

E. H. LOFTIN AND H. H. LYON.
 RADIOSIGNALING.
 APPLICATION FILED APR. 5, 1920.

1,424,365.

Patented Aug. 1, 1922
 2 SHEETS—SHEET 1.

FIG. 1

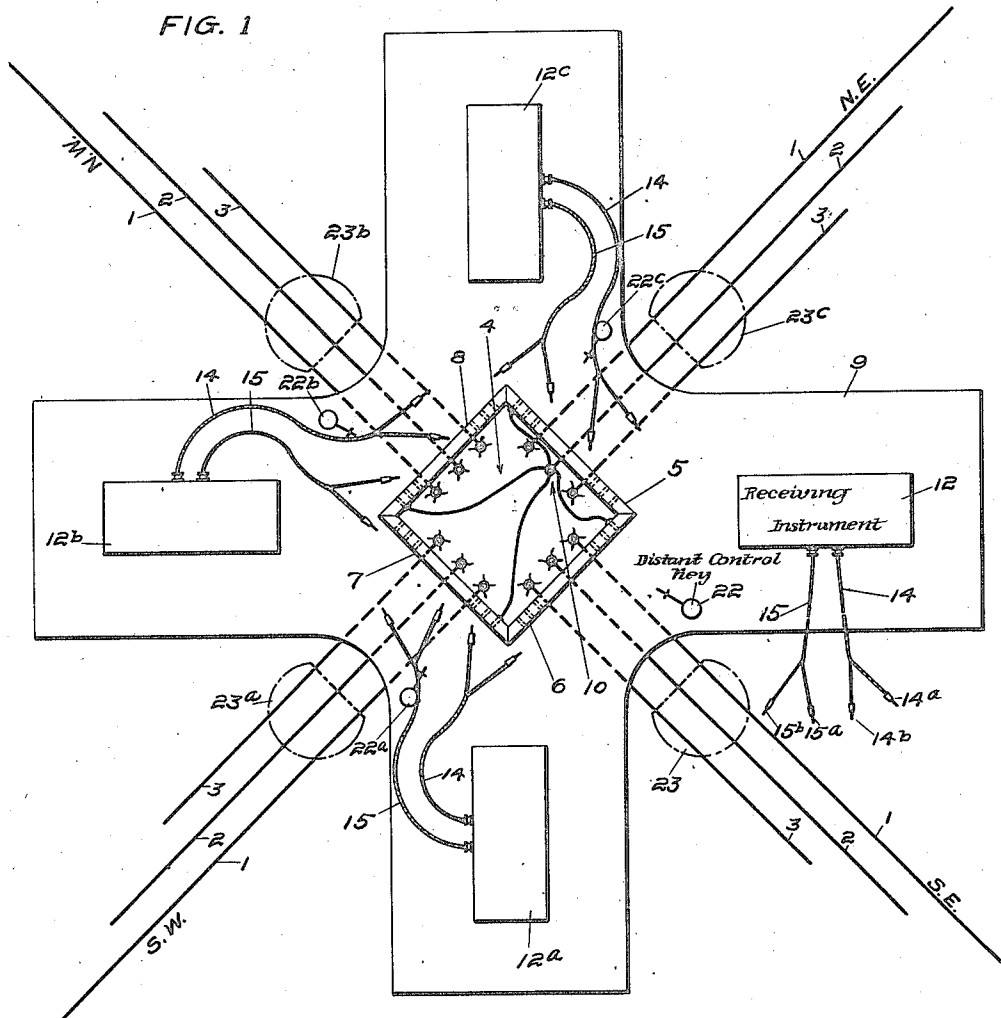
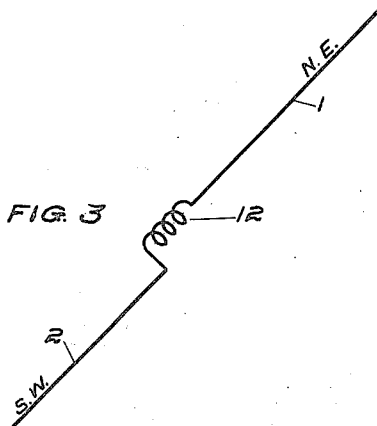


