

Jan. 23, 1934.

W. DUBILIER

1,944,226

WIRED RADIO COMMUNICATION SYSTEM

Original Filed May 11, 1923 2 Sheets-Sheet 1

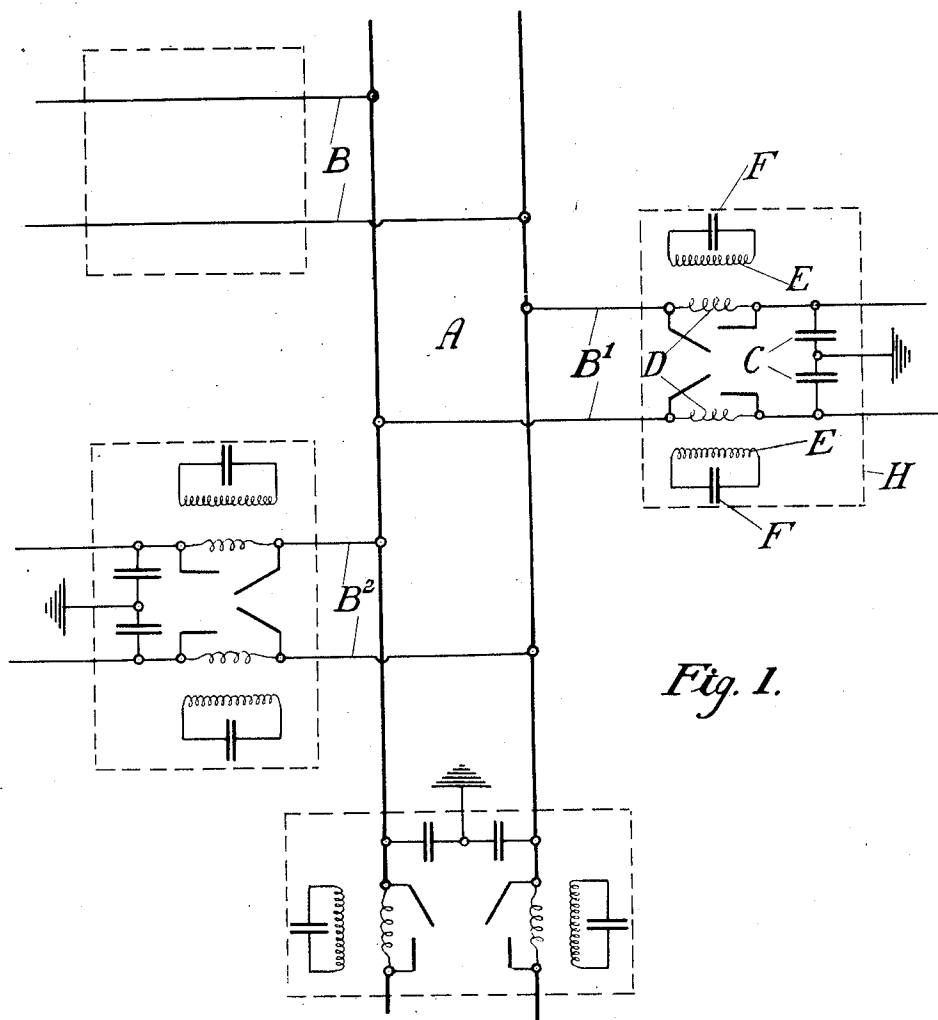


Fig. 1.

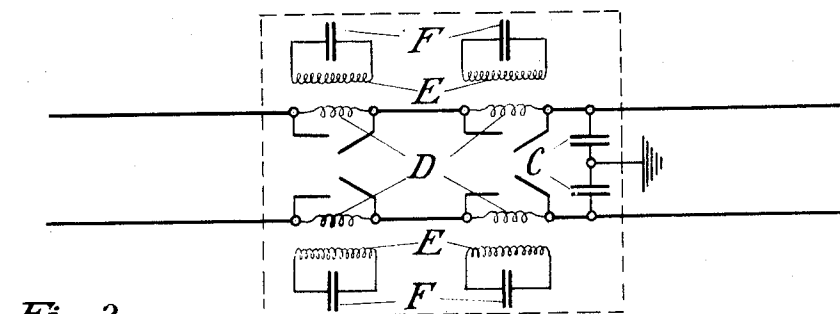


Fig. 2.

Inventor
William Dubilier
By his Attorney
H. R. Van Deventer

Jan. 23, 1934.

