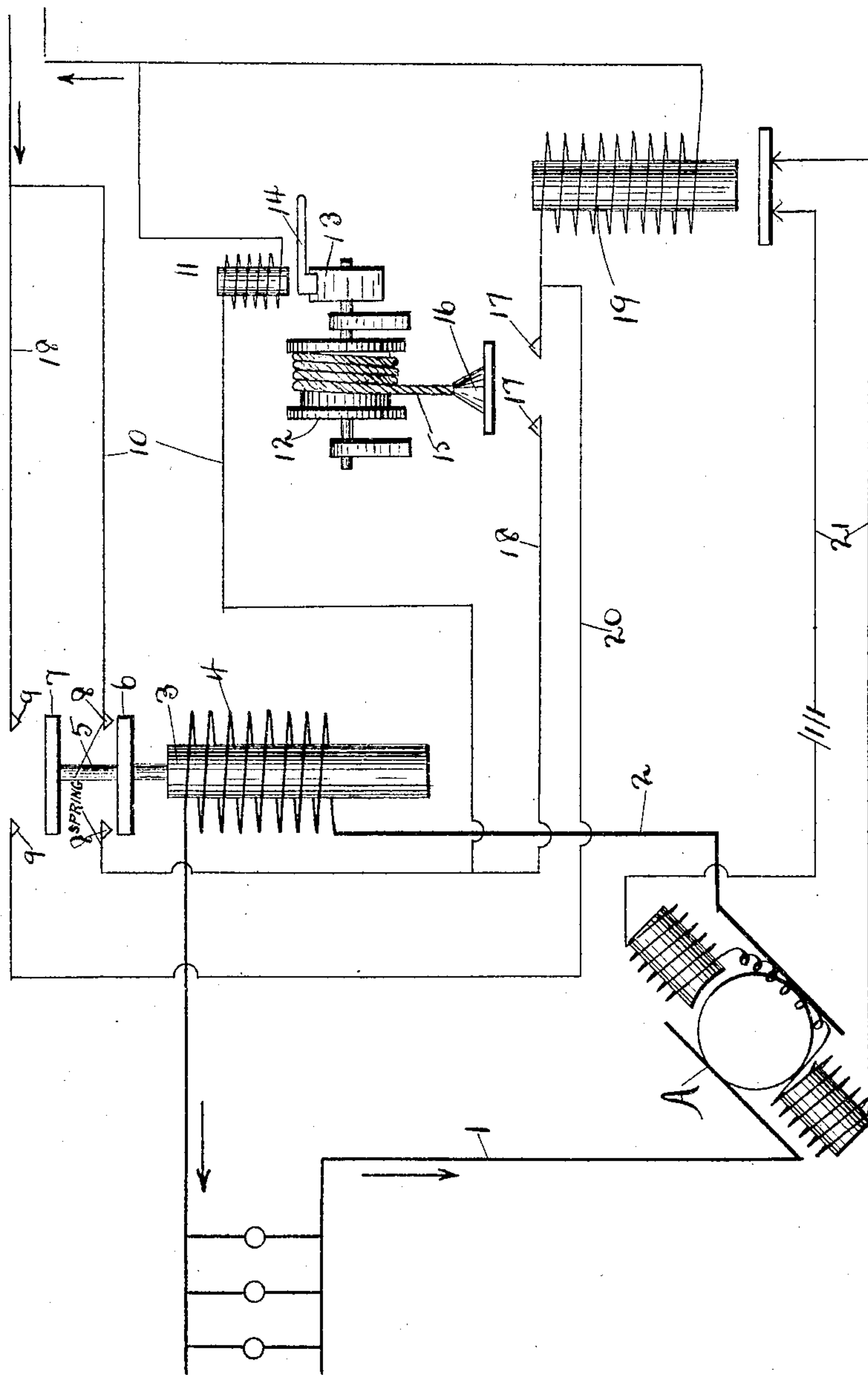


No. 814,643.

