No. 755,828. PATENTED MAR. 29, 1904.

W. C. YATES.

RHEOSTAT.

APPLICATION FILED AUG. 22, 1903.

NO MODEL.

Fig. 1.

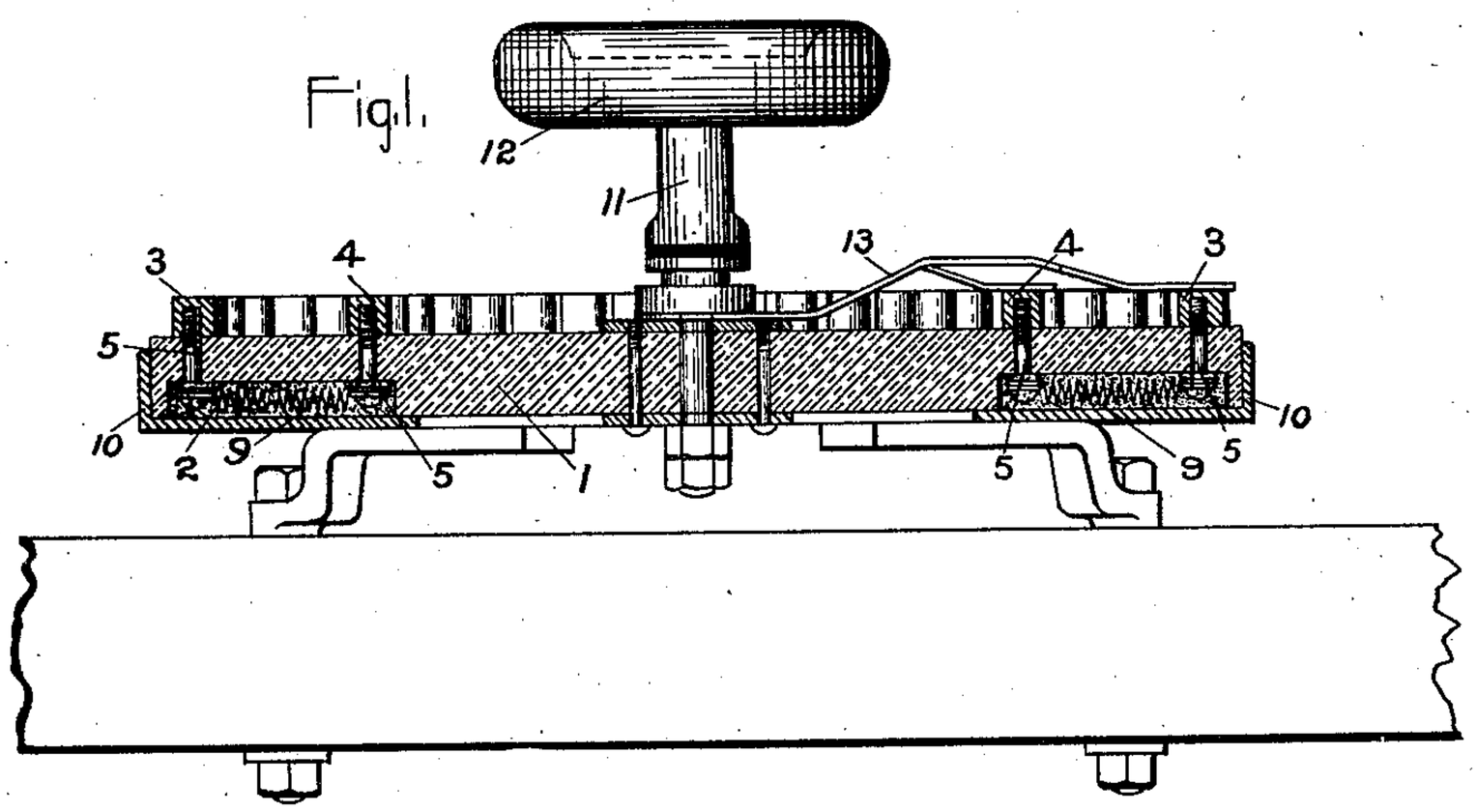
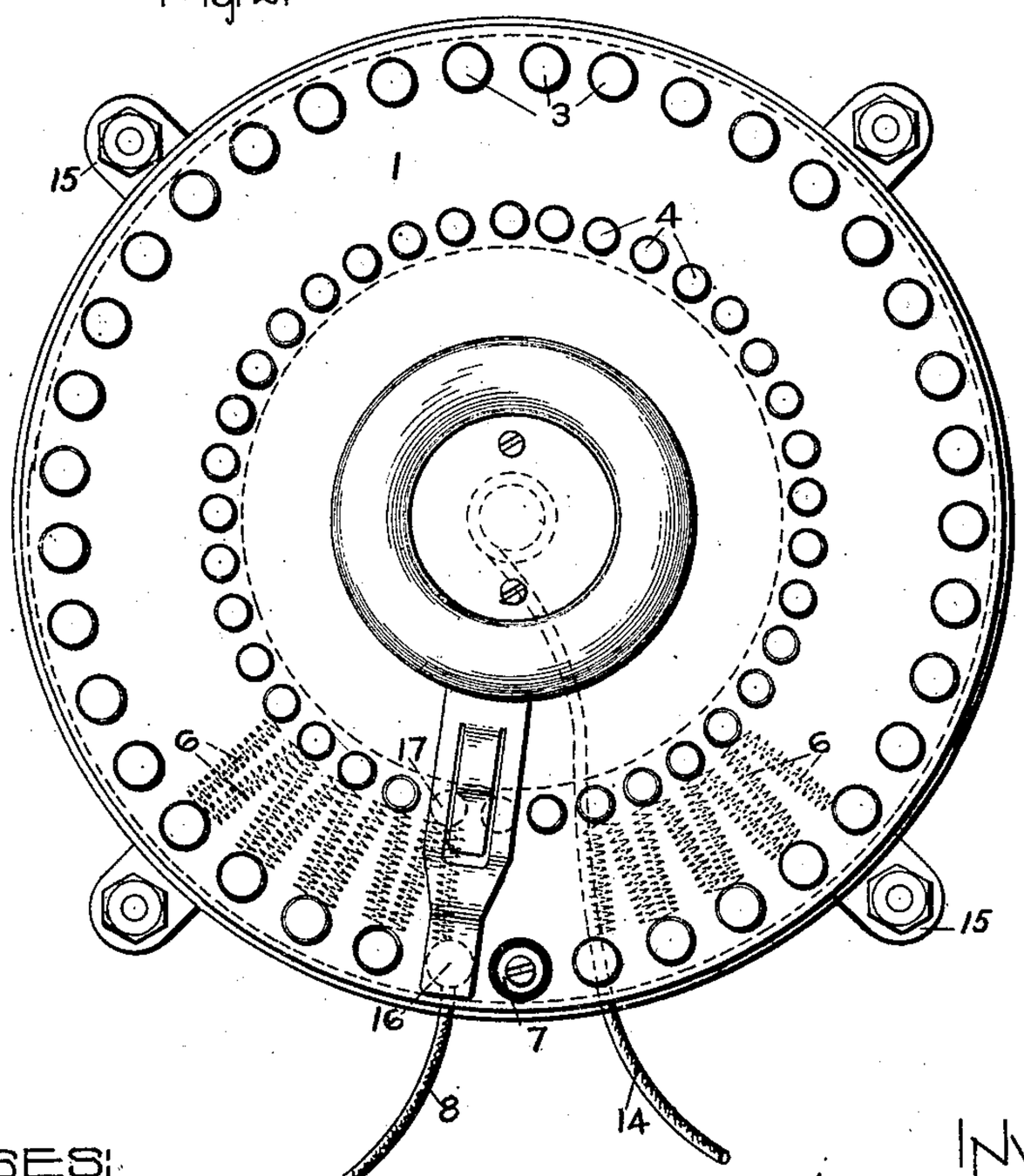


