G. F. KIRCHHOFF.

AUTOMATIC SWITCH FOR FLASHERS, &c.

APPLICATION FILED MAY 10, 1911.

1,101,494. Patented June 23, 1914.

2 SHEETS—SHEET 1.

Fig. 1.

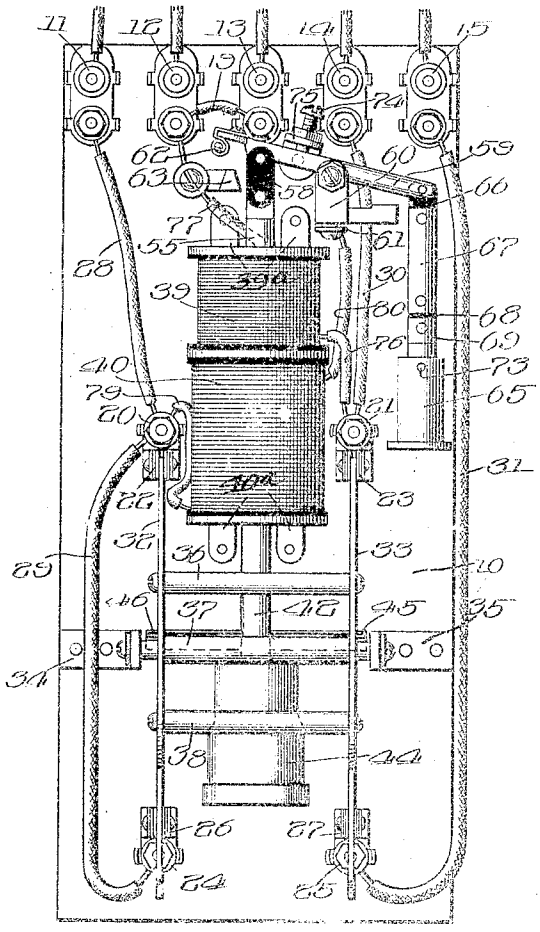
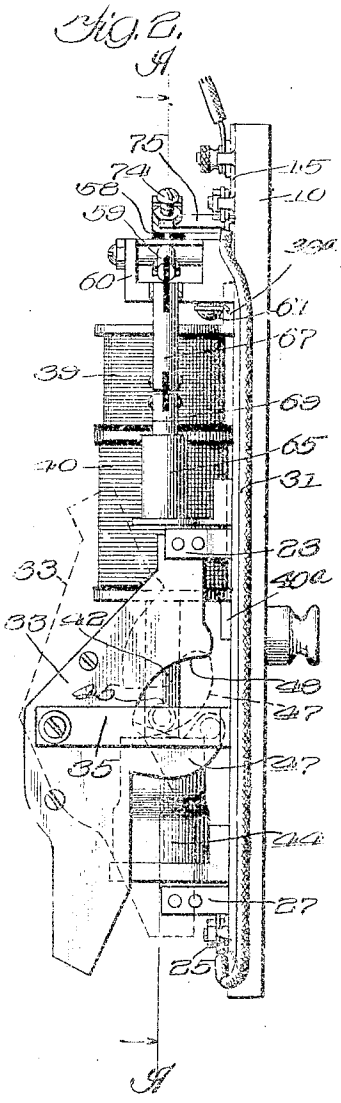


Fig. 2.



Witnesses:

Inventor:

George F. Kirchhoff

By John Howard McElroy

his Atty

G. F. KIRCHHOFF.

AUTOMATIC SWITCH FOR FLASHERS, &c.

APPLICATION FILED MAY 10, 1911.

1,101,494. Patented June 23, 1914.

2 SHEETS—SHEET 2.

Fig. 3.

