

(No Model.)

H. O. SWOBODA.
ELECTRIC ARC LAMP.

No. 527,901.

Patented Oct. 23, 1894.

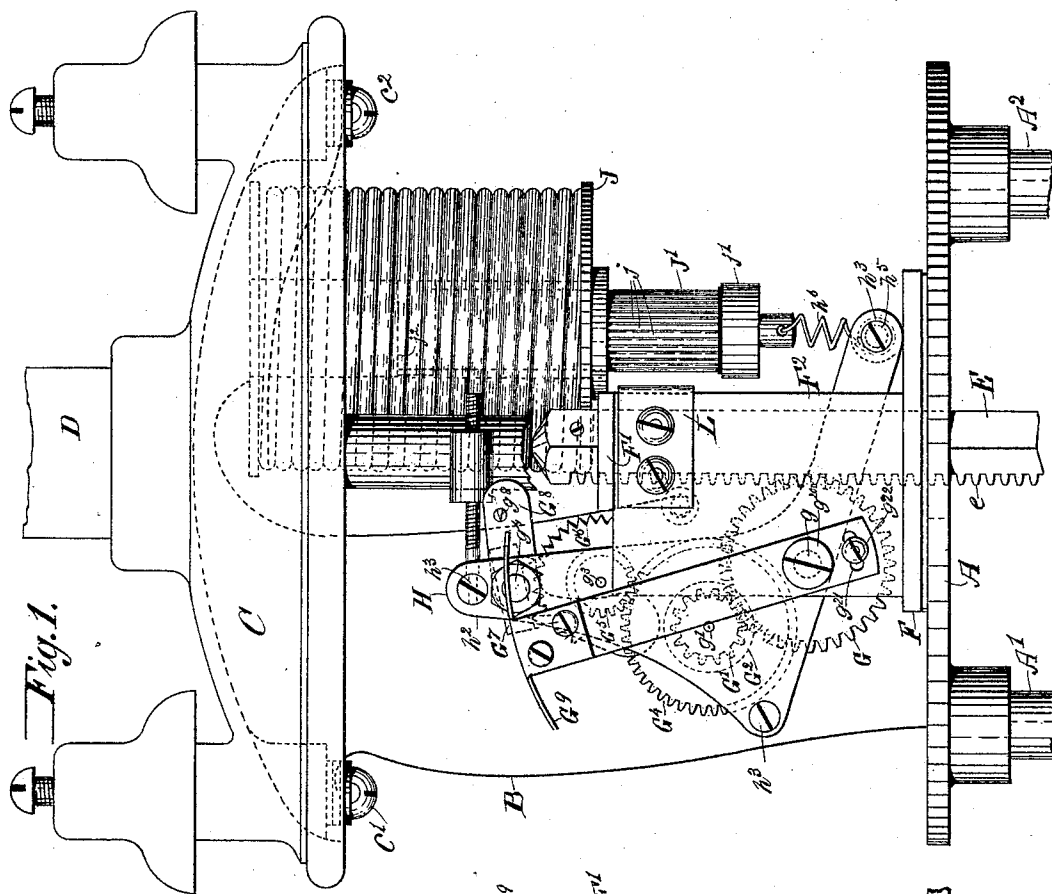


Fig. 2.

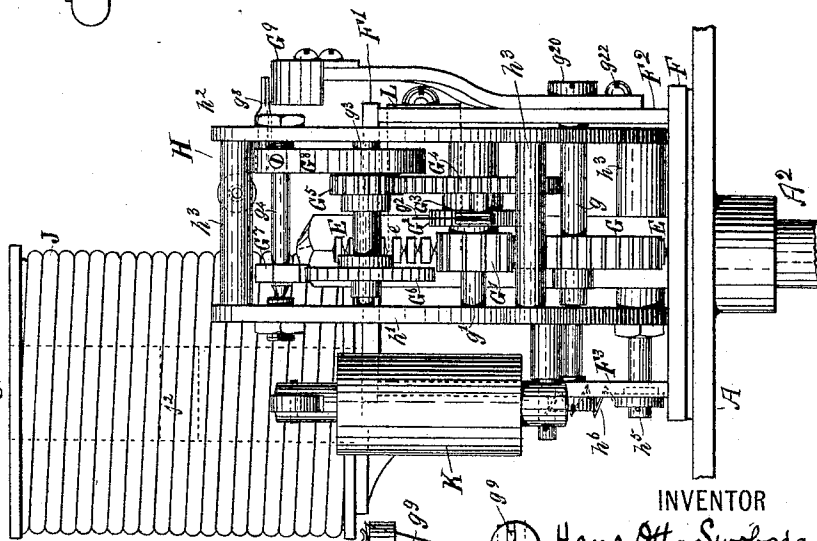


Fig. 3.

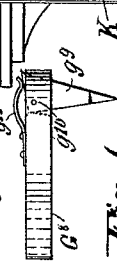


Fig. 4.



