

C. ADER.  
Magnet Telephones.

No. 222,118,

Patented Dec. 2, 1879.

Fig. 1.

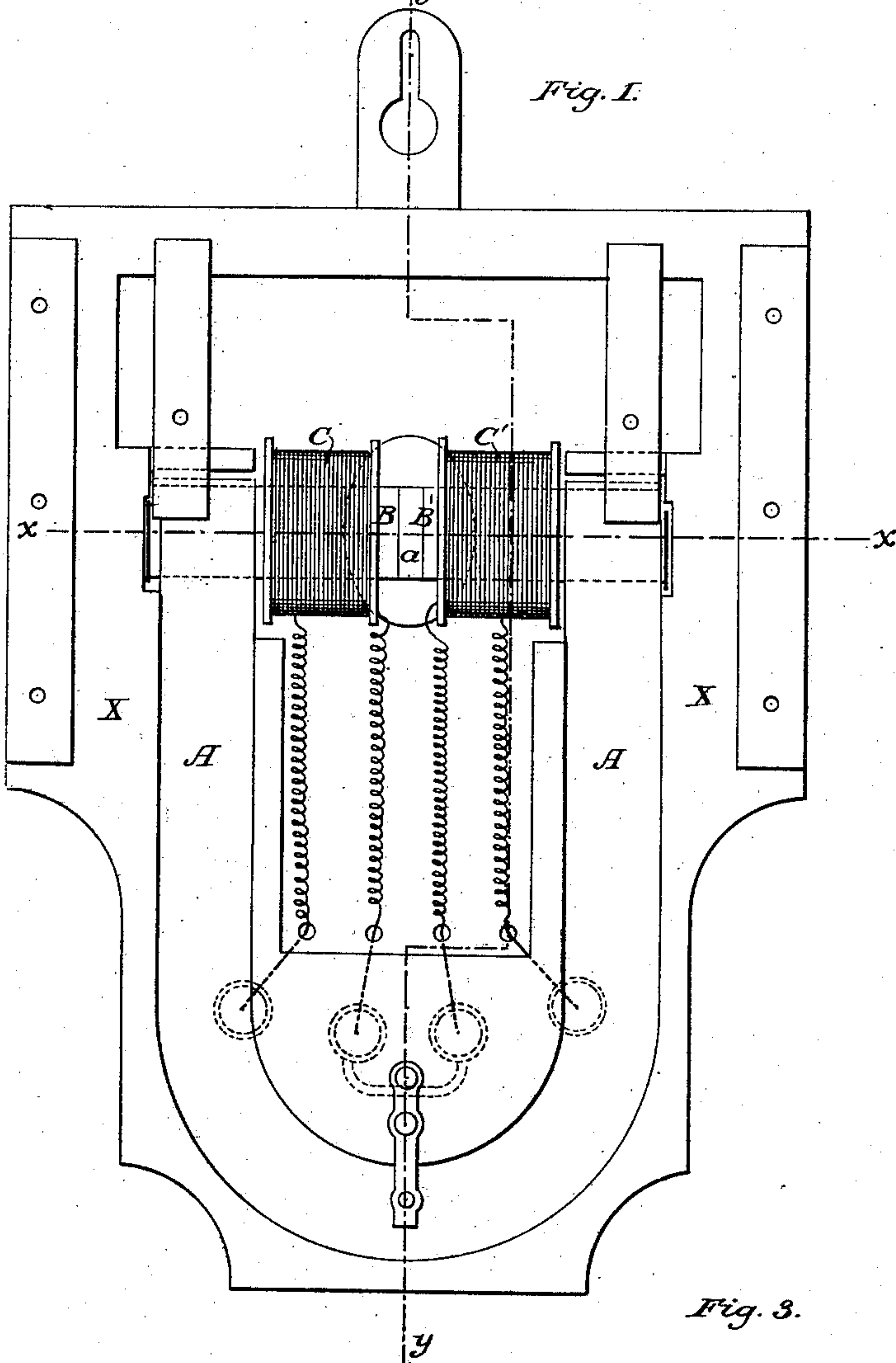


Fig. 2.

