

(No Model.)

T. D. LOCKWOOD.
BATTERY TELEPHONE.

No. 312,871.

Patented Feb. 24, 1885.

Fig. 1.

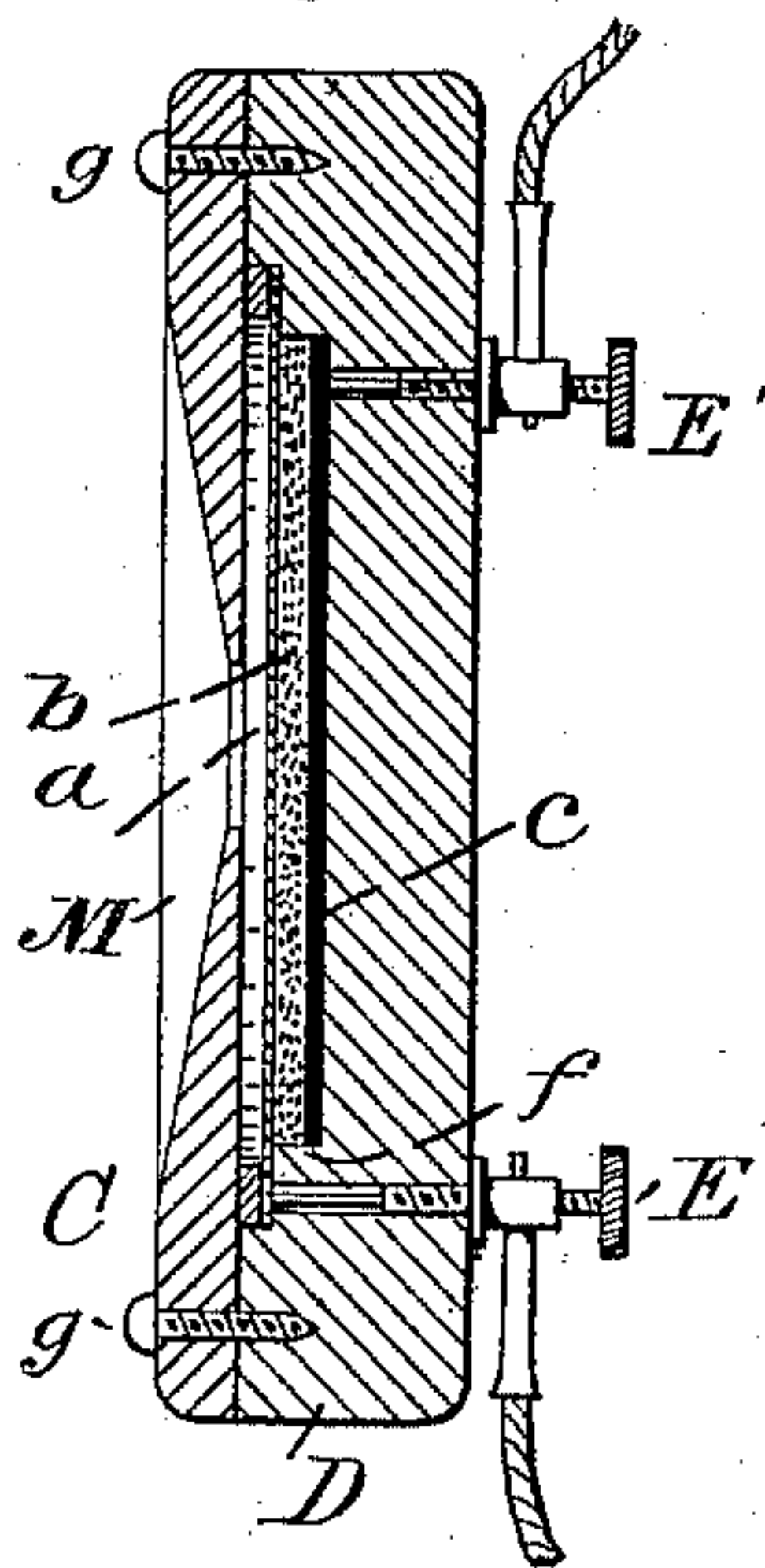


Fig. 2.

