E. C. A. HOH.

SWITCHING APPARATUS.

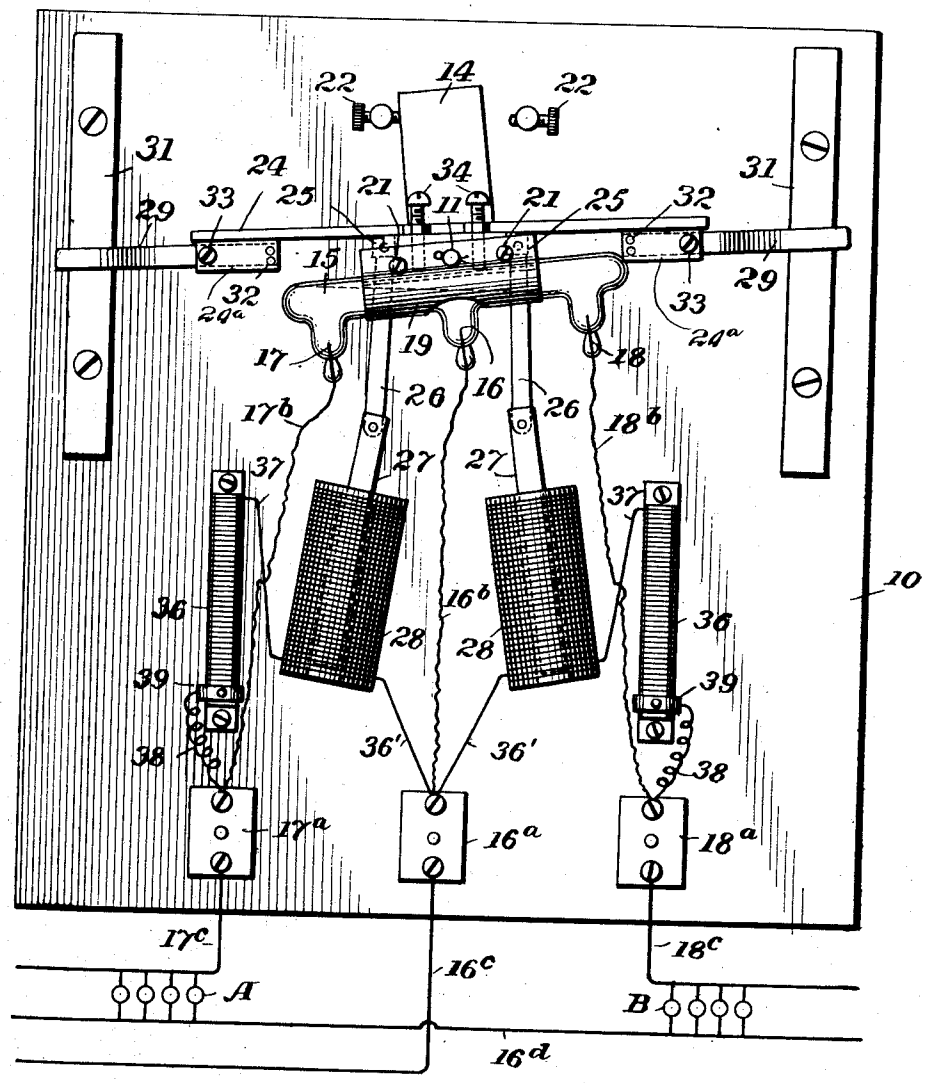
APPLICATION FILED APR. 1, 1910.

1,045,979.

Patented Dec. 3, 1912.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 2.