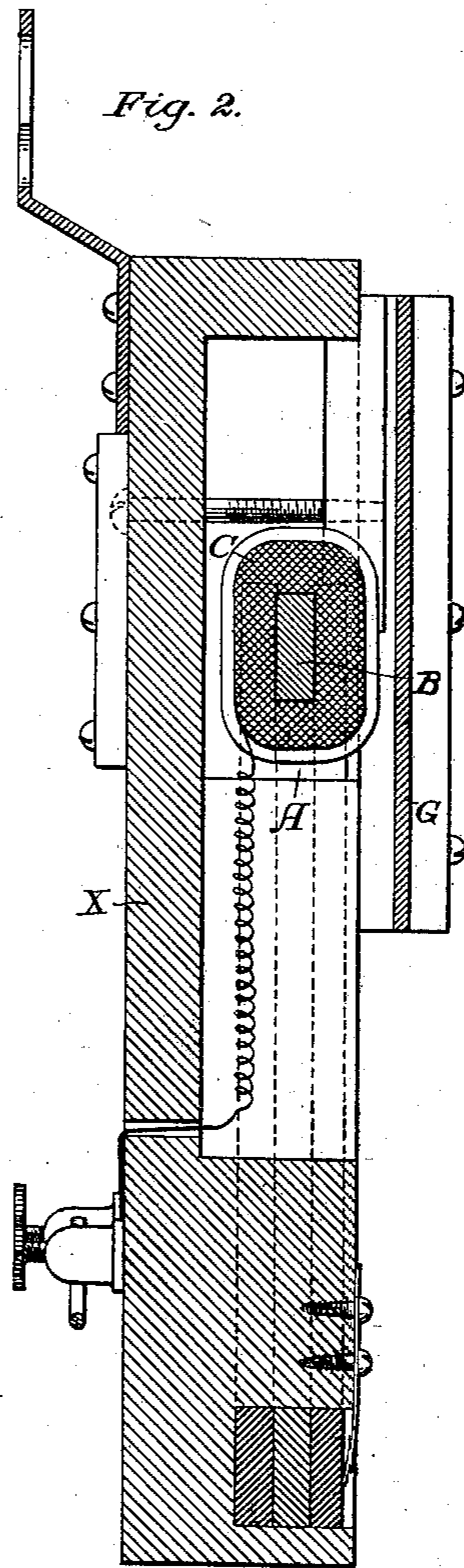
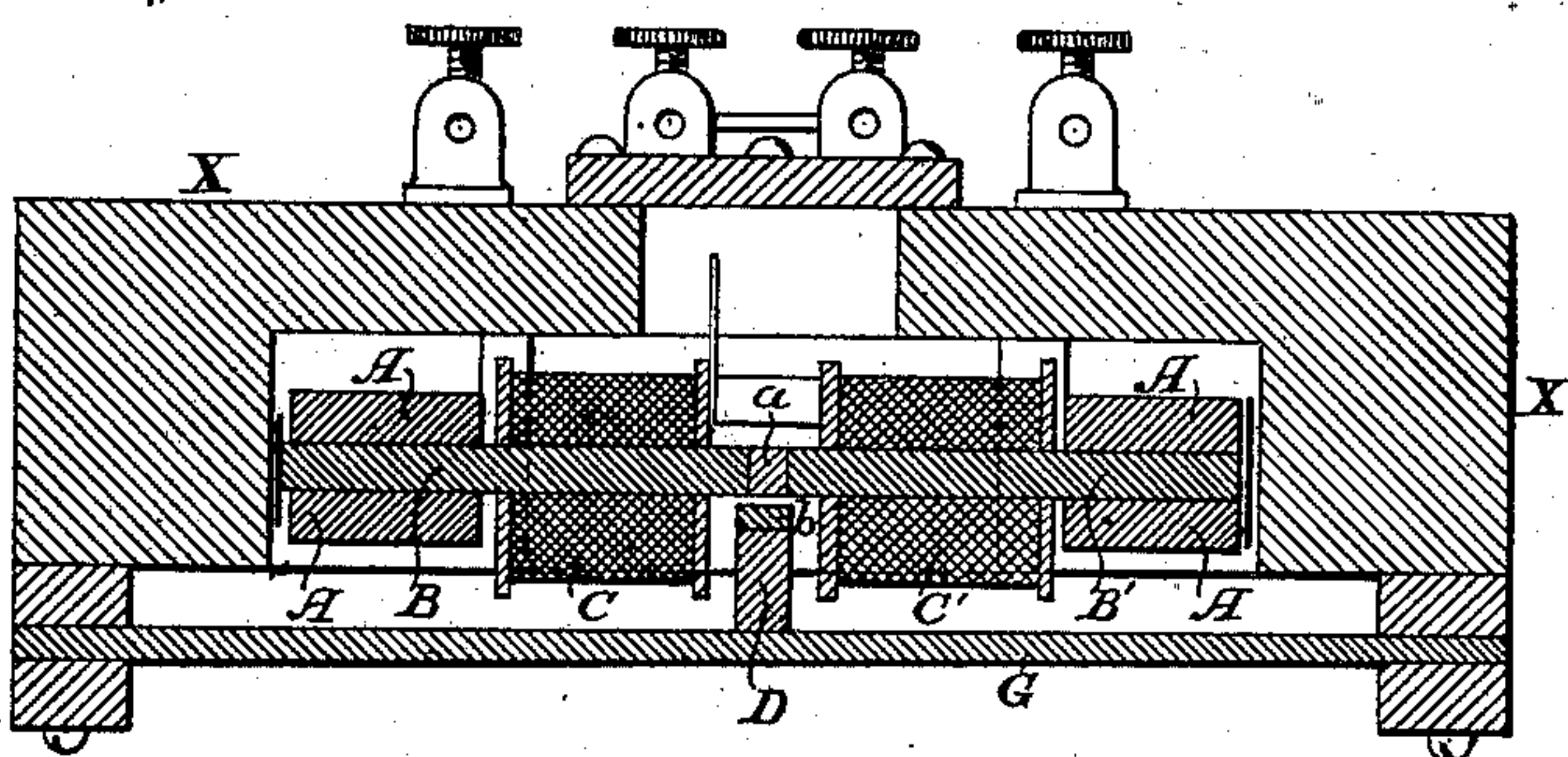


