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Patented Nov. 25, 1902.

H. SHOEMAKER.  
WIRELESS TELEGRAPHY.

(Application filed Oct. 25, 1901.)

(No Model.)

3 Sheets—Sheet 1.

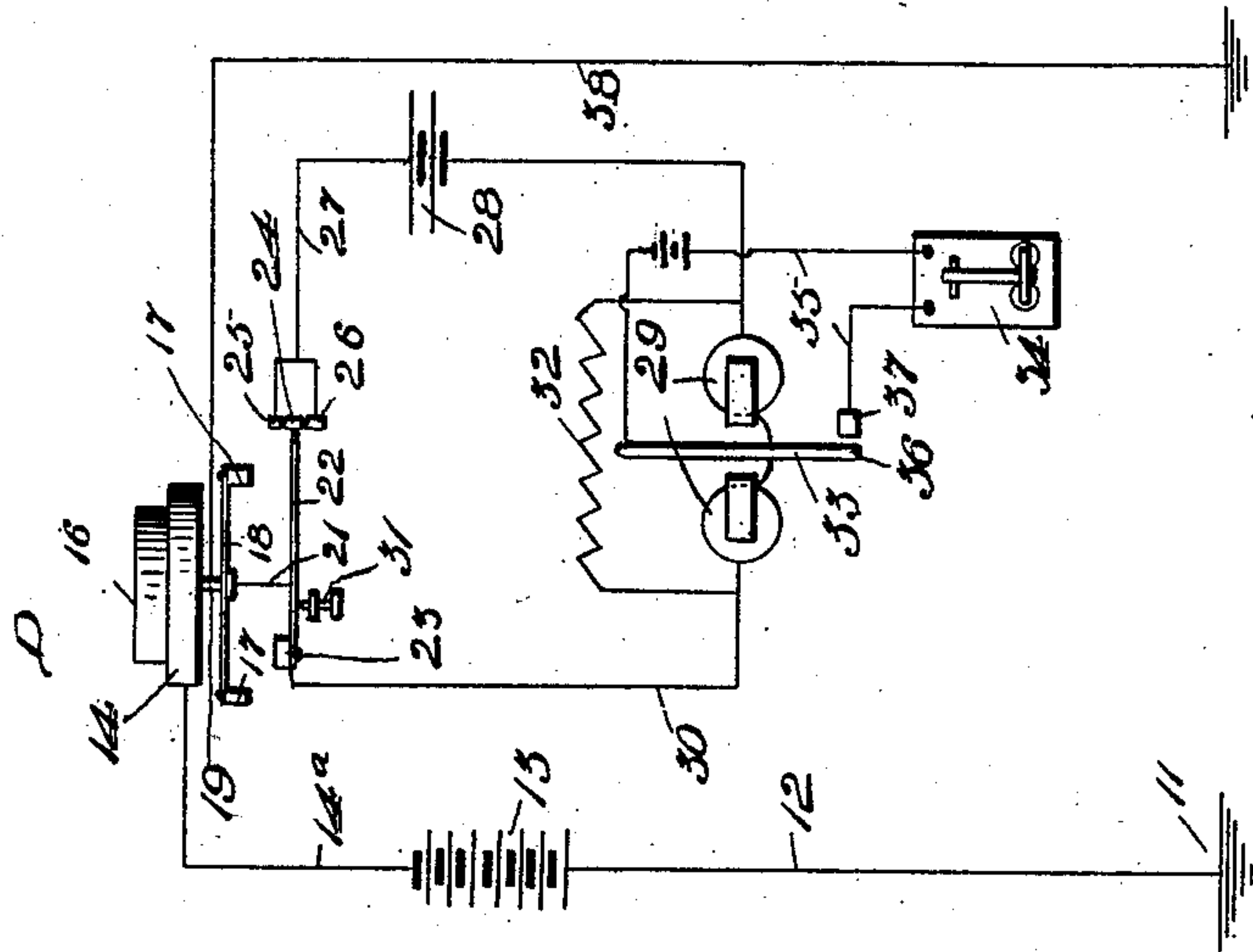
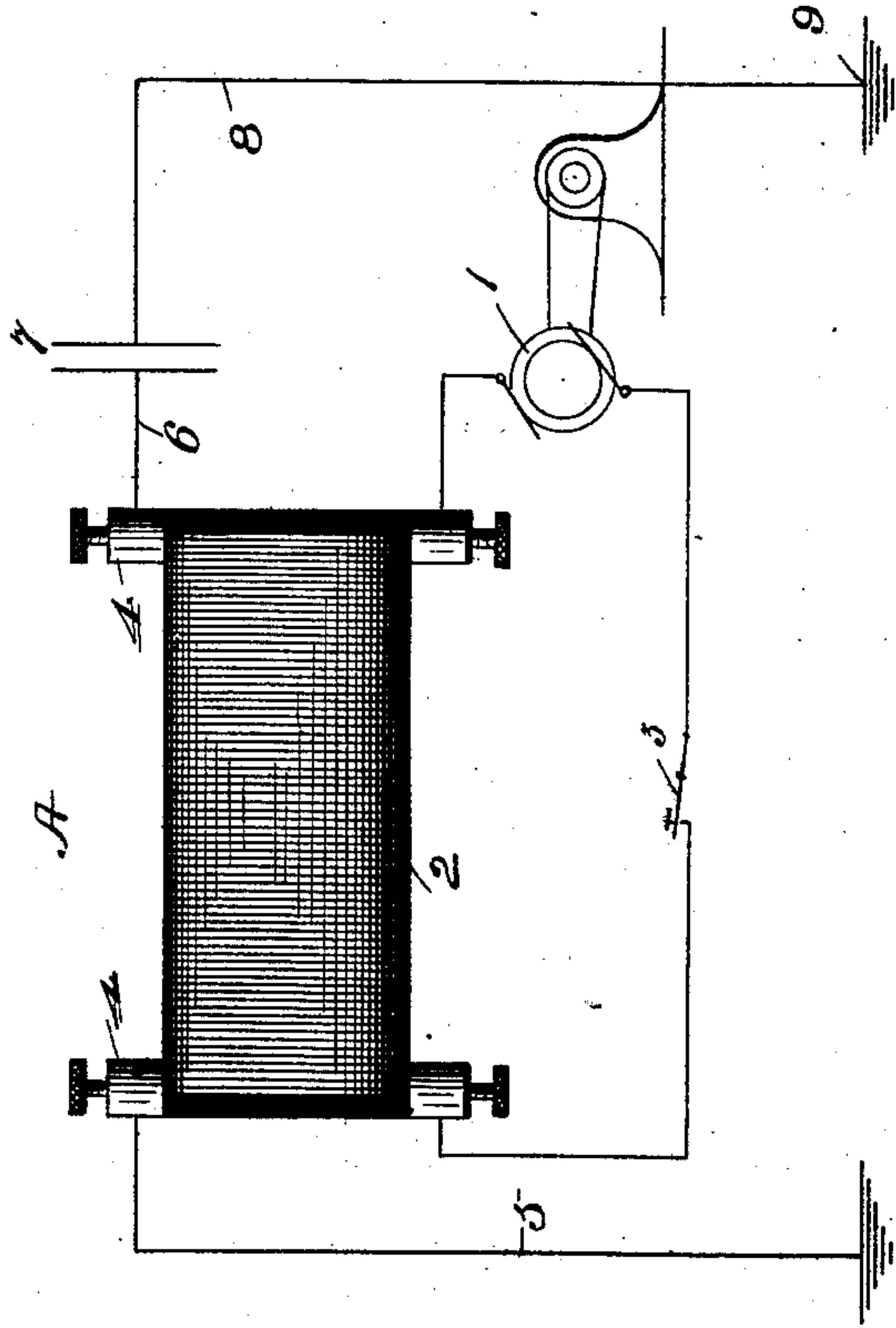


