

N° 17,450



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(Under International Convention.)

Date claimed for Patent under Patents and Designs Act, 1907, being date of first Foreign Application (in the United States), } 8th Mar., 1909

Date of Application (in the United Kingdom), 27th July, 1909

At the expiration of twelve months from the date of the first Foreign Application, the provision of Section 91 (3) (a) of the Patents and Designs Act, 1907, as to inspection of Specification, became operative

Accepted, 10th Mar., 1910

COMPLETE SPECIFICATION.

Improvements in Wireless Signalling.

I, REGINALD AUBREY FESSENDEN, of Brant Rock, in the State of Massachusetts, United States of America, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 5 My invention relates to methods of sending and receiving wireless signals and more particularly to sending and receiving antennae, and has for its object the more efficient generation and reception of wireless signals.

In the accompanying drawings

Figure 1 shows a plan view and

- 10 Figure 2 an elevation of apparatus for accomplishing this purpose.

In these Figures 3 and 4 are two portions of a large capacity formed preferably of a spider's web of wires, or of galvanised iron tape and supported above and insulated from the ground in any convenient way, for example as shown by insulating parts 15, 15, 15, and at a convenient but preferably low height

- 15 above the ground, for example 20 feet.

The two parts of the capacity may be connected so as to form one capacity by throwing the switch 11 so as to make contact with the terminal 16.

- 1 and 2 are portions of another capacity similarly formed supported and insulated and lying on either side of the capacity 3, 4. The two portions 1 and 2
- 20 may be united to form one capacity by throwing the switch 9 so as to make contact with the terminal 18.

It is not necessary that the outer capacity 1, 2 should entirely surround the inner capacity 3, 4, as good results can be obtained without this, and more especially as regards directive reception and transmission.

- 25 The inner capacity 3, 4 is connected through the variable inductance 12 to a source of high frequency oscillations, such as the alternating current dynamo shown at 5, 6 being one of the collector brushes.

The other terminal of the dynamo 5 is connected through the leads 8, 8, 8, having carefully proportioned inductances 21, 21, 21, to the outer capacity 1, 2.

- 30 Good results may also be obtained by connecting the leads 8, 8, 8, to the grounds 20, 20, 20, by means of the switches 22, 22, 22.

These grounds 20, 20, 20 may if desired (and also the capacity 1 and 2) be

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placed almost a complete quarter wave length away from the capacity 3, 4 but in practice are generally placed closer.

When the outer capacity 1, 2 is used it is preferably connected to ground by means of switches 10, 10, 10.

The leads 8, 8, 8, are preferably made to have as small capacity to ground as possible, and to have low resistance and no unnecessary self-induction. The inductances 21, 21, 21 are principally of use in controlling the flow of the oscillations from the dynamo terminal to the outer capacity and condenser capacity may also be inserted in the leads 8 as shown at 24. The inductances are adjusted in practice until the maximum effect is obtained as shown by an ammeter inserted in series with the antenna and in most cases this appears to give the best result when the wave chute capacity and the inductances 21 are such as to bring the wave chute into resonance with the antenna and its inductances so that both have the same frequency individually and therefore also oscillate at the same frequency when connected in series as shown. 25 is a telegraph key.

In the preferred method of operation the dynamo 5 gives the capacities, 1, 2 and 3, 4 rapidly alternating charges. Electrostatic lines are produced in hoop form as shown in 23, 23 and these electrostatic loops repel each other and travel outward in the form of electromagnetic waves.

The action during reception of the waves is similar, the electrostatic lines on arriving bridge the capacities and collapse through the receiver 27, the switch 26 being thrown for that purpose so as to cut out the dynamo and connect the receiver.

When the capacity 1, 2 is omitted the outer portions of the electrostatic loops go direct to earth, but otherwise the action is similar.

A certain and large proportion of the electrostatic lines would normally instead of being projected up into the air as shown at 23 be shunted direct to ground, and their energy wasted.

This objectionable effect is overcome in two ways.

First by placing horizontal circles of thin sheet iron 13 between the capacity 3, 4 and ground. These circles of sheet iron by their self induction tend to choke back and prevent the electrostatic lines from going from the capacity 3, 4 to ground and from ground up again to the capacity 1, 2.

Such hoops of thin sheet iron may also be placed under capacity 2, as shown at 14 and 14', and for a similar purpose, i.e. so as to choke back the electrostatic lines from the capacity 1, 2 or from the ground 20.

An alternative way which may also be used in conjunction with the above described way is to place a wave-chute 19 on the ground as shown; (this wave chute consists of a number of wires or strips of very low ohmic resistance laid horizontally along or in proximity to the ground and extending from the centre a considerable fraction of the quarter wave length of the waves used) so that that part of the charge which is shunted from the capacity 3, 4 to the wave-chute; and thence along the wave-chute and up to the capacity 1, 2 instead of being projected up into the air as shown at 23, should have a very low resistance path to travel, and hence may oscillate backwards and forwards without wasting any energy, and having a natural period as little pronounced as possible.

By means of this invention I am enabled to do away with high masts and expensive antennae and to accomplish other useful purposes.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An antenna for wireless signalling comprising in combination a large capacity in approximately horizontal position and elevated above the ground to a height considerably less than its largest horizontal dimension, a wave-chute consisting of a plurality of conductors of very low resistance arranged in

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proximity to the earth and beneath the horizontal capacity, and extending outwards beyond the horizontal capacity so that the portion of the electric charge on the horizontal capacity, which is not being radiated, can oscillate to and fro along the wave-chute with small loss of energy until it is gradually
5 dissipated in radiation by being fed into the horizontal capacity.