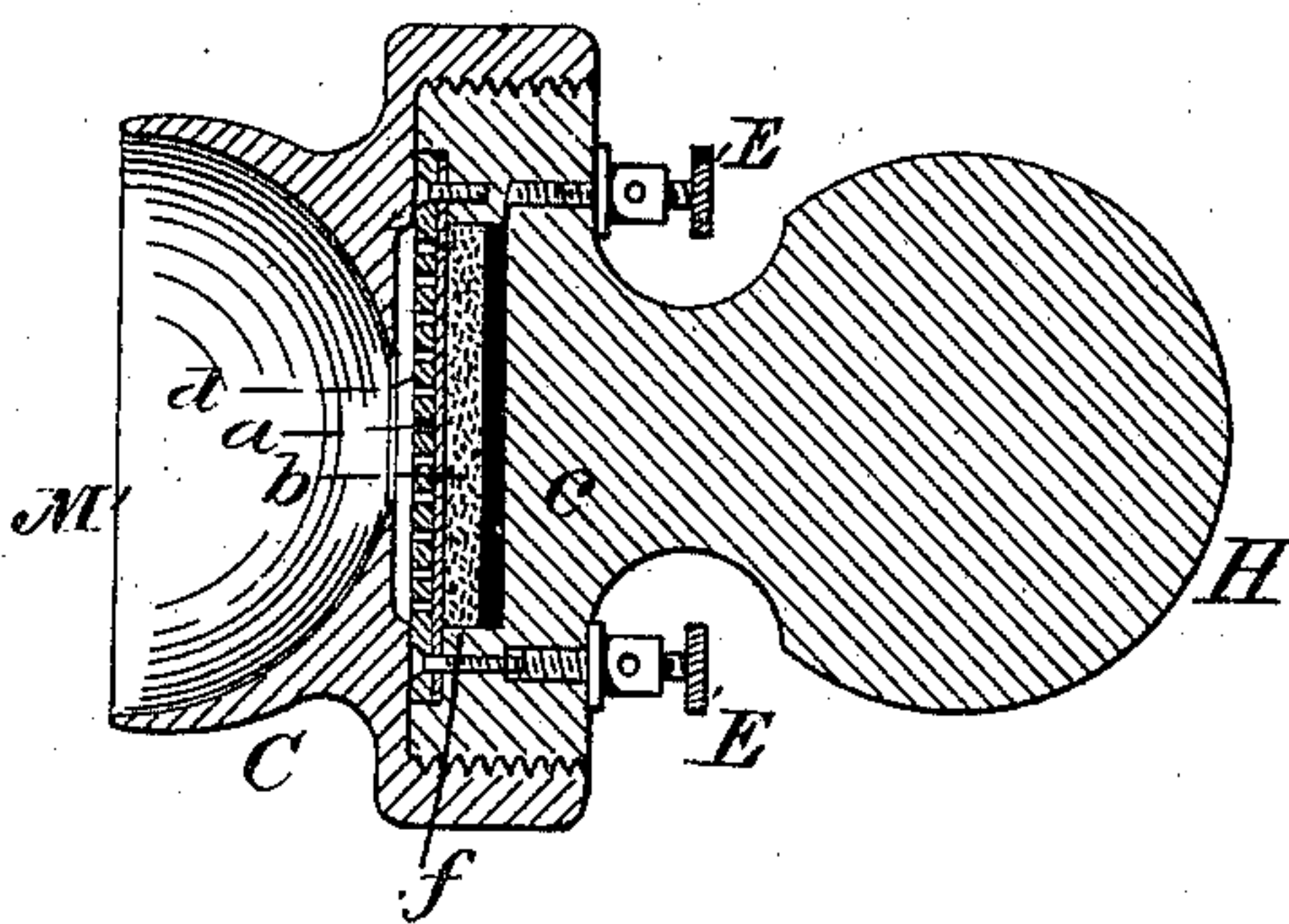


Fig. 3.

