N° 21,651 A.D. 1907

Date of Application, 30th Sept., 1907

Complete Specification Left, 24th Apr., 1908—Accepted, 17th Sept., 1908

PROVISIONAL SPECIFICATION.

"Improvements in Receivers for Wireless Telegraphy."

We, MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED, and ARTHUR MILLAR YOUNG, both of Watergate House, York Buildings, Adelphi, in the City of Westminster, Electricians, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in apparatus for use with wireless telegraph receivers whereby it is possible to eliminate signals which owing to their strength or wave length it is impossible to exclude by tuning or resonance.

If a receiving station is within range of two transmitting stations it is generally possible by placing the receiver in a circuit tuned to the wave length of the station from which it is desired to receive and by providing other circuits tuned to the wave length of the station the signals from which it is desired to exclude to cause the receiver to respond to the signals from one station only, but if the signals received from the other station be very strong, or if they be of very nearly the same wave length, it may be impossible to exclude them by any such means, though it is possible to considerably reduce their strength. Now we have found that in such circumstances it is possible to entirely eliminate the signals from one of the stations by employing two receivers, one tuned by some such method as mentioned above to the wave length of one of the transmitting stations, and the other tuned to the wave length of the other transmitting station and connecting these receivers in opposition to a telephone or other indicator or recorder in such a manner that the effects produced in the indicator or recorder by the signals from one of the stations may be adjusted to be equal and opposite and therefore to annul each other while the signals from the other station are but slightly impaired. Similarly it is possible to eliminate the signals from two or more stations by employing three or more receivers placed in circuits tuned each to one of the wave lengths and so adjusted and connected up to an indicator or recorder that the sum of the effects is zero in every case except for the signals we desire to receive. Thus, if a, b and c represent the signals from three transmitting stations, of which we wish to eliminate b and c, and if we call the receiver placed in the circuit tuned to the wave length of signals a receiver A, that placed in the circuit tuned to the wave length of signals b receiver B, and that placed in the circuit tuned to the wave length of signals c receiver C, and if

[*Price 8d.*]

the relative strengths of the three sets of signals in the three receivers are represented by the figures in the following table:—

	Strength of a signals.	Strength of b signals.	Strength of c signals.
In receiver A -	3	2	1
In receiver B -	1	3	2
In receiver C -	1	2	3

then the total effect of the signals on the indicator or recorder when the three receivers are connected to it may be represented by:—

$$(3a + 2b + c) + n\,(a + 3b + 2c) + m\,(a + 2b + 3c)$$

$$\text{or } (3 + n + m)\,a + (2 + 3n + 2m)\,b + (1 + 2n + 3m)\,c$$

from which it will be seen that if we make $n = -\,{}^4/_5$ and $m = {}^1/_5$ this total effect becomes $2.{}^2/_5 a$, that is to say that if we reduce the strength of signals from receiver B to four fifths and connect it up so as to oppose the signals from receiver A, and reduce the strength of signals from receiver C to one fifth and connect it up so as to assist the signals from receiver A, the signals b and c will be entirely eliminated and the signals a only slightly reduced in the indicator or recorder.

We have found magnetic detectors and telephones very suitable for the purposes of this invention, and although we may connect the magnetic detectors to the telephones in any way and adjust the strength of the signals from them by any known means we find it most convenient to connect them in series to the telephones with adjustable resistances as shunts so that the strengths of the signals from the magnetic detectors may be adjusted until all the objectionable signals are eliminated from the telephones.

We now proceed to describe in greater detail a method by which our invention may be carried out.

Figure 1 is a diagram of the apparatus for eliminating signals of one wave length, and

Figure 2 is a diagram of the apparatus for eliminating signals of two wave lengths.

