Dec. 2, 1924. 1,517,654

H. J. ROUND ET AL

WIRELESS SIGNALING SYSTEM

Original Filed March 30, 1921 2 Sheets-Sheet 1

Fig. 1

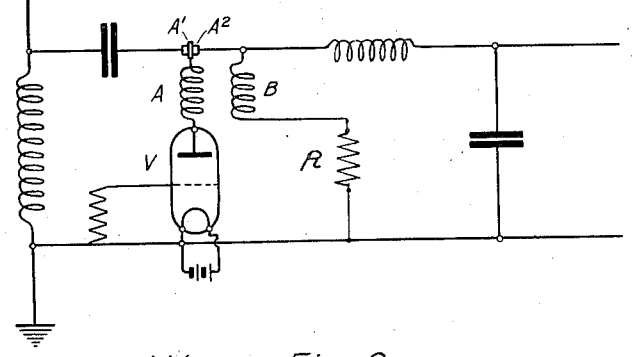


Fig. 2

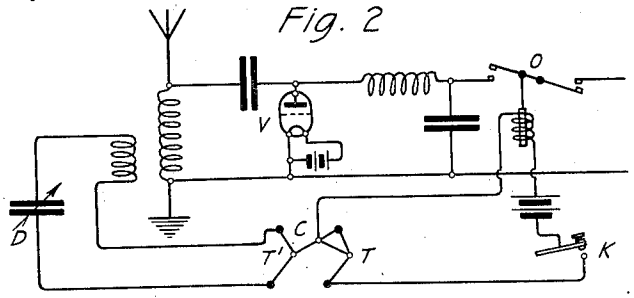
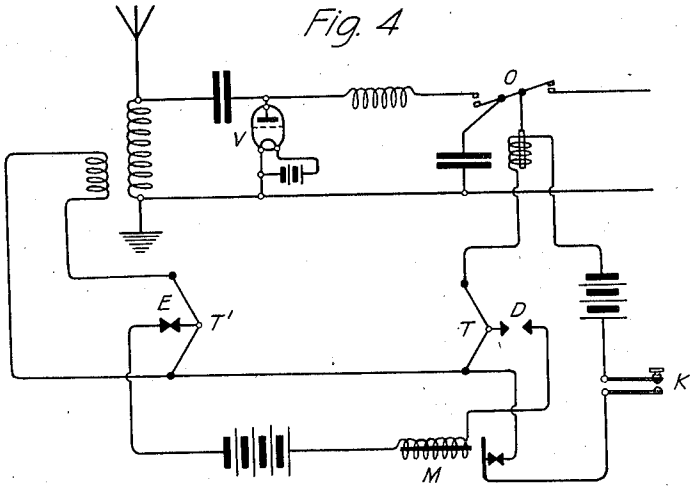


Fig. 4



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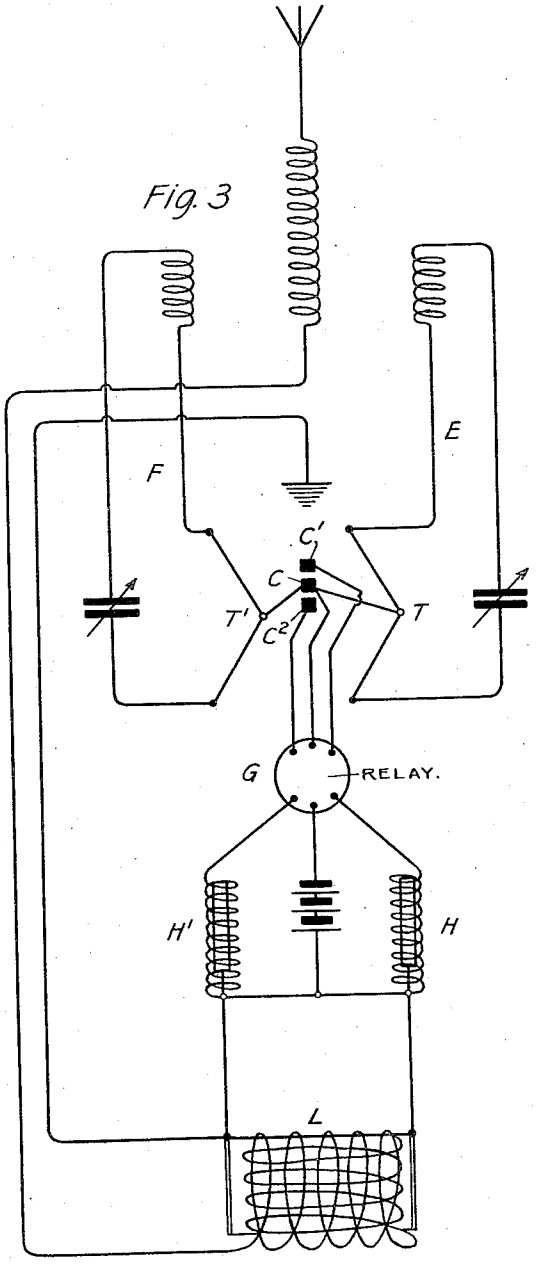
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Fig. 3



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Patented Dec. 2, 1924. 1,517,654

UNITED STATES PATENT OFFICE.