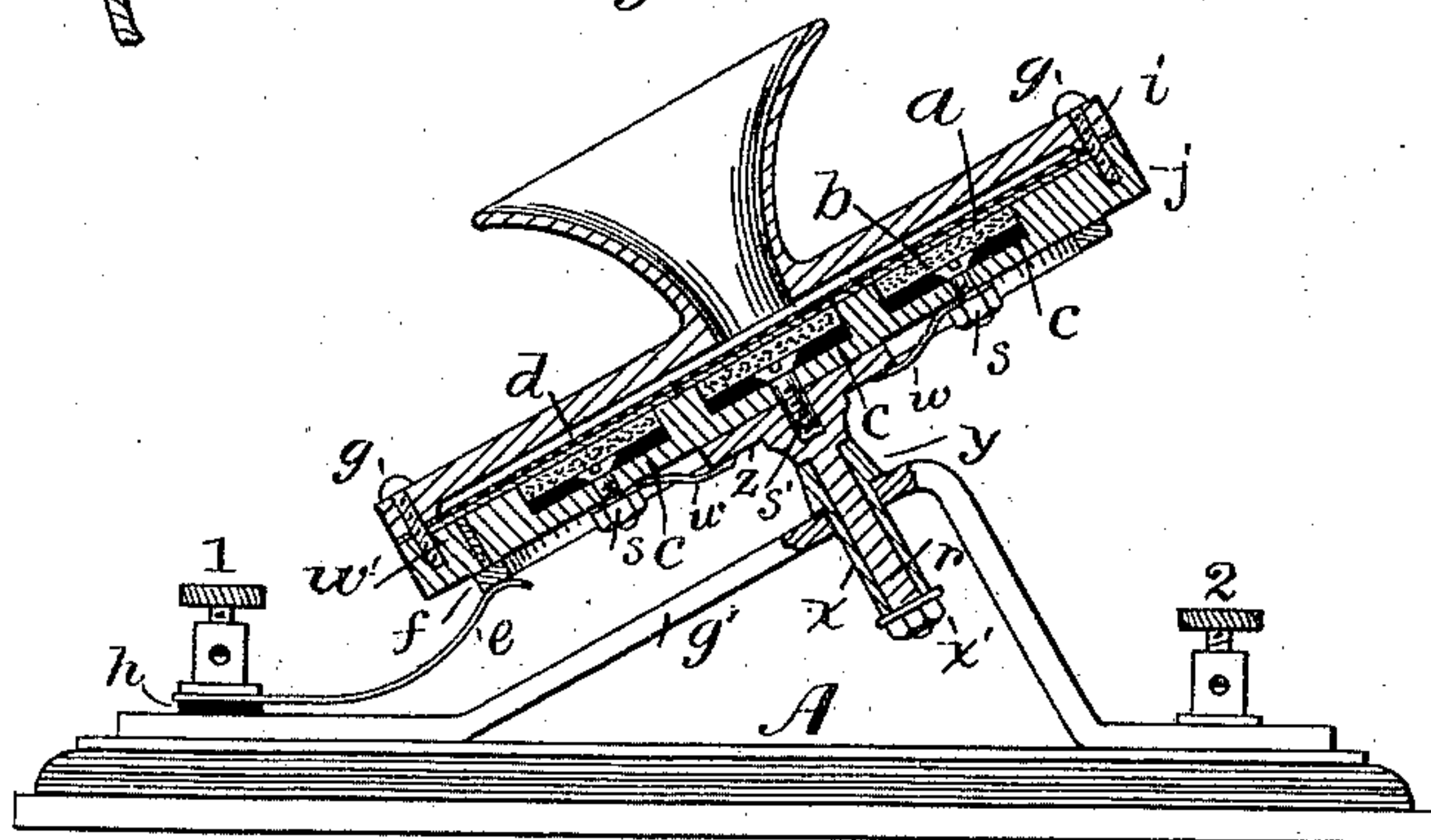


Fig. 4.

