

No. 607,311.

Patented July 12, 1898.

E. E. WERNER.
ELECTRIC CURRENT CONTROLLER.

(Application filed Feb. 23, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

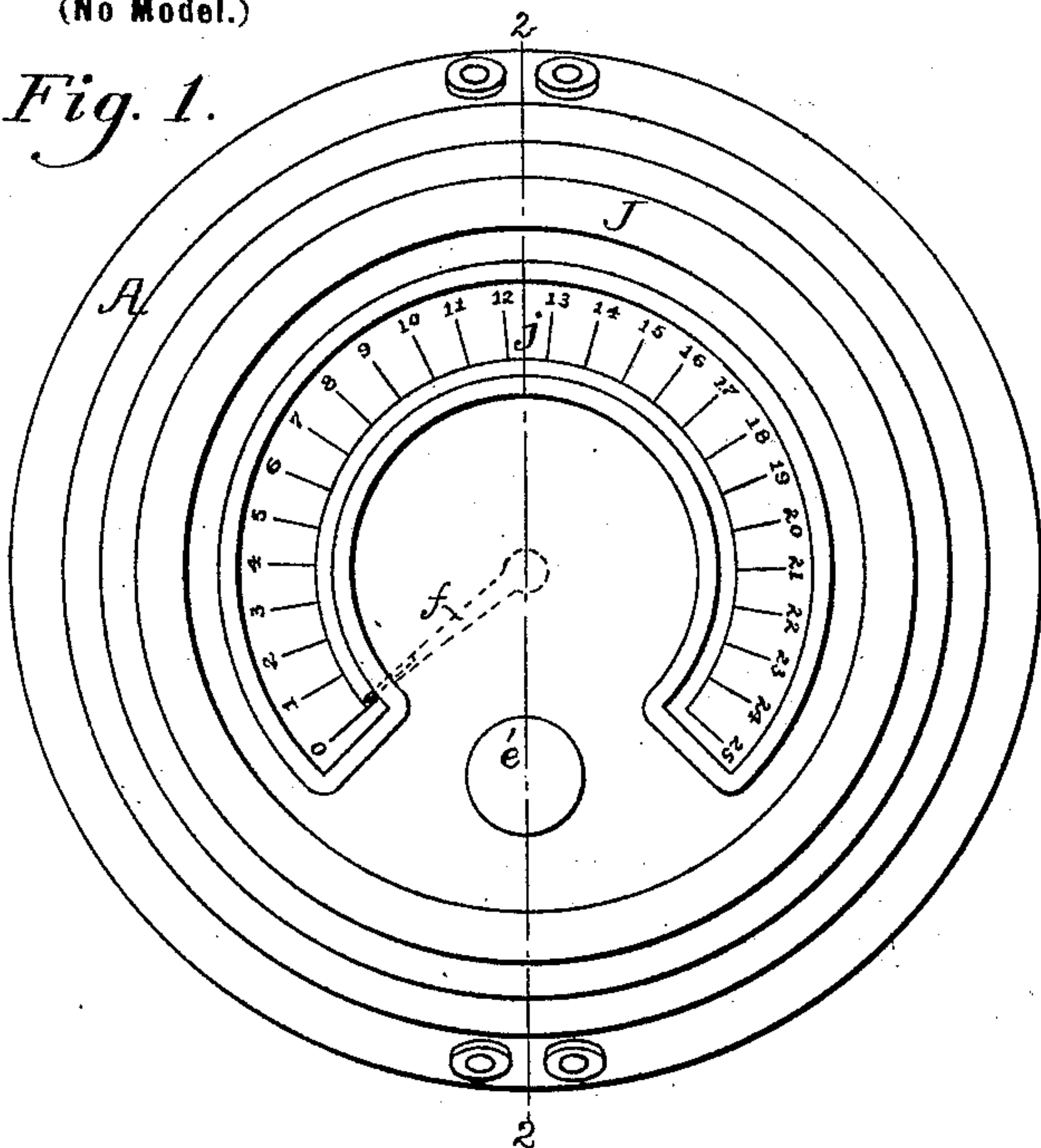


Fig. 2.

