

(No Model.)

2 Sheets—Sheet 1.

O. PATIN.
ELECTRIC ARC LAMP.

No. 473,076.

Fig. 1 Patented Apr. 19, 1892.

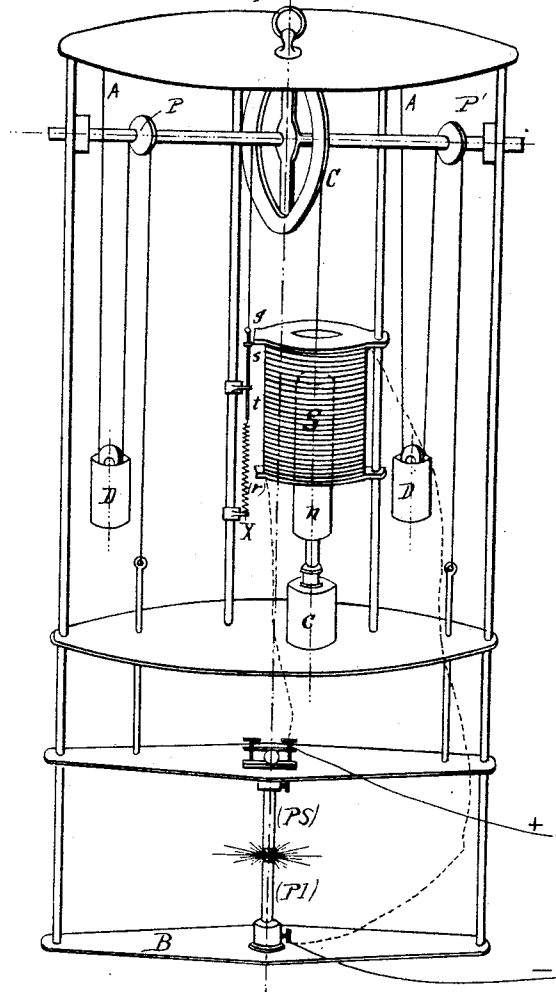


Fig. 2

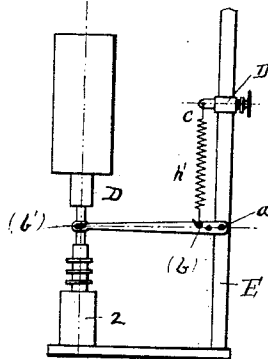
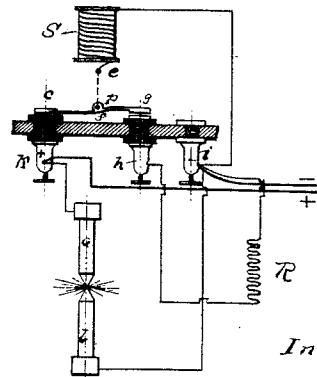


Fig. 5



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2 Sheets—Sheet 2.

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Fig. 4.

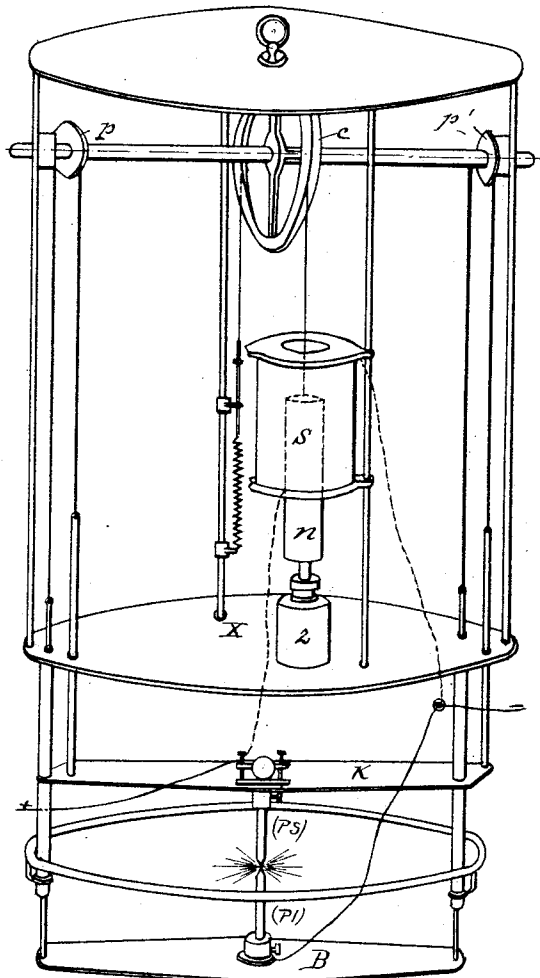
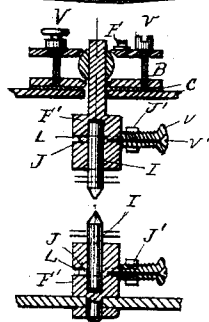


Fig. 3.