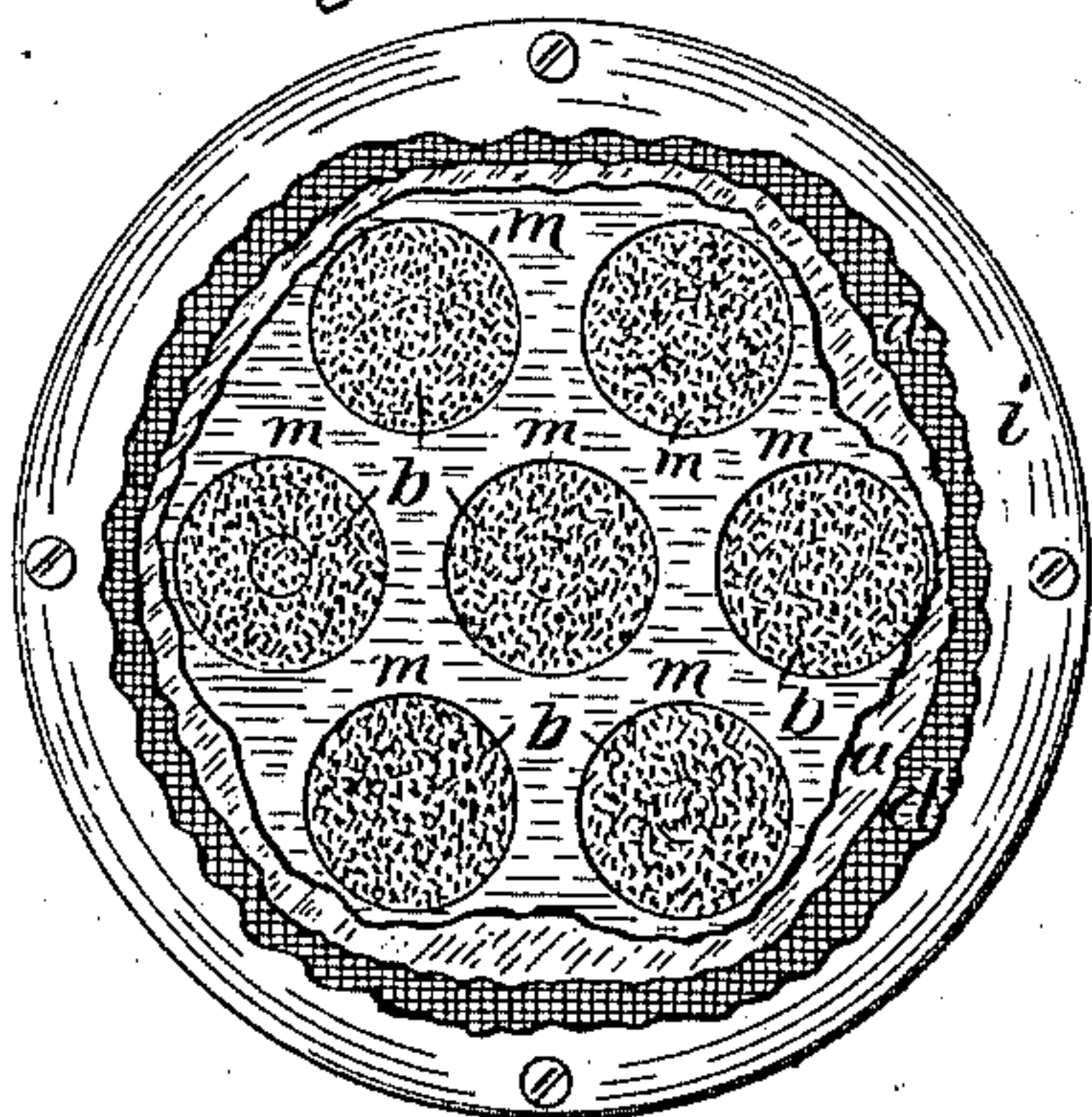