Fig. 1.



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Fig. 2.

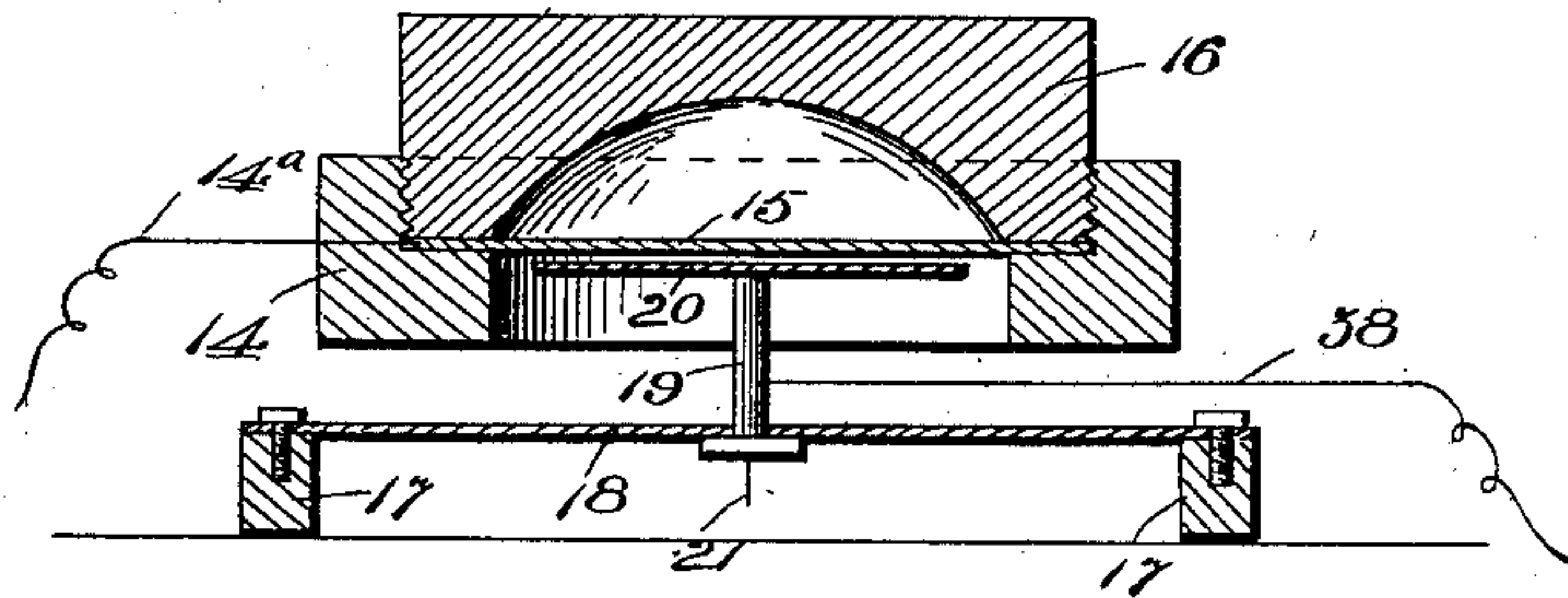
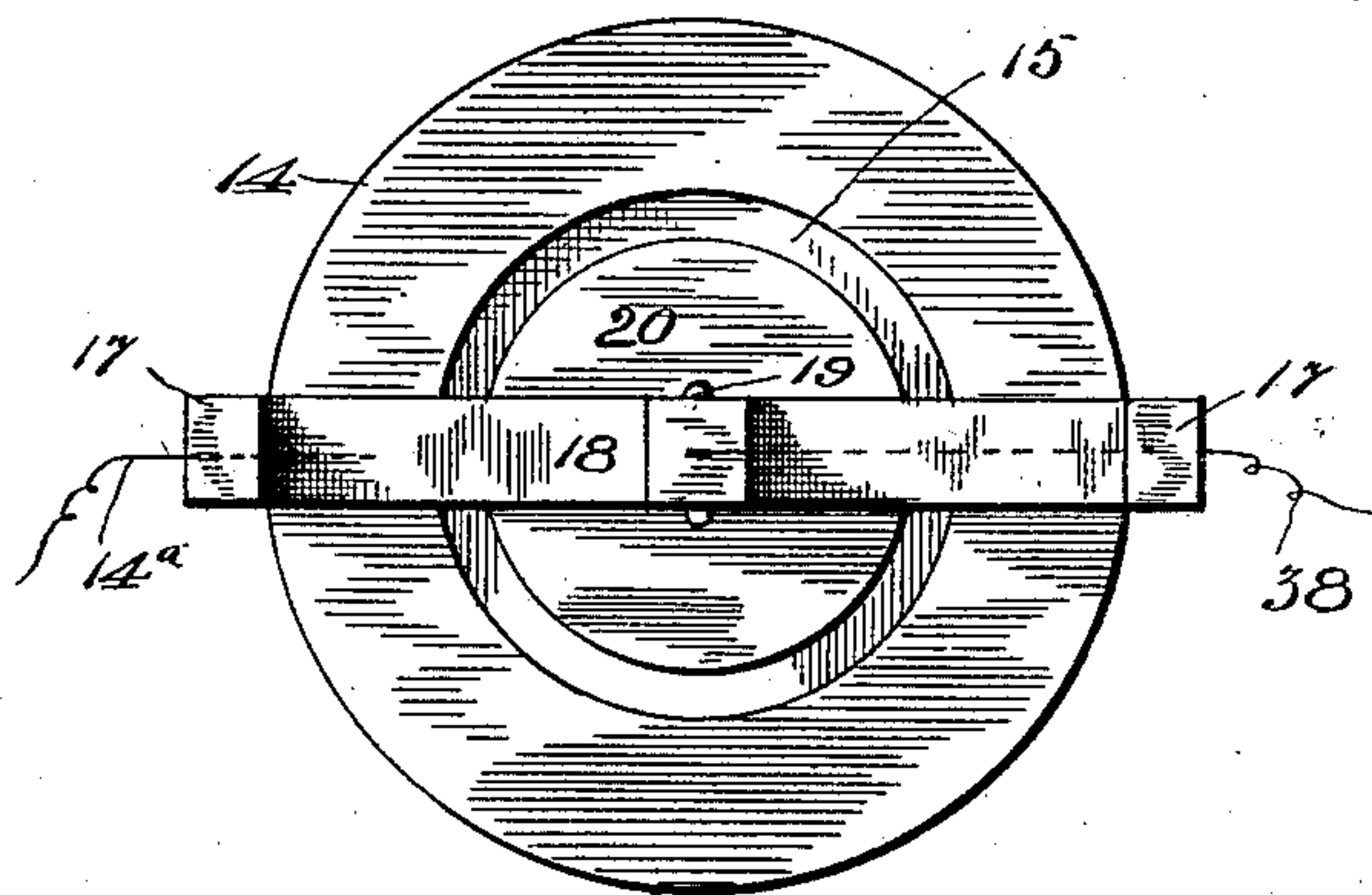


