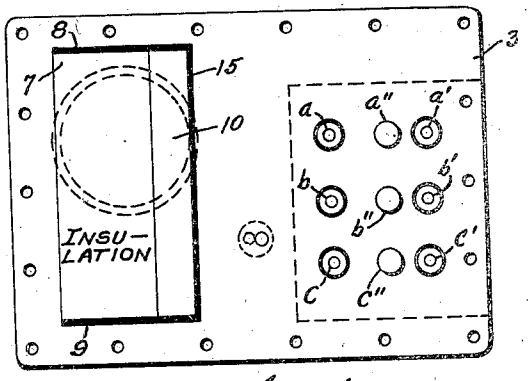


FIG. 6

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CIRCUIT DISTRIBUTION BOX

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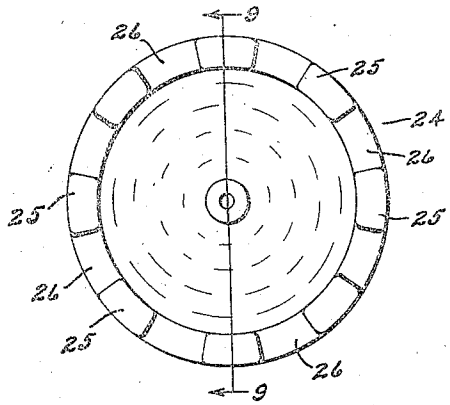


FIG. 7

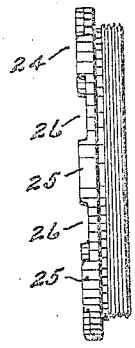


FIG. 8

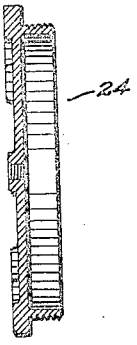


FIG. 9

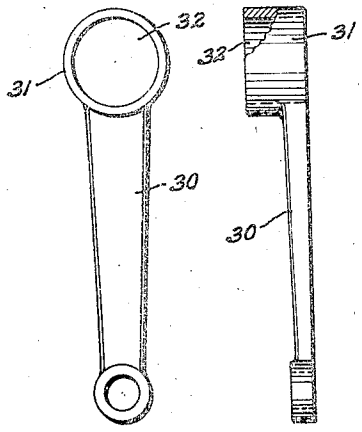


FIG. 10 FIG. 11

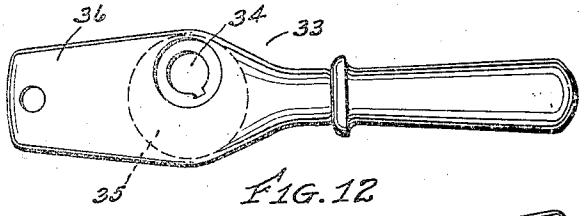


FIG. 12

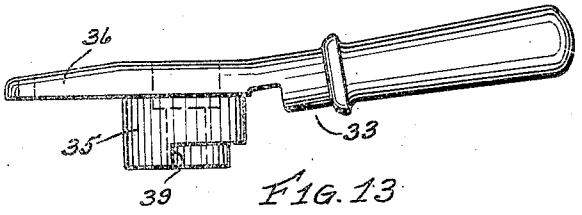


FIG. 13

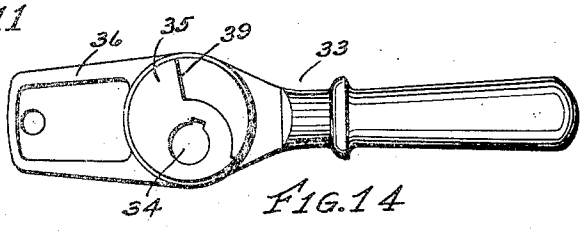


FIG. 14

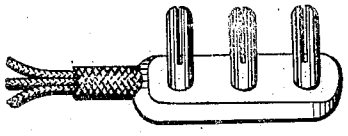


FIG. 21

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CIRCUIT DISTRIBUTION BOX

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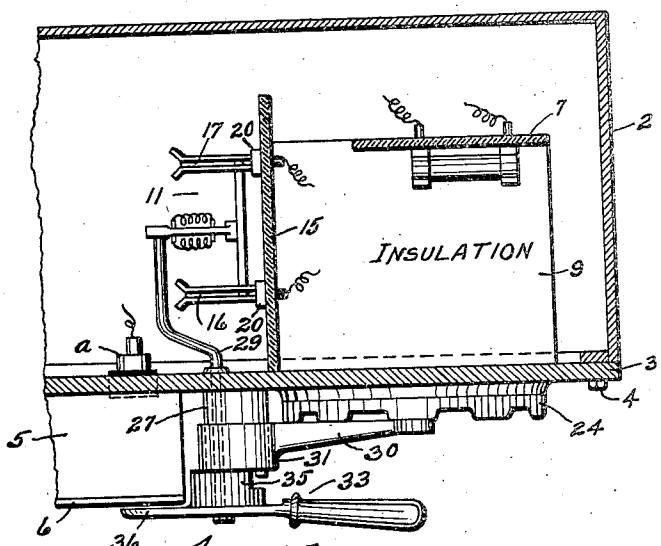


