F. DIEHL.

RHEOSTAT.

APPLICATION FILED OCT. 2, 1017.

1,369,407. **Patented Feb. 22, 1921.**

2 SHEETS—SHEET 1.

Fig. 1.

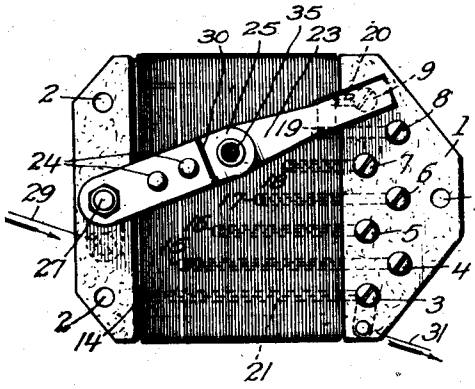


Fig. 2.

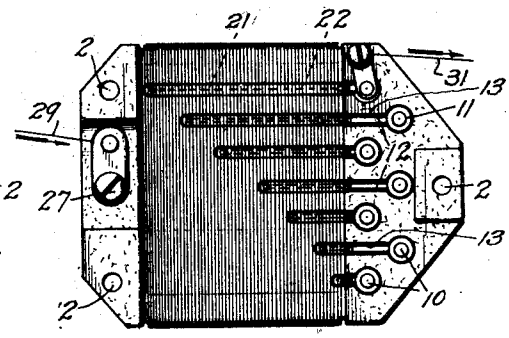


Fig. 3.

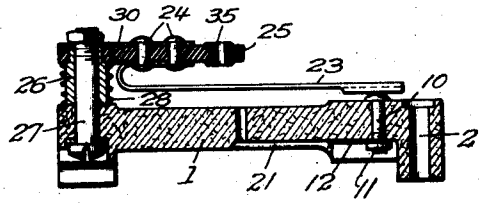


Fig. 4.

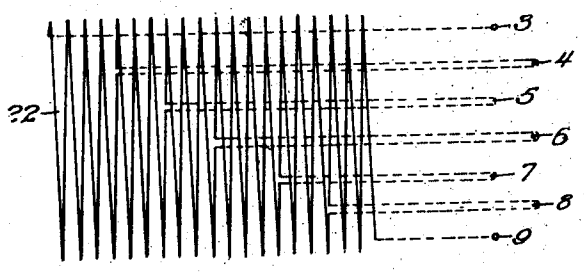
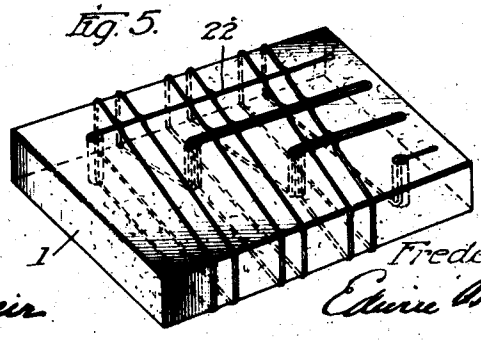


Fig. 5.



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2 SHEETS—SHEET 2.

Fig 6.

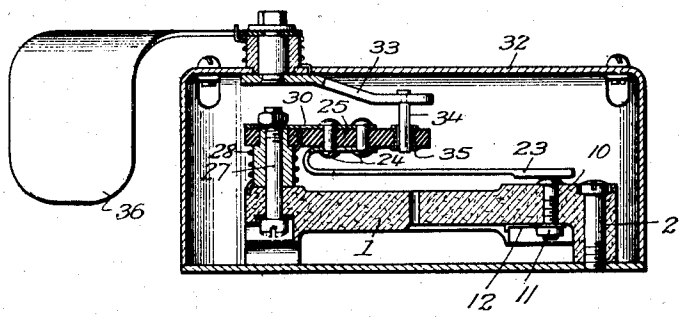
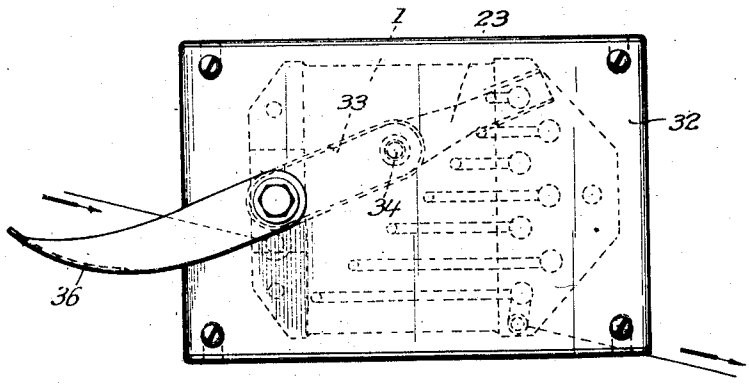


Fig. 7.