Fig. 3.



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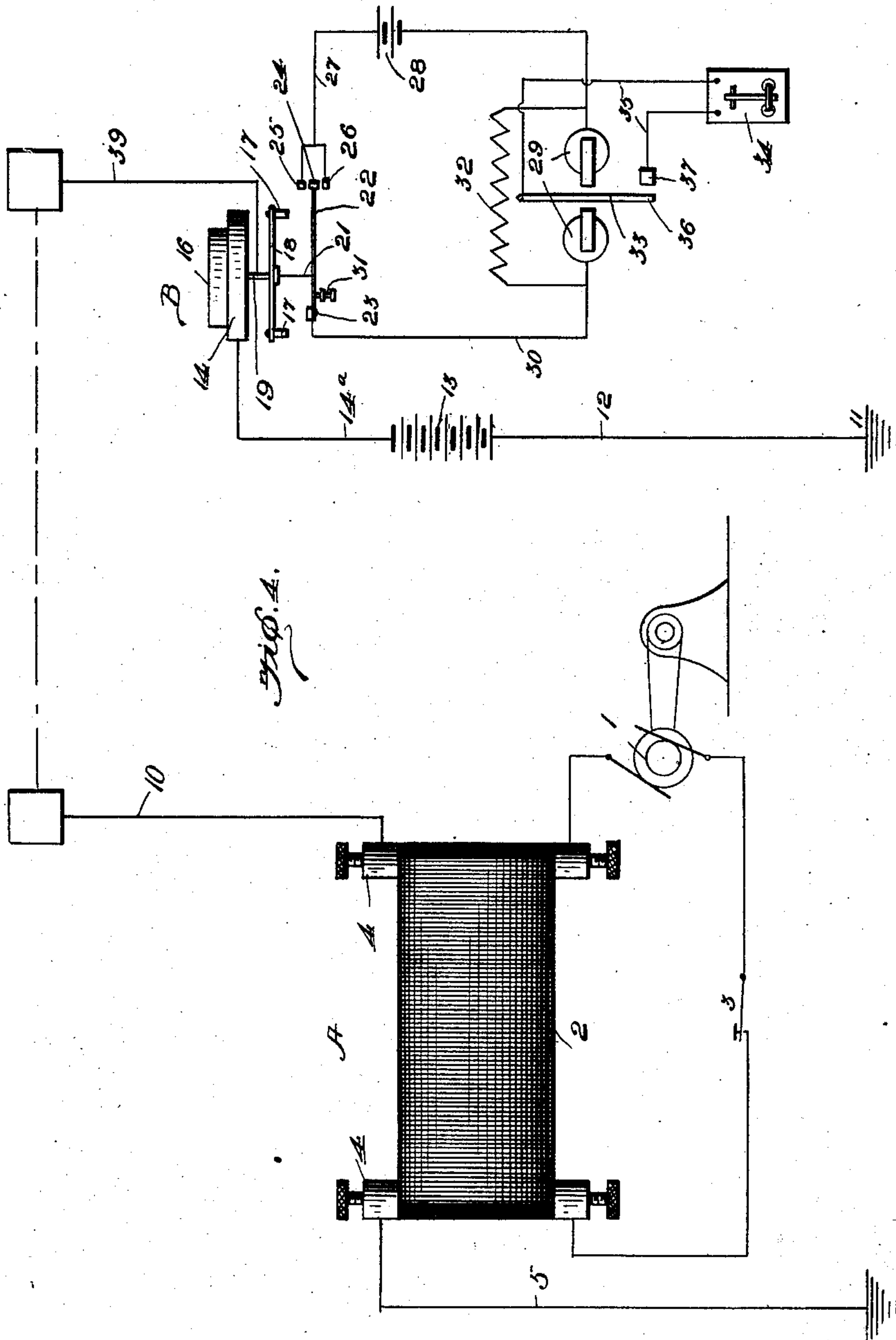
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# UNITED STATES PATENT OFFICE.