Fig. 2.



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No. 755,828. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM C. YATES, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 755,828, dated March 29, 1904.

Application filed August 22, 1903. Serial No. 170,386. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. YATES, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Rheostats, of which the following is a specification.

This invention relates to rheostats; and its object is to provide a compact and inexpensive device having a large resistance capacity relatively to its size and means for cutting the resistance into or out of circuit in small steps.

Further objects of the invention are to provide a rheostat in which the resistance is securely held in place and amply protected against mechanical injury and in which the heat generated by the passage of the current through the resistance material shall be rapidly absorbed and radiated.

To these ends I provide a base-plate of soapstone or similar insulating and heat-absorbing substance, preferably circular in form, having a wide circular groove cut in one side. On the other side of the base-plate are mounted two concentric rows of studs, which extend through the base-plate and into the groove, the studs of one row being staggered relatively to those of the other. The resistance material is zigzagged back and forth across the groove between the lower ends of the studs throughout the length of the groove, and consists, preferably, of coiled resistance-wire. When the resistance-wire has been secured in place, the groove is filled with an insulating substance, such as cement, which can be admitted in a fluid or plastic state and afterward hardened. In some cases I may omit grooving the plate and secure the resistance units in position between the studs on either or both sides of the base-plate and then embed them in the cement or other insulating heat-absorbing substance. A contact device having two spring-pressed arms, one bearing on the studs of each row, is arranged to move over the studs and cut the resistance units into circuit successively by making or breaking contact with the studs of the two rows alternately. By coiling the resistance wire and zigzagging the coils back and forth a rheostat having a large resistance capacity relatively to its size is obtained. The use of two rows of studs connected to the resistance and staggered makes fine regulation possible by dividing the resistance into a great number of steps. The cement in which the coils are embedded and the soapstone base absorb and radiate the heat from the resistance-wire, making its current-carrying capacity much higher than it would be if exposed to the air.

The novel features of my invention will be definitely indicated in the appended claims. The details of construction and the mode of operation of my improved rheostat will be better understood by reference to the following description, which is to be taken in connection with the accompanying drawings, in which—

Figure 1 is a sectional elevation, and Fig. 2 a plan view, of a rheostat embodying my improvements.

In the drawings, 1 represents a base-plate of soapstone or similar insulating and heat-absorbing material, preferably circular in form, having a wide circular groove 2 cut in one side, as indicated in dotted lines in Fig. 2. On the opposite side of the base-plate are mounted two concentric rows of studs 3 3 and 4 4, the studs of one row being staggered relatively to those of the other. The retaining-screws 5 of these studs extend from the bottom of the groove 2 through the base-plate and into the studs, the screws for the studs 3 3 being on one side of the groove and those for the studs 4 4 on the opposite side. Zigzagged across the groove between the screws of the two rows and securely fastened to the screws is the resistance material 6, which consists, preferably, of coils of wire extended so that adjacent convolutions are not in contact. In the outer row of studs is a stop 7, and to the stud 16 adjoining this a lead-wire 8 is connected. The first resistance unit extends from stud 16 to the first stud 17 of the inner row, the second unit from the stud 17 to the second stud of the outer row, and so on completely around the circular groove 2 to the stud next to the stop 7. When the resistance-coils 6 and the lead-wire 8 have been

properly secured to the screws 5, the groove 2 is filled with an insulating material, as indicated at 9. For this purpose I prefer to use cement, as that is a good heat-absorbent and can be filled in around the wires in the groove in a plastic state and afterward hardened; but obviously other insulating substances may be used instead. When the groove has been entirely filled with the cement, I secure a protecting-plate 10 over the groove. The resistance-coils are thus held securely in place by the screws 5, the cement 9, and the retaining-plate 10. The cement holds the coils away from the top and bottom of the groove and prevents a contact between a coil or a convolution of a coil and an adjoining coil or convolution and, with plate 10, insures complete protection of the coils against physical injury. At the center of the rows of studs is mounted a shaft 11, carrying an operating-handle 12 and a contact-arm 13, the latter consisting of a strip of spring metal punched out, as shown in Fig. 2, to form a contact-brush for each row of studs. By this construction the two brushes are spring-pressed independently, so that an unevenness in the height of the studs of either row does not materially affect the brush for the other row. Connected to the shaft 11 is the second lead-wire 14, by which the rheostat is connected in circuit. Secured to the under side of the base-plate are legs 15, which extend out beyond the periphery of the base-plate and by which the device is mounted on a switchboard or in any other convenient position. This construction enables me to mount a number of the rheostats one over the other on rods passing through the legs 15, and to arrange them to be operated by a single handle mounted on a shaft, to which the contact-arms 13 of the several rheostats are attached.

