

(No Model.)

3 Sheets—Sheet 1.

W. A. WEST.

TELEPHONE.

No. 300,422.

Patented June 17, 1884.

Fig. 1.

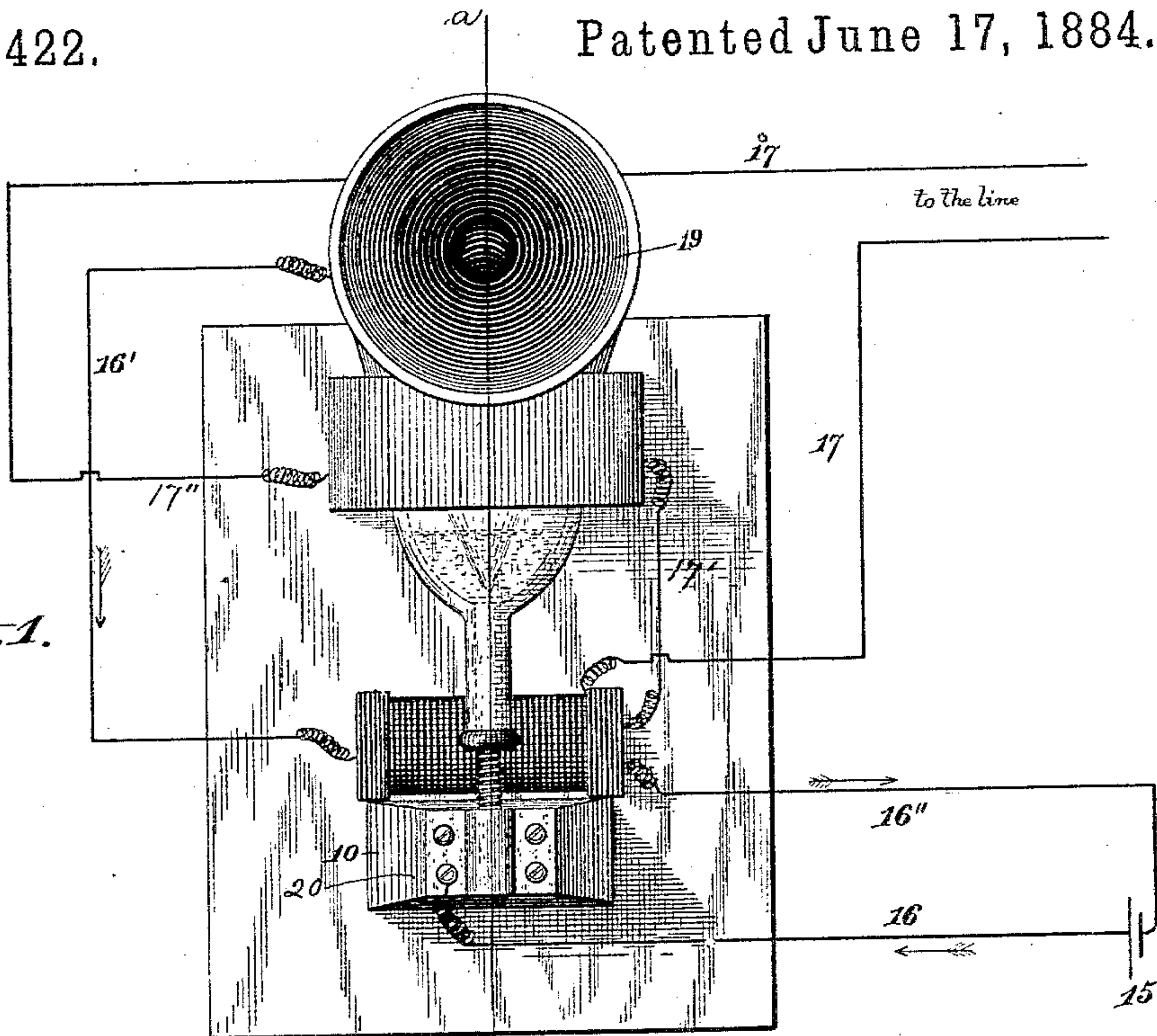


Fig. 2.

