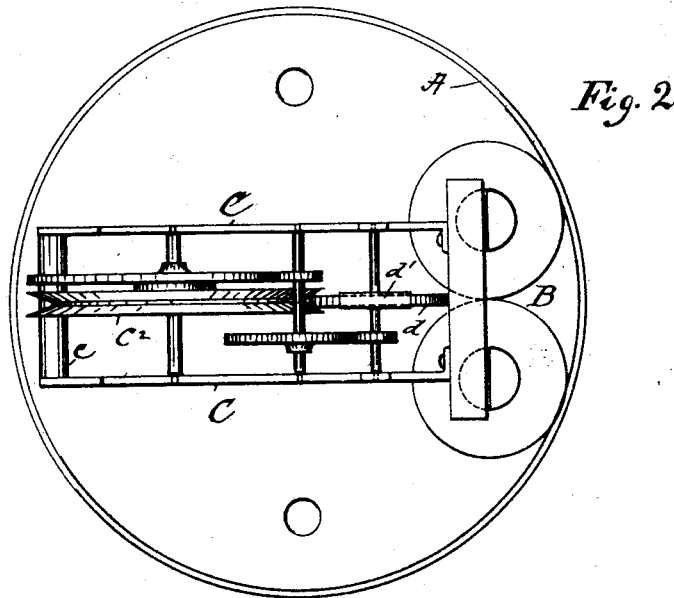
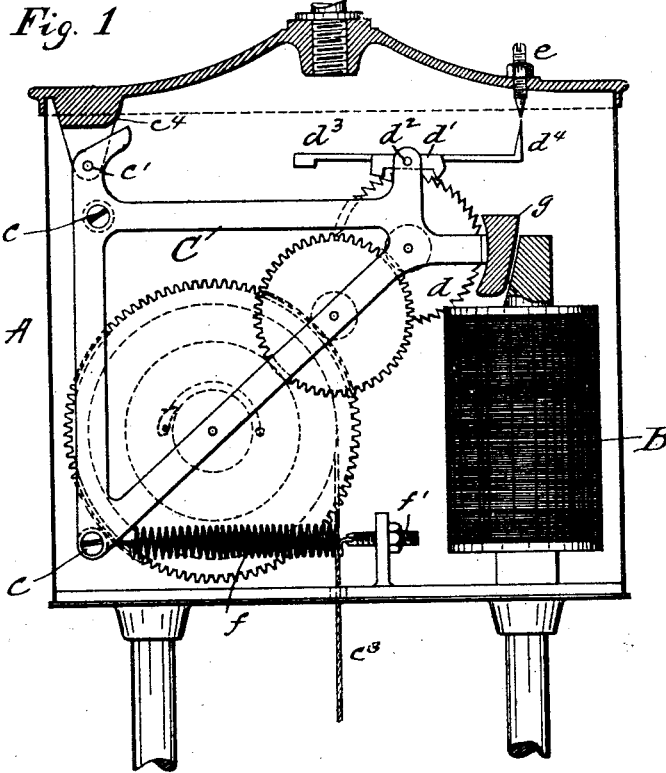


G. KIRKEGAARD.
ELECTRIC ARC LAMP.

No. 515,342.

Patented Feb. 27, 1894.



WITNESSES:
H. A. Opperman
Frank S. Ober.

INVENTOR
Georg Kirkegaard
 ATTORNEY
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Fig. 3

