

(No Model.)

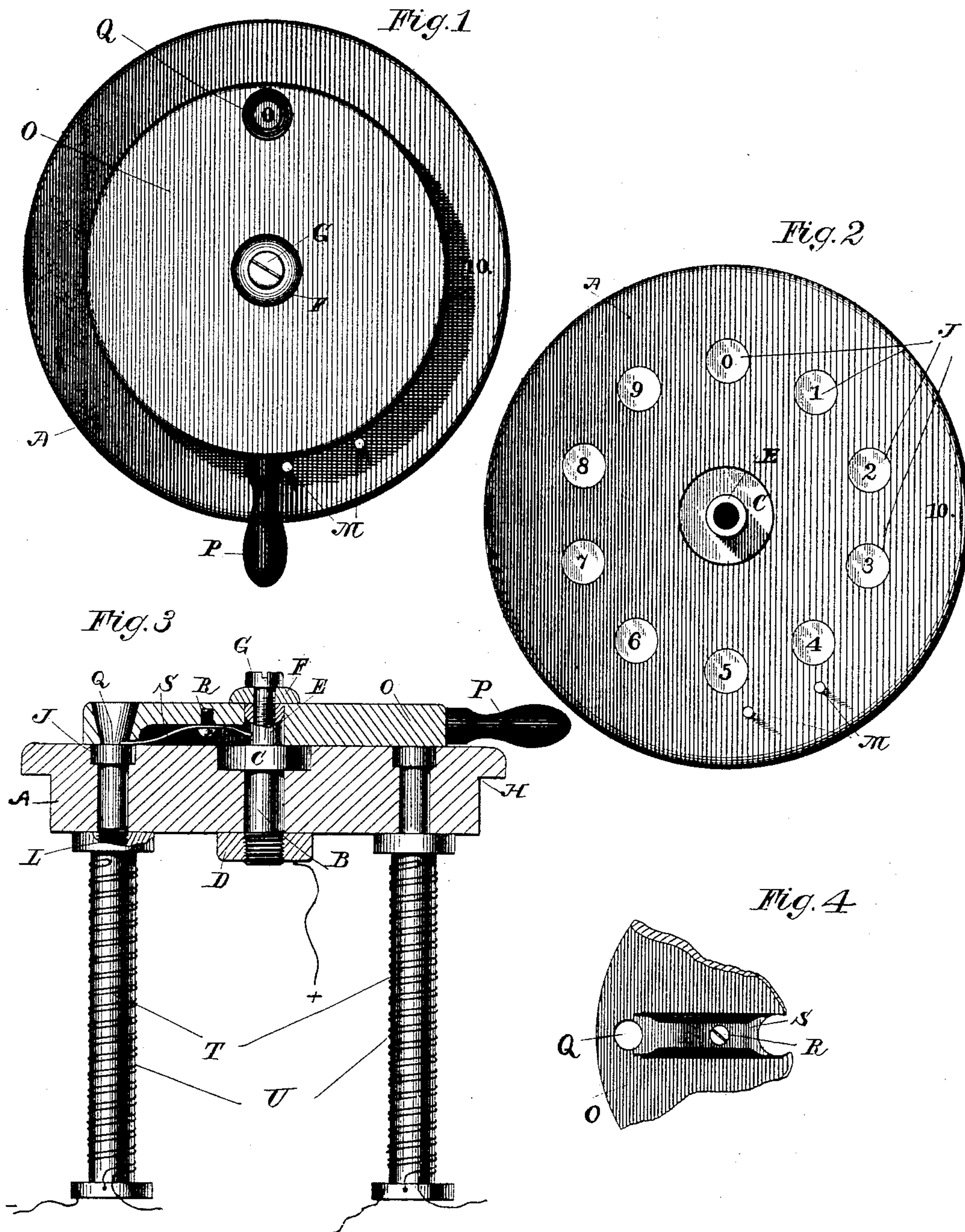
2 Sheets—Sheet 1.

R. H. MATHER.

RHEOSTAT.

No. 347,120.

Patented Aug. 10, 1886.



Witnesses

Frank H. Purpont  
W. M. S. Gorkman

Inventor

Richard H. Mather,  
By his Attorney  
Willard Eddy.

(No Model.)