FIG. 15

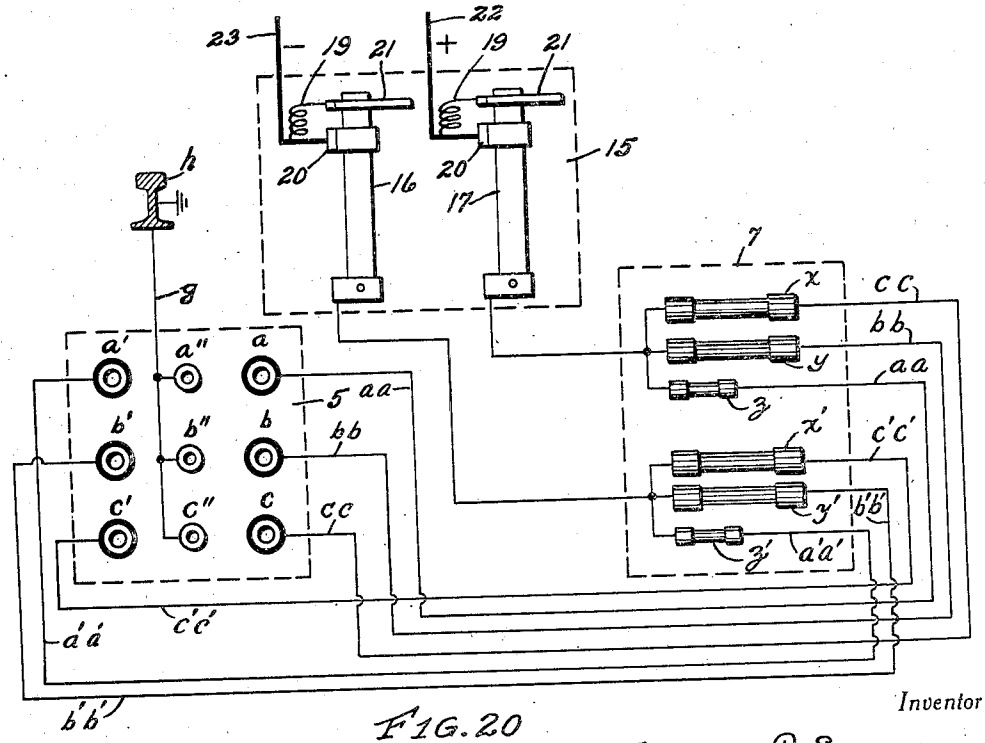


FIG. 20

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CIRCUIT DISTRIBUTION BOX

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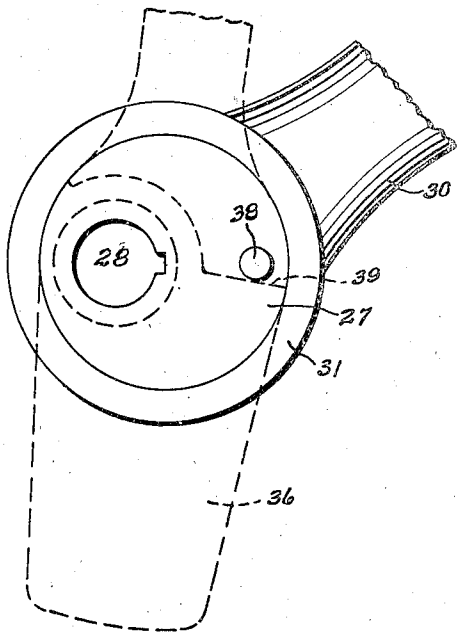


