(No Model.)

F. R. BOARDMAN.

ARC LAMP.

No. 411,088. Patented Sept. 17, 1889.

FIG. 1.

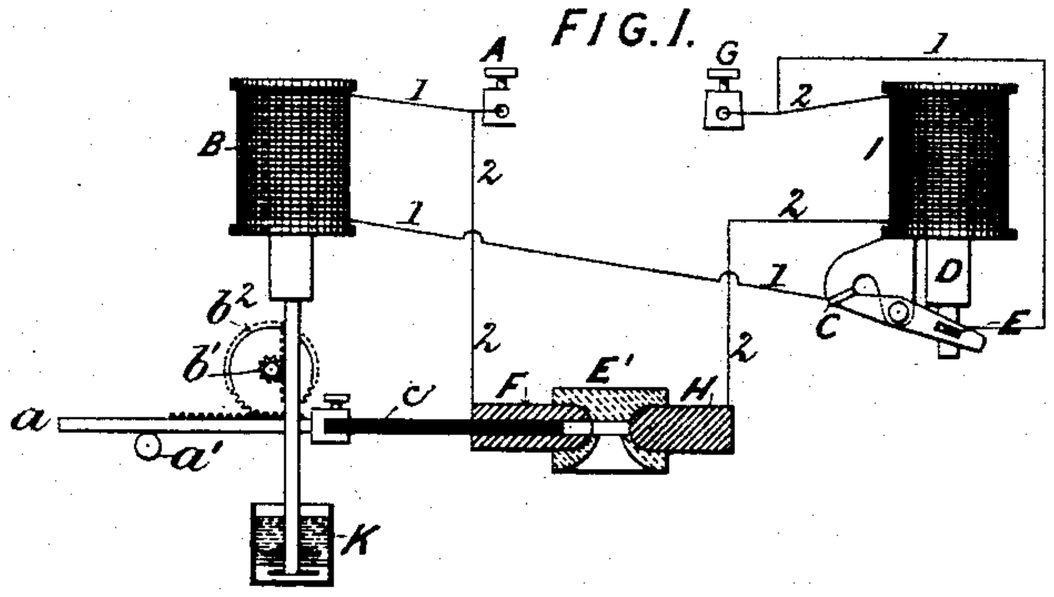


FIG. 2.

