H. D. STONE.

RHEOSTAT.

APPLICATION FILED FEB. 8, 1918.

1,307,643.

Patented June 24, 1919.

4 SHEETS—SHEET 1.

Fig. 1

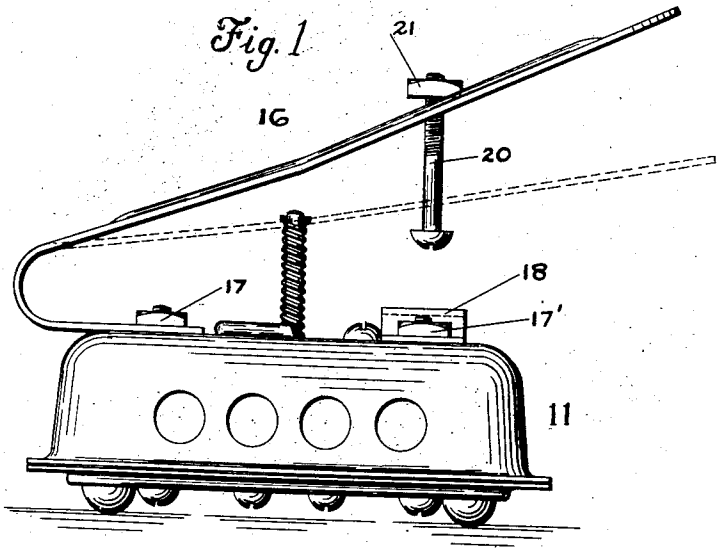


Fig. 2.

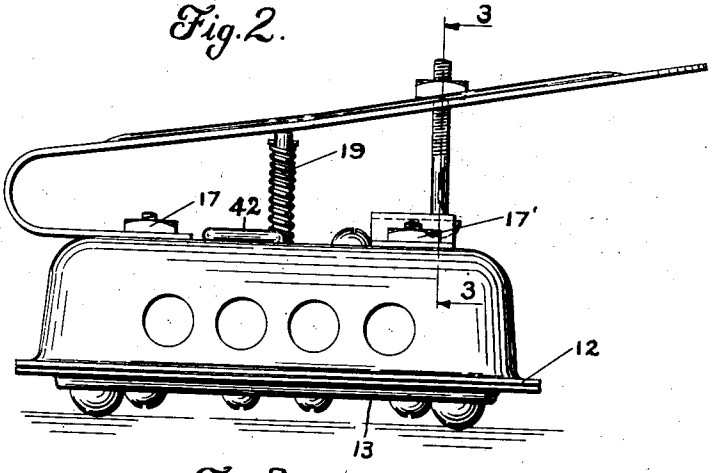
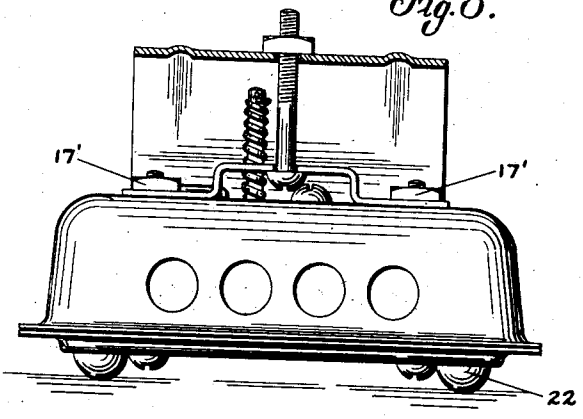


Fig. 3.



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4 SHEETS—SHEET 2.

Fig. 4.

