[Second Edition.]

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Complete Specification Left, 29th June, 1914—Accepted, 26th Nov., 1914

PROVISIONAL SPECIFICATION.

Improvements in Receivers for Wireless Telegraphy.

We, MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED, and HENRY JOSEPH ROUND, both of Marconi House, Strand, London, W.C., Electrical Engineers, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in receivers for wireless telegraphy and has for its object the elimination of atmospherics.

It is well known that an atmospheric, being highly damped, causes the receiving circuits to oscillate at their own natural frequency and cannot therefore be eliminated by tuning these circuits. It is also well known that if an oscillatory potential of a certain frequency be induced in an oscillatory circuit of a different natural frequency two sets of oscillations are produced in that circuit, namely a transient free oscillation of the natural frequency of the circuit and a forced oscillation of the frequency of the induced potential, the latter oscillation being transient if this potential is caused by damped waves and permanent if it is caused by undamped or continuous waves.

According to the present invention we make the natural frequency of the receiving aerial different from that of the received waves so that both the forced and the free oscillations occur producing the well known phenomenon of beats and we rectify the resultant current and carry it to a circuit tuned to the beat frequency and we may directly or indirectly connect a telephone to this tuned circuit. In practice however the oscillations produced by an atmospheric last for a very short time, and in order that they shall not affect the circuit tuned to the beat frequency, it is necessary for this frequency to be comparatively high so that several beats may occur before the oscillations due to the atmospherics die out. Where this necessitates the beat frequency being above the limit of audibility it is necessary to employ one of the well known devices for causing these beats to produce audible indications as for example a rectifier, or in the case of continuous waves a ticker or the generation of another frequency which will interfere with the inaudible frequency and produce beats of an audible frequency.

Where such a device is used for receiving continuous or nearly continuous waves, it is obvious that the transient free oscillations of the aerial will not produce effective beats with the continuing forced oscillations, and in such cases it is desirable to generate a continuous oscillation of a frequency which is different from that of the forced oscillations and may be equal to the natural frequency of the aerial. These locally produced oscillations will interfere with the forced oscillations and produce the required beat frequency, while they either will not interfere with the free oscillations produced by atmospherics or will produce an entirely different beat frequency which will not affect the tuned circuit.

The rectifiers employed should not reach a condition of saturation so that the oscillations due to the received waves may not be impaired by simultaneous oscillations due to atmospherics, the method of elimination depending upon the production by oscillations having slightly different frequencies of beats having

[*Price 6d.*]

widely different frequencies one of which can be detected independently of the other.

Dated this 26th day of November, 1913.

MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED.

The common seal of Marconi's Wireless Telegraph Company, Limited, was hereto affixed in the presence of

H. RIALL SANKEY,
ALFONSO MARCONI,
Directors.
HENRY W. ALLEN,
Secretary.

H. J. ROUND.

COMPLETE SPECIFICATION.

Improvements in Receivers for Wireless Telegraphy.

We, MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED, and HENRY JOSEPH ROUND,, both of Marconi House, Strand, London, W.C., Electrical Engineers, 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 receivers for wireless telegraphy and has for its object the elimination of atmospherics.

It is well known that an atmospheric, being highly damped, causes the receiving circuits to oscillate at their own natural frequency and cannot therefore be eliminated by tuning these circuits. It is also well known that if an oscillatory potential of a certain frequency be induced in an oscillatory circuit of a different natural frequency two sets of oscillations are produced in that circuit, namely a transient free oscillation of the natural frequency of the circuit and a forced oscillation of the frequency of the induced potential, the latter oscillation being transient if this potential is caused by damped waves and permanent if it is caused by undamped or continuous waves.

According to the present invention we make the natural frequency of the receiving aerial different from that of the received waves so that both the forced and the free oscillations occur producing the well known phenomenon of beats and we rectify the resultant current and carry it to a circuit tuned to the beat frequency and we may directly or indirectly connect a telephone to this tuned circuit. The oscillations produced by an atmospheric last for a very short time, and in order that they shall not affect the circuit tuned to the beat frequency, it is necessary for this frequency to be comparatively high so that several beats may occur before the oscillations due to the atmospherics die out. Where this necessitates the beat frequency being above the limit of audibility it is necessary to employ one of the well known devices for causing these beats to produce audible indications as for example a rectifier, or in the case of continuous waves a ticker or the generation of another frequency which will interfere with the inaudible frequency and produce beats of an audible frequency.