2 Sheets—Sheet 2.

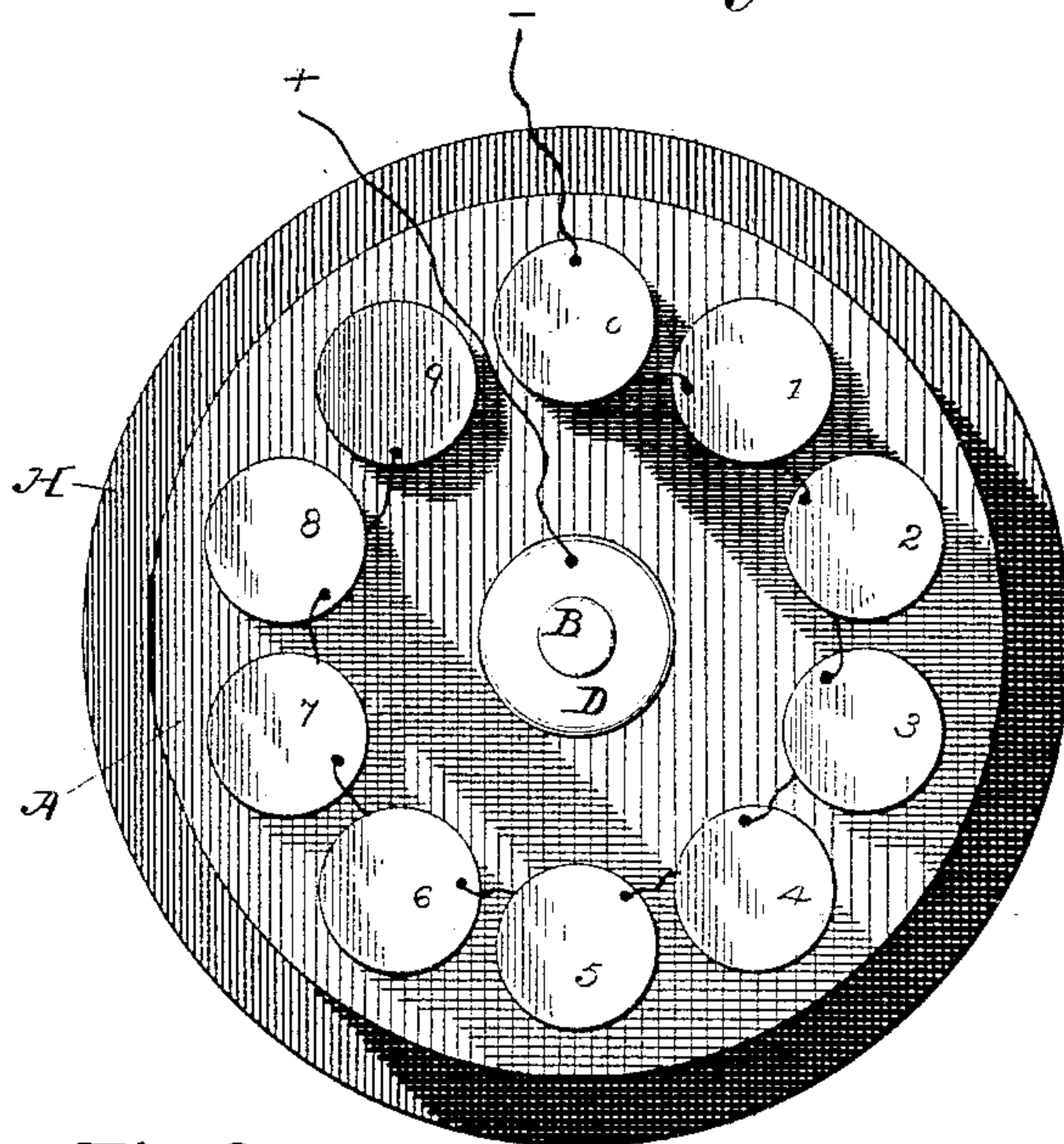
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