

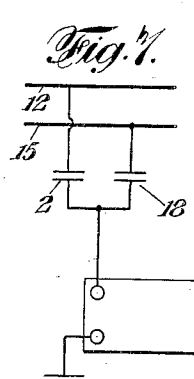
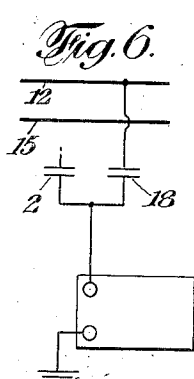
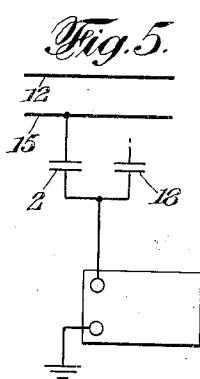
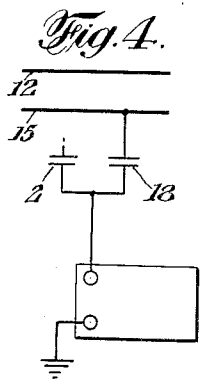
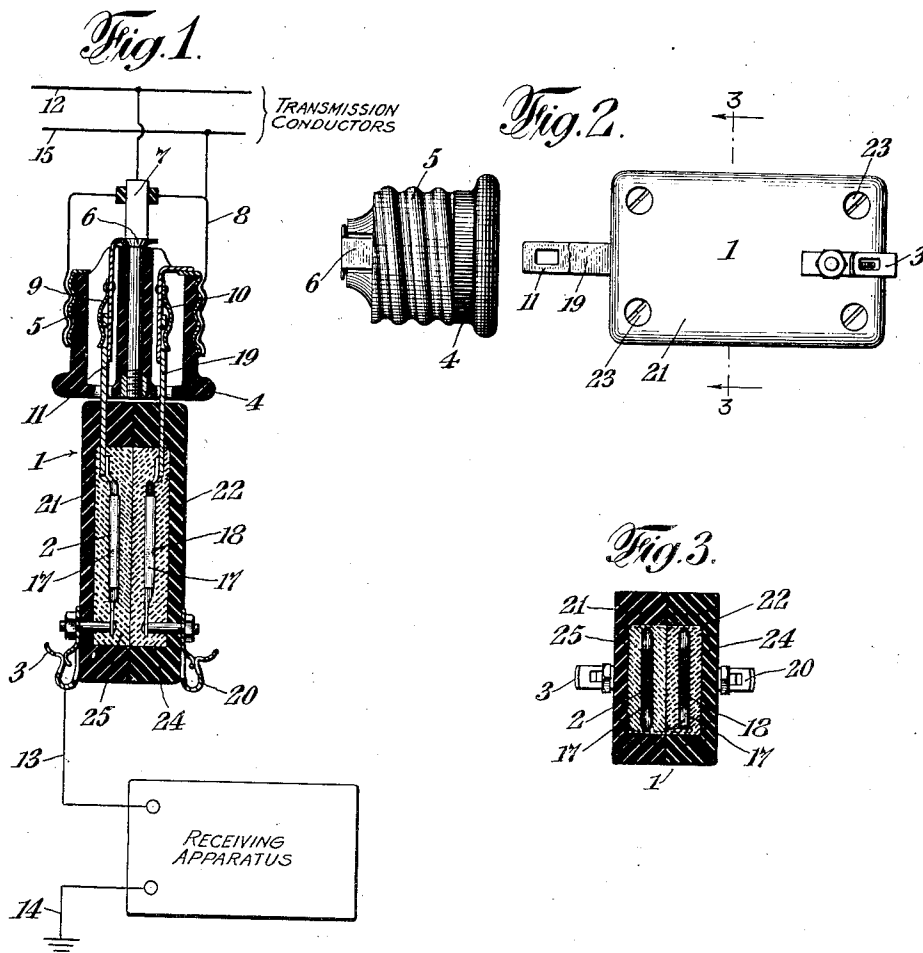
June 18, 1929.

W. DUBILIER

1,717,701

CONNECTING DEVICE FOR RADIO RECEIVING SYSTEMS

Filed May 23, 1922



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BY  
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## UNITED STATES PATENT OFFICE.

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## CONNECTING DEVICE FOR RADIO RECEIVING SYSTEMS.

Application filed May 23, 1922. Serial No. 562,944.

The invention relates to an electrical connecting device adapted to be interposed between a radio receiving apparatus and transmission conductors carrying electrical energy for purposes such as lighting or power, whereby such conductors may be utilized as antennæ in a receiving system.

One object of the invention is to provide a device of the above character which will minimize the risk of injury to the operator or to the transmission circuits in connecting the latter to the receiving apparatus, particularly by eliminating the possibility of improper circuit connections or by the exposure of the operator to the line currents, carried by the transmission conductors, while nevertheless permitting the currents of radio frequency to pass to the receiving apparatus.

