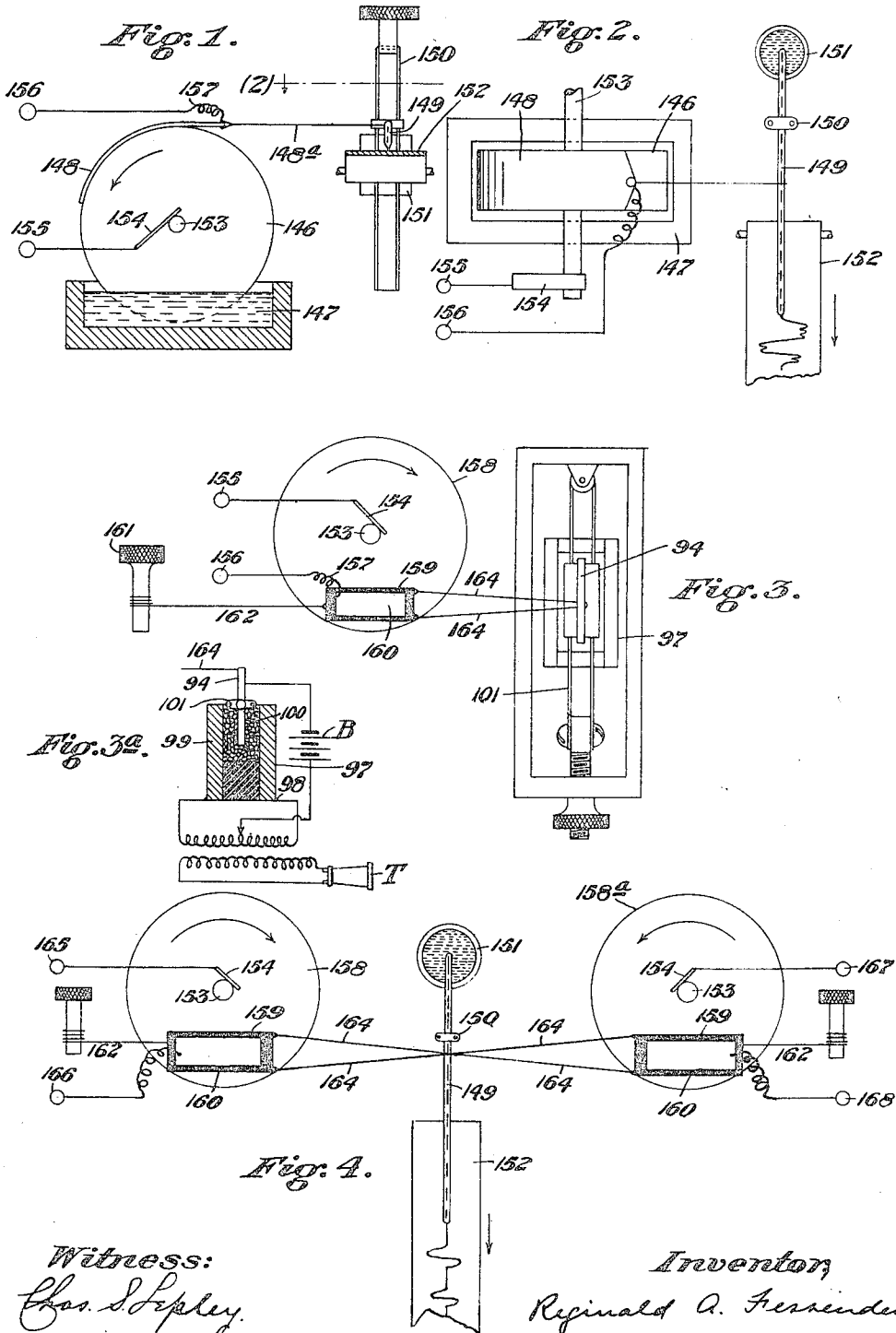


R. A. FESSENDEN.
WIRELESS TELEGRAPHY.
APPLICATION FILED JAN. 29, 1910.

1,045,781.

Patented Nov. 26, 1912.



Witness:
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UNITED STATES PATENT OFFICE.

REGINALD A. FESSENDEN, OF BRANT ROCK, MASSACHUSETTS, ASSIGNOR TO NATIONAL ELECTRIC SIGNALING COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

WIRELESS TELEGRAPHY.

1,045,781.

Specification of Letters Patent.

Patented Nov. 26, 1912.

Original application filed June 16, 1908, Serial No. 438,725. Divided and this application filed January 29, 1910. Serial No. 540,732.

To all whom it may concern:

Be it known that I, REGINALD A. FESSENDEN, a citizen of the United States, residing at Brant Rock, in the State of Massachusetts, have invented certain new and useful Improvements in Wireless Telegraphy, of which the following is a specification.

My invention relates to the art of signaling by electromagnetic waves, and its primary object is to provide a more efficient receiving device for signals so sent.

This application is a division of my co-pending application No. 438,725, filed June 16th, 1908.

In the accompanying drawing Figure 1 is a side view of a receiver for producing a visible signal, and Fig. 2 is a plan of the same. Fig. 3, shows a side view of a modified form of electrostatic receiver producing a change in a local microphonic circuit. Fig. 3^a is a partial vertical section and diagram of an amplifier or relay. Fig. 4 is a similar view of a modified form in which pressure effects are balanced and operate differentially to produce a more sensitive instrument.