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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 527,901, dated October 23, 1894.

Application filed March 2, 1894. Serial No. 502,046. (No model.)

To all whom it may concern:

Be it known that I, HANS OTTO SWOBODA, a subject of the Emperor of Germany, residing in the city of New York, in the county and State of New York, have invented a certain new and useful Improvement in Electric-Arc Lamps, of which the following is a specification.

I will describe a lamp embodying my invention and then point out the novel features in the claims.

In the accompanying drawings Figure 1 is a side view of a lamp embodying my improvement. Fig. 2 is a side view of parts shown in Fig. 1, but they are here represented as they appear in a plane at right angles to Fig. 1. Fig. 3 is a top view, and Fig. 4 is a side view of a balance lever analogous in its action to a pendulum and used in connection with an escapement to control the feed of the upper carbon.

Similar letters of reference designate corresponding parts in all the figures.

As my improvement does not relate to the circuit of the lamp, or to the construction of the frame, I shall not describe these features except incidentally in explaining other parts.

A' A² designate two rods extending from a plate A, down to a holder for the lower carbon. As the latter may be of any suitable construction, I have not shown it. One of the rods A' A² may be hollow to receive a circuit wire B, covered with insulating material.

C designates another plate which is connected to the plate A, by means of intermediate rods, or otherwise. It is shown as having a central hub in which a rod D is fitted. The rod D, may serve as a support for the lamp. I have shown the plate C, as provided with binding screws c' c² for the connection of the circuit or line wires leading to and from the lamp. I may add that both these binding screws are insulated from the plate C. The wire B is connected with the binding screw c'.

I will now particularly describe the form of lamp illustrated by Figs. 1 and 2.

E designates a rod, which is to be provided at the lower end with a holder for the upper carbon, its office being to support said carbon. It will be seen that this rod is provided with

a rack *e* on one side and that it moves upwardly through a hole in the center of the plate A. It may be guided by a bearing in a plate F, which is mounted upon the plate A, and also by a bearing in a plate F' which is supported above the plate F and connected with it by means of two vertical plates or pieces F² F³. This rod E may also pass upwardly through the plate C and into the rod D, providing the latter is made tubular, which will preferably be the case. The downward movement of the rod may be limited by a cross-pin arranged in its upper portion, so that it may contact with the plate F'.

With the rack *e* of the rod E, engages a gear wheel G, which is supported in bearings with which the side pieces F² F³ are provided. As here shown, these bearings consist of screws passing through the side pieces and engaging with the ends of a shaft *g*, upon which the said gear wheel is affixed.

The shaft *g* forms a support for an oscillating frame H, here shown as consisting of two angular or L-shaped side pieces *h' h*² and intermediate cross-pieces or stretchers *h*³. As here shown, these side pieces are loosely mounted upon this frame and loosely mounted upon the said shaft *g*.

G' designates a pinion affixed to a shaft *g'* journaled in the side pieces of the frame H. Affixed to this pinion G' is a ratchet wheel G², and with this is combined a pawl G³, which is pivoted to a stud extending from the side of a gear wheel G⁴, the latter being loosely mounted upon the shaft *g'*. A spring *g*² holds the pawl in engagement with the ratchet wheel.

When the rod E is moved upwardly, it will rotate the pinion G', and consequently the ratchet wheel G², but the latter will play past the pawl G³ and hence no motion will be imparted to the gear wheel G⁴. A downward movement of the rod E, will, however, impart motion to the gear wheel G⁴ as well as to the

The gear wheel G⁴ engages with a pinion G⁵, affixed to a shaft *g*³, which is journaled in bearings in the side pieces of the frame H. On this shaft *g*³ is also affixed an escapement wheel G⁶, with which is combined an escapement G⁷, the latter being affixed to an oscil-

lating shaft g^4 which is journaled in bearings provided on the side pieces of the frame H. This shaft g^4 has affixed to it an angular balance lever G^8 , acting as a pendulum. Obviously the frame H can oscillate about the axis of the shaft g .

The balance lever G^8 is provided with a laterally extending pin g^8 . When the frame is in its normal position or, in other words, in the position which it occupies when there is no current on the lamp, and also at times when the feeding of the upper carbon becomes necessary, this pin will be beyond a plate G^9 and hence will not be controlled by the latter, but when the frame H is oscillated out of this position, the pin g^8 will be moved along the said plate G^9 and by reason of this it will be prevented from oscillating and the gearing, as also the downward movement of the rod E, will be stopped.

The plate G^9 is supported by an appurtenance of one of the side pieces $F^2 F^3$ of the frame $F F' F^2 F^3$. This appurtenance is shown as made in the form of an arm, which is pivotally connected near one end by means of a screw g^{20} to one of the side pieces of the frame $F F' F^2 F^3$, and has a slot g^{21} which is curved concentrically with said pin or screw g^{20} , through which passes a clamp or screw g^{22} , that engages with the said frame. Thus I provide for adjusting the plate G^9 into different positions to adapt the lamp for different currents. The screw g^{20} is concentric with the shaft G .