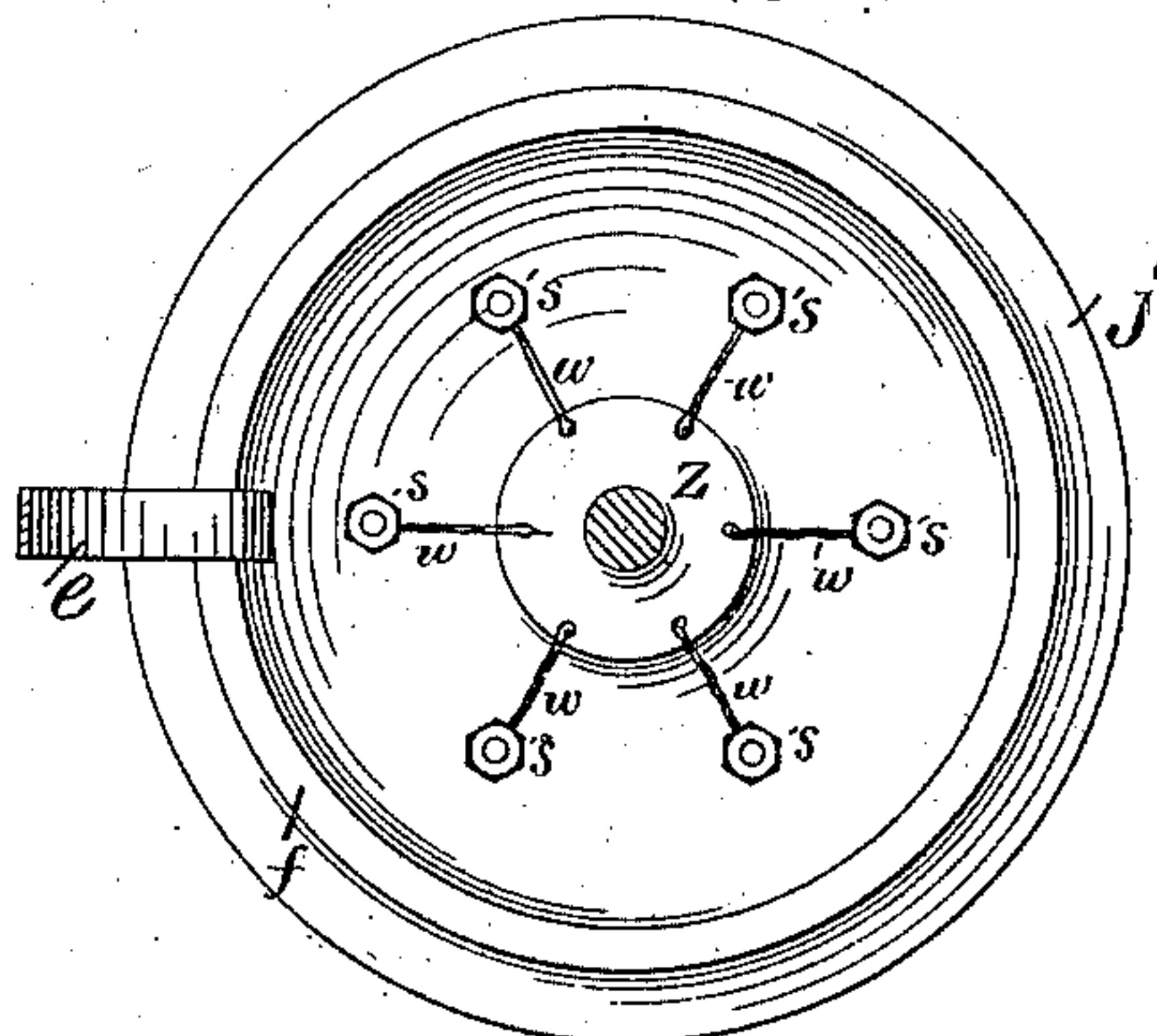