Fig. 3.



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Fig. 4.

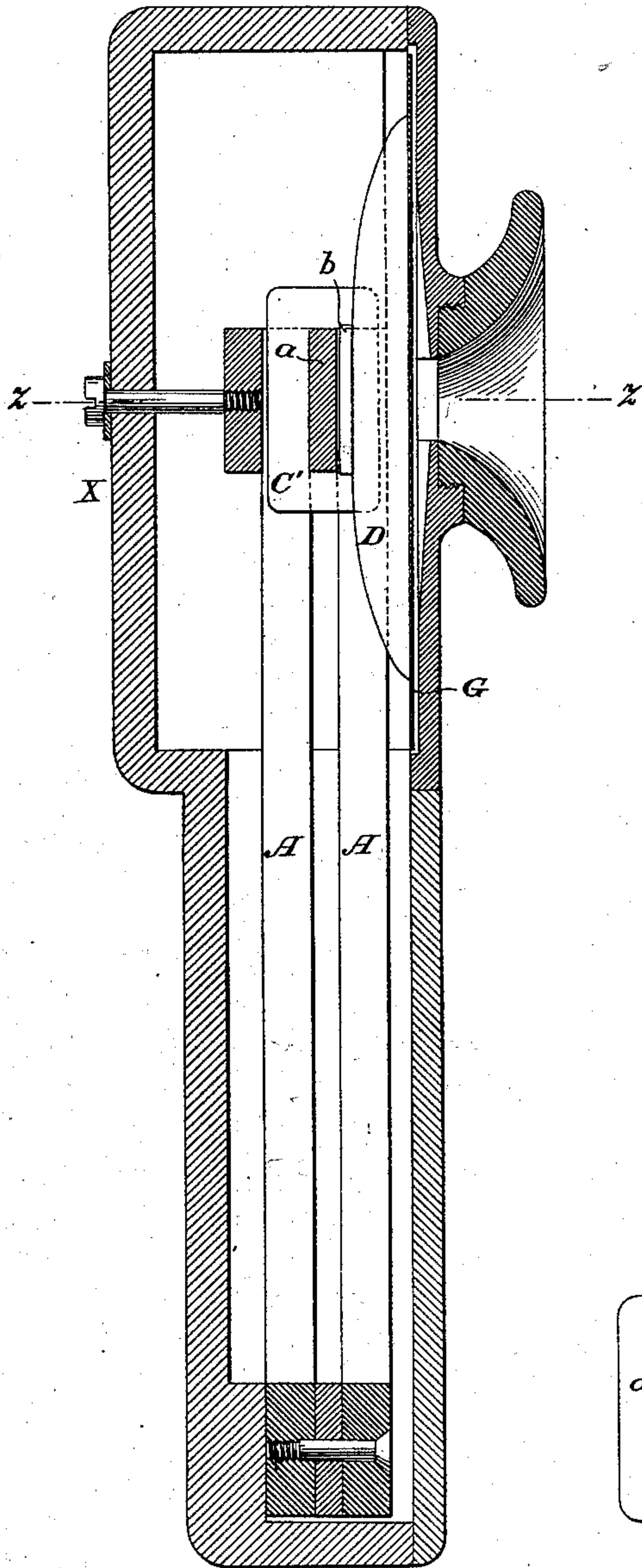


Fig. 5.

