

(No Model.)

S. RUSSELL.  
Magnet and Magnetic Telephone.

No. 238,252.

Patented March 1, 1881.

Fig. 1.

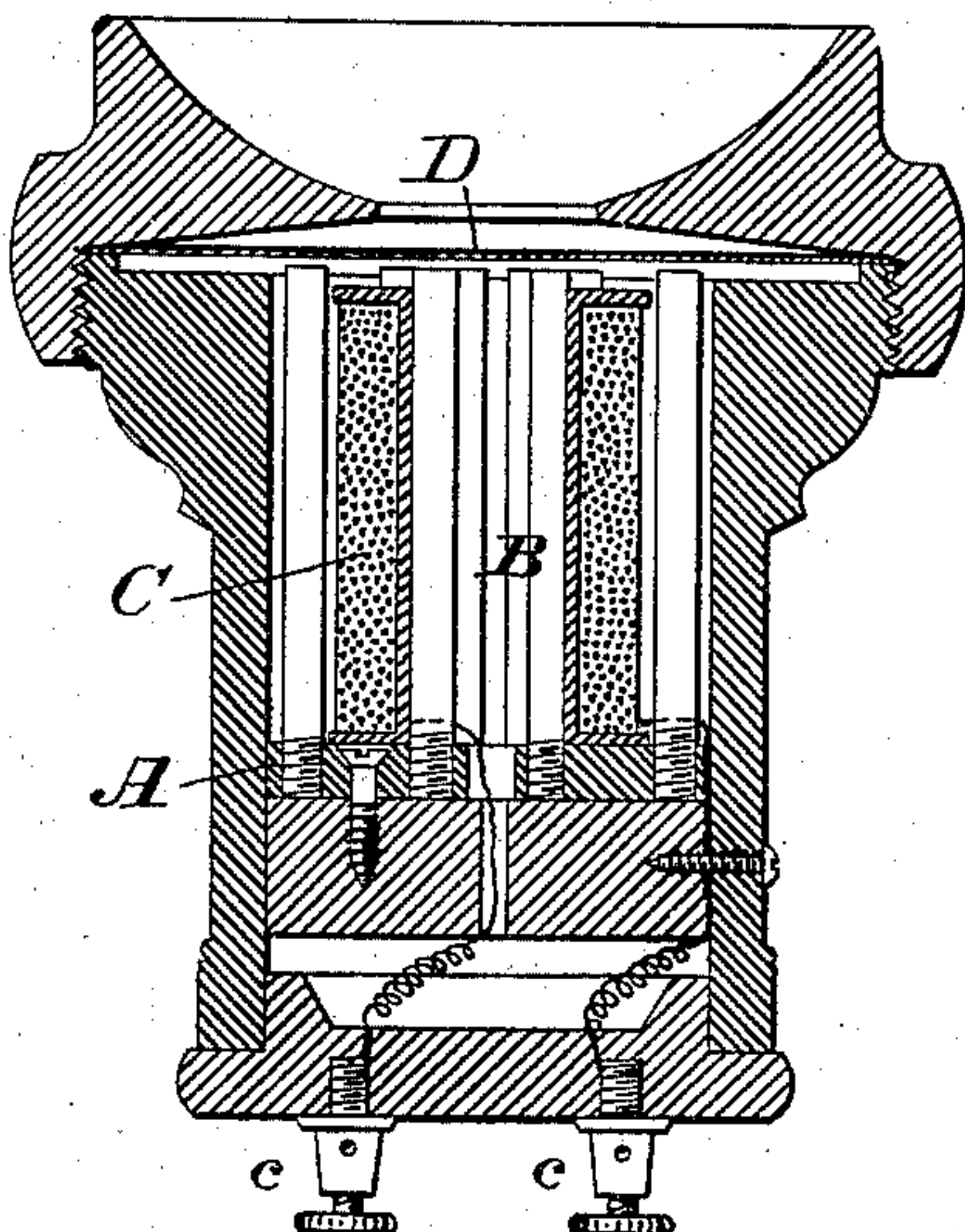


Fig. 2.

