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Dec. 14, 1926. 1,610,228

E. H. ALLFREE ET AL

ELECTRICAL CONTROLLER

Filed April 28, 1925 2 Sheets-Sheet 1

Fig. 1.

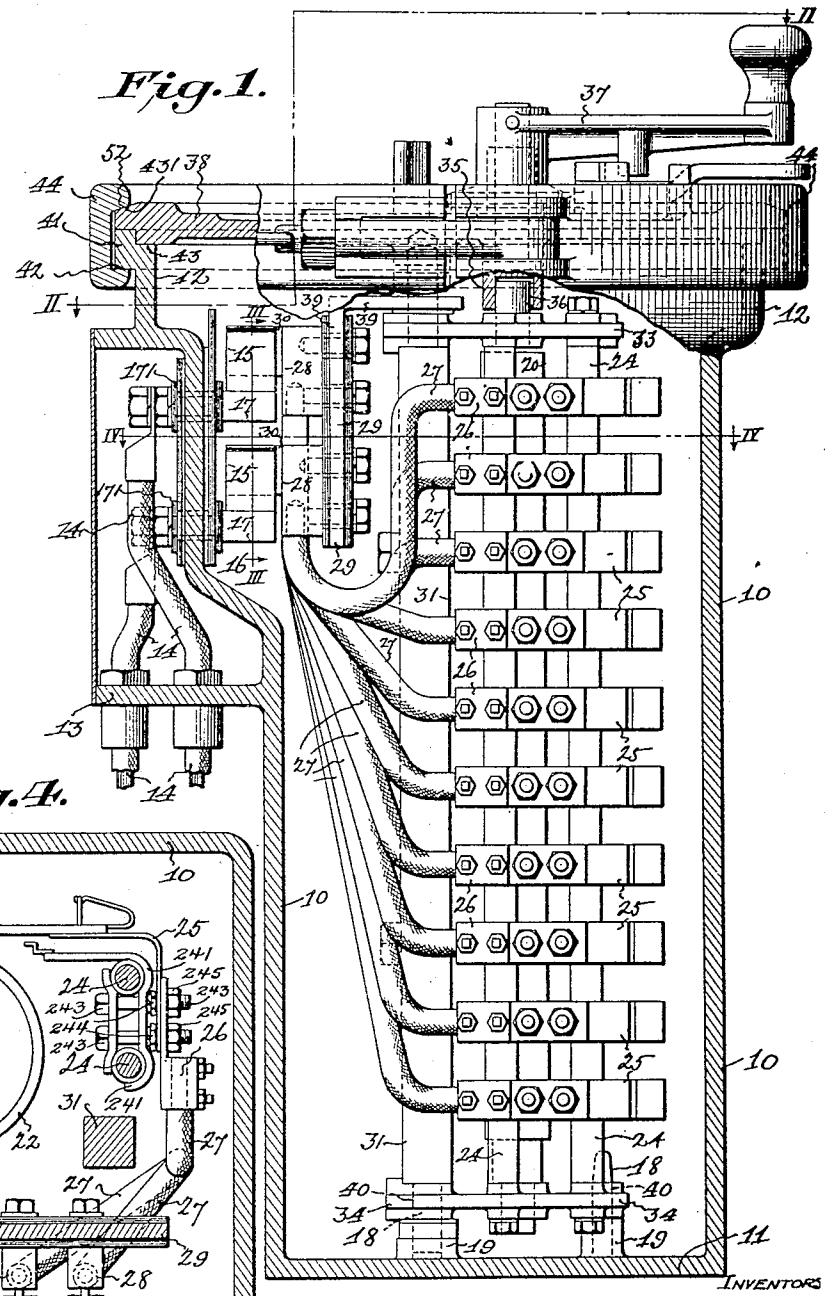
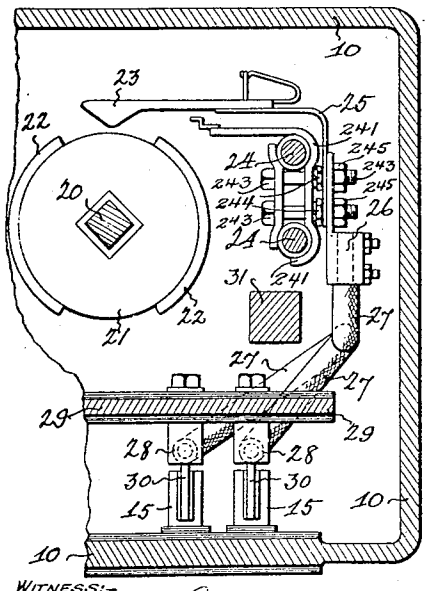


Fig. 4.