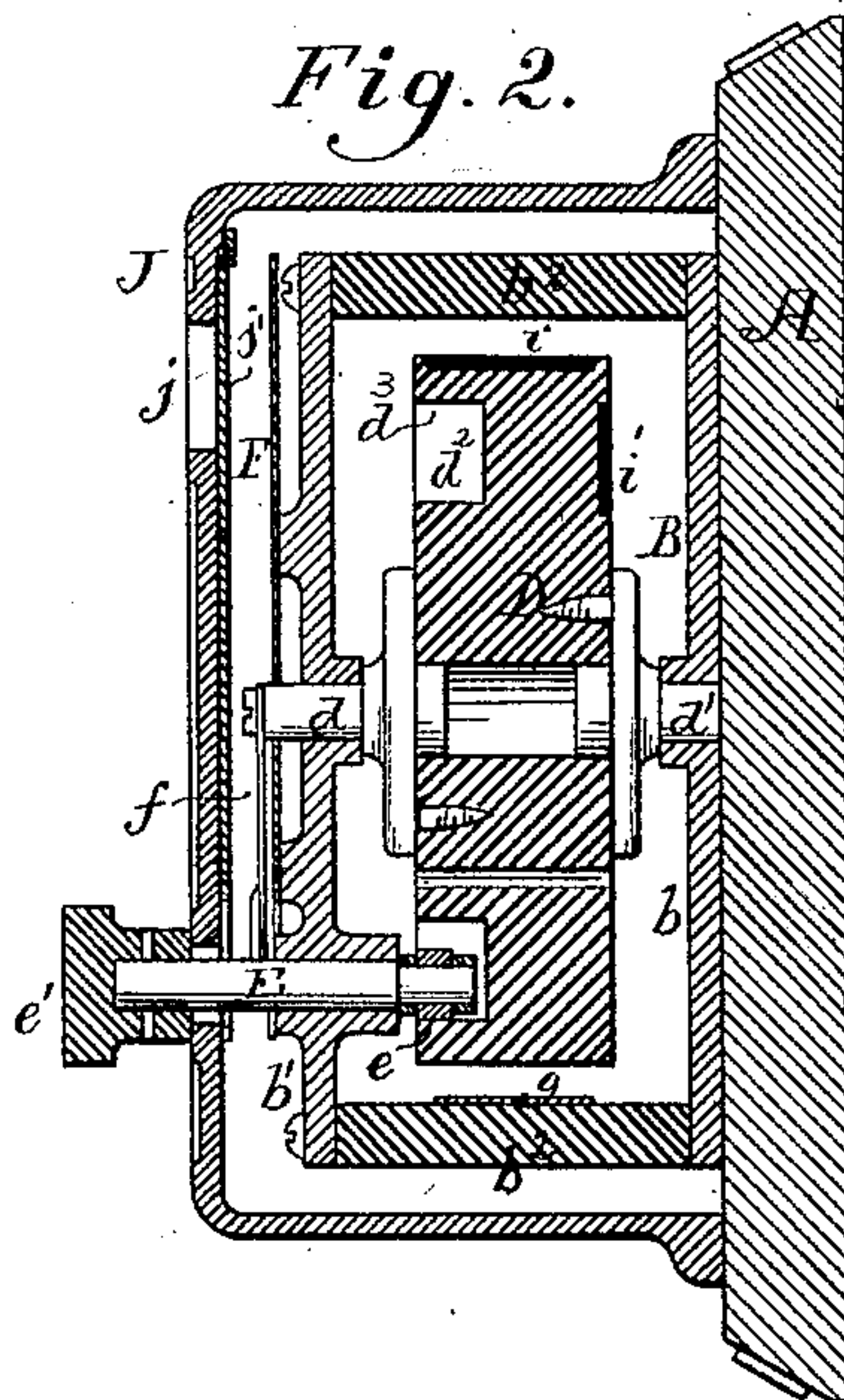
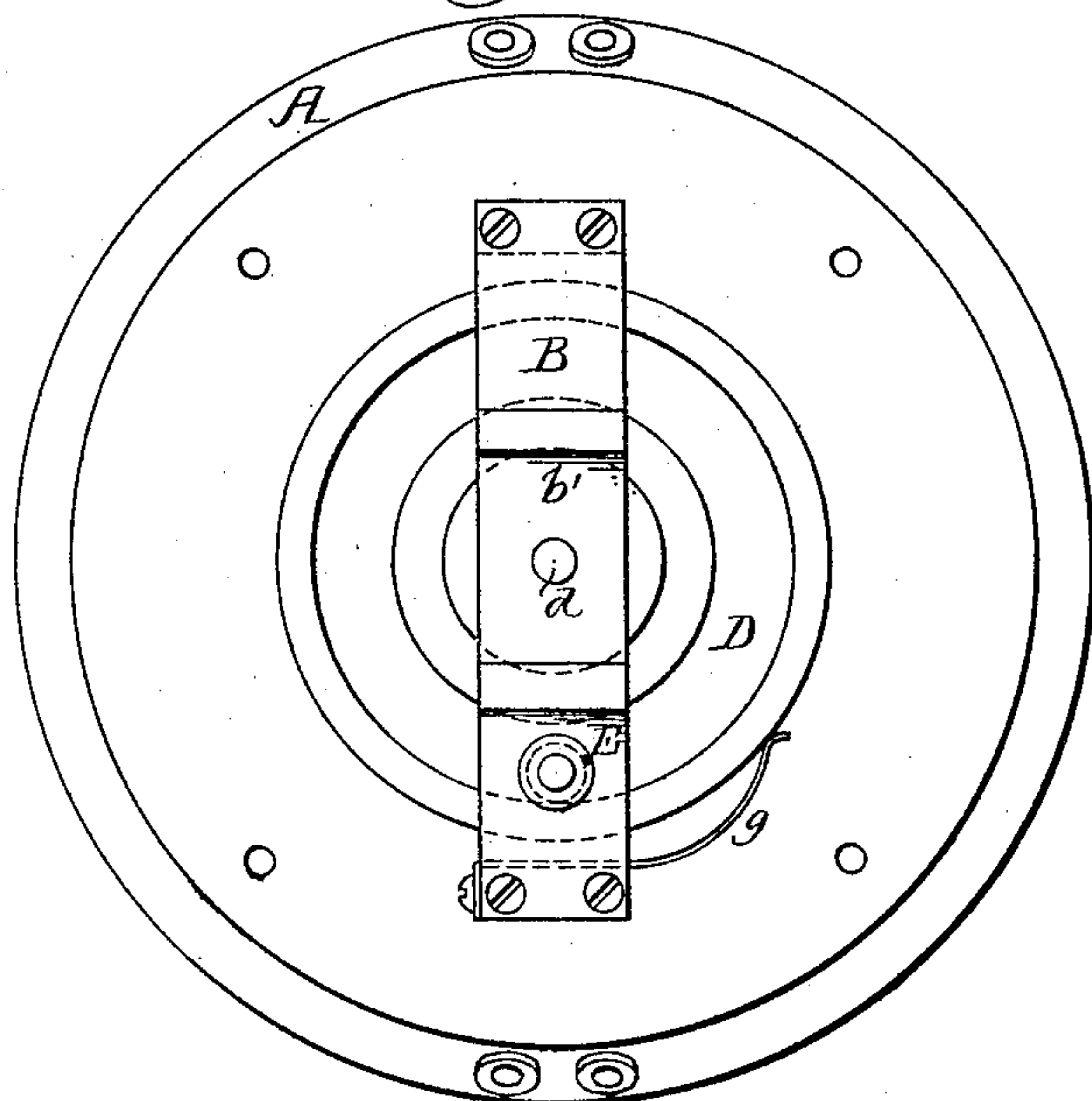


