

(No Model.)

W. L. SILVEY.

AUTOMATIC REGULATOR FOR DYNAMO ELECTRIC MACHINES.

No. 462,020.

Patented Oct. 27, 1891.

Fig. 1.

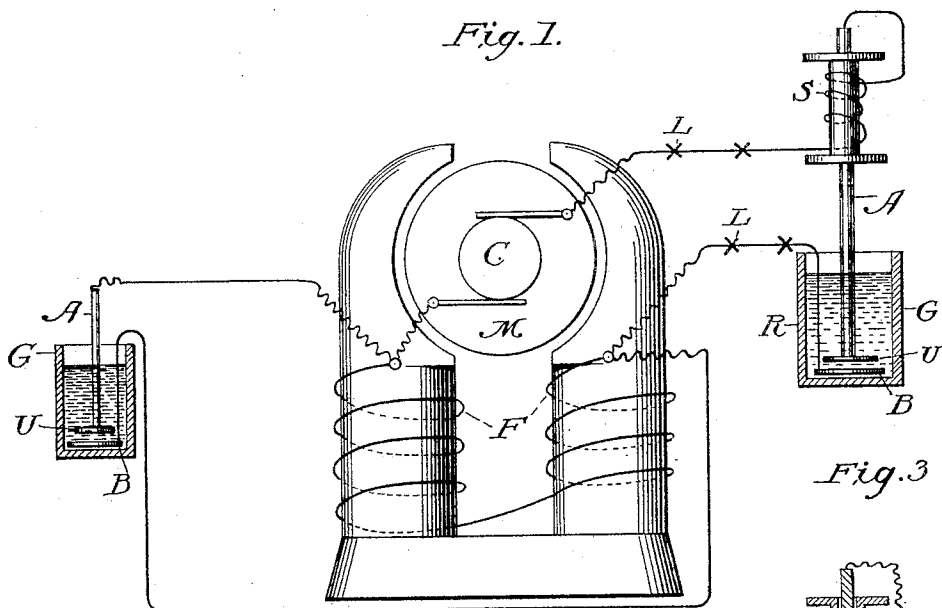


Fig. 3

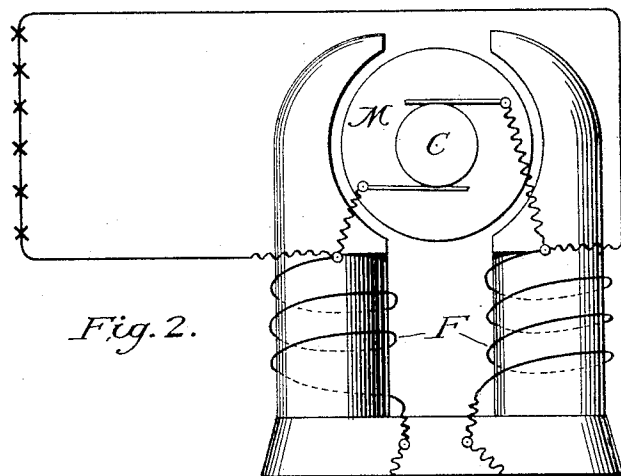
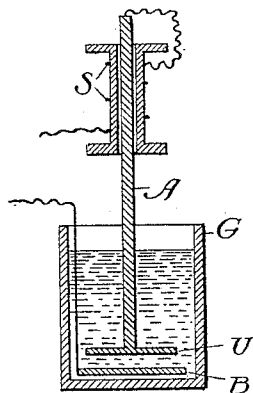


Fig. 2.

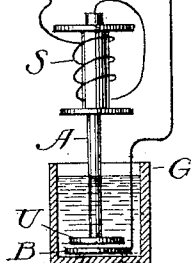


Witnesses:

E. B. Lehman
O. L. Edmiller

Inventor:

William L. Silvey.



UNITED STATES PATENT OFFICE.

WILLIAM L. SILVEY, OF LIMA, OHIO.

AUTOMATIC REGULATOR FOR DYNAMO-ELECTRIC MACHINES.

SPECIFICATION forming part of Letters Patent No. 462,020, dated October 27, 1891.

Application filed July 5, 1889. Serial No. 316,651. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. SILVEY, a resident of Lima, in the county of Allen and State of Ohio, have invented certain new and useful Improvements in Systems of Automatic Regulation for Dynamo-Electric Machines, of which the following is my specification.

My invention relates more particularly to regulators for arc-light dynamos or machines in which the field-magnet coils are in series with the line-circuit, but it may also be used in arc-machines or incandescent machines, having the field-magnet coils in derived circuit to the line. In the construction of this regulator I make use of two very simple arrangements, combining them into a very useful arrangement for a new purpose. It is a well-known fact that a solenoid magnet is capable of lifting considerable weight of iron rod if it is introduced into its coils. This it does by sucking up the iron rod, and if the power is sufficient in the coils the rod or bar will move forward until an equilibrium is established. If the bar projects more at one end than at the other the movement will be in the direction of the shorter end, and the bar will be lifted up until the power of the two ends is equal. In case artificial resistance is now introduced into the electric circuit the solenoid will lose part of its power, and the core will drop until the power of attraction and gravity is equal. The resistance which I employ in this regulator is purely a fluid, although a mechanical substance might be used in part; but I prefer an entirely liquid rheostat. The rheostat may be made to give more or less resistance by varying the density of the fluid. For instance, distilled water gives the highest resistance between the electrodes. The more the water is acidulated the lower the resistance becomes. A copper solution gives the lowest resistance, and the plates in the rheostat give off less gas than by any other combination. I therefore prefer a solution of blue-stone or copper sulphate as my electrolytic medium.