WITNESS:-
Chas. L. Griestauer

INVENTORS
Edwin H. Allfree,
Albert R. Williams,
By W. Schroeder, Attorney

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Dec. 14, 1926. 1,610,228

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Filed April 23, 1925 2 Sheets-Sheet 2

Fig. 2.

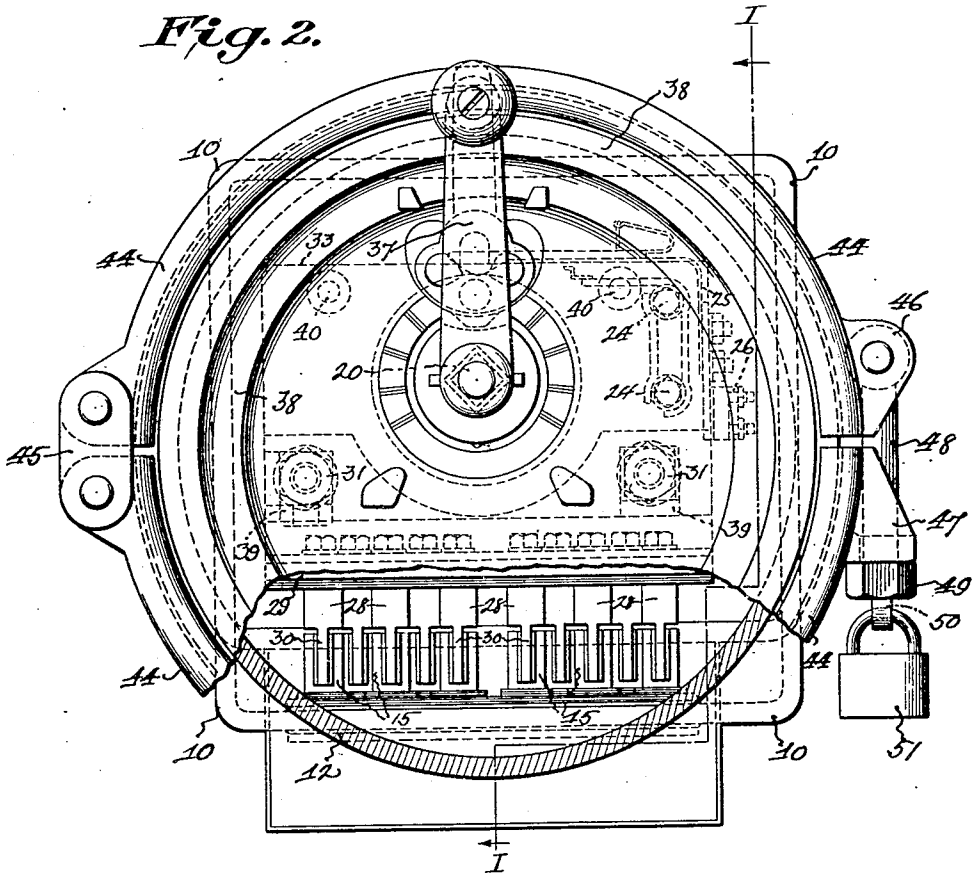
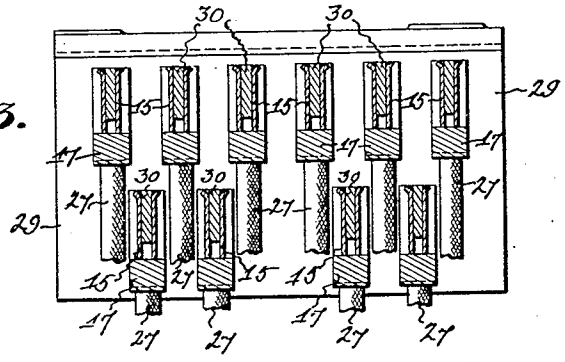



Fig. 3.




Inventor

Edwin H. Allfree,

Albert R. Williams

By N. Gelsenbon

Attorney

WITNESS:-

Chas. L. Guisbauer

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Patented Dec. 14, 1926. 1,610,228

# UNITED STATES PATENT OFFICE.

EDWIN H. ALLFREE AND ALBERT R. WILLIAMS, OF IRONTON, OHIO, ASSIGNORS TO THE IRONTON ENGINE COMPANY, OF IRONTON, OHIO, A CORPORATION OF OHIO.

