(No Model.) 3 Sheets—Sheet 1.

P. TIHON.

ELECTRIC LAMP.

No. 278,832. Patented June 5, 1883.

Fig. 1.

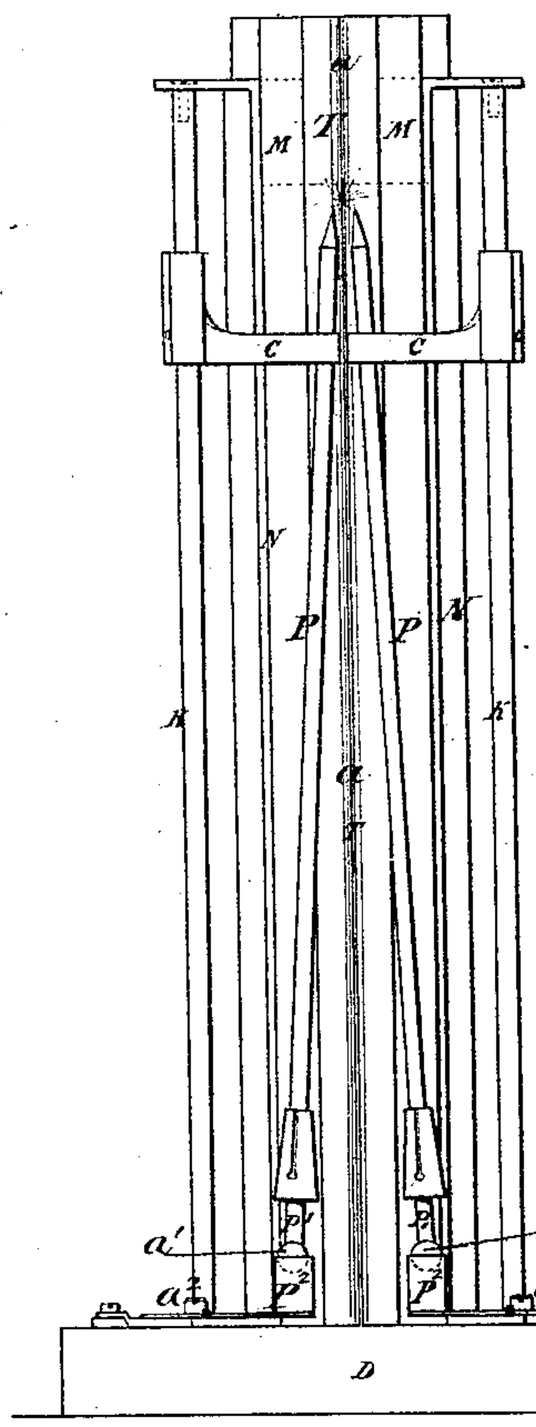


Fig. 2.

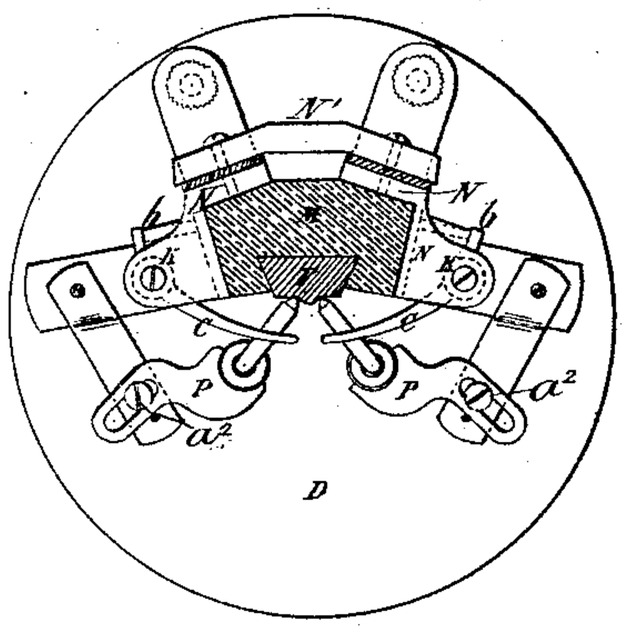


Fig. 3.