In Figure 1, P^1 P^1 is the primary of one magnetic detector which is placed in a circuit tuned to the wave length of the signals which it is desired to receive, and P^2 P^2 is the primary of another magnetic detector which is placed in a circuit tuned to the wave length of the signals which it is desired to eliminate. S^1 and S^2 are the secondaries of the magnetic detectors joined in opposition to the telephone T, and R^2 is an adjustable resistance shunting the secondary S^2 of the magnetic detector which is in the circuit tuned to the wave length of the signals which it is desired to eliminate.

In Figure 2, P^1 P^1 is the primary of one magnetic detector which is placed in a circuit tuned to the wave length of the signals which it is desired to receive, P^2 P^2 is the primary of a second magnetic detector which is placed in a circuit tuned to one of the wave lengths of the signals which it is desired to eliminate, and P^3 P^3 is the primary of a third magnetic detector which is placed in a circuit tuned to the other wave length of the signals which it is desired to eliminate. S^1, S^2, and S^3 are the secondaries of the magnetic detectors joined in series to the telephone T, and R^2 and R^3 are adjustable resistances

shunting the secondaries S^2 and S^3 of the magnetic detectors which are in the circuits tuned to the wave lengths of the signals it is desired to eliminate.

It is evident now from the explanation hereinbefore given that if the secondaries of the magnetic detectors be properly connected to the telephone the shunt resistances may be adjusted to eliminate the objectionable signals from the telephone.

Dated this 30th day of September 1907.

MARCONI'S WIRELESS TELEGRAPH CO. LTD.,
H. CUTHBERT HALL,
HENRY S. SAUNDERS,
Directors.
HENRY W. ALLEN,
Secretary.

A. M. YOUNG.

COMPLETE SPECIFICATION.

"Improvements in Receivers for Wireless Telegraphy."

We, MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED, and ARTHUR MILLAR YOUNG, both of Watergate House, York Buildings, Adelphi, in the City of Westminster, Electricians, 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:—

This invention relates to improvements in apparatus for use with wireless telegraph receivers whereby it is possible to eliminate signals which owing to their strength or wave length it is impossible to exclude by tuning or resonance.

If a receiving station is within range of two transmitting stations it is generally possible by placing the receiver in a circuit tuned to the wave length of the station from which it is desired to receive and by providing other circuits tuned to the wave length of the station the signals from which it is desired to exclude to cause the receiver to respond to the signals from one station only, but if the signals received from the other station be very strong, or if they be of very nearly the same wave length, it may be impossible to exclude them by any such means, though it is possible to considerably reduce their strength. Now it is known that in such circumstances it is possible to entirely eliminate the signals from one of the stations by employing two receivers, one tuned by some such method as mentioned above to the wave length of one of the transmitting stations, and the other tuned to the wave length of the other transmitting station and connecting these receivers in opposition to a telephone or other indicator or recorder in such a manner that the effects produced in the indicator or recorder by the signals from one of the stations may be adjusted to be equal and opposite and therefore to annul each other while the signals from the other station are but slightly impaired. Similarly it is possible to eliminate the signals from two or more stations by employing three or more receivers placed in circuits tuned each to one of the wave lengths and so adjusted and connected up to an indicator or recorder that the sum of the effects is zero in every case except for the signals we desire to receive. Thus, if *a*, *b* and *c* represent the signals from three transmitting stations, of which we wish to eliminate *b* and *c*, and if we call the receiver placed in the circuit tuned to the wave length of signals *a* receiver A, that placed in the circuit tuned to the wave length of signals *b* receiver B, and that placed in the circuit tuned to the wave length of signals *c* receiver C, and if

the relative strengths of the three sets of signals in the three receivers are represented by the figures in the following table;—

