C. A. RHINE & C. H. KEENEY.

RESISTANCE INCLOSURE.

APPLICATION FILED AUG. 20, 1910.

1,067,880.

Patented July 22, 1913.

FIG. 1.

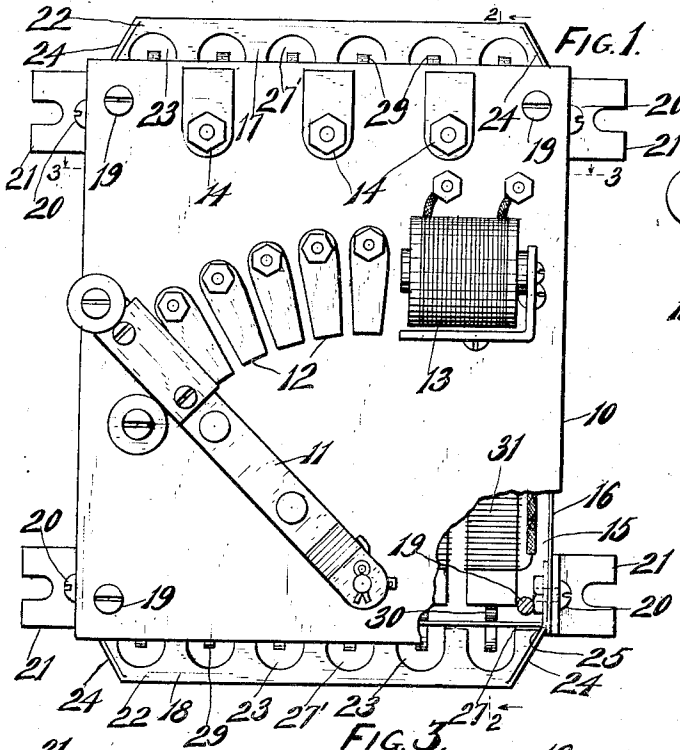


FIG. 2.

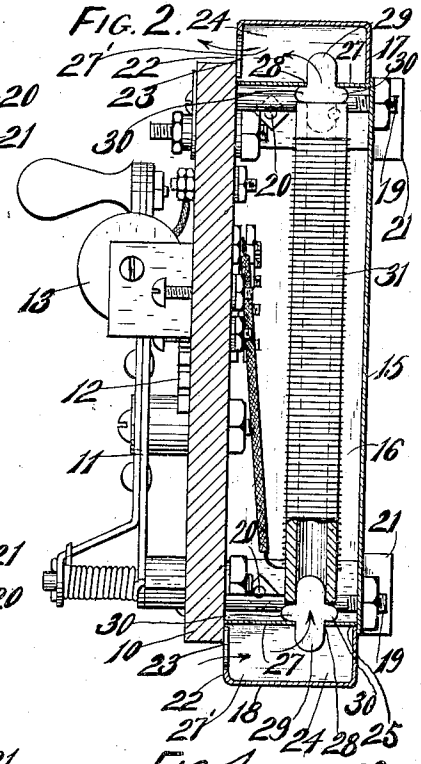


FIG. 3.

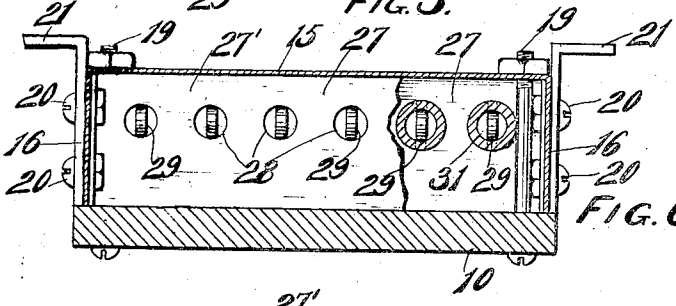


FIG. 4.

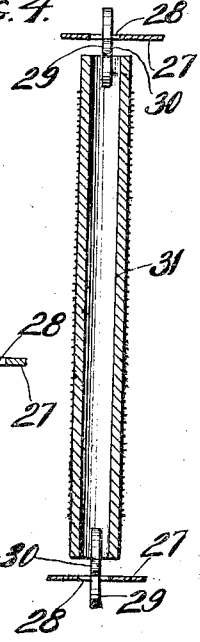


FIG. 5.

