

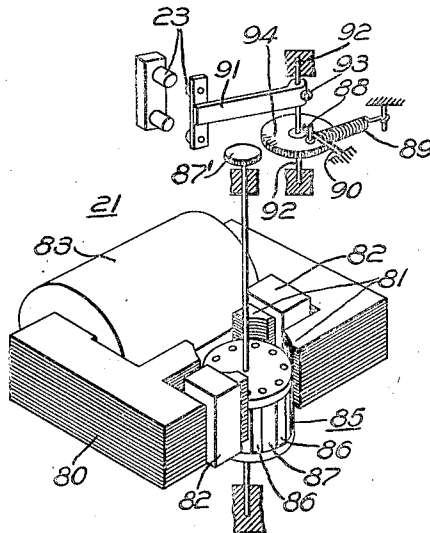
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S. L. GOLDSBOROUGH

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TIMING RELAY ELEMENT

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WITNESSES:

R. J. Fitzgerald
Fred. C. Mann

INVENTOR

Shirley L. Goldsborough

BY *O. B. Buchanan*
ATTORNEY

UNITED STATES PATENT OFFICE

1,934,665

TIMING RELAY ELEMENT

Shirley L. Goldsborough, East Orange, N. J., assignor to Westinghouse Electric & Manufacturing Company, a corporation of Pennsylvania

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3 Claims. (Cl. 200—97)

My invention relates to relays and relaying systems particularly designed for use with quick-acting circuit-breakers for the purpose of increasing the stability of transmission lines, or the ability of such lines to transmit power without loss of synchronism during fault conditions.

My present invention relates to the timing element of a high-speed impedance-responsive relay which has been developed to solve the problem of a high-speed relay for use in connection with high-speed breakers to effect the rapid clearing of line faults. This relay is capable of operating in 1 cycle or less on a 60-cycle system. Selectivity is attained by the employment of the impedance principle. This principle has been chosen as it offers the simplest way of obtaining high-speed discrimination.

The timing element of my relay is used in connection with the second and third impedance elements of my relay. That is, the first impedance element has no timer, so that it trips out the line substantially instantaneously for faults occurring up to about 80% of the line-section being protected. The second impedance element is set for a higher impedance, say about 150% of the line-section impedance, and it is associated with one of the timing elements, so that the tripping contacts are not closed for a predetermined time, long enough for the instantaneous element in the next succeeding line-section to trip out its breaker if the fault is in the 100 to 150% range. The third impedance element is for back-up protection and is associated with a second timing element having a still longer time-setting.

The principal object of my invention is to provide a timing element, preferably driven by a synchronous motor, and having means whereby the contact members are quickly reset to initial position if the timer is deenergized before completing its movement.

With the foregoing and other objects in view, my invention consists in the timing relay element hereinafter described and claimed and illustrated in the accompanying drawing, wherein the single figure is an enlarged, partially diagrammatic, perspective view of the time-switch element.

The complete relaying apparatus of which my timing element is commonly a part consists of a glass-enclosed box or board having a number of so-called elements mounted thereon or therein.

Each complete relaying apparatus is also provided with two synchronous timers or time switches 21. Each synchronous timer has a pair of normally open contacts 23 which are closed

at the end of a time period according to the setting of the timer element, as will subsequently be described.

The time interval for which to set the synchronous timers will depend on the speed of the circuit-breakers. For a breaker opening in 6 cycles, it would be satisfactory to set the first timer at 10 cycles and the back-up timer at 20 cycles.

The synchronous timer 21 preferably consists of a small subsynchronous-speed timing motor, such as that which is described in Patent No. 1,919,395 of O. F. Rowe, patented July 25, 1933, and assigned to the Westinghouse Electric and Manufacturing Company. It consists of a two-pole stator core 80 having split pole pieces 81 carrying shading coils 82 or equivalent dephasing means energized from a single-phase stator coil 83. The rotor member of the timing motor consists of an open-slot squirrel-cage armature 85 having 12 slots 86 forming as many salient poles 87 which lock into step with the split poles of the stator member at a subsynchronous speed corresponding to the 12-pole rotor member instead of the 2-pole stator member.

The armature 85 is mounted for axial and rotatable movement and normally rests in a position below the position of exact alignment with the stator poles when the motor is deenergized. When the motor is energized, the armature is drawn upwardly by the magnetic attraction of the field, thereby causing a pinion 87' which is carried by the armature shaft to come into mesh with a reduction gear 88, thereby providing a declutchable means which permits the armature to become instantly disengaged from the reduction gear as soon as the motor is deenergized, without waiting for the armature to give up its kinetic energy. The reduction gear 88 is provided with a reset spring 89 which instantly returns it to its initial position, in abutment against a suitable stop 90, as soon as the armature is declutched therefrom.

The moving element of the switch contacts 23 of the timing element 21 is carried by a contact arm 91 which is adjustably clamped to the low-speed shaft 92 of the reduction gear by means of a bolt or set screw 93.

The time delay introduced by my synchronous timers can be adjusted by loosening the screw 93 which clamps the contact arm 91 to the gear shaft 92 and moving the arm to the correct position, as indicated by a suitable scale 94 on the gear.

While I have carefully described my new timing relay element and explained its design and

operation in a single preferred form of embodiment, it will be obvious that various changes and modifications may be resorted to without departure from the essential intent and spirit of the invention. I desire, therefore, that the appended claims be accorded the broadest construction consistent with their language and the prior art.

I claim as my invention:

10 1. An electric time-switch relay-element comprising a two-pole single-phase stator member having split pole pieces and dephasing coils, an axially and rotatably movable motor-armature associated therewith, a declutchable reduction
15 gear driven by said motor-armature when said stator member is energized, and disengaged therefrom by axial movement of the motor-armature as soon as the stator member is deenergized and while the motor-armature is still revolving, and a
20 switch contact device, yieldably restrained by a reset element, driven by said reduction gear when the latter is clutched to the motor-armature.

25 2. An electric time-switch relay-element comprising a self-starting electric motor having a stator, an axially and rotatably movable motor-armature associated therewith, a declutchable

reduction gear driven by said motor-armature when said stator member is energized, and disengaged therefrom by axial movement of the motor-armature as soon as the stator member is deenergized, and a switch contact device, yieldably restrained by a reset element, driven by said reduction gear when the latter is clutched to the motor-armature. 80

3. An electric time-switch relay-element comprising a self-starting electric motor having a stator, an axially and rotatably movable motor-armature associated therewith, means for normally biasing said armature to an axial position out of center with respect to said stator whereby the magnetic pull of the stator when the motor is energized will move said armature axially, a declutchable mechanical drive device driven by said motor-armature when said stator member is energized, and disengaged therefrom by axial movement of the motor-armature as soon as the stator member is deenergized, and a switch contact device, yieldably restrained by a reset element, driven by said mechanical drive device when the latter is clutched to the motor-armature. 90 95 100

SHIRLEY L. GOLDSBOROUGH.

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