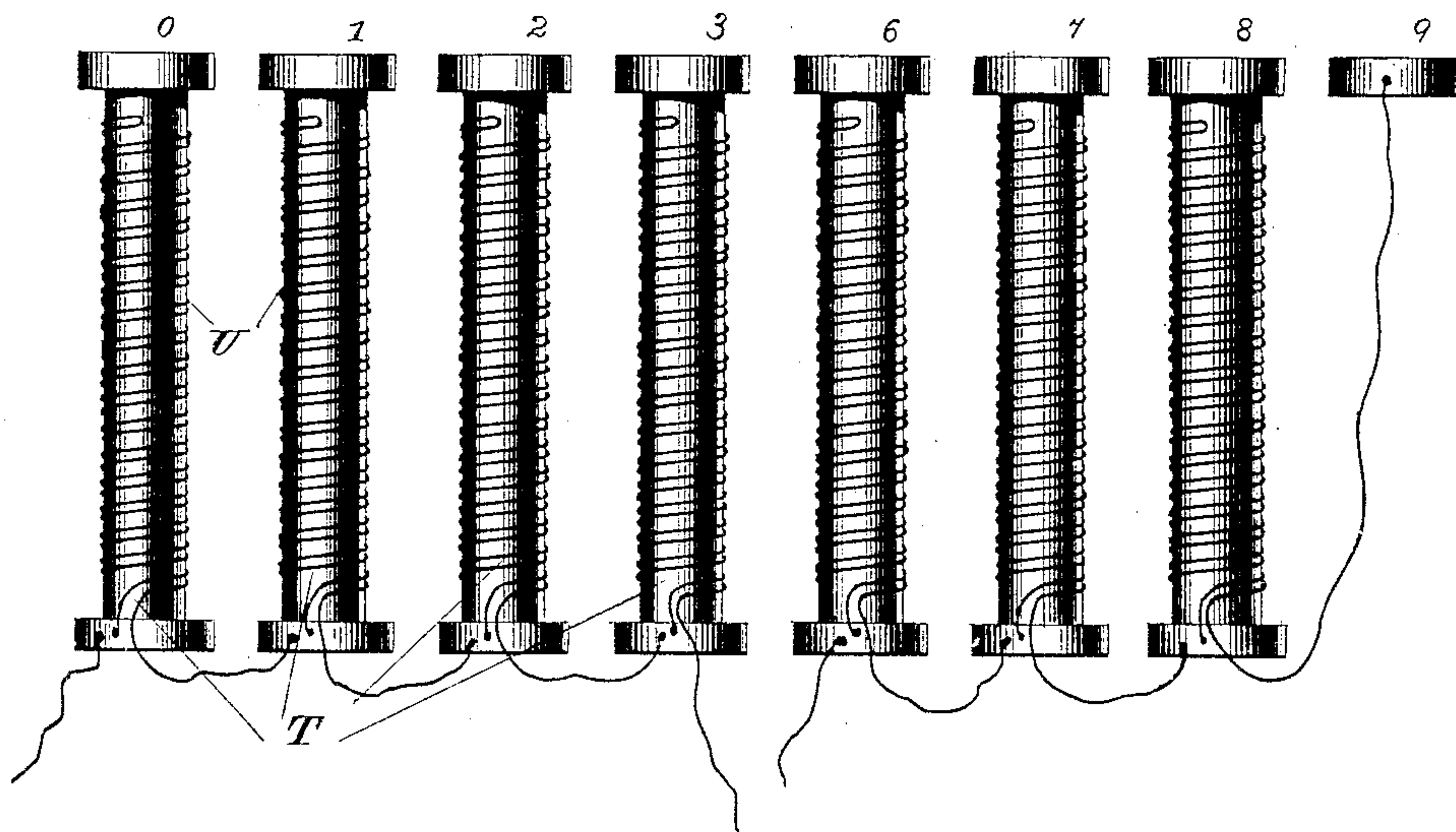
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*Fig. 5*