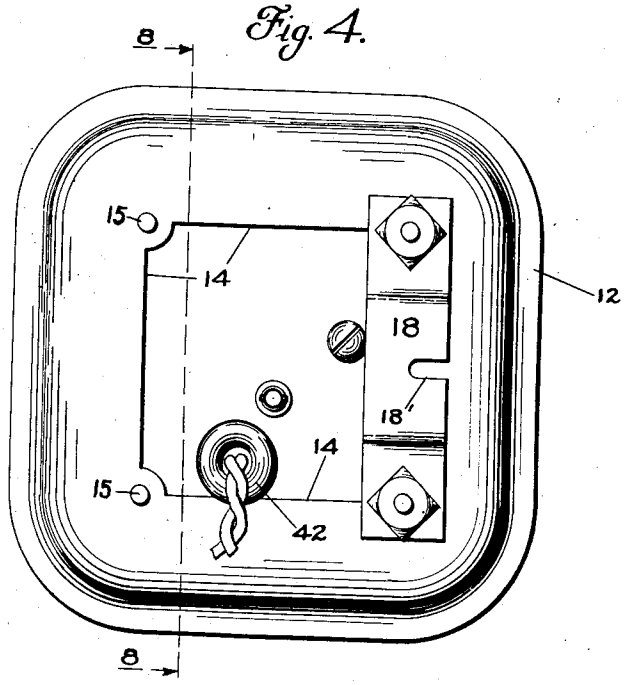


Fig. 5.

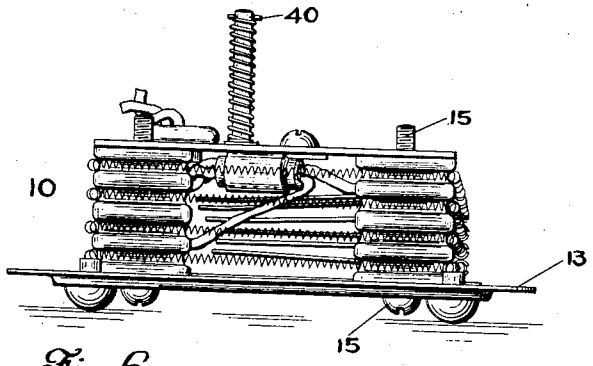
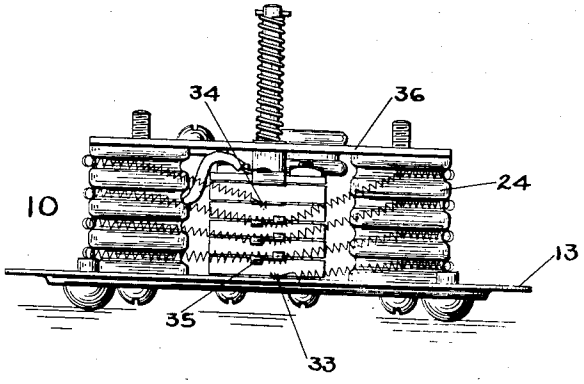


Fig. 6.



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4 SHEETS—SHEET 3.

Fig. 7.

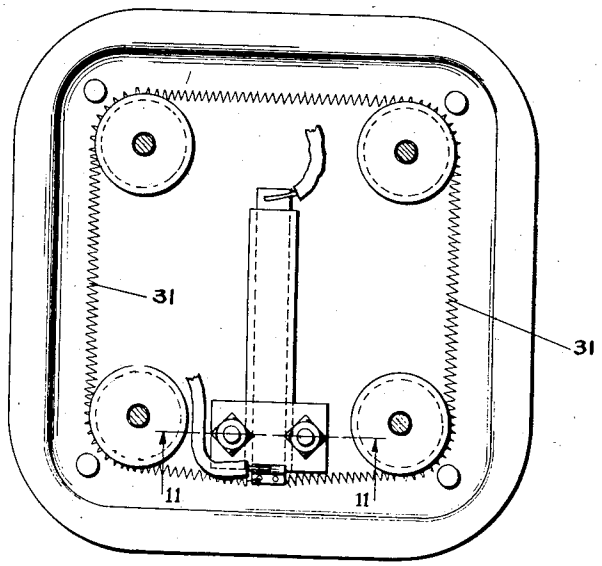


Fig. 8.