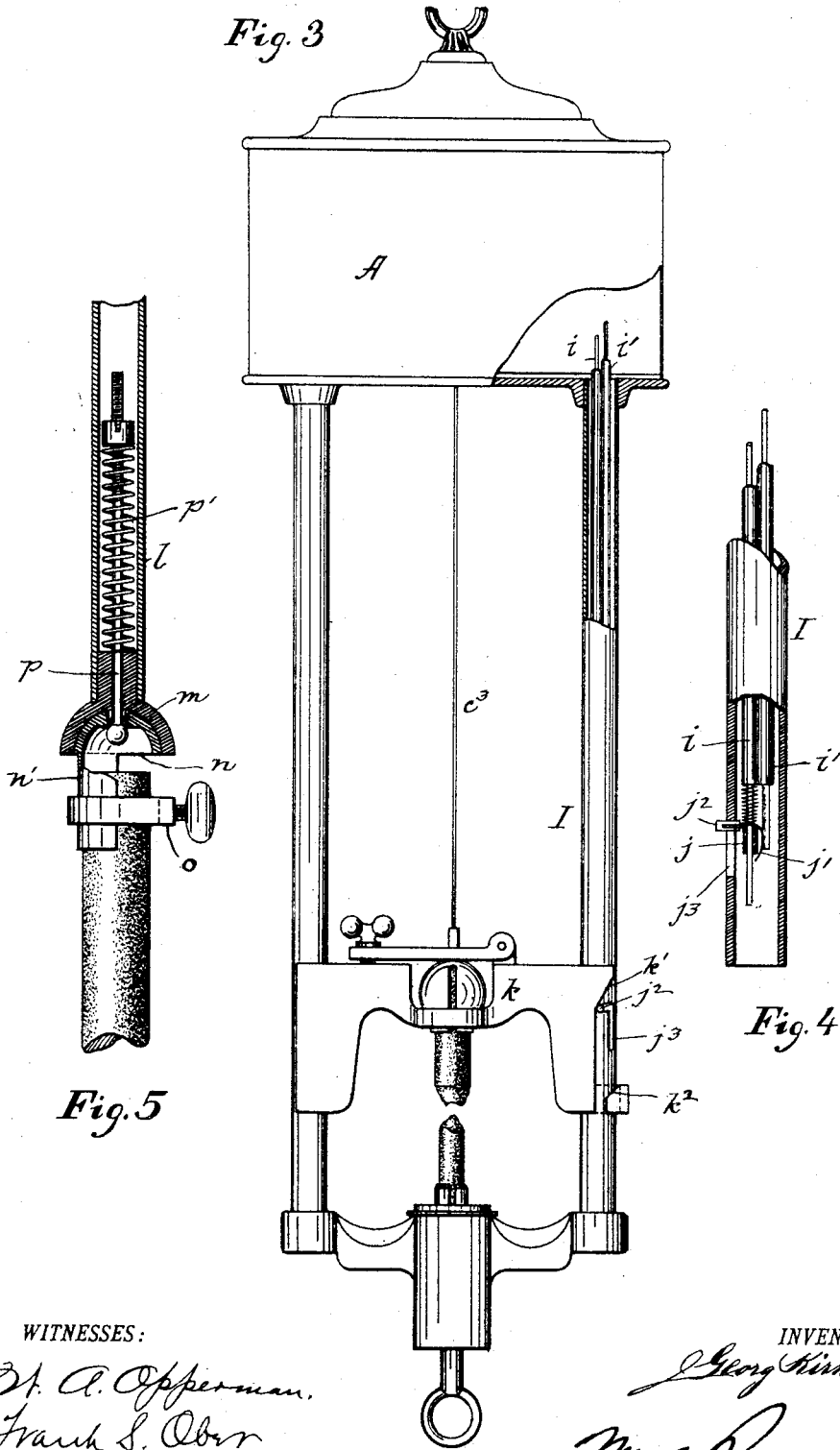


Fig. 5

Fig. 4

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UNITED STATES PATENT OFFICE.

GEORG KIRKEGAARD, OF BROOKLYN, NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 515,342, dated February 27, 1894.

Application filed June 19, 1893. Serial No. 478,055. (No model.)

To all whom it may concern:

Be it known that I, GEORG KIRKEGAARD, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Arc Lamps, of which the following is a full, clear, and exact description.

This invention relates to arc lamps, the object being to provide a regulating mechanism which shall be accurate and sensitive in its operation and simple in construction.

A further object of the invention is to provide an adjustable carbon holder of simple form and a lamp cut-out.

The invention consists of the apparatus and combinations hereinafter described and pointed out in the claims.

Referring to the accompanying drawings, Figure 1 represents a section through the lamp casing, showing the regulating mechanism in elevation. Fig. 2 is a plan of the same, the cover or top being removed. Fig. 3 is a side elevation of the lamp, parts being broken away. Fig. 4 is a detail of the cut-out; and Fig. 5 is a detail of the carbon holder.

Referring to the drawings by letter, A represents the lamp casing which incloses the regulating mechanism.

B is an electro-magnet located in a shunt circuit to the electrodes of the lamp; this magnet may also be a solenoid if desired.

