J. C. ARNOLD.

SIGN FLASHER.

APPLICATION FILED NOV. 29, 1919.

1,430,612. Patented Oct. 3, 1922.

2 SHEETS—SHEET 1.

Fig. 1

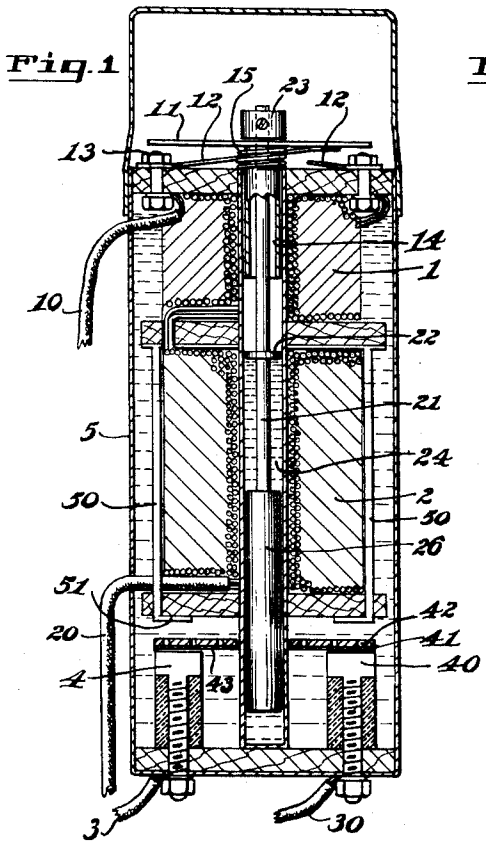


Fig. 2

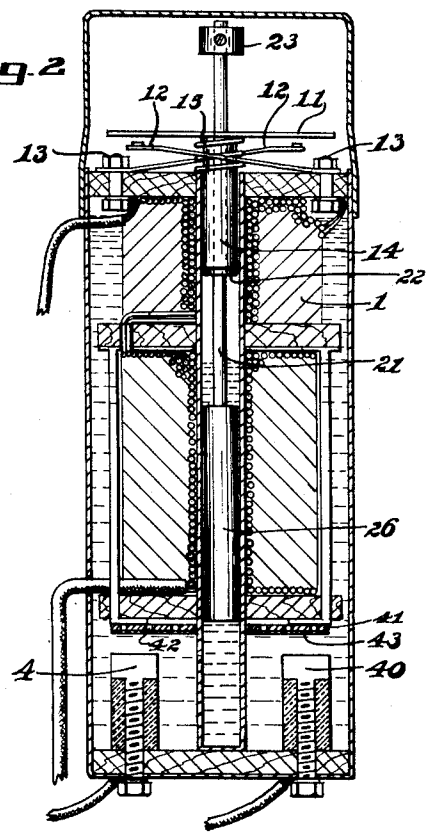


Fig. 6

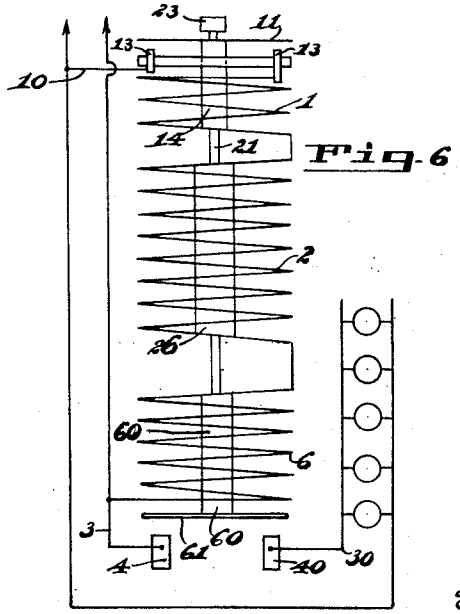
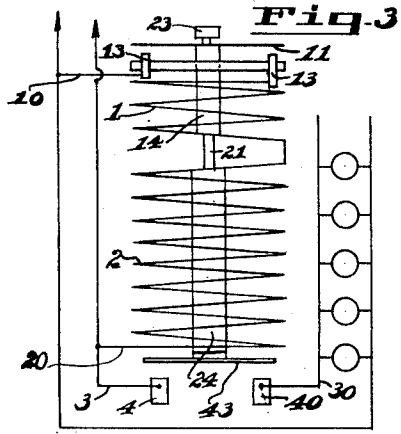


Fig. 3



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2 SHEETS—SHEET 2.