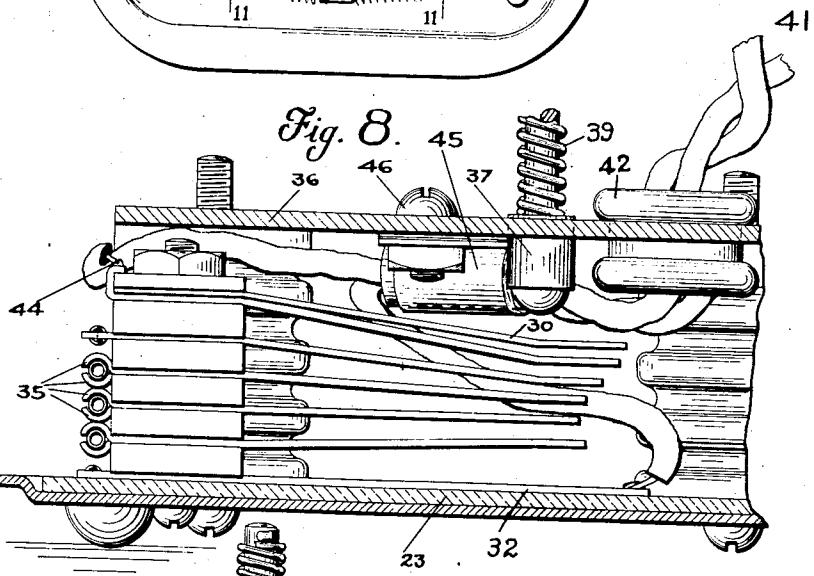
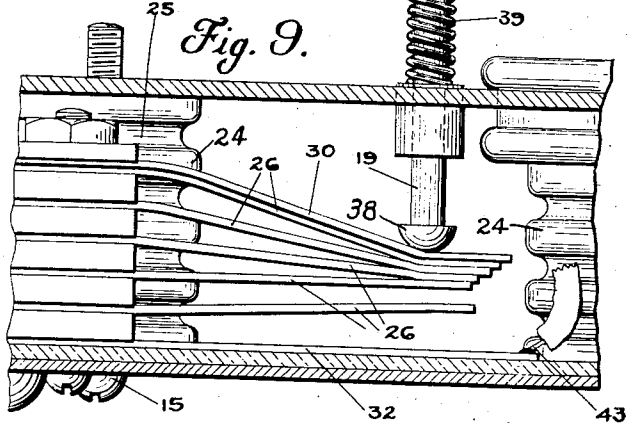


Fig. 9.



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4 SHEETS—SHEET 4.

Fig. 10.

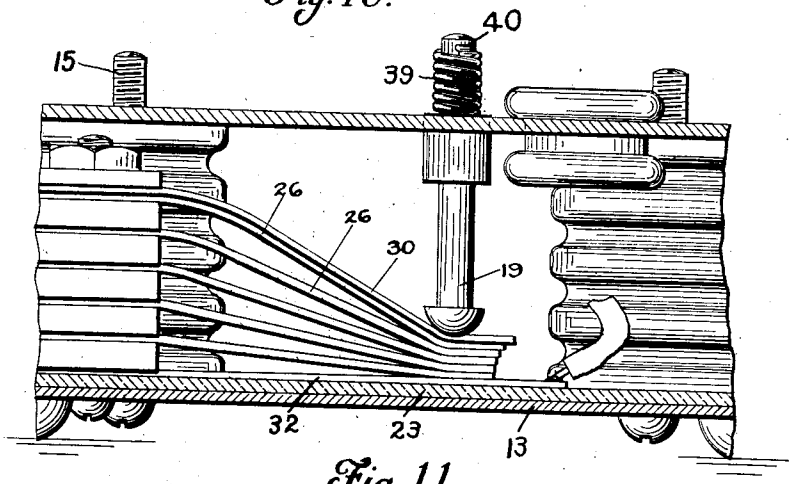


Fig. 11

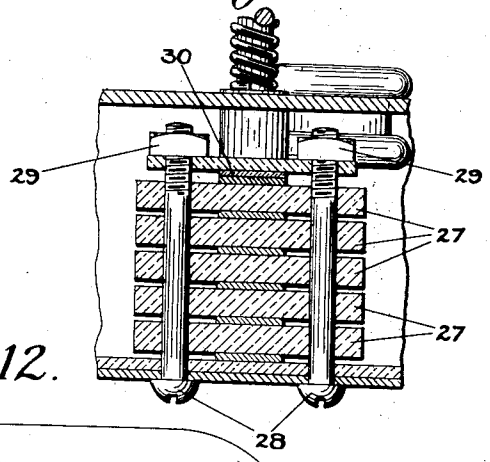
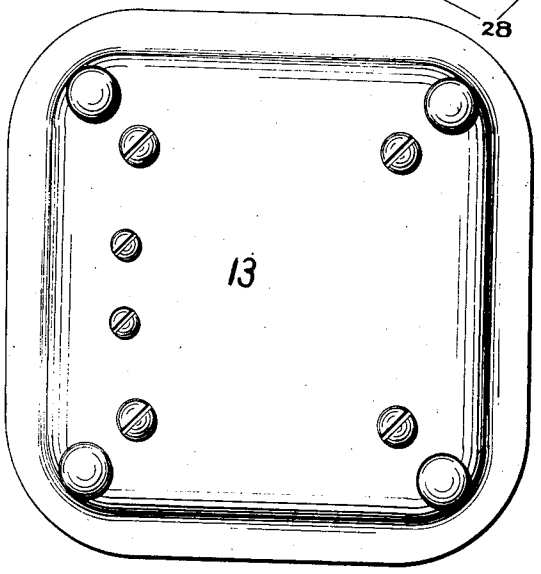