When the frame H oscillates, the pinion G' will impart motion to the gear wheel G , and hence will produce a vertical movement of the rod E.

The frame H is connected with the core or armature J' of a solenoid or magnet J. As here shown, the frame H has a lateral connection in the form of a rod h^3 , and a spring h^6 extends from this to the core J' . Instead of this flexible connection there may, however, be a rigid connection between the frame and the core. This core J' is composed of a number of iron wires j , insulated from each other in any suitable manner, as for instance by being coated or oxidized. If desired, these wires may be surrounded by a single glass sleeve. These wires j are fitted at their ends into cap-pieces $j' j^2$ which may be made of insulating material or metal, but if metal is employed and the lamp is intended for an alternating current, there should be a split in each of the cap-pieces lengthwise of the core and to the center. I do not want to be limited, however, to the use of a core made in this manner, as I may use a solid iron core, or a laminated iron core. If a solid iron core is used and the lamp is employed for an alternating current, the core should be split lengthwise.

The core J' works within the solenoid or magnet J, which may have a series of differential winding. This winding will be connected in a lamp circuit in any suitable man-

ner. As here shown, one of the wires extending from the winding connects with one of the side pieces $F^2 F^3$ of the frame $F F' F^2 F^3$. Obviously the horseshoe form of magnet instead of the solenoid form, may be employed.

When the solenoid or magnet J, draws its core or armature upward, the frame H will be oscillated in such direction as to effect an upward movement of the rod E, and consequently of the upper carbon. In this way the arc is established. As the resistance of the arc increases, the core or armature will be allowed to move downward so as to lower the upper carbon. On moving down far enough it will cause the gearing to be released, so that the rod E may feed downward.

Preferably a dash-pot K will be combined with the frame H, and some stationary part of the lamp frame. In the present instance, its cylinder is connected to an appurtenance of one of the side pieces $F^2 F^3$ of the frame $F F' F^2 F^3$, and its piston to a lateral extension on the frame H. The purpose of this dash-pot is to prevent too sudden movements of the frame H.

In the form of lamp shown by Figs. 1 and 2, the circuit extends through the frame $F F' F^2 F^3$ and from such frame, by means of a metal brush L, to the rod E, which carries the upper carbon.

In Figs. 3 and 4, I have shown a different style of balance lever. In this form of balance lever there is a lateral projection or pin g^9 , which is pivotally connected by a pin g^{10} to the lever and held in its normal position by a spring g^{11} which bears upon it and is affixed to the lever. This lateral projection or pin g^9 is advantageously made yielding so as to prevent it from being rendered inoperative by engaging with the end of the plate G^9 .

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an arc lamp, the combination of a movable carbon support, a rotary part connected with such support, a tilting frame, a solenoid or magnet for controlling the movement of the tilting frame, an escapement, escapement wheel and balance lever carried by said tilting frame, said escapement having a laterally projecting pin, mechanism under the control of the escapement carried by said tilting frame and having a pawl and ratchet connection with said rotary part, a fixed frame, and an arm extending therefrom provided with a laterally projecting arc shaped flange at one end which coacts with the pin of said escapement to prevent movement of the latter in such a manner as not to interfere with the movement of the tilting frame, substantially as specified.

2. In an arc lamp, the combination of a movable carbon support, a rotary part connected with such support, a tilting frame, a solenoid or magnet for controlling the movement of the tilting frame, an escapement, escapement wheel and balance lever carried by said tilt-

ing frame, said escapement having a later-
ally projecting pin, mechanism under the con-
trol of the escapement carried by said tilting
frame and having a pawl and ratchet connec-
5 tion with said rotary part, a fixed frame, and
an adjustable arm extending therefrom pro-
vided with a laterally projecting arc shaped
flange at one end which coacts with the pin
of said escapement to prevent movement of
10 the latter in such a manner as not to inter-
fere with the movement of the tilting frame,
substantially as specified.

3. In an arc lamp, the combination of a mov-
able carbon support, a device for controlling
15 the movement of the same, a magnet or so-
lensoid, a tilting frame connected with the
armature or core of the magnet or solenoid
mechanism carried by said tilting frame and

comprising an escapement wheel and escape-
ment and a balance lever and connected with 20
the said device which controls the movement
of the movable support, a pin pivotally con-
nected with the balance lever, a spring for
holding said pin in its normal position, and
a projection or pin supported by a stationary 25
part of the lamp, for co-acting with said pin
of the balance lever, substantially as speci-
fied.

In testimony whereof I have signed my
name to this specification in the presence of 30
two subscribing witnesses.

HANS OTTO SWOBODA.

Witnesses:

EDWIN H. BROWN,
ANTHONY GREF.