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## WIRELESS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 714,246, dated November 25, 1902.

Application filed October 25, 1901. Serial No. 79,959. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Wireless Telegraphy, of which the following is a specification.

This invention relates to improvements in wireless telegraphy, and has special reference to an apparatus in which static induction is used for operating the receiver.

Another object of my invention is to dispense with the Hertz oscillators now so generally used and also the imperfect electrical contact or coherer.

Another object of my invention is the provision of a system which employs two ground connections at each station, although a ground and an air wire may be employed, if so desired.

Another object of my invention is the provision of a system which is easily tuned, so that any number of apparatus may be operated at the same time without in any way affecting the other.

Another object of my invention is the provision of a transmitting apparatus in which is employed an alternator and a transformer which cause vibrations to pass through the earth or air to the receiving apparatus, which is provided with means which are positively operated to effect a relay and sounder, thus dispensing with the Hertz oscillator and the coherer.

To attain the desired objects, the invention consists of a system of wireless telegraphy embodying novel features of construction and combination of parts, substantially as disclosed herein.

In the drawings, Figure 1 is a diagrammatical view of the entire system. Fig. 2 is a sectional view of the receiving means, and Fig. 3 is a bottom plan view thereof. Fig. 4 is a diagrammatical view of the entire system using a ground and an air conductor at each station.

Referring to the drawings, A designates the transmitting apparatus, and B the receiving apparatus.

The transmitting apparatus consists of the alternator 1, to which is connected the primary of the transformer 2, a key 3 being employed to control the current through the wires connecting the two. Connected to the secondary posts 4 of the transformer are respectively the ground-wire 5 and the wire 6, to which is further connected the condenser 7, having the wire 8 connecting it to the ground at 9. If it should be desired, an air connection may be employed and is placed as shown in Fig. 4.

The receiving apparatus consists of the ground 11, to which is connected the wire 12, which is connected to the batteries 13, a wire 14<sup>a</sup> connecting these batteries to the cap 14, which clamps and holds the ferrotype-diaphragm 15 in place. Secured to this cap is the rubber cup 16. The wire is also connected to the diaphragm.