Fig. 5.



Witnesses.

D. E. Richards.
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UNITED STATES PATENT OFFICE.

THOMAS D. LOCKWOOD, OF MALDEN, MASSACHUSETTS.

BATTERY-TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 312,871, dated February 21, 1885.

Application filed June 7, 1884. (No model.)

To all whom it may concern:

Be it known that I, THOMAS D. LOCKWOOD, of Malden, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Battery-Telephones, of which the following is a specification.

This invention relates to an improved telephonic transmitter of that class in which a steady and continuous current of electricity is caused to flow through a resistance which by suitable means may be varied, producing corresponding and equivalent variations in the strength of said current.

The object of my invention is to produce an instrument of greater efficiency and constancy than those heretofore used in the electrical transmission of articulate speech. To this end my improved transmitter consists in an improvement upon the instrument for which Letters Patent were issued to Henry Hunnings, August 30, 1881, No. 246,512, and November 29, 1881, No. 250,250. That instrument, broadly described, comprises in a suitable case or support two opposing conducting-surfaces, one of which is a thin metallic vibrating diaphragm and the other a fixed metal plate, and an annulus or washer by which these plates are supported at their edges and kept at a suitable distance apart, and which, together with the said plates, constitute a chamber in which a quantity of finely-divided carbon or similar conducting material is loosely placed, and screw-terminals connecting with the plates, whereby the instrument may be included in an electric circuit.

My improvement consists, first, in substituting for the fixed metal plate a plate of carbon; and, secondly, in the use of particles of magnetizable metal as the variable resistance medium.

I have found that when in practice a fixed plate of metal is used, and an electric current passed therethrough, it rapidly becomes covered with a non-conducting film, whereby the effectiveness and constancy of the instrument are impaired. I have also found that when a carbon plate is employed no such result supervenes.

In the drawings which accompany and constitute a part of this specification, Figure 1 is a sectional elevation of the instrument in its

simplest form. Fig. 2 is a section of a more convenient form of the same instrument. Fig. 3 is a sectional elevation of a multiple transmitter of the same class. Fig. 4 is a view of the front part of the transmitter shown in Fig. 3, with the mouth-piece removed and a portion of the cover broken away to show the internal construction; and Fig. 5 is a view of the back of the instrument when removed from its stand or base-board.

Referring to Fig. 1, D is a case, of wood, vulcanite, or similar material, provided with a suitable cavity, at the bottom of which is placed a plate, c, of hard carbon, having preferably a smooth and polished upper surface. a is the vibrating diaphragm, of platinum foil, very thin ferrotype-iron, or like metal or metal-coated material. The carbon plate and vibrating diaphragm are separated electrically by the rabbet f, cut in the case at the edge of the cavity, upon which the edges of the diaphragm rest; or, if preferred, a ring or annulus of non-conducting material may be used for this purpose. A ring of some suitable non-conductor secures the edges of the diaphragm and is clamped down by the cap C, when the said cap C, by means of screws g, is secured to the case. The intervening space between the fixed and vibrating plate is nearly filled with crushed or pulverized carbon or with magnetic filings—that is, filings of steel or iron. The vibrating plate is united electrically with the binding-screw E and the carbon plate with the screw E', for the convenient inclusion of the instrument in an electric circuit.

Fig. 2 represents a similar instrument, but more conveniently constructed. The case is constructed in the form of a handle, H. The cap C, with mouth-piece M, instead of being secured with screws g, is provided with a female thread, which fits a male screw at the end of the casing. As before, a carbon plate, c, rests in a cavity in the case. The vibrating plate a rests on the rabbet or shoulder f. The magnetized particles or crushed carbon is contained in the cavity thus formed; but the vibrating plate, instead of being secured by a ring, is covered by a perforated plate fastened to the casing by small screws.