Fig. 3.



Witnesses.

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Fig. 6.

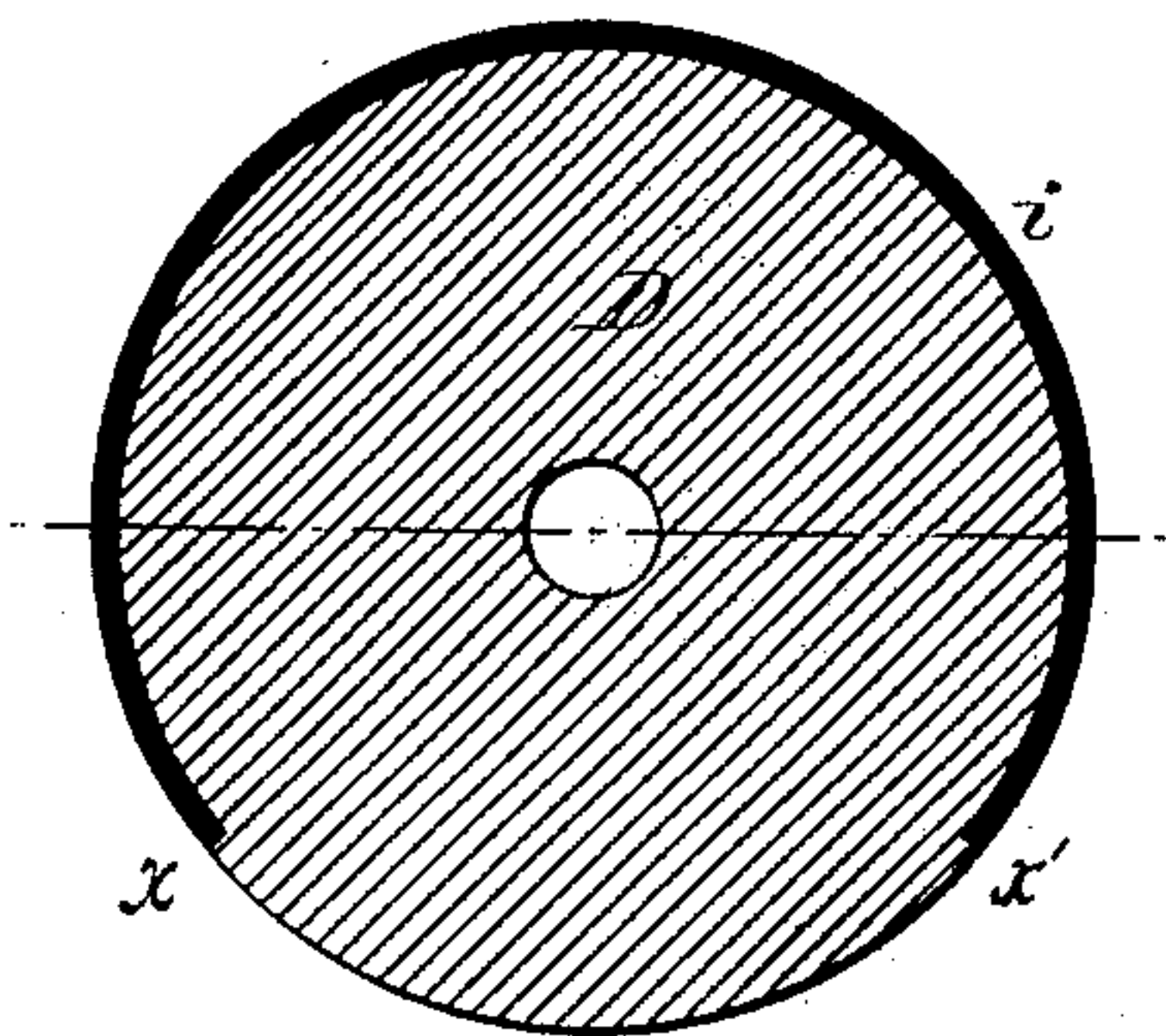


Fig. 4.

