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REMOTE CONTROL CIRCUITS

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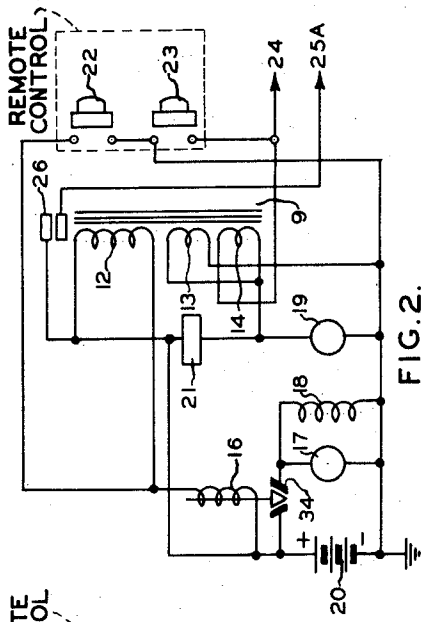


FIG. 2.

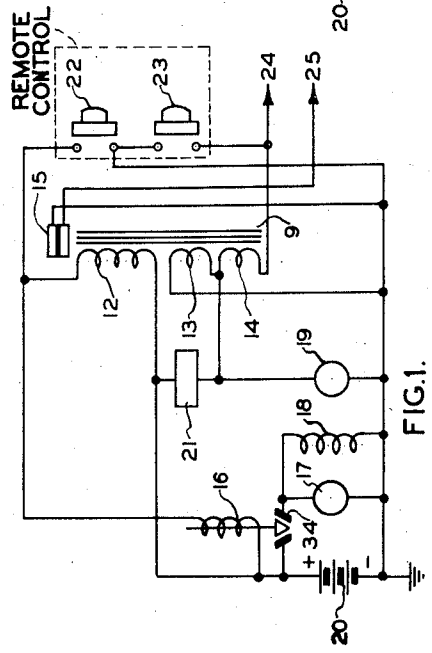


FIG. 1.

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REMOTE CONTROL CIRCUITS

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5 Claims. (Cl. 290—37)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to improvements in remote control circuits for gasoline engine-driven generator units and more particularly to remote control systems in which it is desirable that the flow of current in the remote control electrical conductors ceases when the generating plant is in operation.

Heretofore, remote control operation of generator units has contended with the necessity of a multiplicity of relays. Moreover, remote control units have caused electrical disturbance in nearby radio equipment, the electrical disturbances emanating from the current carrying conductors of the remote control system.

So much depends on the undisturbed reception of radio transmission during times of emergency that it is of paramount importance that the intelligence being received be comprehensive and free from as much electrical disturbance as possible.

When physical requirements permit the operation of a receiver at a position remote from the noise source, the coupling is zero, and thus the noise, or lack of it, may also be considered a function of the coupling.

On the other hand it is well known that any group of conductors, whether integral with the noise source or not, will be potential radiators of electrical disturbances.

In order to overcome this troublesome situation, this invention goes a step further. As previously stated, the positioning of the noise source remote from the receiver reduces the coupling but the lines controlling the remotely placed generating units are conductors.

The invention as set forth in this specification provides means for removing the electrical component from the control lines connected to the remotely positioned generating unit and thus eliminates the said control lines as radiators of electrical disturbances.

It is the primary object of this invention to overcome the cause of electrical disturbances transmitted by the current carrying conductors of a remote control system.

A further object is to simplify the remote control system by the elimination of a multiplicity of relays.

These and other objects become apparent from the following description of the illustrative embodiments of the invention shown in the accompanying drawings, the invention residing in the

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novel method, and arrangement of parts in cooperative relation, as hereinafter pointed out in the claims; and exemplified in the practical embodiments of the system herein described as follows:

Figure 1 is a diagrammatic presentation of a push-button remote control unit using magneto ignition.

Figure 2 is a diagrammatic representation of a push-button remote control system for battery ignition.

Referring more particularly to Figure 1, the invention comprises: a relay 9 composed of three coils 12, 13 and 14, said coils being wound on the same form. Coil 12 is wound with sufficient ampere-turns and when energized holds open the contacts 15. Coil 13 also has an adequate number of ampere-turns to hold the contacts 15 open when coil 12 is de-energized.

However, coil 13 does not have enough ampere-turns to initiate a change of the position of contacts 15 from the normal or closed position indicated in Figure 1. This is due to the fact that the spring on the armature of relay 9 has the tension adjusted so that it requires a certain number of ampere-turns, or greater, than is provided for in the coil 13. However, once the armature is attracted to the pole piece the magnetic flux in the coil 13 at the pole piece face is great enough to hold the armature down. The purpose of this particular arrangement of the coils 12, 13 will be described further along. Coil 14 is wound with a number of ampere-turns equal to coil 13. Moreover, current flows through coil 14 in a direction opposite to that of coil 13, and the reason for this particular arrangement will likewise be explained further along.

In addition to the control relay 9 the system also includes a starting relay 16, circuit closing contacts 34, starting motor 17, automatic choke 18, generator 19, battery 20 for energizing the starter relay 16, and starting motor 17, voltage regulator 21, starting push button 22, "off" push button 23 and positions 24, 25, respectively, safety and oil pressure controls.

The system illustrated in Figure 1 operates in the following manner: Push button 22, when depressed momentarily, closes the circuit connecting the starting motor 17 and automatic choke 18 to the positive side of the battery 20, starting the engine and the generation of current.