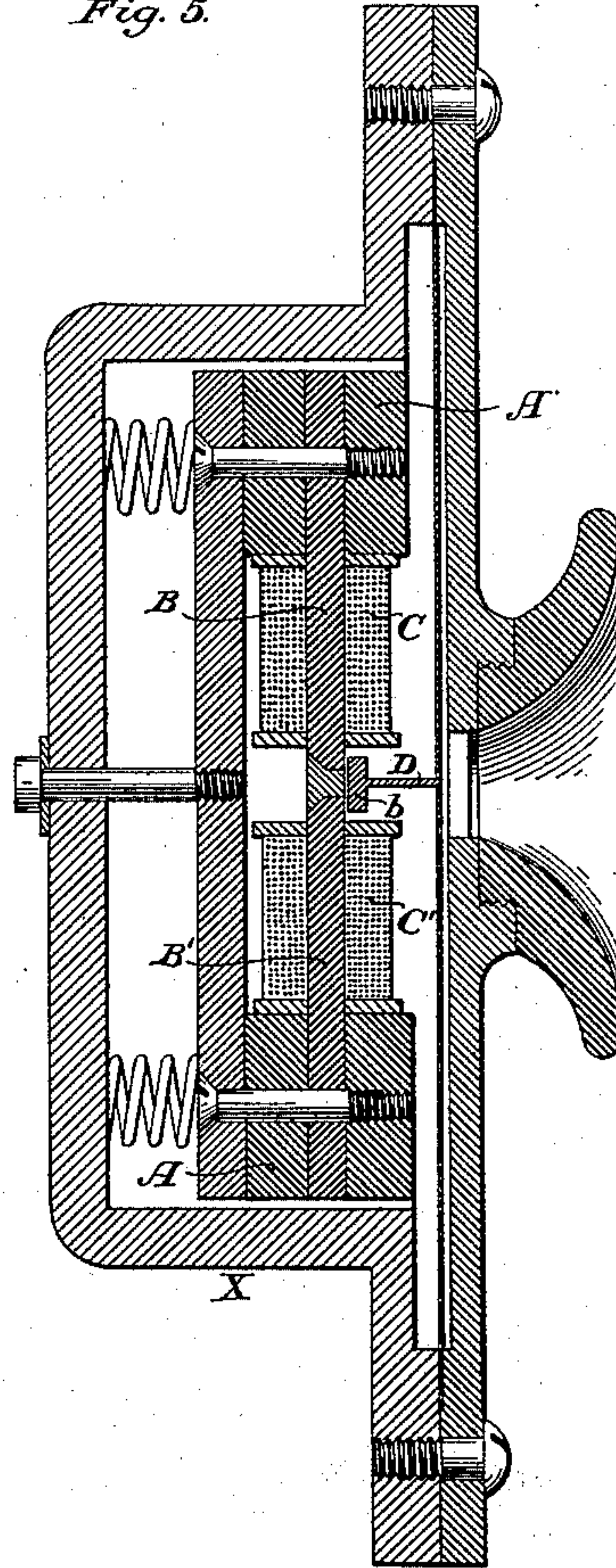


Fig. 6.