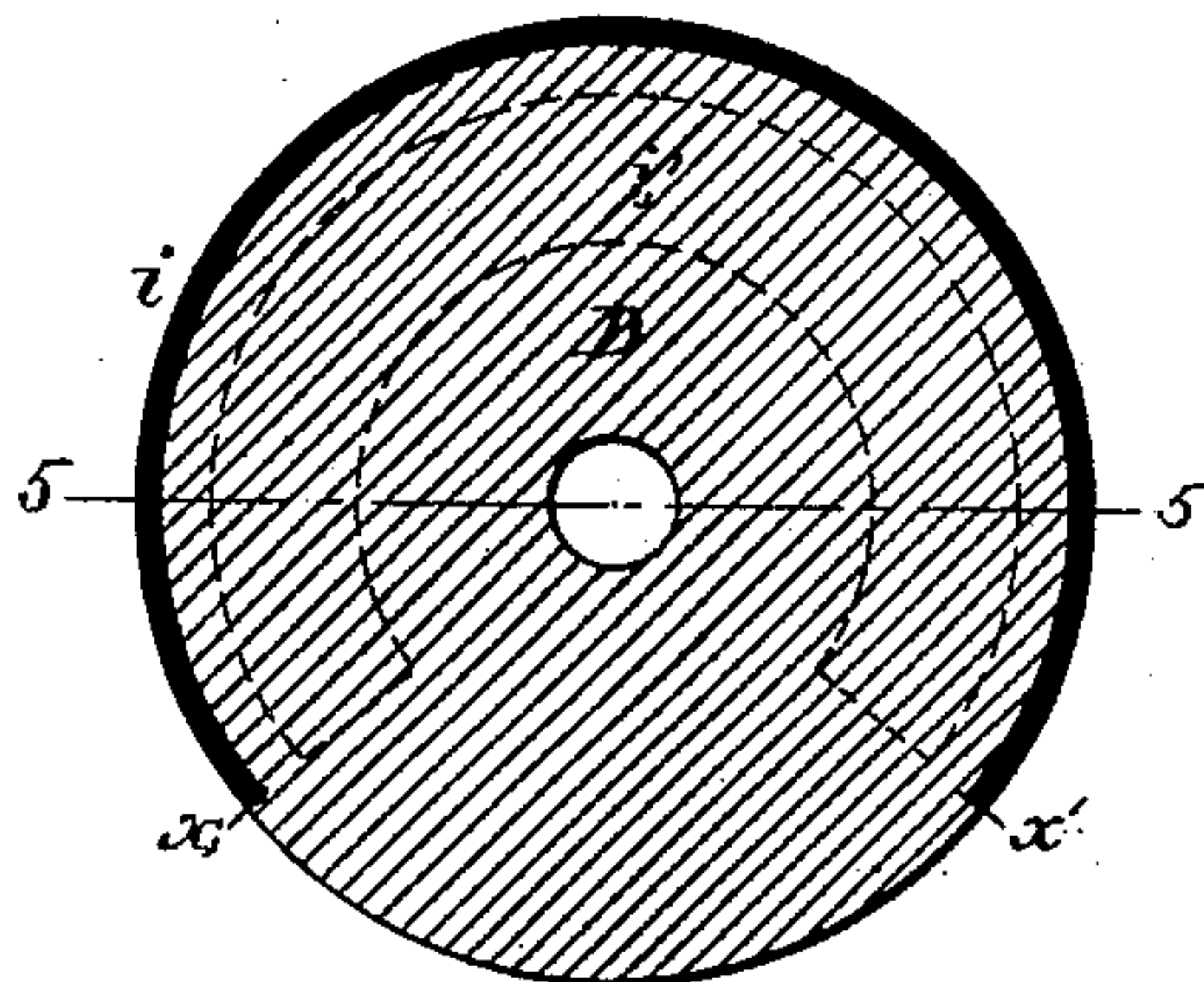


Fig. 7.

