May 9, 1939. S. E. ADAIR 2,157,841

ELECTRICAL SYSTEM

Filed Dec. 19, 1936

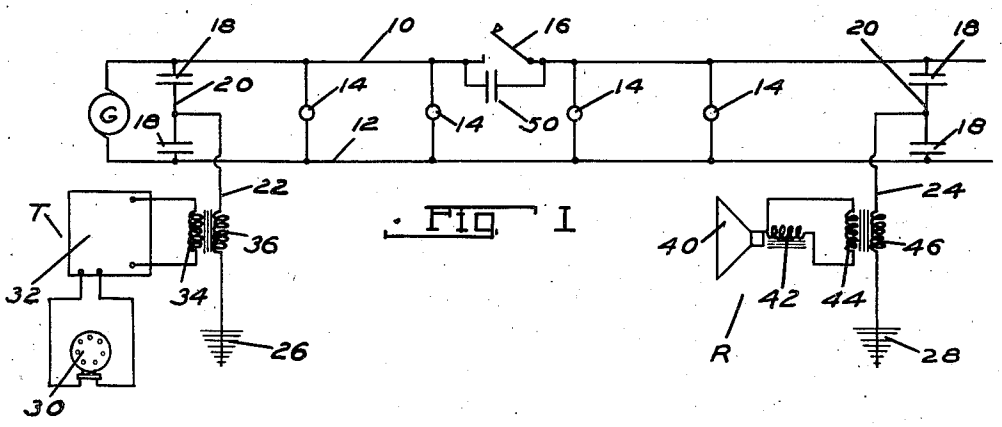


Fig. 1

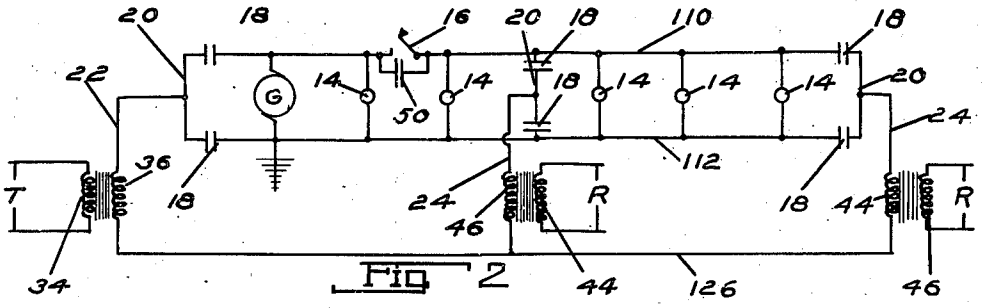


Fig. 2

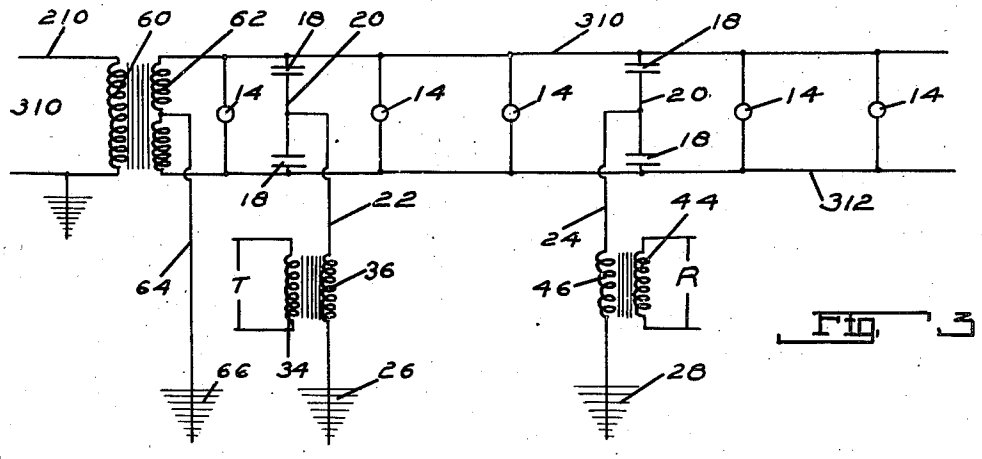


Fig. 3

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Patented May 9, 1939 2,157,841

UNITED STATES PATENT OFFICE

2,157,841

ELECTRICAL SYSTEM

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Application December 19, 1936, Serial No. 116,839

6 Claims. (Cl. 179—2)

This invention relates to the use of the power lines of a lighting system for the transmission of radio and telephone messages and the like, and is diagrammatically illustrated as embodied in a system for utilizing the lighting system or part of the lighting system of a boat for the transmission of messages, as for example from the bridge to the engine room. An important object is to so arrange the system that the transmission of messages is not interfered with by the operation of the lights, and preferably so it will not be affected by the opening and closing of the switches controlling the lights, and so that the transmitter and receiver can be readily and quickly connected to and disconnected from the system at different points.

