

R. KÜCH.
SHUNT CIRCUIT TILTING DEVICE FOR MERCURY VAPOR LAMPS.
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1,063,557.

Patented June 3, 1913.

Fig. 1

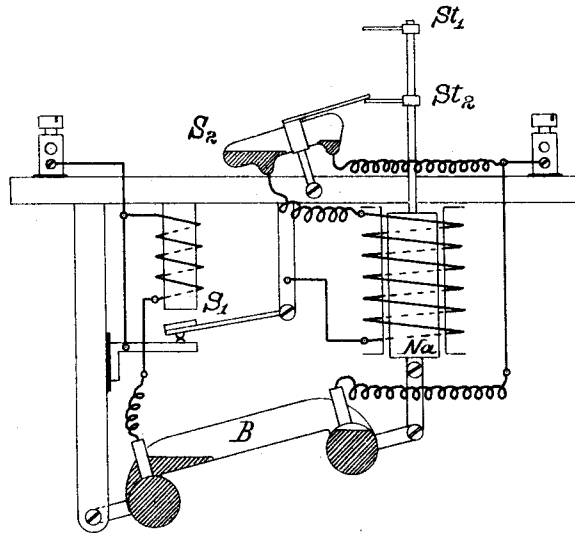
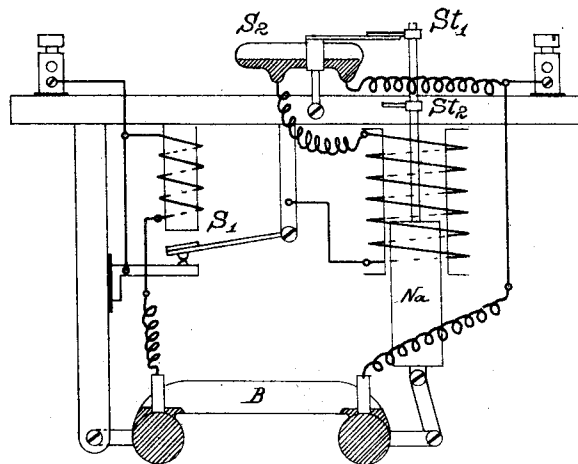


Fig. 2



Witnesses:
Cyril Brown.
M. C. Bender

Inventor:
Richard Küch
by Victor Freeman Watson & Co.
Attys

UNITED STATES PATENT OFFICE.

RICHARD KÜCH, OF HANAU, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

SHUNT-CIRCUIT TILTING DEVICE FOR MERCURY-VAPOR LAMPS.

1,063,557.

Specification of Letters Patent.

Patented June 3, 1913.

Application filed May 23, 1910. Serial No. 562,976.

To all whom it may concern:

Be it known that I, RICHARD KÜCH, a subject of the German Emperor, and resident of Hanau-on-the-Main, Germany, have invented certain new and useful Improvements in Connection with Shunt-Circuit Tilting Devices for Mercury-Vapor Lamps, of which the following is a specification.

Certain types of mercury vapor lamps are started by a shunt magnet which sets in motion an armature connected with the lamp so as to give to the lamp the tilting motion required for starting it. When, in consequence of the arc established by this tilting motion, the main current passes through the lamp, a switch electromagnetically operated by the said main current, opens the shunt circuit, the shunt magnet is deenergized and the lamp returns to its normal position. On the main current being cut off from the lamp, the said switch is again closed. If for any reason the main current should fail to pass through the lamp, the shunt remains switched in and the lamp remains in the tilted position. The tilting back and the repetition of the tilting motion has only hitherto been capable of being done by switching in and out by hand.

While, with direct current lamps, only one tilting motion is required, when the lamps are operated by alternating current, failures in starting the lamps must be expected and this renders an automatic repetition of the tilting motion desirable.

This invention provides a device which effects an automatic repetition of the tilting motion until the lamp becomes lighted, by which device the interruption of the shunt circuit is not alone caused electromagnetically by the flow of the main current, but the up and down motion of the tilting mechanism is utilized to open the shunt circuit at the end of the upward motion, and to close it again at the end of the downward motion.

According to this invention there is provided, in addition to the switch electromagnetically operated by the main current, a second switch which is in series with the first switch and is included in the shunt circuit which is opened and closed by the tilting mechanism.

One of the various forms in which the invention may be embodied is illustrated diagrammatically by Figures 1 and 2 of the ac-

companying drawing. Fig. 1 shows the whole arrangement at the instant when the tilting motion has been effected without the lighting of the lamp having taken place and before the lamp commences to return to its normal position. Fig. 2 shows the device back in normal position with no current passing through the lamp between the main electrodes. The lamp is on the point of being again tilted by the shunt magnet to the position shown in Fig. 1.

When the lamp is in the initial or normal position shown in Fig. 2, with no current passing through the lamp from one main electrode to the other, current can flow from the binding post at the left of the lamp, for example, through the closed switch S_1 , the shunt magnet, and the switch S_2 to the binding post at the right hand of the lamp, energizing the shunt magnet, which lifts the armature N_a to the position shown in Fig. 1. This upward movement of the armature N_a tilts the lamp B to the position shown in Fig. 1. The switch S_2 , which is illustrated as a mercury switch, has been brought by the upward movement of the armature N_a of the shunt magnet into the open circuit position by the rod S_{12} , which is rigidly connected with the shunt armature N_a . The switch S_1 to be operated by the main current has remained closed, because the main current failed to pass through the lamp. Opening of the shunt circuit by the action of the armature N_a on the switch S_2 permits the lamp to return to its normal position, the rod S_{12} (Fig. 2) returns the switch S_2 to the closed circuit position and the tilting motion is repeated. If the main current come into action and pass through the lamp between the main electrodes the switch S_1 is energized by the flow of the main current through the lamp and switches out the shunt current electromagnetically and the lamp returns automatically to its normal position.