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UNITED STATES PATENT OFFICE.

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RHEOSTAT.

1,369,407. Specification of Letters Patent. Patented Feb. 22, 1921.

Application filed October 2, 1917. Serial No. 194,341.

To all whom it may concern:

Be it known that I, FREDERICK DIEHL, a citizen of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented new and useful Improvements in Rheostats, of which the following is a specification.

This invention relates to improvements in rheostats.

One object of the invention is to provide an improved rheostat.

Another object is to provide a rheostat which is simple in construction, efficient in service, and inexpensive to manufacture.

Another object is to provide an improved resistance unit for use in rheostats and the like.

Other objects of the invention will hereinafter appear.

The accompanying drawings illustrate an embodiment of the invention. The views of the drawings are as follows:

Figure 1 is a top plan view of the rheostat;

Fig. 2 is a bottom plan view of the rheostat;

Fig. 3 is a vertical longitudinal section of the rheostat;

Fig. 4 is a diagrammatic representation of the resistor;

Fig. 5 is a diagrammatic perspective view illustrating the manner in which the resistor is wound upon its support;

Fig. 6 is a vertical longitudinal section showing the rheostat mounted in a casing; and

Fig. 7 is a plan view of the structure shown in Fig. 6.

The embodiment of the invention illustrated in the drawings will be specifically described, but the specific description is for illustrative purposes and should not be construed in a limiting sense.

The rheostat comprises a support 1 which may be of any suitable insulating material, such as porcelain. The support is provided with openings 2 by means of which it may be fastened in place when desired by bolts, screws, or other fastening devices. In the present instance the support is adapted to be mounted and fastened in a casing, as will hereinafter appear.

A plurality of contacts 3, 4, 5, 6, 7, 8, and 9 are positioned at one end of the support. The number of these contacts will depend upon the number of resistance sections of the rheostat. Each of the contacts comprises a bolt 10, the head of which constitutes the contact over which the arm of the rheostat moves. The nut 11 of each bolt 10 holds in place a hook-shaped member 12. These hook-shaped members are positioned at the under side of the support 1, as shown in Figs. 2 and 3. The resistor is electrically connected to and passed around these hooks, as will hereinafter appear. The nuts 11 and hooks 12 are positioned in recesses 13, provided in the under side of the support 1. A relatively large number of contacts may be used when so desired on a relatively small support by arranging the contacts in staggered relation, as shown in the drawing. The length of the series of contacts will then be shortened without decreasing the distance between adjacent contacts.

In longitudinal alinement with each contact is an opening which passes transversely through the support 1. These openings are shown at 14 to 20 inclusive. They are arranged in a series which is substantially diagonal of the support, as shown in Figs. 1 and 2, so that the first opening 14 is a greater distance from its contact 3 than the opening 15 is from the contact 4. Likewise, the opening 15 is a greater distance from the contact 4 than the next opening 16 is from its contact 5. In short, each succeeding opening is nearer to its contact than the preceding opening. Each of the openings 14 to 20 inclusive is connected by means of a groove or recess 21, formed in the under surface of the support to the corresponding recess 13, in which the nuts 11 and hooks 12 of the contacts are positioned. Each recess 21 and the corresponding recess 13, therefore, constitute in effect a single recess.

The resistor is wound upon the support and electrically connected with the contacts in the manner now to be described.

Figs. 4 and 5 illustrate in a diagrammatic way the manner in which the resistor is wound upon the support, and these figures should be followed during the following explanation in addition to Figs. 1 and 2.

The resistor 22, which may be a conductor having the desired ohmic resistance, is connected at one end to the hook of the first contact 3. It is then led to the first opening 14 and passed therethrough. The resistor

is then wound transversely about the support with the desired number of turns until the second opening 15 is reached. The resistor is then passed through this opening to the bottom of the support and led out to the second contact 4. It is looped about the hook 12 of this contact and then led back to the opening 15 and passed therethrough to the top of the support, and is then again wound transversely about the support until the opening 16 is reached. The resistor is then passed through the opening 16 and led out to the third contact 5 and looped about the hook of this contact, and then led back to the opening 16 and passed therethrough to the top of the support. The resistor is then again wound transversely about the support with the desired number of turns until the next opening 17 is reached, and it is then led out to the corresponding contact and looped about its hook in the same manner as described above. This process is continued until the last contact 9 is reached. The end of the resistor is then connected to the hook of this contact. Those portions of the resistor which extend out to the hooks of the contacts lie in the longitudinal grooves 21, while the turns of wire which pass transversely about the support pass transversely over these grooves.

