H. SHOEMAKER.

RECEIVING APPARATUS.

APPLICATION FILED JAN. 12, 1911.

997,516. Patented July 11, 1911.

FIG. 1.

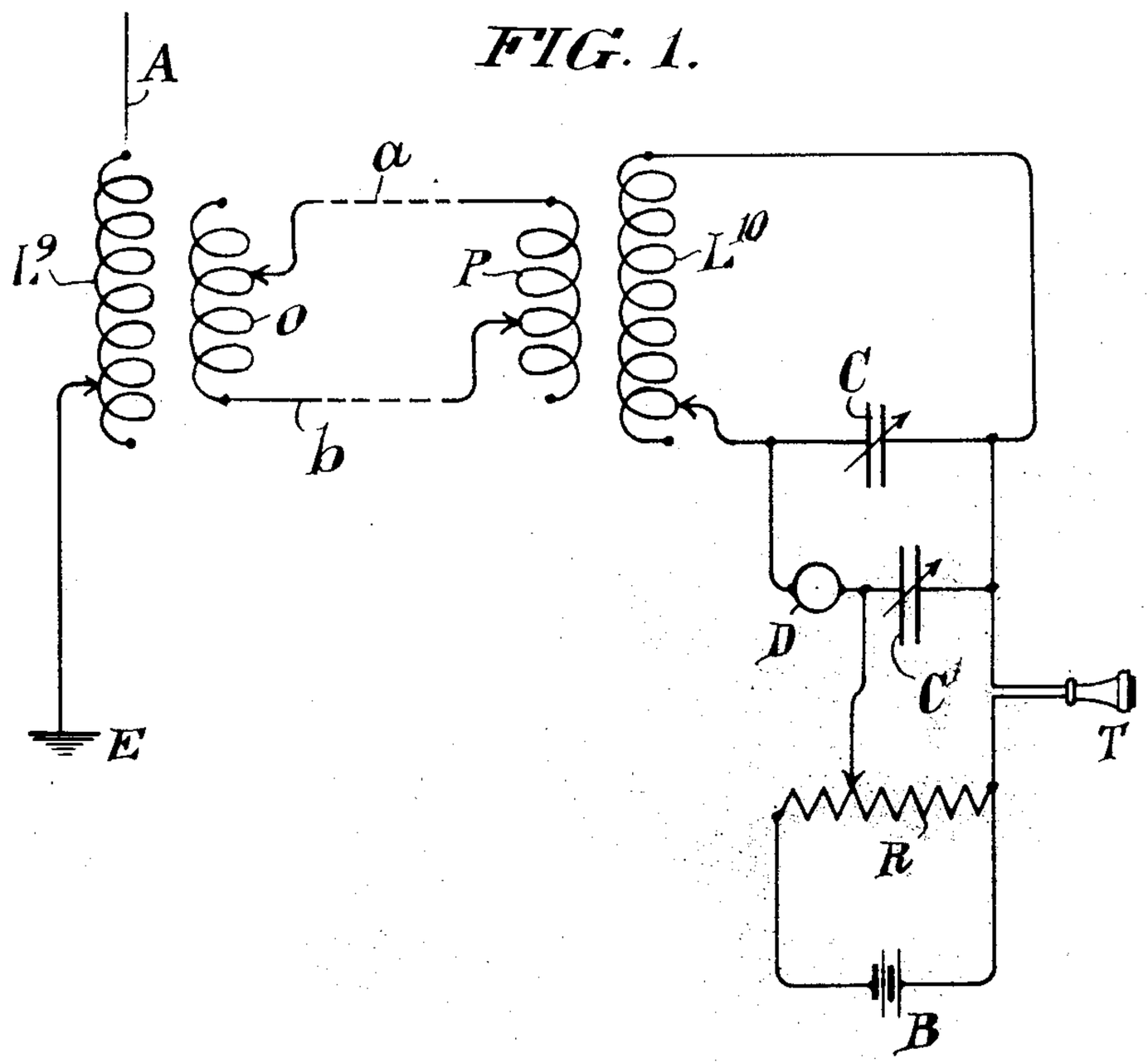
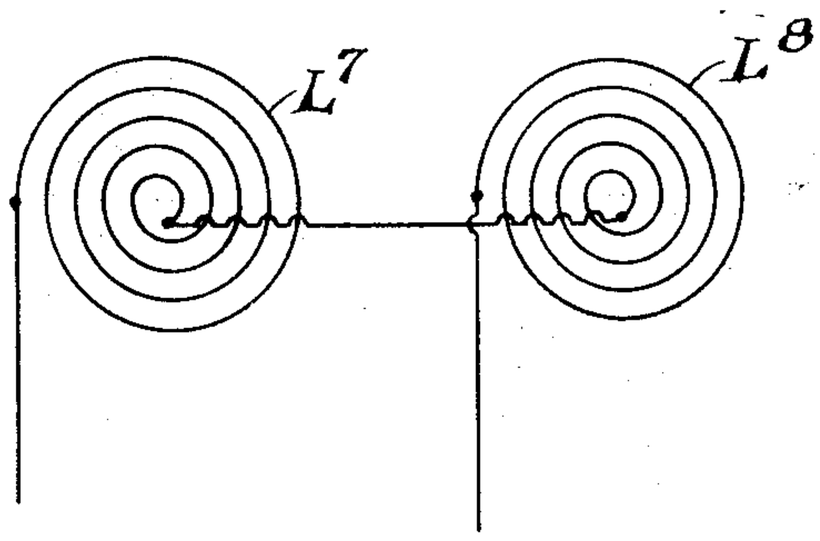