## ELECTRICAL CONTROLLER.

Application filed April 28, 1925. Serial No. 26,377.

This invention relates to an electrical controller of the flame-proof character which is particularly adapted and used in connection with electrically propelled mine locomotives, or electrical apparatus installed in proximity to explosive or other industrial plants where a spark from the electrical equipment might possibly ignite the exterior and surrounding explosive gases or atmosphere.

The objects of this invention are as follows:

First, to devise a controller of the character above identified which is so constructed and arranged as to provide a quick and efficient way of inspecting all the parts and making all the necessary repairs and adjustments without being required to entirely dismantle, reassemble, or adjust the several parts.

Second, to provide a controller which not only is flame-proof but is arranged with a cover which is simple in construction, easily and firmly secured with a tight seal and quickly detached to enable the controlling mechanism of the controller to be removed as a unit from the casing and placed in such a position as to expose all the elements for a thorough inspection or adjustment and easy repairs if found necessary.

Third, to provide a controller with a cover which is cheap to manufacture and consists of a minimum number of parts and which can be assembled and applied to the casing to insure a perfect flame-proof controller or removed from the casing without the use of any special tools or skilled labor.

Fourth, to provide a controller of the character indicated in which the inner controlling mechanism can be seated in said casing or removed therefrom as a unitary structure and all the necessary and proper electrical connections with the terminals from the current supply, are automatically broken or made in the act of withdrawing from or replacing the controlling mechanism within the casing.

Fifth, other objects and advantages of the invention will be manifest and appear from the detailed construction of the structural characteristics and relative arrangements of the parts and manner of the assembling and using the same.

The invention consists of structural characteristics and relative arrangements of parts which will be hereinafter more fully described and particularly pointed out in the appended claims.

In the drawings in which similar reference characters indicate the same parts in the several figures,

Figure 1 is a longitudinal section and front elevation on line I—I of Figure 2.

Figure 2 is a top plan view with a section of the cover broken away.

Figure 3 is a section on line III—III of Figure 1, and,

Figure 4 is a section on line IV—IV of Figure 1.

Referring to the drawings in which a controller of the cylinder or drum type is illustrated and rotations of said cylinder or drum effect various combinations or circuits, as shown for example in U. S. Patent No. 1,466,011 to W. L. Youmans dated August 28, 1923, 10 is the enclosing casing having preferably an integral and closed bottom 11 and an upper open top 12, and integrally formed to one and outer side of the casing 10, is a flange or projection 13 to which is attached the power or lead wires 14, 14 for conveying the current to the contact blades 15, 15 within a lateral pocket 16 of the casing 10, said blades 15, 15, being connected to said lead wires 14, 14, by lugs 17, and connections 171, 171 passing through and insulated from the casing 10, as indicated in Figure 1.

On the inner side of the bottom 11 of the casing 10 are provided vertically projecting guide pins 18, 18 mounted in and securely fastened to supporting bosses 19, 19, as shown in Figure 1, for purposes to be presently described.

20 is the controller or drum shaft for rotating the cylinder or drum 21 in which are properly secured the contact segments 22, 22, as is clearly shown in Figure 4, and explained in U. S. Patent No. 1,466,011, cited, and needs no further explanation.

A series of contact fingers 23, 23, are mounted on insulated upright rods 24, 24 and secured on the shunt 25 of each finger 23, is provided a terminal lug 26 in which is fastened one end of a terminal wire 27, and the other end of the wire 27 is attached to a lug 28 insulated from the carrying plate 29. 241 is a finger base supporting said fingers 23, and is insulated from and is rigidly clamped to said rods 24, 24, by means of clamp 242, clamp bolts 243 and nuts 244,

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said bolts 243 being extended to provide a support for shunt 25 and terminal lug 26, being clamped between nuts 244 and 245, as shown in Figure 4.

Electrically connected with said insulated lug 28 is provided a contact blade 30 which is adapted to be seated in its corresponding fixed contact blade 15, as shown in Figures 2 and 3, said blades 15, 15, being as heretofore described secured stationary to the casing 10 and in the lateral pocket 16 offset from the casing 10, as shown in Figure 1.