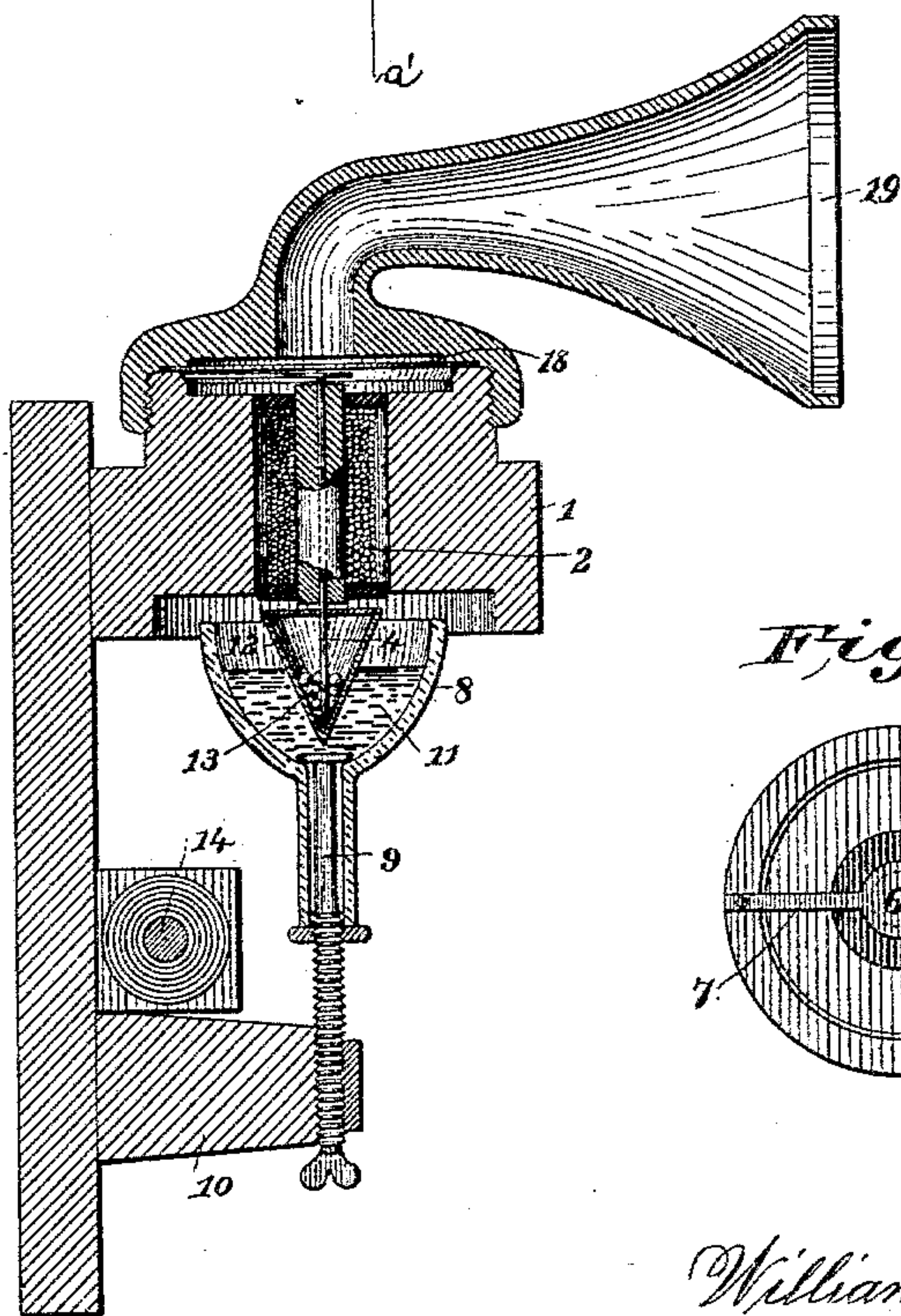
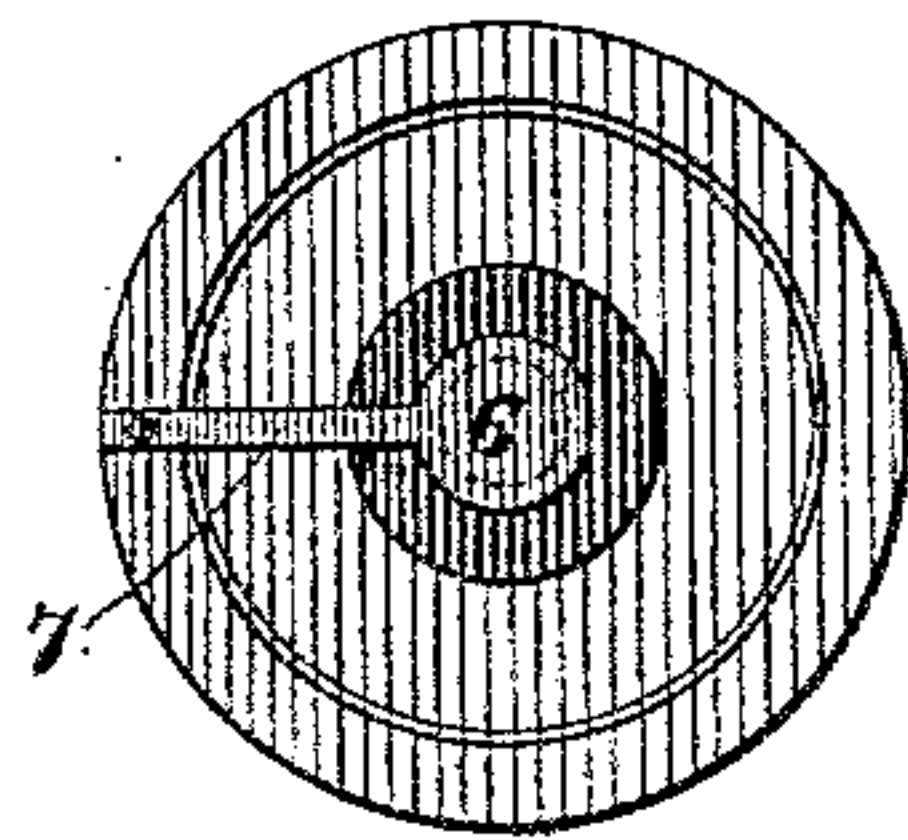


