Aug. 18, 1925. 1,550,640

G. H. WHITTINGHAM

RHEOSTAT

Filed July 12, 1924

Fig. 3.

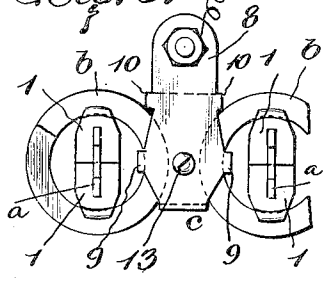
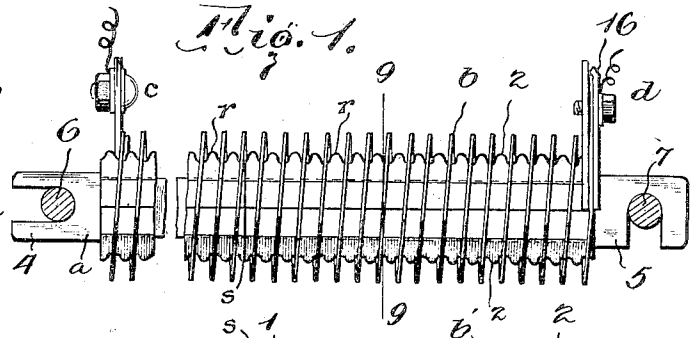


Fig. 1.



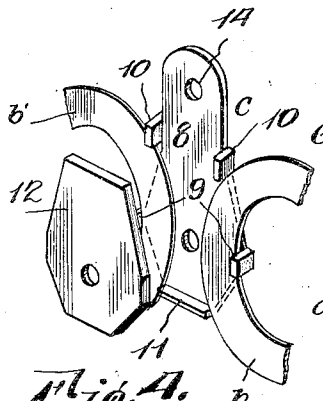


Fig. 4.

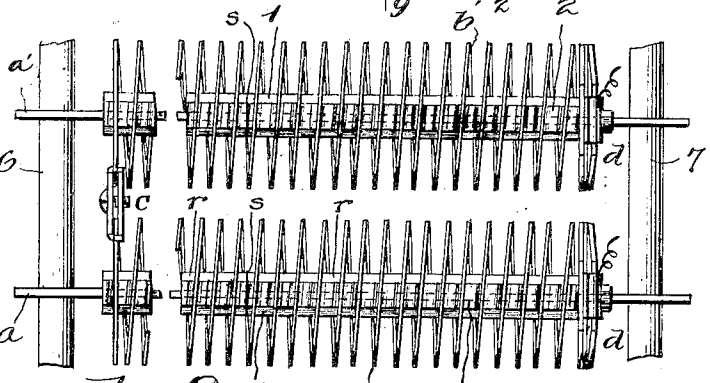


Fig. 2.

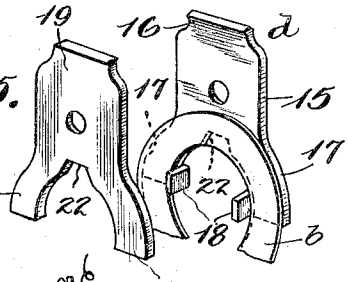


Fig. 5.

Fig. 6.

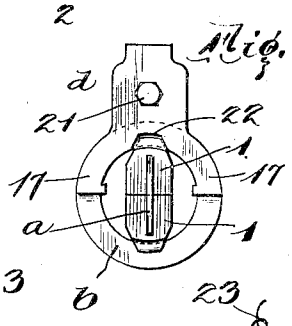
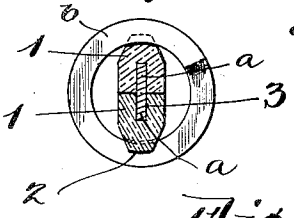


Fig. 9.