Fig. 12.



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UNITED STATES PATENT OFFICE.

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RHEOSTAT.

1,307,643. Specification of Letters Patent. Patented June 24, 1919.

Application filed February 8, 1918. Serial No. 216,058.

To all whom it may concern:

Be it known that I, HARRIS D. STONE, a citizen of the United States, residing in the city and county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Rheostats, of which the following is a full, clear, and exact description.

This invention relates to rheostats, and more particularly to a rheostat adapted to control the speed of a small electric motor.

The object of this invention is to provide a small, portable rheostat that permits of a comparatively large range of current control, which is durable in use, and which may be manufactured at a relatively small cost.

A more particular object of my invention is to provide a small, portable rheostat which is adapted to be placed on the floor and operated by a foot treadle in order to provide a convenient means for controlling the speed of an electric motor.

To these and other ends, the invention consists of the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings,

Figure 1 is a side view of my complete rheostat, showing the operating treadle mounted thereupon, in its released position;

Fig. 2 is a view similar to Fig. 1, but showing the treadle clamped in its operative position;

Fig. 3 is an end view of Fig. 2, looking in the direction of the arrows 3—3 shown in Fig. 2, and showing the treadle cut upon the sectional line 3—3;

Fig. 4 is a plan view of my rheostat, with the operating treadle removed;

Fig. 5 is a side view of the rheostat, with the inclosing casing removed;

Fig. 6 is a view similar to Fig. 5, but taken at right angles thereto;

Fig. 7 is a plan view of the rheostat, with the inclosing casing removed, and the upper plate being removed by a section taken just below this plate;

Fig. 8 is an enlarged section taken on the line 8—8 of Fig. 4, looking in the direction of the arrows, and showing the flexible contact members in their normal spaced relation;

Fig. 9 is a view similar to Fig. 8, but showing several of the contact members depressed to cut out part of the resistance of the rheostat coils;

Fig. 10 is a view similar to Figs. 8 and 9, but shows all of the contact members depressed to cut out all of the resistance of the rheostat coils;

Fig. 11 is an enlarged sectional view, taken on the line 11—11 of Fig. 7, looking in the direction of the arrows; and

Fig. 12 is a bottom view of my rheostat.

In the drawings, I have designated my improved rheostat in its entirety by the numeral 10 (see particularly Figs. 5 and 6). This rheostat is provided with a casing 11 having one face opened and having an outwardly flared rim 12 formed about this opening. The rheostat 10 is provided with a base plate 13, which coöperates with the flared rim 12 to close the opened face of the casing 11 when the same is placed over the rheostat. The opposite face of the casing 11 is also provided with an opening, which opening forms a clearance space for parts projecting from the upper face of the rheostat, which parts will be hereinafter described. The opening last referred to is preferably square and is bounded by the edges of the casing designated by the numeral 14. In order to provide convenient means for securing the parts of the rheostat 10 to the base 13, and for securing the casing 11 in place upon the base 13, I provide four threaded bolts 15, which are inserted through openings formed in the base plate 13 and extending through the rheostat structure 10 and through openings formed in the upper face of the casing 11. Upon the upper face of my rheostat I provide a flexible foot treadle 16, which treadle is preferably mounted upon the upper face of the casing 11 by forming two drill holes in one end of the treadle and placing this end of the treadle over the projecting ends of the threaded bolts 15. The several parts may then be rigidly clamped in place by the nuts 17. Upon the upper face of the casing 11, I also provide a bridge-like member 18, which is secured in place upon this casing by forming drill holes in the opposite ends of this member in order that the same may be placed over the projecting ends of the two remaining bolts 15 and clamped