FIG. 2.



Witnesses

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HARRY SHOEMAKER, OF JERSEY CITY, NEW JERSEY.

RECEIVING APPARATUS.

997,516. Specification of Letters Patent. Patented July 11, 1911.

Original application filed November 15, 1910, Serial No. 592,462. Divided and this application filed January 12, 1911. Serial No. 602,185.

To all whom it may concern:

Be it known that I, HARRY SHOEMAKER, a citizen of the United States, residing at Jersey City, county of Hudson, and State of New Jersey, have invented a new and useful Receiving Apparatus, of which the following is a specification.

My invention relates to signaling apparatus, and particularly to the receiving apparatus employed in space signaling, such as wireless telegraphy, wireless telephony, and the like, in which electro-radiant energy represents the signals or messages during transmission through space.

More particularly my invention relates to improved receiving apparatus, wherein the receiving conductor or circuit and the detector path or circuit are operatively related through what may be termed a link circuit which includes inductance, and whose capacity is substantially *nil*, and whose resistance is very low, so that there is substantially no reaction between the detector path or circuit and the receiving conductor or circuit.

The link circuit includes coils themselves of low resistance and conductively connected through conductors of low resistance, such connecting conductors being preferably separated from each other and not twisted or otherwise brought close together. One of the coils of the link circuit is in operative relation with the receiving conductor or circuit, while the other coil of the link circuit is in operative relation with the detector path or circuit, and these coils of the link circuit are so far apart that their mutual induction is practically *nil*.

For an illustration of some of the forms my invention may take, reference is to be had to the accompanying drawing, in which:

Figure 1 is a diagrammatic view illustrating receiving apparatus illustrative of my invention. Fig. 2 is a fragmentary view illustrating a form of inductance that may be employed.

In Fig. 1, is shown a selective receiving arrangement in which A represents the aerial receiving conductor or antenna between which and the earth connection E is connected an adjustable inductance L^9. In inductive relation with the inductance L^9, and in preferably very close inductive or transformer relation therewith, is the coil O of the link circuit, said coil being conductively connected through conductors *a* and *b* with the other link circuit coil P. And this latter coil P is in preferably close inductive or transformer relation with the adjustable inductance L^{10} connected in series with the adjustable condenser C, forming therewith a tuned circuit. In shunt to the condenser C is connected the detector or wave-responsive device D, of any suitable type, and the condenser C^1, which may also be adjustable if desired. Bridging the condenser C^1 is the telephone or other signal translating instrument T and a portion of the potentiometer resistance R, to whose terminals is connected the battery or other source of current B.