The invention also aims to provide such a connecting device by means of which the circuit connections between the transmission conductors and the receiving apparatus may be readily altered to suit different conditions in the transmission line, and thus enable the currents of radio frequency to be effectively transmitted to the receiving apparatus.

Further objects and advantages of the invention will be in part obvious and in part specifically pointed out in the description hereinafter contained, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof; such embodiment, however, is to be considered merely as illustrative of its principle. In the drawings:

Fig. 1 is a longitudinal sectional view of a connecting device constructed in accordance with the invention, and illustrating one method of employing the same to connect a radio receiving apparatus with transmission conductors.

Fig. 2 is a plan view of the connecting device shown in Fig. 1, with certain parts thereof shown detached.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2.

Figs. 4 to 7 are diagrammatic views illustrating circuit connections which may be obtained by the connecting device shown in Figs. 1 to 3.

If one or more of the conductors of transmission lines supplying current for purposes such as power or lighting, are utilized as antennæ for a radio receiving apparatus, the relatively large amount of energy which is

transmitted through such conductors for ordinary purposes, entails a certain amount of risk in connecting the transmission lines to the receiving apparatus, since injury to the operator of the receiving apparatus may easily result in making the connections, or, if improper connections are made the transmission circuits may be injured.

In accordance with the present invention the receiving circuits are connected with the transmission circuits by a connecting device which will insure against accidents of the above nature. Referring to the drawings, such device comprises a casing 1 carrying an electrostatic element or condenser 2 (the preferred form of which will be later described in greater detail), as well as a terminal 3 of any suitable type, and an element 4 of a quickly detachable connector. In the present instance the quickly detachable connector 4 is of the screw plug type embodying a screw contact 5 and a centre contact 6, adapted to cooperate respectively with the centre and shell contacts 7 and 8 of an ordinary lamp socket, as indicated conventionally in Fig. 1. The condenser 2 is connected in series between the terminal 3 above mentioned and one of the contacts 5 or 6, or preferably the device is so constructed that said condenser may be connected selectively with either of such contacts.

In the present instance the connector element 4 is removably mounted upon the casing 1 by means of a detachable plug and socket connecting device, the contact members 9 and 10 (Fig. 1) of such device being carried by the connector 4, and the contact plug 11 by the casing 1. The plug or part 11 is connected in series with condenser 2 and terminal 3, while the socket members 9 and 10 are connected respectively to the contacts 6 and 5 of connector 4. Thus in the circuit diagram indicated in Fig. 1 the transmission conductor 12 is connected in circuit with one terminal of the radio receiving apparatus through the contacts 7, 6, 9 and 11, condenser 2, terminal 3 and a lead 13, while another terminal of the receiving apparatus may be grounded by a connection 14 in the usual manner.

The capacity of the condenser is so low that unidirectional currents or alternating currents of frequencies such as are encountered in transmission lines, will not pass through the condenser, but the capacity of the condenser is

sufficiently high to permit currents of the high frequency employed in radio transmission to be transmitted through same; for example, for ordinary purposes a condenser having a capacity of .003 microfarads will satisfy the above conditions for transmission lines of the usual type employing about 110 volts and either direct current or alternating current at frequencies up to about 60 cycles. It will be understood, however, that the above capacity value may be varied to a considerable extent without preventing the condenser from functioning as aforesaid. With a connecting device of the above character an unskilled operator may attach connector element 4 to a power circuit without danger of improper connections, or of injury to himself, since the energized parts of the connector are not exposed when the connection is made. The casing 1 may then be attached to the connector by means of the plug and socket connecting device above described, with the result that the only remaining part of the connecting device which has to be adjusted by the operator is the terminal 3. On account of the action of the condenser as above described, the terminal 3 is not subjected to the transmission line energy, and therefore the operator cannot make any circuit connections to the connecting device, which will injure the power circuits, nor will he be exposed to danger of shock from such circuits. The condenser 2 preferably is constructed of alternating sheets of mica and tin foil, compressed and treated as set forth in Patent #1,345,754 issued to me on July 6, 1920, and also preferably adequately clamped to hold it against interior vibrations, for example, by folding about the condenser stack a stiff metal strip 17 as described in my co-pending application #562,946, filed May 23, 1922, entitled Condenser clamping device. The energy on ordinary transmission lines is sufficient to exert relatively large attractive and repulsive forces between the plates of the condenser, and the compression of the condenser as aforesaid will serve to prevent vibrations between the plates which otherwise might cause a hum interfering with efficient reception.

It will be noted that the plug member 11 may be connected selectively to socket members 9 and 10, thus effecting either the circuit connection shown in Fig. 1, or the alternative connection shown in Fig. 5 wherein, if plug member 11 is engaged with socket member 10 transmission conductor 12 will be cut out of circuit and transmission conductor 15 cut into circuit. This is desirable in view of the fact that one side of the transmission line may act more efficiently as an antenna than the other, certain types of transmission systems having one conductor grounded, for example.