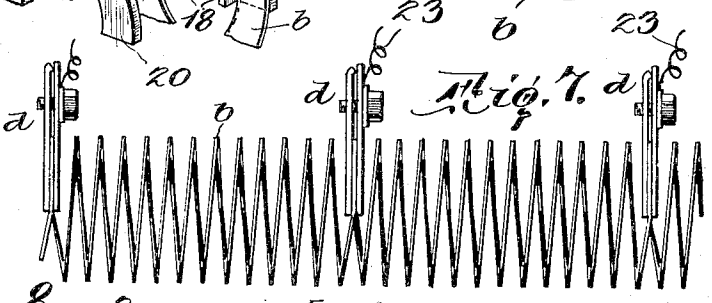
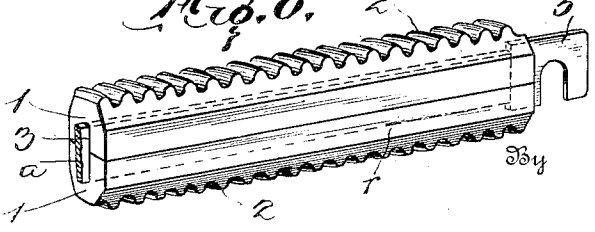


Fig. 7.

Fig. 8.



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By Robert H. Watson

Attorney

Patented Aug. 18, 1925. 1,550,640

UNITED STATES PATENT OFFICE.

GEORGE H. WHITTINGHAM, OF BALTIMORE, MARYLAND, ASSIGNOR TO MONITOR CONTROLLER COMPANY, OF BALTIMORE, MARYLAND, A CORPORATION OF MARYLAND.

RHEOSTAT.

Application filed July 12, 1924. Serial No. 725,555.

To all whom it may concern:

Be it known that I, GEORGE H. WHITTINGHAM, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

This invention relates to improvements in rheostats of the type illustrated in my copending application, Serial No. 708,943, filed April 25, 1924, in which the resistance element is composed of a flat metal band or ribbon wound on edge and threaded on to a support of insulating material, the latter formed with screw threads to receive the coil, and the threads serving to space the successive turns of the coil apart.

The present invention comprises a novel form of connector for connecting adjacent turns of parallel coils together; a novel form of terminal whereby it may be readily attached to any individual turn in a coil, and an improved form of insulated support for the resistance element.

In the accompanying drawing, which illustrates the invention,

Fig. 1 is a side elevation of a resistance unit, partly broken away, embodying my improvements;

Fig. 2 is a top plan view of the same;

Fig. 3 is a left hand end view of Fig. 1;

Fig. 4 is a perspective view of one of the connectors, with the parts separated, illustrating the manner in which it is applied to the coils;

Fig. 5 is a similar view of one of the terminal clips;

Fig. 6 is a right hand end view of one of the coils shown in Fig. 2;

Fig. 7 is a side elevation of a coil showing several of the terminal clips attached;

Fig. 8 is a perspective view of a portion of a coil supporting member; and,

Fig. 9 is a cross section through the same.

Referring to Figs. 1, 2, and 3 of the drawing, a and a' indicate flat metal supporting rods for the coils b and b'. These rods may be of any desired length and each rod is covered by refractory material which is preferably molded in short units and applied to the bar. Each unit r of refractory material is composed of two molded sections 1, which are the same in all respects. Each section comprises a bar, relatively flat on the sides and having teeth 2 on one edge and a longitudinal groove 3 adapted to fit over the metal supporting bar. These grooves are equal in depth to half of the width of the supporting bar, and when the two sections of a unit of the refractory material are applied to the supporting bar, they completely surround the bar, as will be clear from an inspection of Figs. 8 and 9.

In Figs. 1 and 2, two short units r, r, of refractory material are shown, meeting end to end at s. The number of such units will depend upon the length of the bar a and of the resistance coil b. The refractory material employed is preferably porcelain, which is frangible and difficult to make in long pieces without warping. Long pieces, unless they happen to be perfectly straight, are difficult to apply to the metal bar, interfere with applying the resistance coil, and are apt to be broken and shattered, both in assembling and by the expansion and contraction of the coil when the latter is in use. By making the covering for the metal bar in relatively short two-part units, all of these difficulties are overcome. The short pieces, even though not perfectly straight, are adjustable relatively to one another and, collectively, make a substantially straight, continuous covering which facilitates assembling and avoids breakage, both in assembling and in use.