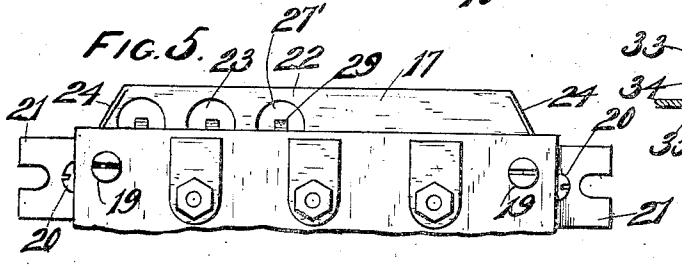
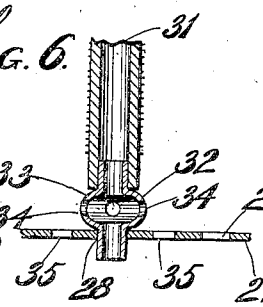


FIG. 6.



WITNESSES.

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RESISTANCE-INCLOSURE.

1,067,880. Specification of Letters Patent. Patented July 22, 1913.

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To all whom it may concern:

Be it known that we, CHARLES A. RHINE and CHARLES H. KEENEY, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Resistance-Inclosures, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to improvements in rheostats and more particularly to the construction of the cases or boxes inclosing the resistance used in connection with starters and controllers for operating electric motors, but may also be used for resistance used for other purposes.

In the electrical art it is now the present practice to inclose the resistance, used in connection with starters and controllers, in flame-tight boxes so that if the resistance should be overloaded or broken down the flame and sparks, resulting from the burning of the insulation and the resistance wire due to the intense heat generated by the arc at the time of the disruption of the circuit will be confined entirely within the box. It is also the present practice to form the resistance of comparatively thin wire which becomes very hot during the passage of the current and it is necessary to dissipate this heat by a free ventilation of the box in order to prevent the resistance from being destroyed.

It is one of the objects of this invention to form an inclosure for resistance units which is adapted to provide ample ventilation for the resistance and at the same time is so constructed as to prevent the issuance of sparks or flame from the inclosure if internal combustion should accidentally occur.

A further object of the invention is to provide an inclosure for resistance units, which is constructed to permit the connection of resistance units to a removable portion of the inclosure and the portion with the connected resistance replaced in the inclosure.

A further object of the invention is to provide an inclosure for resistance units with means for insulating the resistance units from the metallic portions of the inclosure.

A further object of the invention is to provide an inclosure for tubular resistance units with means for ventilating both the inside and the outside portion of each unit and for preventing foreign matter from dropping into the inclosure and short circuiting the resistance.

A further object of this invention is to provide a rheostat of the flame proof ventilated type which is formed in part of sheet metal.

With the above, and other objects in view, the invention consists of the improved rheostat and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawing in which the same reference characters indicate the same parts in all of the views: Figure 1 is a front view of a rheostat or automatic starter embodying the improvements, a part broken away to show other parts in the rear thereof; Fig. 2 is a vertical sectional view of the rheostat taken on line 2—2 of Fig. 1; Fig. 3 is a horizontal sectional view thereof taken on line 3—3 of Fig. 1, a part broken away, to show other parts in the rear thereof; Fig. 4 is a detail view in longitudinal section of one of the resistance units and means for holding the same; Fig. 5 is a detail view of the upper portion of a rheostat slightly modified; and, Fig. 6 is a detail view of a modified form of resistance unit holder.

Referring to the drawing the numeral 10 indicates the slate front or cover of the rheostat which is provided with the usual switch arm 11, contacts 12, holding magnet 13 and binding posts 14 mounted thereon. The main body of the case or box of the rheostat is formed of a sheet metal back portion 15 having side portions 16 bent forwardly therefrom and upper and lower hood portions 17 and 18 respectively overlapping the back and side portions and bolted to the side portions. The lower hood serves as a pan to catch any particles which may drop from the interior of the box. The main body of the case is removably connected to the slate front or cover 10 by means of bolts 19 which pass through openings provided in the front and the back portion and are threaded to nuts. The bolts 20 which fasten the hoods 17 and 18 to the side portions also connect angular supporting legs 21 to the sides of the forwardly projecting side portions. The front walls 22 of the hoods 17 and 18 have ventilating openings 23 formed therein to provide for the entrance and exit of air to the interior

