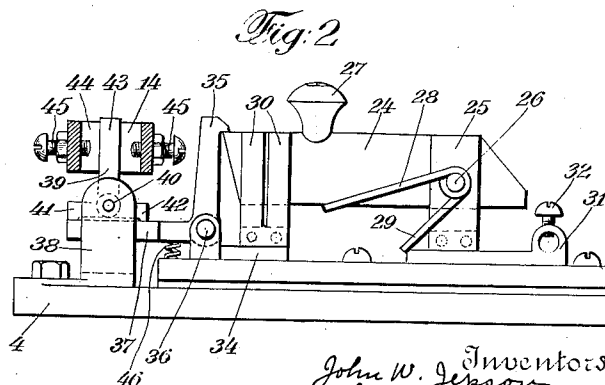
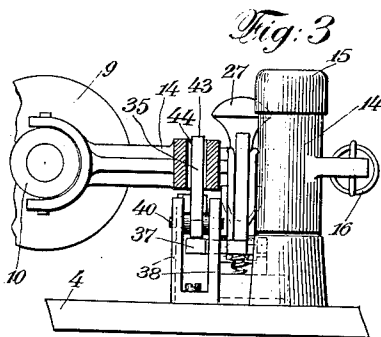
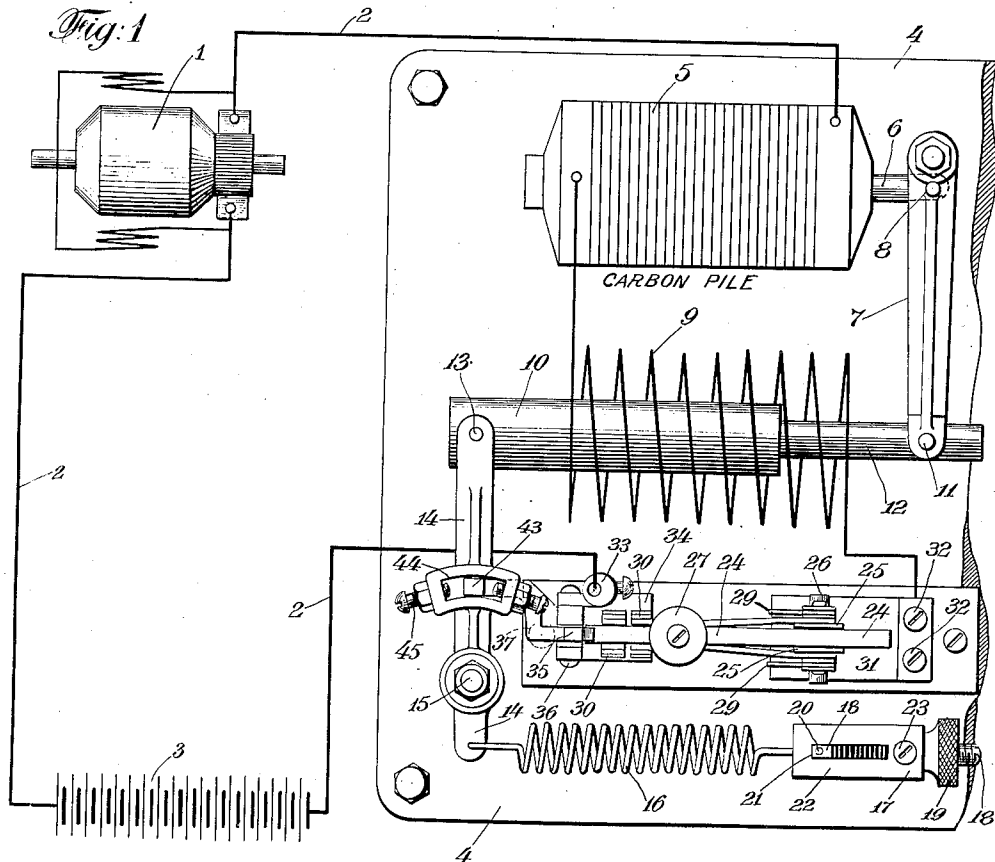


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ELECTRICAL SYSTEM AND APPARATUS THEREFOR.
APPLICATION FILED AUG. 20, 1909.

1,062,918.

Patented May 27, 1913.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SIGNORS, BY MESNE ASSIGNMENTS, TO GOULD COUPLER CO., A CORPORATION OF
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ELECTRICAL SYSTEM AND APPARATUS THEREFOR.

