No. 633,172. Patented Sept. 19, 1899.

C. WIRT.

RHEOSTAT.

(Application filed Aug. 7, 1897.)

(No Model.)

Fig. 4

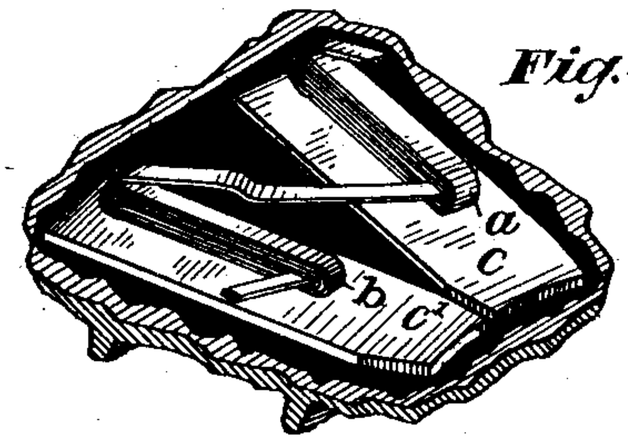


Fig. 3.

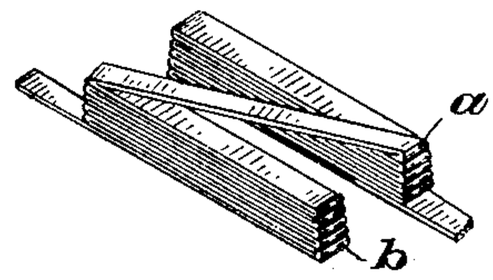


Fig. 1.