portion of the box or case. The side walls 24 of the hoods are bent at an angle to form corners or shoulders 25 which are in substantially the same plane as the edges of the front and rear walls of the said hoods. These corners form holding and supporting shoulders against which removable resistance-unit-holding end-plates 27 bear so as to be spaced from the hoods for forming flame extinguisher chambers 27′ therebetween. These plates are provided with round apertures 28 to accommodate shouldered resistance tube holders 29 which are preferably formed of porcelain or other insulating and heat resisting material. The holders 29 are preferably formed of elongated flat pieces of porcelain having spacing projections 30 extending edgewise medially therefrom which serve to space and insulate the asbestos resistance tubes 31 from the apertured end plates. The asbestos tubes are wound with resistance wire in the ordinary manner. The holders 29 are inserted in the ends of the tubes and in the apertures of the plates, and being of less thickness than the diameter of the apertures of the plates and the openings of the tubes a space is provided on each side of each holder for the passage of air for ventilation. While the resistance unit holders are shown as positioned edgewise with relation to the front and rear portions of the casing they may also be positioned with their edges extending toward the sides of the casing.

The air for ventilation will enter through the ventilating openings of the lower hood and thence into the interior of the box through the openings of the end plates on each side of the holders. Part of the air which enters the box will pass through the interior of the resistance tubes and out through the top thereof and through the openings in the top end plate and out through the ventilating openings of the hood. The balance of the air which enters at the lower portion of the box will pass up and around the resistance tubes and wire wound therearound and out through the same openings through which the air which passes through the tubes passes. The openings are so proportioned as to size and positioned as to location to form a circuitous path for the air that any sparks or flame within the box will be extinguished before they reach the ventilating openings of the hood and if any particles should fall through the openings of the lower end plate they will be caught by the lower hood or pan, thus providing a resistance inclosure which meets all requirements of the rules of the fire under-writers.

In practice it has been found that in the larger size resistance boxes considerable heat is generated in the resistance units nearest to the full on position as the switch handle is moved toward this position and in order to prevent the possibility of sparks or flame passing out of the box at this point, the ventilating openings on this side of the box are omitted in order to provide a more circuitous path for the air and flame as clearly shown in Fig. 5.

The modified resistance tube holder shown in Fig. 6 is formed of sheet metal shaped to form a tubular member 32 provided with an annular spacing shoulder 33 having apertures 34 for the ingress and egress of air. The tubular portions of this holder are adapted to fit within the tube and the aperture of the plate respectively and serve to permit the passage of air therethrough. The end plate shown in Fig. 6 is modified to the extent of providing said plate with openings 35 positioned between the tube holders to provide for an increased amount of ventilation desirable in some cases.

From the above description it will be seen that the resistance inclosure is very simple in construction and operation and is well adapted to permit the free ventilation of the inclosure but is safe guarded against the emission of flame or sparks.

What we claim as our invention is:

1. A resistance inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings, resistance holder end plates removably positioned within the casing to form flame extinguisher chambers, said end plates provided with apertures to accommodate resistance unit holders and to also permit the passage therethrough of air, and resistance unit holders inserted in said apertures.

2. A resistance inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings in the front portion thereof, resistance holder end plates removably positioned within the casing to form flame extinguisher chambers, said end plates provided with apertures to accommodate resistance unit holders and to also permit the passage therethrough of air, and insulating resistance unit holders inserted in said apertures.

3. A resistance inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings, apertured resistance holder end plates positioned within the casing to form flame extinguisher chambers, resistance unit holders inserted in said apertures and formed to also permit the passage of air therethrough, and resistance units held by said holders.

4. A resistance inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings in the front portion thereof, apertured resistance holder end plates positioned within the casing to form a flame extinguisher chamber, shouldered flat resistance unit holders inserted

in said apertures with the shoulders bearing against the end plates, said holders being of less size than the apertures to provide for the passage of air through said apertures, and resistance tubes mounted on the holders.

5. A resistance inclosure, comprising a back portion having side portions extending forwardly therefrom, upper and lower hood portions overlapping the back and side portions and fastened to the side portions and provided with ventilating openings in the front portion thereof, end plates provided with apertures and removably positioned within the case to form flame extinguisher chambers between said hoods and said plates, resistance unit holders inserted in said apertures, and resistance units mounted on the holders.

6. A resistance inclosure, comprising a back portion having side portions extending forwardly therefrom, upper and lower hood portions overlapping the back and side portions and fastened to the side portions and provided with ventilating openings in the front portion thereof, end plates provided with apertures and removably positioned within the case to form flame extinguisher chambers between said hoods and said plates, shouldered flat resistance unit holders inserted in said apertures with the shoulders bearing against the end plates, said holders being of less size than the apertures to provide for the passage of air through said apertures, and resistance units mounted on said holders and spaced from the plates by said shoulders.