PATENTED MAR. 6, 1906.

G. N. EASTMAN.
PLURAL SPEED ELECTRICAL CONTROLLER.
APPLICATION FILED MAY 5, 1904.



Witnesses.

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PLURAL-SPEED ELECTRICAL CONTROLLER.

No. 814,643.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed May 5, 1904. Serial No. 206,535.

To all whom it may concern:

Be it known that I, GEORGE N. EASTMAN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Plural-Speed Electrical Controllers, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to electrical controlling devices—as, for example, devices by which control can be exercised over electrical systems, plants, and the like.

The principal object of my invention is to provide an electrical controller capable of acting at two different speeds under different circumstances—as, for example, acting instantaneously under certain circumstances and in a comparatively slow manner under other circumstances. Devices thus capable of acting with two different speeds under different conditions are desirable, among other places, in electrical power and lighting systems, and especially in systems of this kind employing very large currents. In these systems when the current in one or more of the circuits becomes unduly great it is necessary to exercise some control over that circuit or those circuits, so as to prevent injury by the unduly great or overload currents, and common expedients are to open the circuit itself or to open the exciting-circuit of the generator supplying such circuit. In either case the overload-current is caused to subside, and injury or damage is averted. Where the overload-current is not largely in excess of the normal current, or where it acquires its excess size in a slow manner, it is sufficient and desirable to open or control the circuit slowly; but where the overload-current is greatly excessive or where it acquires its excessive size very rapidly it is desirable to open or control the circuit instantaneously. Thus a device capable of opening or controlling the circuit slowly under the former conditions and also capable of opening or controlling the circuit instantaneously under the latter conditions will be of great use and benefit upon such systems.

In the present application I show such a double or two-speed controller arranged to control a power and lighting circuit in the above manner.

The figure of the accompanying drawing is a diagrammatic view of such an arrangement.

In the drawing, A is a dynamo or generator of the direct-current type. A main circuit, including conductors 1 and 2, leads from this generator and is understood to be provided with translating devices of various kinds, according to the nature of the service to be rendered. The two-speed controller which I show herein for carrying out my invention comprises a magnetic core 3, provided with a coil 4, which is included in the generator-circuit. This core 3 is provided with a rod 5, carrying two contact plates or disks 6 and 7. The disk 6 is adapted to make contact with a pair of contacts 8 8 upon a moderate elevation of the core 3. The disk 7 is arranged to make contact with a second set of contacts 9 9 upon a larger or more extensive elevation of the core, the disk 6, however, still remaining in contact with the contacts 8 8 during the rise of the core 3 to place the contact 7 against the contacts 9 9, the contacts 8 8 being mounted in spring material, so as to permit the elevation of the disk 6. The contacts 8 8 are included in a local circuit 10, containing a relay or magnet 11, which is arranged to control a slowly-acting circuit-closing device, the form shown consisting of a rotary drum 12, provided with a vane 13, which is engaged by an arm 14, which serves as an armature for the magnet or relay 11. The drum 12 carries a coil of rope or cord 15, which is of course lowered as the drum revolves. On the end of the cord 15 is a metal contact-plate 16, which is adapted on the uncoiling of the cord or rope to drop upon and make contact with contacts 17 17 in a trip-coil circuit 18, containing a trip-coil 19. The contacts 9 9 are included directly in the trip-coil circuit 18, a conductor 20 being extended around the contacts 17, so as to make a trip-coil circuit for the contacts 9 9, closed throughout except at said contacts. Thus it will be seen that when the overload-current is only moderately excessive or acquires its excessive size slowly the core 3 will be slowly elevated, thereby causing its disk 6 to connect with the contacts 8 8, and thereby close the local circuit 10 and cause the relay 11 to elevate the arm 14 and release the drum 12, so that the weight 16 descends and makes connection with the contacts 17 17 to close the trip-coil circuit 18. The unwinding of the coil on the drum 11 requires a moderate amount of time, thus causing a delay in the operation, which results in a slow action. If, on the other hand, the overload-current is

