H. A. BURGESS.

SPEED CONTROLLED RHEOSTAT.

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1,305,961.

Patented June 3, 1919.

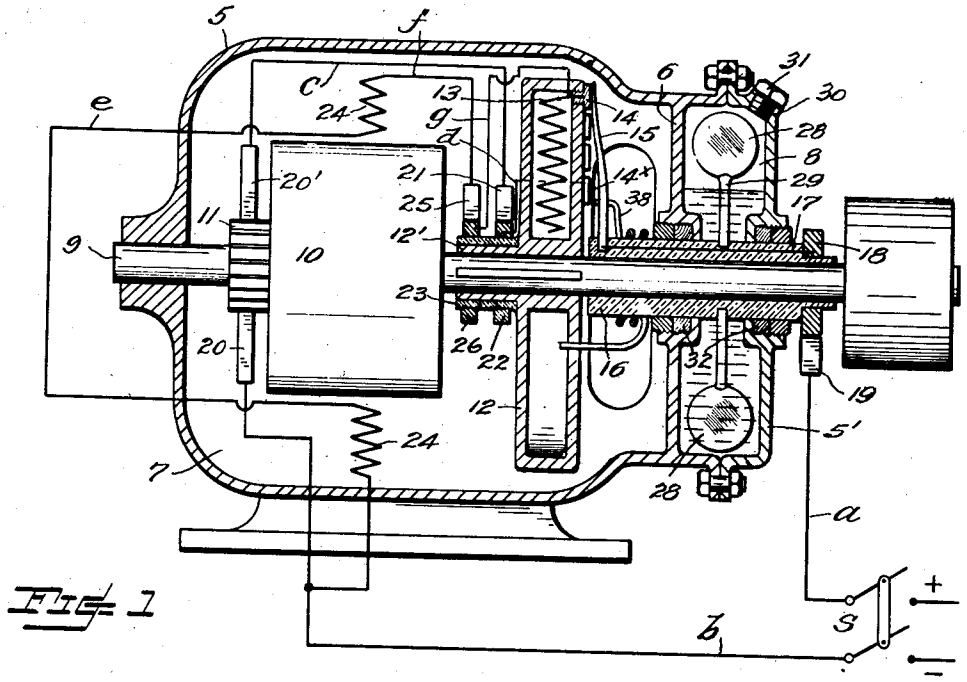


Fig. 1

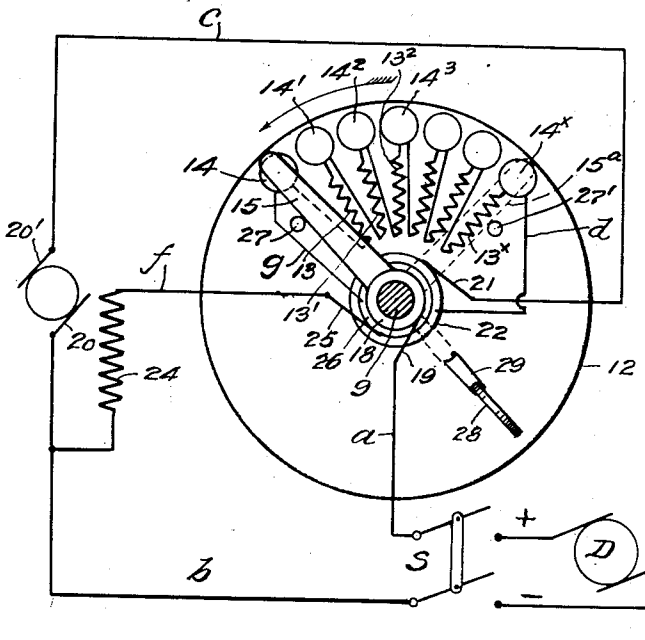


Fig. 2

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SPEED-CONTROLLED RHEOSTAT.

1,305,961. Specification of Letters Patent. Patented June 3, 1919.

Application filed December 5, 1917. Serial No. 205,633.

To all whom it may concern:

Be it known that I, HUBERT A. BURGESS, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Speed-Controlled Rheostats, of which the following is a specification.

The object of this invention is the provision of devices for automatically regulating the current supplied to the armature and field coils of an electric motor proportional to the demand to enable the motor being started from rest and accelerated to operate without injuring the motor.

The invention consists in the novel construction and adaptation of apparatus having suitable cut-outs and resistances arranged to be controlled by governing means which are rendered operative or inoperative by the rate of the motor's speed, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a view in longitudinal section illustrating my invention applied to a shunt-wound motor, the wiring connections being shown diagrammatically. Fig. 2 illustrates a diagram of the wire connections and the rotary resistance devices therefor.

In said drawings, the reference numeral 5 designates a substantially cylindrical casing which is divided by a partition 6 to provide compartments 7 and 8. Extending axially through said casing is a shaft 9 upon which is mounted, in the compartment 7, the motor armature 10 and its commutator 11. Also provided in the compartment 7 and rigidly secured to said shaft, is a drum 12 containing a plurality of resistance coils 13, 13^1, 13^x connected in series through the medium of spaced contact points 14, 14^1, 14^x disposed at one end of the drum and arranged concentrically of the axis thereof.