When relay 16 is energized by the battery 20, coil 12 is energized simultaneously and pulls the contacts 15 into an open position, thus removing the ground connection from the magneto (not

shown) connected to position 25. Releasing button 22 removes the current of battery 20 from the coil 12. However, the generator, now in operation, energizes coil 13 and it is the flux set up in coil 13 that holds the armature of relay 9 down and the contacts 15 in open position.

At this point it may be well to note that the coil 13 when energized does not have, as pointed out previously, an adequate number of turns to initiate the opening of contacts 15. However, once contacts 15 are opened by the action of coil 12, coil 13 is capable of maintaining the contacts 15 in an open position as explained heretofore.

To stop the operation of the equipment, push button 23 is momentarily depressed and this action causes coil 14 to be energized with a current obtained from the generator 19 and supplied in a direction opposite to that of the current flowing in coil 13. The pull on the armature of relay 9 is weakened by the neutralizing action of the flux in coil 14 and the contacts 15 are released and returned to normal or "off" position, the normal position of contacts 15 grounding the magneto and thus stopping the unit's operation.

The safety controls (not shown) position 24 are connected to the ungrounded terminal of push button 23 and function at ground potential. Although the oil pressure safety device (not shown) but indicated as position 24 is closed to ground prior to the starting operation, the neutralizing coil 14 is not affected since it is energized by the generator 19. Before the generator 19 reaches normal output, the oil pressure will be high enough to remove the ground from the safety device, providing of course, the pressure is normal.

Referring now to Figure 2, the system illustrated functions in the same manner as described in the paragraph pertaining to Figure 1. However, in this application the system operates in connection with battery ignition (not shown), position 25A. Further, the contacts 26 are normally open in the "off" position. Depressing push button 22 performs the same cycle of operation described hereinbefore under the paragraph pertaining to Figure 1.

When the gasoline engine starts, push button 22 is released and contacts 26 are held in closed position due to the magnetic field set up in the coil 13 which receives its energy from the generator 19. Maintaining the contacts 26 in the closed position places the ignition battery (not shown) position 25A in the circuit to furnish current for the ignition system of the gasoline engine (not shown) driving the generator 19.

To stop the operation of the unit, push button 23 is depressed, causing current from generator 19 to flow thru the coil 14 thus neutralizing the flow of current in coil 13. This in turn causes the contacts 26 to open, break the battery ignition circuit, position 25A, terminating the operation of the gasoline engine (not shown).

Thus the purpose of each circuit is to provide a remote control system for gasoline engine-driven generator units comprising one controlling relay (together with a standard solenoid type starting switch), the entire arrangement eliminating the flow of current through the remote control wires while the engine is in operation.

While there has been described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed

in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A remote control system of the type described having in combination, an internal combustion engine, an electrical generator connected to said internal combustion engine and adapted to be driven thereby, a motor connected to said internal combustion engine and adapted to start the same, switching means remotely positioned, means operable by said last-named means for energizing said motor to start said internal combustion engine, means energized by said generator for maintaining the engine in operation after said first-named means has been disconnected, whereby the disabling of said first-named means prevents electrical disturbances entering said remotely connected energizing means; said last-named means including a circuit relay having an operating coil connected with said first-named means, a second operating coil connected with said generator, a control circuit connected with the relay for stopping the engine, and a third operating coil connected, in opposition to said first-named coils, with the generator, and means on said last-named connection for controlling the energizing of said last-named coil.

2. In combination, an internal combustion engine, an electrical generator connected to said internal combustion engine and adapted to be driven thereby, a motor connected to said internal combustion engine and adapted to start the same, switching means remotely positioned, means operable by the last-named means for energizing said motor to start said engine and generator, means energized by said generator for maintaining the same in operation after said first-named means has been disconnected whereby the disabling of said first-named means prevents electrical disturbances entering said remotely connected energizing means, and a circuit relay for controlling said last-named means whereby the operation of said generator may be discontinued, said relay means including a third operating coil to neutralize the action of the energized means.

3. In combination, an internal combustion engine, an electrical generator connected to said internal combustion engine and adapted to be driven thereby, a motor connected to said internal combustion engine and adapted to start the same, switching means remotely positioned, means operable by the last-named means for energizing said motor to start said engine, said means including a control circuit and a manually operated push-button switch therein, relay means connected with said control circuit and operable by said push-button switch to release the engine for operation, means energized by said generator for maintaining said last-named means in operation after said first-named means has been disconnected whereby the disabling of said first-named means prevents electrical disturbances entering said remotely connected energizing means, said means including a circuit relay comprising an operating coil connected with said first-named means, a second operating coil connected with said generator, a pair of contacts actuated by said coils, a third coil acting to neutralize the first two coils, means operable by said second coil to maintain in open position aforesaid contacts, and means operable by said third coil whereby the operation of said engine may be discontinued.

4. In combination, an internal combustion engine including an ignition system, an electric

generator connected to be driven by the engine, an electric motor connected to the engine to turn it over, means for starting the motor and actuating the ignition system, means energized by the generator to maintain the engine in operation after the first-named means has been disconnected, and means for controlling the energized means so that the operation of the engine may be discontinued, said controlling means including means adapted to neutralize the action of said energized means.

5. In combination, an internal combustion engine including an ignition system, an electric generator connected to be driven by the engine, an electric motor connected to the engine to turn it over, means for starting the motor and actuating the ignition system, means energized by the generator to maintain the engine in operation after the first-named means has been disconnected, means for controlling the energized means so that the operation of the engine may be discontinued, said controlling means including means adapted to neutralize the action of said energized means, and a safety device for energizing the neutralizing means, under abnormal conditions of the engine, whereby the engine is stopped.

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