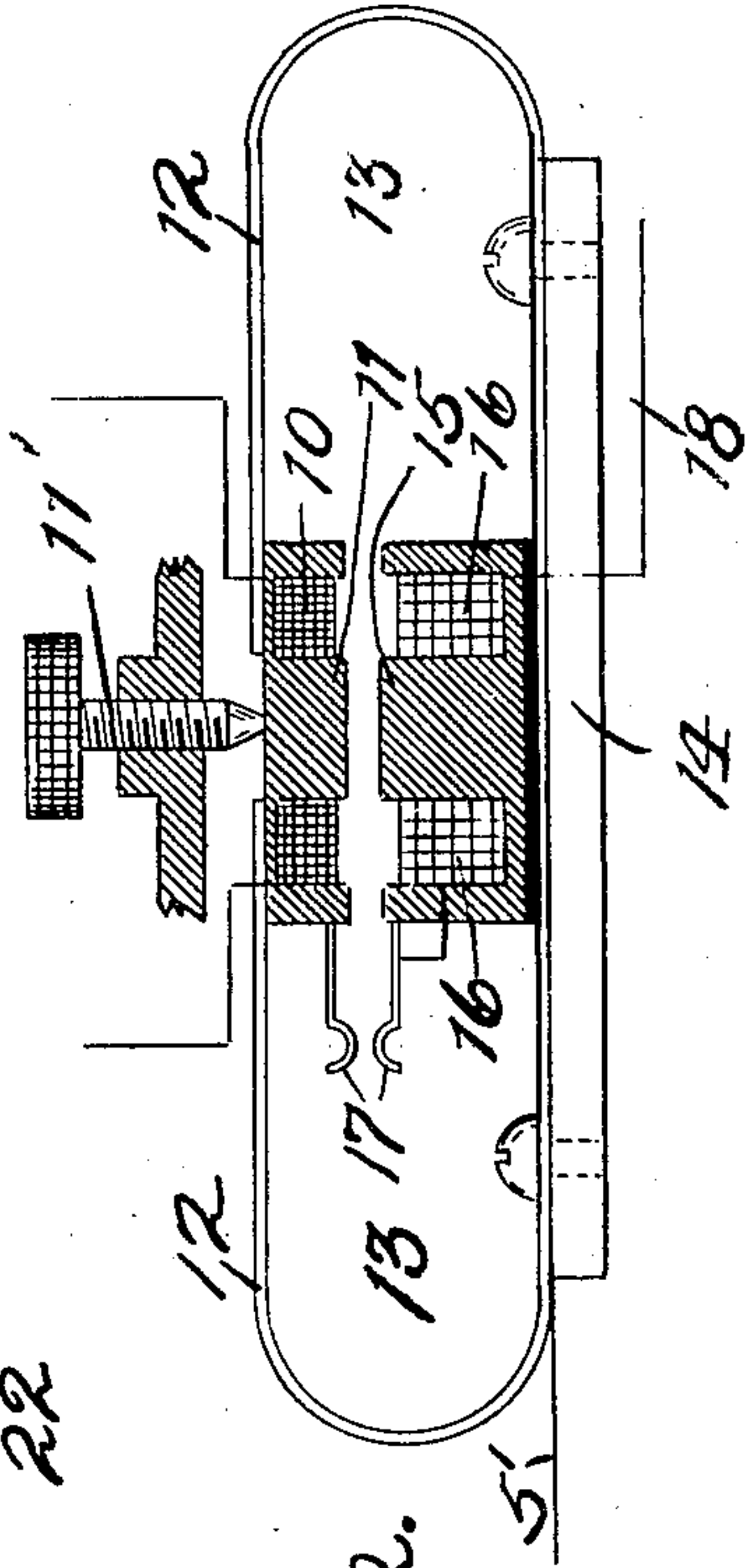
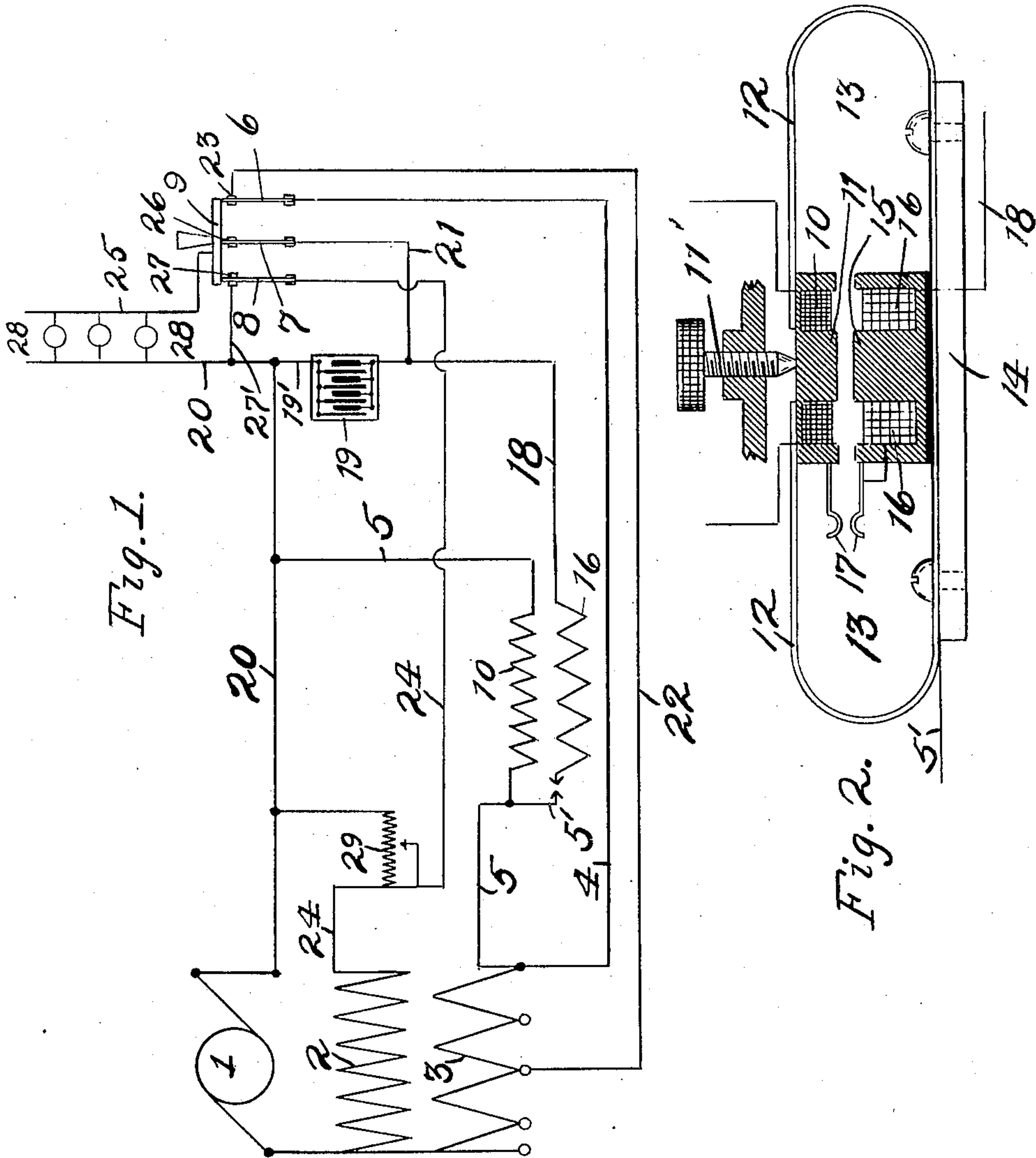