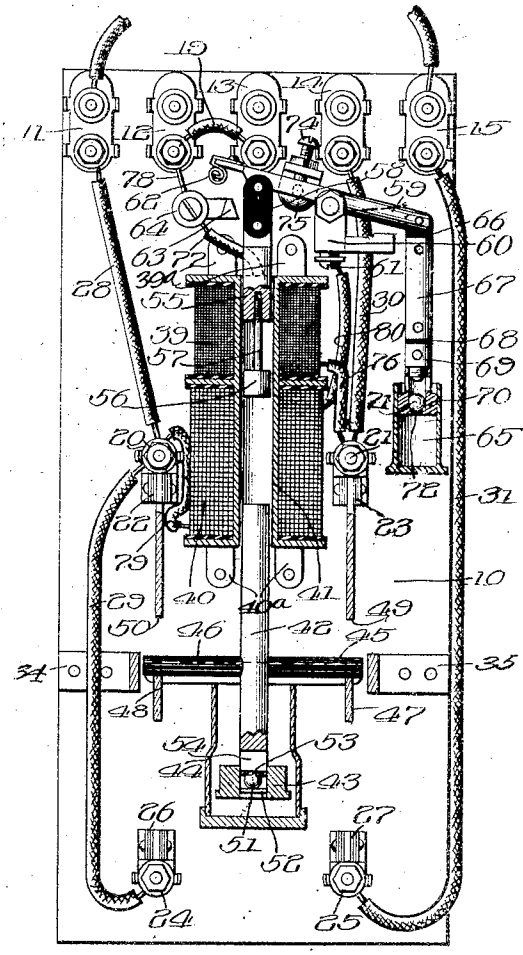


Fig. 4.

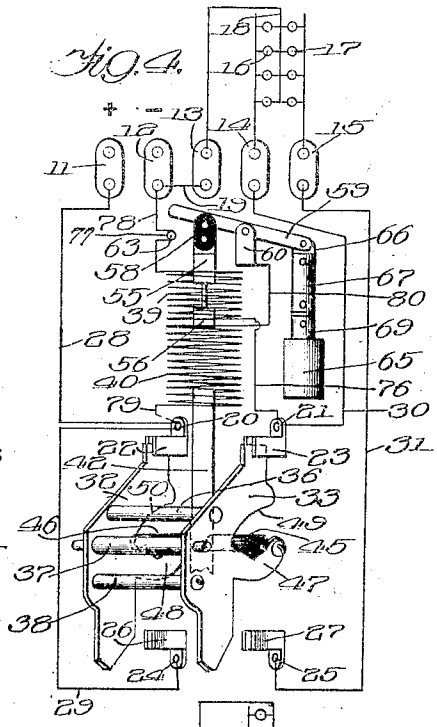
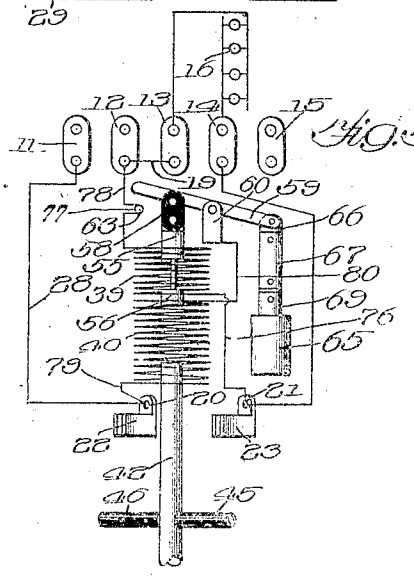


Fig. 5.



Witnesses:
Jas. B. Terry
Jno. H. Nelson Jr.

Inventor:
George F. Kirchhoff,
By John Howard McElroy
his Atty

UNITED STATES PATENT OFFICE.

GEORGE F. KIRCHHOFF, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MAX HARRIS, OF PITTSBURGH, PENNSYLVANIA.

AUTOMATIC SWITCH FOR FLASHERS, &c.

1,101,494. Specification of Letters Patent. **Patented June 23, 1914.**

Application filed May 10, 1911. Serial No. 626,803.

To all whom it may concern:

Be it known that I, GEORGE F. KIRCHHOFF, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Switches for Flashers, &c., of which the following is a full, clear, and exact specification.