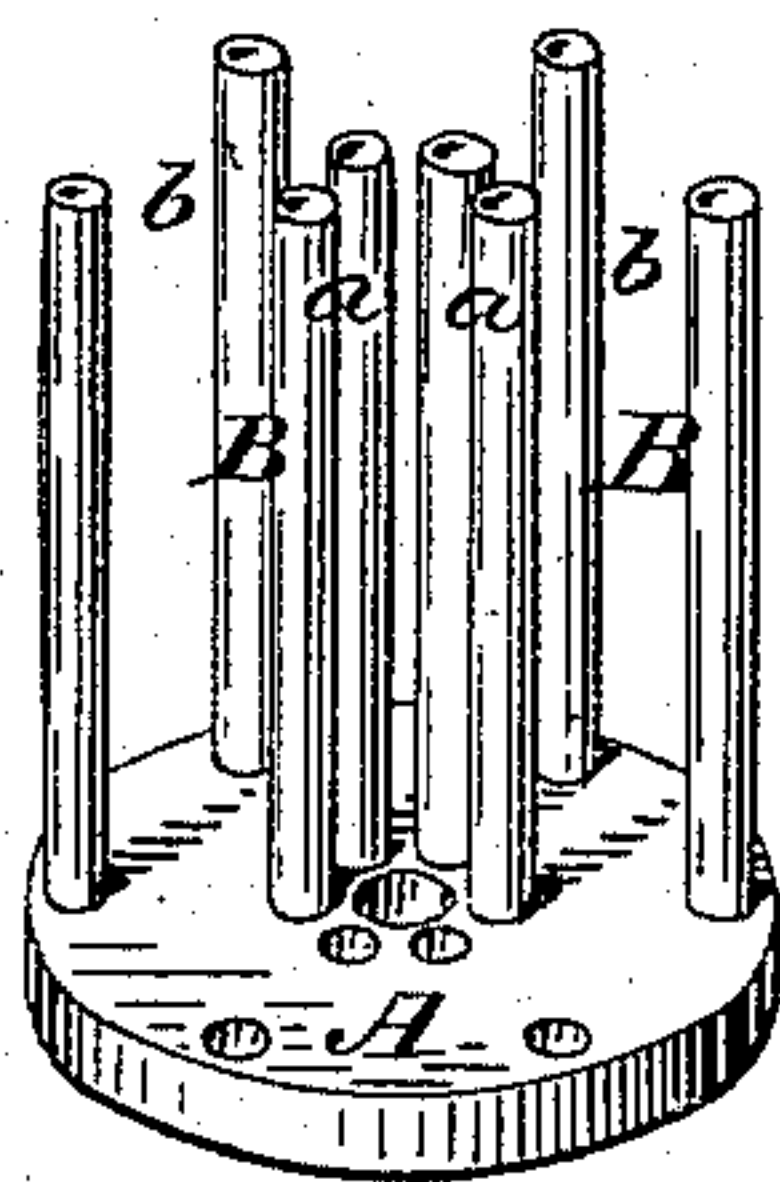


Fig. 3.