Mounted upon the posts 17 is the strip 18 of mica or any resilient insulation material. It is so mounted as to be free to vibrate at a certain period or pitch, depending upon its length. Carried by this strip by means of a post 19 is a metal plate or disk 20, which is also free to vibrate with said strip. Connected to the strip and also with the post 19 by means of a wire 21 is a spring-pointer 22, which is connected to a post 23, so as to have a slight spring motion, and upon its free end is carried the double-headed contact-point 24, which is adapted to always slightly contact one of the points 25 or 26, which, with the wires 27, battery 28, relay 29, wire 30, and pointer, make a circuit. An adjusting-screw 31 is used to vary the pressure of the spring-pointer. 32 is a non-inductive resistance which takes up self-inductance of the relay. The armature 33 controls the sounder 34 through its circuit 35 as contact at 36 and 37 is made. A ground-wire 38 is connected to the post 19, and, if desired, an air-wire 39 may be employed.

From the foregoing description, taken in connection with the drawings, the operation is readily understood; but, briefly stated, it is as follows: As the source of electricity here employed is an alternator, the same is continuously operated, the key keeping the cur-



rent from flowing through the primary of the transformer. When the key is pressed, the circuit is closed and the primary of the transformer is energized, this causing an alternating potential at the grounds. This sends out electrostatic waves at the ground, these waves being radiated over the surface of the earth in much the same manner as ripples in a pond when a stone is thrown therein—that is, it varies the potential at different points in its path. When these waves reach the receiver, a change of potential is caused at the receiver's grounds, causing variations of potential between 15 and 20, thus causing the plate 20 to vibrate the pointer. The relay is now energized, as the points have made a positive contact, and thus the recorder-circuit is operated and a signal transmitted and received. With this system it is possible to operate a great number of transmitting and receiving apparatus without interference, as the plate 20 has a certain natural period of vibration. If these impulses are sent in the same period as the natural period of the strip, the plate carried thereby will get its maximum swing, hence will record the characters sent. Should the periods of the transformer not be the same as the strip, it will not get its maximum swing, but may be affected to a certain extent, which would not be enough to record the characters. The transformer which furnishes the varying potential should have the same period as the strip.

I would have it understood that in place of the transformer and the alternator I may employ an induction-coil and a battery, an ordinary break being used with the coil and being run at the same period as the diaphragm of the receiver. This furnishes a varying potential and will operate equally as well.

The condenser in the transmitter is employed for the purpose of keeping the potential up, as it has enough dielectric to raise the potential very high, and also giving two negative grounds instead of one.

The battery of the receiver is of very high potential, being about one thousand volts, this being done to keep the diaphragm under a static field, thus making the same more sensitive in the same manner as the common magnetic field in magneto-telephones makes them more sensitive.

In the apparatus an air-wire may be employed and if used assumes the relative position as shown in Fig. 4.

I have found by experimenting that the grounds of the transmitter and receiver should be substantially the same distance apart—say from twenty to thirty feet—and also that the distance between the parts 15 and 20 should not be over one-eighth to one-fourth of an inch, the best results being obtained when the enumerated parts are substantially the distance apart as I have herein stated. The purpose of the condenser 7 is to restrict the amount of current through the

wires in the transmitter and to prevent a short circuit.

What I claim as new is—

1. In a signal system, a transmitter, which comprises a generator of fluctuating potentials, connections from said means to separated earth-plates through a current or kinetic-energy restraining means.

2. A transmitter which comprises means for generating high-potential fluctuating energy, connections from said means to separated earth-plates through a current or kinetic-energy restraining means, whereby electrostatic energy of high potential is impressed upon the earth.

3. A transmitter which comprises a source of fluctuating electrical energy, a primary of a transformer in the circuit of said source, a means for controlling the energy in accordance with the signal to be sent, and connections from the secondary of said transformer to separated earth-plates through a current or kinetic-energy restraining device, whereby electrostatic energy of high potential is impressed upon the earth.

4. A transmitter which comprises means for generating fluctuating potential differences, connections for said means to separated earth-plates and a condenser between said generating means and one of the earth-plates and means for modifying the fluctuating potentials in accordance to the signal to be sent.

5. A transmitter which comprises a source of fluctuating electrical energy, a primary of a transformer in the circuit of said source, a means for controlling the energy in accordance with the signal to be sent and connections from the secondary of said transformer to separated earth-plates through a condenser, whereby electrostatic energy of high potential is impressed upon the earth.