Fig. 3.



Attest:

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J. Henry Kaiser.*

Inventor

William A. West.

By Knight Bros

attys.

(No Model.)

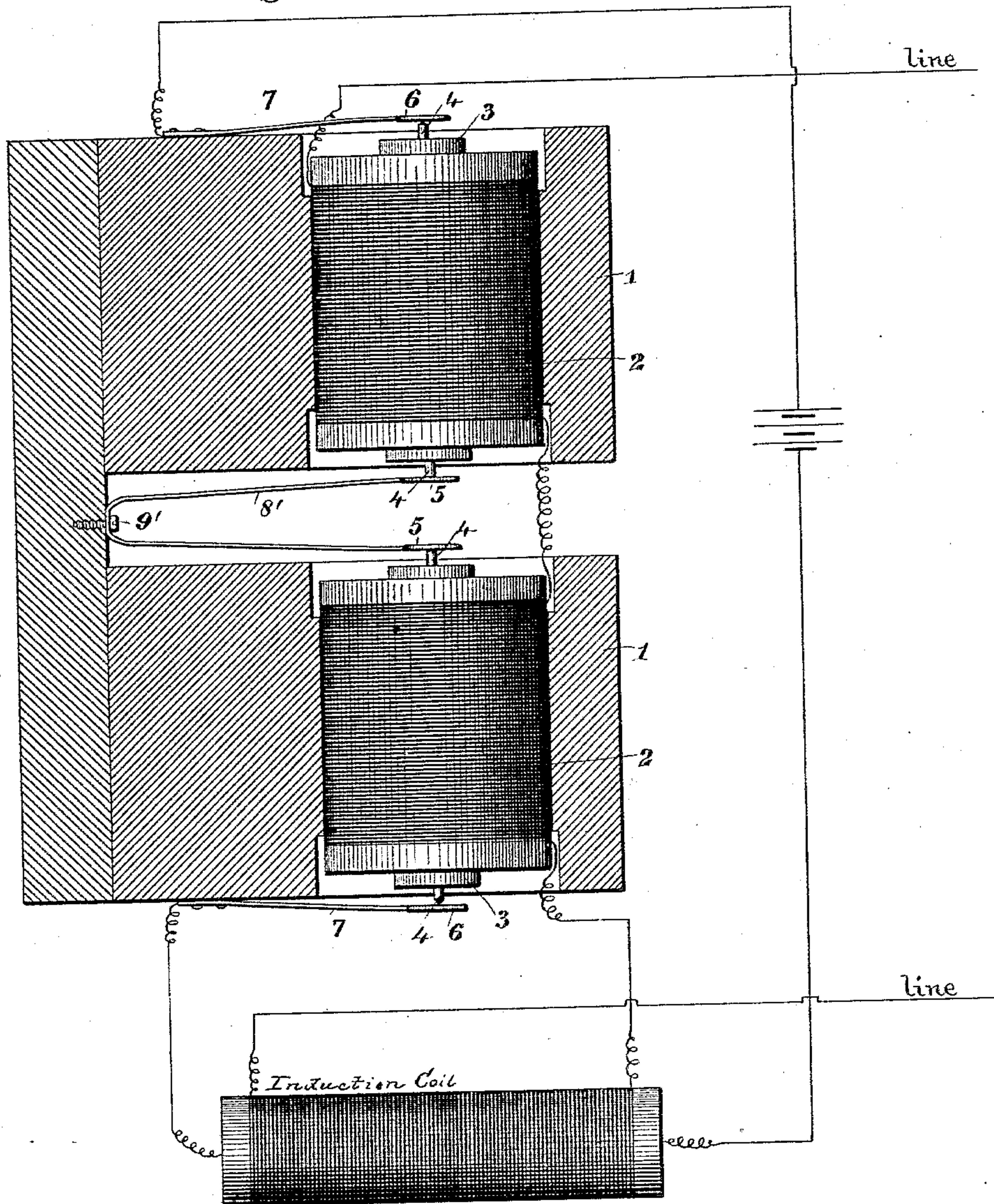