C represents a triangular frame consisting of two side pieces connected together by cross-pieces *c*. This frame is pivoted at the point *c'* to a lug projecting from the cover of the lamp case. The pivot occurs very nearly at one of the apexes of the triangle. The two arms of the triangular frame emanating from the pivotal point are respectively substantially vertical and horizontal, they being connected together at their outer ends by the oblique side of the triangle. Within this frame is mounted a drum *c²* upon which a cord *c³* winds; this cord supports the upper carbon holder. The drum shaft engages with a train of wheels which terminates in an escapement wheel *d*. The escapement wheel is controlled by a pallet or anchor *d'* pivoted at the point *d²*, which is normally in substantially the same horizontal plane as the pivotal point *c'* of the main frame. The anchor is provided with a balancing weight *d³* carrying a detent

d⁴. In the roof of the lamp casing an adjustable screw *e* is fixed, the point of which is arranged adjacent to the detent of the escapement to interfere with it and prevent its movement under certain conditions of operation. To the lower corner of the frame a spiral spring *f* is attached, the tension of which is regulated by an adjustable screw *f'*; the direction of power of this spring is horizontal. At the other corner of the triangle opposite the pivot, is fixed an armature *g* which plays in front of the poles of the electro-magnet B before referred to. The attraction of the magnet is counteracted by the power of the spiral spring *f*. Adjacent to the pivot the frame is provided with a lug *c⁴* which limits the upward movement of the frame. The carbons are normally separated when the lamp is not burning. They are held apart by the spring *f* and the stop *c⁴* determines the length of the arc at starting. The spring tends to hold the lower end of the frame outward and thus slightly elevates the axis of the drum which causes the lifting of the upper carbon. In this position the carbons are held by the locking of the escapement which is in engagement with the screw when the frame is elevated. The resistance of the arc forces current into the shunt magnet which attracts the armature *g* and pulls downward the outer end of the frame. This releases the detent of the escapement from the end of the screw and the clockwork is allowed to rotate by the weight of the carbon holder, and thus shorten the arc which again becomes steady when the shunt magnet is weakened and the escapement engages with the screw.

There are two advantages of this arrangement of the clockwork and the escapement with reference to the pivot. It will be observed that the entire weight of the clockwork and frame is located below the pivotal point. For this reason, all the movements of the frame are more steady than they would be if the pivot was located in any other position. The vibration and hammering of the mechanism will, by this construction, be reduced to the minimum. The pivot of the escapement being located in the same horizontal plane with the pivot of the main frame by which the escapement is carried and the fact that the entire movement of the escapement

is very slight, insures that the escapement will not be thrown out of balance. Its movement is substantially vertical and the center of gravity will always be in its axis in a vertical line with the axis of the escapement wheel; whereas, if the escapement were located out of the horizontal plane of the pivot of the main frame, every time the frame was swung the center of gravity of the escapement would shift out of the vertical line including the axis of the escapement wheel and the effect produced would be the same as the effect on a pendulum clock when it is not placed on a level support. The action of the escapement would also be good if its pivot were in the same vertical plane with the pivot of the frame, but the result would not be as satisfactory as when it is in the same horizontal plane. It will be observed that the spring f which acts in opposition to the magnet is placed at a point and acts in a direction where it will have the greatest effect and be the most sensitive.

I now refer to the lamp cut-out. This is a cut-out for opening the shunt circuit of the lamp when the upper carbon has been entirely consumed. Two stiff wires i and i' forming a loop of the shunt circuit of the lamp are passed down into one of the hollow side rods l to a point near the lower end thereof and there stripped of their insulation, as shown in Fig. 4, and one of them is provided with a sliding collar j carrying a contact spring j' which is adapted to bear against the bare end of the other wire. Above the collar a coiled spring is provided which tends to force the collar downward. The collar also carries a pin j^2 which projects into and through an L-shaped slot j^3 in the side rod l . When the lamp is in operation this pin is in the upper and horizontal portion of the slot, and in that position the contact spring j' is bearing against wire i' thereby completing the circuit through the loop. When the pin is in the lower end of the vertical portion of the slot the spring j' is out of contact with wire i' . The upper carbon holder k consists of a yoke having a carbon clamp at its middle portion and two embracing arms at its lateral extremities which partially embrace the side rods of the lamp. One of the embracing arms working against the side rod is provided with two cam shoulders k' and k^2 , respectively. They are arranged so that they will act upon the pin j^2 in their respective positions. As before stated, when the lamp is in operation the pin is in the upper part of the slot. When the carbon holder reaches the lower end of its movement the arm k' engages with the pin and forces it over into the vertical portion of the slot; the spring above the collar then acts and throws the same downward, thus breaking the circuit of the shunt magnet and thereby preventing a waste of current when not in operation. When the carbon holder is again lifted to trim the lamp, cam k^2 comes in contact with the pin and the latter is lifted to

the upper end of the slot and then forced into the horizontal portion thereof, thus completing the shunt circuit and putting the lamp into operative condition.

