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R. H. SULLIVAN

STORAGE BATTERY SYSTEM

Filed May 4, 1922

Fig. 1

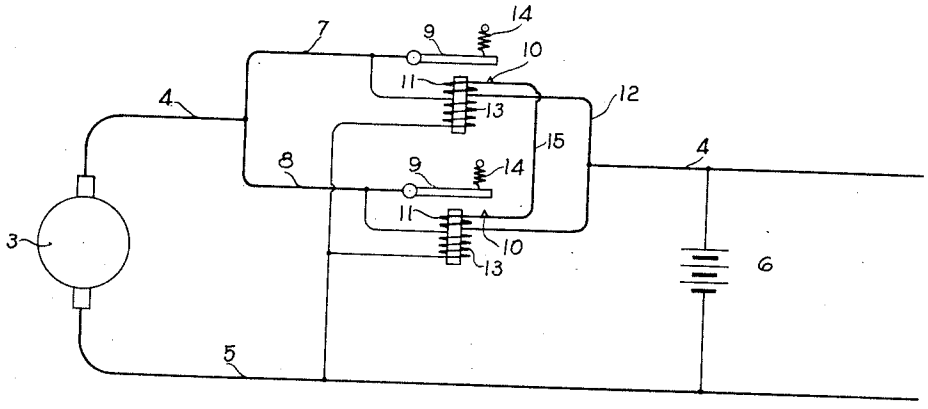
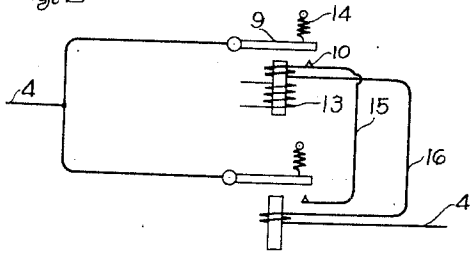


Fig. 2



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UNITED STATES PATENT OFFICE.

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STORAGE-BATTERY SYSTEM.

Application filed May 4, 1922. Serial No. 558,475.

To all whom it may concern:

Be it known that I, RAYMOND H. SULLIVAN, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Storage-Battery Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to storage-battery systems of the type in which a battery is charged by a dynamo-electric machine, and in which an automatic reverse-current cut-out is interposed in the connections between the generator and the battery, to prevent discharge from the battery when the generator is at rest or is running too slowly to produce an electromotive force equal to that of the battery.

In the manufacture of systems of the type in question, particularly for use on motor-vehicles, it is convenient to use a cut-out of standard style and size, having in its contacts and its series-winding a capacity sufficient for ordinary applications. It is occasionally necessary, however, to provide for a current greater than can be safely handled by such standardized cut-out, and rather than to provide a larger size of cut-out for such instances it is desirable to use two or more standard cut-outs arranged in parallel. In this arrangement difficulty is met, owing to the fact that it is impossible to adjust the plural cut-outs so exactly that they will all respond simultaneously to the same voltage. The result is that if the cut-outs are merely connected in parallel in the direct and obvious manner, one cut-out will always close the circuit first. This results in diminishing the voltage effective upon the other cut-outs, so that they do not close at all, until the battery is fully charged, and therefore the arrangement is practically no better than if only one cut-out were used.

The object of the present invention is to avoid the difficulty just pointed out. To this end it is proposed, when using cut-outs connected in parallel, to interconnect the series-windings of the cut-outs so that whenever one instrument acts to close the circuit the series-windings of the other cut-outs will be energized, and as soon, therefore, as the flow of current rises to any substantial volume, all of the cut-outs will move to circuit-closing position, regardless of their exact adjustment.

In the accompanying drawings Fig. 1 is a diagrammatic representation of a storage-battery system embodying the present invention, and Fig. 2 is a detail-view showing a modified connection of the cut-outs.

The invention is illustrated as embodied in a system in which a generator 3, of any suitable form, is connected, through main conductors 4 and 5, with the terminals of a storage-battery 6 which is to be charged. Two cut-outs of conventional form are shown as interposed in the conductor 4, through two wires 7 and 8 connecting the armatures 9 of the cut-outs in parallel. The armatures cooperate with contacts 10 which are connected to the usual series-windings 11 of the cut-outs, and these windings are, in turn, connected with the main conductor through a wire 12. The cut-outs are shown as provided with the usual shunt or voltage windings 13, connected across the conductors 4 and 5, and the usual springs 14 for controlling the armatures. The parts are so adjusted that whenever the voltage produced by the generator reaches a predetermined amount sufficient to overcome that of the battery, the armature of one or the other of the cut-outs will be moved to closed-circuit position by the effect of the voltage-winding 13, and thereafter the current flowing to the battery will traverse the series-winding 11 and maintain the contacts in firm engagement so long as no reversal of direction occurs.

The embodiment of the present invention resides particularly in the use of a conductor 15 by which the two contacts 10 are interconnected, thus connecting the series-windings permanently in parallel. With this connection it will be apparent that whenever either armature engages its contact 10 the current flowing to the battery will divide and flow through both series-windings, in consequence of which the armature of the second cut-out will be attracted regardless of the precise adjustment of its spring 14, and thus both cut-outs will operate substantially at the same time.

The same arrangement may be extended to any number of cut-outs connected in parallel, and it is not necessary to adjust more than one of them precisely to the critical

voltage: the others may all be set for a slightly higher voltage, but will close, nevertheless, in unison with the one correctly adjusted.

In some cases it may be more convenient to interconnect the series-windings of the cut-outs as shown in Fig. 2, where the two windings are connected in series with each other, by means of a wire 16. The operation is the same as in the case of the arrangement first described. It will also be apparent that the use of a voltage-winding 13 on one only of the cut-outs is sufficient, and the voltage-windings on the other cut-out or cut-outs may be omitted, as in the case of the lower cut-out shown in Fig. 2. In this case the armature-spring of the instrument devoid of voltage-winding should be adjusted to yield to a comparatively weak force in the magnet, although no exact adjustment will be necessary. Even if the current through the series-winding be insufficient, upon first closure of the master cut-out, to operate the other cut-outs, the latter will be operated whenever the current increases to such a degree as to overload the contacts of the master cut-out.

The invention claimed is:

1. A storage-battery system comprising: a generator; a storage-battery; circuit connections between the generator and the battery; and a plurality of reverse-current cut-outs arranged in parallel to control said connections, the cut-outs being provided with series-windings which are interconnected so as to be energized in all the cut-outs when the contacts of one of the cut-outs are closed.

2. A storage-battery system comprising: a generator; a storage-battery; circuit connections between the generator and the battery; and a plurality of reverse-current cut-outs arranged in parallel to control said connections, each cut-out being provided with a series-winding and one, at least, with a voltage-winding; and the series windings being interconnected in parallel so as to be energized in all of the cut-outs when the generator-battery circuit is closed by one of the cut-outs.

RAYMOND H. SULLIVAN.