Preferably the system has the lights connected in parallel across the conductors carrying the current, for example the conductors for the direct current used in lighting boats. The transmitter and the receiver or receivers are coupled respectively, for example inductively, to auxiliary conductors each of which is connected between a pair of condensers connected in series between the main conductors of the lighting system. The auxiliary conductors are also electrically connected to complete the transmission circuit, for example by grounding them to the metal hull of the boat. If the lighting system includes any control switches, condensers are connected around them in parallel with them.

In a modification of the above-described system, the transmitter and one or more receivers are connected as described between condensers connected in pairs in series between the conductors of part of an alternating current lighting system, which part is set off from the main lighting system by a transformer having the midpoint of its secondary winding grounded or otherwise electrically connected to the conductors with which the transmitter and receivers are coupled.

The above and other objects and features of the invention will be apparent from the following description of the arrangements illustrated in the accompanying drawing, in which:

Figures 1 and 2 are diagrams of a direct-current lighting system utilized for the transmission of messages; and

Figure 3 is a diagram showing similar use of part of an alternating current lighting system.

In the arrangement of Figure 1, a direct-current generator *g* is used to supply current to the conductors 10 and 12 of the lighting system of a boat. Electric incandescent lights 14 are connected in parallel between the conductors 10 and 12, and suitable control switches 16 are provided where desired, the one illustrated being adapted when opened to cut off all but the first two lights 14.

Several auxiliary connections are also connected in parallel between the conductors 10 and 12. Each of these includes a pair of condensers 18 connected in series by having one set of plates of each connected to one of the conductors 10 or 12 and by having the other sets of plates connected by a lead 20. The mid-points of the leads 20 are connected to auxiliary conductors 22, 24, which are electrically connected, for example by being grounded at 26, 28 to the metal hull of the boat.

The auxiliary conductor 22 has coupled (preferably inductively) thereto a transmitter T, which may be a radio receiver or a telephone set or other means of generating messages. The illustrated transmitter includes a microphone 30 on the bridge of the boat, connected to an amplifier 32 connected to the primary winding 34 of a transformer, the secondary winding 36 of which is connected into the auxiliary conductor 22 between the lead 20 and the ground 26. The condensers 18 and the lead 20 may be included in a single plug adapted to be plugged in the usual way into a wall socket or the like.

Coupled (preferably inductively to each of the other auxiliary conductors 24 is a receiver R. The receiver illustrated in Figure 1 includes a telephone receiver 40 having its coil 42 connected in series with the secondary winding 44 of a transformer which has its primary winding 46 connected into the auxiliary conductor 24.

If any of the switches 16 are so positioned that they would interfere with the transmission of messages between the transmitter T and the receivers R, condensers 50 are connected around them in parallel therewith.

It will be seen that all of the current in the lighting circuit G—10—14—12—G is retained in that circuit and does not interfere with the transmission of messages. However, the two conductors 10 and 12 at the same time together form one side of the message circuit, the other side being the hull of the boat or other ground 26.

The arrangement of Figure 2 is like that of Figure 1, except that the side of the message circuit opposite the conductors 110 and 112 (corresponding to conductors 10 and 12) is a special conductor or metallic ground 126 forming the equivalent of the ground 26, and used where it is not desired to use an ordinary ground for any reason.

The arrangement of Figure 3 may be used where it is desired to utilize part of an alternating-current lighting system to transmit messages, as for example when it is desired to transmit programs from a central radio receiving set (serving as a transmitter) to loud speakers in the rooms of a hotel or apartment house, serving as receivers.

