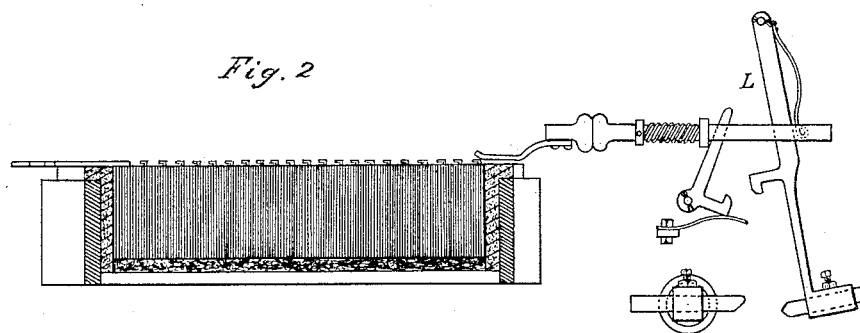
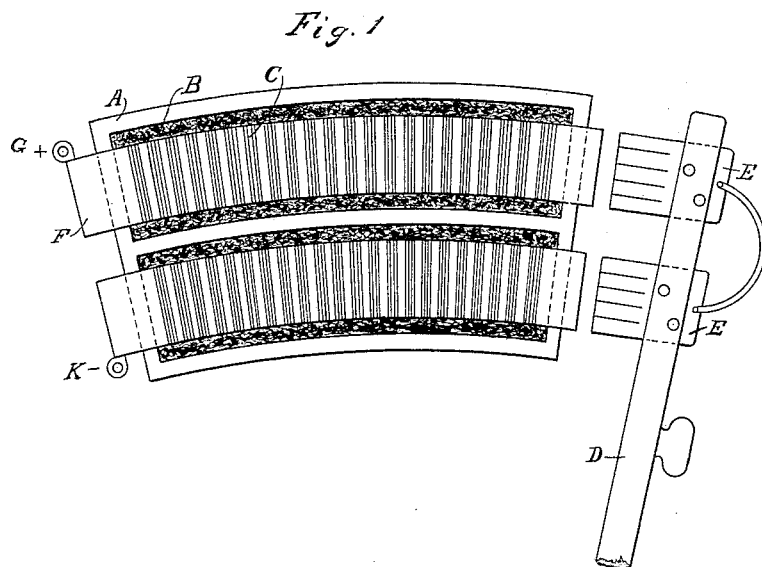


W. H. KNIGHT.

RHEOSTAT.

No. 384,044.

Patented June 5, 1888.



WITNESSES.

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INVENTOR.