My invention is concerned with automatic electric switch mechanism, designed primarily for "flashers," as they are called, but which may be employed for other purposes, and consists essentially of a pair of magnets with a pair of associated switches and a pair of associated dash pots or similar retarding devices, all combined so that they will operate alternately to open and close a single work circuit or to open one work circuit and simultaneously close another and vice versa.

To this end my invention consists in a certain novel structure and arrangement of elements which will be described at length in the body of the specification and the novel combinations particularly pointed out in the claims.

To illustrate my invention, I annex hereto two sheets of drawings in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a front elevation of the switch mechanism removed from the oil holding receptacle in which it is ordinarily immersed; Fig. 2 is a similar view in side elevation of the same mechanism; Fig. 3 is a front elevation in section on the line A—A of Fig. 2; Fig. 4 is a diagrammatic view showing the circuits; and Fig. 5 is a similar view, showing one work circuit instead of the two shown in Fig. 4.

I have designed my novel switch so that it is especially adapted to operate in an oil filled tank, in which it will be understood to be immersed, although I have not illustrated the tank.

The various elements are located on an insulating slab 10, which is provided with the five binding posts 11, 12, 13, 14 and 15, at its upper end and the wire from the positive side is connected to the post 11 and from the negative side to the post 12. Where the switch is used as a flasher for the two sets of lamps, as indicated in Fig. 4, the post 14 will be connected to the positive side of one set of lamps 16, while the post 15 will be connected to the positive side of another set of lamps 17, and a common return wire 18 may be connected to the negative side of both sets of lamps and to the post 13, which in that case will be connected to the post 12 by the wire 19. The binding posts 20 and 21 are electrically connected to the switch contacts 22 and 23 and where it is connected up for two circuits, as indicated in Fig. 4, there will be two other binding posts 24 and 25 connected with the switch contacts 26 and 27. The binding post 11 is connected by the wire 28 with the post 20, which in turn is connected by the wire 29 with the binding post 24. The binding post 21 is connected by the wire 30 with the binding post 14, while the binding post 25 is connected by the wire 31 with the binding post 15. A switch having two blades 32 and 33 is pivotally mounted upon the standards 34 and 35, and the upper ends of the blades 32 and 33 are adapted to engage the contacts 22 and 23 while the lower ends of the blades are adapted to engage the contacts 26 and 27. The two blades are electrically connected in any desired manner as by the three spacing rods 36, 37 and 38, and it will be readily apparent that when the upper end switch blades 32 and 33 are in engagement with the contacts 22 and 23, the circuit will be closed from the positive main through the contact 22, switch contact 23, wire 30, contact 14, the lamps 16, return wire 18, contact 13, wire 19, and contact 12 to the negative main. When the switch is in the other position, as indicated in the dotted lines in Fig. 2, the circuit will be closed through the contacts 24 and 25, wire 31, contact 15, lamps 17 and return wire 18 as before.

To control the automatic operation of this switch where the device is used as a flasher, so that first one circuit will be closed for a time and then the other, I employ the following device: Suitably supported from the base piece 10 by the lugs 29^a and 40^a are a pair of solenoid magnets 39 and 40, which are shown in axial alinement and preferably have the single supporting tube 41 shown with the three flanges forming, as it were, two spools. The main core 42 of the lower solenoid is preferably a heavy metal rod and carries on the lower end thereof the piston 43, adapted to coöperate with the dash pot