HENRY JOSEPH ROUND, OF LONDON, AND ARCHIBALD McLELLAN, OF SWANSEA, ENGLAND, ASSIGNORS TO RADIO CORPORATION OF AMERICA, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

WIRELESS SIGNALING SYSTEM.

Application filed March 30, 1921. Serial No. 457,152. Renewed April 15, 1924.

To all whom it may concern:

Be it known that we, HENRY JOSEPH ROUND, of 9 Woodberry Crescent, Muswell Hill, London, N., England, and ARCHIBALD McLELLAN, of 13 Northampton Place, Swansea, England, both subjects of the King of Great Britain, have invented new and useful Improvements in or Connected with Wireless Signaling Systems, of which the following is a specification accompanied by drawings.

When a valve system consisting of a valve or valves and an oscillating circuit is oscillating, various accidental circumstances may prevent the aerial from oscillating or may produce a variation in wave length which will be harmful to the valve or valves or to the reception of signals.

The object of our invention is to obviate the possibility of such harm.

The novel features which we believe to be characteristic of our invention are set forth with particularity in the appended claims. The invention itself, however, together with further objects and advantages thereof will best be understood by reference to the following description of several arrangements embodying the invention taken in connection with the accompanying drawing in which:—

Fig. 1 is a diagrammatic view illustrating one form of our invention.

Figs. 2, 3 and 4 are diagrammatic views of modifications.

According to one form of our invention, we introduce into such a system a dynamometer relay, one coil of which is in series with the valve, but not including the part of the circuit which feeds power to the aerial and the other in series with a resistance across the valve. The dynamometer will be adjusted so that if the power into the valve exceeds a certain value, the dynamometer relay operates a switch or switches for cutting off or reducing the power.

In accordance with the arrangement of Fig. 1 of the accompanying drawings, a normal transmitting circuit with the addition of coils A and B is arranged with mutual induction between them and so that one is movable in respect to the other. A is the current coil connected between the positive feed main and the anode of the valve V, and B is the voltage coil connected across the valve, resistance R being suitably adjusted so as to give sufficient current through B without absorbing appreciable power. On the moving coil, such as A, is fixed a contact A^1 which controls the feed current by movement into or out of engagement with contact A^2. If the aerial circuit is all right the energy flowing into the valve should be fairly constant, but if owing to any cause such as an earthed aerial the energy flow in the oscillation circuit is decreased and that into the valve is increased, the main feeding circuit is immediately broken by the movement of the coil which may be caused to operate an alarm in any suitable manner (not shown). If desired the coil A can be placed in the aerial feed and would then be actuated by a drop in energy; this, however, adds the complication that inter-working with the key circuit has to take place to prevent the circuit opening when the key is up.

In another form shown in Fig. 2 we use a differential relay which works if there is an absence or a reduction of power in the aerial or some circuit coupled with the aerial when the main power is on. This relay is arranged so that as long as the key current or main feed current and aerial current flow simultaneously it is not in operation, but if by any chance aerial current does not flow, then a cut out is thrown. As the mean value of the grid current usually depends on the oscillations of the aerial system this current can often be used instead of the aerial current.

The differential relay may work with direct current obtained from the aerial current and key current by any well known means. The relay may by a sluggish hot wire relay and it may act so as to cut off the power if the aerial current does not flow or is reduced to any predetermined value.

Fig. 2 illustrating this arrangement shows a movable contact C controlled by the two hot wire elements T T^1, of a differential relay, T being included in the key circuit which actuates a cut out O while T^1 is included in a circuit coupled to the aerial. When the key K is pressed, element T will be heated and the key circuit will be broken by movement of contact C with the result that the feed main will be broken by cut out O unless at the same time sufficient current is flowing in the aerial which will cause T^1 to be heated so that the key circuit is

not broken. If therefore the aerial does not oscillate or only oscillates to a weaker extent than normal, the key circuit is broken and so the valve is protected from damage.

If a condenser D be included, as shown, in the circuit through T^1, then if the currents in that circuit drop owing to a change of tune in the aerial, the key circuit will be broken.

By a simple development of this scheme we can provide means whereby a variometer can be actuated to restore the tune of an aerial to the normal should it vary in either sense by a predetermined amount.

