

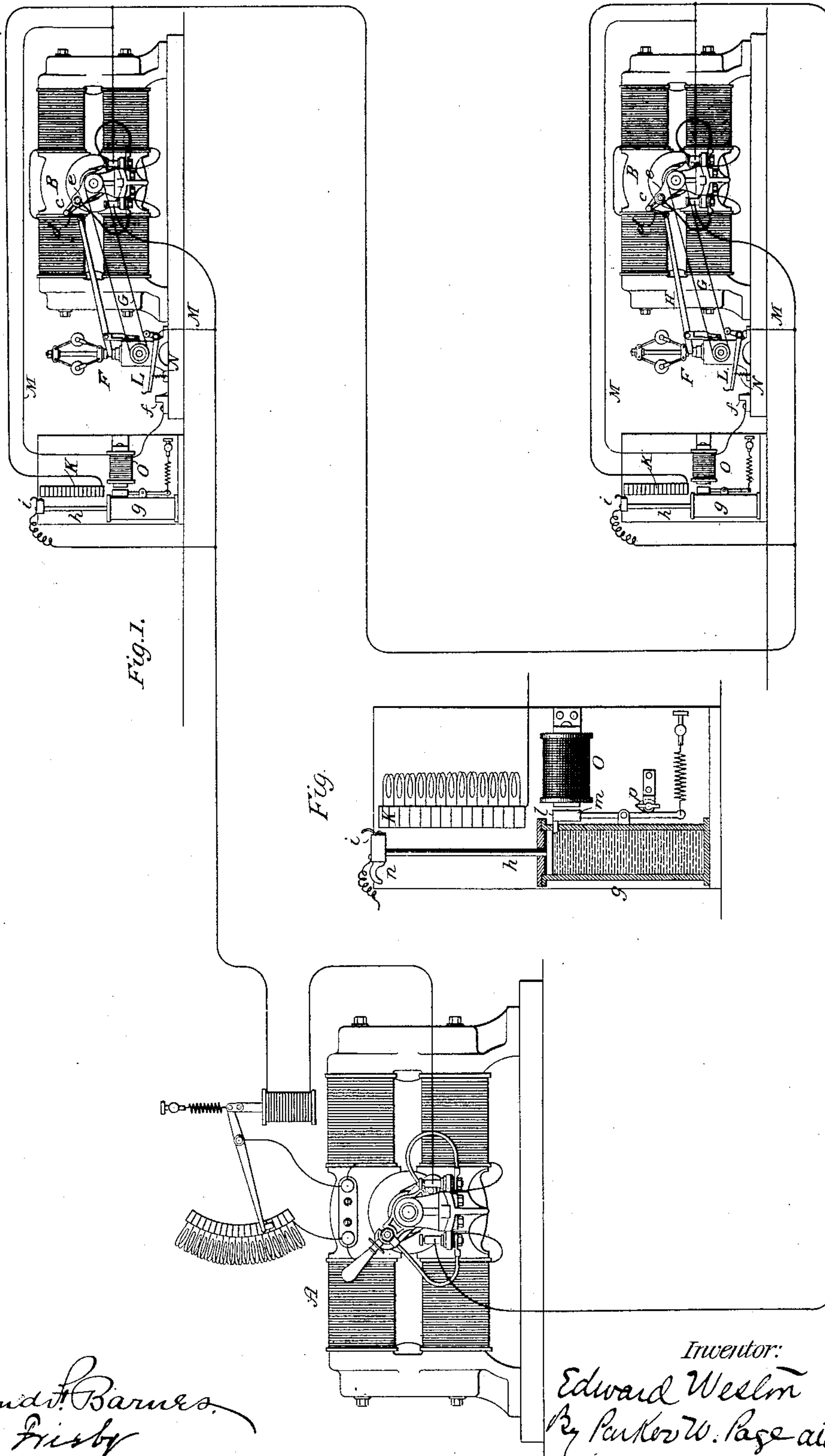
(No Model.)

E. WESTON.

# ELECTRO MAGNETIC MOTOR.

No. 316,092.

Patented Apr. 21, 1885.



*Attest:*

Attest:  
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# UNITED STATES PATENT OFFICE.

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## ELECTRO-MAGNETIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 316,092, dated April 21, 1885.

Application filed June 12, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD WESTON, a subject of the Queen of Great Britain, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electro-Magnetic Motors, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In the application filed by me May 5, 1884, I have described a system or method of transmitting and distributing power by electrical currents, which, briefly described, consists in connecting two or more electro-magnetic motors in series with one or more generators and combining with the generator or generators a regulator for maintaining a uniform current, and with each motor controlling mechanism for maintaining uniform speed, and gradually varying in proportion to variations in its load the effect of the magnetic forces acting to produce rotation of its armature, or, in other words, varying its counter electro-motive force. The means which I have described for effecting this latter result consist of a centrifugal governor or its equivalent that may operate to shift the position of the commutator, vary the resistance of the field-circuit, or in similar ways act upon the motor for varying its capacity for developing counter electro-motive force.

My present invention, though applicable to all cases where similar conditions obtain, relates more particularly to this system, and will be described in connection therewith.

It consists, mainly, in a safety device combined with the driving mechanism that connects the governor with the motor, and adapted to withdraw the motor from the working-circuit in the event of the breaking or a failure of said device to operate; and it also consists in certain features of novelty, which will be more fully hereinafter explained.

In the drawings, Figure 1 is a diagram illustrative of the system. Fig. 2 is a part-sectional view of the circuit-closer used in connection with the safety device.