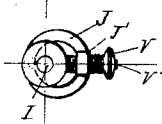


Witnesses

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UNITED STATES PATENT OFFICE.

OCTAVE PATIN, OF PARIS, FRANCE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 473,076, dated April 19, 1892.

Application filed April 11, 1891. Serial No. 388,614. (No model.)

To all whom it may concern.

Be it known that I, OCTAVE PATIN, a citizen of the French Republic, residing at Paris, in said Republic, have invented certain new and useful Improvements in Arc Lamps, of which the following is a full, clear, and exact description.

The present invention relates to an improvement in arc lamps adapted to work either in series or shunt and with continuous or alternating current and producing the lighting and regulating by means of a simple coil mounted in shunt to the poles themselves of the arc. This lamp can have a variable illuminating-point or stationary illuminating-point.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows the arc lamp with variable illuminating-point. Fig. 2 shows an arrangement applying to the lamp with stationary or variable illuminating-point and permitting of making the core lighter and of facilitating the regulating of the lamp. Fig. 3 shows the details of construction of the carbon-holder of the lamp. Fig. 4 shows the arc lamp with stationary illuminating-point. Fig. 5 shows the details of a cut-off placed on the wire of the coil, and which in case of accident puts the lamp in short circuit.

In principle the lamp is formed of a solenoid placed in derivation at the limits of the arc, which reacts on a small cylinder of soft iron, and thus determines the ascent or descent of this cylinder. By aid of a very simple mechanism this movement of the cylinder is transmitted to the carbons, which approach or recede from each other, according as the electro-motive force augments or diminishes. Before putting into operation the carbons are separated. When lighting, the current passes into the coil only, the core is attracted, a brake unloosens, and the carbons come into contact. The moment when the current passes entirely through the carbons the core redescends and produces the separating—that is to say, the lighting.

The regulating is done in the following manner: If the electro-motive force augments, the core of soft iron is attracted and causes the carbons to approach. When the electro-motive force diminishes, the core redescends under the action of its weight and separates

the carbons. Where a continuous current is used, the coil placed in derivation has a great resistance and the intensity of the current passing in the arc is very great compared to that of the current which passes in the coil. This coil attracts the iron cylinder which determines the lighting and the regulating, the lighting—that is to say, the separating of the carbons—each time the electro-motive force goes down below the desired amount and the regulating—that is to say, the approaching of the carbons—every time the electro-motive force goes above the desired amount. It follows from this that when a cut-off is placed on the wire of the derivation-coil it will protect the same in case of the extinguishing of the lamp, and by melting will short-circuit the lamp, and will permit, if desired, replacing the lamp in the circuit by an equal resistance. This cut-off is hereinafter described in detail. Where an alternating current is used, the coil placed in derivation serves to act on the soft iron, which actuates the carbons, as has been explained when the working is by continuous currents. Besides this the coil derives the current, in case of the extinguishing of the lamp, from the arc—that is to say, when the lamp works normally the greater part of the current passes into the arc; but if for any cause the arc goes out the coil can allow the entire current to pass without causing any disturbance in the general working. Despite this accident the lamps mounted on the circuit remain stationary. By this arrangement the coil placed in derivation can be provided with wire of such thickness that the entire current can pass, at the same time presenting sufficient resistance by self-induction so that the greater portion of the current passes into the arc.

The regulating of the lamp can also be obtained by using coils of fine wire of any thickness, but simply wound in a manner to produce the attraction necessary to the regulating electro-motive force. In this case, by an arrangement analogous to that taken for the lamps with continuous currents, a self-induction or other resistance can be established on the disjuncter of fusible lead, and thus short-circuit the lamp. Lamps on the alternating currents can also be made to work in section and obtain all the results I have mentioned

by placing a second self-induction coil in derivation at the limits of the lamp, which coil is independent from the one which serves to produce the regulating of the lamp.