In the position shown in Fig. 2 there is no resistance in circuit, the path of the current being over the lead-wire 8 to the first stud 16 of the outer row and by brush 13 to shaft 11 and out over lead-wire 14. When the brush 13 is first moved by the handle 12, the outer end of the brush leaves stud 16; but as the studs of the two rows are staggered the inner brush is still on the first stud 17 of the inner row. In this position one resistance unit is in circuit, the path of the current being over lead-wire 8 to stud 16 of the outer row through the first resistance-coil to stud 17 of the inner row, then over brush 13 to shaft 11 and out over lead-wire 14. Thus as the contact-arm 13 is turned to the right or left by the handle 12 the brushes make and break contact with the studs of the inner and outer rows alternately, cutting the resistance units into or out of circuit successively.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a rheostat, a base-plate having a groove therein, resistances zigzagged back and forth across said groove, a row of pins on each side of said groove to which the resistances are connected, and a filling of insulating material surrounding the resistances.

2. In a rheostat, a base-plate having a circular groove therein, resistances zigzagged back and forth across said groove, two concentric rows of studs connected to the resistances, a filling of insulating material surrounding the resistances, and a contact device coöperating with the studs.

3. In a rheostat, a base-plate having a groove therein, resistances zigzagged back and forth across the groove, two rows of studs connected to the resistances and staggered, a filling of cement surrounding the resistances, and a contact device coöperating with the studs.

4. In a rheostat, a base-plate having a groove therein, resistances in said groove, two rows of studs connected to the resistances and staggered, and a contact device coöperating with the studs.

5. In a rheostat, a base-plate having a circular groove, two concentric rows of studs mounted on the base-plate and extending into the groove, resistances in the groove connected to the studs and a contact device arranged to make and break contact with the studs of the two rows alternately.

6. A rheostat having two rows of studs, the studs of one row being opposite the intervals between the studs of the other row, resistances connected between the studs of the one row and those of the other, and a contact device coöperating with the studs of the two rows.

7. A rheostat comprising a base-plate, two rows of studs mounted thereon, resistance units secured to the studs, an insulating heat-absorbing substance embedding the resistance units and a contact device coöperating with the studs.

8. A rheostat comprising a base-plate having a groove therein, two rows of studs mounted on the base-plate, resistances zigzagged back and forth across said groove and connected to the studs of the two rows, and a contact device coöperating with the studs.

9. A rheostat comprising a base-plate having a groove therein, resistances zigzagged back and forth across said groove, two rows of studs connected to the resistances and staggered, and a contact device coöperating with the studs.

10. In a rheostat, a base-plate having two concentric rows of studs mounted thereon in staggered relation, coils of resistance-wire zigzagged back and forth between the studs of the two rows, and a contact device coöperating with the studs of the two rows.

11. A rheostat comprising a base-plate having a groove in one side, two rows of studs mounted on the other side and extending into the groove, coils of resistance-wire zigzagged back and forth across said groove and con-

nected to the studs, and a contact device cooperating with the studs.

12. A rheostat comprising a base-plate having a circular groove therein, two concentric rows of studs mounted on the base-plate and extending into the groove, coils of resistance-wire zigzagged back and forth across said groove and connected to the studs, a filling of insulating material in the groove, and a contact device coöperating with the studs.

13. A rheostat comprising a base-plate having a circular groove in one side, two concentric rows of studs mounted on the other side of the base-plate and extending into the groove, the studs of one row being opposite the intervals between the studs of the other, resistances zigzagged back and forth across said groove and connected to the studs, a filling of insulating material in the groove, and a contact device coöperating with the studs.

In witness whereof I have hereunto set my hand this 20th day of August, 1903.

WILLIAM C. YATES.

Witnesses:

BENJAMIN B. HULL,

GEORGE RUSS.