44. The lower end of the iron post is larger than the upper end so that the resistance to the downward movement of the plunger will be suddenly released so that it will fall by gravity and give a greater impetus to the action of the two arms 46 and 48 of insulating material extending at right angles from the plunger and adapted to engage the arms 47 and 49 extending laterally from the switch plates 35 and 36. It will be understood that as the plunger falls rapidly by gravity after the dash pot has released, [illegible] the arms 46 and 48 will engage the arms 47 and 49 and swing the switch from the dotted line position of Fig. 3 to the full line position, and the [illegible] is [illegible] to disengage the blades from the contacts 26 and 27 and to engage them with the contacts 28 and 29. When the plunger is drawn upward, the action is [illegible] and toward the end of said upward movement the arms 46 and 48 engage the [illegible] and 50 on the rear side of the blades and swing the switch blades 35 and 36 from the full line position of Fig. 3 to the dotted line position. In order to permit the piston 44 fitting somewhat tightly in the inner [illegible] of the dash pot 45, to be raised up rapidly while it must descend slowly, I provide a check valve in said piston which will be seen to consist of the steel ball [illegible] in a recess in the lower end of the [illegible] by the rod 32, [illegible] with the valve seat 33 of the aperture [illegible] which the ball rests [illegible] wire 34.

The upper solenoid 39 [illegible] which fits very loosely in the [illegible] oil can pass somewhat freely by the plunger so as not to interfere with its movement in the same. The lower solenoid 40 has an auxiliary plunger 55 which is adjustably connected to the plunger 49 by the rod 51 screwed into said plunger. Understanding that in some uses to which the switch may be put the solenoid 39 is [illegible] and that it acts on the core 43 to hold it down and likewise understanding that when the core of the solenoid 40 has completed its movement, the solenoid 40 is [illegible] its core 49 is drawn up while the solenoid 39 is deenergized and its core 43 is held down by its connection with the auxiliary core of the solenoid 40, it will be understood that in all uses at the end of the upward movement of the core or plunger 49 it engages the auxiliary core 55 and strikes it a blow forcing it rapidly upward and opening quickly the switch, to which the core 55 is connected.

The core 55 is connected by [illegible] link 56 with the switch lever [illegible] which is pivotally mounted in the bracket [illegible] which has the binding post [illegible]. The upper end of the lever 59 [illegible] contact [illegible] adapted to make contact with the contact 62 [illegible] and the binding post 64 [illegible]. A dash pot 65 is supported from the base 13 and the adjacent end of the lever 59 is connected by an insulating link 66 with a connecting rod 67, which in turn is connected by a link 68 with the rod 69, terminating in the piston 70 which cooperates with the dash pot 65. A check valve consisting of the ball 71 adapted to engage with the valve seat 72 of the piston formed in the passage through the piston serves to [illegible] the rapid descent of the piston [illegible] more slowly [illegible] and passes the aperture 73 formed in the dash pot 65 and permits [illegible] the piston [illegible] is threaded [illegible] 75 and engaging with the [illegible] of the lever 59 serves [illegible] to regulate the distance [illegible] of the piston 70 may [illegible] and thus the set screw serves to adjust the length of time that the dash pot shall operate, and consequently the length of time that the circuit shall be closed through the [illegible] when the device is used as a [illegible]. The pivotal link connection between the lever 59 and the piston [illegible] is provided so that it may accommodate itself [illegible] through which the end [illegible] swings.

The [illegible] connections [illegible] as follows: The wire 76 connects the binding post [illegible] to one end of the solenoid coil 39, while the wire 77 connects its other end to the binding post [illegible], which is connected by the wire 78 with the binding post 18. Consequently it will be apparent that when the circuit is closed through the binding posts 20 and 21, the solenoid 39 will be energized. The binding post 10 is connected by the wire 79 with the lower end of the coil of the solenoid 40 and the upper end of said coil is connected by the wire 80 with the binding post 61 so that while the circuit is closed through the contacts 26 and 27, the solenoid 39 will be deenergized, while the solenoid 40 is energized, the circuit in that case being complete through the wire [illegible], binding post [illegible], [illegible] contact [illegible], binding post [illegible], wire [illegible] and binding post [illegible].

