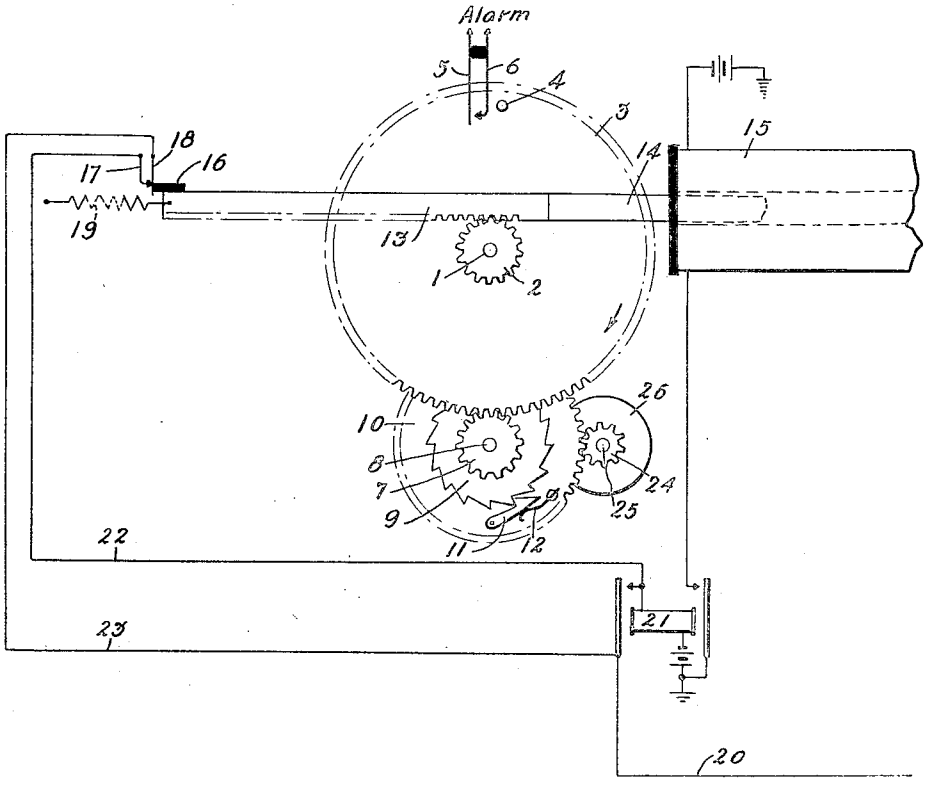
S. B. WILLIAMS, JR., AND W. P. ALBERT.

TIME MEASURING SYSTEM.

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1,337,680. Patented Apr. 20, 1920.



Inventors:
Samuel B. Williams Jr.
Walter P. Albert.
by A. C. Hamel. Atty.

UNITED STATES PATENT OFFICE.

SAMUEL B. WILLIAMS, JR., OF BROOKLYN, NEW YORK, AND WALTER P. ALBERT, OF NEWARK, NEW JERSEY, ASSIGNORS TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TIME-MEASURING SYSTEM.

1,337,680. Specification of Letters Patent. Patented Apr. 20, 1920.

Application filed February 5, 1917. Serial No. 146,671.

To all whom it may concern:

Be it known that we, SAMUEL B. WILLIAMS, Jr., and WALTER P. ALBERT, citizens of the United States, residing at Brooklyn, in the county of Kings and State of New York, and at Newark, in the county of Essex and State of New Jersey, respectively, have invented certain new and useful Improvements in Time-Measuring Systems, of which the following is a full, clear, concise, and exact description.

This invention relates to circuit controlling devices, and more particularly to controlling devices, the operation of which is partially dependent on a time element.

It is the object of this invention to provide an arrangement whereby a suitable signal will be operated after a certain electrical condition has been in existence for a predetermined length of time.

It is a further object of this invention to prevent the possibility of operating such a signal unless the condition has been in existence for the full time predetermined.

A feature of the invention is the use of a solenoid to actuate the signal circuit controlling device, such device being operable at a uniform speed under the control of a governor.

A further feature of the invention is an arrangement by which an off-normal contact is utilized to prevent reoperation of the device until such device has been completely restored to its normal position, and thus obviate the possibility of operating the signal before the full time has been measured.

It is thought that the invention will best be understood from the following detailed description, reference being had to the accompanying drawing.

In the drawing is shown a device embodying the features of the present invention and operating circuits therefor.