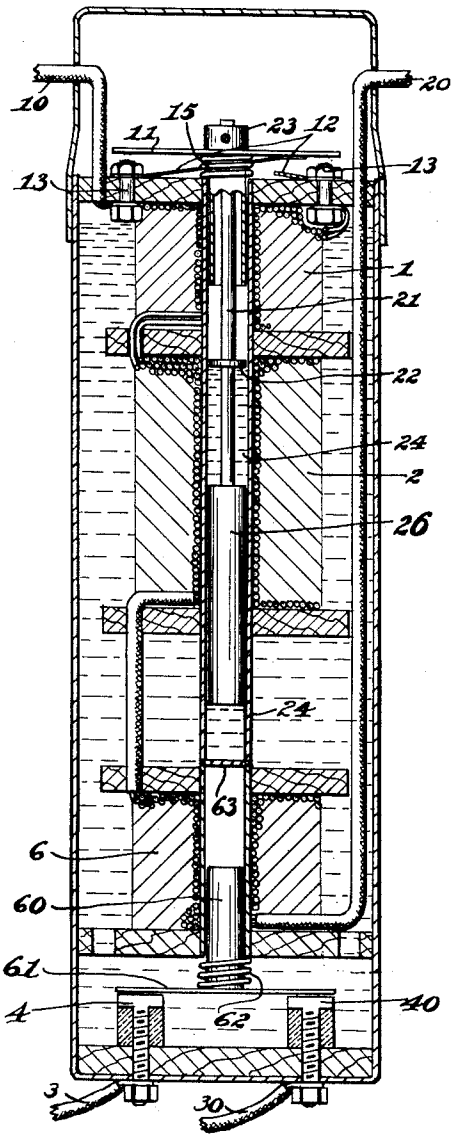


Fig. 4

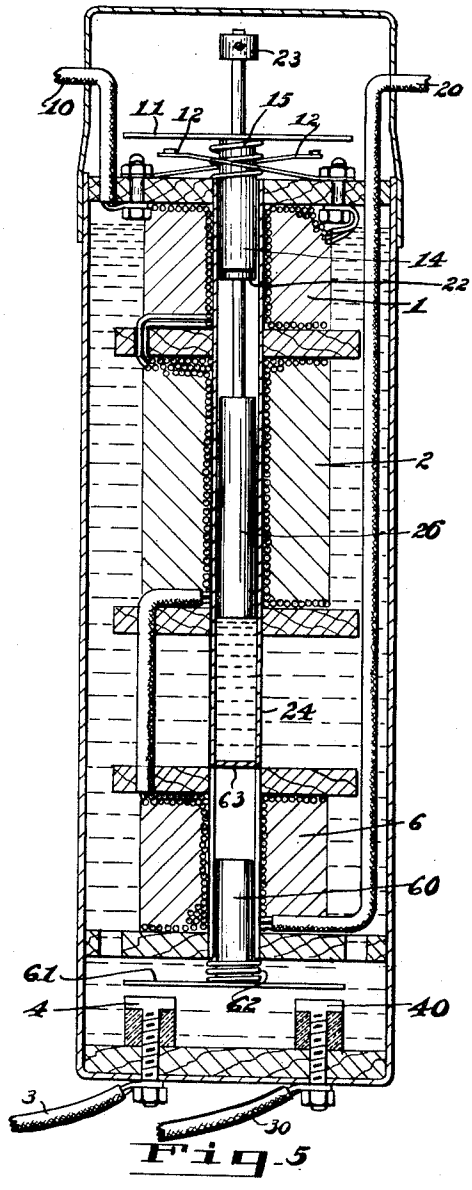


Fig. 5

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Patented Oct. 3, 1922. 1,430,612

UNITED STATES PATENT OFFICE.

JAMES C. ARNOLD, OF SEATTLE, WASHINGTON.

SIGN FLASHER.

Application filed November 29, 1919. Serial No. 341,433.

To all whom it may concern:

Be it known that I, JAMES C. ARNOLD, a citizen of the United States, and resident of the city of Seattle, county of King, and State of Washington, have invented certain new and useful Improvements in Sign Flashers, of which the following is a specification.

My invention relates to devices which operate to automatically and continuously make and break an electric circuit, the same being commonly referred to as "flashers," and being used in connection with electric signs.

