E. J. MURPHY.

BATTERY DISCHARGE REGULATOR.

APPLICATION FILED JUNE 9, 1908.

909,813. Patented Jan. 12, 1909.

3 SHEETS—SHEET 1.

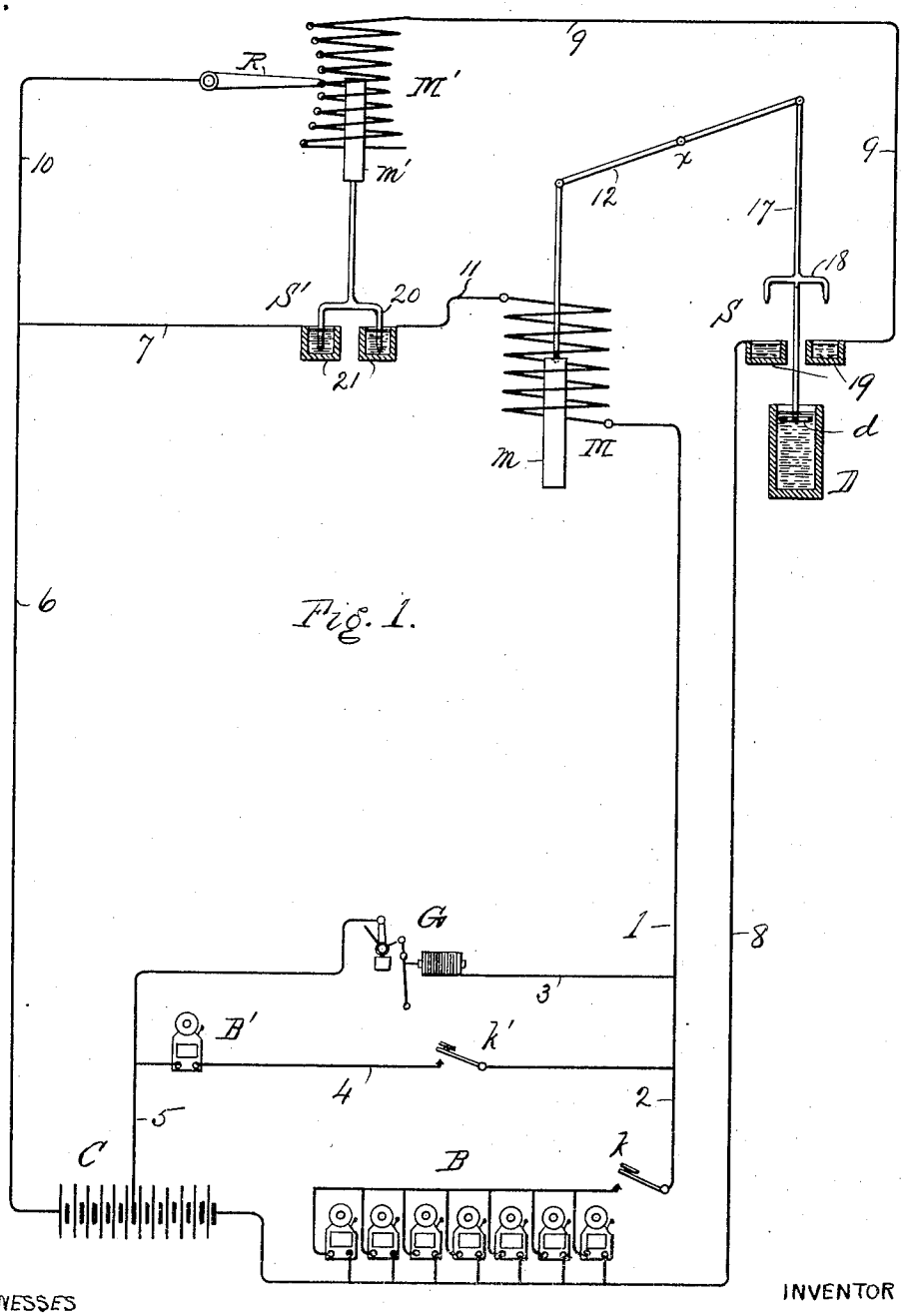


Fig. 1.