FIG. 16

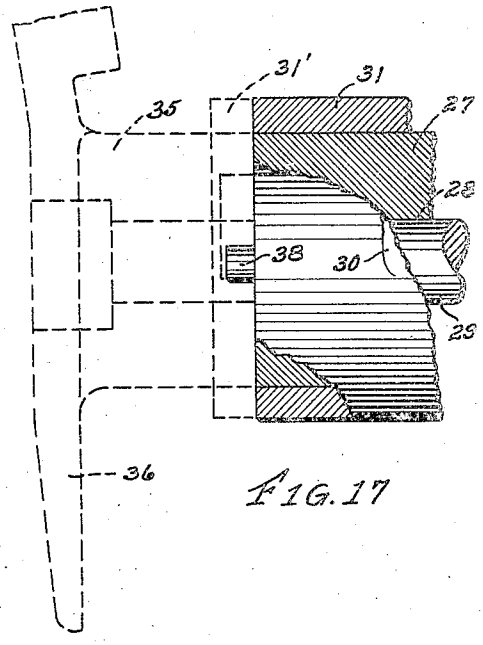


FIG. 17

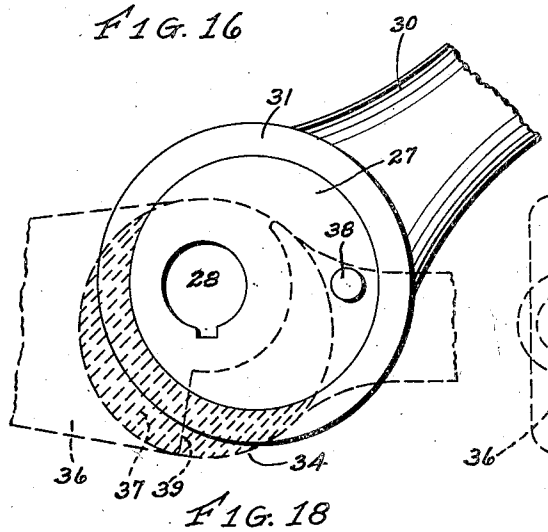


FIG. 18

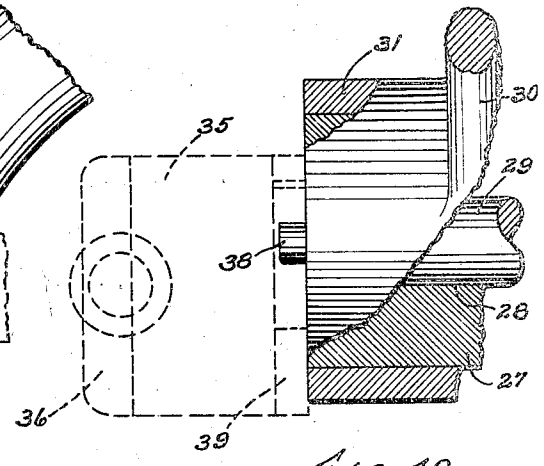


FIG. 19

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Patented Jan. 14, 1947 2,414,423

UNITED STATES PATENT OFFICE

2,414,423

CIRCUIT DISTRIBUTION BOX

Edward P. Smith and Wade H. Utz,
Mansfield, Ohio

Application December 1, 1944, Serial No. 566,159

13 Claims. (Cl. 200—50)

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Our invention relates to junction or distribution boxes from which one or more branch circuits may be led after proper connection to a main circuit entering the box.

One object of our invention is to provide a gas proof receptacle by means of which the said branch circuits may be properly connected to a main circuit.

Another object of this invention is to arrange to have an apparatus mounted on the cover of the receptacle whereby when the cover is removed all apparatus is also removed.

Another object of this invention is to provide a distribution box for one or more branch circuits in which a circuit breaker is mounted within a gas proof box.

Another object of our invention is to provide a gas proof receptacle for a main circuit and a switch to break both sides of the circuit and the branch circuits may be connected without removing the cover from the receptacle or opening the same.

Still another object of this invention is to provide means whereby the branch circuits may not be connected or disconnected to the main circuit while the circuit breaker or main switch is closed.

A still further object of our invention is to provide a distribution box which permits the opening and closing of the main switch within the box without disturbing the branch circuits connected thereto.

A still further object of this invention is to provide a receptacle sufficiently gas proof to prevent any explosive gas mixtures from entering the box under normal use and the box to have sufficient strength to withstand any explosion within the box due to opening the circuit breaker or blowing of a fuse therein, should the box receive an explosive mixture as when the box is opened, as later explained, to replace a fuse.

Further objects and features of our invention will be apparent to those skilled in the art from the following specification and the appended drawings illustrating certain preferred embodiments of our invention in which:

Fig. 1 is a front or face view of our invention.

Fig. 2 is a side view of Fig. 1.

Fig. 3 is a face view of the front cover or panel of Fig. 1.

Fig. 4 is a side view of one end of the panel shown in Fig. 3.

Fig. 5 is a side view of the other end of the panel shown in Fig. 3.

Fig. 6 is a back view of the panel of Fig. 3.

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Fig. 7 is a face view of a hand hole cover later described.

Figs. 8 and 9 are respectively an edge view of Fig. 7 and a section on the line 9—9 of Fig. 7.

Figs. 10 and 11 are respectively front and side view of a link later described.

Figs. 12, 13 and 14 are respectively top, side and bottom views of an operating handle.

Fig. 15 is a view in partial section of Fig. 1 taken on the line 15—15.

Fig. 16 is an enlarged face view of a portion of the operating handle together with a face view of a cooperating end of the link shown in Figs. 10 and 11 when the switch within the receptacle is open and access to the parts within the box may be had and cables connected to or disconnected from the contacts as later described.

Fig. 17 is a side view of Fig. 16 including the operating handle, link and other parts.

Fig. 18 is an enlarged face view of a portion of the operating handle together with a face view of a corresponding end of the link shown in Figs. 10 and 11 when the switch within the receptacle is closed and access to the interior of the receptacle is prevented and manipulation of the cable connections is prevented.

Fig. 19 is a side view of Fig. 18 including the operating handle, link and other parts.

Fig. 20 is a sketch of the connections between the parts of our invention when the switch within the box is closed.

Fig. 21 shows a 3-prong cable connector used to connect the branch circuits to the box.

In present day practice in underground mining, several portable, electrically operated machines are employed within a small area and a distribution box is required to provide protection against short circuits to the branch circuits or trailing cables leading to the several machines and to provide a safe and convenient means of connecting them to a source of power.

Such a distribution box should be mounted on skid means whereby it may be easily moved about the mine and should have means whereby one or more branch circuits of the plug-in type may be connected to the main circuit terminating within the box with a full load circuit control switch operable from without the box and a fuse for each branch circuit.

When such a box is to be used in a gaseous mine, it is desirable that its construction shall be such that no explosive gaseous or coal-dust mixture may enter the box, but should such a mixture inadvertently seep into the receptacle and explode, the box shall be sufficiently strong

to withstand said internal explosion and sufficiently tight that the products of the explosion which may pass the joints of the box will have little if any external effect.

To add protection to the circuits, each should be fused and these fuses should be enclosed within the box for safety, therefore convenient means of access must be provided to the interior of the box to replace a blown fuse.