From Figures 1 and 2 it will be seen that the controller mechanism is formed as a unitary structure and is effected by providing in addition to the insulated upright rods 24, 24, preferably two other rods 31, 31, which act as spacer and tie rods by being connected at their ends with the upper and lower mounting plates 33 and 34. The ends of the drum or controller shaft 20 are rotatably mounted or journaled in the upper and lower mounting plates 33 and 34, and the upper end of the drum shaft 20 projects through the upper mounting plate 33 and is provided with a key 36 to receive the inner hollow end 35 of the operating lever 37, said end 35 having a key-way to receive the key 36, and the boss or recess of the hollow end 35 being a slip fit on the upper end of the drum shaft 20, and the shaft of the operating lever 37 being rotatably mounted in the cover 38 to be presently described.

39 is an inverted L-shaped bracket which has its inwardly projecting end securely fastened and supported by upper ends of the rods 31 projecting through the upper mounting plate 33, while its downwardly extending portion securely fastened to and supporting the carrying plate 29 to which are secured and insulated the upper and lower series of lugs 28, 28 carrying upper and lower contact blades 30, 30, heretofore described.

The lower mounting plate 34 is provided with guide openings or holes 40 for the purpose of receiving and acting as seats for the upwardly projecting pins 18, 18 secured in the inside of bottom of casing, as shown in Figure 1, and act as guides and retaining means for the lower end of the unitary controller mechanism when replaced or seated in the casing 10.

From the foregoing disclosure it will be seen that the mounting plates 33, 34, connecting rods 31, 31, drum 21, with its shaft 20, upright supporting rods 24, 24, with its fingers 23, 23, shunts 25, 25, lugs 26, 26, wires 27, 27, lugs 28, 28, contact blades 30, 30, carrying plate 29 with its sustaining bracket 39 are assembled and connected together as a unitary structure and may be inserted into the chamber within the casing 10 or removed therefrom as a single element with one operation and all the proper electrical connections are automatically made or broken without the necessity of any tools or experienced labor.

The upper end of the casing 10 is preferably circular in form and is formed with a flange 41 having an under-cut flange 42, and may be provided with a step seat 43 to receive the cover 38, as shown, and the upper peripheral surface of the cover 38 is beveled for purpose to be presently disclosed.

44 is a split clamping ring composed preferably of two similar semi-circular sections joined together at one of their ends by a hinge connection 45, and their other ends are provided with bifurcated lugs 46 and 47, said bifurcated lug 46 adapted to receive a pivoted clamping bolt 48 having a threaded end to receive a nut 49 and an opening 50 through which may be passed the bow of a pad lock 51, which construction permits the clamping bolt 48 to be swung clear of the half of the clamping ring 44 which is adjacent to the nut 49 without entirely removing said nut, as will be readily understood.

The upper and inner face 52 of the clamping ring 44 is beveled to conform to the beveled face 431 of the cover 38 and the lower inner face of the clamping ring 44 is straight to conform to the lower face 42 of the flange 41. The inside diameter of the clamping ring 44 is longer than the outside diameters of flange 41 and cover 38 to permit the drawing together of the two sections of the split clamping ring 44, which drawing together or action due to the taper or bevel in ring 44 on cover 38 will cause the machined and seating faces of cover 38 and flange 41 to be drawn tightly together with an equal pressure at all points around the top surface of the flange 41, and thereby hermetically seal the interior of the casing 10 and prevent the emission of a spark or fire within the casing to the exterior thereof.

To open the enclosing casing 10, the lock 51 is removed from the perforated end of the clamping bolt 48, and the nut 48 is turned back on its thread a sufficient amount to permit said bolt 48 to swing clear of the lug 47, and the clamping ring 44 is then opened up and removed free of the flange 41 and cover 38, when said cover 38 together with the operating lever 37 and its hollow end 35 are removed from the top of the casing 10 and shaft 20, and to remove the controlling mechanism unit, it is only necessary to lift said controlling unit out of the casing 10.

To reassemble the electrical controller, the controlling switch or unit is lowered into the casing with the guide holes 40 in the lower plate 34 engaging the guide pins 18, 18 mounted on the bosses 19, 19. The controlling mechanism or unit is then adjusted so that its contact blades 30, 30 are directly over or about to engage or enter the spaces between the sections of the contact blades 15,

15 on lugs 17 fixed to the casing 10, when the controlling unit is forced down until the bottom mounting plate 34 is at rest on the supporting bosses 19, 19 and the contact blades 30, 30 have been pushed down to be firmly and properly engaged throughout their width and depth between the bifurcated ends of the upper and lower rows of staggered contact blades 15, 15, as shown in Figures 1 and 3.