thereto by the nuts 17'. In order that the foot treadle 16 may be retained in operative engagement with the sliding pin 19 (which pin will be more fully hereinafter described), I provide a threaded bolt 20 for securing the treadle in its depressed position. This bolt 20 is inserted through a drill hole formed in the treadle 16, and has a nut 21 threaded upon its outer end, the inner end of this bolt 20 being provided with a head which is positioned to be engaged under the bridge-like member 18 by means of the notch 18' formed in the bridge member 18. The threads upon the bolt 20 and coöperating nut 21 provide a convenient adjustable means for retaining the treadle 16 in any desired depressed position, as shown in Fig. 2. The base plate 13 is preferably provided upon its lower face with four rubber feet or lugs 22 in order to prevent the surface upon which my rheostat is placed from being scarred or damaged by the metal parts of which my device is constructed, and also to prevent the rheostat from slipping upon the face of the surface upon which it may rest.

The base plate 13 preferably has an offset portion formed in the same in which a sheet of insulating material, such as 23, is placed. Upon each of the threaded bolts 15 is mounted a spool-like member 24 formed of porcelain, or some other non-conducting material. Each of these members 24 has a drill hole formed centrally therethrough, which loosely receives the bolts 15, and upon the outer surface of these spool-like members are formed a plurality of circumferential grooves 25. In the rheostat which I have illustrated as disclosing my invention, I have shown each spool-like member 24 provided with four circumferential grooves 25, it being apparent that the number may be increased or decreased as may be desired, depending upon the range of current control it is desired to obtain by the rheostat. Between two of the spool-like members 24 just described, I mount the flexible contact members 26. These members 26 are preferably formed of brass, or some other flexible metal, and are secured in place one above the other in a vertical row, as shown in Figs. 8–11, inclusive. These flexible members are spaced from each other and are retained in their proper position by insulating blocks 27, which blocks are rigidly clamped in place by the threaded bolts 28, which bolts extend through holes formed in the base plate 13 and through the insulating blocks, and are provided with clamping nuts 29 positioned upon the upper ends thereof. Upon the topmost flexible member 26 is provided an insulating strip 30 formed of fiber or some other non-conducting material, the object of which is to insulate the sliding pin 19 from the uppermost strip 26. The flexible strips 26 and the insulating strip 30, as clearly shown in the drawings, extend through the insulating clamping blocks 27 and project in toward the interior of the rheostat 10, the inner ends of these strips being free to be bent toward each other and sufficiently resilient to spring away from each other when released, as will appear from Figs. 8–10, inclusive. The current resisting means which I have provided for my rheostat consists of a bare, relatively fine helically coiled wire, designated in its entirety by the numeral 31, one end of which 33 is secured to a metal strip 32 positioned directly under the bottommost flexible member 26, and the other end 34 of this helical wire is secured to the flexible contact member which is the second from the topmost of the contact members. The intermediate portion of the helically coiled wire 31 is wound spirally about the four spool-like insulating members 24 and rests in the grooves 25 above mentioned, which grooves retain the coils in spaced relation. In this manner the adjacent coils are prevented from coming in contact with each other and therefore the wire itself need not be insulated. This particular arrangement of the wire, whereby the necessity of insulating the same is avoided, materially decreases the cost of the wire which I am able to use for my rheostat over the resistance coils of insulated wire now in general use in rheostats. The intermediate spaced coils of the wire 31 are connected to the different contact members 26 by means of finger-like portions 35 which are formed integrally upon the outer ends of the contact members, each contact member being provided with two fingers bent in opposite directions so as to straddle the wire 31 and hold the same securely in place without mashing the helical coils of the same.

In order to provide means for supporting the sliding pin 19 in its proper position, and for supporting the current supply wires (which will be hereinafter described) in place, I provide a square sheet metal plate 36 having drill holes formed adjacent each corner thereof, in order that this plate may be mounted upon the projecting ends of the bolts 15 upon the upper face of the spool-like members 24. This plate 36 has formed near the center thereof a drill hole in which a collar 37 is mounted, the same preferably being provided with a reduced neck which projects through the hole formed in the plate 36 and is riveted thereto. This collar forms a bearing in which the pin 19 above mentioned freely slides, the lower end of this pin being provided with a head 38 which is positioned below the collar 37. The outer end of this pin 19 is provided with a coiled spring 39, which spring is retained in place upon the pin 19 by a cotter pin, or similar means, 40. The coiled spring 39 serves to normally hold the head 38 of the pin 19 out of contact with the insulating