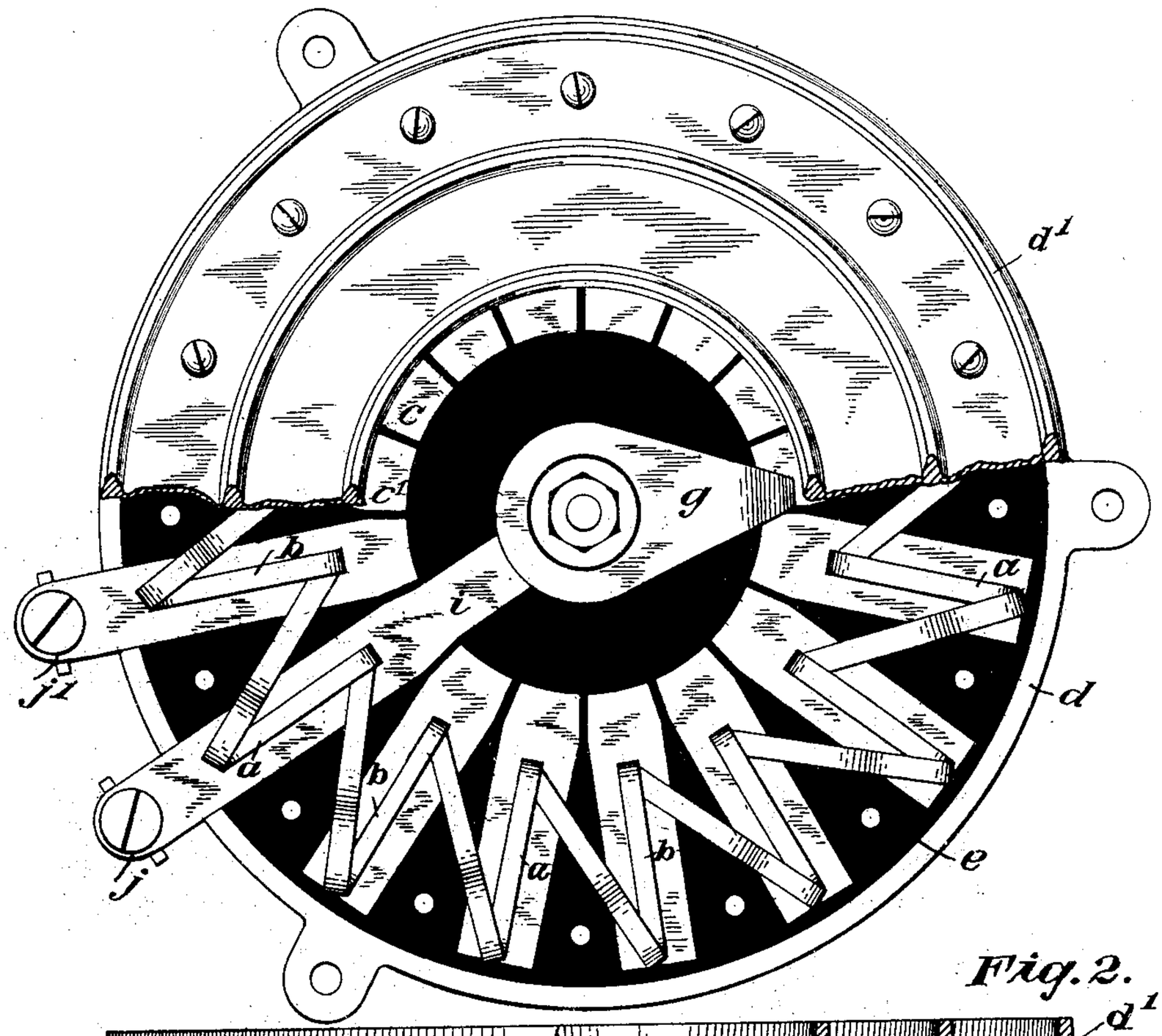
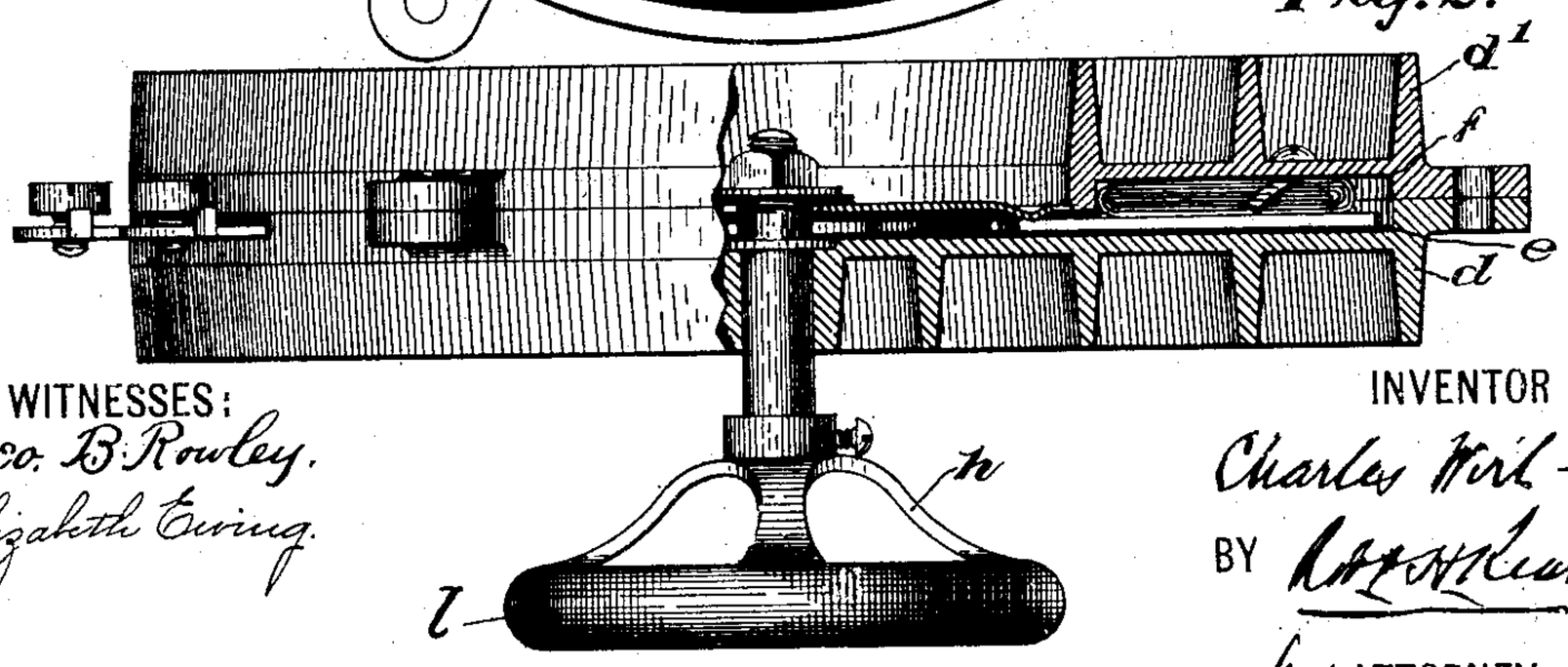