To prevent the formation of an arc without the box when a branch circuit, is connected or disconnected, means must be provided to prevent such operations when the main switch is closed and therefore an interlock is provided whereby such operations may be performed only when the main switch is open, also the interlock must permit access to the fuses only when the said switch is open.

Further, to meet requirements of the U. S. Bureau of Mines, a direct current distribution box must have both sides of the power circuit insulated from the ground and the switch must break both sides of the circuit and an independent safety ground circuit must be provided as well as fuses, under certain conditions.

In a preferred embodiment of our invention, a receptacle or box **1** is provided preferably of a ferrous metal or of a non-ferrous metal of suitable strength.

All sides of the box, except the front or cover, are welded to form a single unit **2**. The cover **3** is of heavier gauge metal and secured to the body **2** by a plurality of cap screws **4** or other suitable devices. The meeting faces of the body **2** and cover **3** form a gas-tight or substantially gas-tight joint either by or without the use of a gasket.

Mounted on the front face of the cover **3** is a shallow box or receptacle **5** attached to the cover **3** preferably by welding. The receptacle **5** has a hinged door **6**.

Metal bushings *a*—*a'*, *b*—*b'*, and *c*—*c'* adapted to receive the plugs for the branch circuits, are shrunk or press fitted into insulating bushings which in turn are threaded into the cover **3** forming gas-proof joints with the bushings insulated from ground.

Positioned between the above bushings are bushings *a''*, *b''*, and *c''* which are directly grounded on the casing and which in turn are connected to ground, and the *a* and *b* and *c* sets of bushings are so positioned that all bushings designated by the same letter are connected to the machine to be operated by a 3-pronged plug (see Fig. 21) making the three connections simultaneously or practically so, thus assuring the machinery being connected to ground as the plug would have three cables connected to the machine.

Secured to the back face of the cover **3** and spaced therefrom is a parallel pannel **7** and pannels **8** and **9** of insulating material. This pannel **7** is placed opposite a normally closed opening **10** in the cover **3** and mounted on its pannel **7** are fuses *x*, *y* and *z*, and *x'*, *y'* and *z'*.

One side of the receptacle **5** has **3** slotted openings, **13**, opposite the bushings *a'*, *b'* and *c'*. Slidably mounted in each slotted opening **13**, is a split clamp type insulated bushing **14**, which interlocks with the side of the box **5** and grips the cable, thereby preventing undue pull on the connection plugs. These bushings are removable from the side wall of the box **5** when the door **6** is open.

Positioned within the box **1**, is a pannel **15**, of

insulating material secured in place by means of the pannels **7**, **8** and **9** or may be secured directly to the cover **3**; pannel **15** extends at right angles to the inner face of the cover **3**.

Mounted on pannel **15** is a double pole switch **11**, capable of operating under full load capacity of the device and having negative blade **16** and positive blade **17**.

Each switch blade is provided with a blowout coil **19** which is energized at the instant the blade breaks with its main clip **20**, and engages only clip **21** to disperse any arc which may form when the switch is opened. The switch **11** may be of the quick break type.

The main or trailing cable, including its **3** conductors, is brought into the receptacle through the packed bushing **18**, constructed on the principle of a gland stuffing box to prevent seepage of gas into the box or the discharge of flames therefrom. The cable mains **22** and **23** are connected to the switch clips **20**, respectively.

Due to the confined position of the fuses, a specially constructed fuse holder is employed which is disclosed and claimed in our application Serial Number 547,896 filed August 3, 1944.

To operate the switch and control access to the fuses and connections in the branch distribution box **5**, a specially constructed interlock is employed.

The opening **10** in the cover **3**, is provided with a hand hole cover or lid **24**, which is screw threaded into the cover **3**, thereby preventing the entrance of gas into the box or the expulsion of flame therefrom. The abutting faces of the covers **3** and **24** may be machined to form a tight joint in addition to that of the threaded surfaces.

The front face of the cover **24**, is provided with projections **25**, forming depressions **26** therebetween by means of which a bar may be applied to the cover **24** to rotate same into and out of position.

Projecting from the face of the cover **3**, is a rigid cylindrical boss **27**, secured thereto as by welding. An opening or passage **28** extends through the boss and cover and is eccentrically positioned with respect to the central axis of the boss **27**.

A shaft **29** is brought through the opening **28** and makes a close fit therein to form a gas tight joint. The inner end of the shaft **29** is provided with means connected to the two-pole switch **11** whereby the switch may be opened or closed by rotating the shaft from without the case.

A link **30** has one end directly connected to the cover **24** at its center and the other end **31** formed with an opening **32** which encircles the boss **27** and has a freely sliding fit thereon such that as the cover or lid **24** is rotated to remove same, it moves outward, the link moves outward therewith and the end **31** of the link **30** which is normally flush with the end face of the boss **27**, will extend beyond or overlap the front end of the boss **27** and when the cover **24** is moved by rotation into its normal closing position, the link will move with it and the outer face of its end **31** of the link will again be flush with the front end of the boss **27**.

The above construction permits the cover to be entirely removed from the opening and dropped down onto a support to gain access to the fuses while the switch **11** is open as later explained.

Mounted on the outer projecting end of the shaft **29** and keyed thereto to rotate therewith is

a handle 33. The angular movement of the shaft 29 and handle 33 is approximately 90 degrees, depending upon the construction and relation of the cooperating parts.