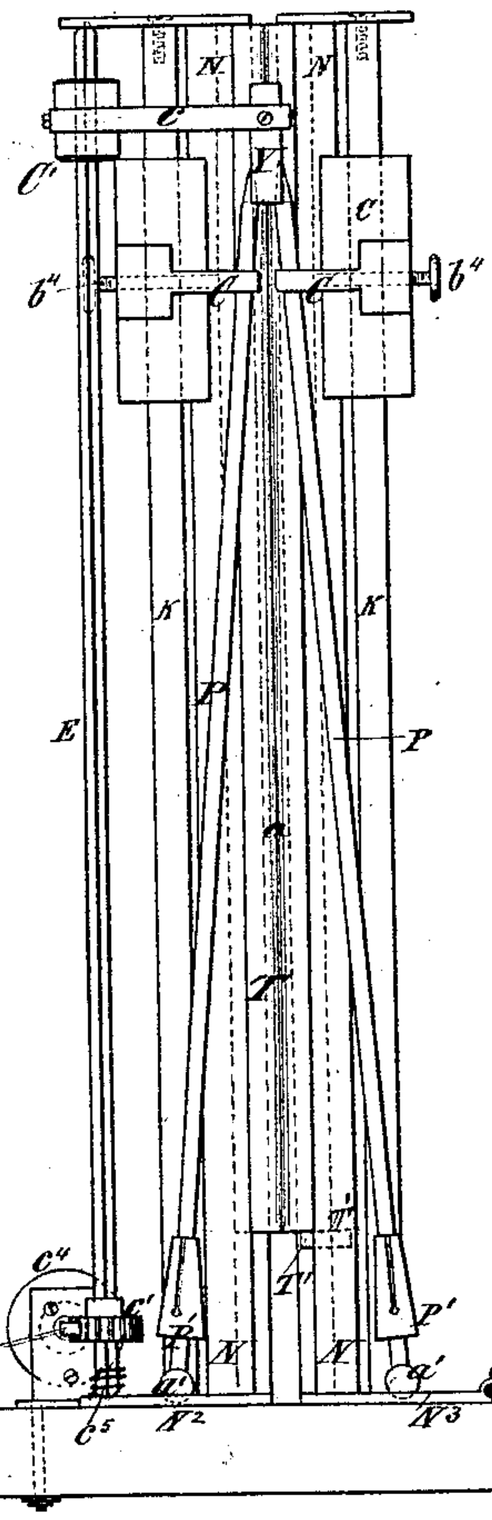
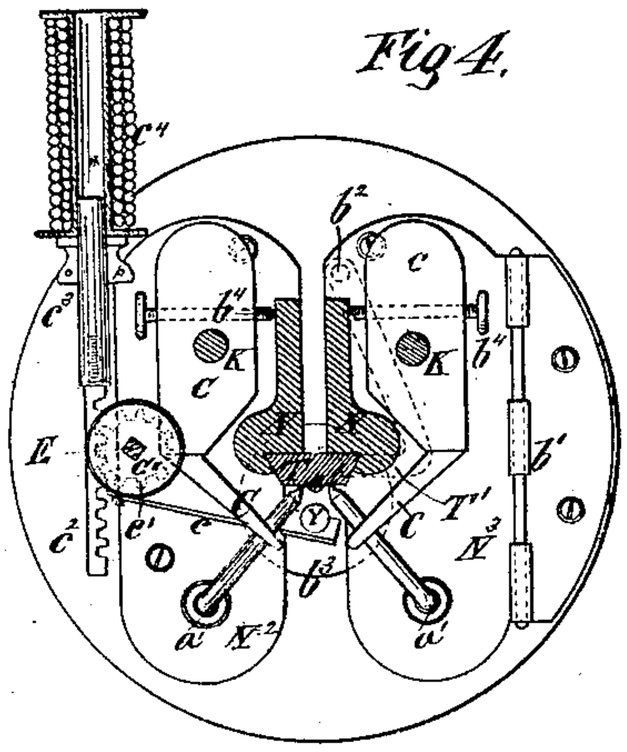


Fig. 4.