Preferably the connecting device is so constructed as to provide also different capaci-

ties, in order to enable same to be adjusted to suit different types of transmission lines. In the present embodiment the casing 1 also carries a further condenser or electrostatic means 18 similar to the condenser 2 previously described, but of different capacity, for example, .0005 microfarads, such condenser being connected in series between a plug member 19 and a terminal 20 similar to members 11 and 3 previously described. It is found that the changes in capacity which may be obtained with the condensers 2 and 18, are sufficient to meet the different conditions required in transmission lines of ordinary types. For example, as shown in Fig. 4, by connecting the lead 13 to terminal 20, condenser 2 is cut out of circuit and condenser 18 cut into circuit between transmission conductor 15 and the receiving apparatus; or, as shown in Fig. 6, by connecting plug member 19 to socket member 9 and lead 13 to terminal 20 condenser 18 is cut into circuit between transmission conductor 12 and the receiving apparatus; or, as illustrated in Fig. 7, both of the transmission conductors 12 and 15 may be connected, by connecting the lead 13 to both of the terminals 3 and 20.

I prefer to construct the casing 1 of mating parts 21 and 22 which ordinarily will be of insulating material and suitably held together as by bolts 23, each of the parts being provided with a recess 24 adapted to receive the corresponding condenser, and such recesses being filled with an insulating compound after the condensers have been properly connected between their corresponding terminals and plug members. An insulating compound 25, for example, of paraffin or beeswax may be poured into the recesses in a liquid condition and allowed to solidify and thus exert a further compression upon the condensers and assist in holding them against interior vibrations.

While a specific embodiment of the invention has been described, it will be obvious that many changes may be made therein without departing from its principle, as defined in the following claims.

I claim:

1. A connecting device for radio receiving systems, comprising a casing, a plurality of condensers carried thereby, and a connector element of the screw plug type, said casing and connector element having thereon a plurality of plug and socket contact members to enable the casing to engage the element, said casing having terminals thereon, and said condensers being each connected in series between a terminal and one of such members carried by said casing, said element and said terminals serving to enable the device to connect a radio receiving apparatus to one or more of the transmission conductors of a power circuit.

2. A connecting device for radio receiving systems comprising a casing, a plurality of condensers enclosed thereby, contact members projecting from the casing, said contact members being connected each to one pole of one of the condensers, and terminals on the outside of the casing, said terminals being connected each to one of the remaining poles of the condensers, said members and said terminals serving to enable the device to connect a radio receiving apparatus to one or more conductors of an electric power system.

3. A connecting device for radio receiving systems comprising a casing, a plurality of condensers enclosed thereby, tongue-shaped contact members projecting from the casing and connected each to one extremity of one of the condensers, and terminals for attaching conductors on the outside of the casing and connected each to the other extremity of one of the condensers, said members and said terminals enabling the device to unite a radio receiving apparatus to one or more transmission conductors of an electric power circuit.

4. A connecting device for radio receiving systems, comprising a casing, a plurality of condensers of different capacities carried thereby, and a connector element of the screw plug type, said casing and connector element having thereon a plurality of plug and socket contact members to enable the casing to engage the element, said casing having terminals thereon, and said condensers being each connected in series between a terminal and one such member carried by said casing, said element and said terminals serving to enable the device to connect a radio receiving apparatus to one or more of the transmission conductors of a power circuit.

5. A connecting device for radio receiving systems comprising a casing, a plurality of condensers of different capacities enclosed thereby, contact members projecting from the casing, said contact members being connected each to one pole of one of the condensers, and terminals on the outside of the casing, said terminals being connected each to one of the remaining poles of the condensers, said

members and said terminals serving to enable the device to connect a radio receiving apparatus to one or more conductors of an electric power system.

6. As a new article of manufacture, a plug comprising an insulating shell or housing, a plurality of male contact elements thereon adapted for insertion in a standard power line plug-jack, insulated terminals carried by the said shell, and a plurality of condensers housed by the shell, the opposite plates of each condenser being connected to a contact element and a terminal respectively, the capacity of each of the condensers being of a magnitude such that when the plug is attached to the standard power line plug-jack the low frequency current flow to the terminals will be substantially impeded while the high frequency current flow thereto will be substantially unimpeded thereby.

7. A plug for radio circuits comprising twin mating plug parts fastened together, each comprising an insulating shell, a prong attached thereto and projecting therefrom for insertion into a standard plug-jack, an angle piece attached interiorly to said shell, a condenser housed by the shell, the opposite plates of the condensers being connected to the prong and angle piece respectively and a connecting terminal mounted on the shell and connected to said angle piece.

8. A device for inductively coupling high frequency signalling apparatus to a system carrying direct or low frequency currents, said device comprising a plurality of condensers of different capacities, the condensers being adapted to pass high frequency currents but prevent the flow of direct or low frequency currents, an insulating casing for said condensers, means secured to the casing for connecting one side of each of the condensers to said system, and means for connecting the other side of the condensers to said signalling apparatus.

In testimony that I claim the foregoing, I have hereunto set my hand this 11th day of May, 1922.

WILLIAM DUBILIER.