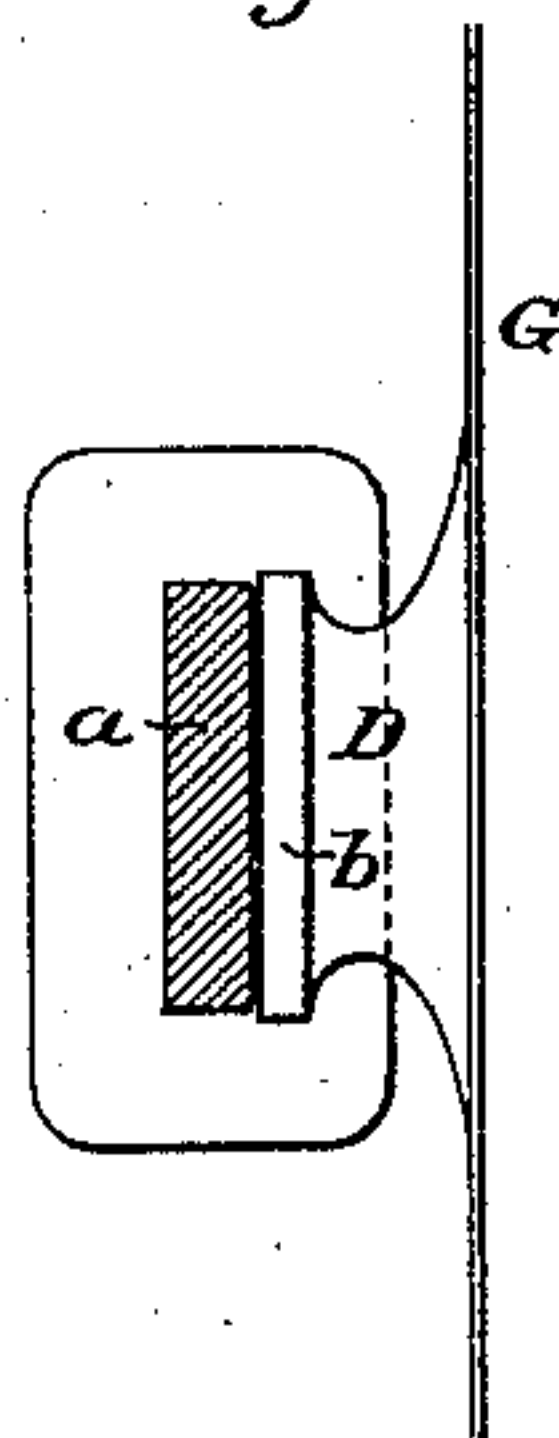
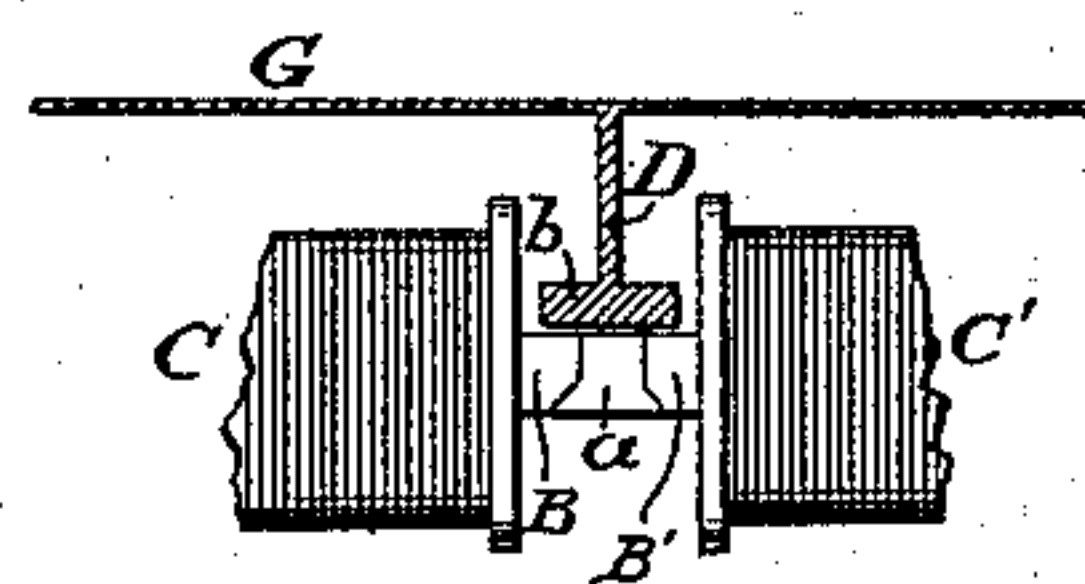