Witnesses

J. P. A. Martin

Jean Germain

Inventor

P. Tihon

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Fig 5.

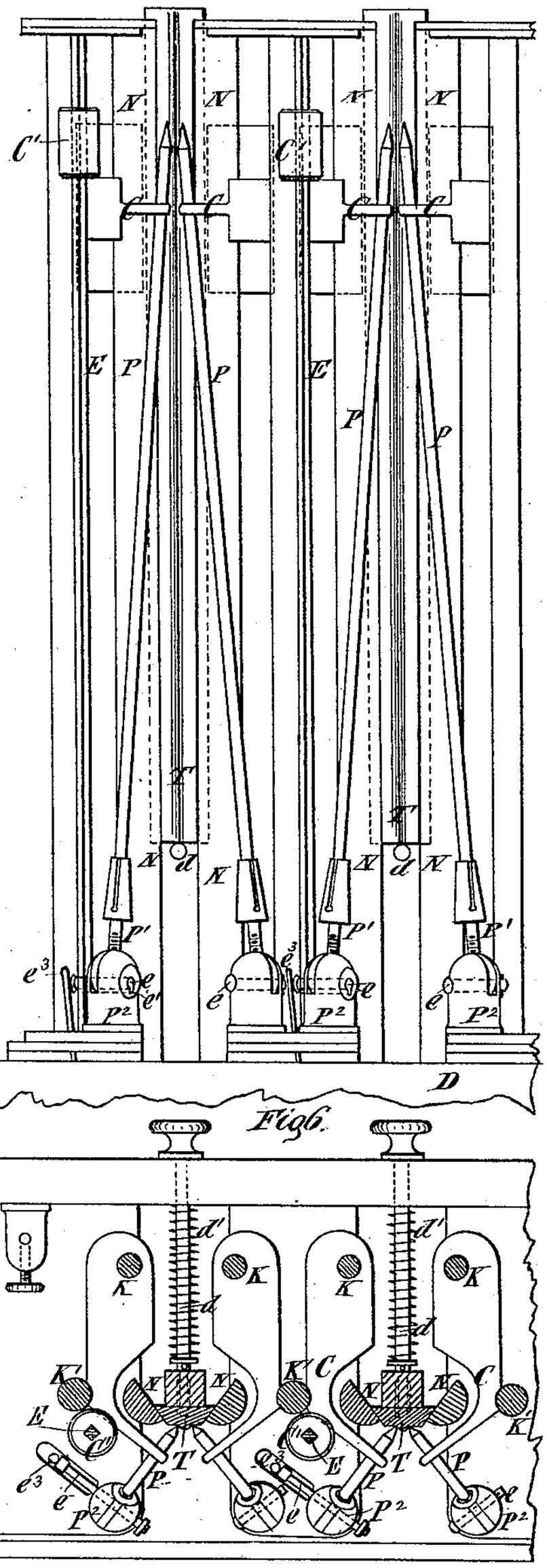

*Fig 5**

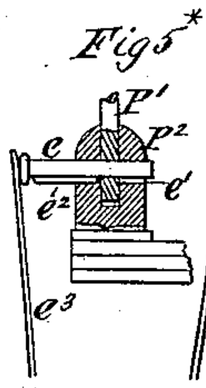

*Fig 5***

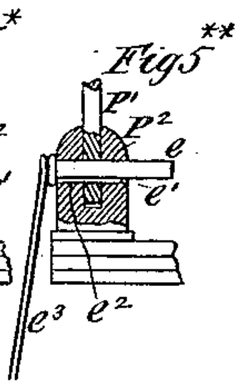

Fig 6.