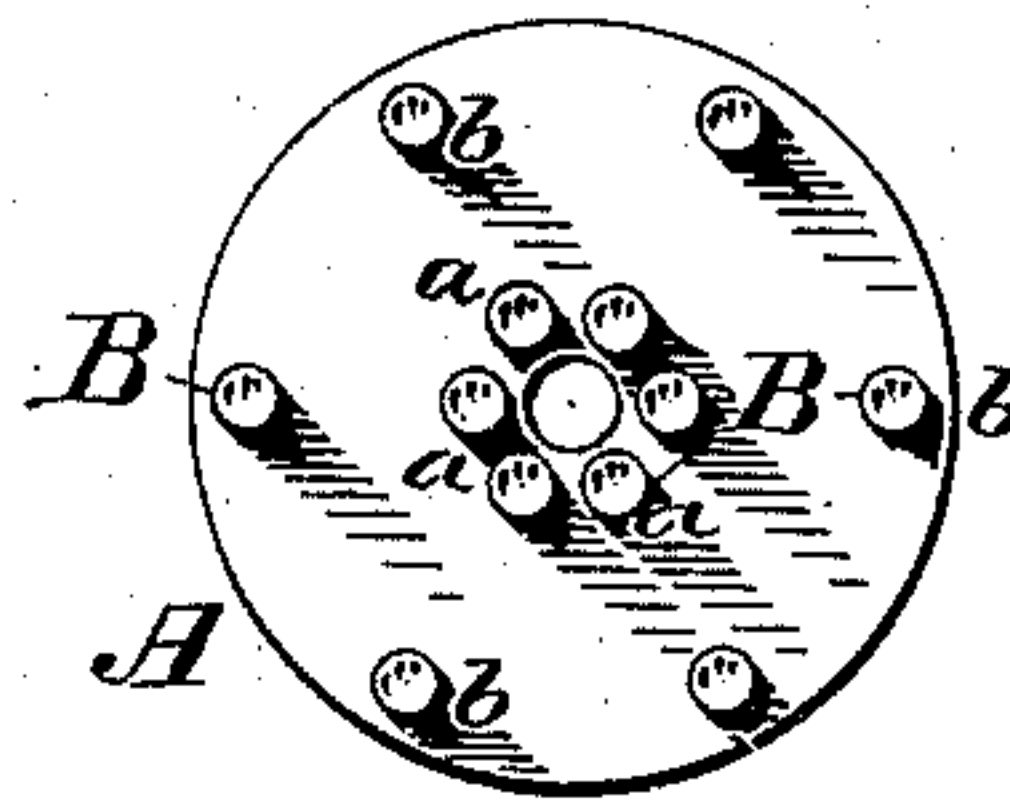


Fig. 4.