Fig. 7.



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# UNITED STATES PATENT OFFICE.

CLÉMENT ADER, OF PARIS, FRANCE.

## IMPROVEMENT IN MAGNET-TELEPHONES.

Specification forming part of Letters Patent No. **222,118**, dated December 2, 1879; application filed August 18, 1879.

*To all whom it may concern:*

Be it known that I, CLÉMENT ADER, of the city of Paris, in the Republic of France, have invented a new and useful Improvement in Telephones, which improvement is fully set forth in the following specification.

This invention relates more particularly to what may be called "magneto-telephones," in contradistinction to carbon, water, and other telephones requiring the aid of a battery for operation. In this class of telephones the transmission and reproduction of speech depend upon the vibrations of an inductive armature in front of magnetic poles surrounded by bobbins, the vibrations of the armature inducing or responding to currents in the coils of the bobbins.

In the telephones now known and used the magnetic poles are separated by a distance in general somewhat greater than the diameter of the coils, and are parallel, or nearly so, their ends facing the armature. A telephone has, however, been devised in which an electro-magnet with its poles beyond the ends of the bobbins bent at right angles, so that they face each other, is used in connection with an ordinary metallic vibratory plate. In this case the bobbins are parallel, as usual.

This invention is essentially different from the above; and it consists in bringing the poles of the electro-magnet together almost to the point of touching, to create thereby a magnetic plane, opposite the center of which is suspended from a suitable vibratory plate or diaphragm an inductive armature, exceeding but slightly, if any, the distance between the poles. By bringing the poles thus together the attraction upon the armature is concentrated, and, the latter being of light weight, the readiness and amplitude of its vibrations are increased. In this invention, moreover, the bobbins which surround the magnetic poles are arranged end to end, as well as the latter.

In order to carry out most effectually the principles above indicated, I employ, by preference, the following disposition: Two magnets of the ordinary horseshoe form are placed parallel with each other, being sep-

arated from each other throughout their length. Between the ends of the two magnets are placed pole-pieces of soft iron, the ends of which face each other, and, being brought very close together, are united by a small insulating or non-magnetic strip of suitable material, such as brass. The pole-pieces are in the form of flat oblong or rectangular strips, and are each surrounded by coils of insulated wire, through which coils the telephone-circuit is completed.

The inductive armature is but slightly wider and longer than the non-magnetic strip. It is attached to the diaphragm of the telephone, and is disposed symmetrically over the said strip, so as to be suspended above, to extend a slight distance over the magnetic poles.

The diaphragm may be of almost any kind of material. It may, for example, be a thin plate of wood, free or secured at the sides; or it may be a thin sheet of metal, which can be stretched as desired; or, again, it may be of mica. In a word, any plate susceptible of vibration and adapted to transmit sound may be used.

The diaphragm may be square, round, oval, or any desired shape. It may be exposed or covered with a protecting plate provided with a mouth-piece or acoustic tube.