WITNESSES

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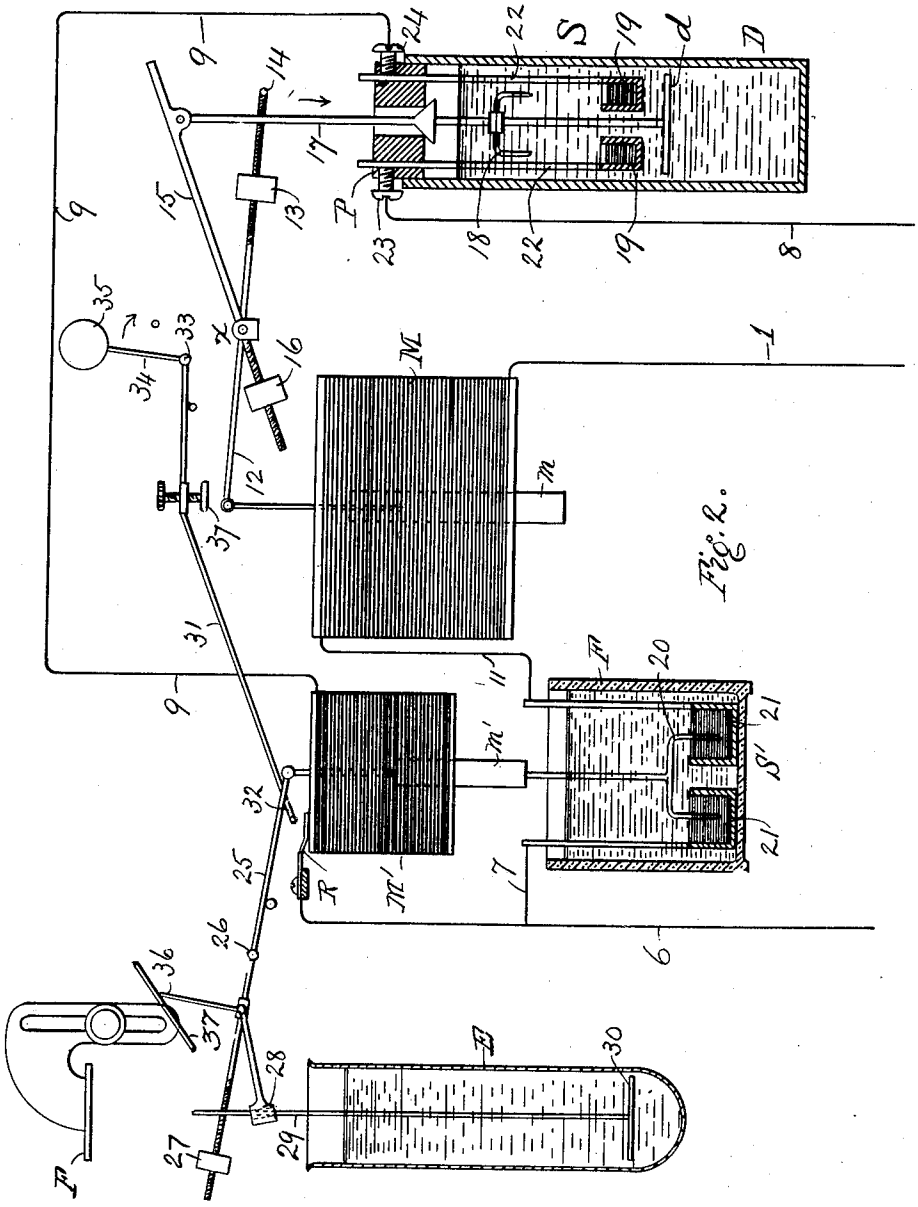


Fig. 2.

WITNESSES

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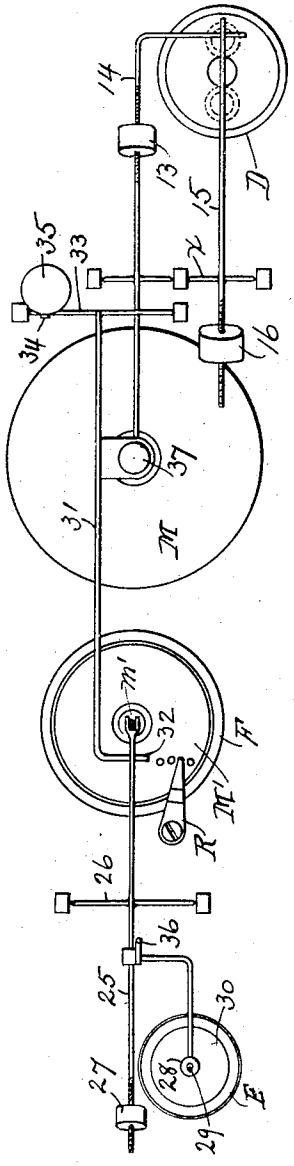


Fig 3

WITNESSES

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BATTERY-DISCHARGE REGULATOR.

No. 909,813. Specification of Letters Patent. Patented Jan. 12, 1909.

Application filed June 9, 1908. Serial No. 437,578.

To all whom it may concern:

Be it known that I, EDWARD J. MURPHY, a citizen of the United States of America, and residing in the borough of Brooklyn, in the county of Kings and State of New York, have invented a certain new and Improved Battery-Discharge Regulator, of which the following is a specification.