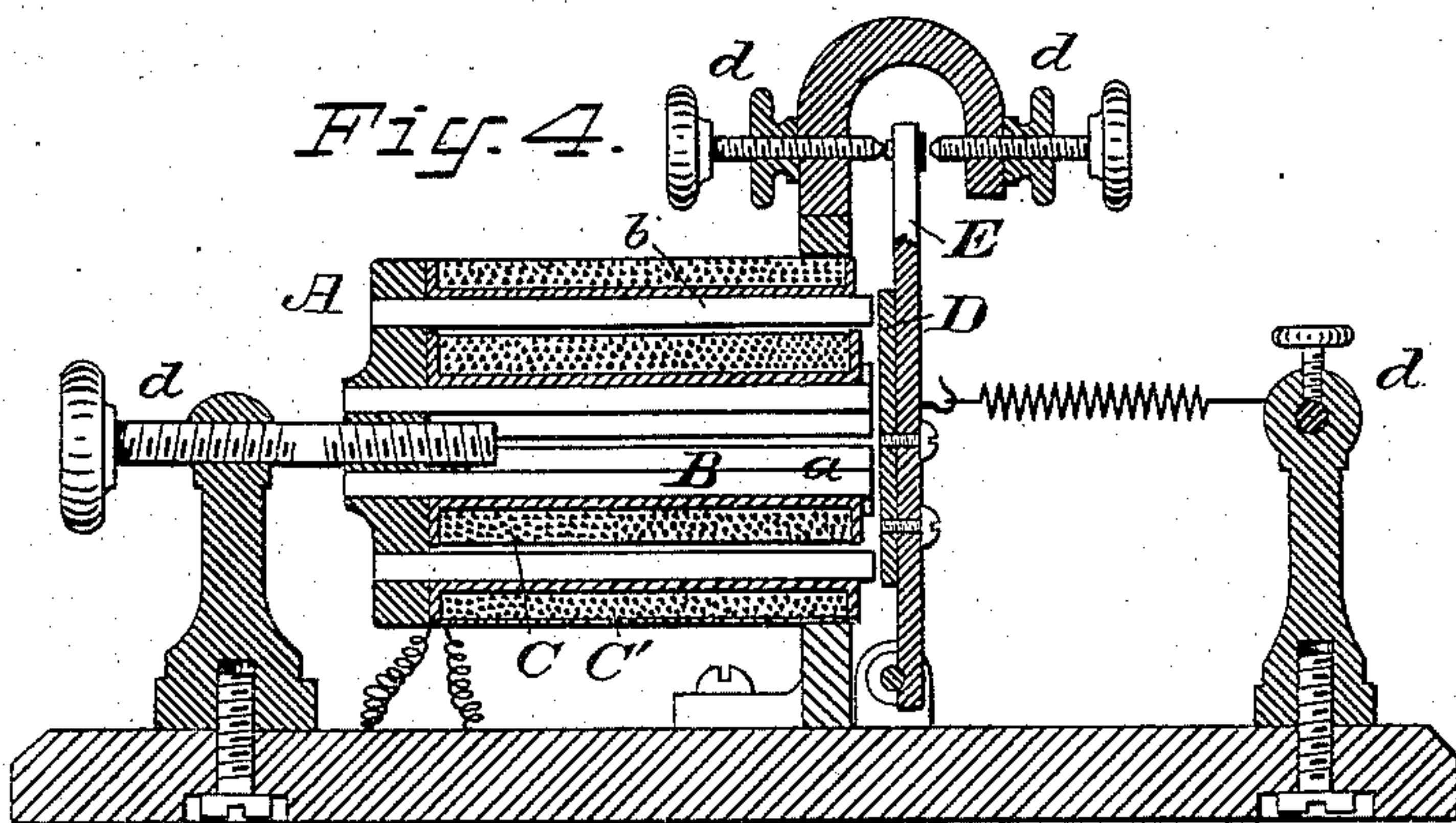
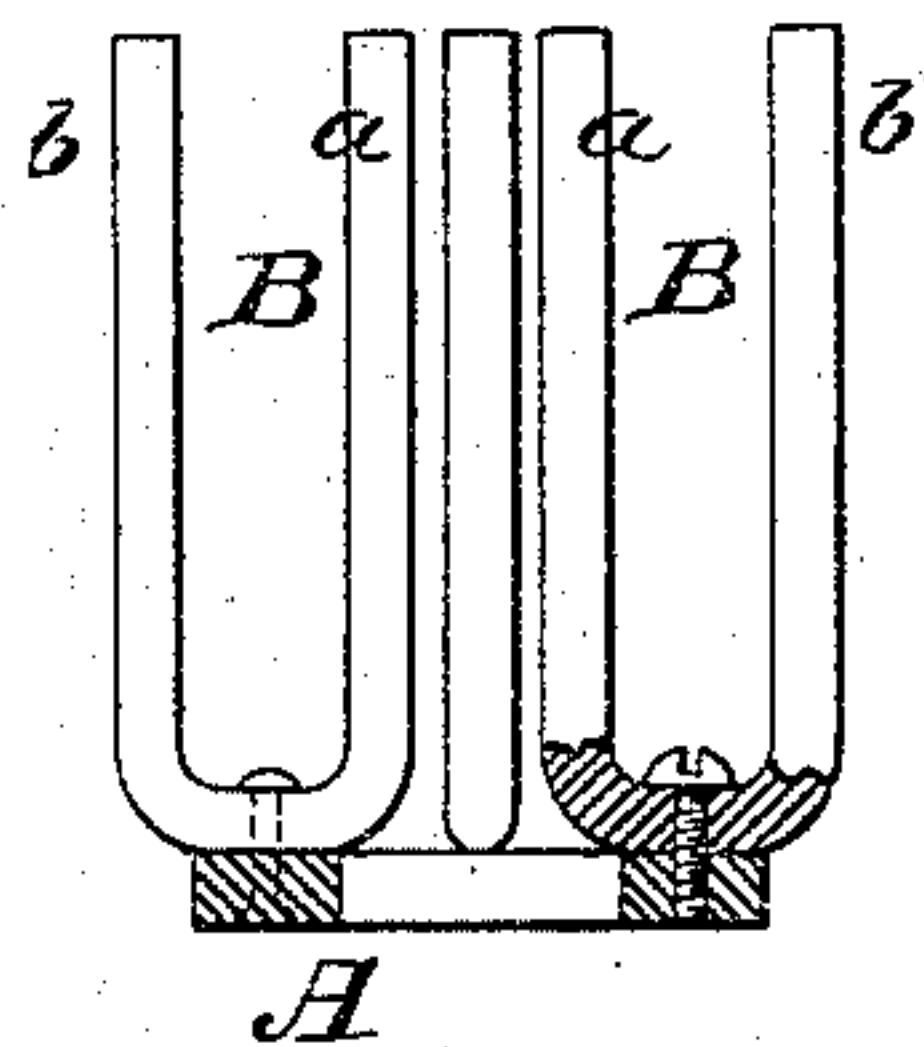


Fig. 5.