2. A means of reducing the ineffective portion of the charge imparted to the antenna to as small an amount as possible, consisting of sheets of magnetic material placed between the capacity and the ground, this arrangement being used either as a substitute for the wave-chute or in combination with it.

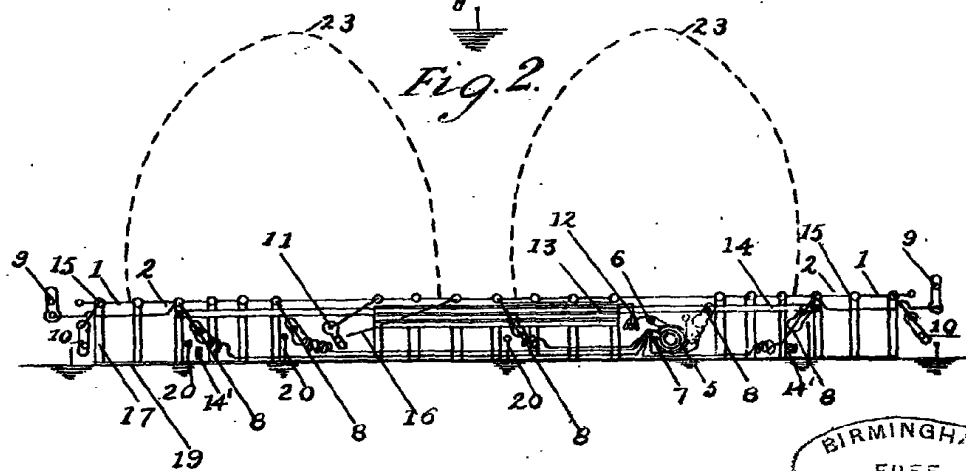
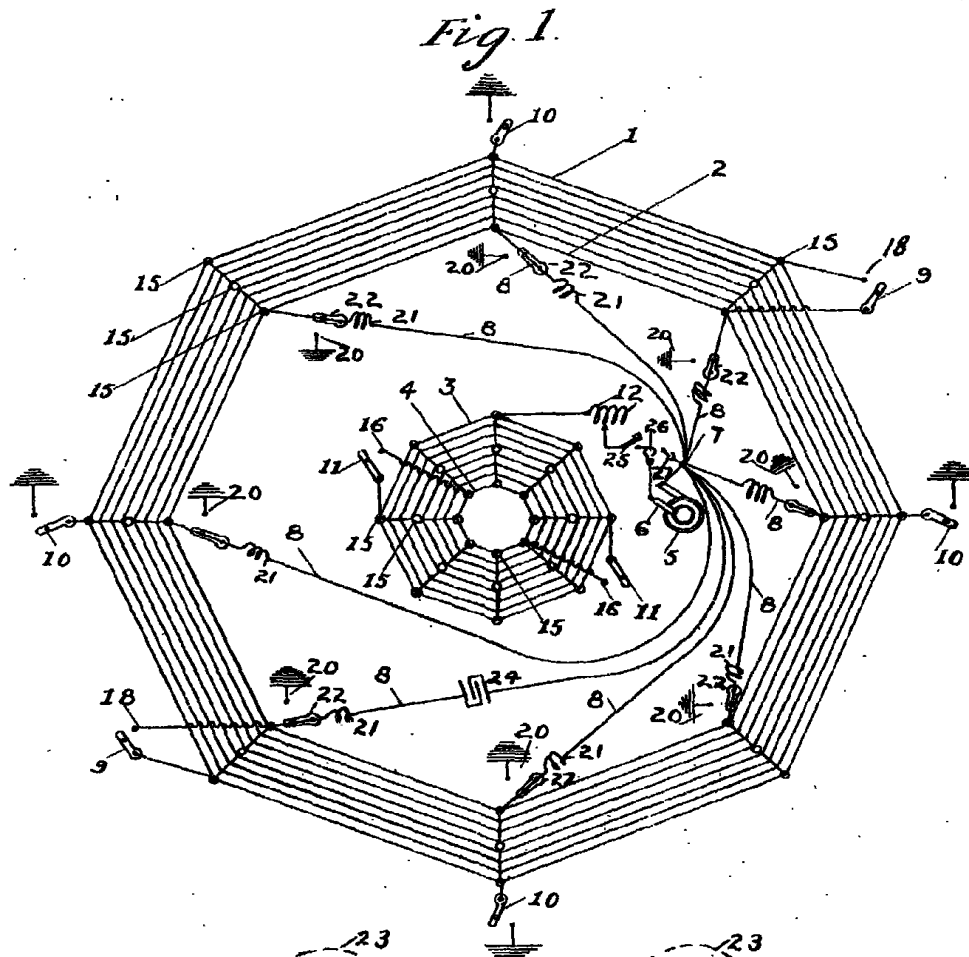
10 3. An antenna for wireless signalling comprising in combination a conductor of large capacity supported at comparatively small elevation from the ground, a second and similarly constructed conductor surrounding the first and connected thereto by leads which have relatively small capacity to earth and contain means for adjusting the wave length, and circularly arranged magnetic
15 material placed between said capacities and the ground and having also a good conducting path extending over the earth between the inner and outer capacities, whereby to cause the capacities to act as efficient radiators and absorbers of energy, substantially as described.

Dated this 27th day of July, 1909.

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[This Drawing is a reproduction of the Original on a reduced scale.]



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