The inductance L^9 and the inductance L^{10} are so remote from each other that their mutual inductance is zero or substantially zero, and the link circuit coils O and P do not inductively affect each other, but are so far apart that their inductive effect upon each other is substantially *nil*, and the energy is transferred from one to the other by conductance only. The coils O and P may have any desired number of turns, and may be adjustable as shown, but the resistance of the link circuit including the conductors *a* and *b* should be very low and the lower the better.

The inductance L^9 may take the form of an inductometer inductance, that is, two coils serially connected with each other and movable with respect to each other to change their effective inductance. And the coil O of the link circuit may be closely inductively coupled with one or the other of such inductometer coils. And, similarly, the inductance L^{10} may be an inductometer inductance, and the link circuit coil P may be in close inductive relation with one of such inductometer coils.

The inductometer for either L^9 or L^{10} may take the form shown in Fig. 2, where the two coils L^7 and L^8 are connected in series with each other and consist, respectively, of spirals having substantially equal numbers of turns. They are to be so connected that when they are close together and their planes parallel, and with their axes substantially coinciding, they will have minimum inductance, and when moved apart their inductance will increase. When this type of inductance is used for either

L^9 or L^{10}, the coils of the link circuit may each be closely inductively coupled to one of the flat spirals.

By the receiving apparatus shown, great selectivity in reception of signals or messages is possible.

It is to be understood that my invention is not limited to the arrangement of receiving apparatus here shown, but that the link circuit may be employed with any known receiving arrangement or circuit, it being remembered that the coils of the link circuit shall be so far apart that there shall be no reaction between the circuits or paths between which the link circuit transfers energy, and that the capacity of the link circuit should be substantially *nil* and that its resistance should be as low as possible, and the lower the better.

The receiving apparatus here shown is equally applicable to wireless telegraphy and wireless telephony, the only condition to be observed in the case of wireless telephony is that the detector D is one which is self-restoring and quantitative in its action so far as possible.

The number of turns in either or both coils of the link circuit may be varied or adjusted; or with a given number of turns, the turns may be spread apart or brought close together as may be desired.

This application is a division from my application Serial No. 592,462, filed November 15, 1910.

What I claim is:

1. The combination with a receiving aerial conductor, of a tuned circuit, a detector associated with said circuit, and a signal translating instrument, said receiving aerial conductor and said tuned circuit being so remote from each other that their mutual inductance is substantially zero, and a link circuit inductively related with said receiving conductor and said tuned circuit, said link circuit having substantially no capacity and very low resistance.

2. The combination with an aerial receiving conductor, of an inductance associated therewith, a tuned circuit including an inductance, and a conductively separate link circuit having a coil closely inductively coupled with said inductance associated with said receiving conductor, said link circuit having substantially no capacity and very low resistance.

3. The combination with an aerial receiving conductor, of an inductance associated therewith, a tuned circuit including an inductance, and a conductively separate link circuit inductively linking said inductances and having a coil in close inductive relation with said inductance of said tuned circuit, said link circuit having practically no capacity.

4. The combination with an aerial receiving conductor, of an inductance associated therewith, a tuned circuit including an inductance, and a conductively separate link circuit having coils closely inductively related respectively with each of said inductances, said link circuit having practically no capacity.

5. Receiving apparatus comprising an open oscillating circuit adapted to receive electro-radiant energy, a closed oscillating circuit having capacity and inductance, the mutual inductance between said open oscillating circuit and said closed oscillating circuit being substantially *nil*, and a conductively separate third circuit having inductance and practically no capacity linking said circuits together.

6. The combination with a receiving aerial conductor, of an inductance included therein, a closed oscillation circuit comprising inductance and capacity, a conductively separate link circuit having inductance and practically no capacity and having coils in inductive relation respectively with said inductance in said aerial conductor and in said closed oscillation circuit, a detector affected by the energy transferred to said closed oscillation circuit, and a signal translating instrument controlled by said detector.

7. The combination with an aerial receiving conductor, of a receiver circuit, and a link circuit conductively separate from said aerial conductor and said receiver circuit and in inductive relation with said aerial conductor and said receiver circuit, said link circuit having inductance and substantially no capacity.

In testimony whereof I have hereunto affixed my signature in the presence of the two subscribing witnesses.

HARRY SHOEMAKER.

Witnesses:
A. C. FIKE,
GEO. W. HAYES.