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# UNITED STATES PATENT OFFICE.

SAMUEL RUSSELL, OF BROOKLYN, NEW YORK.

## MAGNET AND MAGNETIC TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 238,252, dated March 1, 1881.

Application filed April 1, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL RUSSELL, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Magnets and Magnetic Telephones, of which the following is a specification.

My invention consists of a compound or multipolar magnet formed with a body portion or plate of magnetic or magnetizable material, with two series of oppositely-polarized pins or bars projecting therefrom, those of one polarity being arranged in a group at the center, and those of the opposite polarity being arranged to concentrically surround the first, and with an electric coil placed in the annular space between the two series; also, in the combination, with a magnet of this character, of an armature arranged before its poles and capable of motion toward or from them, and also in the combination, with such a magnet, of an armature-diaphragm arranged to be vibrated by the varying attraction of the magnet, and forming thereby an electro-magnetic telephone, all as will be fully hereinafter set forth.

In the accompanying drawings, Figure 1 is a longitudinal mid-section of a telephone embodying my whole invention. Fig. 2 is a perspective or oblique elevation of my magnet alone. Fig. 3 is a plan of the same. Fig. 4 illustrates the application of my magnet to a telegraph-relay, and Fig. 5 shows a modification of the magnet.

Let A in the drawings designate a plate, disk, or ring of iron or steel, forming the body portion of the magnet; and B B, a number of iron or steel pins, their one ends fixed to the plate A, and their other ends projecting therefrom and forming the poles of the magnet. The pins may be screwed into the plate, or be riveted, soldered, or otherwise fixed therein. They are arranged in two sets or series, the north poles being in one set and the south poles in the other, and these sets are in the form of circular rows—one, the poles of which are lettered *a a*, being disposed centrally within the other, whose poles are lettered *b b*. If the magnet thus made is to be a permanent magnet, either the pins or the plate, or both, will be magnetized, being formed of permanently-

magnetizable material, as steel. If the plate is suitably magnetized, so as to have one pole at its periphery and the other at its center, the pins may be of soft iron, becoming magnets by induction; or, on the contrary, if the pins are permanently magnetized, the plate may be of soft iron, and will become magnetized by induction. I prefer, however, that both the pins and plate shall be of permanently-magnetizable material, and that both shall be magnetized simultaneously by placing an electric coil in the annular space between the two rows of poles and sending a powerful current of electricity through the coil. Both the pins and plate are thus permanently magnetized—the pins by the direct action of the current, and the plate by induction from the pins—and the polarization of the separate elements of the magnet will be relatively correct, so that the inductive action of each will increase the magnetism of the others.

In Figs. 1 and 4 I have shown an electric coil, C, arranged in the annular space between the poles *a* and *b*. With this addition both the pins and plate may be of soft iron, becoming magnetic only when a current of electricity is sent through the coil, and forming thus an electro-magnet admirably suited for use in telegraphy and for analogous purposes. The current, by passing inside of one row of poles and outside of the other, acts oppositely on each, causing the poles in one row to become north, and those in the other to become south, poles. Another coil may be arranged outside of the outer row, as shown at C' in Fig. 4, to increase the effect upon the poles *b b*; but in this coil the current should pass in the opposite direction from that in the coil C, else it will neutralize the effect of that coil upon said poles. Another coil may be inserted within the poles *a a*, if desired; but its effect will not be so marked as that of the coils C and C'. If desired, a separate coil may be placed around each pole; but I prefer the arrangement shown, it being much simpler and equally as effective, or very nearly so.

The coil or coils may be used if the magnet is permanently magnetized, its action being then to increase or decrease the magnetism of the magnet when a current is passing through it, or to carry a current generated by an in-



crease or decrease of the magnetism of the magnet, as the case may be.