*Fig. 6*



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# UNITED STATES PATENT OFFICE.

RICHARD H. MATHER, OF WINDSOR, CONNECTICUT.

## RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 347,120, dated August 10, 1886.

Application filed February 17, 1886. Serial No. 192,231. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD H. MATHER, a citizen of the United States, residing at Windsor, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Rheostats, of which the following is a specification, reference being had to accompanying drawings.

My invention relates to instruments for the measurment of electric currents by the method of comparison with known resistances, and particularly to mechanism by means of which resistance-coils may be introduced into an electric-circuit, and the resistance so introduced may be read from the face of the instrument introducing the same.

The object of my invention is to combine a set of resistance-coils, and an index-plate or face-plate, indicating the absolute resistance of such coils, with convenient mechanism for the manipulation of said coils, in such a manner that the resistance introduced at any time into an electric circuit by the use of my improved rheostat shall be correctly indicated by the figure or figures then visible by the observer, while all other index-figures shall be hidden from view. This object I accomplish by means of the electrical and mechanical devices which are illustrated in the accompanying drawings.

Figure 1 in the drawings is a top view of my improved rheostat. Fig. 2 is a top view of the same, a part being removed. Fig. 3 is a longitudinal section of Fig. 1. Fig. 4 is a detail. Fig. 5 is a bottom view of said rheostat. Fig. 6 is a detail showing resistance-coils, spools, and connections.

In the drawings, A is an index-plate of hard rubber, preferably of circular form, and is of sufficient thickness to allow the contiguous parts of the instrument to be conveniently and firmly attached thereto in the manner which is hereinafter described. In the middle of this plate and extending through its entire thickness is a hole, which is occupied by a brass stud, B, whose head C is counter-sunk in the top of plate A. The lower extremity of stud B, protruding from plate A, is a screw, and is provided with a brass nut, D, by means of which the stud B is held immovably in position in plate A. Nut D is electrically connected with a binding-post,

which forms the positive terminal of the instrument, but is not shown in the drawings. Stud B is also provided with a stem, E, which passes up through the cap-plate O, hereinafter mentioned, and is provided with a terminal washer, F, and with a screw, G, which holds the latter in position. A circumferential flange or shoulder, H, is formed at the periphery of plate A, whereby the latter may be conveniently fitted into the top of a wooden box, wherein the resistance coils are located. This box is not shown in the drawings. Plate A has ten other perforations, which are equidistant from each other, and equidistant from the center of the plate A. The distances here involved are such as to allow convenient room for the adjustment of the resistance-coil spools and for the application of the cap-plate, in the manner hereinafter mentioned. Each of these perforations is occupied by a brass stud, J, which is provided with a head, counter-sunk in the top of plate A. These several heads of studs J are respectively indicated in the drawings by the index-figures 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. The same figures are stamped or engraved upon the upper surfaces of the same stud-heads, as exhibited in Fig. 2. Each stud J, excepting one, (see stud No. 9,) is provided with a terminal screw, L, protruding below plate A.

M is a stop consisting of one or more pins rising from the upper surface of plate A in the position hereinafter indicated.

O is a circular cap-plate of hard rubber, and by a central perforation is mounted rotatably upon stem E of stud B, where it is held snugly against the top of plate A by means of washer F and screw G. Plate O has a peripheral finger-piece, P, extending radially therefrom in position to engage stop M. Plate O is pierced near its outer edge by a sight-hole, Q, of convenient size and position to allow an observer, by looking through hole Q, to read the index-figures above mentioned, but not large enough to expose any two such readings at one and the same time. Said stop M, hole Q, and finger-piece P are so located relatively to each other that cap-plate O, when rotated to its full extent, is stopped in one direction in position to show the index-figure 0, as in Fig. 1, and in the other direction to show the index-figure 9. The under surface of cap-plate



O is cut away in a radial channel from hole Q to the middle of plate O. This channel, which is shown in Figs. 3 and 4, is of sufficient size to accommodate spring S. The latter, being  
 5 formed of brass and movable within said channel, is held in position by screw R, and is terminally at all times in pressing contact with the stem E of stud B and with the upper surface of plate A, including the upper sur-  
 10 faces of the index-numbered heads of studs J. The width of spring S at its outer extremity is greater than the distance between any two adjacent studs J. A brass spool T, provided with a terminal female screw, is firmly screwed  
 15 upon each of the terminal screws L. The spools T are of uniform size and shape for the accommodation of resistance-coils of the desired resistance. Such a coil, U, of insulated German-silver wire, is wound upon each spool  
 20 T in the usual manner, being doubled before winding, in order to prevent magnetization by induction. These coils and spools, the latter being arranged in the relative positions shown in Fig. 5, are connected with each other in the  
 25 following manner: One end of each coil is soldered to the lower part of the spool upon which it is wound, as shown in Fig. 6, and the other end of the same coil, except in the case of the coil upon the last spool, is soldered  
 30 to the lower part of the spool whose stud bears the next higher index-number; and the last coil since there is no spool attached to the stud of index-number 9, is soldered directly to that stud. The first of said spools or studs, index-  
 35 number 0, is connected with a binding-post, (not shown in the drawings,) which constitutes the negative terminal of the instrument.