1,062,918.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed August 20, 1909. Serial No. 513,760.

To all whom it may concern:

Be it known that we, JOHN W. JEPSON and ALEXANDER MCGARY, citizens of the United States, the former a resident of Depew, New York, and the latter a resident of New York city, New York, have invented certain new and useful Improvements in Electrical Systems and Apparatus Therefor, of which the following is a specification.

Our invention relates to electrical systems and apparatus therefor and is more especially devised to provide automatic regulating arrangements for the charging of storage batteries.

One object of our invention is to provide a simple and economical device and arrangement whereby the charging current in such systems may be maintained substantially constant and in which the circuit may be opened and the charging stopped if the current should become too large for the range of the apparatus and also in which the circuit may be opened when the charging current becomes sufficiently small due to the increase in the battery voltage.

Further objects, features and advantages will more clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms a part of this specification.

In the drawing, Figure 1 represents more or less diagrammatically a system embracing one form of our improvements. Fig. 2 is a vertical view partly in section of the knife switch and adjacent parts shown in Fig. 1. Fig. 3 is a vertical view at right angles to Fig. 2, showing various parts of the apparatus which control the operation of the knife switch.

Referring to the various figures, 1 represents a source of electromotive force shown as a shunt generator which supplies the circuit 2, 2. Connected in series in the circuit 2, 2 is a storage battery 3 which is arranged to be charged from the generator 1.

4 represents a base upon which is situated a series of carbon blocks 5 forming a variable carbon pile resistance. The pressure exerted upon the blocks 5 and consequently the resistance thereof is varied by means of a member 6 operated by a lever 7, the member 6 being pivoted to the lever 7 at 8.

9 represents the windings of a solenoid provided with a core 10, the core 10 being pivotally connected to the lever 7 at 11 by

means of an extension 12. To the other end of the core 10 at point 13 is pivoted a lever 14 which is in turn pivotally mounted on the base 4 by means of a pivot pin 15 at its opposite end from the point 13. The lever 14 is connected to a spring 16 which is adjustably connected to the base 4 by means of an upright 17, screw 18 and thumb nut 19. This screw 18 is provided with a pin 20 sliding in a slot 21 in a plate 22 secured to the upright 17 by means of a screw 23.

The parts above described form a ready means for adjusting the tension on the spring 16, the pin 20 preventing the screw 18 from turning as the thumb nut 19 is adjusted.

24 represents a knife switch pivoted between two uprights 25 by means of a pin 26. The knife blade 24 is provided with a handle 27 and a spring 28 is passed under the lower part of the knife switch and coiled about the member 26 on both sides of the switch and has its ends 29 brought adjacent the base of uprights 25, so that the spring tends to always force the knife switch upwardly. The blade of knife switch 24 is arranged to engage the spring members 30 to complete the circuit.

The circuit from the generator passes through the line 2, carbon pile resistance 5, solenoid 9 and the conductor is then connected to the knife switch 24 through a base plate 31 by means of set screws 32. The circuit leads through the knife switch 24, contact members 30 and thence leads to the battery 3 by means of a conductor which may be secured to a binding post 33 secured to the base 34 of the spring contact members 30. From the battery the circuit 2 leads directly to the generator 1.

For holding the knife switch 24 in contact with the spring members 30 a latch 35 is provided which is pivoted at 36 and provided with a laterally extending arm 37. The arm 37 extends between two upright members 38 to which is pivoted a rocking member 39 at 40. The rocking member 39 is provided with two lateral extensions 41 and 42 which lie adjacent the extension 37 of the latch 35. The rocking member 39 is provided with an upright extension 43 which lies within an aperture 44 formed within the lever 14. At each end of the aperture 44 there are provided set screws 45 which are for the purpose of adjusting the

points at which the lever 14 will contact with the upright extension 43. A spring 46 always tends to maintain the latch 35 in engagement with the knife switch 24 to maintain the switch closed.