The turns of wire between any two adjacent openings constitute one of the resistance sections of the rheostat.

It will be seen from Figs. 4 and 5 that the resistor is one continuous length of wire having its ends connected to the end contacts and having intermediate portions brought out and looped about the intermediate contacts. A section of the resistor is therefore electrically connected between every two adjacent contacts. In Fig. 5 the support is viewed from its under side. The purpose of this view is merely to make clear the manner in which the resistor is wound upon the support. Only a few contacts are shown and only a few turns of wire are shown between each two adjacent openings. This is to make the view as simple and clear as possible.

The arm of the rheostat is shown at 23. One end of the arm passes over the contacts 3 to 9 inclusive and the other end is secured by means of rivets 24 to an arm 25 made of suitable insulating material. The arm 25 is pivotally mounted upon a post 26 that is clamped to the support 1 by means of a bolt 27. A coil spring 28 encircling the post 26 acts upon the arm 25 to bias the same to the position shown in Fig. 1.

One of the current leads 29 is electrically connected to the bolt 27, as shown in Figs. 1 and 2. Current passes from the bolt 27 to the rheostat arm 23 through a conducting plate 30 on the insulating arm 25, and through the rivets 24.

If the rheostat arm 23 is in the position shown in Fig. 1, the current will pass through all of the resistance sections and out through the lead 31 electrically connected to the contact 3. If the rheostat arm 23 is in electrical engagement with the contact 3 all of the resistance sections will be short-circuited and current will pass directly through the rheostat arm to the contact 3 and lead 31 without passing through any of the resistance sections. If the rheostat arm is in engagement with the contact 8, the current will pass through all of the resistance sections except that section at the right-hand end of the rheostat; *i. e.*, the section that is electrically connected between the contacts 8 and 9. Likewise, if the rheostat arm is in engagement with the contact 7 the first two right-hand resistance sections will be short-circuited. When the rheostat arm reaches the contact 4 all of the resistance sections except the one at the left-hand end of the rheostat are short-circuited and the current flows only through this section.

The rheostat arm 23 may, of course, be actuated in any desired manner. In the present instance the rheostat shown in Figs. 1, 2, and 3 is positioned in a casing 32, as shown in Figs. 6 and 7. The casing 32 has pivoted thereto an actuating arm 33 provided with a pin 34. The pin 34 projects into an eyelet or bushing 35 provided in the insulating arm 25. The actuating arm 33 may be operated from the exterior of the casing by means of a lever 36.

The complete rheostat shown in Figs. 6 and 7 is intended for use as a controller for a sewing machine motor and when so used the lever 36 may be actuated by the knee of the operator. It is obvious, however, that the rheostat shown in Figs. 1, 2, and 3 is not limited to this use and may be used in other ways.

It will now be noted that the resistor of the rheostat is continuous in length and is so wound upon the support and so connected with the contacts that no soldered connections are necessary. The rheostat is simple in construction, inexpnsive to manufacture, and is efficient in operation.

What I claim is:—

1. A resistance unit comprising a support having a plurality of openings extending therethrough and arranged in a series diagonally of the support, a series of contacts at one end of the support, a resistor connected to one of the end contacts and passing through one of the end openings, the resistor being then wound upon the support and passed through the second opening and looped about the second contact, then brought back to the same opening, passed therethrough, and again wound upon the support until the next opening is reached, the resistor being then passed through the

opening and looped about the next contact and so on until the last contact is reached, the end of the resistor being connected to said last contact.

2. A resistance unit comprising a support having a plurality of openings passing therethrough and arranged in a series transversely of the support, a continuous resistor wound transversely upon said support and having integral portions passed through said openings and extending longitudinally of the support to points on said support where electrical contact may be made.

3. A resistance unit comprising a support provided with a series of openings passing therethrough, and a resistor wound transversely upon said support, the ends of said resistor being passed through the end openings and extending longitudinally of the support toward the end thereof, and the resistor having loops passing through the intermediate openings and extending longitudinally of the support toward the end thereof.