A static telephone receiver as described by Dolbear in his United States Patent No. 350,299 of 1882, has been used in various forms, with the diaphragms made of sheet metal either plain or covered with an electrified dielectric, or else made of a dielectric with a metallic coating on the side next the fixed plate. These types of receiver, however, have been insensitive and have not come into practical use. I have discovered, however, that by the use of certain improved constructions and methods of operation, static receivers can be made extremely sensitive, and I here show a form of such receivers.

For example, I have found that if a thin conducting film such as gold leaf, be coated with insulating material and kept in relative motion in contact with another surface, the friction is greatly altered when the conducting film is electrified. Therefore as shown in Fig. 1, I make use of this phenomenon by providing a wheel 146 with a conducting surface such as finely burnished nickel steel or platinum iridium, which may be driven by any convenient means at uniform speed, and in revolving dips into a bath such as a tank of lubricating oil 147,

whereby the lubricant is carried over the wheel and forms a thin film thereon. A light film of aluminum or gold 148 rests thereon. (For use with aluminum I found milk to be a suitable lubricant). This gold or aluminum leaf 148 is connected by a filament 148^a to a siphon arm 149, supported in any convenient way as by bifilar suspension 150, dipping into an ink well 151 and its discharge end resting on traveling paper 152 driven by pulleys or in any other usual way. It will be understood that the axle 153 of the wheel 146 is electrically connected as by a brush 154 to a terminal 155 connected with an oscillating circuit, while the other terminal 156 may be connected by a flexible lead 157 to any convenient point on the leaf 148.

In operation, the impulses received from an antenna or other circuit at one of the terminals 155, 156, charge the leaf 148 and the wheel 146 through the medium of the separating film of lubricant. This charging produces an increased frictional drag between the relatively moving parts, (probably on account of increased pressure between the surfaces, in part, though it appears that there are other obscure causes unnecessary to mention). The increased friction of course acts to move the leaf 148 and therefore moves the pointer of the recorder 149, making a written signal as shown in Fig. 2.

In the modification shown in Fig. 3, I use a disk 158 rotating in a horizontal plane, and resting on it is a thin film of mica 159, made as thin as possible and covered with gold foil 160 over the whole area except the edges. As before, the terminals 155 and 156 are connected respectively to the disk and the coating on the mica leaf. The position of the mica leaf is controlled by a fine fiber 162 which is mounted for adjustment of tension on a bolt 161. The other end of the mica leaf may be connected by fine filaments 164 to a plate 94 which is mounted pivotally on wires 101 and has one end dipping into a trough 97 containing granules of carbon 100 and having electrodes 98 and 99 connected to a local signaling circuit, the whole device forming a relay as indicated in Fig. 3^a,—it being understood that the battery circuit has one terminal connected to the plate 94. Thus the movements of the elec-

trostatic leaf 159, 160, will move the plate 94, vary its position and pressure in the trough of microphonic carbon and thereby vary the current in the local battery circuit and effect the telephone T, as will be evident to those familiar with the art. Of course, any other form of amplifier or relay could be used in place of that shown in Fig. 3^a, or any other device for making apparent the movements of the electrified leaf 160, but I have found this form of relay extremely sensitive.

In Fig. 4, I have shown a modified form of receiver and recorder in which I employ two revolving disks 158 and 158^a, each having a mica strip and gold leaf as in Fig. 3. This being as before connected to live terminals 165, 166, on the one side, and 167, 168, on the other. The leafs are supported as before by filaments 162 and 164, but in this case all the filaments 164 are connected to the arm of the siphon recorder 149 as in Figs. 1 and 2. By this means, I get a differential effect by the balanced tensions of the traction elements by adjusting the phase of the oscillations through the two circuits to act oppositely and this results in making the device much more sensitive.

Having thus described my invention and its use, what I claim is:

1. An electrical indicator comprising two conducting members in proximity with a dielectric between them, and maintained in relative motion, to cause a frictional traction and means to produce an electrostatic field of force between said members, and means to indicate the resulting relative change of position of said two members.

2. An electrical indicator comprising rela-

tively movable conductors maintained in frictional relation through the medium of an intervening dielectric, means for electrostatically charging said members, whereby to change the degree of friction, and means for recording the resulting change of relative position of said conductors.

3. An electrical indicator comprising two pairs of relatively movable conducting members in frictional relation to each other through the medium of an intervening dielectric, a recorder connected to said pair of conductors so as to be acted on differentially by their tractive forces, and means to produce an electrostatic field of force between the members of each pair of conductors, whereby changes in said electrostatic forces are recorded by the combined effect on the recorder, substantially as described.

4. The combination with terminals connected to a source of oscillating currents, of a pair of relatively moving conductors having an intervening dielectric and constituting a condenser with relatively moving members in a state of frictional traction, and means to indicate the relative change of position of said members of the said condenser when the frictional traction is altered by change of strength of the electrostatic field between them produced by said oscillating current, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

REGINALD A. FESSENDEN.

Witnesses:

JESSIE ETTA BENT,
FLORENCE MAY LYON.