The main object of my invention is to provide a regulating means to protect primary batteries from abnormal rates of discharge, and to increase the useful life of any form of battery and prolong the life of the bell contacts by limiting the amount of electric energy which can be delivered at any one closure of the circuit, automatically breaking the circuit, but automatically restoring it again after a predetermined interval of time. I also provide means to permanently open the circuit upon a predetermined number of repetitions of the circuit breaking and making and also means to instantly open or break the circuit whenever abnormal overload or accidental short circuit occurs.

My invention is applicable to all sorts of open circuit signaling apparatus, such as call bell circuits, electro mechanical detent trips, gas lighting circuits, etc.

In the accompanying drawings:—Figure 1 is a diagram showing some of the principal elements of the apparatus and illustrative circuits; Fig. 2 is a view partly in elevation and partly in section; and Fig. 3 is a plan view corresponding with Fig. 2.

Referring to Fig. 1, I have indicated at C a number of cells of battery, with which are shown connected up, by way of illustration, a gang of bells B, controlled by a button k, through wires 2, 1, the low resistance coil of the solenoid M, wire 11, switch S^1 and wires 7 and 6. In a branch 3, 5, is illustrated a gas lighting device G, while in another branch 4, 5, is a single call bell B^1 controlled by a button k^1. The electromagnet or solenoid coil M controls a time-limit circuit closing switch S, the core m of the coil being connected to a lever 12, pivoted at x, and supporting a rod 17 which carries a contact fork 18. When the coil M is energized by current, the core m is drawn upwards and thereupon the rod 17 can descend until the fork 18 has plunged into the contact cups 19 and thereby closed a circuit from the battery C through wires 8, 9, adjustable high resistance coil M^1, arm R and wires 10, 6 to the battery. To retard the closing of this circuit, and give a time limit before the closure, I provide a dash pot device D, in which moves a plunger d on the lower end of the rod 17. By this retardation means, the circuit through coil M^1 will not be closed until the desired time has elapsed after closing of any of the circuits through coil M, and therefore if the person who has pressed any of the buttons, such as k, k^1, withdraws pressure from the button within a moderate time, the circuit through coil M will be opened again before the time switch at S can be closed. But if the user keeps the circuit through coil M closed an abnormal length of the time the switch S will close and will cause the electro magnetic coil at M^1 to be energized and to draw up its core m^1 and thereby raise the contact fork 20 carried by it, out of the contact cups 21 and thus break the bell circuit at S^1. Thereupon the coil M being deenergized, the core m will descend and the switch at S be slowly re-opened as the retardation device D permits. Then the coil M^1 will be again deënergized, and the switch closed again at S^1, by which time the button or key (k, k^1), which had been closed by the user will usually have been opened by him. By the means described, I prevent the user from keeping the batteries in circuit an abnormal length of time.

The detailed construction of my described regulator and the additional features, whereby its effectiveness is made more complete will be understood by reference to Figs. 2 and 3, where the same letters and numerals are used for the same parts as in Fig. 1. For convenience of description and the more easily to identify their functions, I will speak of the switch S′ as a circuit breaker and the switch S as a circuit closer.

While I support the rod 17 from the lever 12, I do not attach the two directly to each other, but allow lost motion between the two. As seen in Fig. 2, the rod 17 is connected to a lever 15, freely pivoted at x' and with an adjustable counterweight at 16, and the outer end of the lever 15 is normally supported on the bent end 14 of the lever 12 (Fig. 3), but when the coil M is energized, the core m is at once drawn up, as seen in Fig. 2, and the end of lever with counter weight 13 descends. The end of the lever 15 to which the rod 17, contact fork 18 and plunger d are connected follows the lever 12 only as fast as the retarding plunger d

moving in the liquid in the vessel D will allow. The vessel D is filled with insulating fluid, in which are suspended the cups 19 containing conducting fluid. These cups are carried by rods 22, 22, fixed by screws 23, 24 in the insulating plug P in the top of the vessel D. To these screws 23, 24 are connected the conductors 8 and 9 respectively. The several devices thus described in connection with this vessel D constitute the time limit circuit-closing device S. By adjusting the counterweight 16 on the lever 15, the time required for the closing of the circuit at S, on the energizing of the core m may be varied. The circuit breaking devices S, consisting of the fork 20 and conducting cups 21, are also preferably contained with a vessel F filled with insulating fluid.