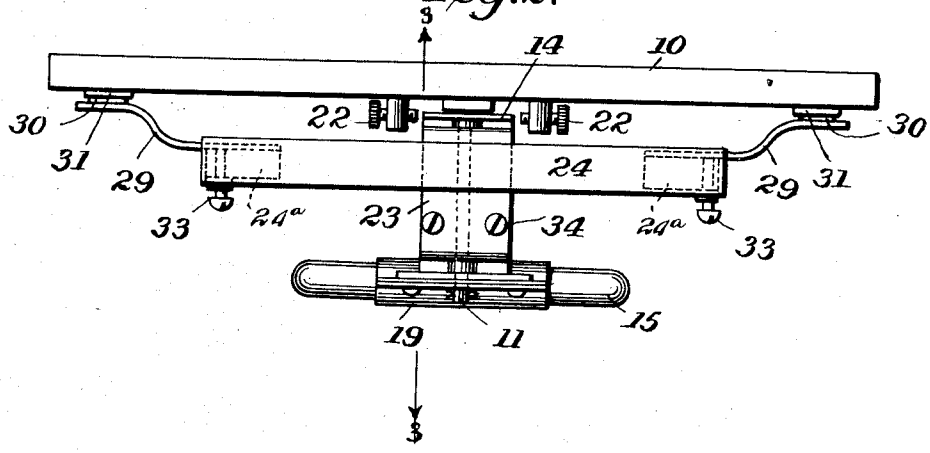
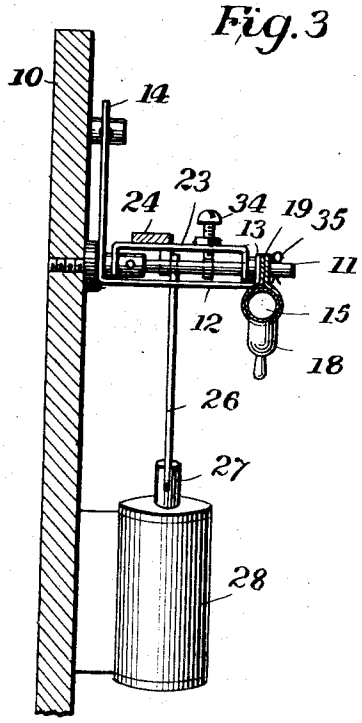


Fig. 3



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3 SHEETS—SHEET 3.

Fig. 4.

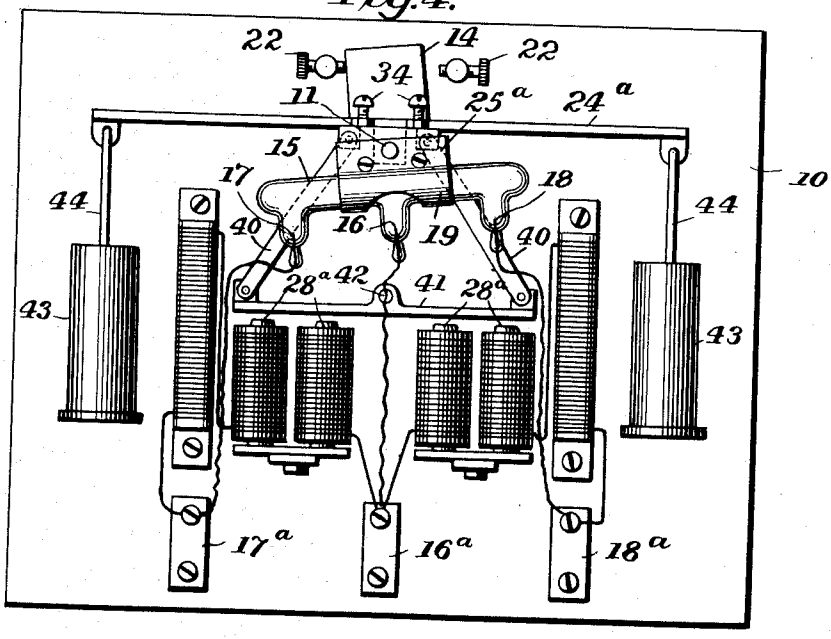
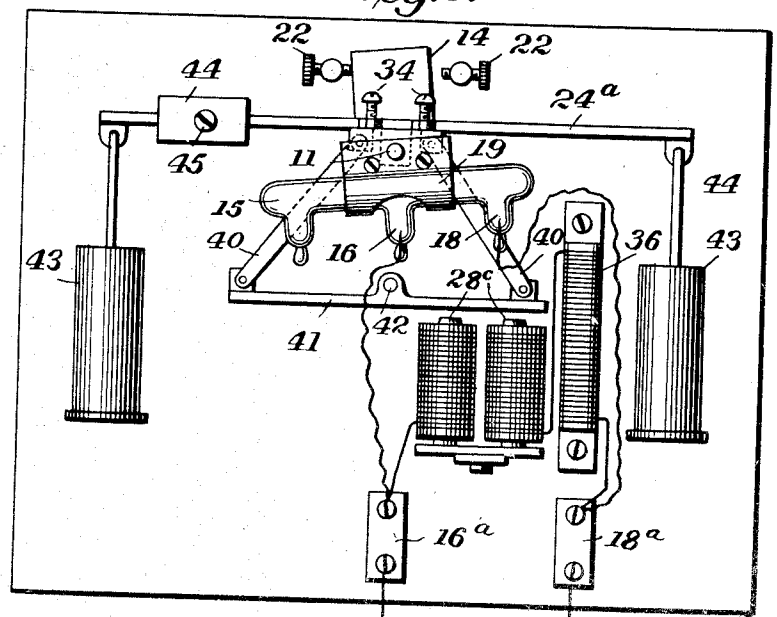


