P. C. HEWITT.

DIRECTIVE WIRELESS TRANSMISSION.

APPLICATION FILED DEC. 2, 1915.

1,314,593.

Patented Sept. 2, 1919.

3 SHEETS—SHEET 1.

Fig. 1a

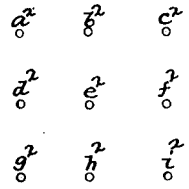
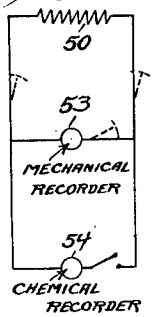


Fig. 1

Fig. 3a



WITNESS

Chas. F. Clagett

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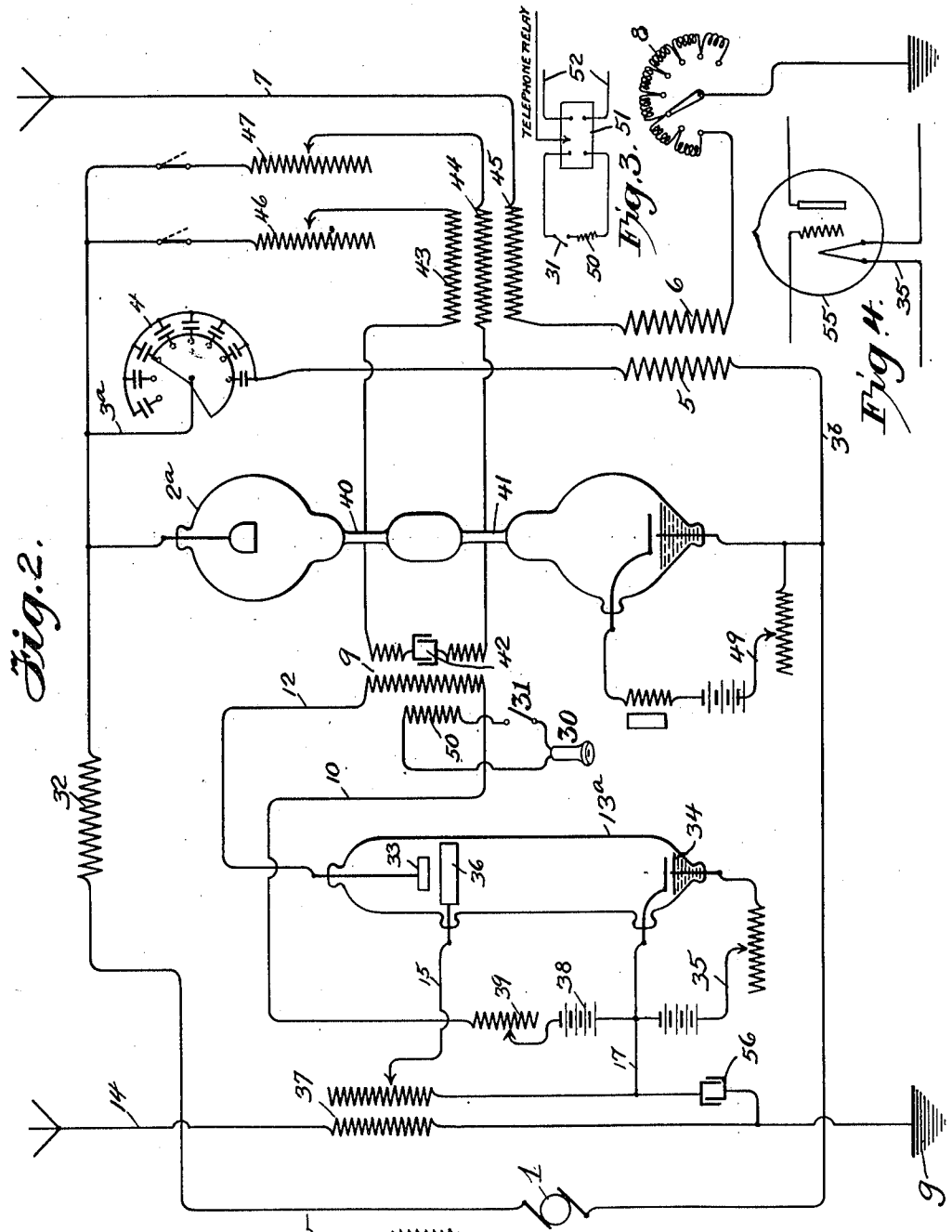

Fig. 2.