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 LIGHTING SYSTEM FOR SELF PROPELLED VEHICLES.
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UNITED STATES PATENT OFFICE.

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LIGHTING SYSTEM FOR SELF-PROPELLED VEHICLES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, HARRY J. BISHOP and JAMES K. DELANO, Jr., citizens of the United States, residing at Riverside and Chicago, respectively, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Lighting Systems for Self-Propelled Vehicles, of which the following is a specification.

Our invention relates to a system of electric lighting for automobiles or other self propelled vehicles, and its object is to provide an efficient and economical lighting system for this purpose.

In the drawings, Figure 1 is a diagrammatic view of the lighting system and Fig. 2 is a section through a circuit breaker employed in the system.

The generator 1 is driven from the engine of the vehicle in any desired manner, and its fields are differentially wound with shunt coils 2 and series coils 3 of opposite polarity as indicated diagrammatically in Fig. 1. The end of series coil 3 is connected with two wires 4 and 5, wire 4 connecting to blade 6 of the three bladed switch 9, and one branch of wire 5 connecting with winding 10 on electromagnet 11, and thence back to generator 1, the other branch 5' connecting with spring 12 of the circuit breaker 13. The winding 10 is of very high resistance. The spring 12 is secured to a base plate 14 and yieldingly supports electromagnet 11. Branch wire 5' connects with spring 12, and through it with the frame of magnet 11. Opposed to magnet 11 is another electromagnet 15 of opposite polarity to magnet 11 and insulated from spring 12. The winding 16 of magnet 15 is of comparatively low resistance and one end of it is grounded to the frame of magnet 15. Magnets 11 and 15 are adapted to contact with each other, and to insure good electrical contact, their faces are copper plated and supplemental spring contacts 17 are provided. Winding 16 is connected by wire 18 to storage battery 19 which is also connected with the main generator line 20 by wire 19'. A branch wire 21 leads from wire 18 to blades 7 of the switch. A set screw 11' is provided for regulating the distance between magnets 11 and 15. Provision is made for connection with any of the coils of series winding 3 and a wire 22 is adapted to make connection

between a selected coil thereof and the contact 23 of switch 9. The shunt coils 2 are connected by wire 24 with blade 8 of switch 9. Wire 25 connects contact 26 of blade 7 with lamp circuit 28, which is also connected with main generator wire 20 as indicated. Contact 27 of blade 8 is connected by wire 27' with main generator wire 20. A variable resistance 29 is also connected in series with shunt winding 2.