strip 30. In order to provide means for conducting the current to my rheostat from any source of supply, such as the ordinary lamp socket, and for conducting the current which has been controlled by the rheostat from the same to the motor, or other devices operated thereby, I provide four flexible wire conductors, indicated generally by the numeral 41. These wires pass into the interior of the rheostat through a hole formed in the plate 36, which hole is preferably provided with the insulating collar 42. One of the wires 41 passes through the collar 42 and has its end 43 secured to the metal strip 32 above mentioned. Another one of the current supply wires 41 passes through the collar 42, and has the end thereof 44 secured to the uppermost flexible contact member 26. The two remaining wires 41 are not electrically connected to any structure within the rheostat, but simply pass into the rheostat casing through the collar 42 and are secured therein by the clamping member 45, which clamping member is bolted in place by the bolt 46. The clamping member 46, which is rigidly secured to the plate 36 by means of the bolt 46, forms a convenient means for securing all four wires in place, so that they will not be torn from the rheostat by a pull upon the same. The two wires 41 last mentioned in reality form a single wire, as they do not terminate in the rheostat but simply pass into and out of the casing thereof, forming an uninterrupted lead or conductor. The other lead or conductor of the circuit is formed by the first-mentioned wires 41, between which the rheostat proper is interposed.

The operation of my device is as follows: The current which is supplied to my rheostat by one of the wires 41 is conducted to the uppermost flexible contact member 26, and when the circuit is completed within my rheostat, the current will pass out of my rheostat through the metal strip 32 and the flexible member 41, which is connected to this strip at 43. When the flexible members 26 assume the position shown in Fig. 8 in which the outer ends of these members are out of contact with each other, no current can pass through the rheostat, for since the helical wire 31 does not come into contact with the uppermost contact 26, this contact member is entirely insulated from the other flexible contact members until it is forced downwardly into engagement with the contact member immediately below it. Should the uppermost flexible member 26 be forced downwardly by the pin 19 into electrical engagement with the strip immediately below it, the circuit will then be completed, although the amount of current which is permitted to pass through my rheostat will be materially reduced by the resistance of the helical wire 31, as the current will have to pass through the entire length of this wire 31 before it reaches the metal strip 32. Should it be desired to cut out part of the resistance offered by the wire 31, this is done by slightly increasing the pressure upon the pin 19 so that one or more of the flexible members 26 will be brought into electrical engagement with each other in order to cut out or short-circuit the uppermost spaced coils of the wire 31, the members 26, in this instance, assuming the positions shown in Fig. 9. Should it be desired to cut out all of the resistance offered by the wire 31, this is accomplished by increasing the pressure upon the pin 19 so that all of the flexible members are forced into electrical engagement with each other, as shown in Fig. 10. The current then enters the rheostat through the wire 41 which has its end secured to the uppermost flexible member, as shown at 44, and passes from the uppermost flexible member 26 directly through all of the flexible members 26 to the metal strip 32, and from there directly out of the rheostat through the wire, the end of which 43 is secured to this strip.

Should it be desired to retain the pin 19 in a particular position, for instance that shown in Fig. 9, for some length of time, this may be done by the threaded bolt 20, the head of which may be engaged under the bridge 18, after this bolt has been adjusted relatively to its nut 21 to retain the free end of the treadle 16 in the desired adjusted position. It will be apparent that the object in providing the bolt 20 and coöperating parts is to enable a person using my rheostat to remove his foot from the pedal 16 when it is no longer necessary to vary the current passing through my rheostat, at short intervals.

From the above description it will be seen that the flexible contact members 26 and the sliding pin 19 which controls the position of these contacts, forms a very simple and convenient means which is easily operated by a foot treadle for obtaining any desired adjustment of my rheostat.

I have not attempted to illustrate or describe the numerous changes which may be made in the details of the construction which may be adopted within the scope of the invention as defined in the claims. Various changes in the details of the device may be made without digressing from the scope of my inventive idea.