Fig. 1 shows the application of my invention to a magnetic telephone in which the magnet is or may be a permanent one, and the coil C is in connection with the binding-posts *c c*, where the line-wires may be attached. The diaphragm D is of such material—as iron or steel—as to form an armature for the magnet, being what I call an “armature-diaphragm.”

In Fig. 4 I have shown my improved magnet as applied to a telegraph relay or receiving-instrument, of which D is the armature, fixed to an armature-lever, E, and capable of motion toward or from the poles of the magnet, and *d d d* are the usual adjusting-screws common to all relays. The binding-posts I have not shown, they being arranged in precisely the usual manner.

In Fig. 5 I have shown a slight modification of my invention, the pins B B being bent into U shape and their bent portions secured to a ring or disk, A, their one legs forming the poles *a a* and their others forming the poles *b b*. Another modification would consist of a flat bar having a ring formed on one end, in which ring are fixed the pins *b b*, and having the pins *a a* fixed to its other end, but projecting on its opposite side, and being then bent at its center so as to bring its two ends nearly together, the pins *a a* projecting through the ring, and being sufficiently longer than those *b b* to project to the same distance. It is not absolutely necessary that the poles *a* and *b* shall be arranged in circular rows, as they might be arranged in two or more straight rows. Neither is it essential that the plate A shall be circular, as it might be rectangular or star-shaped, according to circumstances.

I am aware that a multipolar magnetic battery has been constructed with the poles arranged in two series, exactly as in my present magnet; but the poles have been connected together only in pairs, one south being connected to one north pole, (the same as in Fig. 5 of my drawings, if the ring A were removed,) this construction being shown in my patent on improved telephone, No. 228,395, dated June 1, 1880. My present construction connects all the poles together, all those of like polarity being connected, as well as those of unlike polarity. By this means the inductive action of one element or pole upon the others is measurably increased, the several poles are rendered more strongly magnetic by their mutual action, and the attractive power of all the poles is rendered more nearly the same. Furthermore, my multipolar magnet is cheaper to construct and is more readily applied in practice than the multipolar magnetic battery referred to.

I am aware that a multipolar magnet has been invented having one large central pole of one polarity, with a number of smaller poles of the opposite polarity and of collectively equal at-

tractive power, arranged symmetrically around the central one, and that such a magnet has been made with a body portion in the form of a flat iron disk, having slender pins projecting from its periphery, and a single thick pin projecting from its center, and provided with a coil arranged in the annular space between the central pole and the peripheral ones; and I make no claim to a multipolar magnet of such construction.

By using several smaller poles in place of the one large central one, I secure a greater attractive power and greater sensitiveness to electrical action to the same bulk.

I claim as my invention—

1. An electrically-influenced magnet consisting of a plate, A, of magnetic or magnetizable material, with two series of oppositely-polarized pins, B B, projecting therefrom, the pins of one polarity being arranged in a group at the center, and those of the opposite polarity being arranged to concentrically surround the first, in combination with an electric coil, C, arranged in the annular space between the two series of pins, substantially as set forth.

2. An electrically-influenced magnet consisting of a plate or body portion, A, having a number of pins, B B, projecting therefrom, and disposed in two series or rows of opposite polarity, with an annular space between them, in combination with an electric coil, C, arranged in said space, and with an opposite coil, C', arranged around and inclosing the outer series of poles, substantially as set forth.

3. An electrically-influenced magnet consisting of plate A, with two series of oppositely-polarized pins, B B, projecting therefrom, those of one polarity being arranged in a group and inclosed by an electric coil, C, and those of the opposite polarity being disposed around the outside of said coil, in combination with an armature, D, arranged in proximity to said poles, and capable of movement toward and from the same, substantially as set forth.

4. An electric telephone consisting of a magnet formed of a plate, A, having two series of oppositely-polarized pins, B B, projecting therefrom, those of one polarity being arranged in a central group, and those of the opposite polarity being disposed concentrically around said group, in combination with an electric coil, C, arranged in the annular space between the two series of poles, and with an armature-diaphragm, D, arranged in front of and closely adjacent to the said poles, substantially as set forth.

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

SAML. RUSSELL.

Witnesses:

ARTHUR C. FRASER,  
HENRY CONNETT.