

1,004,383.

A schematic diagram of a mechanical device. It features a vertical frame with two lamps at the top. A central horizontal bar is connected to a vertical rod. This rod has a series of three circles (possibly representing a spring or a stack of discs) in the middle. Below the circles, the rod is labeled with the number '20' and a dashed line. The rod is also connected to a horizontal bar at the bottom, which has two lamps. Arrows indicate the direction of movement or force.

WITNESSES:

INVENTOR.

Ernest W. Davis

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ERNEST W. DAVIS, OF CHICAGO, ILLINOIS.

AUTOMATIC ELECTRIC SWITCH.

1,004,383.

Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed October 22, 1910. Serial No. 588,472.

To all whom it may concern:

Be it known that I, ERNEST W. DAVIS, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Automatic Electric Switch.

This invention relates to devices for automatically opening and closing electrical circuits, such as are used for operating flashing, electric signs, and relates more particularly to flashing devices in which the operating power is obtained from a magnet or solenoid instead of a motor.

Solenoid-operated flashers as heretofore constructed have proved unsuitable for operating heavy switches, such as are required for currents of high amperage. In flashers of this class the movement of the core is retarded by various means, such as a revolving fan, a dash pot, a metallic disk rotating in a magnetic field, etc. As usually constructed the movement of the core from one extreme position to the other is retarded by the fan, dash pot, or other device, and the change in the circuit is produced by a slight amount of movement at the end of each reciprocating movement of the core. The defect of such a construction lies in the fact that a large part of the energy produced by each stroke of the core is used to overcome the retarding means and the little energy remaining is insufficient to make forcible connections at the switch contacts. Obviously, this defect may be overcome by increasing the size of the solenoid, but when thus constructed the device would be no cheaper to produce than an efficient motor driven flasher and would consume several times the amount of current in operation.

The object of this invention is to overcome the above named objections and to produce an automatic electric switch which will operate large contacts and make more forcible connections than the previously described flashers, without increasing the size of the solenoid. I attain this object by using a fly-wheel or other inertia member, in place of the fan, dash pot, etc., used in other flashers. I have demonstrated by practical tests that the retarding effect of a fly wheel, due to overcoming its inertia, is sufficient to produce intervals of the required time. I have also demonstrated that the power which is imparted to the fly wheel is not entirely dissipated as it is in a fan or dash pot, but may

be easily regained, as the revolving fly wheel has considerable energy due to its momentum. In my invention this energy, due to the momentum of the fly wheel, is used to make forcible connections at the switch contacts, which forcible connections are very necessary for operating with heavy currents.

In order to make the invention more clearly understood reference is made to the accompanying drawing, in which:

Figure 1 is a front elevation. Fig. 2 is a circuit diagram of the apparatus shown in Fig. 1. Fig. 3 is a circuit diagram with duplicate solenoids.

The solenoid 1, Fig. 1, is provided with a paramagnetic core 2, which moves vertically in said solenoid. A rack 3, is connected to said core and is provided with arms 4 and 5, which engage with an insulating roller 7, and thereby operate the switch 8.

The rack 3, engages with a pinion 9, which operates a train of gears 10 and 11, and thereby imparts rapid rotation to a fly wheel 12, which by its inertia, retards the movements of the core 2. At the end of each reciprocating movement of the rack 3, the fly wheel 12, by virtue of its momentum produces forcible contact between the switch 8, and the contacts 15 and 18.

In operation, the current entering at 13 passes through the lamp 14, switch 8, contact 15, and back to the line 16. The current is also shunted at 17 and flows through the solenoid 1, to the switch 8. The solenoid 1, being thus energized, raises the core 2, and brings the switch 8, in connection with the contact 18. With the switch 8 in this position, the current entering at 13, passes to the contact 18, through the switch 8, and lamp 19, back to the line 16. The solenoid 1, is then short circuited through the switch 8, and contact 18, and is deenergized. This allows the core 2, to fall by the action of gravity, but before doing so the fly wheel 12, by virtue of its momentum, jams the switch 8 in forcible connection with the contact 18. When the core 2, falls to its lowest position the switch is returned to its original position and the operation is repeated automatically. Obviously, a second solenoid 20, Fig. 3 could be used to replace the action of gravity described above.

I am aware that prior to my invention, automatic, electric switches have been used

which were operated by solenoid and in which various retarding means were employed. I therefore do not claim such a combination broadly. What I claim as being new and useful and that which I desire to secure by Letters Patent is the use of a retarding means in which the imparted energy may be regained and made to assist in operating the switch.

10 In devices of this class as previously constructed the efficiency has been low, as only a fraction of the total energy of the solenoid is utilized in actual operation of the contacts, while in the improved device the mechanical efficiency is theoretically perfect, as the total amount of kinetic energy produced in the solenoid is utilized, theoretically, in operating the switch.

I claim:

20 1. In combination, an electric switch; a transforming means, capable of transforming electrical energy into kinetic energy; means whereby said switch is operated by said kinetic energy; an inertia member arranged to retard the motion produced by said kinetic energy, said inertia member being so arranged that the energy imparted thereto tends to continue the motion produced by said kinetic energy.

30 2. In combination, an electric switch; an electric solenoid, provided with a movable, paramagnetic core; means whereby said

switch is operated by the movement of said core; a rotatable inertia member driven by said core and capable of retarding the motion thereof; said inertia member being so arranged that the energy imparted thereto tends to continue the motion of said core. 35

3. In combination, an electric switch; an electric solenoid provided with a movable paramagnetic core; means whereby said switch is operated by the movement of said core; a rotatable inertia member, driven by said core and capable of retarding the motion thereof, said inertia member and said switch operating means, being so arranged that the energy imparted to said inertia member is transmitted through said switch operating means and thereby makes forcible connections at the contacts of said switch. 40 45 50

4. In combination, an electric switch; an electric solenoid provided with a movable paramagnetic core; means whereby said switch is operated by the movement of said core; a rack connected with said core; a pinion in mesh with said rack; a train of gears operated by said pinion; and a rotatable inertia wheel operated by said gears. 5

In testimony whereof I affix my signature in the presence of two witnesses.

ERNEST W. DAVIS.

Witnesses:

C. K. CHAMBERLAIN,
A. S. PHILLIPS.