March 3, 1942. W. KIMMICH 2,274,926

SPEED REGULATOR FOR ELECTRIC MOTORS

Filed Jan. 13, 1938

Fig. 1

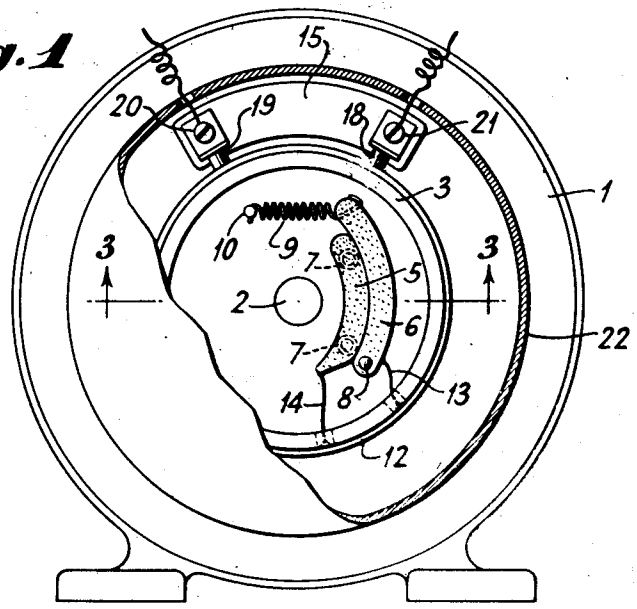


Fig. 2

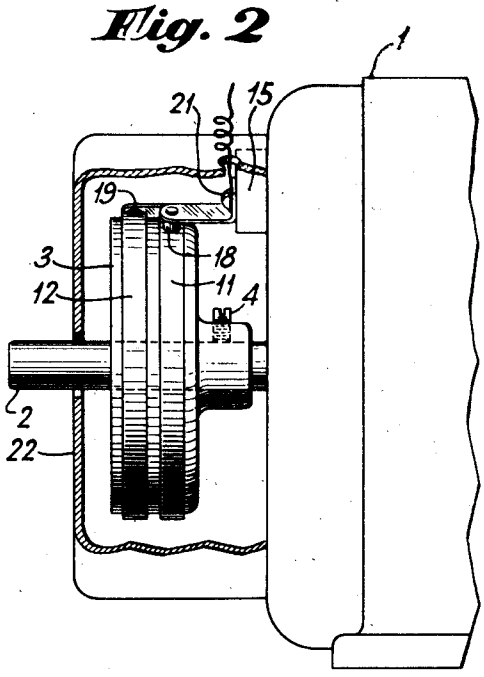
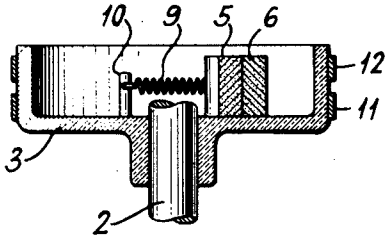


Fig. 3



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SPEED REGULATOR FOR ELECTRIC MOTORS

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6 Claims. (Cl. 201—48)

This invention relates to a new and novel speed regulator for electric motors.

An object of this invention is to simplify and improve the speed regulation for electric motors by employing two resistive elements arranged in variable contact with each other so that upon variation of motor speed the surface contact resistance of the two resistive elements is changed.

Another object of this invention is to prevent the burning and sticking of contacts which are commonly employed for speed regulators or governors for electric motors.

A feature of this invention is an improved speed regulator whose principle of operation is based upon a change in contact resistance of two or more resistive elements, the change in contact resistance being caused by varied pressure and areas in contact with each other to act as a rheostat in series with the motor and the supply line.

There is one type of governors known in the prior art and commonly used as speed regulators to open or to close the motor circuit, or to place a resistor in the armature circuit, wherein a pair of contacts is normally closed but is opened by centrifugal force. Although these contacts are provided with arc suppressing condensers and resistors, the frequent opening and closing of the contacts while the motor is in operation introduces sufficient arcing to result in burning contacts and unsatisfactory control. By my invention, such arcing troubles are eliminated, inasmuch as no circuit will open in the device of this invention but that the current is varied through the action of centrifugal force.

This invention will best be understood by referring to the accompanying drawing, in which:

Fig. 1 is a front elevation of a motor having attached thereto a speed regulator of this invention;

Fig. 2 is a side elevation of Fig. 1; and

Fig. 3 is a section taken on line 3—3 of Fig. 1.