My improved carbon holder is adapted for either the upper or lower carbons. It is shown in Fig. 5 as applied to an upper carbon carrying rod. The rod is represented by l and is provided at its lower end with a hollow semi-spherical socket-piece m having an upward projection entering the lower end of the rod. Its concave side is downward and carries therein another hollow semi-spherical piece n which makes an accurate fit with it. This latter piece has a downward projection n' in which is a clamping ring and screw o . Both of these spherical parts are perforated through the centers and fitted with a rod p which passes axially through both of them and projects up into the hollow carbon carrying rod. The upper end of the rod p is threaded and provided with a nut between which and the socket a spring p' is arranged. The lower end of the rod has a ball which is held against the inside of the piece n to hold it in the piece m . The opening in the piece n is larger than the rod p so that it may have a short movement independent of the rod. With this holder, the carbon point may be adjusted as much as is necessary to bring it into alignment, with the other carbon, and by means of the end on the rod p the friction between the two spherical surfaces may be varied at will. Having thus described my invention, I claim—

1. In an arc lamp, a pivoted frame carrying a clockwork and escapement, the escapement being located in one of two planes perpendicular to each other, one of which planes is vertical, the pivot of the frame being at the apex of the two planes, substantially as and for the purpose described.
2. In an arc lamp, a pivoted frame carrying a clockwork and escapement, the anchor or vibrating portion of the escapement being pivoted in a plane substantially horizontal and including the pivot of the main frame, substantially as described.
3. In an arc lamp, a frame pivoted at or near its upper end and carrying a clockwork located below the pivotal point, in combination with an electro-magnet acting upon the frame to swing it on its pivot.
4. In an arc lamp, a frame pivoted at or near its upper end and carrying a clockwork located below the pivotal point, in combination with an electro-magnet and a spring acting in opposition to swing the frame.
5. In an arc lamp, a triangular frame carrying a clockwork, one side being vertical and another horizontal, the frame being pivoted adjacent to the apex of these two sides and the clockwork being located below the pivotal point of the frame, means for swinging the frame on its pivot, and an escapement controlled by the swinging movement of the frame.

6. In an arc lamp, a frame pivotally suspended from above and carrying a clockwork, an escapement for said clockwork, the escapement anchor being pivoted in the same horizontal plane with the pivot of the frame.

7. In an arc lamp, the combination of a carbon holder, a side rod, a mechanical cut-out located inside of said rod, and devices whereby the carbon holder may operate the cut-out, substantially as described.

8. In an arc lamp, the combination of a carbon holder, a side rod, a mechanical cut-out located inside of said rod, a pin connected with the cut-out and projecting through a slot in the rod and devices carried by the carbon holder adapted to engage with the pin to operate the cut-out, substantially as described.

9. In an arc lamp, the combination of a carbon holder, a side rod, a mechanical cut-out located inside of said rod, a pin connected with the cut-out through a slot in the rod, and two cams carried by the carbon holder adapted to engage with the pin to operate the cut-out, substantially as described.

10. The combination of a hollow side rod, of an arc lamp, a sliding contact device located therein, a spring adapted to move the contact device in one direction, a pin connected with the contact device and projecting through an L-shaped slot in the side rod,

and a carbon carrier provided with two cams acting upon the pin in opposite directions, substantially as described.

11. A carbon holder consisting of two hollow, semi-spherical parts, one seated within the other, said parts being perforated, in combination with a headed rod passing through said perforations, a hollow supporting rod to which one of the semi-spherical parts is rigidly connected and into which the headed rod extends, and a spring acting upon the headed rod to hold the semi-spherical parts together, substantially as described.

12. A carbon holder consisting of two hollow, semi-spherical parts, one seated within the other, said parts being perforated, in combination with a headed rod passing through said perforations, a hollow supporting rod to which one of the semi-spherical parts is rigidly connected and into which the headed rod extends, and an adjustable spring acting upon the headed rod to hold the semi-spherical parts together, substantially as described.

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

GEORG KIRKEGAARD.

Witnesses:

WM. A. ROSENBAUM,
FRANK S. OBER.