The opening or passage 34 through the handle 33 and which receives the shaft 29, is eccentrically positioned with respect to the central longitudinal axis of the hub 35 of the handle. This adds to the eccentric movement of the handle with respect to the boss 27 when the handle is operated. The hub 35 has substantially the same diameter as the boss 27.

The central longitudinal axis of the hub 35 coincides with the central longitudinal axis of the boss when the switch 11 is open, therefore the opening 34 will be eccentric to the axis of the hub 35 to the same extent that the opening 28 is eccentric to the said axis of the boss.

The construction, location, and relation of the parts of the boss 27, handle 33 and eccentric openings or passages 28 and 34 are such that when the handle is in its vertical position (Figs. 16 and 17) at which time the switch 11 within the box is open, the longitudinal or peripheral surfaces of the boss 27 and hub 35 will coincide (see Figs. 16 and 17) thus permitting the end 31 of the link 30 to move outward and extend over or overlap the inner end of the hub 35 (see dotted extension 31' of part 31 in Fig. 17) as is necessary when it is desired to entirely remove the cover 24 from the opening 8.

It will be evident by referring to Figs. 17 and 18 that when the handle 33 is operated clockwise, the blade 36 will swing to the left and overlap the door 6 thereby closing the switch and preventing the opening of the door 6.

It will also be evident from Figs. 18 and 19 that as the handle is moved clock-wise, the hub 35 will rotate and due to the eccentric positioning of the shaft 29 relative to the boss 27 and of the opening 34 relative to the hub 34 that the peripheral surfaces of the boss 27 and hub 35 will be automatically moved from a position of alignment to one of non-alignment in which the hatched portion 37 (Fig. 18), of the hub 34 will overlap the end of the boss 27 and end 31 of the link 30 thereby automatically preventing the end 31 of the link 30 from moving across onto or overlap the hub 34, thereby preventing removal of the cover 24 when the switch is closed.

When the switch 11 is open with the handle 33 in its vertical position as in Figs. 16 and 17 and the cover 24 removed for access to the fuses, the end 31 of the link 30 will occupy the position shown by the dotted lines 31' of Fig. 17 since the periphery of the boss 27 and of the hub 35 coincide longitudinally. If now an attempt is made to move the handle 33 clock-wise which would close the switch 11, the peripheral surface of the hub 35 would immediately tend to move laterally relative to the peripheral surface of the boss 27 and inner surface of the opening 32 of the link 30 due to the eccentric relation of the parts as explained and would thereby directly engage the inner surface of the opening 32, which would automatically prevent rotation of the handle 33, and prevent closing the switch 11 while the opening 10 is uncovered.

It will be evident from the above disclosure that if cover 6 should be open when the handle 33 is moved clock-wise to close switch 11, that the blade 36 will contact the cover 6 and simultaneously close same as the handle is rotated.

Figs. 16 and 17 show a stop pin 38 which is engaged by the stop-wall 39 on the handle 33 when the handle is rotated anti-clockwise, thereby limiting the movement of the handle.

The door 6 may be held closed by the thumbscrews 41.

From the above description we have disclosed an interlock between the operating handle 33 and the link 30 whereby

(a) The switch 11 may be opened or closed when the cover 24 is in position closing the opening 10.

(b) The door 6 will be closed by the handle 33 when the handle is operated clock-wise through its full movement and at the same time closing the switch 11.

(c) The cover 24 cannot be removed wholly or in part from its normal closing position while the switch 11 is closed.

(d) The switch 11 cannot be closed while the opening 10 is uncovered or while the cover 24 is partly in place.

(e) Connections and disconnections of branch conductors cannot be made while switch 11 is closed.

To permit the device to be readily moved about on the rough, uneven floor of the mine, the device is provided with skids or runners, 40.

All parts of the device except back and sides and skids or runners are attached to the cover 3 so that when the cover 3 is removed, access is readily to be had to all parts of the mechanism.

The projections 25 on the cover 24 brace the link 30 against pressure against the end of the hub 35 when an attempt is made to remove the cover while the switch 11 is closed, and the same projections 25 press against the link 30 and force it outward when the cover 24 is being removed, causing the end 31 to overlap the hub 35 when the switch 11 is open, thereby preventing closing the switch.

In Fig. 20 is shown diagrammatically the connections within the receptacle 1. Other schemes of connections may be used but that shown in Fig. 20 has been found practical.

The fuses x, y and z are shown as connected to the positive side of the switch 11 and connected respectively to the terminals a, b and c by conductors aa, bb and cc. The fuses x', y', and z' are shown as connected to the negative side of the switch 11 and connected respectively to the terminals a', b' and c' by conductors $a'a'$, $b'b'$ and $c'c'$.

The fuses x, y, x' and y' protect the two high amperage circuits and the fuses z and z' protect a much lower amperage circuit.

If desired the fuses x', y' and z' may be omitted, relying for protection only upon the fuses x, y and z.

As previously stated, the terminals a'', b'' and c'' are connected directly to the cover 3 and a conductor g provides grounding means for the casing 1 thus protecting the operator from a shock should the casing become accidentally charged. The lead g is usually connected to a track rail h or to a grounded water pipe.

The grounded conductor leading from the terminals a'', b'' and c'' is arranged to be connected to the frame of the connected machine and this frame is grounded thereby protecting the operator should the machine frame become charged.