	Strength of a signals.	Strength of b signals.	Strength of c signals.
In receiver A -	3	2	1
In receiver B -	1	3	2
In receiver C -	1	2	3

then the total effect of the signals on the indicator or recorder when the three receivers are connected to it may be represented by;—

$$(3a + 2b + c) + n\,(a + 3b + 2c) + m\,(a + 2b + 3c)$$
$$\text{or } (3 + n + m)\,a + (2 + 3n + 2m)\,b + (1 + 2n + 3m)\,c$$

from which it will be seen that if we make $n = -\,{}^4/_5$ and $m = {}^1/_5$ this total effect becomes $2{}^2/_5 a$, that is to say, that if we reduce the strength of signals from receiver B to four fifths and connect it up so as to oppose the signals from receiver A, and reduce the strength of signals from receiver C to one fifth and connect it up so as to assist the signals from receiver A, the signals b and c will be entirely eliminated and the signals a only slightly reduced in the indicator or recorder.

According to this invention we connect the means for adjusting the strengths of the signals in the secondaries of the receiving circuits. We have found magnetic detectors and telephones very suitable for the purposes of this invention. We connect the detectors in series to the telephones with adjustable resistances as shunts so that the strengths of the signals from the magnetic detectors may be adjusted until all the objectionable signals are eliminated from the telephones.

We now proceed to describe in greater detail a method by which our invention may be carried out.

In the drawings lodged with the Provisional Specification:—

Figure 1 is a diagram of the apparatus for eliminating signals of one wave length, and

Figure 2 is a diagram of the apparatus for eliminating signals of two wave lengths.

In Figure 1, P^1 P^1 is the primary of one magnetic detector which is placed in a circuit tuned to the wave length of the signals which it is desired to receive, and P^2 P^2 is the primary of another magnetic detector which is placed in a circuit tuned to the wave length of the signals which it is desired to eliminate. S^1 and S^2 are the secondaries of the magnetic detectors joined in opposition to the telephone T, and R^2 is an adjustable resistance shunting the secondary S^2 of the magnetic detector which is in the circuit tuned to the wave length of the signals which it is desired to eliminate.

In Figure 2, P^1 P^1 is the primary of one magnetic detector which is placed in a circuit tuned to the wave length of the signals which it is desired to receive, P^2 P^2 is the primary of a second magnetic detector which is placed in a circuit tuned to one of the wave lengths of the signals which it is desired to eliminate, and P^3 P^3 is the primary of a third magnetic detector which is placed in a circuit tuned to the other wave length of the signals which it is desired to eliminate. S^1, S^2 and S^3 are the secondaries of the magnetic detectors joined in series to the telephone T, and R^2 and R^3 are adjustable resistances

shunting the secondaries S^2 and S^3 of the magnetic detectors which are in the circuits tuned to the wave lengths of the signals it is desired to eliminate.

It is evident now from the explanation hereinbefore given that if the secondaries of the magnetic detectors be properly connected to the telephone the shunt resistances may be adjusted to eliminate the objectionable signals from the telephone.

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

1. The combination of two receivers, the primary of the one being in a circuit in resonance with the wave length of the desired signals, and the primary of the other in a circuit in resonance with the wave length of the objectionable signals, the secondaries of such receivers being connected to a telephone or other instrument in such manner that the difference of the strengths of the signals from them actuates the instrument means being provided in the secondaries of the two receivers for equalising the strength of the objectionable signals and thereby eliminating them in the instrument substantially as described.

2. Wireless telegraph receivers substantially as and for the purposes described and illustrated in the drawings.

Dated this 23rd day of April 1908.

MARCONI'S WIRELESS TELEGRAPH CO. LTD.,

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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1908.