7. A resistance inclosure, comprising a front plate adapted to have a resistance controlling device mounted thereon, a back portion connected to the front plate and having side portions extending forwardly therefrom and contacting with the front plate, upper and lower hood portions overlapping the back and side portions and fastened to the side portions, said hoods projecting beyond the upper and lower edges of the front plate and provided with ventilating openings in the front portions thereof, removable apertured end plates positioned between the back and side portions and the front plate and spaced a distance from the projecting portions of the hoods to form flame extinguishing chambers, shouldered flat resistance unit holders inserted in said apertures with the shoulders bearing against the end plates, said holders being of less size than the apertures to provide for the passage of air through said apertures, and tubes wound with resistance wire mounted on the holders and spaced from them by said shoulders.

8. The combination with a resistance tube and its support, of a flat piece of insulating material provided with a projection extending medially of the edge thereof, one end of the insulating piece adapted to be inserted in the end of a resistance tube and the other end engaged by the support, the projection serving to space and insulate the tube from the support.

9. The combination with a resistance tube and its support, of a flat piece of insulating material provided with projections extending medially of the opposite edges thereof, one end of the insulating piece adapted to be inserted in the end of a resistance tube and the other end engaged by the support, the projections serving to space and insulate the tube from the support.

10. The combination with a resistance tube and its support, of a flat piece of porcelain having rounded ends and provided with spacing projections extending medially of the opposite edges thereof, one of the rounded ends adapted to be inserted in the end of the tube and the other end engaged by the support, the spacing projections serving to space and insulate the tube from the support.

11. A resistance inclosure comprising a casing provided with an upper and a lower hood having ventilating openings, end plates positioned within the casing to form flame extinguishing chambers between said plates and said hoods, said plates provided with apertures to accommodate resistance unit holders and to also permit the passage therethrough of air, resistance unit holders inserted in said apertures, and tubes having resistance wire wound therearound mounted on the holders, the diameters of the openings of the tubes being greater than the thickness of the holders to permit the passage through said tubes of a portion of the air which passes through the apertures.

12. A resistance inclosure comprising a casing provided with an upper and a lower hood having ventilating openings, end plates positioned within the casing to form flame extinguishing chambers between said plates and said hoods, said plates provided with apertures to accommodate resistance unit holders and to also permit the passage therethrough of air, flat resistance unit holders inserted in said apertures and provided with projections extending medially from opposite edges thereof, and tubes having resistance wire wound therearound mounted on the holders and spaced from the end plates by the projections, the diameters of the openings of the tubes being greater than the thickness of the holders to permit the passage through said tubes of a portion of the air which passes through the apertures.

13. A resistance inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings, resistance holder end plates removably positioned within the casing to form flange extinguish-

ing chambers, said end plates provided with apertures to permit the passage therethrough of air and also with means for holding resistance unit holders, and resistance unit holders held by said end plates.

14. A resistance-inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings, apertured resistance-holder end-plates positioned within the casing to form flame-extinguisher chambers, resistance-unit holders inserted in said apertures, said end-plates also permitting the passage of air therethrough, and resistance-units held by said holders.

15. A resistance-inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings, resistance-holder end-plates removably positioned within the casing to form flame-extinguisher chambers, said end-plates being provided with apertures to accommodate resistance-unit holders and permit the passage therethrough of air, and resistance-unit holders inserted in some of said apertures.

16. A resistance-inclosure, comprising a casing provided with an upper and a lower hood having ventilating openings in the front portion thereof, resistance-holder end-plates being removably positioned within the casing to form flame-extinguisher chambers, said end-plates provided with apertures to accommodate resistance-unit holders and permit the passage therethrough of air, and insulating resistance-unit holders inserted in some of said apertures.

17. In a rheostat, the combination of a box-body divided by two transverse plates into three separate chambers, said plates supporting between them resistance-units and being perforated to allow air communication between the three chambers; the two end-chambers being closed substantially at the top and bottom and right and left sides of the box-body, and having in the front side a plurality of apertures permitting circulation of air through the three chambers.

In testimony whereof, we affix our signatures, in presence of two witnesses.

CHARLES A. RHINE.
CHARLES H. KEENEY.

Witnesses:
LAURA A. KELLEY,
L. G. THEURER.