

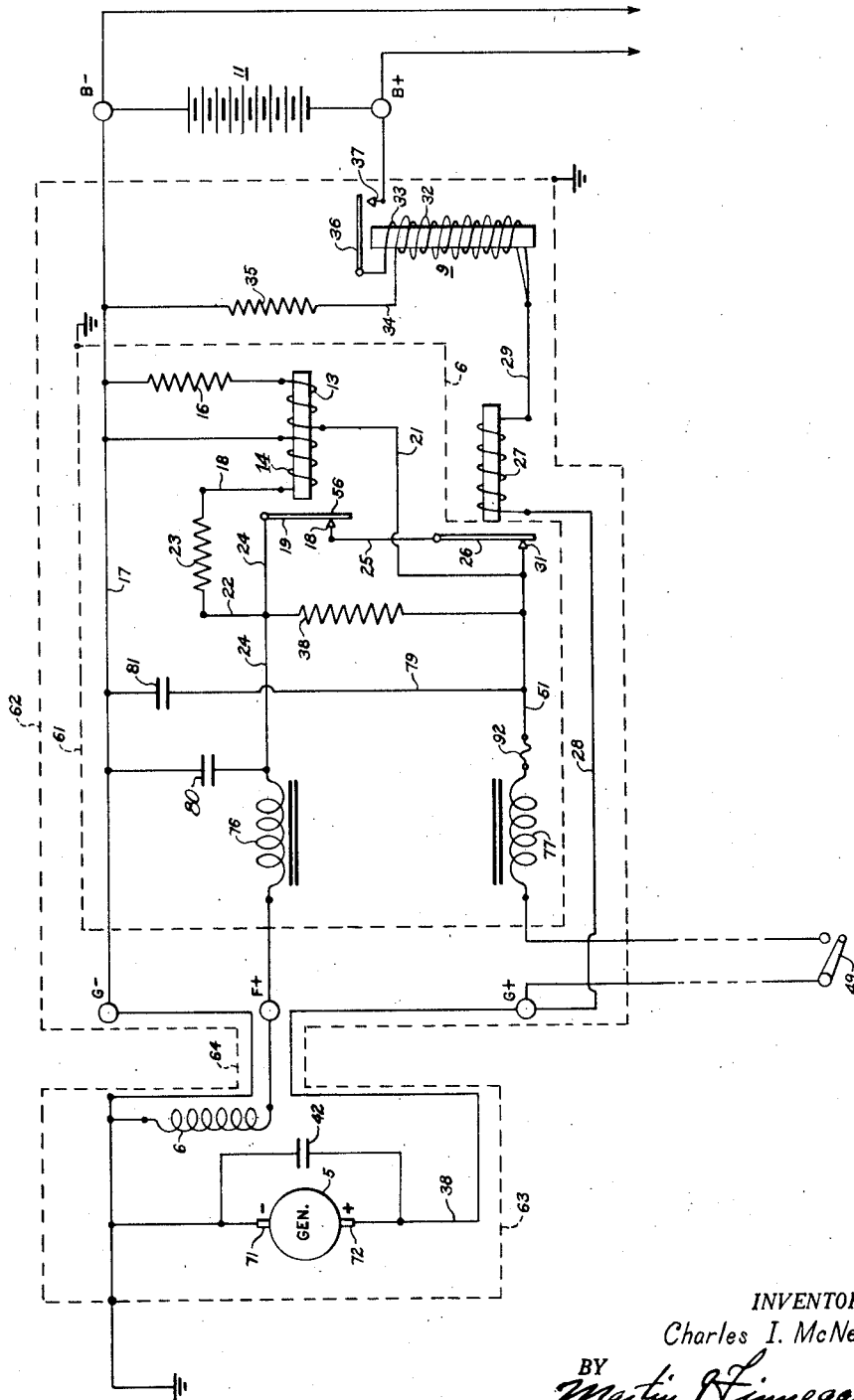
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ELECTRICAL APPARATUS

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ELECTRICAL APPARATUS

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This invention relates to electrical apparatus, and more particularly to means for controlling the output of an electric generator.

One of the objects of the present invention is to provide, in combination with an electric generator and regulating means for controlling the electrical output thereof, a system of electrical and mechanical impedance devices so combined that the possibility of radio frequency disturbances is eliminated, or at least appreciably minimized.

With this end in view, the present invention provides means characterized by a novel combination of metallic enclosures and high frequency eliminating "choke" coils electrically and mechanically associated with the system in such a manner that an effective barrier is provided to prevent escape, either by conduction or radiation, of radio frequency impulses into the path of action of any radio receiving or transmitting apparatus which might be carried by the vehicle in which the electrical apparatus of the present invention is installed.

Another object of the invention is to provide a novel system of shielding electro-magnetic devices, such as a current regulating relay, characterized by the inter-position of a shielding barrier between the winding of said relay and the circuit controlling switch or switches actuated thereby, certain of said circuit controlling switches being sources of radio frequency impulses.

These and other objects and advantages to be derived from the use of the invention herein disclosed reside in the inter-relation and method of operation of the parts and will become apparent upon inspection of the following specification when read with reference to the accompanying drawing, wherein the preferred embodiment of the invention is illustrated. It is to be expressly understood, however, that the drawing is for the purpose of illustration and is not to be construed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawing,

Fig. 1 is a diagrammatic view illustrating one embodiment of the invention.

Referring to the drawing, the invention is shown applied to a generator 5 having a shunt field 6, the action of which is controlled by regulating devices including a voltage regulating relay, a current limiting relay and a reverse current cutout 9.