6. In a signal system the combination of a transmitter which comprises a generator of fluctuating potentials, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver which comprises a plurality of plates in inductive relation, means for permanently charging the plates, and a local circuit controlled by said plates.

7. In a signal system, the combination of a transmitter, which comprises means for generating fluctuating potential differences, connections for said means to separated earth-plates, and means for modifying the fluctuating potentials in accordance with the signal to be sent; and a receiver, which comprises a plurality of plates in inductive relation, means for permanently charging the plates, and a local circuit controlled by said plates.

8. In a signal system, the combination of a transmitter, which comprises means for generating high-potential fluctuating energy, connections from said means to separated earth-plates through an energy-restraining means,



whereby the earth connections are maintained at widely-different potentials; and a receiver, which comprises a plurality of plates in inductive relation, means for permanently charging the plates, and a local circuit controlled by said plates.

9. In a signal system, the combination of a transmitter, which comprises a source of fluctuating electrical energy, a primary of a transformer in the circuit of said source, a means for controlling the energy in accordance with the signal sent, and connections from the secondary of said transformer to separated earth-plates through an energy-restraining device, whereby said earth-plates are maintained at widely-different potentials; and a receiver, which comprises a plurality of plates in inductive relation, means for permanently charging the plates, and a local circuit controlled by said plates.

10. In a signal system, the combination of a transmitter which comprises a generator of fluctuating potentials, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver, which comprises a plurality of plates in inductive relation, and a source of high-potential energy in connection with opposing plates through an earth-circuit.

11. In a signal system, the combination of a transmitter, which comprises means for generating fluctuating potential differences, connections for said means to separated earth-plates, and means for modifying the fluctuating potentials in accordance with the signal to be sent; and a receiver, which comprises a plurality of plates in inductive relation, and a source of high-potential energy in connection with opposing plates through an earth-circuit.

12. In a signal system, the combination of a transmitter which comprises means for generating high-potential fluctuating energy, connections from said means to separated earth-plates through an energy-restraining means, whereby the earth connections are maintained at widely-different potentials; and a receiver, which comprises a plurality of plates in inductive relation, and a source of high-potential energy in connection with opposing plates through an earth-circuit.

13. In a signal system, the combination of a transmitter which comprises a source of fluctuating electrical energy, a primary of a transformer in the circuit of said source, a means for controlling the energy in accordance with the signal sent, and connections from the secondary of said transformer to separated earth-plates through an energy-restraining device, whereby said earth-plates are maintained at widely-different potentials; and a receiver which comprises a plurality of plates in inductive relation, and a source of high-potential energy in connection with the opposing plates through an earth-circuit.

14. In a signal system, the combination of a transmitter, which comprises a generator of

fluctuating potentials, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver, which comprises opposing plates, a high-potential source of energy connected to said plates through an earth-circuit to permanently charge the same, and a circuit-controlling means operated by the reaction between said plates upon the reception of a signal.

15. In a signal system, the combination of a transmitter, which comprises a generator of fluctuating potentials, and connections from said generator to separated earth-plates through an energy-restraining means, and a receiver, which comprises plates in inductive relation to each other, means for normally charging said plates to a high potential, means controlling a local signal-circuit operated upon fluctuations of charge on said plates due to received signal energy.

16. In a signal system, the combination of a transmitter, which comprises a generator of fluctuating potentials, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver, which comprises a plurality of plates in inductive relation, batteries of high potential permanently charging the plates, and a local circuit controlled by said plates.

17. In a signal system, the combination of a transmitter, which comprises a generator of fluctuating potentials, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver, which comprises a plurality of plates in inductive relation, a battery of high-potential energy in connection with opposing plates through an earth-circuit.

18. In a signal system, the combination of a transmitter, which comprises a generator of fluctuating potential, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver which comprises opposing plates, a battery of high potential connected to said plates through an earth-circuit to permanently charge the same, and a circuit-controlling means operated by the reaction between said plates upon the reception of a signal.

19. In a signal system, the combination of a transmitter, which comprises a generator of fluctuating potential, and connections from said generator to separated earth-plates through an energy-restraining means; and a receiver, which comprises plates in inductive relation to each other, a battery for normally charging said plates to a high potential, and means controlling a local signal-circuit operated upon fluctuations and charge on said plates due to received signal energy.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY SHOEMAKER.

Witnesses:

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