Witnesses

J. P. A. Martin

Jean Germain

Inventor

P. Tihon

(No Model.) 3 Sheets—Sheet 3.

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Fig 8.

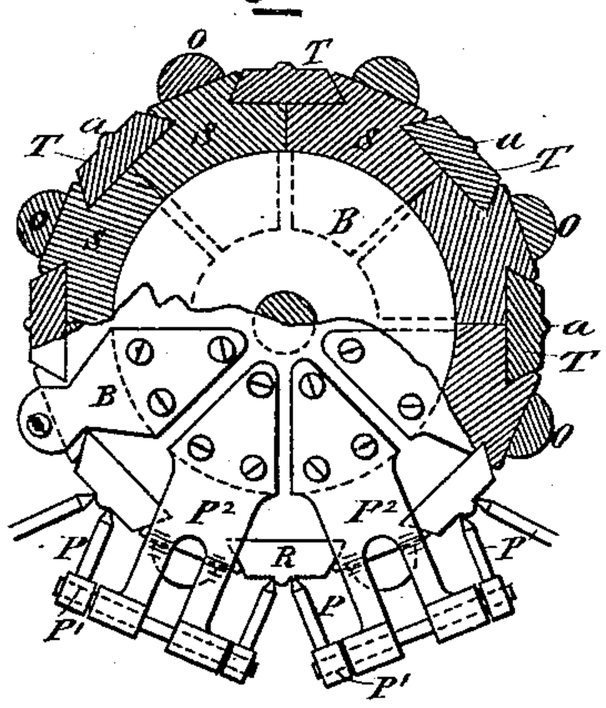


Fig 7.