The operation of the device as a two circuit device will now be readily understood. Assuming that the switch blades 35 and 36 have just been swung to close the circuit between the contacts 26 and 27, as soon as this occurs the solenoid 40 is energized and its core 49 is pulled down very slowly owing to the resistance of the dash pot 35 until it passes the aperture [illegible], when the core [illegible] brings the contact [illegible] into [illegible] closes [illegible] the solenoid 40 which

draws the core 42 upward rapidly as the valve 51 is then opened and the arms 45 and 46 ultimately engage the surfaces 49 and 50 opening the circuit between contacts 20 and 21 and simultaneously closing it between the contacts 26 and 27. This shifts the work circuit which had been through the lights 16 to the lights 17 and at the end of the upward movement of the plunger 42 it strikes the auxiliary plunger 56 and opens the switch at contacts 62 and 63 quickly, thus de-energizing the solenoid 40 and allowing the core 42 to fall slowly, as described, until the contracted portion of the dash pot 44 is passed, after which it will fall rapidly and in its final movement, open the contacts 26 and 27 by the engagement of the arms 45 and 46 with the arms 47 and 48. This completes the cycle of operations described, which will thus be repeated indefinitely so long as the apparatus is in circuit, and consequently the two sets of lamps 16 and 17 will be alternately illuminated for the desired intervals. Where the plunger is employed simply to control one circuit, as indicated in Fig. 5, the lower contacts 26 and 27 may be omitted and in that case, the connections would be as shown in Fig. 5.

I claim—

1. In an automatic electric switch, the combination with a work circuit, of a shunt circuit, a solenoid magnet in the said shunt circuit, a second shunt circuit, a switch in said second shunt circuit operated by the core of the magnet in the first shunt circuit, a solenoid magnet in the second shunt circuit with its core in axial alinement with the core of the first magnet, a member adjustably threaded into one of said cores so that the time of the striking of the core of the magnet in the first shunt circuit by the core of the magnet in the second shunt circuit to open the switch in the second shunt circuit can be regulated, and mechanism for regulating the rate of separation of said cores.

2. In an automatic electric switch, the combination with a work circuit, of a shunt circuit, a solenoid magnet in said shunt circuit, a second shunt circuit, a switch in said second shunt circuit operated by the core of the magnet in the first shunt circuit, a solenoid magnet in the second shunt circuit in axial alinement with the magnet in the first shunt circuit, a switch in the first shunt circuit operated by the magnet in the second shunt circuit, a supplementary core for the magnet in the second shunt circuit carried by and forming a physical extension of the core of the magnet in the first shunt circuit, and means for adjusting the position of the supplementary core, the main core of the solenoid magnet in the second shunt circuit being adapted to engage its supplementary core to open the switch in said second shunt circuit positively.

3. In an automatic electric switch, the combination with a work circuit, of a shunt circuit, a magnet in said shunt circuit, a second shunt circuit, a switch in the second shunt circuit operated by the magnet in the first shunt circuit, a magnet in the second shunt circuit, and a swinging switch in said first shunt circuit provided with two engaging surfaces, and means for causing the magnet in the second shunt circuit to act when energized to first open the switch in said first shunt circuit by engagement of its armature with one of the surfaces and then to open the switch in the second shunt circuit and finally to close the switch in the first shunt circuit by its armature engaging the second surface on its return movement.

4. In an automatic electric switch, the combination with a work circuit, of a shunt circuit, a magnet in said shunt circuit, a second shunt circuit, a switch in said second shunt circuit operated by the magnet in the first shunt circuit provided with an armature, a magnet in the second shunt circuit, a swinging switch in the first shunt circuit provided with two engaging surfaces, and means for causing the magnet in the second shunt circuit to act when energized to first open the switch in the first shunt circuit by the engagement of its armature with one of the surfaces and then to open the switch in the second shunt circuit, and finally to close the switch in the first shunt circuit by its armature engaging the second surface on its return movement, and a dash pot connected to the armature of the magnet in the second shunt circuit and having a resistance release operating during the engagement of the armature of the second surface to close the switch automatically.

In witness whereof, I have hereunto set my hand and affixed my seal, this 27th day of April, A. D. 1911.

GEORGE F. KIBOUHOFF.

Witnesses:
F. M. Brow,
John Howard McElroy.