Fig. 5.



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UNITED STATES PATENT OFFICE.

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SWITCHING APPARATUS.

1,045,979. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed April 1, 1910. Serial No. 552,917.

To all whom it may concern:

Be it known that I, EMIL C. A. HOH, a citizen of the United States, and resident of Brooklyn, Kings county, State of New York, have invented certain new and useful Improvements in Switching Apparatus, of which the following is a specification.

This invention relates to switches and more particularly to devices adapted to intermittently render the working circuit operative and inoperative.

The switch is particularly applicable for flashing lamps or the like for electrical signs, etc., although this invention is not necessarily limited to this application.

One of the objects of this invention is to construct a switch by means of which the working circuit may be rendered operative or inoperative without entirely interrupting the circuit.

Another object is to provide means whereby the lamps are dimmed when the working circuit is rendered inoperative.

Further objects will appear from the detail description.

The invention will be described in connection with the accompanying drawings, in which,

Figure 1 is an elevation of one form of switching apparatus; Fig. 2 is a plan view; Fig. 3 is a section on the line 3—3, Fig. 2; Fig. 4 is an elevation of another form of this invention; Fig. 5 is an elevation of a third form of this invention.

Referring to Figs. 1, 2 and 3, 10 designates a suitable insulating base on which is mounted a pivot or axle 11. An oscillating member 12 is pivotally mounted upon the axle 11 by means of the lugs 13 and 14. A movable switch member comprising a tube 15 has mounted therein switch or working circuit contacts 16, 17 and 18. These contacts extend into and are sealed in the tube and the tube is arranged to receive a suitable conducting liquid as mercury. The tube is secured to the oscillating member 12 by means of a strap 19 and screws 21 passing through the strap and the lug 13. The lug 14 is extended upwardly and coöperates with adjustable stop screws 22 which are mounted upon the base. An actuator 23 is provided with lugs which engage the axle 11 and this actuator has rigidly secured thereto a walking beam 24. The walking beam is provided with bearing lugs 25. Links 26 pivotally connect these bearing lugs with plungers 27 which work in electro-magnets 28 mounted upon the base, as shown in Fig. 3. The walking beam has secured thereto at its ends lugs 24^a which support flexible members or leaf springs 29 provided with leather faces 30 which engage members or plates 31 mounted upon the base. The flexible members 29 are secured to the lugs on the walking beam at one end only, as indicated at 32 and adjustable screws 33 are arranged to engage these members. It will be seen that the members 29, which are in the nature of flat springs, are secured at one end to the lugs on the walking beam by means of suitable fasteners as shown at 32. The other ends are left free to bear against the members 31. The screws 33 threaded in the lugs bear against the spring members at points between the fulcrum 32 and the end of the member. By adjusting the screws, the tension of the spring members can be adjusted so as to cause the ends thereof to bear with greater or less force on the members 31 so as to vary the frictional engagement. The actuator 23 is provided with adjustable abutments or screws 34 which are arranged to engage the oscillating member 12. The members 12 and 23 are spaced from each other by means of collars, as shown in Fig. 3 and a cotter pin 35 is arranged to lock these members on the axle 11. A pair of resistance coils 36 are mounted on the base and connected in series with the electro-magnets 28 by means of suitable connections 36′, 37 and 38. The base has mounted upon it a set of working circuit terminals 16^a, 17^a and 18^a, which are connected with the switch contacts 16, 17 and 18 by means of flexible connectors 16^b, 17^b, 18^b. The working circuit comprises banks of lamps A, B, which are connected to the working circuit terminals by means of suitable connections 16^c, 16^d, 17^c and 18^c.