Fig. 3.

Fig. 4.

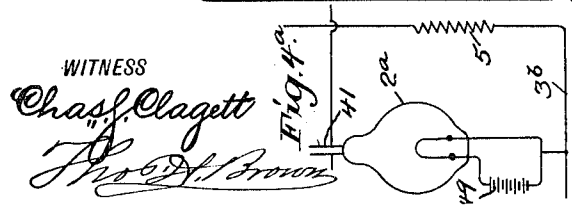

Fig. 4a.

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3 SHEETS—SHEET 3.

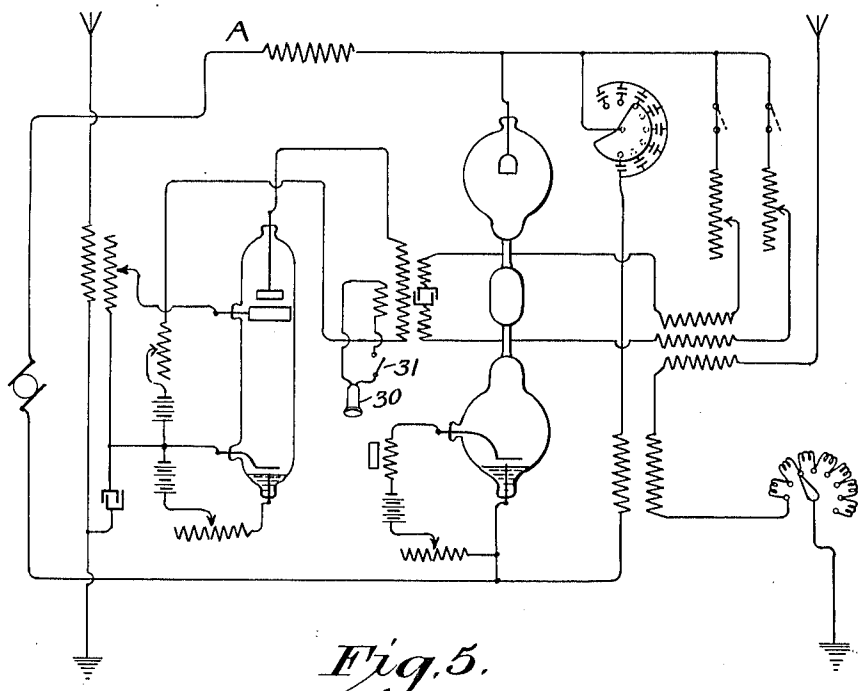
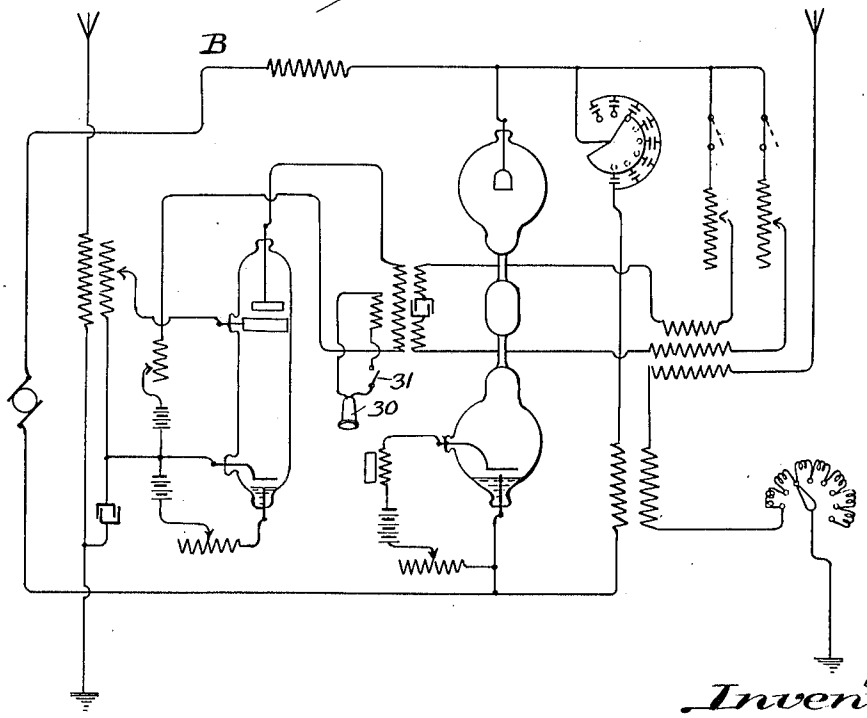