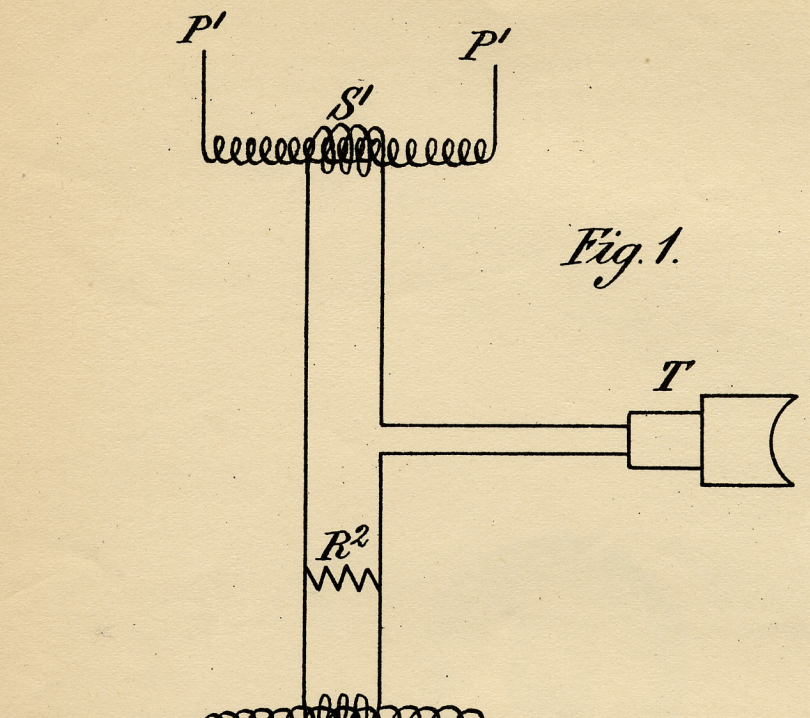

Fig. 1.

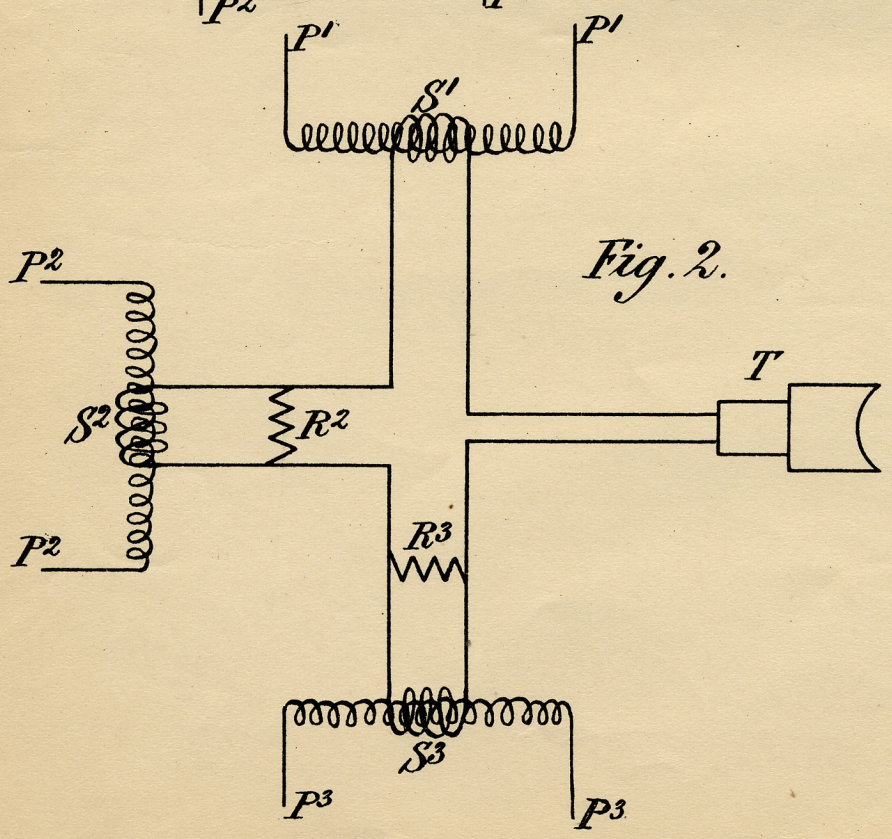

Fig. 2.

Malby & Sons, Photo-Litho.