FIG. 3

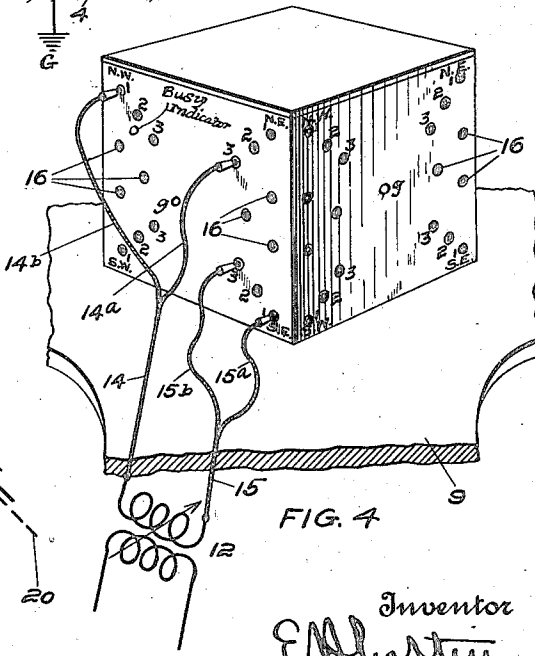
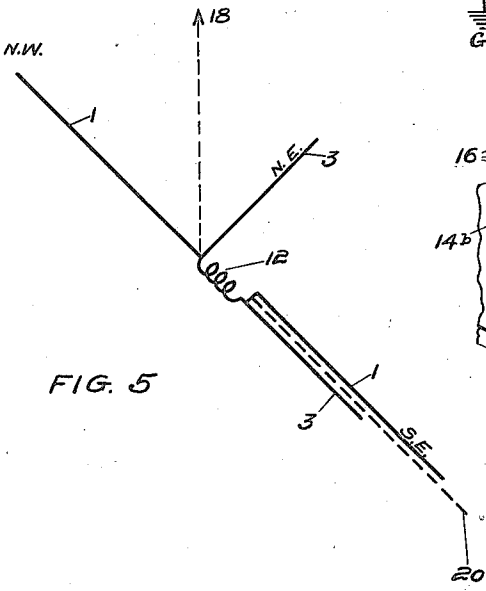
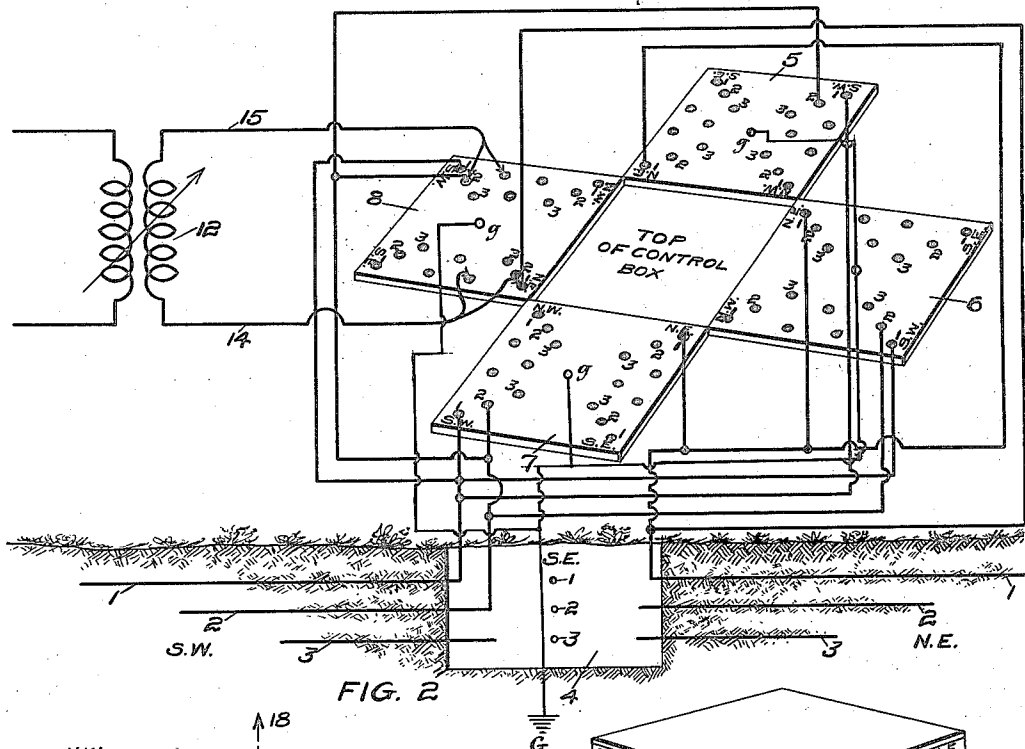


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UNITED STATES PATENT OFFICE.