The object of my invention is to produce a device which will do this work and which is simple and cheap in construction and one which is also reliable in its operation.

The features of my invention which I believe to be novel and upon which I desire to secure a patent will be described in the specification and then particularly defined by the claims.

In the accompanying drawings I have illustrated my invention in the form of construction which I now prefer to use.

Fig. 1 is a section taken lengthwise through one form of my device showing the load switch as closed.

Fig. 2 is a similar view of the same parts but showing the switches as open.

Fig. 3 is a wiring diagram showing the type of construction employed in Figures 1 and 2.

Figures 4 and 5 are longitudinal sections through a device embodying my invention but varying slightly in construction from that shown in Figures 1 and 2, the said Figures 4 and 5 showing the parts respectively in closed and opened positions of the switches.

Fig. 6 is a wiring diagram of the construction shown in Figures 4 and 5.

The device which is the subject of this invention employs a plurality of solenoids which are associated with mechanisms and operated in such a manner that they continuously and automatically act to make and break the electric circuits, and also to produce a sufficient delay between the acts of making and breaking the circuit, as to provide the time interval desired between such acts.

In the device as shown in Figures 1 and 2, two solenoids 1 and 2 are used. These solenoids are shown as connected in series in a shunt circuit. It is evident however, that these two solenoids may be connected in parallel in shunt circuits. The essential feature is that they be so associated that the current supplied thereto is controlled by a common switch, or at least so as to be operated simultaneously, so that when the current is supplied to, or cut off from, one of the solenoids, the same is done to the current of the other solenoid.

The wire 10 is a portion of a shunt circuit which supplies the solenoids. The wire 20 is another part of the same circuit. Between these two wires 10 and 20, is included the wires which form the coils of the two solenoids 1 and 2. In the circuit of the solenoids is included a bridge or switch member 11, which is conveniently made in the form of a disk of conducting material, which is adapted to connect the two resilient conductors 12, which conductors are connected with the binding posts 13, placed in the circuit of the solenoid coils. In the position shown in Figure 1, the disk 11 is in contact with the resilient fingers 12 and the solenoid circuit is closed. In Figure 2 the disk 11 has been raised so as to break the circuit.

The disk 11 which forms the bridge member of the switch controlling the solenoid circuit, is connected with and operated by the core 14 of the solenoid 1. When the solenoid circuit is broken, this bridge member will be held in raised position by the action of a spring 15, which is of sufficient strength to break the contact and to maintain the disk and the core 14 which is connected therewith in raised position, if there be no current on the solenoid coil. The solenoid 1 is however, of such strength that it is able to overcome the action of the spring 15, and to hold the bridge disk 11 down, so as to close the circuit when the solenoid 1 is energized.

The solenoid 2 is of such strength that it is capable, when energized, and acting in conjunction with the spring 15, to overcome the action of the solenoid 1 and to raise the bridge piece 11, and thus to break the solenoid circuit. When once broken, the spring 15 is of sufficient strength to maintain it broken, or in open condition, until an additional force is applied acting to close the circuit.

The core 26 of the solenoid 2 has an ex-

tension rod 21, which rod extends upward and through the core 14 of the solenoid 1. To accommodate this, the core 14 has been made as a tube. The rod 21 has two tappets, 22 and 23, secured thereto and located respectively below and above the core 14. The tappet disk 22 contacts with the lower end of the core 14 when the core 26 is drawn within its coil. In consequence of the greater strength of the lower solenoid 2, the action of the solenoid 1 is overcome and the circuit is broken by lifting the disk 11.

At this point the tappet 23, which is above the disk 11, is separated therefrom by a material distance. The core 26 is also within a tube 24 which is filled with a liquid, as oil. In consequence, the drop of the core 26 is delayed, causing a material time interval to elapse before the tappet 23 engages the disk 11. When this occurs however, the disk 11 will be brought downward, the spring 15 compressed and contact made with the terminal fingers 12 and the solenoid circuit closed. This action goes on continuously, resulting in alternate opening and closing of the solenoid circuit.