Where such a device is used for receiving continuous or nearly continuous waves, it is obvious that the transient free oscillations of the aerial will not produce effective beats with the continuing forced oscillations, and in such cases it is desirable to generate a continuous oscillation of a frequency which is different from that of the forced oscillations and may be equal to the natural frequency of the aerial. These locally produced oscillations will interfere with

the forced oscillations and produce the required beat frequency, while they either will not interfere with the free oscillations produced by atmospherics or will produce an entirely different beat frequency which will not affect the tuned circuit.

The rectifiers employed should not reach a condition of saturation so that the oscillations due to the received waves may not be impaired by simultaneous oscillations due to atmospherics, the method of elimination depending upon the production by oscillations having slightly different frequencies of beats having widely different frequencies one of which can be detected independently of the other.

The accompanying diagrams illustrate our invention. In Figure 1, A is the aerial slightly out of tune with the incoming signal waves. B is a circuit which is coupled to the aerial and which is preferably aperiodic. D is a circuit connected to the circuit B through a rectifying crystal C and tuned to the frequency of the beats due to the forced and free oscillations and T is a telephone inductively coupled to the circuit D.

With such a simple arrangement however it may be difficult to get the beat frequency unaffected by atmospherics and yet low enough to be within the limits of audibility and to obviate this difficulty we may employ the arrangement illustrated in Figure 2. A B C D are the same as before but D is now coupled through an intermediate circuit E to a circuit B^1 in which oscillations can be induced by means of a local oscillation circuit F^1 of such a frequency as to interfere with the oscillations in D producing beats of a frequency within the limits of audibility. The circuit B^1 is connected through a second rectifier C^1 to a circuit D^1 connected to a telephone.

Figure 3 is similar to Figure 1 except that a local oscillation circuit F is provided for generating continuous oscillations in B for interfering with the forced oscillations in the aerial when continuous oscillations are employed for signalling. The frequency of the oscillations induced in circuit D by circuit F may be equal to the natural frequency of the aerial.

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. In a receiver for wireless telegraphy the combination of an aerial slightly out of tune with the signal waves, means for rectifying the resultant current due to the forced and free oscillations in the aerial and a circuit tuned to the beat frequency substantially as described.

2. In a receiver for wireless telegraphy the combination of an aerial slightly out of tune with the signal waves, a circuit coupled to the aerial, means for generating in that circuit oscillations of a frequency slightly different from that of the signal waves, means for rectifying the resultant current and a circuit tuned to the beat frequency substantially as described.

3. A method of eliminating the results of atmospherics in wireless telegraph receivers, which consists in the production by oscillations having slightly different frequencies of beats having widely different frequencies substantially as described.

4. A method of eliminating the results of atmospherics in wireless telegraph receivers which consists in the production of a frequency interfering with the received frequency, rectifying, inducing a frequency interfering with the resultant oscillations and rectifying again substantially as described.

Dated this 29th day of June, 1914.

CARPMAEL & Co.,
Agents for Applicants,
24, Southampton Buildings, London, W.C.

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(2nd Edition)