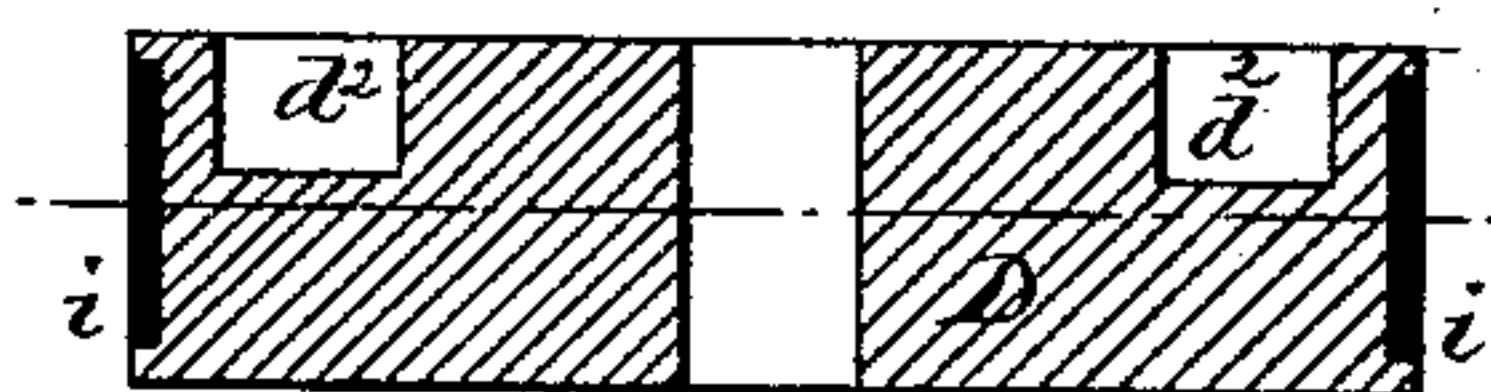


Fig. 5.

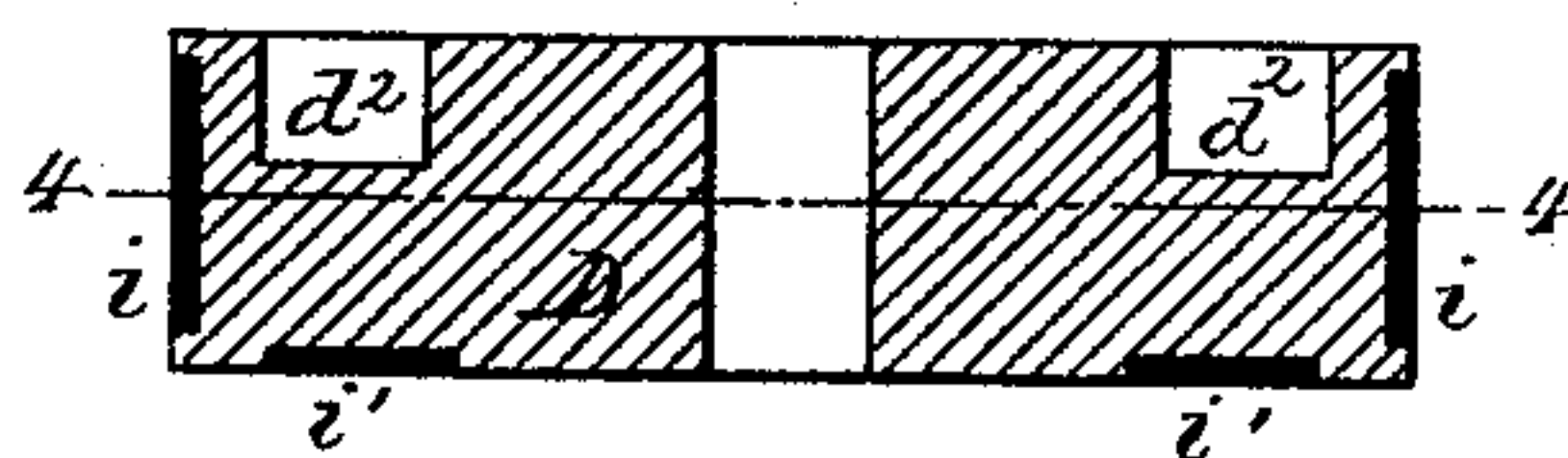


Fig. 8.