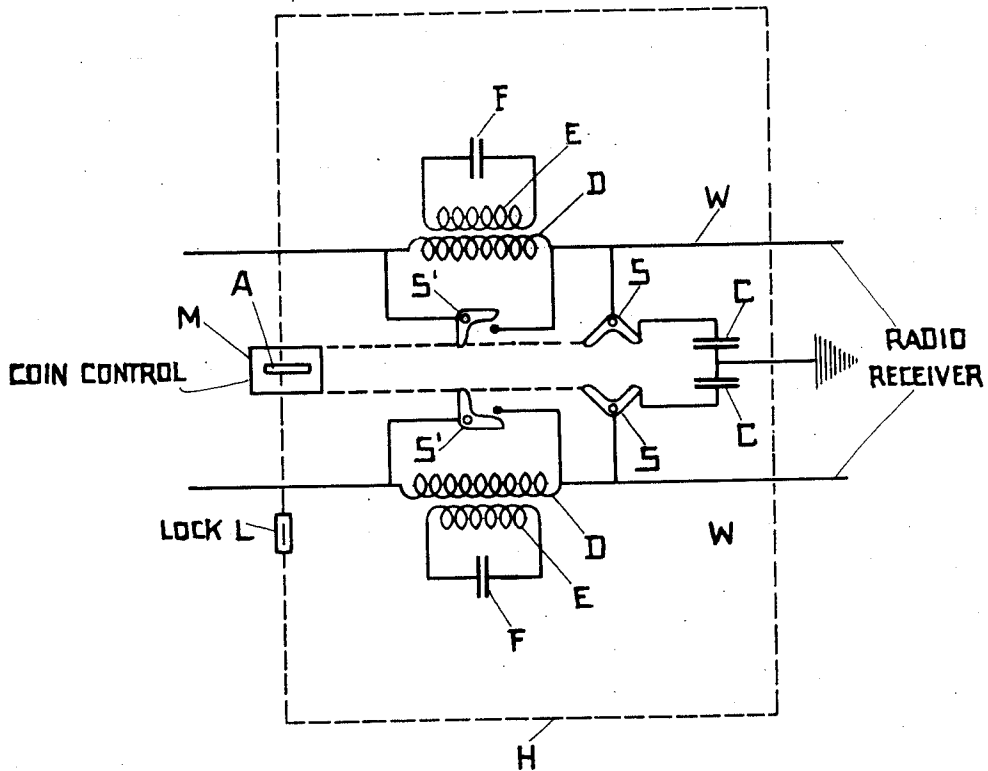
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Fig. 3



INVENTOR
WILLIAM DUBILIER
BY *Samuel Petrolnik*
ATTORNEY

UNITED STATES PATENT OFFICE

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WIRED RADIO COMMUNICATION SYSTEM

William Dubilier, New Rochelle, N. Y., assignor
to Radio Patents Corporation, New York, N. Y.,
a corporation of New York

Application May 11, 1923, Serial No. 638,167
Renewed September 30, 1933

6 Claims. (Cl. 179—2.5)

This invention relates to improvements in methods of communication wherein currents of high or radio frequency are employed and has for its object the provision of means for effectively controlling such communication in cases where conductors, such as for example, the wires of a domestic electric lighting system, are utilized for reception purposes.

The invention is primarily intended to be applied to cases where communication is to be established by the aid of the so-called wired wireless system, that is to say, in cases where currents of high or radio frequency are transmitted along conductors or wires.

According to the invention means are provided whereby high frequency currents or currents of radio frequency may be excluded from or admitted to conductors, such as for example, the wires of a domestic electric lighting system, either wholly or in part for the purpose above set forth.

Further features of the invention will hereinafter appear.

In transmitting high frequency currents for signalling or similar purposes over the wires of an ordinary electric lighting system, it is somewhat difficult, especially when the system is provided with a large number of branches, to control the use of these currents without at the same time interfering with the use of the commercial currents on such wires.

With the present invention this difficulty is overcome by inserting a set of inductances and capacities on the different branch-offs. In this manner it is possible to control the high frequency currents for each branch without materially affecting the other branches and without materially interfering with the ordinary commercial or lighting currents. Thus the present invention renders possible the provision of a system of transmitting ordinary currents and high frequency currents over the same set of wires and the control of one independent of the other.

In the ordinary electric lighting system electric meters are usually installed either in the different branch-offs or in the main supply circuit and the inductances in such meters may sometimes interfere with the high frequency currents. This can be overcome by shunting a condenser across the meter coil to form a short circuit or an easy path for the high frequency currents without materially affecting the commercial currents. A condenser arranged in this manner will also, of course, eliminate any possible dangerous effects that the high frequency

currents would be likely to have upon the meter coils.