This system of coils constitutes a rheostat, the resistance of which is regulated by the position of a switch or finger 15 extending from a sleeve 16 which is mounted for independent rotary motion on said shaft. Said finger is connected by a wire 17 (Fig. 1) with a ring conductor 18 provided on said sleeve exteriorly of the casing, and contacted by a brush 19 provided on a lead a of a constant potential main +. The complementary main — is connected by a lead b to one of the armature brushes 20, while the other, 20^1, of such brushes is connected by a wire c with a brush 21 contacting with a second ring 22 which is mounted upon an insulating bushing 23 provided upon the hub 12^1 of the drum 12.

The ring 22 is also connected by a wire d with the contact point 14^x of said rheostat coils.

24 represents the motor field winding, two being shown in Fig. 1 as coupled by a conductor e, said field winding being in circuit with the main lead b and also, by a wire f, with a brush 25 which contacts with a ring 26, the latter being connected by wire g with the rheostat contact point 14.

27 and 27^1 represent stops provided on the drum 12 to limit the revoluble movement of the finger 15 with respect to the drum. A spring 38 (Fig. 1) having its ends respectively engage said drum and the finger 15, is utilized to yieldingly hold the latter in its normal or motor-starting position against the stop 27 as indicated by full lines in Fig. 2.

Included in the invention are devices for regulating the position of the finger 15, said devices comprising paddles or blades 28 carried by arms 29 extending from the sleeve 16 within the casing compartment 8. This compartment contains a fluid, either gaseous or liquid, which serves as a medium to retard the rotation of the sleeve 16 through the office of the blades. When liquid is utilized it may be introduced into compartment 8 through an intake hole 30, for which is provided a removable closure 31. Packing 32 provided in stuffing boxes in the partition 6 and end wall 5^1 serves to prevent the leakage of the liquid therethrough.

S represents a double pole switch in the mains leading from a supply or source of electric current such as a dynamo indicated by D in Fig. 2.

The operation of the invention may be explained as follows:—

Assuming the motor is at rest and the finger 15 is held by spring 38 in the position at which it is represented by full lines in Fig. 2: To start the motor, the switch S is moved by the operator into position to complete connections between main leads a and b with main wires + and —. A current will then pass through the main lead a, brush 19, ring 18, through wire 17 and finger 15 to rheostat contact 14, thence by wires g, f through field winding 24 to excite them and thence through lead b to

main —. Meanwhile a shunt current is caused to pass through all of the resistance coils 13—13× and by wire *d*, ring 22 and wire *c* to the armature winding, before reaching the main *b*, whereby the motor is started with a corresponding rotation of the drum 12 and the finger carrying sleeve 16 which is yieldingly coupled to the drum by means of the spring 38.

As the speed of the armature is accelerated, the inertia of the fluid in the compartment 8 acting against the paddles 28, serves to retard the rotation of the sleeve 16 whereby the finger 15 is gradually brought into the position indicated by broken lines 15ª in Fig. 2 when the motor attains full speed and with a consequent cutting out of the various resistance coils.

While I have illustrated and described my invention as applied to an electro-dynamic machine, I do not wish to be understood as confining myself thereto, as it may be utilized to regulate the currents supplied to windings of a dynamo-electric machine.

What I claim is—

1. In apparatus of the class described, the combination with an electric machine having magnetic windings, a shaft driven by the armature of said machine, a drum mounted on said shaft to rotate in unison therewith, a sleeve loosely mounted on said shaft, means to resiliently connect said sleeve to said drum for limited relative movements, a series of resistance coils provided in said drum, the respective terminals of said series of coils being electrically connected with said windings, a switch finger carried by said sleeve and electrically connected with said windings, and governing devices influenced by the speed of said shaft whereby the switch finger is regulated by changes in the speed of said shaft to vary the effective power of said resistance coils with respect to the supply of current to said windings.

2. In apparatus of the class described, a system of controlling the supply of an electric current to the field and armature windings, comprising a series of resistances included in the wiring connections of said windings, a switch finger rotatable by the armature shaft, a paddle operatively connected with said switch finger, and a fluid agent acting through the medium of said paddle to successively cut out the resistances with respect to the armature winding and add to the number of resistances with respect to the field winding as the speed of the armature shaft is accelerated.

3. In apparatus of the class described, the combination with an electric machine having field and armature windings, a shaft driven by the armature of said machine, a drum mounted on said shaft to rotate in unison therewith, a sleeve loosely mounted on said shaft, means to resiliently connect said sleeve to said drum for limited relative movements, a series of resistance coils provided in said drum, the respective terminals of said series of coils being electrically connected with the field and armature windings, a switch finger carried by said sleeve and electrically connected with both of said windings, and governing devices influenced by the speed of said shaft whereby the switch finger is regulated by changes in the speed of said shaft to vary the effective power of said resistance coils with respect to the supply of current to each of said windings.

Signed at Seattle, Washington, this 27th day of Nov., 1917.

HUBERT A. BURGESS.

Witness:

E. PETERSON.