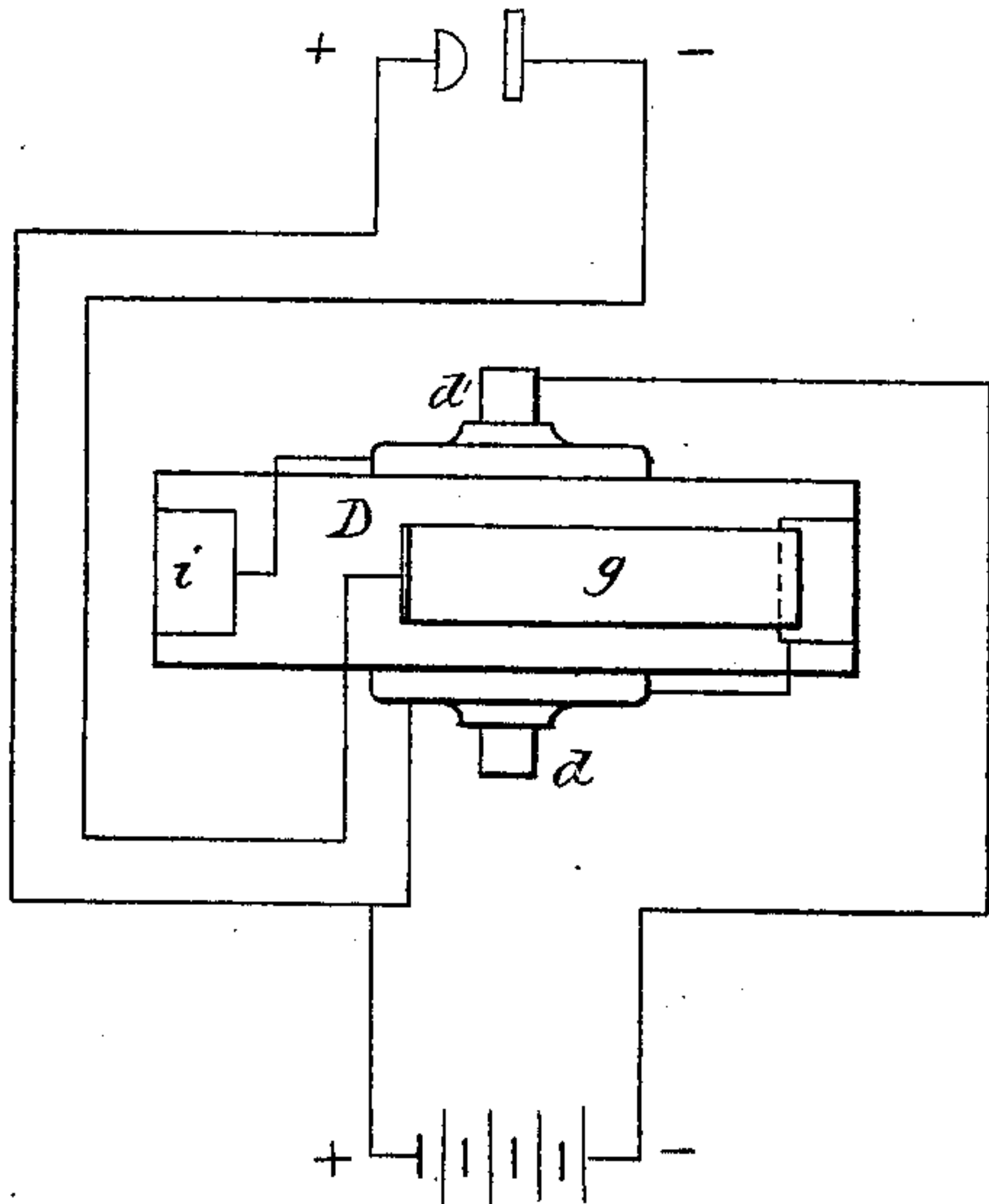
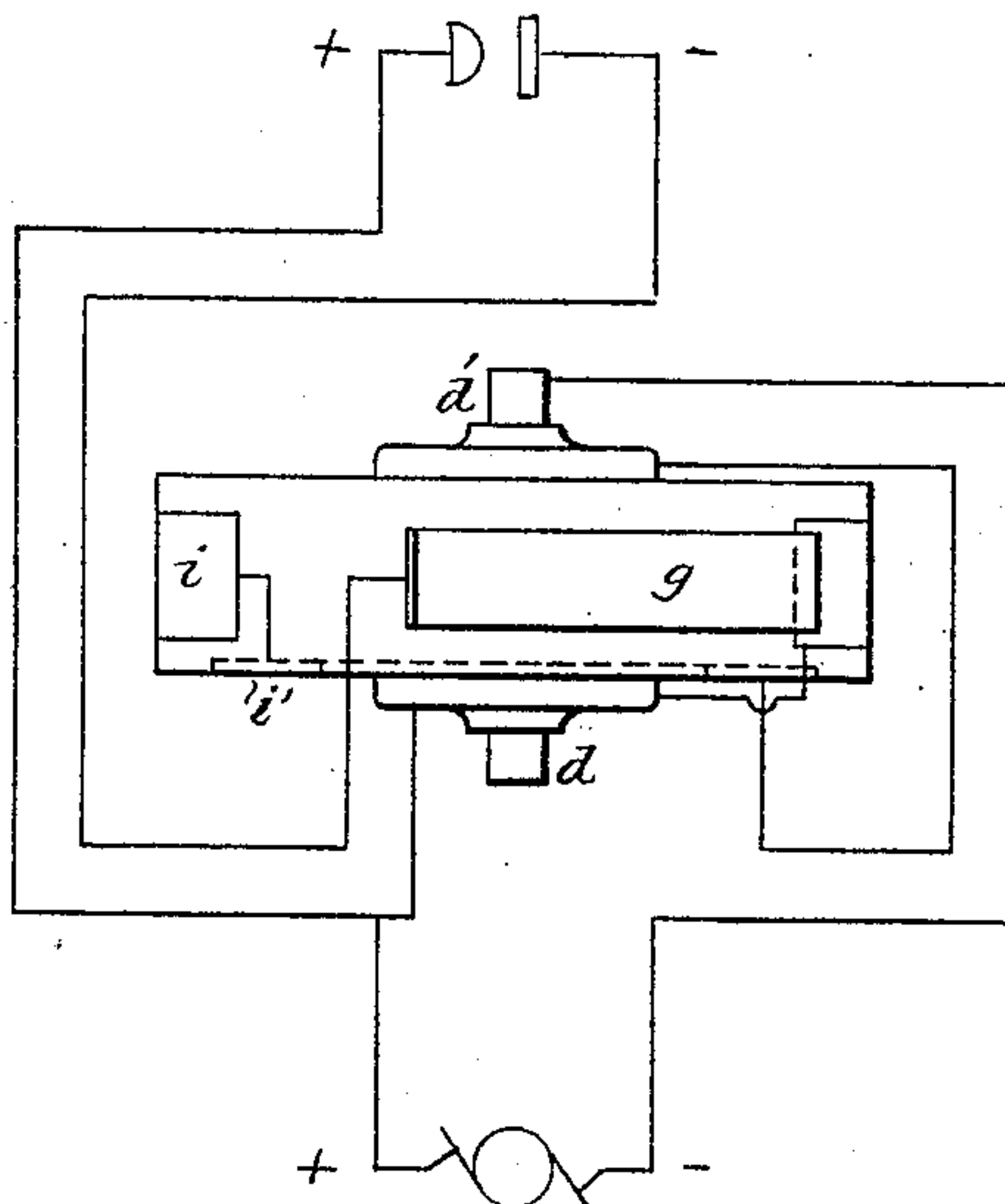