It will be noted that the electro-magnets 28 and the resistances 36 are connected in shunt across the working circuit terminals. In order that the resistance of these shunt circuits may be regulated, suitable means are provided for cutting in and out the coils of the resistances 36. This may be accomplished in any suitable manner. In the specific construction shown the movable sleeve 39 is mounted upon the resistance and

electrically connected to the connector 38 which is preferably of a loose flexible type. By moving the sleeve along the resistance, the resistance of the shunt circuit may be varied.

It will be noted that the switch contacts 16, 17 and 18 form in effect a pair of switches or two sets of switch contacts, that is the contacts 16 and 17 form the switch for the circuit A, while 16 and 18 form the switch for the circuit B. When the switching apparatus is in the position shown in Fig. 1, the switch contacts 16, 17 are connected, short circuiting the left shunt circuit and flashing lamps A, while the working circuit B will be closed through its resistance and its electro-magnet. The resistances of the shunt circuits are preferably so proportioned that the lamps will be dimmed when they are in series with the shunt circuit. Since the left-hand shunt circuit is short circuited the left-hand magnet will be deënergized. Since the right-hand magnet is energized the walking beam will be tipped in a clock-wise direction and will through the medium of the screws or abutments 34 move the support 12 and the tube 15 about the axle. This movement is continued until the mercury begins to flow from the left to the right-hand end of the tube and the tube will then drop causing a quick opening of the contacts 16 and 17 and a quick closing of the contacts 16 and 18. The tube will be arrested by the engagement of the lug 14 with the right screw 22. The connection between the switch contacts 16 and 18 will short circuit the right shunt circuit and will flash the lamps B, while the lamps A will be closed through the left shunt circuit and will therefore be dimmed. This action will continue so that the banks of lamps A and B are alternately flashed and dimmed.

In order that the movement of the switch may be sufficiently slow the retarding device is provided. This retarding device is of the frictional type in which the members 29 and 31 have a frictional engagement. The member 31 is preferably in the form of a flat strip which is secured to the base 10. By adjusting the screws 33 the tension may be adjusted so as to regulate the speed of the apparatus. The position of the tube 15 may be adjusted by means of the stop screws 22 and the operative movement of this tube is adjusted by means of screws 34.

By regulating the resistances of the shunt circuits the dimming of the lamps is regulated and in addition the strength of the magnets is also regulated. It will thus be seen that this invention provides an apparatus in which the dimming of the lamps and the speed of the apparatus may be adjusted within wide limits by varying the strength of the magnets and also by adjusting the screws 22, 33 and 34. The apparatus may also be adjusted that the speed of the switch for one circuit may be different from that of the other by giving one magnet a greater strength than the other.

The switch contacts are inclosed and the circuit is made and broken in the tube 15 which preferably is exhausted to a suitable degree, or the tube may contain a non-corrosive gas. In this way the contact is made between the mercury in the tube and thus all corrosion of the contacts is avoided.

By means of the above construction the capacity of the switch may be very large without necessitating repair to the switch contacts. Since the circuit is broken in an inclosed chamber the arc formed cannot set fire to inflammable gases, dust, etc.

In the construction shown in Fig. 4 the solenoids 28 are replaced by electro-magnets 28^a of a different type. The bearing lugs 25^a on the walking beam 24^a are connected to an armature 41 by means of links 40. This armature is mounted on a pivot 42 on the base 10. The frictional retarding device is in this case replaced by ordinary dash pots 43 in which work plungers which are connected to the walking beams by suitable links 44. The dash pots may contain a liquid as glycerin or oil or may contain air. The construction of the tube, the support therefor, the actuator and other parts are of the same construction, as shown in Fig. 1, and therefore a detail description will be unnecessary. The operation of this mechanism is also the same as that shown in Fig. 1.

In the construction shown in Figs. 1 and 4 the switch is arranged to operate two banks of lamps, that is it is arranged to control two working circuits. By replacing one bank of lamps with a suitable resistance the apparatus may be made to flash one bank of lamps.