EDWARD H. LOFTIN, OF WASHINGTON, DISTRICT OF COLUMBIA, AND HENRY H. LYON,
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RADIO SIGNALING.

1,424,365.

Specification of Letters Patent.

Patented Aug. 1, 1922.

Application filed April 5, 1920. Serial No. 371,553.

To all whom it may concern:

Be it known that we, EDWARD H. LOFTIN and HENRY H. LYON, citizens of the United States, and residents, respectively, of the city of Washington, in the District of Columbia, and Hyattsville, in the county of Prince Georges and State of Maryland, have invented an Improvement in Radiosignaling, of which the following is a specification.

Our invention relates to radio antennæ systems, and relates more particularly to stations employing low horizontal antennæ or lineal collectors.

In a co-pending application Serial No. 371,557, filed April 5, 1920, we have pointed out the necessity for selecting an optimum length for the horizontal component in such antennæ for tuning to obtain the best results on given wave lengths. In the publications embodying the prior art, noted in our co-pending application, the directional qualities of such antennæ have been fully discussed. The purpose of our invention is the devising of a system of antennæ for a radio station whereby advantage may be taken with facility and efficiency, of these qualities of such antennæ for general communication with a number of stations employing various wavelengths and having various directions.

Figure 1 shows a general diagrammatic plan view of a receiving station equipped to take advantage of both the optimum length and directional qualities of low horizontal antennæ or lineal collectors.

Figure 2 shows the details of connections of the antennæ to a control box in the receiving station.

Figure 3 shows two wires connected together to form an antenna in a northeast-southwest direction.

Figure 4 shows the details of two panels of the control box, and details of the equipment for connecting the receiving instruments to the antennæ through the medium of the control box.

Figure 5 shows the combination of antennæ which is obtained by plugging in the jacks in the positions shown in Figure 4. Like numerals and letters represent like parts throughout the several figures.

In Figure 1, reference characters 1, 2 and 3 are lineal collectors of different lengths, and here shown in four groups extending northeast, southeast, southwest and northwest; 4 is a pit or space in which the lineal

collectors terminate under the receiving house; 5, 6, 7 and 8 are control panels on a cubical box; 9 is a table, having the form of a Geneva cross, on which the control box and receivers rest, suitable to accommodate four operators, each one in front of a panel of the control box; 10 indicates the manner in which the northeast collector 2 is connected by four leads to like jacks on the four panels of the control box, all other conductors being connected to the four panels in the same way; 12, 12^a, 12^b and 12^c are the containers for suitable receiving instruments; 14 and 15 are leads from the receiving instruments to which are attached the plugs and plug cords 14^a, 14^b, 15^a and 15^b; 22, 22^a, 22^b, and 22^c are distant control keys whereby each operator may control a nearby transmitting station, operating in conjunction with the receiving station, for answering calls or sending messages; 23, 23^a, 23^b and 23^c are chairs for the operators in reach of the control panels 5, 6, 7 and 8 and the receiving instruments 12, 12^a, 12^b and 12^c.

In Figure 2 reference characters 1, 2 and 3 are lineal collectors terminating in a pit or space 4. G is a ground plate or other ground connection. Illustrative details are shown of how the collectors and ground plate are all connected to corresponding jacks on the four panels of the control box by following out the connections shown for collector NE 1 and collectors SW 1 and SW 2. The panels 5, 6, 7 and 8 of the control box are shown in projection for illustrative purposes. 12 illustrates the variable coupling coil of a receiver, the primary being connected to the control box by the leads 14 and 15.

In Figure 3, collector NE 1 and collector SW 2 represents a long northeast collector connected to a short southwest collector to give an antenna of total optimum length of the combination, and coupled to the receiver through the medium of the coil 12.