In operation when it is desired to charge the battery from the generator 1 the knife switch 24 is closed by means of handle 27, the latch 35 springing into place to hold the same closed. The current then flows into the battery to charge the same. If the charging current becomes greater than some predetermined average value the strength of the solenoid 9 increases thereby pulling the core 10 within the same against the action of the spring 16 and moving the lever 7 to decrease the pressure upon the carbon blocks 5. This increases the resistance in series with the battery, thus cutting down the charging current to substantially its predetermined value. On the other hand if the charging current tends to decrease the strength of the solenoid 9 decreases, thereby allowing the spring 16 to withdraw the core 10 therefrom and pull the lever 7 in a direction to increase the pressure upon the carbon pile resistance 5, so that this resistance is increased, allowing the charging current to be brought back substantially to its original value. If for any reason the charging current should increase to such an extent that the rheostatic apparatus could not take care of the same and would have reached its range of operation, the inner end of the outer set screw 45 will contact with the upright extension 43 of the rocking member 39, thereby forcing its lateral extension 42 downwardly against the lateral extension 37 so as to oscillate the latch 35 against the action of spring 46 and release the knife switch 24 which will fly up under the action of spring 28 and thus open the circuit and cut down the charging current. In a like manner when the charging current decreases to a point at which the resistance 5 has reached the limit of its range of operation the inner end of the inner set screw 45 will contact with the upward extension 43 of member 39 rocking it in the opposite direction and forcing its lateral extension 41 downwardly so as to force the extension 37 downwardly and release the latch 35 and allow the knife switch to open as before.

It will thus be apparent that we have not only provided means for maintaining a substantially constant charging current but have provided means in conjunction therewith much simplified which will automatically open the circuit when the charging current decreases to a certain value due to the battery becoming fully charged or other causes, and that we have also provided in conjunction therewith means for opening the circuit to cut down the battery current if for any reason it should reach so great a

value that the rheostatic device will not be able to take care of it.

While we have shown means for opening the battery circuit to stop the battery charging current it is obvious that certain of our improvements may be obtained by practically stopping the charging current in other ways.

Although we have shown our improvements with respect to one particular arrangement we do not desire to be limited to this arrangement nor to the details shown except as hereafter claimed, but

Having fully and clearly described our invention what we claim as new and desire to secure by Letters Patent, is:

1. The combination of a storage battery, a source of electrical energy for charging the same, a carbon pile resistance in series with the battery, a coil for controlling said resistance responsive to variations in the battery current, and means controlled by said coil for opening the battery circuit.

2. The combination of a storage battery, a source of electrical energy for charging the same, a variable resistance for regulating the battery current and a coil for controlling said resistance responsive to variations in the battery current, and means regulated by said coil for automatically stopping the battery current when the current in said coil exceeds a predetermined value, and for automatically stopping the battery current when the current in said coil decreases below a predetermined value.

3. The combination of a storage battery, a source of electrical energy for charging the same, a variable resistance for regulating the battery current and a coil and means for controlling the increase and decrease of said resistance responsive to variations in the battery current and for opening the battery circuit when the battery current decreases below a predetermined value and for opening the battery circuit when the battery current rises above a predetermined value.

4. The combination of a storage apparatus, a source of energy for charging the same, a variable resistance for regulating the charging current and means for controlling the increase and decrease of said resistance responsive to variations in the charging current and for stopping the charging current when it decreases below a predetermined value responsive to a definite change in said resistance.

5. The combination of a storage apparatus, a source of energy for charging the same, a variable resistance for regulating the charging current and means for controlling the increase and decrease of said resistance responsive to variations in the charging current and for stopping the charging current when it increases above a

predetermined value responsive to a definite change in said resistance.

6. The combination of a storage apparatus, a source of energy for charging the same, a variable resistance for regulating the charging current and means for controlling the increase and decrease of said resistance responsive to variations in the charging current and for stopping the charging current when it decreases below a predetermined value responsive to a definite change in said resistance and for stopping the charging current when it increases above a predetermined value responsive to a definite change in said resistance.

7. The combination of a storage battery, a source of electrical energy for charging the same, a variable resistance for regulating the battery current and a coil and means for controlling the increase and decrease of said resistance responsive to variations in the battery current and for opening the battery circuit when the battery current rises above a predetermined value responsive to a definite change in said resistance.

8. The combination of a storage battery, a source of electrical energy for supplying the same, a variable resistance for regulating the battery current, means for controlling said resistance and means for stopping the battery current when it exceeds a predetermined value, said last mentioned means being controlled by said first mentioned means.

9. The combination of a storage battery, a source of electrical energy for supplying the same, a variable resistance for regulating the battery current, electromagnetic means for controlling said resistance responsive to variations in the battery current, means for stopping the battery current when it exceeds a predetermined value and means for stopping the battery current when it decreases below a predetermined value, both of said last mentioned means being controlled by said electromagnetic means.