The positive and negative terminals of the instrument are sufficiently indicated in Fig.  
 40 3 by the signs + and —, respectively.

The figures 10 which are marked upon the instrument and are reproduced upon the index-plate in Figs. 1 and 2 indicate the number of ohms of resistance in a single coil U.

45 In constructing a series of rheostats for general use it is convenient to employ in successive instruments coils whose resistances are successive decimal multiples or sub-multiples of the standard ohm.

50 It is obvious that the index-numbers, instead of being stamped upon the studs J, may be marked upon any other convenient part of the upper surface of the index-plate A, provided that the above-described relative location of the finger-piece P, stop M, and hole Q be still preserved.

Such being the construction of my improved rheostat, the mode of its operation is as follows: Starting with the index-figure 0 in view,  
 60 the instrument is placed in any electric circuit into which it is desired to introduce any known resistance within the capacity of the instrument. By means of the finger-piece P the cap-plate O is then turned until the number indicating the desired resistance is visible  
 65 upon plate A through hole Q. When the rheostat is at the zero-point, as shown in Fig. 1, the

electric current passes between the terminals of the instrument by the way of nut D, stud B, spring S, stud 0, and the spool which is  
 70 attached to stud 0. No resistance-coil is then in circuit. When the cap-plate is turned so as to disclose index No. 1, the spring passes from its position of contact with stud No. 0 across the intervening space to a position of  
 75 contact with stud No. 1, and then the current passes from the positive terminal through the nut D, stud B, spring S, spool under stud No. 1, and resistance-coil under stud No. 0 to the negative terminal; and so, if it is desired to  
 80 introduce another resistance-coil, the cap-plate is further turned until index figure 2 is visible through the cap-plate. The current then passes through the first and second resistance-coils and through the spool and stud No. 2.  
 85 In the same way the instrument is further operated for greater resistances up to its full capacity. By means of a series of rheostats of the same general description, but of different resistances, it is possible to introduce into the  
 90 circuit any resistance which may be desired.

This rheostat possesses an advantage over other rheostats now in use, by reason of the circumstance that the resistance introduced thereby into an electric circuit can be read  
 95 correctly and cannot be read incorrectly by any observer, however unskilled in electrical measurements.

I claim as my invention and desire to secure by Letters Patent—

100 1. A rheostat consisting of a number of equal resistance-coils, each of which is wound upon and electrically connected in series with a conducting-spool, which is provided terminally with a numbered contact-stud in the face of  
 105 an index-plate, in combination with a cap-plate mounted rotatably upon such index-plate, and having a sliding contact-spring and an opening which is at all times directly over any such stud with which said spring is for  
 110 the time being in contact, substantially in the manner and for the purpose specified.

115 2. A rheostat consisting of several resistance-coils electrically connected in series and provided with numbered contact-studs in an index-plate, in combination with a cap-plate which is mounted rotatably upon such index-plate, is provided with a sliding contact, and has an opening which is always found directly  
 120 over a predetermined number or other mark indicating the resistance of the rheostat in the position in which it is for the time being adjusted, substantially in the manner and for the purpose specified.

125 3. A rheostat consisting of a number of resistance-coils electrically connected with contact-studs in the face of an index-plate, in combination with a cap-plate which is mounted rotatably upon such index-plate, is provided with a movable contact, and has an opening  
 130 which is always directly over an index-number or other character marked upon the face of such index-plate and indicating the aggregate resistance of those resistance-coils which



are for the time being in circuit, substantially in the manner and for the purpose specified.

4. A rheostat consisting of a number of resistance-coils in series, and a corresponding  
5 number of contact-surfaces and index-characters on the face of an index-plate, in combination with a cap-plate which is mounted rotatably upon said index-plate, and is provided with a sight-hole and circuit-closing contact-

spring, substantially in the manner and for the purpose specified.

In witness whereof I have hereunto set my name in the presence of two witnesses.

RICHARD H. MATHER.

Witnesses:

ALBERT H. WALKER,  
WILLARD EDDY.