In Figs. 3, 4, and 5, A is a base-board, to which a metal plate, g', bent to the conforma-

tion shown, is attached. A binding-screw, 2, is in electrical connection therewith, and a second binding-screw, 1, is likewise fastened to the same plate, but is insulated therefrom by the non-conducting washer *h*. The body or case of the instrument *j* has several shallow cavities, *m*, cut therein, each of which has a plate of carbon, *c*, to serve as the floor or lower conducting-surface. The several carbon plates are secured in position by means of the screws and nuts *s*. These screws are all by wires *w* electrically united to one another and to a central brass ring or circular plate, *z*, fixed to the back of the case. The said circular plate has a rod, *r*, attached to its center, and the rod, passing through the metal gland *y* and socket *x*, is capable of rotation therein, being loosely fastened by the nut *x'*. The circular plate, and consequently all of the carbon plates, are thus in electrical connection with the bracket-plate *g'* and binding-screw terminal 2. The several cavities are filled, or nearly so, with the conducting material before mentioned, the usual vibrating diaphragm, *a*, stretched over the cavities and secured to the case by the perforated plate *d*. The cover may then be fastened to the case by the screws *g*. A metal ring, *f*, is attached to the back of the instrument and electrically connected with the vibrating plate *a*. The said ring is in frictional contact with a spring, *e*, extending from the terminal 1. The circuit from the terminal 1 is as follows: binding-screw 1, spring *e*, ring *f*, wire *w'*, vibrating diaphragm *a*, crushed conducting material *b*, carbon plates *c*, screws *s*, wire *w*, center plate, *z*, rod *r*, standard-plate *g'*, and terminal 2.

It is to be observed that the several variable resistances are each in a branch of the main circuit, or, in other words, are in multiple arc with one another.

I am not of course restricted to a single vibrating diaphragm when this form is used, as I may, if I so elect, use small metal-foil diaphragms, one for each cavity, provided I connect them electrically together or in any preferred way with the ring *f*.

By the use of the carbon plate *c* in lieu of the metal plates which have heretofore been used, I find that greater constancy of action is maintained, and that a loud tone and clear articulation are more easily sustained.

By using particles of magnetizable metal for the variable resistance I also secure an advantage, in that such particles become polarized upon the passage of a current through them, and thus tend to set themselves in the direction of their length, whereby electric continuity, while still variable in consequence of the multitude of contacts involved, is never impaired. In practice the instrument improved

in accordance with the terms of this specification is to be operated in an electrical circuit with which a voltaic battery and a receiving-telephone are also connected.

The receiving-telephone may be, of course, in a manner well understood, connected in the secondary circuit of an induction-coil, the primary of said coil being in that case included in the direct circuit with the battery and transmitter.

I claim—

1. In a battery-telephone, the combination of a diaphragm or vibrating plate constituting one electrode of an electric circuit, a carbon plate constituting the complementary electrode of said circuit, and a mass of loose finely-divided conducting material held between the said plates to form a variable resistance, substantially as specified.

2. A transmitting-telephone comprising a metal vibrating plate and a fixed carbon plate, forming or adapted to form the opposing electrodes of a battery-circuit, and mounted in a suitable case, so that they are maintained separate from one another, whereby a close chamber is formed between them, and a mass of loose finely-divided conducting material, substantially as hereinbefore described.

3. In a battery-telephone, two or more variable resistances, each consisting of a fixed carbon plate, a metal vibrating plate, said plates being maintained a suitable distance apart, so as to form a closed chamber, and a granulated or powdered conducting material held between said plates in said chamber, each of the resistances so constituted being in a derivation or branch of the main circuit or in multiple arc with one another, substantially as described.

4. A transmitting-telephone consisting, substantially as hereinbefore described, of the following elements: a non-conducting case, a fixed carbon plate, embedded in a cavity in said case, a metal-foil vibrating plate or diaphragm maintained a suitable distance in front of the fixed plate and supported in said case by a rabbet or offset of said case, a mass of loose or granulated conducting material confined between the metal and carbon plates, and a suitable mouth-piece whereby the impact of the sound-waves may be directed upon the vibrating plate, all combined for the purposes specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 3d day of June, 1884.

THOS. D. LOCKWOOD.

Witnesses:

D. E. RICHARDS,
GEO. WILLIS PIERCE.