4. A resistance unit comprising a support, a series of contacts, a continuous resistor wound upon said support, said support having a series of openings therethrough and said resistor having integral portions passed through said openings and extending substantially at right angles to the turns of the resistor to said contacts.

5. A resistance unit comprising a support provided with a series of openings passing therethrough, and a resistor wound transversely around said support, said resistor having portions passing through said openings and extending longitudinally toward the end of the support, and said support having longitudinal grooves in which said longitudinally extending portions of the resistor are positioned.

6. A resistance unit comprising a support, a plurality of contacts at one end of the support, said support having an opening passing therethrough in line with each contact, and a longitudinal groove extending from each opening to one of said contacts, and a resistor wound transversely about said support and having portions passed through said openings and lying in said grooves and extending toward the contacts.

7. A resistance unit comprising a support, a plurality of contacts at one end of the support, said support having an opening passing therethrough in line with each contact, and a longitudinal groove extending from each opening to one of the contacts, and a continuous resistor wound transversely about said support and having integral portions passed through said openings and lying in said grooves and extending toward the contacts.

8. A resistance unit comprising a support, a continuous resistor wound transversely about the support, said resistor having integral portions extending longitudinally toward the end of the support, and a series of contacts having hooks about each of which one of said portions of the resistor is looped.

9. A resistance unit comprising a support, a continuous resistor wound thereon, and a series of contacts, said resistor having integral portions extending substantially at right angles to the turns of the resistor and electrically connected to said contacts, and the support having grooves or recesses in which said integral portions of the resistor are positioned.

10. A resistance unit comprising a support, a continuous resistor wound thereon, said resistor having integral portions extending substantially at right angles to the turns of the resistor to points where electrical contact may be made, said integral portions being positioned under said turns and at a different level therefrom to space said portions from the turns.

11. A resistance unit comprising a support, a continuous resistor wound thereon, said resistor having integral loops extending substantially at right angles to the turns of the resistor to points where electrical contact may be made, and said loops being positioned under said turns and located at a different level therefrom so that the loops will be spaced from the turns.

12. A rheostat comprising a support, a continuous resistor wound thereon, said resistor having integral loops extending substantially at right angles to the turns of the resistor to points where electrical contact may be made, said loops being positioned under said turns and located at a different level therefrom so that the loops will be separated from said turns, and a switch arm adapted to pass over said points.

13. A rheostat comprising a non-conducting support, a series of contacts carried thereby, a resistor comprising a continuous conductor wound upon said support and looped out at intervals into electrical connection with said contacts, and a switch pivotally mounted upon said support and movable over said contacts to vary the effective resistance of the resistor.

14. A rheostat comprising a support, a series of contacts carried thereby, a sectional resistor comprising a continuous conductor wound transversely of said support and looped out at intervals to said contacts at substantially right angles to the turns, and a switch pivotally mounted on said support to move over said contacts to vary the number of effective sections of the resistor.

15. A rheostat which may be applied as a unit, comprising a support arranged to be mounted in position, a series of electrical contacts carried by said support, a resistor

comprising a continuous conductor wound transversely upon said support and extending at intervals in loops through openings in said support into electrical connection with said contacts, and a pivoted switch arm carried by said support and movable over said contacts to vary the effective resistance of the resistor.

16. A resistance unit comprising a support having a plurality of openings passing therethrough, and a continuous resistor looped upon the support to include said openings, the resistor having integral portions passed through said openings and extending axially of the loops to a point on the support where electrical contact may be made.

17. A resistance unit comprising a support having openings passing therethrough, and a continuous resistor wound upon the support forming turns alined with the openings, said resistor having integral portions passed through the openings and extending between the turns to a point on the support where electrical contact may be made.

18. A rheostat comprising a support having an opening therethrough, terminals mounted thereon, and a continuous resistor wound upon said support and having integral portions drawn through the openings contained within turns of the wound resistor for connection with the terminals.

19. A rheostat comprising a support having apertures therein, and a continuous resistor having turns wound upon the support about an axis different from that of the opening, the resistor having integral portions drawn through the openings and extending axially of the turns to a point on the support where an electrical connection may be made.

20. A rheostat comprising a support having apertures therein, terminals on the support and a continuous resistor wound upon the support so that the openings lie within the turns of the resistor, said resistor having integral portions drawn through the openings and extending to the terminals.

21. A rheostat comprising a support having openings therethrough, and a resistor wound upon the support to overlie the openings, the resistor having integral portions passed through the openings and extending to a point on the support where electrical contact may be made.

In witness whereof I have hereunto subscribed my name.

FREDERICK DIEHL.