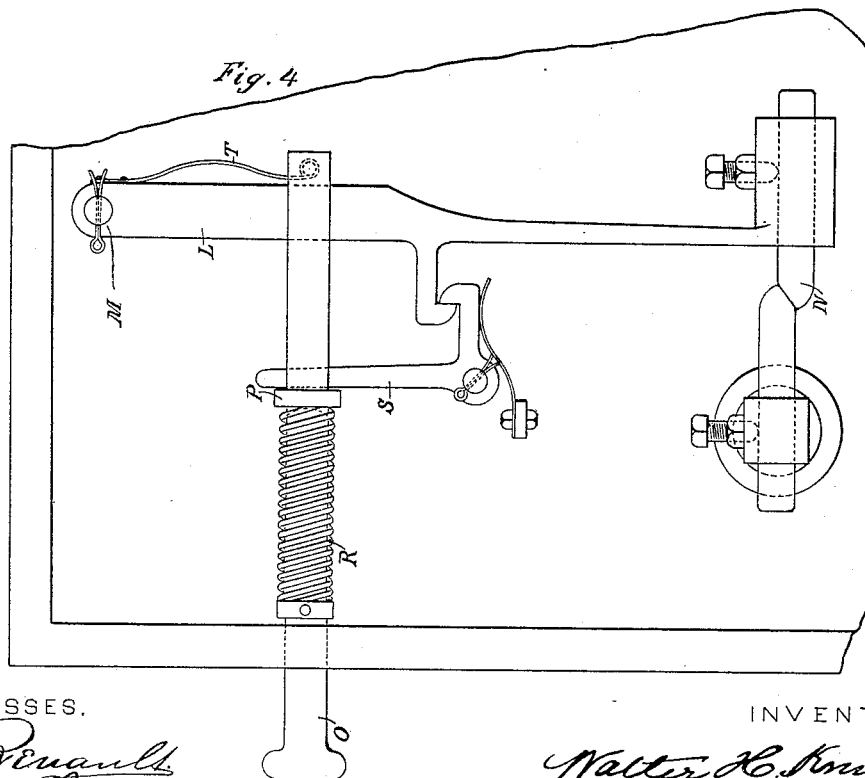
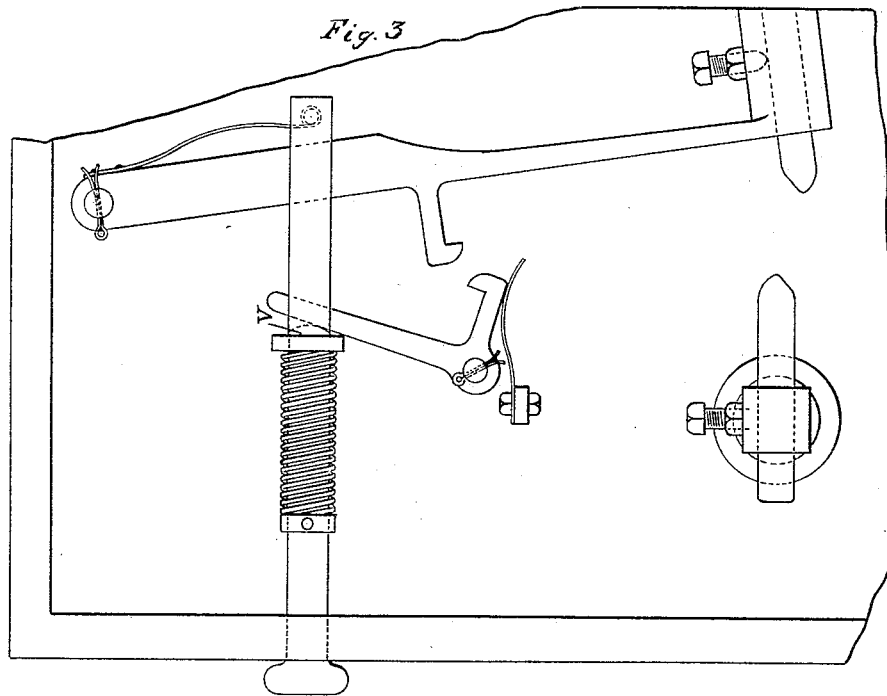
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SPECIFICATION forming part of Letters Patent No. 384,044, dated June 5, 1888.

Application filed April 10, 1888. Serial No. 270,155. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. KNIGHT, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Electrical Resistances, of which the following is a specification.

My invention relates to artificial electrical resistances which are adapted to be varied at will; and it consists in an improvement on the device shown in my Patent No. 368,596, of August 23, 1887. In said patent I have shown an artificial resistance composed of a series of metallic plates placed in superficial contact and provided with a contact-lever adapted to bring more or less of these plates into circuit. In the construction therein shown I have found three features more or less objectionable, which it is the intention of the devices embraced in my present application to remedy. In the first place, in the patented device the contact-lever was adapted to slightly lift each of the plates in succession as it came into connection with them, the result of which was that the constant rubbing together of the plates made a better contact between them and materially lessened their resistance in the course of time. In my present form I have made the plates stationary relatively to one another, so that they are held firmly in permanent superficial contact, while the contact-lever only is movable relatively to the whole series, sweeping over the plates to make contact with them and introduces more or less of them into the circuit. In the second place, I have found that the method of contact shown in the patent, where connection was made with the edge of every plate, was liable to cause an arc between successive plates which would weld them together, and in time materially decrease the resistance of the whole. The improvement herein shown for remedying this feature consists in having the contact made only with certain plates of the series elevated a certain distance above the rest, so that no arc can be drawn from one point of contact to the next. In the third place, I have found that when the same contact-piece was used both for the progressive connection with the series of plates, and also for interrupting the circuit completely when the resistance had all been thrown

in, the resulting arc from the complete break would so roughen the contact-piece as to render it unfit for the progressive connection over the edges of the plates. To remedy this objectionable feature, I have introduced a supplementary circuit-breaker adapted to be operated when the contact-arm reaches the end of its movement, and having contact-pieces of carbon or material not likely to be injured by the arc.

My invention therefore consists, principally, of, first, an electric resistance composed of metallic plates held in permanent superficial connection and stationary relatively to one another, while the contact device is movable relatively to the whole series, and by sweeping over the plates brings more or less of them into the circuit.

Second. It consists of a form of contact for a plate resistance wherein the contact device makes connection only with certain plates of the series which project or have an extension beyond the other plates.

Third. It consists of a supplementary circuit-breaker combined with the variable resistance which is adapted to be operated by the contact device when it has reached the end of its course.