Fig. 2.



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RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 633,172, dated September 19, 1899.

Application filed August 7, 1897. Serial No. 647,401. (No model.)

To all whom it may concern:

Be it known that I, CHARLES WIRT, a citizen of the United States, residing in Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

This invention relates to rheostats or variable resistance devices for use in electric circuits or in connection with electric translating devices.

The object of the invention is to provide a device of this character which will admit of cheap construction and will remain stable both in its mechanical and its electrical properties for a longer period of service than such devices as commonly constructed.

The chief feature of the invention is to form the entire series of resistances which constitute the rheostat of a single length or piece of ribbon or wire conductor and to provide a considerable area of contact-surface between the several sections of the rheostat and the contact-blocks or conductors connected with them, such increased area of contact insuring better working conditions by promoting radiation of heat and dispensing with the necessity of soldered or other connections which are liable to work loose under the influence of heat.

In carrying out my invention I preferably use as a resistance material a metallic ribbon of German silver or iron which I wind upon a mandrel cylindrical or elliptical in cross-section, building each coil up to a sufficient number of layers to constitute an ohmic resistance as large as is required for each section of the variable rheostat. An insulating heat-refractory medium may be interposed between the several spirals, or the ribbon may be carried through a bath of insulating cement, or it may be provided with a superficial coating of high resistance by oxidation or in any other suitable way. After a sufficient length of the ribbon has been wound to constitute one section of the rheostat the other end of the ribbon is shifted axially of the mandrel and a second coil is wound in the same manner as the first, after which the free end of the conductor is again shifted axially of the mandrel and a third, fourth, and fifth coil, or as many as may be needed, wound in the same manner. The coils are then removed from the mandrel and flattened by squeezing the sides together, after which they are laid in series on a range of contact-blocks and firmly clamped or otherwise secured thereto. Thus each contact-block bears upon a considerable superficial area of the resistance medium and a good electrical and heat-conductive joint is established. A brush is mounted in suitable relation to the contact-blocks, and the terminal coils of the rheostat are provided with connectors for including the rheostat in an electric circuit.

My invention therefore comprises a continuous length of electric conductor coiled, folded, or otherwise compactly arranged in a plurality of sections, each containing a suitable length of the conductor and so mounted as to be cut gradually into or out of circuit one at a time. It comprises also a series of such resistances brought into engagement with a contact over a large superficial area to promote dissipation of heat. It comprises also other features the novelty of which will be hereinafter more fully described and will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate the invention, Figure 1 is a top plan view, part broken away, of a rheostat embodying my improvements. Fig. 2 is a side elevation, partly in section, of the organization shown in Fig. 1. Fig. 3 is a perspective view of a ribbon conductor folded in a way to embody my improvements, and Fig. 4 is a similar view of a conductor wound according to my invention.