Similarly when the electric lighting supply is by means of alternating current, and a transformer is included in the main supply circuit or in the branch-offs, a condenser or condensers may be shunted across between the output and input wires of the transformer in order to provide an easy path for the high frequency currents.

Figure 1 shows a lighting or power circuit with apparatus according to my invention connected thereto. Figure 2 shows another form of my invention and Figure 3 indicates how the apparatus for utilizing radio frequency currents can be controlled so as to prevent unauthorized persons from obtaining the benefit thereof.

Referring now to the accompanying drawings, Figure 1 illustrates diagrammatically, by way of example, one convenient mode of carrying the invention into effect as applied to the commercial electric lighting system of a building in which there are a pair of main supply lines and a plurality of branches leading therefrom. The invention may be applied to the pair of main lines alone or to one or more of the branch lines or, if desired, to the main lines and to one or more of the branches. In Figure 1 for the sake of illustration there are shown three branches B, B' and B², and since the invention may take the same form whether it be applied to a main or to a branch line, it will only be necessary to fully describe the embodiment illustrated as applied, say to the branch line B'.

Referring now to the branch line B' in detail, D represents an inductance or impedance arranged in series with the lines and CC represents a pair of condensers connected across the lines with the centre point grounded. Of course, it will be appreciated that only one or any desired number of condensers may be employed and that in cases where one side of the line is already grounded it will only be necessary to arrange an inductance in series with and one or more condensers across the lines.

In connecting an inductance or impedance in series with the line, it may be found in certain circumstances that the said inductances or impedance introduces into circuit a resistance sufficiently great to cause considerable losses to occur in respect of the commercial current and to produce a heating up of the coils resulting in further serious objections. In order to reduce these losses and the heating up of the coils to a minimum, the inductances or impedance is

made up of a few turns only and is magnetically coupled to another inductance, which may be termed a secondary inductance, of many turns, and a condenser is connected across the ends of the said secondary inductance. In Figure 1 the secondary inductance is denoted by E and the condenser associated with same is denoted by F. This secondary circuit, containing the secondary inductance and a condenser, is adjusted so that it has a natural period or frequency which is the same or about the same as that of the high frequency current which it is desired to control.

The main lines and one or more of the branch lines are preferably provided with means whereby the inductances can be short-circuited and cut out of the line, or a complete high frequency circuit may be connected or disconnected, or the condenser or condensers may be connected or disconnected either by blocking or switching. It is also preferred that these means should be enclosed or encased in a suitable container, indicated in Figure 1 by dotted lines H, which may be sealed in any desired manner, such as by lock and key, so that only authorized persons may be permitted to examine or tamper with such means and the interior of said container.

In order that the high frequency currents may be placed under perfect control and that the persons desirous of using these currents may only be permitted to do so upon the payment of a predetermined fee or charge, the above mentioned container may be provided with a timing device operated by any known and suitable form of coin-freed mechanism, such as, for example, a clockwork mechanism having a coin in a slot control as is commonly employed in meters of other kinds. In this manner it is possible to control the high frequency currents in such a manner that when a coin is inserted in the meter or container the inductances or capacities or both are cut out of circuit and the high frequency currents are thus permitted to be employed, for a given predetermined period of time.

Figure 3 shows more fully how the use of the radio frequency currents can be controlled. In this view, the casing H, as shown, is provided with a lock indicated diagrammatically at L, so that only the person having the proper key can obtain access to the inside of the casing H to adjust the apparatus in the manner required for purposes of radio reception. Further the two condensers C, which are bridged across the main line wires W are shown as having in the conductors lead thereto, circuit breaking switches S and the inductances D also have short circuiting switches S'. The two sets of switches, S and S' are indicated as being connected to means such as a suitable coin-controlled device M, having a slot A', so that unless a coin is deposited in this device, the switches will maintain the position which they occupy in Figure 3, then, on the deposit of a coin the device M, if this device be associated with suitable timing mechanism, messages can be received for a predetermined period; after which the device operates in such a manner as to open again the switches S' and close the switches S. It is, of course, understood that the device M and connections therefrom to the switches S and S' are indicated only in a diagrammatic way in Figure 3.