My invention, embracing the improvements above described and their details of construction, which have not been mentioned, is shown in the accompanying drawings, in which—

Figure 1 is a plan of a resistance-box embodying my invention. Fig. 2 is a section thereof, having a supplementary contact. Fig. 3 is a view of the supplementary contact in its open position, on a large scale; and Fig. 4 is a view of the same in its closed position.

In Fig. 1, A is an inclosing box or frame. B is a second interior box or lining of non-combustible material—such as terra-cotta or asbestos—and C is a series of iron plates in superficial contact. These plates are placed in two parallel series, and a lever, D, moving about a center, is provided with two contact-brushes, E, in electrical connection and adapted to short-circuit more or less of the plates in the two series. The end plates of each series rest against a large contact-plate, F, the current entering at G and leaving at K. As will be seen in Fig. 2, certain plates in the series

project above the rest at regular intervals and are bent over to afford broader contact-surface. The brushes E in sweeping over the series come in contact with these projecting plates, and according to their position more or less of the plates will be included in the circuit. It will be noticed that the inclosing-boxes are open on the under side, so that there may be a circulation of air through the plates from one side to the other. When the brushes E have reached the end of their sweep, it is arranged, as shown in Fig. 2, that the brush does not leave the last plate in any case, a supplementary circuit-breaker being provided, which will now be described.

Referring to Figs. 2, 3, and 4, L is a lever pivoted at M and provided at its free end with a removable piece, N. O is a rod forked at one end to embrace the lever L and at its other end provided with a knob adapted to be struck by a corresponding knob on lever D. P is a bearing for rod O, attached to the inclosing-case, and R is a coiled spring holding O normally in its outward position, as in Fig. 4. S is a spring-latch normally retaining L in its closed position. T is a spring attached at one end to L and at the other end to the inner end of rod O.

In practice, when lever D approaches the end of its sweep, it strikes the knob on rod O and forces it in against the pressure of spring R. This action stores up in spring T a certain amount of energy, tending to turn lever L about its center and break the circuit at N. This action cannot take place, however, until an offset, V, in rod O comes against latch S and forces it over until lever L is released and free to act under the accumulated pressure of spring T. In this manner the circuit is broken suddenly and by a wide distance at N, and little or no arc is formed at the break. When lever D is moved in a contrary direction, so as to cut out resistance from the circuit, the rod O is released and left free to act under the pressure of spring R, which restores the parts to their normal position, as shown in Fig. 4. By this arrangement no heavy arc will in any case be formed on brushes E, and they will not become roughened or lose their temper from excessive heat, but will always remain in a good condition for sweeping the raised plates of the resistance.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an artificial electric resistance, the combination, with a series of plates in superficial contact, of a contact device and extensions on certain plates of the series with which the contact device is adapted to connect.

2. The combination, in an artificial resistance, of a series of plates in superficial contact, certain plates of the series projecting above the rest, with a contact device adapted to sweep over the edges of the projecting plates.

3. In an artificial resistance, the combination of a series of exposed metallic plates held in permanent superficial contact and stationary relatively to one another, a non-combustible support therefor and a movable contact device sweeping over the series to bring more or less of them into circuit.

4. The combination, with a variable artificial resistance, of a controlling device therefor, and a supplementary circuit-breaker in series therewith and placed in line of action of said controlling device, so as to be operated thereby.

5. The combination of a variable artificial resistance, a movable contact device therefor, and a supplementary circuit-breaker in series with said resistance and placed at the terminal point of movement of said contact device, so as to be actuated thereby after the resistance has been included in the circuit.

6. The combination, with a variable artificial resistance, of a controlling device therefor, and a "snap" circuit-breaker in series with said resistance and placed in the line of action of said controlling device, so as to be operated thereby.

7. The combination, with a variable artificial resistance, of a movable controlling device therefor, a supplementary terminal contact, and a mechanical power-accumulator between it and the said controlling device, whereby a sudden and wide separation between the contact-points may be effected.

8. The combination of a variable artificial resistance, a controlling device therefor, a supplementary terminal contact, and an accumulating-spring between it and the said controlling device, substantially as described.

9. The combination, with a double series of resistance-plates, C, of a movable contact device for each series in electrical connection with each other, and a line-connection at corresponding ends of the two series, respectively, whereby any desired number of plates may be included in the circuit.

10. An artificial resistance consisting of a series of metallic plates in superficial contact and a box or frame having a non-conducting and non-combustible lining, substantially as described.

WALTER H. KNIGHT.

Witnesses:

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B. H. HOWELL.