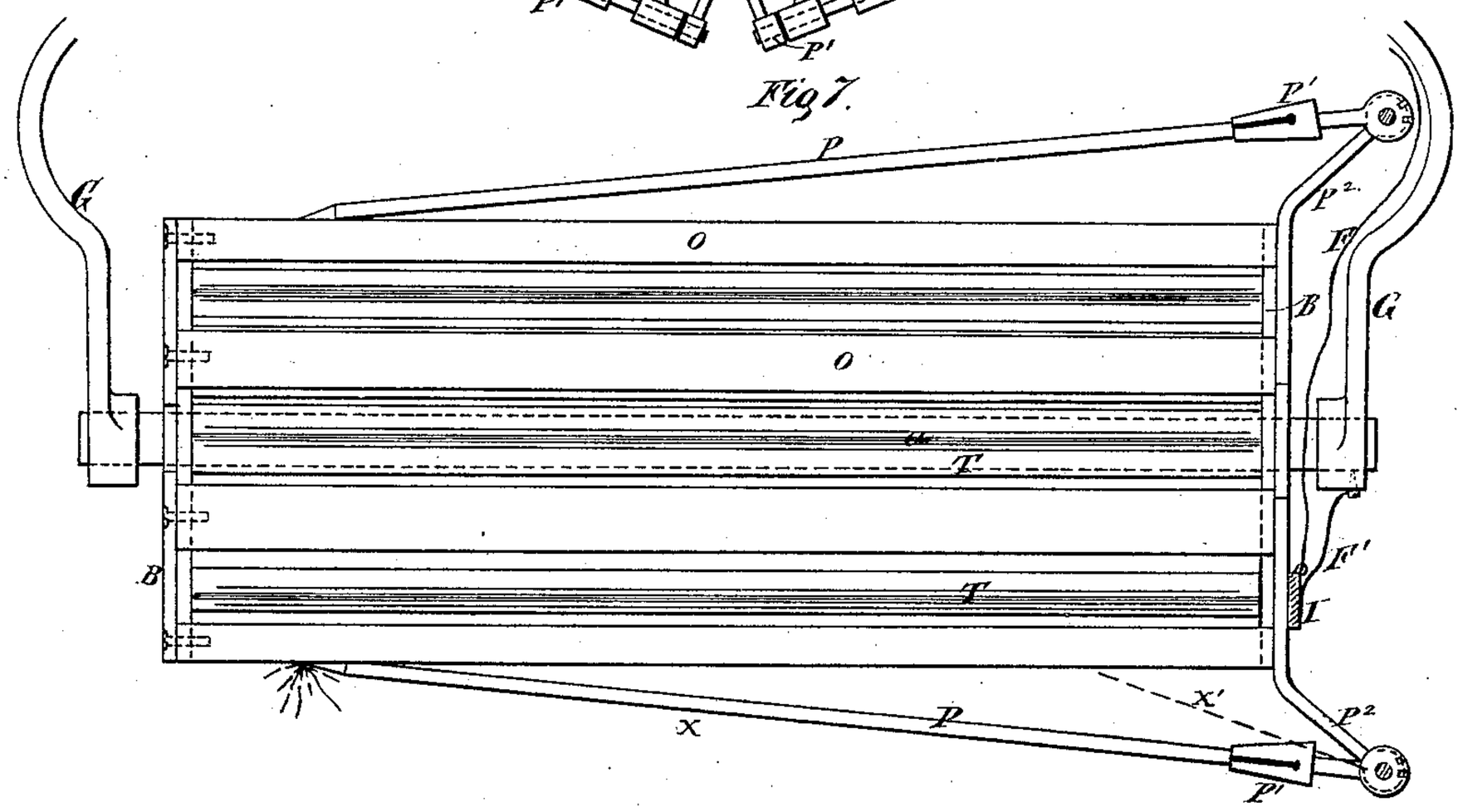
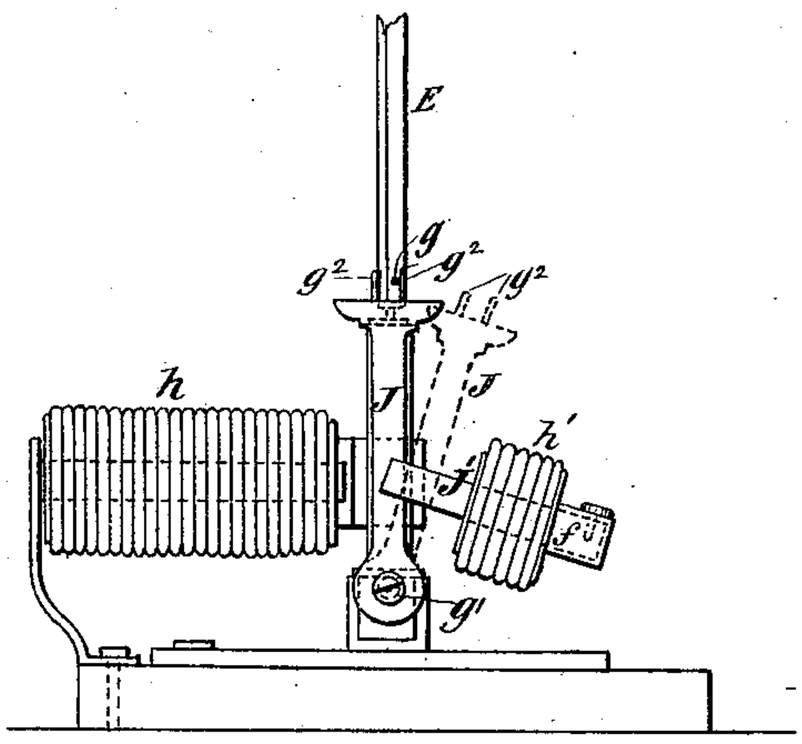


Fig. 9.



Witnesses

J. P. A. Martin

Jean Germain

Inventor.

P. Tihon

UNITED STATES PATENT OFFICE.

PIERRE TIHON, OF LYONS, FRANCE.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 278,832, dated June 5, 1883.