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Fig. 4.



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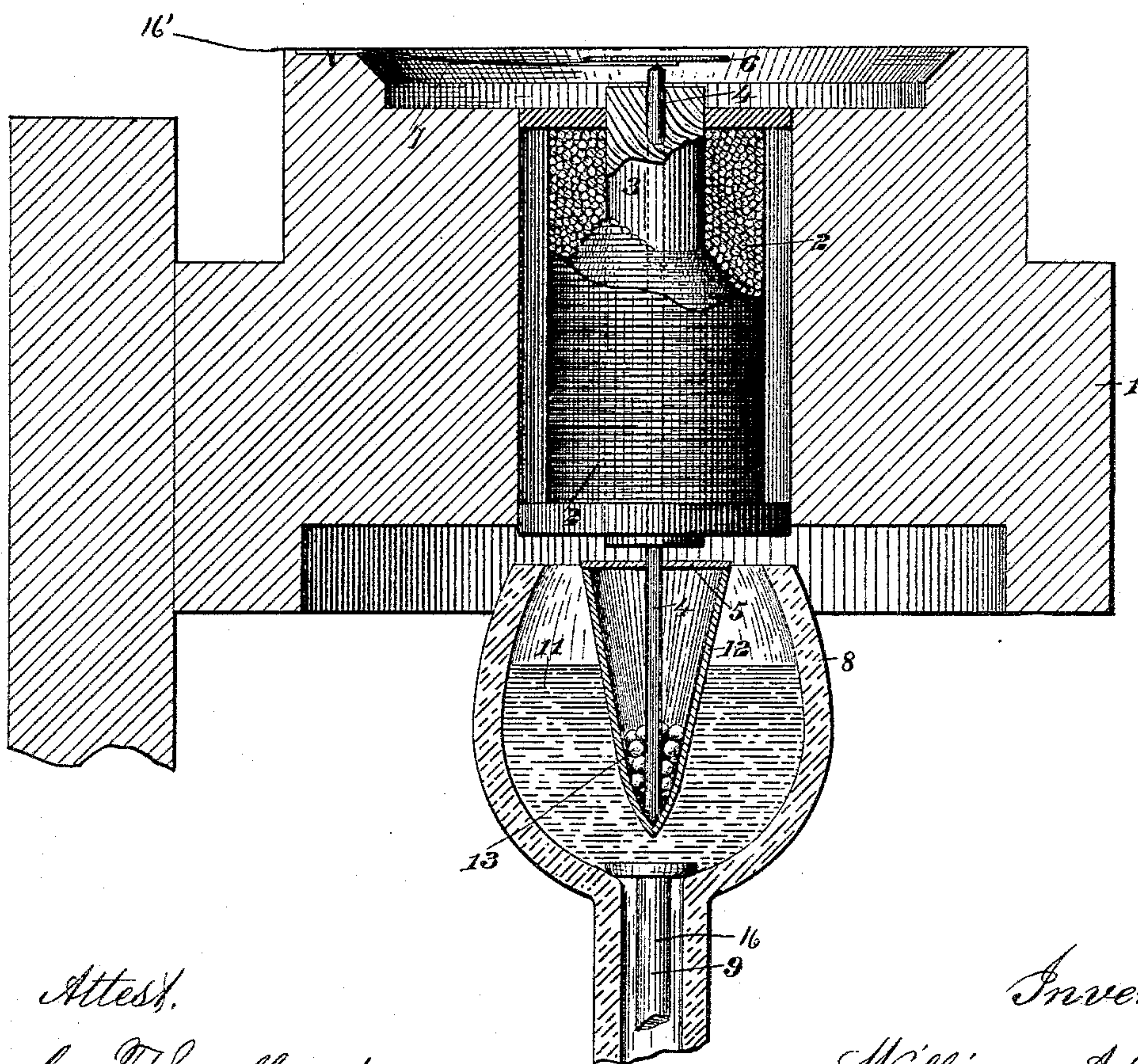
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Fig. 5.