The two lead wires 3 and 30, shown at the bottom of the device, form a part of the load circuit which it is desired to control by this device. These wires connect with two binding posts 4 and 40, which form terminals for this circuit and are contained within the casing 5, within which the entire device is enclosed. This casing is shown as supplied with oil for insulating purposes. A disk 41 surrounds the tube 24 and is free to move up and down around the same. This disk is preferably composed of two layers, an upper layer 42, which is of magnetic material, and a lower layer 43, which is a good conductor. While I prefer to use this combination of two metals, as iron and copper, this is not strictly essential to the operation of my device. It is essential to the operation of the device when of the form shown in Figures 1 and 2, that a portion, at least, of this disk be of magnetic material. The core 26 of the lower solenoid, when said solenoid is energized, becomes a magnet and as it is drawn upward, it acts magnetically upon the disk 42 to carry it along. In consequence, it will raise this disk off of the terminals 4 and 40, thus breaking the load circuit. It will also act to hold this disk raised, so long as the solenoid circuit is closed and the solenoids are energized.

To further assist in maintaining this when raised, I have shown rods 50, of which any suitable number may be employed, these extending outside of the solenoid cores and having ends 51, which are bent under, so as to contact with the disk 42 when the latter is raised. If these be made of soft iron they become temporary magnets and act to hold the disk 42 raised, so long as the solenoids are energized. They however, lose their holding power as soon as the solenoid circuit is broken.

The type of construction shown in Figures 4 and 5 is the same as that of Figures 1 and 2, except for the means for controlling the load circuit switch. This means, as shown in Figures 4 and 5, consist of a third solenoid 6, of which the core 60 is directly connected with a disk 61, which forms the bridge piece, this solenoid being connected either in series or in parallel, as desired, with the solenoids 1 and 2. As illustrated it is shown as connected in series with the other solenoids. I have also shown a spring 62, as interposed between the disk 61 and the head 62 of the lower solenoid. This spring will assist in producing a prompt return of the bridge disk 61 when the solenoids are de-energized.

I prefer to employ a partition, as 63, in the tube 24 into which the cores of the solenoids enter, in order to free the core of the lower solenoid from the dash pot action which it is desired to use in connection with the core of the second solenoid 2. The core 60 may be made hollow so as to entirely free it from any dash pot action.

It is believed that the operation of the device is evident without further detailed description. The solenoid circuit is closed by the gravity action of the core 26 of the second solenoid. It is opened by the attraction of the solenoid upon its core. The movement of the core in both directions is slowed down by the dash pot action of the core in the tube 24. In consequence, there would be a period of time when the current is on, and another period of time when it is off, these following continuously each other.

What I claim as my invention is:—

1. A current-make-and-break device comprising a solenoid, a solenoid circuit, a switch controlling said solenoid circuit, means for operating said switch by the solenoid core, load circuit terminals, a switch for the load circuit terminals and a magnetic opening-and-closing member for said load switch actuated to open the switch by the magnetic attraction thereon of the solenoid core.

2. A current-make-and-break device comprising a solenoid, a solenoid circuit, a switch controlling said solenoid circuit, means for operating said switch by the solenoid core, load circuit terminals, a switch for the load circuit terminals and having a magnetic opening-and-closing member surrounding the projecting end of the solenoid core and magnetically moved thereby to break the load circuit when the core is drawn into the coil.

3. A current-make-and-break device, comprising a solenoid, a solenoid circuit, a switch controlling said solenoid circuit,

means for operating said switch by the solenoid core, load circuit terminals at opposite sides of the solenoid core, a floating magnetic disk surrounding the solenoid core and acting as a switch for said terminals.

4. A current-make-and-break device comprising a solenoid, a solenoid circuit, a switch controlling said solenoid circuit, means for operating said switch by the solenoid core, load circuit terminals, a switch for the load circuit terminals and a magnetic opening-and-closing member for said load switch actuated to open the switch by the magnetic attraction thereon of the solenoid core, and fixed bars energized by the solenoid coil to magnetically hold said opening-and-closing member in open position.

5. A current-make-and-break device, comprising a solenoid, a solenoid circuit, a switch controlling said solenoid circuit, means for operating said switch by the solenoid core, load circuit terminals, a switch for the load circuit terminals and a magnetic opening-and-closing member for said load switch actuated to open the switch by the magnetic attraction thereon of the solenoid core, and magnetizable bars energized by the solenoid core and engaged by the said opening-and-closing member when in open position to support it in such open position until the coil is de-energized.

6. A flasher having a solenoid adapted to both open and close its own circuit, a yielding means of less power acting to maintain an open circuit, load circuit terminals and a bridge piece of magnetic material adapted to connect said terminals, and means whereby the solenoid core acts magnetically to lift the bridge-piece from its terminals.

Signed at Seattle, Washington, this 13th day of October, 1919.

JAMES C. ARNOLD.