Fig. 5.



Inventor:
Peter Cooper Hewitt
by Charles A. Terry, Atty.

UNITED STATES PATENT OFFICE.

PETER COOPER HEWITT, OF RINGWOOD MANOR, NEW JERSEY.

DIRECTIVE WIRELESS TRANSMISSION.

1,314,593. Specification of Letters Patent. Patented Sept. 2, 1919.

Application filed December 2, 1915. Serial No. 64,622.

To all whom it may concern:

Be it known that I, PETER COOPER HEWITT, a citizen of the United States, and resident of Ringwood Manor, county of Passaic, State of New Jersey, have invented certain new and useful Improvements in Directive Wireless Transmissions, of which the following is a specification.

My invention relates to directive wireless transmission of speech, telegraphy or signals in a definite direction. It also contemplates receiving at a station which receives by means of one wave length only and impressing the signals or other message received on a transmission system at the station having a sending wave length different from the receiving wave length and transmitting the signal to another station by means of the sending wave length and rendering this useful for directive transmission by checker-boarding a country with wireless stations, each of which receives on its own wave length and sends by a number of others.

The invention is illustrated in the accompanying drawings in which Figure 1 is a diagram of a system of wireless stations checker-boarding a country; Fig. 2 represents diagrammatically the apparatus at one of the stations of Fig. 1; and Figs. 1^a; 3; 3^a; 4; 4^a; and 5 show modifications and details.

In Fig. 1, a, b, c, d, e, f, g, h and i, a' to i'; a^2 to i^2; a^3 to i^3; a^4 to i^4; and a^5 to i^5 represent stations checker-boarding a country and spaced at such a distance apart that each is able to receive from any station next to it and has sending power sufficient to transmit to the next station, but not sufficient to operate the receiving apparatus at a station which is the third station distant. Each station has its own receiving wave length, preferably fixed, and herein represented by the letters a^λ, b^λ, c^λ, d^λ, e^λ, f^λ, g^λ, h^λ, and i^λ, (Fig. 1^a) the wave length a^λ being that of each station lettered a, etc., and each station is capable of sending by means of each of the receiving wave lengths of the stations next to it, which, in this case, would mean that it is capable of sending any one of eight wave lengths. These various wave lengths are so selected that they differ sufficiently so that the wave length designed to be received at a station affects the receiving apparatus at that station only with sufficient force to actuate the sending apparatus of that station. For example, station e, sending wave length i^λ, wil not affect the instruments at a, b, c, d, f, g and h, but will affect the instruments at and be received by station i. Station i, in turn, will transmit by wave length a^λ the signals which have been received at wave length i^λ and these signals will be received at station a^3. Station a^3 then sends at wave length e^λ the signals as received, which affect the instruments at station e^3, the destination. There, signals corresponding to the original message may be read off by means of a telephone or other receiving device. By the means described, messages may be transmitted, selectively, from the station e to the station e^3.