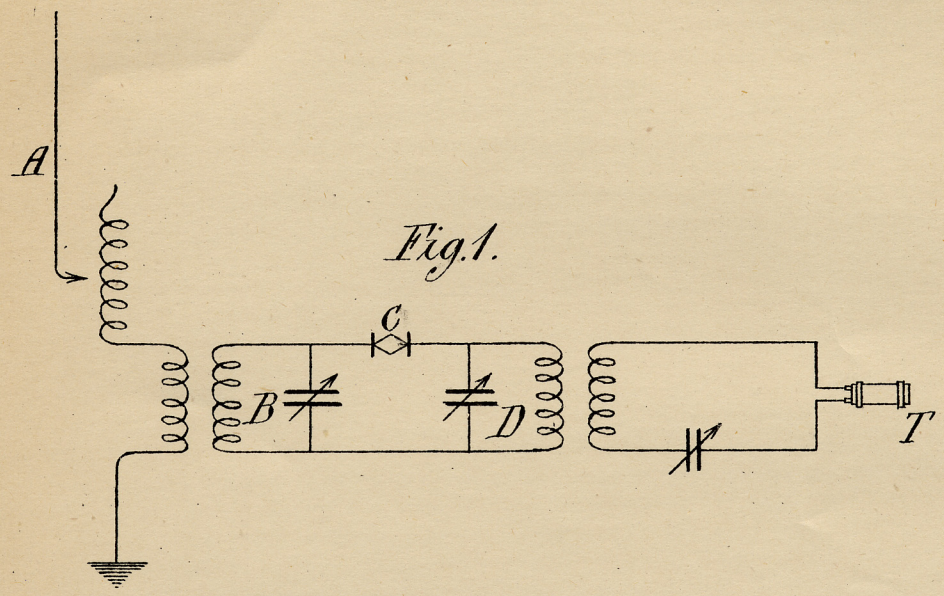

Fig. 1.

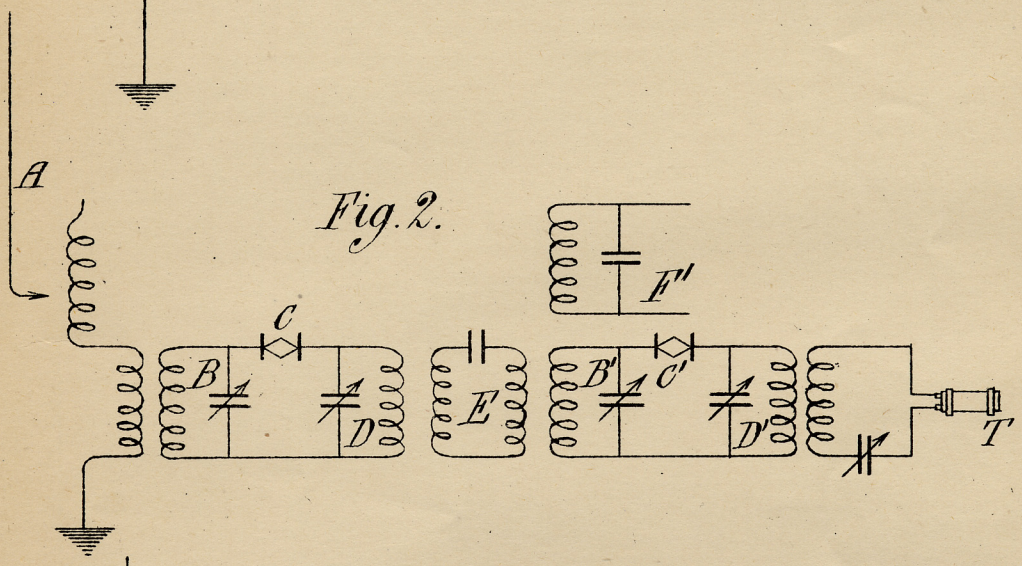

Fig. 2.

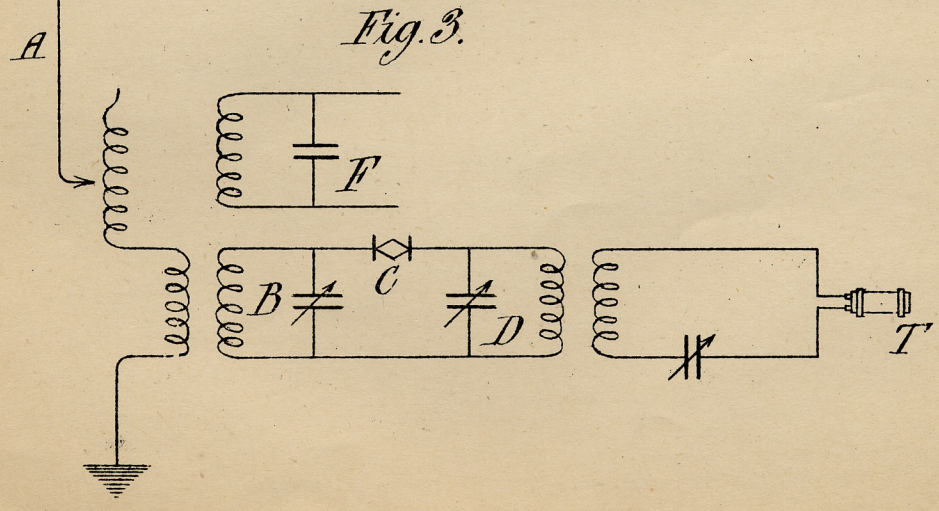

Fig. 3.

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

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