In Figure 4 it will be seen that the jacks are grouped and marked NE 1, 2 and 3; SE 1, 2 and 3; SW 1, 2 and 3; NW 1, 2 and 3, to correspond to the directions and lengths of the lineal collectors, this to aid the operators in quickly selecting any desired combination. The jacks *g* connect to ground. The jacks 16 are idle jacks in which anyone of the plugs 14^a, 14^b, 15^a and 15^b can be placed when idle. The plugs and jacks may be similar to those ordinarily used on telephone

switchboards. A further refinement may be obtained by arranging the jacks with a system of "busy" lights or other indicators. For example, the box can be so wired that
 5 when the operator on the panel 5 plugs in on NE 1, a light would show on the panels 6, 7 and 8 at NE 1, and the operators on these panels would not interfere by plugging in a busy collector.

10 In Figure 5 it is intended to merely illustrate the antennae combination obtained by plugging a receiving instrument as shown in Figure 4, the dotted lines 18 and 20 being illustrative of the possible effective resultant
 15 obtained by such a combination.

While we have shown buried, non-insulated collectors, we do not wish to be so limited, as we consider it within the scope of our invention to use any form or combination of forms of collectors which combine
 20 directional qualities with the quality of best or optimum length of horizontal component for maximum signal, as disclosed in our co-pending application.

25 We have shown four groups of three collectors each, the groups having directions northeast, southeast, southwest and northwest, but the number of groups, number of collectors in each group, directions of the
 30 groups and lengths of the collectors may vary widely depending upon the conditions to be met at a particular station. For example, a particular station may only be intended to receive from a southerly direction,
 35 but on several wavelengths, in which case a group of collectors of different lengths extending in a northerly direction would suffice and anyone of these collectors, or any combination of these collectors, may be combined
 40 with ground G, Fig. 2 at the receiving station, the ground being led to jacks on the control panels, just as the collectors are so led. In other words, it is not always necessary to have an oppositely disposed
 45 collector for a combination, but where there is a group of oppositely disposed collectors of different lengths, the number of possible combinations is increased.

We have shown the collectors of a group
 50 disposed in the same horizontal plane and in the same vertical plane, but it makes no difference if they are disposed in intermediate planes. The separation of collectors in a group may be varied. We have
 55 found that good multiplex reception could be had in a system where the collectors were buried insulated wires spaced ten feet apart.

What has been stated concerning the system for receiving can be reversed for transmitting, it only being necessary to substitute
 60 transmitting apparatus for the receiving instruments, and the control panels and leads by suitable apparatus for high current, high potential work.

What we claim and desire to secure by Letters Patent of the United States is—

1. In a system of radio signaling a station having a plurality of low horizontal antennae whose horizontal components are substantially parallel and of different
 70 lengths.

2. In a system of radio signaling a station having a plurality of groups of antennae extending in different directions, each group having a plurality of low horizontal antennae
 75 whose horizontal components are substantially parallel and of different lengths.

3. In a system of radio signaling a station having a plurality of buried lineal collectors substantially parallel and of different
 80 ent lengths.

4. In a system of radio signaling a station having a plurality of groups of collectors extending in different directions, each group having a plurality of buried lineal
 85 collectors substantially parallel and of different lengths.

5. In a system of radio signaling having a station employing an antenna whose vertical component is small compared to its horizontal
 90 component, means for tuning the antenna to a desired signal wave comprising a plurality of low horizontal antennae whose horizontal components are substantially parallel and of different lengths and means
 95 for selecting from these antennae that combination which gives the desired optimum total length.

6. In a system of radio signaling having a station employing an antenna whose vertical component is practically nil compared to its horizontal component, means for tuning
 100 the antenna to a desired signal wave comprising a plurality of substantially parallel horizontal components of different lengths and a ground connection, and means for selecting from these components that component or combination of components
 105 which, when connected to ground, gives the desired effective optimum total length.

7. In a system of radio signaling a receiving station employing grouped components of different lengths from which antenna combinations may be selected, and a plurality of similar control panels to all
 115 of which each of the components is connected.

8. In a system of radio signaling a receiving station employing grouped components of different lengths from which
 120 antenna combinations may be selected, a plurality of similar control panels to all of which each of the components is connected, and means for indicating on all other panels when a component has been chosen and is
 125 busy on one panel.

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