In the case of speech, the signals received by the receiving set may be connected as shown in Fig. 3 so as to operate jointly with the local telephone central or so as to operate a relay that will relay the speech to the telephone line so that messages or signals may be received at any telephone subscriber's station by means of the telephone circuit. In such a case, the station e^3, for example, may be regarded as an intermediate station, the point of final destination being the station of the telephone subscriber. Working in the reverse direction, the telephone subscriber's line may actuate the sending apparatus of the station e^3, for example, either directly or through the instrumentality of a relay, and in this way, the sending telephone subscriber may talk directly to the receiving telephone subscriber by means of a wireless link operating in any direction.

It will be seen from the above illustration that it becomes possible to send wireless messages in any direction all over a country checker-boarded by wireless stations, and that the messages may be caused to pass by and around one another by reason of the receiving and sending wave lengths of the various stations. It will also be seen that messages may be sent over the same country, partly by wireless and partly by metallic circuits.

In carrying the system above described into operation, it may become necessary or convenient to supply each station with two or more receiving devices having wave lengths individually fixed but different from each other and, also, two or more sending de-

vices for communicating with different stations, shown at A and B, Fig. 5, the object being to enable a station to transmit two or more messages at the same time.

Fig. 2 shows the invention made operative by means of devices and connections described in my Patent No. 1,144,596, and in my patent applications Serial No. 13,873 and Serial No. 15,267, all relating to apparatus for sending and receiving wireless signals adapted to operate in connection with each other. In Fig. 2 I have shown a source of current 1 connected through an inductance 32 across the terminals of a pulsator 2^a which is connected in parallel by means of conductors 3^a and 3^b with a variable capacity 4 and an inductance 5. The inductance 5 is inductively related to the inductance 6 included in the aerial 7 and having means for varying its natural time period, here shown as a variable inductance 8. In this instance, the device 13^a is one of my mercury vapor receiving devices having a positive electrode 33 and a negative electrode 34. A keep-alive circuit for the device 13 is indicated at 35. A potential terminal 36 of the device is connected by the lead 15 with a transformer 37 of the receiving antenna 14. The device 13^a is in operative relation to the pulsator 2^a by virtue of the leads 10, 12 and the repeating coil 9, the usual battery and resistance being shown at 38 and 39, respectively. The portion of the repeating coil 9 which is connected to the tubes of conducting material 40 and 41 of the pulsator 2^a, has included in it a condenser 42 for preventing direct current flow through that portion of the circuit. The usual devices for controlling the starting reluctance of the pulsator 2^a are shown connected with the tubes 40 and 41 thereof, the same being coils 43 and 44, in inductive relation with a coil, 45, in the aerial 7, resistances, 46 and 47, being connected in series with the coils 43 and 44, respectively. The keep-alive circuit for the pulsator 2^a is indicated at 49. A tuning condenser, 56, is included in the line between the receiving apparatus and the ground *g*. The gas or vapor devices here shown have negative electrodes of mercury, but other devices may be substituted, having other means for maintaining the negative electrode in a receptive condition such, for instance, as devices 55 (Fig. 4) and 2^a (Fig. 4^a) having an incandescent negative electrode. At 30 is shown a listening or receiving telephone that can be cut in or out by a switch, 31, the coil 50 being in inductive relation to the coils 9. A relay 51 (Fig. 3) may be included in the telephone circuit and the circuit connected to a telephone distribution circuit 52 of a regular telephone system. Another form of receiving instrument may be employed such as a machine 53, (Fig. 3^a) or chemical receiving telegraph apparatus 54 with circuits and connections.

The means employed for actuating the variable capacity 4, of Fig. 2, and for actuating the variable inductance 8 may be devices such as are well-known for operating stock-tickers or the like.

I claim as my invention:

In a long distance signaling system, a number of stations checker-boarding a country, and each having a definite receiving wave length and definite variable wave lengths different from its receiving wave length, the stations being located at such range that the transmitted signals of proper wave length will be effective at any adjacent station but will not be effective at any station of the same wave length that is materially further removed from the sending station.

Signed at New York, in the county of New York and State of New York, this 30th day of November, A. D. 1915.

PETER COOPER HEWITT.

Witness:

RAYNER M. BEDELL.