Application filed December 29, 1882. (No model.) Patented in France June 3, 1882, No. 149,422.

To all whom it may concern:

Be it known that I, PIERRE TIHON, of Lyons, in the Republic of France, have invented a new and useful Improvement in Electric Lamps, of which the following is a specification.

Three classes of electric lamps have heretofore been used—namely, the voltaic-arc lamp, the incandescent lamp, and the combined voltaic and incandescent lamp. The voltaic-arc lamp is objectionable because of the irregularity and sudden fluctuations which are inherent to it, and the incandescent lamp only gives a feeble light proportionate to the resistance which it makes in the electric circuit, although the light is soft, regular, and capable of taking all tints most agreeable to the eye. In the third class of lamps, in which the voltaic arc and incandescent are both utilized, the latter plays but a small part or is utilized very imperfectly. To this latter class belongs the Jablochkoff taper, in which a stick of kaolin is employed. In this taper the rays of light are directed upward only, and the stick of kaolin is much too small to store and keep for any length of time a quantity of heat sufficient to render it luminous. To this same class also belongs what is known as the "sun-lamp," in which a piece of refractory material placed in the voltaic arc is rendered incandescent. This lamp is objectionable because the small piece of refractory material employed, being acted on continuously in the same place, changes its conditions and the quality of the light emitted, and although the change is slow, and therefore less fatiguing to the sight than the other burners, it is nevertheless a serious objection.

The object of my invention is to provide a lamp which will utilize both the voltaic arc and incandescent, and will be free from the objections hereinbefore enumerated.

To this end my invention consists, essentially, in the combination, in an electric lamp, of a bar of refractory material and carbon-holders carrying carbons which extend in a direction lengthwise of said bar, and are inclined relatively to said bar and to each other, and rest against the face of said bar during the time they are in operation. The carbon-holders are pivoted or otherwise supported, so that the force of gravitation will maintain the carbons in contact with said piece or bar of refractory material. Hence it will be seen that the portion of the refractory piece or bar which is in the voltaic arc is constantly changing, and is therefore not overheated or subject to material changes.

The invention also consists in novel details of construction and combinations of parts in a lamp of the kind above described, which are hereinafter described and claimed.

In the accompanying drawings, Figure 1 represents an elevation of a lamp embodying my invention. Fig. 2 represents a sectional plan thereof. Fig. 3 represents an elevation of a lamp of modified form, also embodying the invention. Fig. 4 represents a sectional plan of the lamp shown in Fig. 3. Figs. 5 and 6 represent, respectively, an elevation and a sectional plan of a double lamp, also embodying my invention. Figs. 5* and 5** are detail views, hereinafter described. Fig. 7 represents a side view of a lamp also embodying my invention. Fig. 8 represents a partly-sectional end view thereof, and Fig. 9 represents a detail view, hereinafter described.

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

Referring first to Figs. 1 and 2, D designates a base, of wood, glass, or other insulating material, upon which is erected a standard, M, of prismatic form and refractory material. The standard M is provided in one side with a dovetailed groove, in which is fitted a bar or piece, T, also made of refractory material, and provided on its face with a rib or tongue, *a*. The standard M is retained in place by two metallic uprights, N, connected at the top by a cross-piece, N′, which is, however, insulated from them. In front of the piece or bar T are placed two carbons, P, which are secured in carbon-holders P′, and the carbon-holders are provided at their lower ends with spherical heads, *a′*, which rest in cavities in carbon-holder supports P^2. Said supports are adjustably fastened to the base D by screws a^2 passing through slots in them. The carbons P are inclined relatively to the piece T and each other, and their points rest against the face of the piece T, on opposite sides of the tongue *a*, which maintains them at a proper distance apart. The

carbons P naturally gravitate toward the piece T as they burn off; but to insure their points always being against said piece I employ runners C, which are adapted to slide upward and downward on rods K. These runners cannot swing outward beyond a certain point because of their inner ends or tails, *b*, coming against the uprights N, and they rest upon the carbons, and as they burn off the runners descend and preserve the contact of the carbons with the face of the piece T. The runners also serve to bring the current near the points of the carbons and prevent the current from running the whole length of the carbons. When the current is passed through the lamp, the voltaic arc is established against the face of the piece T, which becomes incandescent and compensates for any irregularities in the current. As the carbons burn off, their points move downward on the piece T, and the portion of the surface of said piece which is rendered incandescent is constantly but slowly changing.