The accompanying drawings, which form a part of this specification, represent telephones constructed in accordance with my invention, Figure 1 being an elevation with the diaphragm removed; Figs. 2 and 3, horizontal and vertical sections, respectively, on line *xx* and *yy*, Fig. 1; Fig. 4, a central vertical section of a modified construction; Fig. 5, a section on line *zz*, Fig. 4; and Figs. 6 and 7, partial views in different planes, showing the armature differently connected with the diaphragm from that illustrated in the other figures.

The same letters refer to like parts on the drawings wherever they occur.

A represents two horseshoe-magnets; B B', the two pole-pieces, of soft iron, fixed between the two pairs of poles of the magnets. The two pole-pieces are brought very close together, and



separated by a strip, *a*, of non-magnetic material—copper, for instance. *C C'* are bobbins carried by the pole-pieces, the coils of which are connected with binding-posts, as shown in Figs. 1, 2, and 3, or otherwise connected in the telephonic circuit.

The parts above described are inclosed in a box, *X*, of wood, ebonite, or other material, upon the face of which the vibratory diaphragm *G* is secured. This diaphragm is very large, and to it is attached the armature *b* by means of a block or tongue, *D*, fixed solidly to the center of the diaphragm. The armature is but little larger than the insulating material, and is held at a very small distance from and projects at the sides over the pole-pieces or cores *B B'*. The armature is thus placed opposite the center of the magnetic plane created by the poles of the magnet.

The adjustment is effected by any suitable means—for example, by springs and set-screws, as shown, operating to raise and lower the magnet.

The diaphragm, as before stated, can be of wood, mica, &c., and of all forms, free or stretched. In the drawings the diaphragms represented are square or rectangular, with a width exceeding somewhat their length. In Figs. 1, 2, and 3 the diaphragm is shown exposed, while in Figs. 4 and 5 it is covered with a plate provided with a mouth-piece.

In Figs. 4 and 5 the telephone is shown provided with devices for stretching the diaphragm.

The piece *D* for securing the armature to the diaphragm may be of different shapes and sizes, as illustrated in the different figures. As shown in Fig. 2, it corresponds in width with the armature. It may extend the entire length of the diaphragm, or be of the same length as the armature, or somewhat less. In Figs. 4 and 5 it is shown extending nearly the length of the diaphragm, and rounded on the under side, the armature being centrally attached, while in width it is very much less than the armature, and is placed in the middle line of the latter. In Figs. 6 and 7 the piece *D* is thin and shorter than the armature.

The material of which the piece *D* is composed may be the same as that of the diaphragm, as wood, or it may be metal.

Although I have shown the magnet composed of two magnets of horseshoe form, separated from each other, yet one, or three, or more may be used, and I do not limit myself to the horseshoe form.

The pole-pieces may be fixed in position on the permanent magnets in any way deemed proper, so long as they are under the magnetic influence.

The box or case may be of any suitable form and dimensions.

Having thus fully described my said invention, and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. A telephone having the poles of the magnet brought together almost to the point of touching, as described, thereby creating a magnetic plane, and provided with an inductive armature of a width but slightly, if any, greater than the space between the poles, arranged opposite the center of the aforesaid magnetic plane, whereby the readiness of the diaphragm of the telephone to vibrate and the amplitude of the vibrations are increased, substantially as set forth.

2. In a telephone, a magnet with pole-pieces connected with opposite poles, and arranged with their ends facing each other and brought almost to the point of touching, the said pole-pieces being surrounded by bobbins, the ends of which latter face each other also, substantially as described.

3. The combination, with a magnet having its poles surrounded by bobbins, brought together end to end almost to the point of touching, and separated by a strip of non-magnetic material, the said bobbins being placed also end to end, of an armature but slightly wider than the non-magnetic strip, suspended from a vibratory diaphragm between the ends of the said bobbin centrally over the aforesaid strip, substantially as described.

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

CLÉMENT ADER.

Witnesses:

FREDERIC A. GOWER,  
ROBT. M. HOOPER.