The core m^1 of the coil M^1 is suspended from a lever 25, pivoted at 26 and with adjustable counterweight 27. This lever has pivoted to it a clutch lever 28, the clutch end of which embraces a rod 29 in the same way that the feed clutch of the upper carbon of an arc lamp embraces the carbon to lift it. This rod 29 carries at its lower end a plunger 30 immersed in the liquid contained in the vessel E. Every time the core m^1 is raised, the clutch 28 will slide a short distance down the rod 29; then when the coil M^1 is deënergized, and the core m^1 descends again, the clutch 28 will grip the rod 29 and lift the latter with its plunger 30, and thereby retard the descent of the core m^1 and the closing of the circuit at S^1.

Means are provided to free the grip of the clutch 28 upon the rod 29 as the switch at S^1 closes again, and this may be accomplished by providing the clutch lever 28 with an arm 36 and in connection with the latter a releasing stop 37 which is mounted in a stationary position in such relation to the end of the arm 36 that when the core m^1 descends to close the switch at S^1, the lever 25 will bring the end of the arm 36 into contact with the stationary device 37 and cause the clutch lever to be tilted to release the grip of clutch 28 upon the rod 29, as shown in Fig. 2, and thereupon the rod 29 and its plunger can descend in the liquid in vessel E. The counter weights 16 may be so adjusted that after the opening of the switch in D, its re-closing will be so retarded that rod 29 and its plunger 30 may always have time to descend to its full extent after the re-closing of the switch S^1, but I prefer to so adjust the weight 16 that so long as the working circuit is kept closed the time limit switch in D will close again before rod 29 and plunger 30 have had time to redescend the whole way. If then it should happen that one of the buttons (such as k, k^1, is kept closed or there is a long continued circuit closure through other means, so that the closing of the circuit at S and the breaking at S^1 are constantly repeated, the rod 29 will be intermittently lifted a short distance at a time until the top of the rod comes into contact with an adjustable stop F, Fig. 2, before the arm 36 reaches the release stop 37 in that upward movement of the rod with the result that the switch at S^1 is thereby held open. To reset this mechanism, the arm 36 on the clutch lever 28, may be pressed down a little, so as to free the rod 29 from the grip of the clutch and allow the rod and its plunger 30 to descend to their normal and initial position shown in Fig. 2. I also provide for a permanent breaking of the circuit in case of a sudden overload. For this purpose, I provide a trip lever 31, pivoted at 33 and having a hooked outer end 32 extending under that end of the lever 25 which supports the core m^1 and contact fork 20. This lever has an arm 34 with a weight 35 normally in the position shown in Fig. 2, where it is just counterbalanced by the long arm or lever 31. Immediately over the end of the lever 12, carrying the core m, the lever 31 carries an adjustable striking plate 37, so that if a sudden overload throws the core m upwardly quickly, the impetus will cause the lever 12 to strike the plate 37 and kick up the lever 31 with the result that the weight 35 will fall over beyond the balancing position in the direction of its arrow, Fig. 2, causing the end 32 to lift the lever 25 and core m^1 to permanently break the circuit at S^1 until the weighted arm 34 and lever 31 are reset.

I claim as my invention:—

1. A battery discharge regulator, comprising a circuit breaker in the working circuit and an electromagnetic means in a second circuit controlling the circuit breaker, in combination with a circuit closer controlling said electromagnetic means, an electromagnet in the working circuit controlling said circuit closer retardation means in connection with the latter, and mechanical means whereby the time limit of the action of the retardation means may be adjusted.

2. A battery discharge regulator, comprising a circuit breaker in the working circuit and an electromagnetic means in a second circuit controlling the circuit breaker, and a retardation device for the latter in combination with a circuit closer controlling said electromagnetic means, an electromagnet in the working circuit controlling said circuit closer and time limit retardation means in connection with the latter.

3. A battery discharge regulator, comprising a circuit breaker in the working circuit and an electromagnetic means in a second circuit controlling the circuit breaker, a circuit closer controlling said electromagnetic means, and an electromagnet in the working circuit, controlling the said circuit

closer, in combination with means for permanently opening the circuit breaker on a determined number of repetitions of the circuit breaking operations.

4. A battery discharge regulator, comprising a circuit breaker in the working circuit and an electromagnetic means in a second circuit controlling the circuit breaker, a circuit closer controlling said electromagnetic means, and an electromagnet in the working circuit, controlling the said circuit closer, in combination with a trip to permanently open the circuit breaker on overload.

5. A battery discharge regulator, comprising a circuit breaker in the working circuit and an electromagnetic means in a second circuit controlling the circuit breaker, in combination with a circuit closer controlling said electromagnetic means, an electromagnet in the working circuit controlling said circuit closer, mechanical means for actuating the circuit closer when released by this electromagnet, and time limit retardation means in connection with the circuit closer.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWARD J. MURPHY.

Witnesses:

WALTER ABBE,

WILLIAM ABBE.