10. The combination of a storage battery, a source of electrical energy for supplying the same, a variable resistance for regulating the battery current, and means for automatically stopping the battery current when it increases above a predetermined value, said means being controlled responsive to variations in the condition of said variable resistance.

11. The combination of a storage battery, a carbon pile resistance for regulating the battery current, a coil responsive to variations in the battery current, a member actuated by said coil and controlling said carbon pile and means for automatically stopping the battery current, said means being actuated by said member.

12. The combination of a storage battery, a source of electrical energy for supplying the same, a carbon pile resistance for regulating the battery current, and means responsive to certain variations in the electrical condition of said resistance for automatically stopping the battery current when it exceeds a predetermined value.

13. The combination of a storage battery, a carbon pile resistance for regulating the battery current, a coil responsive to variations in the battery current, a member actuated by said coil and controlling said carbon pile, and means for automatically stopping the battery current when it exceeds a predetermined value, said last mentioned means being controlled by said member.

14. The combination of a storage battery, a carbon pile resistance for regulating the battery current, a coil responsive to variations in the battery current, a member actuated by said coil and controlling said carbon pile, means for automatically stopping the battery current when it exceeds a predetermined value, and means for automatically stopping the battery current when it decreases below a certain predetermined value, both of said last mentioned means being controlled by said member.

15. The combination of a storage battery, a carbon pile resistance for regulating the battery current, a coil responsive to variations in the battery current, a member actuated by said coil and controlling said carbon pile, and means for automatically stopping the battery current independently of said resistance responsive to certain variations in the battery current.

16. The combination of a storage apparatus a source of energy for charging the same, a variable resistance for regulating the charging current and means for controlling the increase and decrease of said resistance responsive to variations in the charging current and for stopping the charging current when it decreases below a predetermined value.

17. The combination of a storage apparatus, a source of energy for charging the same, a variable resistance for regulating the charging current and means for controlling the increase and decrease of said resistance responsive to variations in the charging current and for stopping the charging current when it increases above a predetermined value.

18. The combination of a carbon pile resistance, a coil controlling said resistance, a switch in series with said resistance, a member for operating said carbon pile, and means controlled by said member for controlling the operation of said switch.

19. The combination of a carbon pile resistance, a coil controlling said resistance, a switch in series with said resistance, a mem-

ber for operating said carbon pile, and mean controlled by said member for operating said switch when the carbon pile has expanded to a predetermined point.

5 20. The combination of a carbon pile resistance, a coil controlling said resistance, a switch in series with said resistance, a member for operating said carbon pile, and means controlled by said member for causing the operation of said switch when the carbon pile has been compressed to a predetermined point.

21. The combination of a carbon pile resistance, a coil controlling said resistance, a switch in series with said resistance, a member for operating said carbon pile, means controlled by said member for operating said switch when the carbon pile has expanded to a predetermined point, and means controlled by said member for causing the operation of said switch when the carbon pile has been compressed to a predetermined point.

22. The combination of a carbon pile resistance, a coil in series with said carbon pile resistance controlling said resistance, a switch in series with said resistance, a member for operating said carbon pile, and means controlled by said member for controlling the operation of said switch.

23. The combination of a carbon pile resistance, a coil in series with said carbon pile resistance, a switch in series with said resistance, a member for operating said carbon pile, means controlled by said member for operating said switch when the carbon pile has expanded to a predetermined point,

and means controlled by said member for causing the operation of said switch when the carbon pile has been compressed to a predetermined point.

24. The combination of a carbon pile resistance, a coil controlling the operation of said resistance, a switch and means for opening said switch responsive to an increase in current in said coil and responsive to a decrease in current in said coil.

25. The combination of a carbon pile resistance, a coil controlling the operation of said resistance, a switch and means for opening said switch responsive to an increase in current in said coil and responsive to a decrease in current in said coil, said resistance, coil and switch being in electrical series with each other.

26. The combination of a storage battery, a source of electrical energy for charging the same, a variable resistance for regulating the battery current and a coil and means for controlling the increase and decrease of said resistance responsive to variations in the battery current and for opening the battery circuit when the battery current decreases below a predetermined value responsive to a definite change in said resistance.

In testimony whereof, we have signed our names to this specification, in the presence of two subscribing witnesses.

JOHN W. JEPSON.
ALEXANDER McGARY.

Witnesses:

THOS. DOBBINS,
W. H. PATTENDEN.