The cover 38 is then replaced on the top of the casing and adjusted so that the inner hollow end 35 of the controller lever 37 properly engages the key 36 at the top of the drum shaft 20, as shown in Figure 1, when the clamping ring 44 is applied and drawn together by clamping bolt 48 and nut 49 and as its diameter is decreased the contact faces of the cover 38 and top of the casing 10 are drawn tightly together, as previously described and for purposes heretofore explained.

From the foregoing description of the construction and arrangement of parts and mode of operation, it will be readily seen that a flame-proof controller has been devised which comprises a minimum number of highly efficient cooperating elements of simple construction, which can be cheaply manufactured and readily installed or assembled or disassembled or renewed at a minimum of expense and without the use of skilled labor or special tools.

It will also be seen that all the objects and advantages recited in the statement of invention have been fully carried out, and while the preferred form has been shown and described, it is to be understood that many changes will suggest themselves without in any way changing the material features of construction or departing from the spirit of the invention as expressed in the claims.

What is claimed is:—

1. An electrical controller comprising a casing having an open end and stationary contacts, a controlling mechanism adapted to be inserted or withdrawn from said casing as a unitary structure through said open end, the said controlling mechanism having fixed contacts mounted thereon, contact fingers mounted on an insulated supporting base, and forming a part of said controlling mechanism, and means for flexibly and electrically connecting said fixed contacts and said contact fingers, the said fixed contacts constructed, arranged and adapted to automatically engage and disengage said stationary contacts of the casing on the insertion or withdrawal of the controlling mechanism in or from the casing, a cover for said casing so constructed, arranged and adapted to close the interior of said casing, and means for securing said cover to said casing.

2. An electrical controller comprising a casing having an open end and stationary contacts, a controlling mechanism adapted to be inserted or withdrawn from said casing as a unitary structure through said open end, the said controlling mechanism having fixed contacts mounted thereon, and contact fingers mounted on an insulated supporting base, said base forming a part of said controlling mechanism, and means for making a positive connection of said fixed contacts and contact fingers, the said fixed contacts so constructed, arranged and adapted to automatically engage or disengage the said stationary contacts of said casing on the insertion or withdrawal of the controlling mechanism in or from said casing, a cover independently removable of the controlling mechanism for said casing so constructed, arranged and adapted to close the interior of said casing, and means for securing said cover to said casing, the said cover having mounted thereon the operating handle and shaft for said handle.

3. An electrical controller comprising a casing having an open end and stationary contacts, a controlling mechanism adapted to be inserted or withdrawn longitudinally from said casing as a unitary structure through said open end, the said controlling mechanism having fixed contacts mounted thereon, contact fingers mounted on an insulated supporting base forming a part of said controlling mechanism, means for flexibly connecting the said fixed contacts and said fingers, the said fixed contacts so constructed, arranged and adapted to automatically engage or disengage the said stationary contacts of said casing on the insertion or withdrawal of the controlling mechanism in or from said casing, a cover independently removable of the controlling mechanism for said open end of said casing so constructed, arranged and adapted to close the interior of said casing and said cover having mounted thereon means for operating the controlling mechanism, the said operating means arranged to automatically engage or disengage the controlling mechanism when cover is applied to or removed from the said casing, and means for securing said cover to said casing.

4. An electrical controller comprising a casing having an open end and stationary contacts suitably insulated from said casing, a controlling mechanism adapted to be inserted and withdrawn longitudinally from said casing as a unitary structure through said open end, the controlling mechanism having fixed contacts mounted thereon and suitably insulated from the main body of said controlling mechanism, the said contact fingers being mounted on an insulated supporting base forming a part of said controlling mechanism, means for flexibly connect-

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ing the said fixed contacts and said fingers, the said fixed contacts arranged and adapted to engage or disengage the stationary contacts of said casing on the insertion or withdrawal of the controlling mechanism in or from said casing, a cover for said open end of said casing so constructed, arranged and adapted to close the interior of casing and said cover having mounted thereon means for operating the controlling mechanism, the said operating means arranged to automatically engage or disengage the controlling mechanism when the cover is applied to or removed from the said casing without disturbing or moving the controlling mechanism or any of its parts, and means for securing said cover to said casing.