While we have shown and described the switch, the receptacle 5, the interlock and cover 24 as mounted on the cover 3, and which is the preferable mounting as all parts are removed when

the cover 3 is removed, these parts may be mounted on any of the other walls of the receptacle; further it is evident that the switch 11 could be mounted on the cover 3 and the other parts on the wall opposite the cover 3, it being only necessary to connect the shaft 29 to the switch operating mechanism.

The fit between the threads of cover 3 and the threads of cover 24 need not be a particularly tight fit as any explosion within the receptacle 2 will tend to force the cover 3 outward thereby automatically tightening the said threaded fit and also producing a tortuous spiral path which the explosion products must follow to reach the exterior of the receptacle, thereby cooling such products below the danger point.

Having disclosed our invention, we do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

We claim:

1. A current distribution device comprising, a box-like structure forming a substantially sealed receptacle and having a removable cover, an opening through the cover for access to the receptacle and a removable lid to close the opening, a plurality of fuses mounted on an insulating pannel within the receptacle and opposite said opening; a quick break switch mounted on an insulating pannel within the receptacle, a plurality of terminals mounted on the receptacle cover and insulated therefrom and extending through the receptacle cover whereby connections may be made thereto within and without the receptacle and conductors connecting the switch to the fuses and other conductors connecting the fuses to the terminals, means enclosing the terminals and having a hinged cover, a shaft extending through the receptacle cover and having the inner end operatively connected to the switch to actuate the same and a handle secured to the shaft without the receptacle to rotate the shaft to open and close the switch, and means operatively associated with the lid and with the said handle whereby the operation of the handle is prevented to close the switch while the opening is not securely closed, also the lid cannot be removed while the switch is closed, and further, the said handle will engage and close the said hinged door when the handle is operated to close the switch if at the time the hinged door is open.

2. A current distribution mechanism comprising, a closed receptacle, a switch mounted within the receptacle and means operatively secured to the switch and projecting outside the receptacle, a stationary boss through which the said means projects, a handle attached to said means whereby the said means may be rotated to open and to close the switch, a hub secured to the handle abutting the end face of said boss, the peripheral surface of the boss and of the hub coinciding when the handle is in one position and eccentric to each other when the handle is in its other position, fuses positioned within the receptacle and connected to the switch, terminals mounted on the receptacle casing and connected to the fuses, the terminals adapted to receive external branch circuits, a wall of the casing of said receptacle provided with a hand-hole for access thereto and a cover to close the hand-hole and means operatively associated with the said cover and with the said boss and hub whereby the operation of the handle is prevented to close the switch when the hand-hole cover is not in place and the removal of the hand-hole cover is prevented while the switch is closed.

3. A current distribution mechanism comprising a closed receptacle, a switch mounted within the receptacle and means operatively secured to the switch and extending without the receptacle, a handle attached to said means whereby the said means may be rotated to open and to close the switch, other means associated with and actuated by the handle, terminals mounted on the receptacle casing and connected to the switch, the terminals adapted to receive external branch circuits, the casing of said receptacle provided with a hand-hole for access thereto and a cover to close the hand-hole and means so constructed and operatively associated with the said cover and directly with the said other means as to automatically prevent operating the handle to close the switch when the hand-hole cover is not in place and to automatically prevent removing the hand-hole cover while the switch is closed.

4. A power distribution mechanism comprising, a box-like structure forming a closed receptacle, a second box-like structure attached to the outer face of one side wall of the closed receptacle, a door for the second structure, a plurality of contacts extending through the side wall and terminating within the receptacle and within the said second box-like structure and insulated from the wall, a switch within the closed receptacle and electrically connected to the contacts, means associated with the switch to receive power conductors, the said wall provided with an opening for access to the receptacle, a removable cover to close the opening, operating means extending through the said wall to actuate the switch to its open and closed positions, a handle without the receptacle and attached to said operating means to operate the means, means on the handle and movable with the handle to prevent opening the door when the switch is closed and other means integral with and operated by the handle, a link attached to said cover and directly and operatively associated with the said other means, the link and said other means being so constructed and arranged relative to each other and to the handle that the link and said other means will directly cooperate while the said door is closed and the switch closed to prevent removal of the cover.

5. A box-like structure comprising a plurality of walls forming a closed receptacle within the said walls and one wall forming a removable cover, the said one wall having an opening therethrough for access to the receptacle, a removable lid to close the opening, mechanism within the receptacle, a boss fixed to said wall, means extending through the said one wall and boss to operate the mechanism, a handle including a hub attached to the said means outside the receptacle and boss and movable to two positions to operate the said means and mechanism, a link having one end secured to the lid and the other end operatively associated with the said boss, the said link and boss and hub being so constructed and related to each other that the handle is prevented from operating the said means when the handle is in one position and the lid removed from the opening and also the lid is prevented from removal from the opening while the handle is in its other position.

6. A current distribution mechanism comprising, a closed casing forming a receptacle, a switch mounted within the receptacle and means operatively secured to the switch and projecting out-

side the receptacle, a handle attached to the said projecting means and movable to two positions whereby the said means may be operated to actuate the switch to its open and its closed positions, terminals associated with the receptacle casing and adapted to receive connectors on branch circuits, one wall of the casing provided with a hand-hole for access to the interior thereof, a cover to close the hand-hole, other means associated with and actuated by the handle to control the manipulation of the handle and the cover, a unitary link having one end connected to the cover, the other end of the link and the said other means being so constructed and directly related that the handle is movable to either of its two positions when the cover is in position closing the hand-hole but whereby the cover is automatically rendered non-removable from the opening while the handle is in one position and the switch closed and further whereby the handle is automatically rendered non-movable to its other position to close the switch while said hand-hole is open.