In the construction shown in Fig. 5, the apparatus is modified so as to operate one bank of lamps. The specific device is similar to that shown in Fig. 4 with the exception that the left hand magnet and resistance have been dispensed with. The electro-magnet 28^c is arranged to operate the armature 41 which is connected to the walking beam 24^a in the manner shown in Fig. 4. The left hand end of the walking beam has mounted upon it a weight 44 which is adjusted along the walking beam and may be clamped in adjusted position by means of a screw 45. The switch terminal 16^a and 18^a are connected in circuit with the working circuit C, and 45 designates the supply mains.

In the operation of this device when the switch contacts 16, 18, are disconnected, as shown in the figure, the shunt circuit containing the magnet 28^c and the resistance 36 is in circuit with the working circuit. The

magnet will therefore be energized and will actuate the armature 41 so as to swing the walking beam 24ª in a clockwise direction. This will cause the tube 15 to oscillate so as to connect the contacts 16 and 18 thereby short circuiting the shunt circuit and flashing the lamps C. When the shunt circuit is short circuited, the magnet will be deënergized and the weight 44 will cause the walking beam to move in a counter-clockwise direction so as to open the switch contact 16, 18. A spring may also be used instead of a weight to pull down the walking beam. The dash pots 43 retard the movements in either direction. It will thus be seen that the working circuit is alternately flashed and dimmed in the same manner as in the construction shown in the other figures.

It is obvious that the construction shown in Fig. 1 could be altered in the same manner by dispensing with one of the electromagnets and its resistance and by mounting a suitable weight on one end of the walking beam or by using a spring to pull down the walking beam.

In Figs. 4 and 5, the adjustable arrangement of the resistances 36 have been omitted for the sake of clearness, but it is to be understood that in practice the resistances are adjustable.

It is obvious that various changes may be made in details of construction without departing from this invention and it is therefore to be understood that this invention is not to be limited to the specific construction shown and described.

Having described my invention what I claim and desire to secure by Letters-Patent is,

1. In a switching apparatus for periodically varying the current flowing through lamps or equivalent translating devices, a pivotally mounted tube containing contacts and a conducting fluid, an electric main having a branch permanently connected to one of said contacts and adapted to be connected with another contact through said fluid, a conductor leading from said other contact, a translating device between said conductor and the other branch of the main, means to permit a current to flow through said translating device at all times when said switching apparatus is in operation, and means for rocking said tube to periodically direct a current through said conductor and vary the current flowing through said translating device.

2. In a switching apparatus for alternately varying the current flowing through lamps or equivalent translating devices, a pivotally mounted tube containing three contacts and a conducting fluid, an electric main having a branch permanently connected to one of said contacts and adapted to be connected at all times with either of the other contacts through said fluid, conductors leading from said other contacts, translating devices between said conductors and the other branch of the main, means to permit the flow of a current through said translating devices at all times when said switching apparatus is in operation and to rock said tube to alternately direct current through said contacts to said conductor and vary the current flowing through said translating devices.

3. In a switching apparatus for alternately varying the current flowing through lamps or equivalent translating devices, a pivotally-mounted tube containing three contacts and a conducting fluid, an electric main having a branch permanently connected to one of said contacts and adapted to be connected with either of the other contacts through said fluid, conductors leading from said other contacts, translating devices between said conductors and the other branch of the main and means for rocking said tube to alternately direct current through each of said other contacts to said conductors and vary the current flowing through said translating devices, said means comprising magnets and resistance devices in shunt circuits around said tube and the fluid therein.

4. In a switching apparatus for periodically varying the current flowing through lamps or equivalent translating devices, a pivotally mounted tube containing contacts and a conducting fluid, an electric main having a branch permanently connected to one of said contacts and adapted to be connected with another contact through said fluid, a conductor leading from said other contact, a translating device between said conductor and the other branch of the main, a resistance connected in shunt around said contacts to permit a current to flow through said translating device at all times when said switching apparatus is in operation, and means for rocking said tube to periodically direct current through said conductor and vary the current flowing through said translating device.

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

EMIL C. A. HOH.

Witnesses:
WM. KRAMER,
RICHARD COHN.