The resistance coils b, b' are made from flat metal ribbons, wound on edge, and they are applied to the supporting members by screwing them on to the threaded insulating coverings. When threaded on to the coverings, the coils hold the coverings in place on the supporting bar and the threads on the coverings space the convolutions of the coils apart.

The supporting bars are provided with notched ends 4 and 5, adapting them to be fitted on to parallel rods 6 and 7, respectively. When a plurality of coils are arranged parallel with one another upon these rods, and it is desired to connect them in series, difficulty arises in joining the ends of the coils because the convolutions, being of flat metal wound edgewise, cannot readily be bent in their own planes. I have therefore devised the connector c for connecting the end convolutions of adjacent coils, which connector can, however, be readily used to connect any two adjacent

convolutions in a pair of coils where it is desired to short circuit parts of the coils. This connector comprises a flat elongated plate 8, having at its side edges a pair of overturned lugs 9, which may, for convenience, be termed retaining lugs, these lugs being adapted to pass through adjacent turns of a pair of coils and to engage the inner edges of said turns or convolutions, as shown in Figs. 3 and 4. Above the lugs 9 and spaced a shorter distance apart are lugs 10, bent over on the same side of the plate as the lugs 9, these lugs 10 being adapted to engage the outer edges of the adjacent coils. Below the lugs 9 is a lug 11, formed by bending over the lower end of the plate, and this lug 11 is adapted to engage the outer edges of the convolutions which are to be connected. A clamping plate 12 is formed so as to fit between the pairs of lugs 9 and 10 and the lug 11, and when this plate is connected to the plate 8 by a clamping screw 13, the convolutions of the coils will be clamped between the plates and mechanically and electrically connected together. The lugs 10 and 11 space the coils apart and the retaining lugs 9 prevent spreading of the coils, and the several lugs also hold the clip in upright position. The upper end of the clip is provided with an opening 14, for receiving a binding post, where it is desired to connect wires to the coils at the points where they are joined.

For the purpose of connecting wires to the end of a coil or at any intermediate point in the coil, I provide the terminal clip *d*, shown in detail in Fig. 5. This clip comprises a flat plate 15, having one end slightly overturned, as shown at 16, and having curved forked arms 17, upon the inner edges of which are overturned lugs 18, these lugs being adapted to pass through a turn or convolution of a coil and to engage the inner edges of the convolution at diametrically opposite points. A clamping plate 19, having substantially the same form as the plate 15, but without the lugs or overturned end, is adapted to fit against the plate 15 and clamp the convolutions of the coil against said plate. The forked arms 20 of the plate 19 straddle the lugs 18 and these position the clamping plate and prevent it from turning about the clamping bolt 21, which passes through the body portions of both plates. The slightly overturned end 16 of the plate 15 spaces the plates apart at their upper ends a distance approximately equal to the thickness of the resistance metal so that when the clamping bolt is tightened, both plates will lie flat against the convolution, with which they will engage for about the length of a half of a turn. Each plate is notched at the center of the fork, as shown at 22, and this notched portion straddles the insulator on the supporting bar, which bar serves as a guide to position and support the members of the clip while they are being placed in position and clamped.

As shown in Figs. 1, 2 and 6, the terminal clips may be connected to the ends of the coils, and as shown in Fig. 7, they may be connected to any intermediate part of a coil, and leads or taps 23 may be connected to the clips and coil by the clamping screws.

While the devices described are adapted particularly for rheostat coils, it will be evident that they may also be used in connection with other electrically conducting coils composed of edge wound metal.

What I claim is:

1. A resistance unit comprising a metal supporting bar, an insulating covering thereon composed of a plurality of pieces of refractory material each grooved to fit the bar and interlocking therewith to prevent rotation thereon, and each having threads on its outer surface, and an edgewound helix of flat resistance metal threaded on to said covering.