Let A designate any suitable generator or

generators, and B B two or more electro-magnetic motors connected up in series in the circuit. With the generator is combined any suitable form of regulator for maintaining an approximately-uniform flow of current. In this case a magnet or solenoid, D, in the main circuit, that controls or varies the resistance E in the derived field-circuit of the generator, the construction and principle of operation being substantially similar to that of the regulator described in my Patent No. 278,640, May 29, 1883. Near each motor is set a centrifugal governor, F, that is driven from the armature-shaft of the motor by a cord or belt, G. The movement of the governor-balls due to centrifugal action is imparted to a pivoted lever, H, the short arm of which is suitably connected to the sleeve that is raised or lowered by the balls. The long arm of this lever is connected by a link, d, to an arm, e, extending from the brush-holder e, which is capable of rotation about the axis of the armature-shaft for the purpose of adjusting the brushes in proper position.

It is obvious from the described construction that any tendency to an increase of speed in the motor beyond such limits as may be predetermined by well-understood adjustments is checked by the operation of the governor, which shifts the brushes around nearer the neutral points of the commutator, thus decreasing the effect of the magnetic forces by which the rotation is produced. The speed of the motors is thus maintained nearly uniform, and no more current is supplied than is necessary to meet the actual requirements of the system. Should the driving belt or cord, however, become displaced or stretched or broken, so that connection between the motor and governor is broken, the motor, uncontrolled except by the load upon it, runs at varying speeds, and on the removal of its load would race—that is, run up to a very high rate of speed that not only interferes with the operation of all the other motors, but exposes it to injury, if not destruction. To prevent this, I provide a means for withdrawing the motor from circuit in case of the failure of the cord or equivalent connector to impart the proper



movement to the governor. This consists in a bell-crank lever, L, pivoted under or near the belt G. One arm of this lever carries a roller that is held against the belt G by the tension of a spring, N. The other arm of the lever L is provided with a contact plate or spring, and is arranged to be brought into contact with a stud, *f*, by a movement of desired extent. The conductors of a shunt-circuit, M, of high resistance, around the motor are connected to the lever L and stud *f*, respectively, so that this circuit is closed when the two parts named are in contact.

O is an electro-magnet in the shunt M L for operating a circuit-closer. This I prefer to construct in such a way that the operations of making and breaking circuit will be effected gradually and not suddenly. For this purpose I use a cylinder, *g*, filled with a liquid and containing a weighted plunger, *h*, with a contact-plate, *i*, that slides over a series of rheostat-terminals, K, as the plunger moves. The wires of a shunt of low resistance around the motor are connected to the plunger and to the rheostat, as shown. The plunger is held in an elevated position by a catch, *l*, projecting into the cylinder from a pivoted armature-lever, *m*. When the magnet O is energized, the catch is withdrawn from under the plunger, allowing the latter to slowly descend and gradually reduce the resistance of the shunt around the motor until a free path for the current is established. A handle, *n*, may be provided for raising the plunger, and a cam, *p*, for setting it in motion by releasing the catch by hand.

It is obvious that the lever L might be employed to close a shunt-circuit of low resistance about the motor without the use of the retarded cut-out, the latter being employed simply to prevent the sudden lowering of counter electro-motive force, which would occur on the removal from the circuit of a motor running at a high rate of speed.

The character of the motion-transmitting devices or connection between the motor and the governor may evidently be greatly varied, in which case obvious changes in the construction of the cut-out may be necessary; but the object of my invention, as before stated, is to cut the motor out of circuit when, by reason of the breaking, disarrangement, or failure to operate of the motion-transmitting mechanism connecting the governor with the motor, the motor is left without control. In illustration of the way in which I propose to accomplish this I have shown one specific form of mechanism for transmitting motion and one

form of cut-out; but I regard as within the scope of my invention any other mechanism that is brought into operation by the disarrangement of the connecting, driving, or motion-transmitting mechanism for accomplishing the same result.

I do not claim herein the method of nor the means for regulating motors run in series in the same circuit; nor do I claim the retarded circuit-closer, except in combination with the other devices which enter into the present invention, as these are matters which form the subject of other applications for Letters Patent.

What I claim is—

1. The combination, with an electric motor, means for varying the effect of the magnetic forces that produce its rotation, and a centrifugal governor for controlling said means, of motion-transmitting mechanism connecting the governor with the motor, a circuit-closer operated by the disarrangement of said mechanism and included in a circuit containing an electro-magnet, and a retarded circuit-closer brought into operation by the excitement of the said magnet for gradually shunting the motor out of circuit, as and for the purpose specified.

2. The combination, with an electric motor or adjustable brush-holder, and a centrifugal governor for shifting or controlling the same, of a cord or belt for transmitting motion from the motor to the governor, and a hindered or retarded circuit-closer, held out of operation through intermediate mechanism by the belt or cord, and adapted on the disarrangement of the belt to close a shunt or path for the current around the motor, as set forth.

3. In a system of the kind described, the combination, with each of two or more motors run in series in the same circuit, of a current-regulator for maintaining an approximately uniform flow of current, means for varying the effect of the magnetic forces producing the rotation of the motors, and a centrifugal governor for controlling said means, a belt or cord connecting the motor and the governor, and a circuit-closer adapted to close a shunt or path for the current around the motor upon the disarrangement of the belt or cord, substantially as set forth.

In testimony whereof I have hereunto set my hand this 7th day of June, 1884.

EDWARD WESTON.

Witnesses:

RICHARD VARLEY, Jr.,  
FRANK N. CRANE.