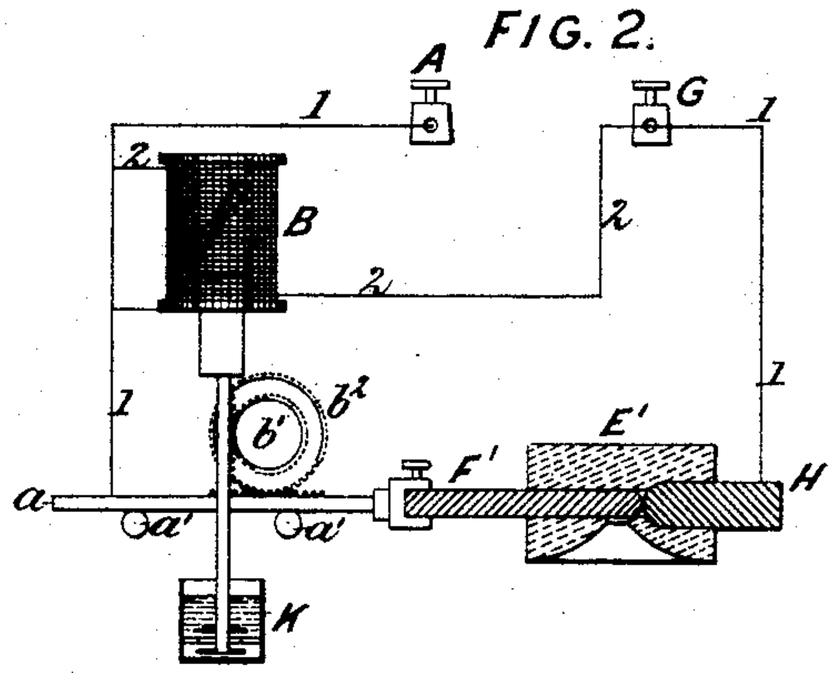
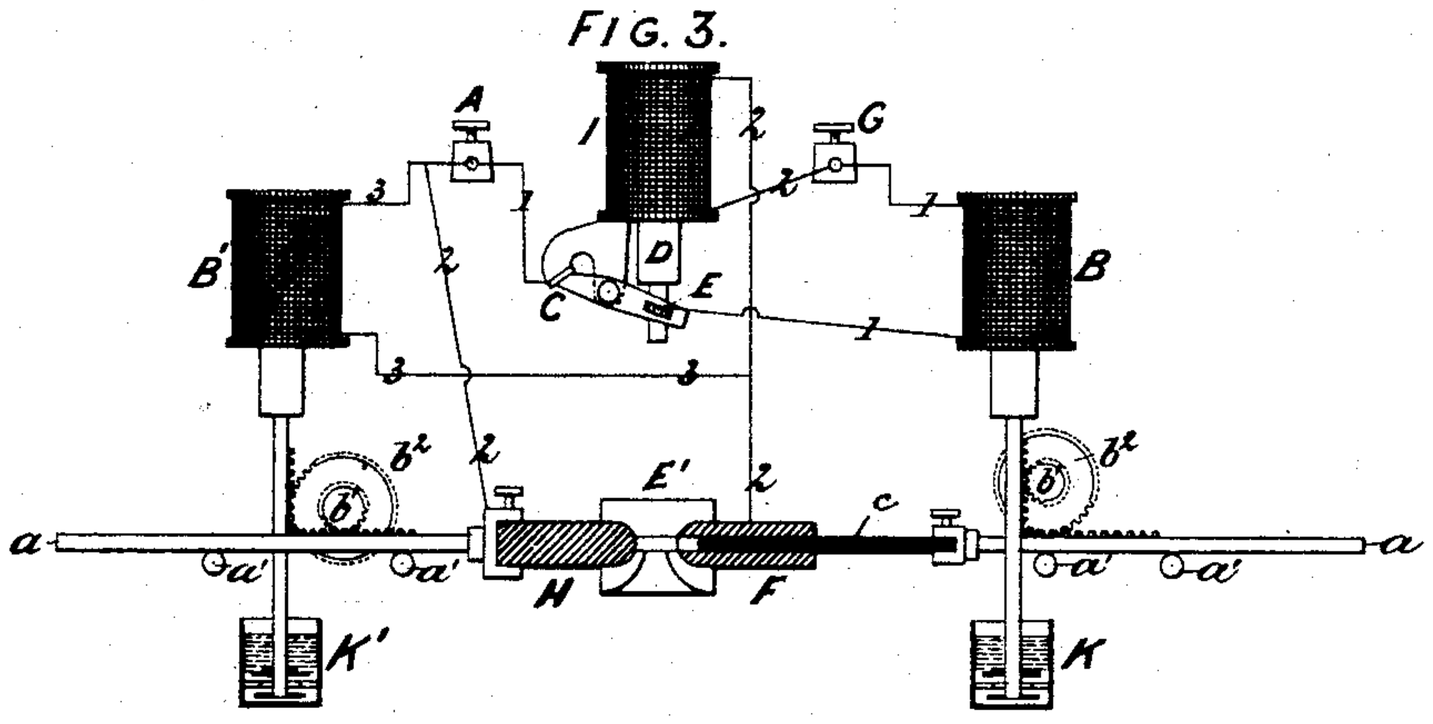


FIG. 3.



Witnesses.
Wm. Thum Andrew.
Alf. H. Lindell

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UNITED STATES PATENT OFFICE.

FREDERICK RICHARD BOARDMAN, OF LONDON, COUNTY OF SURREY, ENGLAND, ASSIGNOR OF ONE-HALF TO BERNAT CARL WILHELM PETERSON AND MADS PETER HARDT, OF SAME PLACE.

ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 411,088, dated September 17, 1889.

Application filed August 14, 1888. Serial No. 282,751. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK RICHARD BOARDMAN, a subject of the Queen of Great Britain, residing at 71 Ondine Road, London, in the county of Surrey, England, have invented certain new and useful Improvements in Arc Lamps, of which the following is a specification.