The mechanism may be varied in its details, and the switches S_1 and S_2 , can be combined in one and can be switched in and out electro-magnetically by the main current, or mechanically by the tilting mechanism.

I claim:

1. A shunt circuit tilting device for mercury vapor lamps comprising an electrically operated tilting device connected in a normally closed circuit in shunt to the lamp, means responsive to the main current for

- electromagnetically keeping said shunt circuit open while the main current is flowing, and additional means for mechanically opening the shunt current on the completion of the tilting motion and for closing the shunt current after the lamp tilts back to initial position, whereby a repetition of the tilting motion is secured when necessary to start the lamp.
2. The combination with a vapor electric device started by tilting, a main electric circuit including electrodes at opposite ends of the device, a shunt circuit, an electromagnet controlled by said shunt circuit to tilt the device to close the main circuit through said electrodes at opposite ends of the device, and means for automatically rendering the shunt circuit inoperative when the main circuit is properly established through the length of the device, a switch actuated by the reciprocating movement of said electromagnet, said electromagnet being provided with means constructed to open the switch near the limit of travel of said electromagnet and to reestablish the circuit by the return stroke.
3. The combination with a vapor electric lamp started by tilting, a main electric circuit including electrodes at opposite ends of the lamp, a shunt circuit, a magnet energized by the shunt circuit to tilt the lamp, and a switch for opening the shunt circuit when the main circuit is properly completed through the lamp, of a second switch in the shunt circuit automatically opened and left open by each tilting movement of the lamp, and positively closed by the return of said lamp to its initial position.
4. The combination with a vapor electric lamp started by tilting, a main electric circuit including electrodes at opposite ends of the lamp, and a shunt circuit including a switch for opening said circuit when the main circuit is properly completed through the lamp, of means actuated in response to current flow in the shunt circuit for tilting the lamp and opening said shunt circuit as one end of the lamp reaches the limit of its upward movement, and means for closing the shunt circuit only at the conclusion of the downward movement of said end of the lamp.
5. The combination with a vapor electric lamp started by tilting, a main electric circuit including a plurality of fluid electrodes in the lamp, and a shunt circuit including a switch opened when the main circuit is properly completed through the lamp, of a magnet energized by current flow in the shunt circuit and having a movable member connected with the lamp for tilting it, a second switch in the shunt circuit constructed to remain open until positively closed, and means actuated by the movable member of the magnet for positively opening and closing said switch during each tilting movement of the lamp.
6. The combination with a vapor electric lamp adapted to be started by tilting, a main electric circuit including a plurality of fluid electrodes in the lamp, and a shunt circuit including a switch adapted to be opened when the main circuit is properly completed through the lamp, of a magnet adapted to be energized by the shunt circuit and having a movable member connected with the lamp for tilting it, a second switch in the shunt circuit constructed to remain in either the open or the closed position until positively moved into the other position, and two separated arms connected with the movable member of the magnet and adapted respectively to open and close the last said switch during each tilting movement of the lamp.
7. The combination of a vapor electric lamp having fluid electrodes at its opposite ends and started by tilting to cause such fluid to flow from one end of the lamp to the other, a main electric circuit including said electrodes, a shunt circuit including a switch opened when the main circuit is properly completed through the length of the lamp, a magnet energized by the shunt circuit and connected with the lamp to tilt it as described, and means whereby said magnet will be deenergized on the completion of the tilting motion of one end of the lamp from normal position and reenergized only as said end returns to such normal position.
8. In a tilting vapor electric device having main electrodes through which a flow of current may be started by tilting said device, the combination of electroresponsive tilting means connected in a shunt circuit to said main electrodes, a switch in said shunt circuit constructed to remain open until positively closed, and means whereby said switch is positively opened by said tilting means at the conclusion of one part of the tilting movement of the device and is positively closed by the return of said device to normal position.
9. In a vapor electric device, the combination of main electrodes, means for pivotally mounting said device to permit it to tilt and return to normal position, and thereby start a flow of current between said main electrodes, electroresponsive tilting means connected in a shunt circuit to said main electrodes, and means controlled by said tilting means for maintaining said shunt circuit closed during movement of said device in one direction and for maintaining said shunt circuit open during the return of said device to its normal position.
10. In a tilting vapor electric device having main electrodes between which a flow of current may be started by tilting said device, the combination of electroresponsive

tilting means connected in a shunt circuit to
said main electrodes, means responsive to
current flow between said electrodes for
opening said shunt circuit, a switch in said
5 shunt circuit constructed to remain open un-
til positively closed, and means whereby said
switch is positively opened by said tilting
means at the conclusion of one part of the
tilting movement of the device and is posi-
10 tively closed by the return of said device to
normal position.

11. The combination of a vapor electric
device started by tilting, current con-
nections therefor, automatic means for
15 tilting said device to start the same, a

switch in circuit therewith, means for open-
ing said switch by the movement of said tilt-
ing means and means for closing said switch
by the return of said tilting means to its
original position so that its action may be 20
repeated if the device has not started, and
means for deenergizing said tilting means
while said device is in normal operation.

In testimony whereof I have signed my
name to this specification in the presence of 25
two subscribing witnesses.

RICHARD KÜCH.

Witnesses:

FRANZ HASSLACHER,
ERWIN DIPPEL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents.
Washington, D. C."