The rheostat herein illustrated is particularly intended for controlling the speed of sewing machine motors and for similar purposes. The rheostat may be placed on the floor in a position to be conveniently operated by the foot of the person using the sewing machine, or, if desired, it may be operated by hand, since the rheostat is provided with means for holding the treadle 16 in any

desired adjustment. My rheostat is therefore manually operable by either the foot or the hand of the person using the same.

What I claim is:

1. A rheostat, comprising a hollow receptacle, a plurality of flexible contact members insulated from each other and positioned one above the other within said receptacle, resistance means for electrically connecting the adjacent contact members, comprising an non-insulated, relatively fine wire having one end connected to the bottom contact member and the other end connected to the top contact member, the intermediate portion of said wire being wound about said receptacle in spaced coils, said spaced coils being connected to the intermediate contact members, and means for forcing said contact members into contact with each other, whereby said spaced coils will be successively short-circuited.

2. A rheostat, comprising a hollow receptacle, a plurality of spaced contact members insulated from each other mounted in said receptacle, resistance means for electrically connecting the adjacent contact members, comprising a non-insulated, relatively fine wire wound about said receptacle in spaced coils, said spaced coils being electrically connected to the different contact members, and means for bridging the spaces between the contact members, whereby the resistance means may be cut in or out of the circuit.

3. In a rheostat, a plurality of flexible contact members insulated from each other and positioned one above the other, electric resistance conductors for connecting the adjacent contact members, manually depressible means for forcing said contact members successively into contact with each other, and clamping means for retaining said depressible means in any desired depressed position.

4. A rheostat, comprising a receptacle having insulating members positioned at the corners thereof, a plurality of spaced contact members insulated from each other mounted in said receptacle, resistance means for electrically connecting the adjacent contact members, comprising a non-insulated, relatively fine wire wound about said receptacle in spaced coils, the coils being held in their spaced relation by said insulating corner members, said coils being electrically connected to the different contact members, and means for bridging the space between the adjacent contacts to increase or decrease the resistance of the rheostat.

5. In a rheostat, the combination with a supporting frame provided with a bottom and a top plate, a plurality of spaced flexible contact members insulated from each other mounted one above the other upon one of said plates, electric resistance conductors mounted between said plates and connected to the adjacent contact members, and means slidably mounted in one of said plates for forcing said flexible members into contact with each other; substantially as described.

6. A rheostat comprising a plurality of electric resistance conductors, means for cutting said conductors into and out of an electric circuit, a casing inclosing said rheostat, a member slidably mounted in said casing for operating said means, a treadle mounted upon said casing for operating said slidable member, and an adjustable means for clamping the treadle in the desired operating position.

7. In a rheostat, the combination with a supporting frame provided with a pair of spaced plates, a plurality of electric contact members mounted therebetween in spaced relation one above the other, electric resistance conductors for connecting the adjacent contact members, means slidably mounted in one of said plates for forcing said flexible members into contact with each other, and a treadle mounted upon said supporting frame for operating said sliding means; substantially as described.

8. In a rheostat, the combination with a supporting frame consisting of spaced plates and pins connecting the marginal portions of said plates, insulating members mounted on said pins and constructed to support said plates in spaced relation, electrical resistance means comprising non-insulated, relatively fine wire wound around said insulating members in spaced relation and inclosing the interior of the frame bounded by said pins, and a plurality of flexible contact members insulated from each other and positioned one above the other within said inclosure for cutting parts of said resistance means in and out of circuit.

9. In a rheostat, the combination with a supporting frame consisting of spaced plates and pins connecting said plates, insulating posts mounted on said pins and constructed to support said plates in spaced relation, electric resistance means comprising non-insulated, relatively fine wire having a plurality of spaced coils encircling a number of said posts and inclosing the interior of the frame bounded by said posts, and contact members mounted within said inclosure for cutting parts of said resistance means in and out of circuit.

10. In a rheostat, the combination with a supporting frame consisting of spaced plates and pins connecting the marginal portions of said plates, insulating members mounted on said pins constructed to support said plates in spaced relation, electric resistance means comprising non-insulated, relatively fine wire wound in spaced relation about

said posts to inclose the interior of the frame bounded by said posts, a plurality of flexible contact members insulated from each other and positioned one above the other within said inclosure for cutting parts of said resistance means in and out of circuit, and means slidably mounted in one of said spaced plates for operating said contact members.

In witness whereof, I have hereunto set my hand on the 28 day of January, 1918.

HARRIS D. STONE.