greatly excessive or acquires its excessive size rapidly, the core 3 will rise quickly and extensively, and while the contact 6 will close the circuit 10 the contact 7 will also close the contacts 9 9 at practically the same time, whereby the trip-coil circuit 20 will be closed and the trip-coil energized before the mechanism set in operation by closing the circuit 10 has time to operate. In this way the trip-coil will be instantaneously actuated under the conditions mentioned and will be slowly actuated under the other conditions referred to.

The trip-coil could be arranged to control the circuit in any desired manner. In the arrangement shown it is illustrated as being arranged to open the generator-exciting circuit 21 when energized. Thus in the operation of the device, whether operated instantaneously or slowly, the trip-coil 19 is actuated and the generator-exciting circuit opened to discontinue excitation of the generator.

It will be understood, as hereinabove set forth, that the device can be used to control other arrangements than the one herein set forth and that this control can be exercised in methods different from the one herein shown, also that changes and modifications can be made in the devices herein set forth without departing from the spirit of my invention.

What I claim is—

1. The combination with an overload-current device, of a controlling device included in an electrical circuit, means for closing said circuit by the passage of a largely-excessive current, a mechanical device requiring a moderate interval of time for its operation, an electromagnetic device for permitting the actuation of said mechanical device, said magnetic device being included in a second circuit, means for closing said second circuit on the passage of a moderately-excessive current, and means whereby said mechanical device causes the closure of said first-mentioned circuit when operated, substantially as described.

2. The combination of an overload-current relay provided with a pair of circuit-closing devices, a controlling device included in a circuit including contacts adapted to cooperate with one of said circuit-closing devices, a mechanical device requiring a time interval for its operation, an electromagnetic device controlling said mechanical device and included in a second circuit, which includes contacts arranged to cooperate with the other circuit-closing device of said overload-relay, and means whereby the operation of

said mechanical device causes the closure of said first-mentioned circuit including the controlling device, substantially as described.

3. The combination of an overload-current relay provided with a pair of circuit-closing devices, a controlling device included in a circuit including contacts adapted to cooperate with one of said circuit-closing devices, a mechanical device requiring a time interval for its operation, an electromagnet controlling said mechanical device and included in a second circuit which includes contacts arranged to cooperate with the other circuit-closing device of said overload-relay, said sets of contacts being arranged to be closed, the last-mentioned set before the first-mentioned set, and means whereby the operation of said mechanical device causes the closure of said first-mentioned circuit including the controlling device, substantially as described.

4. The combination with an overload-current relay provided with a pair of circuit-closing devices, of two sets of contacts arranged to cooperate with said circuit-closing devices, one set being arranged to be closed before the other, a trip-coil included in a circuit with the contacts which are last closed, an electromagnet included in a second circuit which includes the other set of contacts, a mechanical device requiring a time interval for its operation, whose actuation is permitted by the energization of said electromagnet, and contacts in said trip-coil circuit whereby the same is closed by said mechanical device, substantially as described.

5. The combination with an overload-current relay provided with a pair of circuit-closing devices, of two sets of contacts arranged to cooperate with said circuit-closing devices, one set being arranged to be closed before the other, a trip-coil included in a circuit with the contacts which are last closed, an electromagnet included in a second circuit which includes the other set of contacts, a mechanical device requiring a time interval for its operation, comprising a rotary drum provided with a coil of cord or rope carrying a weight, and whose actuation is effected by the energization of said electromagnet, and contacts in said trip-coil circuit whereby the same is closed by said mechanical device, substantially as described.

In witness whereof I hereunto subscribe my name this 22d day of March, A. D. 1904.

GEORGE N. EASTMAN.

Witnesses:

A. MILLER BELFIELD,
I. H. LEE.