In this case, the leads 210 and 310 of the regular lighting system are connected, where they enter the building, to the ends of a primary winding 60 of a transformer having a secondary winding 62 arranged with its center point grounded through a lead 64, for example to the frame of the building or to the water pipes, as indicated at 66. The ends of the secondary winding 62 are connected to interior conductors 310 and 312, across which the lights 14 are connected in parallel. The transmitter and receiver are shown connected to the conductors 310 and 312 between condensers 18, the same as they are connected to the conductors 10 and 12 in Figure 1, and are electrically connected to each other and to the mid point of the secondary winding 62, by being grounded at 26 and 28 as before.

The condensers 18 are so constructed that they have a high reactance at the low frequency of the line voltage and comparatively low reactance at the sound frequency range.

While three illustrative arrangements have been described in detail, it is not my intention to limit the scope of the invention to those particular arrangements, or otherwise than by the terms of the appended claims.

I claim:

1. In an electrical system having a source of electric power and a lighting circuit including two conductors connected to said source and a plurality of electric lights connected in parallel between said conductors, a communication system comprising a plurality of connections in parallel between said conductors and each including a pair of condensers having one set of plates connected to said conductors respectively and having a lead connecting their other sets of plates electrically together, grounded auxiliary conductors connected respectively to said leads, a transmitter inductively coupled to one of said grounded auxiliary conductors, and a receiver inductively coupled to another of said grounded auxiliary conductors.

2. In an electrical system having a source of electric power and a lighting circuit including two conductors connected to said source and a plurality of electric lights connected in parallel between said conductors, a communication system comprising a plurality of connections in parallel between said conductors and each including a pair of condensers having one set of plates connected to said conductors respectively and having a lead connecting their other sets of plates electrically together, auxiliary conductors connected respectively to said leads, a transmitter coupled to one of said auxiliary conductors, a receiver coupled to another of said auxiliary conductors, and means electrically connecting said auxiliary conductors to complete a circuit therethrough and through the said two conductors which is independent of said lighting circuit.

3. In an electrical system having a power line having two conductors connected to the primary winding of a transformer, a secondary winding for said transformer having its mid point grounded and a pair of conductors connected to the ends of said secondary winding, electric lights connected in parallel between said conductors, a communication system comprising auxiliary connections in parallel between said conductors and each including two condensers in series with each other, grounded auxiliary conductors each connected to one of said auxiliary connections between said condensers therein, a transmitter inductively coupled to one of said auxiliary conductors, and a receiver inductively coupled to another of said auxiliary conductors.

4. In an electrical system having a power line having two conductors connected to the primary winding of a transformer, a secondary winding for said transformer, a pair of conductors connected to the ends of said secondary winding and electric lights connected in parallel between said conductors, a communication system comprising auxiliary connections in parallel between said conductors and each including two condensers in series with each other, auxiliary conductors each connected to one of said auxiliary connections between said condensers therein, a transmitter coupled to one of said auxiliary conductors, a receiver coupled to another of said auxiliary conductors, and means for electrically connecting said auxiliary conductors and the mid point of said secondary winding.

5. In an electrical system having a source of electric power and a lighting circuit including two conductors connected to said source and a plurality of electric lights connected in parallel between said conductors, a communication system comprising a plurality of connections in parallel between said conductors and each including a pair of condensers having one set of plates connected to said conductors respectively and having a lead connecting their other sets of plates electrically together, grounded auxiliary conductors connected respectively to said leads, a transmitter inductively coupled to one of said grounded auxiliary conductors, and a receiver inductively coupled to another of said grounded auxiliary conductors, said lighting circuit conductors being provided with a switch for opening and closing of the lighting circuit, together with a condenser connected in parallel around said switch, whereby the opening and closing of the switch does not affect the transmission of messages from said transmitter to said receiver.

6. In an electrical system having a source of electric power and a lighting circuit including two conductors connected to said source and a plurality of electric lights connected in parallel between said conductors, a communication system comprising a plurality of connections in parallel between said conductors and each including a pair of condensers having one set of plates connected to said conductors respectively and having a lead connecting their other sets of plates electrically together, auxiliary conductors connected respectively to said leads, a transmitter coupled to one of said auxiliary conductors, a receiver coupled to another of said auxiliary conductors, and means electrically connecting said auxiliary conductors to complete a circuit therethrough and through the said two conductors which is independent of said lighting circuit, said lighting circuit conductors being provided with a switch for opening and closing of the lighting circuit, together with a condenser connected in parallel around said switch, whereby the opening and closing of the switch does not affect the transmission of messages from said transmitter to said receiver.

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