7. A power distribution mechanism comprising, a box-like structure forming a receptacle with a removable cover, a switch within the receptacle and means associated with the switch to open and close the same, a boss secured to and projecting from the outer face of the cover, operating means extending through the boss eccentric to the axis of the boss and connecting with the first said means to operate the same, an operating handle movable to two positions, the handle provided with a hub and a longitudinal opening therein eccentric to the central axis of the hub to receive the said outer end of the operating means to which the handle is secured, the outer peripheral surfaces of the boss and hub being substantially in longitudinal alignment when the handle is in one position and the switch open and the said peripheral surfaces being out of said alignment and the end of the hub on the handle forming an abutment when the handle is in its other position and the switch closed, the cover provided with an opening and a lid to close the same, a link having one end attached to the lid and the other end encircling the boss, the construction and arrangement of the boss and hub and encircling end of the link being such that when the lid is in place in the opening the handle may be moved to its two positions and when the handle is in its said one position and the switch open the said encircling end of the link may move along the peripheral surfaces and overlap the hub when the lid is removed thereby preventing the handle being moved to its other position and the switch closed while the opening is uncovered, and when the handle is in its said other position the said abutment on the handle hub will be engaged by the link and thus prevent the link end to move along the said peripheral surfaces thereby preventing the removal of the lid while the switch is closed.

8. In a power distribution mechanism, in combination, a box-like structure forming a sealed receptacle having a removable cover, a switch mounted upon the cover within the receptacle, an opening through the cover for access to the receptacle, a removable lid to seal the opening closed, rotatable operating means cooperating with the switch to open and close the same, a cylindrical boss attached to and projecting from the cover, a passage through the boss and cover and positioned eccentric and parallel to the central axis of the boss and through which passage

the said means extends, an operating handle attached to the outer end of the said means to actuate the means to two positions, namely one to open the switch and the other to close the switch, the handle formed with a hub having substantially the same diameter as that of the boss and having an opening in which the end of the means is positioned and the said opening in the boss being parallel and eccentric to the central axis of the hub, the peripheral surfaces of the boss and hub coinciding when the switch is open and being offset relative to each other when the switch is closed and the end face of the hub forming an abutment, connecting means operatively connected with the lid and hub and also so constructed and arranged relative to each other and the hub that the said connecting means will move with the lid and relative to the boss and in removing the lid from the opening and hub whereby the connecting means will contact the said abutment while the switch is closed and thereby prevents the removal of the lid.

9. In a box-like structure forming a closed receptacle to receive mechanism therein, in combination, a cylindrical boss-like member secured to and projecting from the face of one side wall of the said structure, an opening through the boss-like member and said side wall, rotatable means extending through the opening and into the receptacle to operate mechanism therein, a handle attached to the outer end of said rotatable means to actuate the same, the handle provided with a hub and an opening in the hub to receive the said end of the rotatable means, the said openings through the boss and in the hub being in longitudinal alignment but offset relative to the central longitudinal axis of the boss and hub, an opening through the side wall, a removable lid to close the opening, the said hub forming an abutment when the handle is in one position, the lid provided with means to engage the abutment thereby preventing the removal of the lid when the handle is in said one position, the construction of the hub and boss being such that the lid may be removed when the handle is in another position.

10. A cover for a receptacle comprising a plate-like member of extended area, an opening through the member, operating means extending through the opening whereby mechanism contained in the receptacle may be actuated, a handle attached to the said means to operate it to different positions, the member provided with a hand-hole for access to the receptacle, a lid for the hand-hole normally closing the same, means on the handle eccentric to the axis of the operating means to be directly engaged by means on the lid to prevent removal of the lid when the handle is in one position, the said eccentric means on the handle to engage the means on the lid to prevent operating the handle when the lid is partially removed from its normal closing position.

11. A receptacle including a cover to close the receptacle and having a boss projecting from the outer face of the cover, an opening through the cover and a lid to close the opening, the lid being removable and replaceable by rotation, a passage through the cover and boss and rotatable means extending through the passage into the receptacle whereby mechanism within the receptacle may be actuated, a handle provided with a hub secured to the outer end of the rotatable means, the central longitudinal axis of the boss and hub coinciding when the handle is in one

position, the longitudinal axis of the rotatable means being parallel to and spaced from the first said axis, the said handle movable from the said one position to another position about the axis of the rotatable means whereby the hub moves eccentric in a lateral direction to the boss thereby producing an abutment, the lid provided with means movable longitudinally along the boss and hub as the lid moves towards and away from the cover while the handle is in said one position thereby preventing removal of the lid, and the said means on the lid being engaged by the hub on the handle when the lid is removed from said opening through the cover thereby preventing the movement of the handle from said one position to said another position.