Referring first to Fig. 4, a metallic ribbon is wound in a lathe, preferably on an elliptical or oblong mandrel, so as to form a plurality of coils *a b*, side by side, of a single length of ribbon. The coils are removed from the mandrel and flattened, as indicated in the figure. If desired, the ribbon may be folded in lieu of being wound. Such an organization is shown in Fig. 3. I prefer, however, to form it in coils, as the operation is much more rapid and therefore cheaper to conduct. Any suitable mode of insulating the successive spirals or folds from one another may be employed. I preferably apply an insulating-cement to the ribbon as it is wound and per-

mit it to dry and harden while the coils are held under compression, after which they may be removed from the mandrel and placed in the rheostat-casing, each coil lying on a contact-plate $c\,c'$, giving an area of contact equal to its entire length. A series of plates $c\,c'$ (see Fig. 1) are placed in a suitable casing or frame in coöperative relation to a traveling contact. As shown, the contact-blocks are arranged in circular order in an iron frame $d\,d'$, being insulated therefrom by layers of mica or asbestos $e\,f$. The coils are placed one on each contact-block, covered with an annulus of mica or asbestos f, and firmly clamped in place by a coöperative member d' of the casing by screws, as shown. Ribs or corrugations may be provided, as indicated in the drawings, to assist dissipation of the heat generated by the rheostat in service. A brush g, mounted upon a stem projecting into the casing, to which is connected a handle l, permits the spiral contact-blocks to be brought successively into circuit. The brush is insulated from the casing and from the handle by mica or asbestos washers (see Fig. 2) and is connected with a metallic strip i, leading to a binding-post j on the outside of the casing. The strip may serve as one of the contact-blocks, as shown in Fig. 1. A coöperative binding-post j' may be mounted upon the adjacent contact-block. As thus organized, the terminal coils of the resistance bear upon adjacent contact-blocks, one of which connects with the brush, so that by turning the brush more or less of the coils may be cut into a circuit in which the device may be included.

If desired, the casing of the rheostat may be formed of slate or similar non-conducting and fireproof material; but I prefer iron in most cases to permit more rapid radiation of heat.

The contact-blocks may be held in place while the apparatus is being assembled by a weight or clamp, or they may be cemented to the mica insulation. After the parts have been assembled the coils and contact-blocks may be embedded in cement to prevent displacement in service.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electrical resistance comprising a continuous and integral length of conductor wound or folded in a plurality of elongated sections placed side by side in contact with independent heat-radiating devices engaging the long side of the respective sections.

2. An electrical resistance comprising a plurality of resistance-sections formed of a continuous, integral length of metallic ribbon, each section comprising a plurality of folds or bends and the several sections lying side by side and being in contact over a considerable area of the ribbon with a heat-radiating metallic surface.

3. A rheostat or variable resistance comprising a plurality of resistance-sections formed of a continuous integral length of metallic ribbon, each section consisting of a plurality of folds or convolutions superposed in close relation with a thin separating medium of low conductivity, the several sections lying side by side, contacts electrically connected with the several sections, and a switch adapted to successively engage the several contacts.

4. A rheostat or variable resistance comprising a plurality of sections formed of a continuous, integral length of metallic ribbon, each section being provided with a plurality of layers or folds having a great length relative to its thickness, the several sections being placed side by side; a heat-radiating body of metal in contact with each section lengthwise of the section, and a switch for successively cutting into a circuit the several sections.

5. As a resistance device, an elongated or flattened coil of wire ribbon having a great length relative to its thickness, the long side of the coil being in close mechanical contact with a heat-radiating contact-block.

6. A rheostat or variable resistance comprising a plurality of resistance-sections formed of one integral piece of conducting-ribbon arranged side by side and clamped in an inclosing case and held in place by pressure, and a switch for successively connecting with the several sections.

In testimony whereof I have hereunto subscribed my name this 5th day of August, A. D. 1897.

CHARLES WIRT.

Witnesses:
ROBT. H. READ,
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