The shunt and series windings are so proportioned that a current of a given amperage is allowed on the line before the demagnetizing action of the series field 3 begins to assert itself. Any excess of current generated by higher speeds, will weaken the field of the generator resulting in a constant output of current for great variations in speed. The parts are so designed that at a predetermined voltage, sufficient to lightly charge the storage battery for lighting and for ignition of the engine, the magnet 11 is sufficiently energized to draw it down to make contact with magnet 16, thus completing a circuit between the generator and the storage battery through the winding 16, which firmly holds the electromagnets together. The copper plated faces of magnets 11 and 15 insure good contact and prevent sticking due to residual magnetism. The current from generator 1 now passes from the frame of magnet 11 through the ground on the frame of magnet 15 to the winding 16 and thence to the storage battery 19. If the engine is slowed down below the speed for generating the predetermined voltage, or is stopped through accident or by design, the current will flow from the storage battery to generator 1 producing a like polarity in magnets 11 and 15, thereby allowing spring 12 to part the magnets and open the circuit at this point. Adjustment of the sensitivity of magnet 11 to act at the predetermined voltage is made by means of screw 11'.

With switch 9 open and the lamps out, resistance 29 is in series with shunt winding 2 cutting down its effective strength. Winding 3 has all its coils connected in circuit and being of opposite polarity to winding 2 further reduces the strength of the field, thus reducing the output to the required capacity. By closing switch 9 for the purpose of lighting the lamps resistance 29 is bridged, giving full field strength to shunt winding 2

and series winding 3 is bridged for a portion of its coils, thus reducing the opposition to the field of windings 2 and so bringing up generator 1 to the capacity required to run the lighting load and also to keep storage battery properly charged. Thus it will be seen that by varying the number of coils of winding 3 that are bridged and the resistance 29 the output of the generator may be accurately adjusted to suit the requirements. When the generator is stopped the storage battery 19 may be utilized for lighting the lamps.

While we have illustrated and described the preferred construction for carrying our invention into effect, this may be varied somewhat without departing from the spirit of the invention. We therefore do not wish to be limited to the exact construction set forth but wish to avail ourselves of such modifications and variations as come within the scope of the appended claims.

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

1. In a lighting system, the combination of a compound wound generator having the series field winding opposed to the shunt; a lamp circuit adapted to be lighted by the generator circuit, an adjustable circuit adapted to bridge variable numbers of the series windings; and a common switch for closing said lamp and adjustable circuits, substantially as described.

2. In a lighting system, the combination of a compound wound generator having the series field winding opposed to the shunt; a storage battery in the generator circuit; a lamp circuit adapted to be lighted by current from the generator or from the battery; a reverse current and self restoring cut out in the battery circuit; an adjustable circuit adapted to bridge variable numbers of the series windings; and a common switch for closing said lamp and adjustable circuits, substantially as described.

3. In a lighting system, the combination of a compound wound generator having the series field winding opposed to the shunt; a

storage battery in the generator circuit; a reverse current and self restoring cut out in the battery circuit; a lamp circuit adapted to be lighted by the generator current or the battery current; a resistance in series with the shunt winding; a circuit for bridging the shunt resistance; a circuit for bridging a portion of the series coils; and a switch for simultaneously closing said lamp circuit and said circuits for bridging the shunt resistance and said series coils, substantially as described.

4. In a lighting system, the combination of a compound wound generator having the series field winding opposed to the shunt; a storage battery in the generator circuit; a reverse current and self restoring cut out in the battery circuit; a lamp circuit adapted to be lighted by the generator current or the battery current; a variable resistance in series with the shunt winding; a circuit for bridging the shunt resistance; a circuit for bridging a variable portion of the series coils; and a switch for simultaneously closing said lamp circuit and said circuits for bridging the shunt resistance and said series coils, substantially as described.

5. In a lighting system, the combination of a compound wound generator having the series field winding opposed to the shunt; a storage battery in the generator circuit; a reverse current and self restoring cut out in the battery circuit; a lamp circuit adapted to be lighted by the generator current or the battery current; a resistance in series with the shunt coils; means for bridging the shunt coil resistance when the lamps are lighted and means for bridging a portion of the series coils when the lamps are lighted, substantially as described.

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

HARRY J. BISHOP.
JAMES K. DELANO, JR.

Witnesses:

B. G. RICHARDS,
A. A. OLSON.