Referring to the accompanying drawings, Figure 1 is a front-elevation diagram of a dynamo of the purely series type, with electrical circuits connecting the liquid rheostats and regulator. Fig. 2 is a front-elevation diagram showing the field-magnets in derived

circuit to the line, the rheostat joined in series with the fields. Fig. 3 is a central section of the rheostat and solenoid in order to give an idea of their electrical connections.

Referring to Fig. 1, the current escapes from the armature to the commutator C, thence to one of the brushes, thence to the field-magnet coils F, thence to the line and lamps L, liquid rheostat R, and solenoid S, returning to the armature by the opposite brush. In addition to the rheostat coupled directly in the lamp-circuit, there is a second rheostat coupled in derived circuit around or in parallel with the field-magnet coils. This second rheostat serves a very useful purpose to save the extra current which is set up in the field-magnet coils and thrown back on the insulation in case of rupture in the line or any sudden change in the rheostatic regulator. This extra rheostat consists of a vessel (preferably glass) G nearly filled with acidulated water. On the bottom of the vessel is fastened a conducting plate or electrode B of carbon, although metal may be employed. This plate should be of considerable superficial area in order to prevent the formation of too many hydrogen bubbles. Directly above this plate is a second plate of a similar material to the lower one; but this upper plate U is fastened to an adjusting-rod A, whereby the distance between the plates can be increased or decreased, thereby changing the resistance of the cell. This resistance changes very rapidly as the plates are separated. In fact several hundred ohms resistance can be obtained in a small rheostat. The cell, Fig. 3, which is connected directly in the field-magnet circuit, is constructed in an almost identical manner to that just described, the only difference being that in this case the separation between the plates U B is effected by the iron rod being sucked up into the coils, thereby increasing the resistance between the plates as they are drawn apart. This rheostat is prevented from a too-rapid fluctuation by the upper plate acting as a dasher catching against the liquid. The plates U B under a proper load should nearly touch together and draw farther apart as the amperes increase, the object being in the series system to not increase above a certain number of amperes, which in the arc system should be about ten amperes.

Having fully described my invention, what I claim as new, and wish to secure by Letters Patent in the United States, is—

1. In a system of automatic regulation for dynamo-electric machines, the combination, with the field-magnets and field-magnet coils of a dynamo-electric machine, of an automatically-actuated regulator therefor, consisting of a vessel containing an electrolytic fluid, a solenoid-magnet located above the electrolytic bath, a vertically-actuated iron core free to move through the axis of the solenoid and projecting beyond the solenoid into the electrolyte, a conducting-plate attached to the movable core, a stationary conducting-plate located in the bottom of the vessel containing the electrolyte, an electric conductor connecting the field-magnets and field-magnet coils of the dynamo-electric machine with the stationary conducting-plate, the movable conducting-plate attached to the magnet-core, the electrolyte, and the coils of the solenoid, all together into a continuous electric circuit, as set forth, whereby automatic regulation is attained.

2. In a system of automatic regulation for dynamo-electric machines, the combination, with the field-magnet coils of a dynamo-electric machine, of an automatic rheostatic regulating device in series therewith, the regulator consisting of a vessel containing acidulated water, a conducting-plate inside the vessel, but stationary with relation thereto, a movable plate attached to the armature of a reciprocative magnetic core, one end of which traverses a solenoid-magnet through its axial line, and an electric circuit consisting of conducting-wires in the solenoid-magnet, the magnet-core, stationary and movable conducting-plates, an electrolytic fluid between them, the field-magnet coils of the dynamo-electric machine, an external circuit, and a series of electric lamps, as specified.

3. In a system of automatic regulation for dynamo-electric machines, an automatic regulator consisting of a vessel containing an electrolytic fluid of acidulated water, a solenoid-magnet located above it, a vertical iron core traversing the axis of the solenoid, one

end projecting downward, to which a conducting-plate is attached, and which plate is immersed in the electrolytic fluid, a stationary conducting-plate in the electrolyte, and an electric circuit comprising the field-magnet coils of an electric generator, the stationary and movable conducting-plates, the electrolyte between them, the rod to which the top plate is attached, the actuating-solenoid by which the iron core is moved, and an external circuit connecting the regulator with the parts to be regulated, as set forth.

4. In a system of regulation for dynamo-electric machines, the combination, as herein described, of the field-magnet coils, an automatic regulator in series therewith, consisting of a vessel containing an acidulated electrolyte, a solenoid-magnet located above it, an iron core, one end passing through the solenoid-magnet, the other end attached to a horizontally-disposed conducting-plate, the plate immersed in the acidulated electrolyte, a second conducting-plate in the vessel containing the electrolyte, and an electric circuit comprising the field-magnet coils of the dynamo-electric generator, the stationary and movable metal plates, the electrolyte, the movable iron core to which one plate is attached, and an external circuit, as set forth.

5. An automatic regulator consisting of a containing-vessel, a conducting-plate stationary therein, a conducting-plate movable therein, an acidulated electrolytic fluid surrounding the plates, a rod of iron attached to the movable conducting-plate near its center at right angles to its side, a solenoid-magnet the axis of which is traversed by the iron rod placed in a vertical position, whereby a reciprocative motion is imparted to the movable conducting-plate in the electrolyte and the resistance of the electric circuit varied, all the parts in circuit with the field-magnet coils of a dynamo-electric machine, as set forth.

WILLIAM L. SILVEY.

Witnesses:

R. C. WARNER.

E. W. COOK.