5. An electrical controller comprising a casing having an open end, stationary contacts insulated from said casing, a controlling mechanism adapted to be inserted or withdrawn from said casing as a unitary structure through said open end, said controlling mechanism having fixed contacts mounted thereon and suitably insulated therefrom contact fingers, the said contact fingers being suitably mounted on an insulated supporting base forming a part of said controlling mechanism, and flexible means for connecting the said fixed contacts and said controller fingers, the said fixed contacts constructed, arranged and adapted to engage or disengage the stationary contacts of said casing on the insertion or withdrawal of the controlling mechanism from said casing, a cover for said open end of said casing, means for operating controlling mechanism mounted on said cover, the said operating means arranged to connect with or disconnect from the controlling mechanism on attaching or detaching the said cover to or from said casing, the said cover so constructed, arranged and adapted to close the interior of said casing, and means for clamping the said cover to said casing.

6. In combination an electrical controller comprising a casing having stationary contacts, a controlling mechanism consisting of a frame, a rotating drum, contact fingers, fixed contacts, flexible connectors between contact fingers and fixed contacts, a sealing cover for said casing, means for operating the said controlling mechanism mounted on and extending through said cover, and a split clamping ring engaging said casing and cover and forcing said cover to said casing.

7. A flame-proof controller comprising a casing having an open top and an inner seat at its bottom, stationary current leading in and out terminals provided with contact blades within and attached to and insulated from said casing, a controlling mechanism having an upper and a lower mounting plate, said lower plate engaging said seat, and said controlling mechanism adapted to be inserted in said casing or withdrawn from said casing as a unitary structure through said open top and having terminals provided with contact blades so constructed, arranged and adapted to automatically engage or disengage said contact blades of the stationary terminals of the casing on the insertion or withdrawal of the controlling mechanism from the casing, a cover for and engaging said open top of the casing so constructed, arranged and adapted to hermetically seal the interior of said casing and prevent the emission of a spark or fire within the casing to the exterior thereof, and means connected with and passing through said cover for operating the controlling mechanism.

8. A flame-proof electrical controller comprising a casing having an open top and stationary terminals, a controlling mechanism adapted to be inserted or withdrawn from said casing as a unitary structure through said open top and having terminals so constructed, arranged and adapted to automatically engage or disengage said stationary terminals of the casing on the insertion or withdrawal of the controlling mechanism from the casing, a cover seated on said open top, a clamping ring engaging the top of said casing and cover and so constructed, arranged and adapted to force said cover on the top of the casing to hermetically seal the interior of said casing and prevent the emission of a spark or fire within the casing to the exterior thereof, and means for operating the controlling mechanism.

9. A flame-proof electrical controller comprising a casing having stationary terminals and an open top provided with a seat, a controlling mechanism adapted to be inserted or withdrawn from said casing as a unitary structure through said open top and having terminals so constructed, arranged and adapted to automatically engage or disengage said stationary terminals of the casing on the insertion or withdrawal of the controlling mechanism from the casing, a cover disposed in the seat of said open top, a split clamping ring so constructed, arranged and adapted to engage the peripheral edges of the casing top and cover and force said cover on the seat to hermetically seal the interior of said casing and prevent the emission of a spark or fire within the casing to the exterior thereof, and means for operating the controlling mechanism.

10. A flame-proof controller comprising a casing having an open top and an inner seat at its bottom, stationary current leading in and out terminals within and attached to and insulated from said casing, a controlling mechanism adapted to be inserted in said casing and engage said seat or withdrawn from said casing as a unitary structure through said open top and having terminals so constructed, arranged and adapted to

automatically engage or disengage said stationary terminals of the casing on the insertion or withdrawal of the controlling mechanism from the casing, a cover for said open top of the casing, a hinged split ring engaging the top of said casing and cover and so constructed, arranged and adapted to clamp said cover to the casing and hermetically seal the interior of said casing and prevent the emission of a spark or fire within the casing to the exterior thereof, and means for operating said controlling mechanism.

11. A flame-proof controller comprising a casing having an open top and an inner seat at its bottom, stationary current leading in and out terminals provided with fixed contact blades within and attached to and insulated from said casing, a controlling mechanism adapted to be inserted in said casing and engage said seat or withdrawn from said casing as a unitary structure through said open top and having terminals provided with contact blades so constructed, arranged and adapted to automatically engage or disengage said contact blades of the stationary terminals of the casing on the insertion or withdrawal of the controlling mechanism from the casing, a cover for said open top of the casing, a hinged split ring engaging the top of the casing and cover and so constructed, arranged and adapted to clamp said cover to the casing and hermetically seal the interior of said casing and prevent the emission of a spark or fire within the casing to the exterior thereof, means for tightening or drawing together the sections of the split ring, and means for operating said controlling mechanism.

In testimony whereof, we hereunto affix our signatures.

EDWIN H. ALLFREE.
ALBERT R. WILLIAMS.