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UNITED STATES PATENT OFFICE.

WILLIAM A. WEST, OF BELLEFONTAINE, OHIO.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 300,422, dated June 17, 1884.

Application filed July 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. WEST, a citizen of the United States, residing at Bellefontaine, Ohio, have invented certain new and useful Improvements in Telephones, of which the following is a specification.

My invention consists in a telephonic apparatus which may be used as a transmitter, as a receiver, or as a re-enforcing device, which may be placed at points along the line and add fresh strength to the weakening current.

It consists of improvements in "reaction" telephones, which consist, in general, of a polarized electro-magnet and an induction-coil, the main line passing through said magnet and the secondary of said induction-coil, and a local circuit passing through the primary of the induction-coil and over a microphonic contact controlled by the electro-magnet. A vibrating diaphragm is usually added to the electro-magnet when the device is used as a transmitter or receiver. By this arrangement whenever an electric current is set up on the main line, either in the process of transmitting or receiving, the electro-magnet becomes active, actuates the microphonic contact in the local circuit, and produces thereby a variation of current therein, which variation, by means of the induction-coil, sets up an additional current in the main line, and this additional current will be practically coincident with the original impulse. As this additional current energizes the electro-magnet still more, an accumulative or reactionary process ensues, the original impulse always tending to intensify itself. The best form of my invention which I have yet devised is shown in the accompanying drawings, in which—

Figure 1 is a front elevation. Fig. 2 is a section on line *a a'*, Fig. 1. Fig. 3 is a plan view of the electro-magnet and its armature. Fig. 4 is a modified form of the device as a relay, and Fig. 5 is an enlarged view, partly in section, of the electro-magnet and its adjuncts.

In Figs. 1, 2, 3, and 5, 2 is an electro-magnet supported vertically in a suitable case, 1. At opposite ends of magnet-core 3 are soft-iron disk-armatures 5 and 6. The top armature, 6, is supported on a slight horizontal spring-arm, 7, and rests on the top of a diamagnetic needle or rod, 4, making a microphonic con-

tact therewith. Needle 4 passes down through a longitudinal perforation in steel core 3, and is rigidly attached to lower armature, 5, which is supported by a conical float, 12, in a mercury-cup, 8. The weight of the float 12 is adjustable by small balls 13, and the mercury-cup 8 is itself vertically adjustable by screw 9, working in bracket 10. By this arrangement a very delicate adjustment may be had, and armature 5 very nicely balanced between gravity acting in one direction and the upward pressure of the mercury added to the attraction of polarized core 3 acting in the opposite direction.