Fig. 9.



Witnesses.

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UNITED STATES PATENT OFFICE.

ERNEST EMIL WERNER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY
MESNE ASSIGNMENTS, TO S. ELDRED GILBERT AND SAMUEL I. SHUTE,
OF SAME PLACE.

ELECTRIC-CURRENT CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 607,311, dated July 12, 1898.

Application filed February 23, 1897. Serial No. 624,652. (No model.)

To all whom it may concern:

Be it known that I, ERNEST EMIL WERNER, a subject of the Emperor of Austria-Hungary, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Electric-Current Controllers, of which the following is a specification.

The object of my invention is to construct a compact and accurate electric measuring instrument which is especially used to control currents of electricity, commonly called a "volt-selector" and used principally in cataphoresis or electromedicamental diffusion.

The main object of the invention is to so construct the instrument that the current may be increased with absolute uniformity and without jerks or interruptions.

In the accompanying drawings, Figure 1 is a plan view of my improved electric measuring instrument. Fig. 2 is a section on the line 2 2, Fig. 1. Fig. 3 is a plan view with the casing removed. Fig. 4 is a section on the line 4 4, Fig. 5, of the resistance-carrier. Fig. 5 is a section on the line 5 5, Fig. 4. Figs. 6 and 7 are views of the carrier without the auxiliary resistance, and Figs. 8 and 9 are diagram views illustrating the method of wiring.

A is the base of the carrier, to which is secured a frame B, consisting of a base-plate b , a top plate b' , and insulating-posts b^2 . Adapted to bearings in the top and base plates are the journals d d' of the carrier D, and in one face of the carrier is an annular groove d^2 , having a friction-face d^3 . The carrier D is made of insulating material, and the journals d d' are independently secured to the carrier by means of screws or other fastenings.

Journalled in the top plate b' is a short shaft E, carrying at its inner end a friction-wheel e , which rests in frictional contact with the surface d^3 of the carrier D. On the outer end of the shaft E is a hand-knob e' , by which the carrier is turned. The relative diameters of the two parts is such that a full revolution of the friction-wheel e will turn the carrier only a fractional part of a revolution.

In front of the plate b' is mounted a dial-plate F, having graduations, as shown in Fig.

1, and on the end of the journal d , which extends through the dial-plate, is a hand or pointer f , so that as the carrier D is turned the hand or pointer will turn with it over the face of the dial.

The periphery of the carrier D has a segmental groove in which I insert a suitable resistance compound i , and, as shown in Figs. 2, 4, and 5, I also groove the back of the carrier and insert a resistance compound i' .

The apparatus can be wired, as shown either in Fig. 8 or Fig. 9, Fig. 8 showing the wiring without the resistance material i' at the back of the carrier, while Fig. 9 shows the wiring when the additional resistance material i' is used.

Secured to one of the non-conducting posts b^2 is a brush g , which rests against the periphery of the carrier, and by turning the shaft E by means of the knob the distance between the end x of the resistance material and the brush can be regulated to place more or less resistance in the circuit.

The mechanism is inclosed within a casing J, having a segmental slot j , so as to display the dial. The dial is protected by a glass j' . The shaft E projects through the casing, as shown, and the knob e' is so proportioned as to be easily turned by the operator.

By placing the resistance material on the periphery of the carrier, driven by means of a frictional wheel, in the present instance at the ratio of about six and one-half to one, I obtain the following advantage: If the diameter of the knob is three-fourths of an inch and the instrument is set, say, to handle twenty-five volts through the shunt-circuit, the electromotive force will be increased about four volts on one turn of the handle and about one inch of the surface of the carrier will pass under the brush. This surface being a continuous one and absolutely uniform in resistance the increase as the knob is turned will be absolutely uniform and without jerks or interruptions.