Referring now in detail to the drawing, a motor 1 has attached to its shaft 2 a flange-like housing 3 which is made preferably of insulating material and is secured against rotation by a set screw 4. Located within housing 3 are the resistive elements 5 and 6. These resistive elements are made preferably of solid carbon or any other high resistance material, or may be that of a metallic member coated with such resistance material. Part 5 is mounted firmly to the plate-like wall of housing 3 by a plurality of screws 7. Part 6 is located adjacent part 3 and is normally in contact with the entire surface but free to rotate around a pin 8 which acts as a pivot. In order to insure contact between the surfaces of members 5 and 6, a spring 9 is fastened to the free end of member 6 and secured by a pin 10 to housing 3. In order to provide connection to an external circuit, housing 3 has securely fastened thereto a pair of slip rings 11 and 12, connection being made by means of short leads 13 and 14. On an insulating block 15 there are mounted two spring elements 16 and 17, the ends of which are terminated by brushes 18 and 19 which are arranged to be in contact with slip rings 11 and 12. The resistance values for the desired speed range which are to be constituted by the pressure and contact areas of the blocks depend upon the shape and size of housing 3 and the selection of the resistive material which must be predetermined in the same general manner as the resistance values of the contact controlled governors. The governor is connected to an electrical supply circuit and the motor by screws 20 and 21 which in turn are connected through brushes 18 and 19 to slip rings 11 and 12. The governor may be connected in series with the series or shunt field winding, the armature, or with either field winding combined with the armature. The entire assembly is enclosed by means of a cover 22 which is secured to the frame of motor 1, or if desired, the entire arrangement may be enclosed within the motor housing.

In the operation of this invention, as the motor speed builds up, due to centrifugal force, the pressure between the resistive elements 5 and 6 or their contact areas, will be reduced. This causes a reduction in the current of the motor circuit and a slowing down of the motor speed. The result will be a slight increase in resistance due to increasing pressure. These fluctuations will continue to exist for a short period, that is, a matter of a few seconds, until finally the motor speed settles down and remains constant at its proper predetermined speed.

While only one form of this invention has been disclosed, it is to be distinctly understood that it is capable of other modifications, for example, several of the resistive elements may be contained in one housing and connected together either in series or parallel. A mechanical control can also be provided whereby the spring tension can be varied while the motor is turning over. Furthermore, a slide wire resistance controlled by centrifugal force may be used instead of the resistive elements. Therefore, this in-

vention should not be limited except as to such limitations as are clearly imposed in the appended claims.

What is claimed is:

1. Speed regulating means for a motor comprising a feeder circuit for said motor, a variable resistor in said feeder circuit said resistor comprising a pair of elements having mutually contacting surfaces the resistive properties of which vary as a function of contacting pressure, one of said elements being fixedly mounted on the rotor of said motor, the other of said elements being eccentrically pivoted with respect to said rotor and subject to radial displacement by centrifugal force, and resilient means for maintaining a normal contacting pressure between said surfaces, said resilient means acting in opposition to said centrifugal force applied to said pivotally mounted element during rotation of said rotor.

2. The combination according to claim 1 and including slip rings and brushes for connecting said variable resistor to external portions of said feeder circuit.

3. In a device of the class described, an electrical machine having operating windings and a rotor, a shaft rotatable with said rotor, a rheostat connected in circuit with at least one of said windings, said rheostat being constituted by a pair of cooperating resistive elements having mutually contacting surfaces, one of said elements being fixedly mounted on said rotor for rotation therewith, the other of said elements being rotatable with said shaft and radially displaceable in response to centrifugal force, and means for subjecting said elements to a certain pressure engagement one with another thereby to determine the resistance value of said rheostat when the machine is idle, said resistance value being increased by centrifugal force as a function of the speed of said machine.

4. In a device of the type defined by claim 3, the elements stated, in combination with means for causing the speed of said rotor to be governed by the resistive value of said rheostat.

5. In a rheostat for a motor of the type having a rotor and a circuit for regulating the speed of said rotor, rheostat means in said circuit and rotatable with said rotor, said means being constituted by a pair of resistive elements mounted for variable pressure engagement of their surfaces, one of said elements being radially displaceable in response to centrifugal force thereby to vary the resistance value of said rheostat as a direct function of the rotor speed, and resilient means operative to oppose the centrifugal force so applied.

6. The combination according to claim 5 and having carbonaceous material on the surfaces of said elements.

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