If desired, a plurality of sets of high frequency currents may be imposed upon the same electric conductors or wiring. In these circumstances a plurality of sets of coils and condensers are in-

stalled in the circuit or branch, the number of such sets corresponding with the number of sets of high frequency currents which it is desired to control, and each set of coils and condensers is tuned to the same or about the same frequency as that of the particular high frequency current to be controlled. Preferably the plurality of sets of coils and condensers are enclosed in a single container which is divided into a plurality of compartments and each compartment is adapted to contain one of the said sets. Furthermore, it is also preferred to provide each compartment with a suitable form of sealing means, such as a lock and key, and also with an individual coin-freed mechanism for the separate control of the cutting out or switching means associated with the set of apparatus enclosed in that particular compartment.

In Figure 2 of the accompanying drawings there is shown, as an example, an arrangement of inductances and capacities suitable for the controlling of two sets of high frequency currents, the parts which correspond with those employed with the arrangement shown in Figure 1 being denoted by the same reference letters as those which are assigned to such parts in Figure 1.

The manner in which the casing in Figure 2 can be divided up into compartments and each compartment provided with separate locks or coin controlled devices or both, will be obvious especially in view of the arrangement of Figure 3.

While the present invention has been described more particularly as applied to conductors such as those employed in an ordinary commercial electric lighting system, it is to be understood and of course it will be readily appreciated that the invention is equally applicable to the conductors or wires of telephone or power circuits.

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. In a composite system, a conductor carrying a power supply and high frequency currents superimposed thereon, means comprising a transformer, the primary of which is made up of comparatively few turns of negligible impedance to power currents and the secondary of which is connected in circuit with a condenser and tuned to the high frequency, one end of said means being connected to said conductor, a load connected to the other end of said means operated by the power supply, a receiver for the reception of the high frequency signals also connected to the other end of said means and means for shunting said first means to permit said signalling currents to operate said receiver.

2. In a composite system, main and branch conductors carrying a power supply and a plurality of high frequency currents superimposed thereon, a plurality of impedance means in each branch conductor, each of said impedance means offering a negligible impedance to said power currents and each offering a high impedance to a specific one of said high signalling frequencies, a load for each branch conductor operated by said power supply, receiver apparatus for each branch conductor for the reception of said plurality of high frequencies, said plurality of impedance means being interposed between said receiver apparatus and load on each branch on the one side and the main conductor on the other side and means for selectively shunting one of said impedance means whereby the corresponding high

frequency currents operate the associated receiver.

3. In a wired wireless composite signalling system, a conductor carrying power currents and high frequency currents superimposed thereon, an impedance offering a negligible impedance to said power currents and a high impedance to the high frequency currents, and comprising inductance and capacity, said high impedance being connected in series with said conductor, one end of said impedance being connected to said conductor, a load connected to the other end of said impedance operated by the power supply, a receiver for the reception of its high frequency signals also connected to the other end of said impedance, said impedance normally constituting the sole electrical path from said line to said receiver and load, and means for shunting said first impedance to provide an electrical path for said signalling currents to operate said receiver.

4. In a wired wireless composite signalling system, a conductor carrying power currents and high frequency currents superimposed thereon, a plurality of branch conductors, means offering a negligible impedance to said power currents and a high impedance to the high frequency currents and comprising inductance and capacity, said high impedance being connected in series with each of said branch conductors, one end of each of said impedances being connected to said branch conductors, a load connected to the other end of each of said impedances operated by the power supply, a receiver for the reception of the high frequency signals also connected to the other end of each of said impedances, said impedances normally constituting the sole electrical paths from said line to each of said receivers and loads, and

individual means for shunting each of said first impedances to provide electrical paths for said signalling currents to operate said receivers.

5. In a wired wireless composite signalling system; a conductor carrying power currents and high frequency currents superimposed thereon, means offering a negligible impedance to said power currents and a high impedance to said signalling currents, one end of said means being connected to said conductor, a load connected to the other end of said means operated by the power supply, a receiver for the reception of high frequency signals also connected to the other end of said means, said means normally constituting the sole conductor path from said line to said receiver, and means for disabling said first means to provide electrical paths for said signalling currents to operate said receiver.

6. In a wired wireless composite signalling system, a conductor carrying power currents and high frequency currents superimposed thereon, a plurality of branch conductors extending from said main conductor, means individual to each of said branch conductors offering negligible impedance to said power currents and a high impedance to said signalling currents, one end of each of said means being connected to its individual branch conductors, loads connected to the other end of said means operated by the power supply, receivers for the reception of high frequency signals also connected to the other end of each of said means, said means normally constituting the sole electrical paths from said line to said receivers, and means for disabling said first means to permit said signalling currents to operate said receivers.

WILLIAM DUBILIER.

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