It will be seen that by the leverage obtained in my apparatus fractions of one-fiftieth of one volt may be obtained without difficulty, and therefore one of the important features

of the invention is the use of a resistance compound or paste absolutely homogeneous and of a uniform consistency.

It will be understood that any resistance paste having these qualities may be used either by placing the paste in the groove when hot and cooling it afterward, or it may be placed therein in the form of a cement or in the form of a strip cemented or otherwise attached to the carrier.

The carrying capacity as well as the heating qualities of an instrument of this kind being largely dependent upon the contact surface and cross-section of the resistance material by widening the groove to any desired degree the carrying capacity can be increased.

By employing a paste consisting of a combination of a conducting and non-conducting material suitably proportioned any desired resistance can be obtained.

In making the resistance compound I preferably use a mixture of black-lead, oxid of zinc, and phosphoric acid; but other compounds may be used without departing from my invention.

When a high electromotive force is to be used, the additional resistance-segment i' on the bottom of the disk serves to reduce this electromotive force to such a maximum as may be desired. For instance, the construction shown in the drawings is arranged for a so-called "one-hundred-and-ten-volt" commercial current. The electromotive force necessary is twenty-five volts, and this maximum is obtained by placing the auxiliary resistance in series with the shunt-circuit and the periphery of the disk, so that it not only prevents the use of a higher electromotive force, but also acts as a safeguard for overloading the instrument, as it prevents the shunt-circuit from passing a greater amount of current than the auxiliary resistance will permit. This is a very important feature of the invention, as the instrument is especially designed for use in delicate surgical and dental operations.

In Figs. 6, 7, and 8 I have shown a two-way shunt which normally is connected to the battery from x to x' , Fig. 6, one terminal of the shunt from x conveying current to the patient, and by means of the brush, the position of which is variable between x and x' , a current of any desired potential may be obtained.

In Figs. 4, 5, and 9 a suitable current taken from a dynamic generating-machine of a given potential is reduced by means of a serial resistance i' to the potential to be utilized in the shunt-circuit $x x'$. The utilization of this for therapeutical work is the same as described above in reference to Figs. 6, 7, and 8.

The maximum potential necessary for the average work is approximately thirty volts, and inasmuch as it would be somewhat dangerous to utilize the commercial current for the purpose of therapeutical treatment I pre-

fer to introduce the aforementioned serial resistance for the purpose of decreasing the potential of the generator-circuit, which serves not only as a safeguard for the patient, but also prevents unnecessary waste of energy.

I claim as my invention—

1. The combination of a frame, a rotatable carrier journaled in said frame, a hand-shaft in frictional contact with the carrier, a segment of resistance material on the carrier, a brush in contact with the resistance material, a hand or pointer adapted to turn with the carrier and a dial fixed in relation to the carrier and its hand, substantially as described.

2. The combination of the frame, a carrier journaled therein and having an annular groove in one face thereof, a hand-shaft having a friction-roller bearing against one face of the groove in the carrier and by which the carrier is turned, segmental resistance material on the carrier, a hand, and a dial, substantially as described.

3. The combination of a frame, a carrier mounted therein, a hand-shaft for turning the carrier, a hand traveling with the carrier, a dial, said carrier having a segmental groove in its periphery, a homogeneous resistance compound adapted to the groove and a brush fixed to the frame and in contact with the resistance material, substantially as described.

4. The combination of a frame, a carrier journaled in the frame, an indicator on the carrier, means for driving the carrier, a segmental groove in the periphery of the carrier and a segmental groove at the back of the carrier, resistance compounds in each of said grooves, one of said compounds being in series with the shunt-circuit and a brush resting in contact with the other compound, substantially as described.

5. The combination of the frame, a carrier journaled thereon and having a hand, a fixed dial over which the hand travels, an annular groove in the face of the carrier, a hand-shaft having its bearings in the frame, a frictional wheel mounted on one end of said shaft and in frictional contact with one of the walls of the groove in the face of the carrier, a segmental resistance-plate within the groove in the periphery of the carrier, a brush mounted on the frame and resting against the periphery of the carrier, and a segmental strip of resistance material at the back of the carrier, with a case inclosing the entire mechanism and having a segmental opening through which the dial is exposed, the hand-shaft extending through the case and having a knob by which it is turned, substantially as described.

6. The combination of the rotatable carrier for the resistance material, with separated bearing-spindles for said carrier, one of said spindles being in electrical connection with one pole of the generator and the other with the other pole of the same, substantially as described.

7. The combination of the frame, a carrier

mounted therein, and having a segmental groove in its periphery, a homogeneous resistance compound contained in the groove, a brush in contact with the resistance material, means for turning one in respect to the other, a stationary indicator and a pointer connected to the moving part and adapted to travel over the indicator, substantially as described.

10 8. The combination of a carrier having a segmental groove in its periphery and a segmental groove in its back, resistance compounds in each of said grooves, one of said

compounds being in series with a shunt-circuit, a brush resting in contact with the other 15 compound, and means for moving either the carrier or the brush, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of 20 two subscribing witnesses.

ERNEST EMIL WERNER.

Witnesses:

WILL. A. BARR,
JOS. H. KLEIN.