This is illustrated in Figure 3 where a plurality of circuits are coupled to the aerial, two circuits E F being tuned one a certain amount above and the other a certain amount below the aerial and including hot wire elements T, T^1.

Should the tune of the aerial vary so much that the aerial is in tune with either E or F, contact C is brought against one or the other of the fixed contacts C^1, C^2 so as to actuate a relay G which controls two solenoids H, H^1, operating a variometer L by which inductance is added to or withdrawn from the aerial so as to restore it to its normal tune, or at any rate so near that tune that the circuit of relay G is broken.

Obviously the relay G can be arranged in other ways, for example, to operate the cut out O in the feed main of Figure 2, or may cut inductances of definite values in and out of the antenna circuit.

As a modification of the arrangement illustrated in Fig. 2 we can employ two relays one of which is normally closed and can be actuated by the aerial current, and the other of which is normally open and actuated by the key current.

If their contacts be arranged in series, these two relays may control a cut out circuit so that unless the aerial current relay immediately opens on the key relay being closed the cut out works.

This is illustrated in Fig. 4 in which the contact D controlled by the hot wire T in the key circuit is normally open and is in series with a relay M and the normally closed contacts E controlled by hot wire T^1 in the circuit coupled to the aerial.

It will be seen that when the key K is pressed, unless sufficient current flows in the aerial to open the contact of T^1, relay M will be energized owing to the closing of its circuit by hot wire T and therefore cut out O will be thrown.

Obviously other kinds of relays, such as direct current relays, may be used, in which case the aerial currents will be rectified in any well known manner.

With the arrangement of Fig. 4, it will be wise, if T T^1 are fast relays, to make relay M sluggish so that sending will not be unnecessarily interrupted by slight kicks passing through the apparatus.

Having now described our invention, what we claim is:

1. A wireless signaling system comprising in combination a valve, an oscillation circuit, a relay adapted to be operated when the current in the oscillation circuit is below a certain value and means adapted to be operated by said relay for controlling the supply of energy to the valve when the relay is operated.

2. A wireless signaling system comprising in combination a valve, an oscillation circuit, a relay adapted to be operated when the relative currents through the oscillation circuit and valve are altered and means for controlling the supply of energy to said valve, said means being adapted to be operated by said relay when the relative currents in said oscillation circuit and valve are altered beyond certain limits.

3. A wireless signaling system comprising in combination a valve, an oscillation circuit and a relay having a coil in series with the valve and another coil across the valve, said coils being relatively movable and adapted to interrupt the supply of energy to the valve when the current through the valve relative to the current in the oscillation circuit is varied beyond certain limits.

4. A wireless signaling system comprising in combination, a valve, an oscillating circuit and means for automatically interrupting the supply of energy to the valve on the current in the oscillatinng circuit falling below a certain value.

5. A wireless signaling system comprising in combination, a valve, an oscillating circuit and relay having a coil in series with the valve and another coil in series with a resistance across the valve and adapted by the relative movement of said coils to interrupt the supply of power to the valve if that supply exceeds a certain value.

6. The combination with a vacuum tube oscillator of a source of current for supplying electrical energy thereto, and means for interrupting the supply of current to said oscillator upon the occurrence of abnormal conditions, comprising a relay having two windings supplied with current from two different circuits, said windings being so proportioned that the effects of the two currents normally oppose and neutralize each other and the circuits from which the currents are supplied being so chosen that upon the occurrence of abnormal conditions the effect of one current will overbalance that of the other and cause the relay to operate and interrupt the supply of current to the oscillator.

7. The combination with a vacuum tube oscillator of a source of current for supplying electrical energy thereto, and means for

interrupting the supply of current to said oscillator upon the occurrence of abnormal conditions comprising a relay having two windings supplied with current from two different circuits, one of said circuits being a circuit by means of which current is supplied to the plate circuits of the vacuum tubes, said windings being so proportioned that the effects of the two currents normally oppose and neutralize each other and the circuits from which the currents are supplied being so chosen that upon the occurrence of abnormal conditions the effect of one current will overbalance that of the other and cause the relay to operate and interrupt the supply of current to the oscillator.

8. The combination with a vacuum tube oscillator of a source of current for supplying electrical energy thereto, and means for interrupting the supply of current to said oscillator upon the occurrence of abnormal conditions comprising a relay having two windings supplied with current from two different circuits, one of said circuits being a circuit by means of which current is supplied to the plate circuits of the vacuum tubes, and the other of said circuits being a circuit in which the current remains substantially constant as long as oscillations are produced, but decreases greatly when oscillations are interrupted by means other than normal keying, said windings being so proportioned that the effects of the two currents normally oppose and neutralize each other and the circuits from which the currents are supplied being so chosen that upon the occurrence of abnormal conditions the effect of one current will overbalance that of the other and cause the relay to operate and interrupt the supply of current to the oscillator.

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