The mechanical construction of the device will first be described. A shaft 1 is rotatably mounted in any suitable manner and carries fixedly secured to it a pinion 2 and a gear wheel 3. A pin 4 is mounted on the wheel 3 at some point near its periphery and is arranged to operate contact springs 5 and 6 upon complete rotation of the wheel 3. A pinion 7 arranged to mesh with the teeth of the gear wheel 3 is loosely mounted upon a shaft 8, such shaft being rotatably mounted in any suitable manner. A ratchet wheel 9 is also rotatably mounted on shaft 8 in fixed relation to the pinion 7. A gear wheel 10 is secured to shaft 8. Gear wheel 10 is arranged to drive a pinion 24 secured to a rotatable shaft 25, such shaft 25 being arranged to operate a centrifugal governor 26 of any desired type. Secured at a convenient point on the gear wheel 10 is a pawl 11 spring-pressed into engagement with the teeth of ratchet wheel 9 by means of a leaf spring 12. A toothed rack 13 is slidably mounted in any desired manner and is arranged to mesh with the pinion 2 and to be operated by means of a magnetic plunger 14 controlled by a solenoid 15. The solenoid 15 is only partially shown, the broken edge indicating that this solenoid may be of any required length in order to allow full rotation of pinion 2 when the rack 13 is actuated. Similarly the plunger 14 is also indicated as being of indeterminate length by a broken edge for a similar purpose. A block of insulating material 16 is mounted on the rack 13 and is arranged to hold contact springs 17 and 18 in electrical engagement with each other when the rack is in its normal position. A spring 19 is provided to control the return motion of rack 13. The dotted portion of the spring indicates that this spring is of such length that sufficient transverse motion of rack 13 may be obtained.

If we assume that the condition, the duration of which is to be measured, is a ground, on conductor 20, the operation of the device will be as follows, it being assumed that a relay 21 and a time measuring device, such as described, are provided for each such circuit. When a ground is present on conductor 20, a circuit is completed for relay 21 from grounded battery, conductor 22, closed contact springs 17 and 18, conductor 23 to grounded conductor 20. Relay 21 is energized in this circuit and attracts its armatures. A circuit is then completed for solenoid 15 from grounded battery, winding of solenoid 15 to ground at the right-hand armature and front contact of relay 21. Relay 21 at its left-hand armature locks itself to conductor 20 irrespective of the condition of off-normal contact springs 17 and 18. The energization of solenoid 15 causes it to attract plunger 14, causing movement of the rack and a resultant clockwise rotation of

pinion 2 and gear wheel 3. Pinion 7 and ratchet wheel 9 are rotated in a counter-clockwise direction, and since pawl 11 is held in engagement with the teeth of ratchet wheel 9, the gear wheel 10 is also caused to rotate and operate governor 26 to control the speed of operation of the device. If the ground remains on conductor 20 for a sufficiently long period of time, the pin 4 will complete a revolution and operate contact springs 5 and 6 to complete a circuit to an alarm device of any desired form to inform an attendant that the condition on conductor 20 has existed for the predetermined period of time.

When the grounded condition is removed from conductor 20 relay 21 will be deënergized, causing in turn the deënergization of solenoid 15. When solenoid 15 is deenergized, rack 13 is restored to its normal condition under the control of spring 19. During such return motion, wheel 3 is rotated in a counter-clockwise direction, causing the clockwise rotation of pinion 7 and ratchet wheel 9. At this time pawl 11 will ride over the teeth of ratchet 9 and wheel 10 will not be rotated, and therefore the governing device will be ineffective during the return movement of the rack 13.

If a ground should be present on conductor 20 for a relatively short time and be removed before the contacts 5 and 6 are operated, the relay 21 and solenoid 15 will be deënergized as before described and the device will return to normal. If ground should be reapplied to conductor 20 while the device is returning to normal, it would be impossible to cause the measuring device to start reoperation from the stage of operation in which it was at the time when such reapplication of ground occurred, since no circuit can be found for relay 21 because the off-normal contacts 17 and 18 are open. This insures the return of the apparatus to its normal condition before reoperation may take place and eliminates the possibility of closing the signal circuit except in the cases in which the ground has been present for at least the full predetermined time.

It is obvious that the invention may be used for a variety of purposes and is not restricted to use with any particular time measuring system.

What is claimed is:

1. In a time measuring system, a contact operating member, a reciprocatory element, a conductor, a relay, a circuit for said relay, contacts closed by said reciprocatory element when said contact operating member is in normal position, whereby said relay is energized at the time said conductor is in a certain electrical condition, means for operating said reciprocatory element to open said contacts and impart motion to said contact operating member upon energization of said relay, other contacts, a circuit therefor, and means to actuate said other contacts to close the associated circuit after said contact operating member has been in operation a predetermined period of time.

2. In a time measuring system, a controlling device, contacts, a circuit controlled thereby, means to actuate said contacts after said controlling device has been in operation for a predetermined period of time, a conductor, a relay, an energizing circuit therefor, said circuit extending to said conductor through contacts closed in the normal position of said controlling device, means to energize said relay when said conductor is in a certain electrical condition, means to operate said controlling device while said relay is energized, a locking circuit for said relay exclusive of said normally closed contacts, and means to restore said controlling device upon deënergization of said relay.

In witness whereof, we hereunto subscribe our names this 2nd day of February, A. D. 1917.

SAMUEL B. WILLIAMS, JR.
WALTER P. ALBERT.