2. A resistance unit comprising a metal supporting bar, an insulating covering thereon composed of a plurality of relatively flat pieces of refractory material each grooved to fit the bar and interlocking therewith to prevent rotation thereon, and each having threads on its outer surface, and an edgewound helix of flat resistance metal threaded on to said covering.

3. A resistance unit comprising a metal supporting bar, an insulating covering thereon composed of a plurality of relatively short pieces of refractory material each interlocking with the bar to prevent rotation of the covering on the bar, each piece having a row of threads on its outer surface, and an edgewound helix of flat resistance metal threaded on to said covering.

4. A resistance unit comprising a metal supporting bar, an insulating covering thereon composed of a plurality of relatively short and flat pieces of refractory material each interlocking with the bar to prevent rotation of the covering on the bar, each piece having a row of threads on its outer surface, and an edgewound helix of flat resistance metal threaded on to said covering.

5. A resistance unit comprising a relatively flat metal supporting bar, an insulating covering thereon composed of relatively flat opposing pieces of refractory material, each piece grooved along one edge to fit the bar and having threads on its opposite edge, and an edgewound helix of flat resistance metal threaded on to said covering.

6. A resistance unit comprising a relatively flat metal supporting bar, an insulating covering thereon composed of relatively short and flat opposing pieces of refractory material, each piece grooved along one edge to fit the bar and having threads on its op-

posite edge, and an edgewound helix of flat resistance metal threaded on to said covering.

7. The combination with adjacent coils of flat metal, wound on edge, of a connector for said coils comprising a plate having retaining lugs adapted to engage the inner edges of adjacent convolutions in both coils and having spacing lugs adapted to engage the outer edges of both coils, and a clamping plate adapted to clamp the convolutions against said first mentioned plate.

8. The combination with adjacent coils of flat metal, wound on edge, of a connector for said coils comprising a plate having retaining lugs adapted to engage the inner edges of adjacent convolutions in both coils and having spacing lugs adapted to engage the outer edges of both coils, and a clamping plate adapted to fit between the lugs of the first mentioned plate.

9. The combination with adjacent coils of flat metal, wound on edge, of a connector for said coils comprising a plate having retaining lugs adapted to engage the inner edges of adjacent convolutions in both coils and having spacing lugs, above and below said retaining lugs, adapted to engage the outer edges of both coils, and a clamping plate adapted to clamp the convolutions against said first mentioned plate.

10. The combination with adjacent coils of flat metal, wound on edge, of a connector for said coils comprising a plate having retaining lugs adapted to engage the inner edges of adjacent convolutions in both coils and having spacing lugs, above and below said retaining lugs, adapted to engage the outer edges of both coils, and a clamping plate adapted to fit between the lugs of the first mentioned plate.

11. The combination with a coil of flat metal, wound on edge, of a terminal clip comprising a flat plate having forked arms provided with lugs adapted to engage the inner edge of a convolution of the coil at opposite points, and a clamping plate having forked arms adapted to straddle said lugs and to clamp the convolution against said first mentioned plate.

12. The combination with a coil of flat metal, wound on edge, and a relatively flat threaded member supporting said coil, of a terminal clip comprising a flat plate having forked arms provided with lugs adapted to engage the inner edge of a convolution of the coil at opposite sides of said member, a clamping plate having forked arms adapted to straddle said lugs, said plates having notches between the forks to receive the threaded member, and means for securing the plates together.

13. The combination with adjacent parallel coils of flat metal wound on edge, of a connector comprising clamping plates adapted to fit flatly against the faces of adjacent convolutions in said coils, one of said plates having means for positioning the plates with respect to both convolutions.

14. The combination with a coil of flat metal wound on edge, of a terminal clip comprising two clamping plates adapted to fit flatly against the opposite faces of a convolution of said coil, one of said plates having means for positioning the plates with respect to the convolution.

15. The combination with a coil of flat metal wound on edge, and a relatively flat threaded member supporting said coil, of a terminal clip comprising two clamping plates adapted to fit flatly against the opposite faces of a convolution of said coil and having notches to receive one edge of said member.

In testimony whereof I hereunto affix my signature.

GEORGE H. WHITTINGHAM.