5 Referring now to Fig. 1, which shows a lamp provided with a variable illuminating-point, the lamp with variable illuminating-point is composed of a solenoid S, which serves at the same time to produce the separation of the
10 carbons for the lighting and the approach of the same in accordance with the consumption. In the interior of this solenoid, placed in shunt on the two ends of the arc, a core *n* is suspended, composed of a bundle of soft-iron
15 wires of a heavier weight than that of the movable-carbon holder. To this core a dash-pot O is connected, which, placed at its lower end, rests on the frame and serves to take up the shock of the sudden oscillations of the
20 core. The suspension-cord of the core passes on a large grooved pulley *c* and is fastened on the other side of the pulley to a small rod *t*, drawn by a spring *y*, fastened to the frame of the lamp at X in a manner to exercise a
25 pressure, or, rather, to form a brake on the grooved pulley. This little bar has a pin *g* and slides in a stationary piece *s*, which is pierced by a cylindrical hole. On the axle of the large pulley another small grooved pulley
30 *p* is fixed, on which a cord passes, of which one end is fastened to the upper-carbon holder P S. The other end is fastened at A to the frame of the lamp and holds by means of a pulley a counter-weight D in suspension, this
35 counter-weight serving to maintain the tension of the cord and to diminish in part the weight of the movable-carbon holder. The lower carbon rests on a piece B, which forms a body with the frame of the lamp. Two pulleys
40 *p* can be used and two counter-weights.

An arrangement, Fig. 2, which applies to lamps with either stationary or variable illuminating-point permits of the core being made lighter and facilitates the regulating. This
45 arrangement consists in a lever L, pivoted on the frame. At a point *b* of this lever is fixed a spring R, the other end of which *c* can be moved, as desired, by aid of a slide-block D, which serves to stretch it by sliding on the
50 rod of the frame. The end *f* of lever L reacts on the core *n* by communicating to it a part of force exercised in *b* by the spring. This force tends to raise the core. The extremity
55 *f* has an eye, in which a pin fixed on the stem of the core engages.

The carbon-holder herein shown, which is applicable to the two kinds of lamps, also presents some desirable features. The upper-carbon holder in Fig. 3 is composed of a metal ball
60 *s'*, fastened between an elliptic A and a rectangular clasp B. This last clasp rests on an insulating-plate *c*, which is itself attached to the bed-plate of the carbon-holder K, Fig. 4. Screws *v v* serve to press the ball *s'*. Thereby
65 a knee-joint is obtained. At one end is attached the wire conducting the current. The ball *s'* is traversed by a rod F, enlarged at F'.

In the lowest part of the rod a hole is made, into which the carbon I penetrates. To fasten the carbon, a clasp J is actuated by means of the collar J', forming a nut and pressing
70 against the carbon by displacing itself in the incision L, made in the stem F'. The screw V' only serves to fasten the screw V by penetrating into the body of the rod F'.
75

The lower part of the carbon-holder does not show the same arrangements as the upper-carbon holder. It is held on the bed-plate of the carbon-holder generally used by means of a screw and nut.
80

The operation of the device is as follows: At rest the core of the solenoid, not being attracted, acts with all its weight, which is greater than that of the movable-carbon holder and always holds the upper movable carbon
85 apart from the lower stationary carbon. As soon as the current is put into the lamp it passes entirely into the coil, the core of soft iron is attracted to the interior of the solenoid, and the cord which suspends it takes an
90 ascending movement, at the same time being held by the spring *r*, fixed at *x* to the frame and sliding in the guide *s*, also fixed to the frame. This movement draws the grooved pulley in a receding motion, thus, if desired,
95 producing the contact of the carbons. However, if the separation is too great, the receding movement continues until the pin *g* rests on the stationary guide *s*. In this movement the cord ceases to be a brake on pulley *c*.
100 The rod is drawn on by the weight of the upper-carbon holder. The two carbons come into contact. The entire current passes through the carbons, and thus ceases to pass into the coil S. The core *n*, being no longer attracted,
105 falls by its own weight, and as its weight is superior to that of the upper-carbon holder P S (balanced in part by the counter-weight D) it carries along the upper-carbon holder and causes the separation of the carbons, and
110 in consequence the lighting. When in working the length of the arc increases in consequence of the wear of the carbons, the electro-motive force at the ends of the lamp, and consequently at the ends of the solenoid, increases also, and the attraction of the solenoid following the same course makes the core
115 rise again. The cord which suspends it follows the same ascending movement, slowly drawing the grooved pulley in a receding
120 movement. This movement produces by itself the approach of the carbons. It continues to the moment when the fixed pin at the rod rests on the stationary piece. From this moment the ascending movement has the effect of loosening the cord, which then does
125 not exercise any pressure or does not act as brake on the grooved pulley, the latter thus becoming free to turn, inclined to that as it is by the weight of the upper carbon-holder.
130 The arc being brought back to its normal length, the electro-motive force at the ends of the lamp, and consequently at the ends of the solenoid, diminishes, regaining its normal

