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RECEIVING OF WIRELESS SIGNALS

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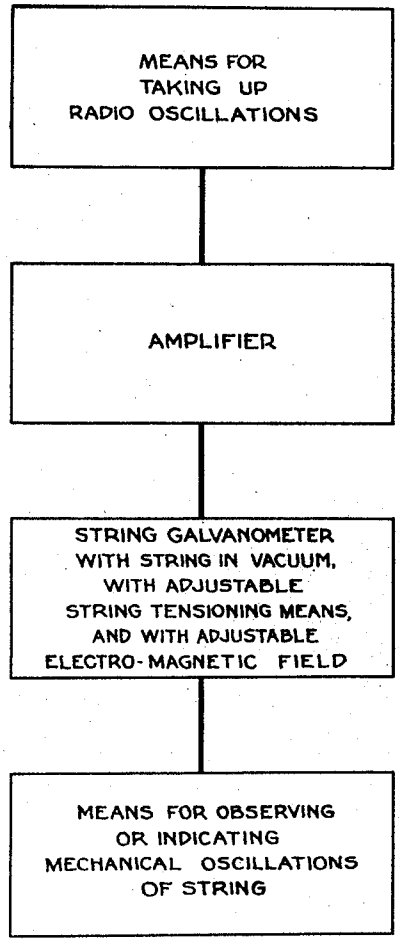

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UNITED STATES PATENT OFFICE.

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RECEIVING OF WIRELESS SIGNALS.

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This invention relates to the receiving of wireless or radio signals and has for its object to provide means whereby long distance signals can be satisfactorily received and the receiver can be tuned to be sensitive to selected frequencies with a high degree of sharpness.

It is known in wireless telegraphy to employ a so-called string galvanometer as a receiver the fibre or string of the galvanometer being tuned to an audible frequency, such frequency being derived from the received radio oscillations by means of a heterodyne or in other ways. The present invention similarly employs a string galvanometer as a receiver but makes it possible to dispense with the heterodyne or other frequency-changing instruments.

The invention is illustrated diagrammatically in the accompanying drawing.

In the arrangement according to the present invention the received oscillating currents are led after amplification but without rectification to the fibre of the string galvanometer, the size and tension of the fibre being so adjusted that its natural frequency is the same as the radio-frequency of the received oscillations.

Hitherto it has been generally believed that it is practically impossible to give the string a natural frequency agreeing with the usual radio frequencies. The applicant has, however, found not only that it is possible to do so but that the receiving of radio signals by means of such a string presents great advantages which cannot be obtained by any of the methods hitherto known.

It has been found that the string, when given an appropriate length and tension, may be brought into resonance with practically any ordinary radio frequency. If this frequency is say 300,000 cycles per second, corresponding with a wave length of 1 kilometre, the natural frequency of the string can in practice be made to correspond. The length of the string in this case would only be about 1 mm. or less. For longer waves the length of the string should preferably be made proportionately greater; thus in the case of a wave length of 10 kilometres a string of about 10 mms. in length can be used. The strings are preferably made of quartz fibre the surface of which is made conductive in the usual way and the diameter of the string is conveniently 0.001 mm. or less. The energy required to give to the stretched fibre a sufficiently large amplitude and to make distinct records possible, is of the same order of magnitude as the energy required in a telephone for producing an audible sound. The galvanometer is consequently approximately as sensitive as a telephone.

The great advantage of the invention does not, however, reside merely in the sensitiveness of the receiver but also in the great sharpness with which the device may be tuned to a desired frequency and in its insensitiveness to frequencies which are only slightly different therefrom. Furthermore the decrement of the free oscillations of the wire may be varied within wide limits.

This is achieved according to a further feature of the invention by exhausting as far as possible the space containing the string, the desired damping coefficient being obtained by controlling the magnetic field in which the string vibrates.

The air pressure may be reduced to a pressure equivalent to that of a column of mercury 0.001 mm. high or less so that the damping due to the surrounding air may be neglected. The damping decrement may thus be made so small that the fibre will take several seconds before coming to rest. Decrements of 2×10^{-5} and less can be obtained in this way, i. e. several hundred times smaller than the decrement of the best constructed oscillating circuit. On the other hand by making the magnetic field stronger the decrement may be increased to such an extent that high speed telegraphy becomes possible and 400 to 500 words per minute can be received. Practically any desired degree of damping may be obtained by suitably controlling the magnetic field.

This way of controlling the decrement through the magnetic field is essentially different from the method suggested by Blondel, according to which a regulatable vacuum is used.

What I claim is:

1. Apparatus for receiving radio signals at radio frequency, comprising a string galvanometer having the natural mechanical frequency of its string in syntony with the radio frequency of the signal to be received.

2. Apparatus for receiving radio signals at radio frequency, comprising a string gal-

vanometer having the dimensions and tension of its string adjusted to give a natural mechanical frequency of vibration syntonous with the radio frequency of the signal to be received.

3. Apparatus according to claim 1, having the magnetic field of the galvanometer adjustable to provide a desired damping decrement of the fibre.

4. In a receiver for radio oscillations, an electrical circuit adapted to take up the oscillations including the string of a string galvanometer individually tuned mechanically to the radio frequency, and means for indicating the mechanical oscillations of said string.

In testimony whereof I affix my signature.
WILLEM FREDERIK EINTHOVEN.