12. A receptcle for a mechanism comprising, a box-like structure including a cover to close the receptacle, a boss projecting from the outer face of the cover, an opening through the cover, a lid to close the opening, a passage through the cover and boss, rotatable means extending through the passage into the receptacle to actuate mechanism therein, a handle provided with a hub secured to the outer end of the rotatable means to actuate the means, the central longitudinal axis of the boss and hub coinciding when the handle is in one position, the longitudinal axis of the rotatable means being spaced from and parallel to the said central axes, the said handle movable from the said one position to another position about the axis of the rotatable means whereby the hub moves laterally relative to the boss, the lid provided with means encircling the boss and movable along the longitudinal surface thereof and into overlapping relation with the hub when the handle is in said one position and the lid has been removed from the opening, the handle being held from movement to said another position when the lid has been removed from the opening in the cover due to the lateral movement of the hub causing it to engage the encircling means on the lid which overlaps the hub preventing the movement of the handle.

13. A cover for a receptacle comprising a plate-like member for attachment to the receptacle to close the same, a boss projecting from the outer face of the member, an opening through the member, a lid to close the opening and having a threaded connection with the member, a passage through the member and boss, operating means extending through the passage, a switch mounted on the member on the side opposite the boss and having connections with the operating means, a handle provided with a hub secured to the end of the operating means projecting from the boss to move with and actuate the operating means whereby the switch may be moved to its open and closed positions, the outer longitudinal surfaces of the boss and hub being in substantial alignment when the switch and handle are in one position, the longitudinal axis of the operating means being parallel to and spaced from the longitudinal axis of the boss and hub whereby the said surfaces of the boss and hub will be in non-alignment when the switch and handle are each in its other position and the end face of the hub will form an abutment, the lid being provided with means so constructed and related and so cooperating with the boss and hub that the rotation of the lid to remove it from the opening will move the last said means into engagement with the said abutment and prevent its removal, and when the lid has been removed while the said longitudinal surfaces on the boss and hub are in substantial alignment the said hub will engage the last said means and prevent operation of the handle and hence the actuation of the switch.

14. A power distribution mechanism comprising, a receptacle including a cover member having an externally projecting boss and an opening, a lid to close the opening and removable and replaceable by rotation and having a threaded connection with the cover, a switch within the receptacle to control circuits therein, a passage through the cover and boss, rotatable means operatively connected to the switch and extending through the passage to actuate the switch, a handle including a hub attached to the outer end of the rotatable means, the axis of the rotatable means being parallel to and spaced from the longitudinal central axes of the boss and hub whereby the periphery of the hub and boss are in longitudinal alignment when the switch is open and relatively offset when the switch is closed, the lid provided with means operatively connected with the boss and hub, the construction and relation and operation of the means on the lid relative to the boss and hub being such that the removal of the lid is prevented when the switch is closed and the closing of the switch is prevented while the lid is removed from the opening in the cover.

15. In a structure forming a receptacle and having a switch mounted therein movable to open and closed positions and also having an opening through one wall for access to the interior of the structure and a rotatable cover to close the opening and rotatable operating means cooperating with the switch to actuate the switch to either its open or its closed positions, the axes of rotation of the cover and operating means extending in the same direction, the combination with the operating means and with the cover of cover control means the last said means comprising connecting means associated with the cover and with the operating means, and other rotatable means actuated by the operating means and having its axis of rotation parallel to that of the cover cooperating with the said connecting means during the initial movement of the operating means in a switch closing direction and before the switch is closed to prevent removing the cover.

16. In a structure forming a receptacle and a switch mounted therein movable to open and closed positions and also having an opening through one wall for access to the interior of the structure and a cover to close the opening through rotation and manually operable rotatable means to actuate the switch, the axes of rotation of the cover and manually operable means being parallel, the combination with the said cover and manually operable means of a single rigid movable member extending between the cover and operating means and cooperating with the cover and said manually operable means and moved by the movement of the cover in removing the cover from said opening and means actuated by the movement of the manually operable means in a switch opening direction to prevent the movement of the said movable member whereby the cover may not be removed until the switch is open.

17. A power distribution mechanism comprising, a box-like structure forming a sealed receptacle with a removable cover, a switch within the receptacle and operating means extending through the cover whereby the switch may be opened and closed from without the receptacle,

the cover provided with an opening for access to the interior of the said structure, a rotatable lid to close the opening, the axis of rotation of the lid being parallel to that of the said operating means, a handle attached to the operating means to rotate the same to actuate the switch, other rotatable means operated by the handle, the axis of rotation of the said other rotatable means being parallel with that of the said lid, unitary interconnecting means operatively connected to the said rotatable lid and adapted to be directly connected to the said other rotatable means whereby the said interconnecting means and the said other rotatable means will directly cooperate while the rotatable lid is in other than its sealing position or is removed entirely from the opening to prevent closing the switch and to prevent removing the rotatable lid wholly or partially while the switch is closed.

18. A receptacle including a plate-like cover member of extended area and having an externally projecting boss and an opening, a lid to close the opening and removable and replaceable by rotation, an opening through the boss and cover and rotatable means extending through the boss and cover into the receptacle whereby mechanism within the receptacle may be actuated, a handle attached to the external end of the rotatable means to actuate the same, means on the lid having one end directly associated with the boss, a hub having an eccentrically disposed periphery associated with and rotatable with the said rotatable means, the construction and operation of the hub and handle and means on the lid relative to each other being such that the end of the hub prevents the lid from being removed when the handle is in one position, and the eccentrically disposed periphery prevents the handle from being moved from another position to said one position when the lid has been rotated from its normal closing position.

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