force. The core of soft iron redescends and takes its first position. If for any reason the carbons approach below the limit of regulation, the electro-motive force at the ends of the lamp diminishes. It is the same in the solenoid. The soft-iron core, drawn by its own weight, descends, and, drawing with it the pulley, brings the separation of the carbons to its normal extent.

Referring now to Fig. 4, which shows a lamp with stationary illuminating-point, just as in the lamp with variable illuminating-point does the solenoid of the lamp serve at the same time to produce the separating of the carbons for the lighting and the approaching of the carbons as they wear off. This solenoid and its regulating accessories are arranged in the same manner in the present case as in the lamp with variable illuminating-point. In the drawings, Fig. 4, showing this lamp I have represented the same parts by the same letters. The lighting and regulating of lamp is equally effected in the same manner. The only difference consists in that the movement of the grooved pulley is transmitted to two carbon-holders, which are both stationary. The rods of these carbon-holders are fixed to the ends of two cords moving on two grooved pulleys p p' , which themselves are fixed on the same shaft as the large pulley C. Thus when the upper carbon descends the lower carbon is raised. The cut-off used when showing the theoretical working of the lamp with a continuous current applies also to lamps with alternate currents and is composed of a plate e g , forming a spring and in communication with the limit K, insulated and held up by a fusible weight p or by any fusible wire. In case the thread breaks the plate e establishes the communication with the terminal H, which is isolated from the mass. Between the contact H and the terminal D the resistance R is wedged, which is equal to the resistance of the lamp. The terminal K is insulated from the mass and communicates with the plate e g . On the other hand, the coil communicates through one of the ends e of its wire with the terminal K by the intermediary of the fusible weight, and the other end of the wire communicates directly with the terminal i , which is in communication with the lower carbon b of the lamp. The terminal K is connected with the upper carbon. At the terminals K and i end the two wires of the line. The advantages which these arrangements present consist in that the lamp works with the electro-motive force strictly necessary to produce the arc, that one avoids the absorbing of a part of the total electro-

motive force of the current to produce the regulating, and that the power spent in producing the regulating is thus reduced to very small proportions. The entirety of these arrangements offers, besides, the advantage of assuring an almost absolute regularity, and, in case of lamps being mounted in series, to avoid the perturbations which are produced in the whole of the lighting either through poor working of one or several lamps or even by the fact of the extinction of some of them.

It may be added that these lamps can work either in series or in shunt, with continuous current or alternating current, whatever may be the distributing system, with constant electro-motive force and variable intensity, or with variable electro-motive force and constant intensity.

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

1. In an arc lamp, in combination with the carbon-holders, a solenoid, a core movable therein and when unattracted holding the carbons apart, a dash-pot for taking up the shock of movement of the core, a cord attached to the upper end of said core, a shaft, a pulley on said shaft over which the cord passes, a spring attached to one end of the cord and to the frame to form a brake on the pulley, and connections between the shaft and the carbon-carrier, substantially as described.

2. In an arc lamp, in combination with the carbon-holders, the solenoid, the core therefor, the dash-pot, the cord for suspending the core, the shaft, the grooved pulley c , the rod t , attached at one end to the cord, a spring r , secured at one end to the frame and at the other to the rod t , and a guiding-casing attached to the frame and inclosing the rod t , and connections between the shaft and the carbon-holders, substantially as described.

3. The herein-described carbon-holder, comprising the metallic ball, with clasps for holding the same, a rod, as F, passing through said metal ball and having a socket for the reception of the carbon and having also a recess L, and a circular clasp J, surrounding the rod and pressing through the recess L against the carbon, substantially as described.

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

OCTAVE PATIN.

Witnesses:

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JOSEPH COURNIER.