Instead of the mercury-float a spring may be used, as in Fig. 4, and will necessarily be used when the magnet is placed in other than a vertical position. By the opposing pressure of spring 7 and mercury 11 and the conjoint action of the two armatures at the opposite ends of the magnet a very strong yet very delicate microphonic action is insured between needle 4 and armature 6, and a corresponding variation in the local circuit. When used as a transmitter or receiver, the diaphragm 18 and trumpet 19 are employed, although I have distinctly transmitted speech with the disk-armatures alone. The diaphragm 18 is placed at any suitable distance from the core 3.

The circuits described above may be followed in Figs. 1 and 5, the line-circuit 17 going to secondary of induction-coil 14, thence by 17', magnet-coil 2, and by 17" to line, while the local circuit goes from battery 15 by line 16 to bracket 10, to arm 9, mercury 11, needle 4, microphonic contact, and by armature 6 and spring 7 to line 16', thence to primary of induction-coil 14, and back to battery by line 16".

As a transmitter the device acts both magneto-electrically and electrically or microphonically, for, in the first place, the vibrations of iron diaphragm 18 disturb the magnetic condition of steel core 3 and induce undulating electrical impulses in surrounding coil in main line, while in the second place the vibrations of the diaphragm act on the microphonic contact and vary thereby the current of the local circuit, which current variations act through the induction-coil to set up corresponding variations in the main line. These two sources of variable current in the main line are practically coincident in action, and the current

thus set up reacts through magnet 2 to still further increase the intensity of its source. As a receiver the variable line-current through magnet 2 acts directly on diaphragm 18 to produce sound-waves, and at the same time to produce a corresponding microphonic action in the local circuit, which reacts accumulatively to intensify itself. As an intermediate re-enforcing device the action is the same as when used as a receiver, except that no diaphragm is necessary to reproduce sound-waves. The reactionary microphonic effect of the original current causes fresh strength to be added to its own impulses. A good form of the device for this purpose is shown in Fig. 4, wherein the arrangement of Fig. 2 is simply duplicated, a spring, 8', being used in place of the mercury-cup. The two magnets 2 2 are placed end to end, their two armatures, 5 5, rigidly attached to diamagnetic needles 4 4 and supported by the spring 8', fastened to the base at 9'. The two armatures 6 6 are supported by springs 7 7 and have microphonic contact with needles 4 4. The circuits are the same as above described, the two microphonic contacts being in series in the local circuit and the two magnets 2 2 are in series in the main circuit. There is in this arrangement the power of four armatures, instead of two, acting on two contacts instead of one, and a corresponding increase of variable intensity.

In an application filed by me November 12, 1883, I lay claim, broadly, to a relay or reactionary re-enforcing device, such as is herein shown, and also to the diaphragm combined with two armatures and a microphonic contact controlled jointly thereby, and I therefor do not claim such in this case.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination of a main and a local

circuit, a number of electro-magnets in series in the main circuit, a number of sets of microphonic contacts in series in the local circuit, means for simultaneously actuating the contacts by the action of the electro-magnets, and an induction apparatus having the primary in said local and the secondary in said main circuit.

2. The combination of an electro-magnet having a perforated core and placed vertically, an armature at each end thereof, a diamagnetic needle passing through said core and rigidly connected to one armature while making a microphonic contact with the other armature, a mercury-float forming an elastic support for one armature, an induction-coil and a main and a local circuit, the former including the electro-magnet and the secondary of the induction-coil, the latter including the local battery, microphonic contact, and primary of the induction-coil.

3. The combination of an electro-magnet having a perforated core and placed vertically, a horizontal diaphragm therefor, two armatures for said magnet, a diamagnetic needle passing through said core and rigidly connected to one armature while making a microphonic contact with the other armature, and a float in mercury forming an elastic support for one armature.

4. The combination of an electro-magnet having a perforated core and placed vertically, an armature at each end thereof, a diamagnetic needle passing through said core and rigidly connected to one armature while making a microphonic contact with the other armature, and a float in mercury forming an elastic support for one armature.

W. A. WEST.

Witnesses:

OCTAVIUS KNIGHT,
HARRY E. KNIGHT.