This invention relates to an apparatus for making electrical connection between the two carbons or electrodes of arc lamps, whereby the arc is struck and light produced. The apparatus is automatic in its action and intended especially for the lighting and regulating of the "Lampe Soleil," although applicable to others of a similar character. In the above-named lamp the carbon electrodes are kept in close contact with a piece of marble, (or other refractory material,) which is made to keep the poles at the required distance apart to allow the electric arc to play between the same and upon the marble, so as to make the latter incandescent. One of the carbons is made tubular to admit a small pencil carbon to be pushed through the tube and along a canal in the marble until it comes in contact with the opposite or solid carbon electrode. This makes electrical contact between the carbon poles, and, the pencil carbon being withdrawn, the arc is struck and the marble block becomes incandescent and luminous.

This invention is adapted to perform the above operation automatically either by the action of the main current or by a shunt-current. If the light goes out from any cause, the lamp will be relighted automatically so long as the actuating-current is operating in the circuit. The invention, further, allows the resistance between the poles to be regulated automatically, so that the above-named lamp may be burned in parallel circuit, and it admits of using in some cases two solid carbons, thus dispensing with the specially-made tubular and pencil carbons.

In Figure 1 the current enters at the terminal A, circulates in the solenoid B, and thence to the contact-pieces C and E and out by the terminal G. This circuit is marked 1. When the circuit is completed, the soft-iron core of the solenoid B is raised, and with it the vertical rack gearing into the pinion b' on the axis of the toothed wheel b^2. This wheel b^2 works a horizontal rack a, supported on friction-rollers a'. The rack is formed at the end to hold the pencil carbon c, and as the core of B is raised the pencil carbon c is advanced in the tubular carbon F through the canal in the marble block E′ until it touches the solid carbon electrode H. When contact is made between the carbons, part of the current passes from the terminal A to the tubular carbon F, across the marble block E′ to the solid carbon H, through the solenoid B, and out by the terminal G, the course being along the circuit marked 2. This circuit being formed raises the soft-iron core D, breaking the circuit I between the contact-pieces C and E, when the weight of the core B brings back the pencil carbon ready for lighting again should the main circuit be broken. A dash-pot, break, or equivalent device K is used to prevent the carbon moving too quickly.

In Fig. 2 the core of the solenoid B is down and the solid carbons F′ and H are in contact with each other until the current is switched on. When this occurs, the magnetic action of the solenoid B (placed in the shunt-circuit 2 from the main circuit 1) raises the core of B and withdraws the movable carbon F′ to the distance required to form the arc across the marble block E′. The distance withdrawn depends on the force of gravity tending to make contact between the carbons balanced by the magnetic effect of the solenoid B, (which may be in the main or in a shunt circuit,) and this arrangement varies the resistance when it is required to use the lamp in parallel.

In Fig. 3 the current enters at the terminal A, passes by the contacts C and E, (suitably insulated,) through the solenoid B, and out by the terminal G along the circuit marked 1. This propels the pencil carbon c through the tubular carbon F to the solid carbon H, (as described in relation to Fig. 1,) the current passing by way of terminal A between the carbons H and F, across the marble block E′, thence around the solenoid I, and out at terminal G by the circuit marked 2. This

raises the iron core D and breaks the circuit through the solenoid B, which allows the core of the same to fall and withdraw the pencil carbon *c* ready for relighting. The solenoid B′ (of very high resistance) is in a shunt-circuit from the main circuit, and comes into action only when a larger current is passing across the carbons and the marble block than is desirable. It then acts to slightly withdraw the carbon H, and thus to vary the resistance, as in Fig. 2. Dash-pots K and K′ are used, as before stated, to check rapid movement of the carbons.

Suitable bearings or supports are arranged for the carbon-holders, and instead of using the force of gravity to withdraw the carbon after contact has been made magnetic force may be employed to operate in both directions.

Having fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

In an arc lamp, the combination of one or more solenoids, each having a core attached to a vertical rack-bar, a marble block with an aperture therethrough, two electrodes in connection with said block, one of which is movable, a horizontal rack-bar attached to said movable electrode, a pinion with which the rack-bars engage, and the circuits and connections, substantially as described.

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

FREDERICK RICHARD BOARDMAN.

Witnesses:
J. WETTER,
CHAS. ROCHE.