As shown, the voltage regulator comprises a

core having two windings 13 and 14. One end of winding 13 is connected through the resistance 16 to the negative feed, the other end is connected by lead 21 to the positive side of the line. One end of winding 14 is connected to the negative feed, the other end is connected through the resistance 23 and the leads 22 and 24 to the positive end of the field winding. The lead 22 also connects through the lead 24 to the armature 19, thence through the contact 18 and the lead 25 to the armature 26 of the current limiting relay.

The current limiting relay 8 preferably includes a core upon which is wound a single coil 27. One end of the coil is connected through the conductor 28 to the positive side of the armature winding of the generator. The other end of the coil is connected through the conductor 29 to the windings on the cut-out. The armature on the current limiting relay is connected through the contacts 31 to the positive side of the line.

The cut-out 9 consists of a core upon which are wound two windings 32 and 33. One end of the winding 32 is connected to the lead 29. The other end is connected through the lead 34 and the resistance 35 to the negative side of the line. One end of the winding 33 also connects to the lead 29. The other end is connected through the armature 36 and the contacts 37 to the positive battery terminal B⁺.

The armature 19 of the voltage regulator 7 is adapted to vibrate in the event of excessive generated voltage and to successively open and close the field circuit alternating through the contacts 18 and the resistor 38 which is connected across the contacts.

The armature 26 of the current limiting relay 8 is adapted to vibrate in the event of an excessive flow of current through the coil 27 and to successively open and close the field circuit alternating through the contacts 31 and resistor 38.

The armature 36 of the cut-out is adapted to close the contacts 37, in the positive battery circuit, at the proper generated voltage and to open the contacts 37, in the event that the generated voltage falls below the proper value.

Energization of the field winding 6 is effected by closing the switch 49 interposed in the line connecting the positive side of the generator with the conductor 51.

Having thus described the electrical parts to which the present invention is shown applied, there remains to be described the novel means

for effectively suppressing radio frequency disturbances which these parts might cause.

As shown, the disturbance suppressing means includes a novel arrangement of metallic casings including an inner casing 61 and an outer casing 62, the latter enclosing all parts above described, except the generator which has its own metallic housing 63 from which extends a shielded cable 64 containing the electrical connections from the generator to the associated control units in the casings 61 and 62.

As shown, the inner shield 61 is so formed and related to the outer shield, and to the other parts of the apparatus as to enclose the sources of radio frequency radiations (arcing of contacts) and those portions of the circuit that cannot be readily filtered of such radio frequency currents that they might pick up and re-radiate. The leads or conductors leading from the inner shield are provided with choke coils to filter such radio frequency currents that may exist in the internal circuits to prevent their passage into the outer circuits.

These choke coils are indicated at 76 and 77, and the associated condensers at 80 and 81, the functions of the latter being to provide drainage to ground for the radio frequency currents suppressed by the coils 76 and 77.

It will be noted that the inner shield 61 is so formed as to enclose both the winding and contacts of the voltage regulating relay 7, and the contacts 31 of the current limiting relay, which are sources of radio frequency impulses. The winding 27 of said relay is located outside the inner casing 61, although within the outer casing 62, for if it were enclosed in 61 it would be necessary to provide radio frequency filters for the current it carries, and as it handles comparatively large currents, such procedure introduces undesirable physical complications.

In practice, the outer casing is the metallic housing of the receptacle, and the remaining electrical parts exclusive of the generator are mounted therewithin to prevent radio frequency disturbances generated by the arcing of the brushes 71 and 72 of the generator from being radiated to adjacent electrical apparatus. In order to insure the grounding of radio frequency currents created by such arcing, a condenser 42 is shunted across the armature winding, as shown.

Preferably a fuse 92 is interposed in the lead 51 as a safety feature in order to insure an opening of the field circuit should the condenser 81 fail to function properly.

There is thus provided a novel method of suppressing radio frequency disturbances, the novel method being embodied in means calculated to prevent the passage by conduction of radio frequency current beyond the limits of the unit, while at the same time constituting an effective enclosure barring the escape of radio frequency energy by inductive radiation. The apparatus

is extremely simple in construction, compact and is readily accessible for repair. While the embodiment of the invention illustrated has been described with considerable particularity, it is to be expressly understood that the invention is not restricted thereto, as the same is capable of receiving a variety of expressions, some of which will now readily suggest themselves to those skilled in the art. Reference will therefore be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In a device of the class described, a generator and a voltage regulator therefor, a shield enclosing said voltage regulator, a second shield enclosing said first named shield, a current limiting relay having a winding in series with said generator, and a switch adapted to be opened by the excessive current flowing through said winding, said switch being disposed within said inner shield, and said winding being disposed without said inner shield.

2. In a device of the class described, a generator and an output circuit leading therefrom, a shield enclosing a portion of said output circuit, a second shield within said first-named shield and spaced therefrom, a current limiting relay having a winding constituting a part of said output circuit, and a switch adapted to be opened upon passage of excessive current through said winding, said switch being disposed within said inner shield, and said winding being disposed in the space between said inner and outer shields.

3. In a device of the class described, a generator having an output circuit and a field circuit, current filtering means in said field circuit, a shield enclosing said current filtering means, a second shield enclosing said first-named shield and spaced therefrom, a current limiting relay having a winding constituting a part of said output circuit, and a switch adapted to be opened upon passage of excessive current through said winding, said switch being disposed within said inner shield, and said winding being disposed in the space between said inner and outer shields.

4. In a device of the class described, a generator and a field circuit therefor, including a field coil and current filtering means in circuit with said field coil, a shield enclosing said current filtering means, a second shield enclosing said first-named shield and spaced therefrom, a current limiting relay including a winding and a switch adapted to be opened upon passage of excessive current through said winding, said switch being disposed within said inner shield, and said winding being disposed in the space between said inner and outer shields, and a field controlling switch in said field circuit, said switch being located in that portion of the circuit which extends outside both said shields.

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