Referring now to Figs. 3 and 4, T designates the piece of refractory material which is held between uprights N. One of these uprights projects from a plate, N^2, which is secured rigidly to the base D; but the other upright projects from a plate, N^3, hinged at b', so that it may be swung aside when desired. The piece T is sustained vertically by an arm, T′, which is pivoted at b^2, and upon which said piece rests. When desired, the arm T′ may be swung to one side, whereupon the piece T will drop through the hole b^3 in the base D. The carbons P rest against the piece T on opposite sides of the tongue *a*, and the ball or spherical ends *a′* of the holders P′ rest in cavities in the plates N^2 N^3. The runners C bear on the carbons P, as before described, but are of slightly-different form. They slide on rods K, and are prevented from moving outward away from the carbons by screws b^4, which may be adjusted so as to just bear on the uprights N. E designates a small square rod, parallel with the rods K, and carrying a hub or piece, C′, which turns with it, but is adapted to slide vertically upon it. To the hub or piece C′ is attached an arm, *c*, which carries a piece of carbon, Y, adapted to come between and make contact with the carbons P. On the lower end of the rod E is a small pinion, c', with which engages a rack, c^2, on the core c^3 of an electric magnet, c^4. When the lamp is in operation, the magnet, being energized, draws in the core c^3 and turns the rod E to move the piece Y out of contact with the carbons. When the force of the magnet diminishes, a spring, c^5, on the rod E draws the core outward and holds the piece Y in contact with the carbons P for lighting.

Referring now to Figs. 5 and 6, which represent a double lamp, it will be seen that the pieces T, of refractory material, are held between uprights N, somewhat different in form from those before described. The pieces T are retained vertically by pins or bolts *d*, which are kept under said pieces by springs *d′*, and when it is desired to remove one of the pieces T all that is necessary is to draw back its pin or bolt *d* and the piece will fall. The runners C, which slide on the rods K, are held against movement away from the carbons by rods K′, arranged outside of and between them, as best shown in Fig. 6. The small hubs or pieces C′ and the square rods E, on which they slide, are like the corresponding parts shown in Fig. 3; but the arm *c* and piece Y are not shown, as they would hide other parts of the drawings. The same rack-and-pinion arrangement operated by a magnet and core as are shown in Figs. 3 and 4 may be used for turning the rod E. More than two pairs of carbons P may be employed, if desired, and they are intended to be brought into circuit one after another. As here represented, each carbon-holder P′ is jointed to its support by a pin, *e*, and in the one support of each pair is formed a groove, *e′*, in which fits a feather, e^2, on the pin *e*, as best shown in Figs. 5* 5**. The eye of the carbon-holder P′, through which the pin *e* passes, also has a groove adapted to receive the feather e^2; but the feather cannot enter it until the groove comes opposite the groove *e′* in the support, and that never occurs until the carbons are used up. The pin *e* has a spring, e^3, bearing on one end and tending to press it through the support P^2; but it is arrested by its feather e^2 abutting against the carbon-holder P, as shown in Fig. 5*. When the pair of carbons which have been in use are used up, the groove in said holder comes into coincidence with the groove *e′* in the support P^2, and the pin is then allowed to be moved by the spring e^3 into the position shown in Fig. 5**, and the circuit is closed through the other pair of carbons by any suitable mechanism. (Not here represented.)

As the circuit-closer of itself forms no part of my invention, I have not thought it necessary to show it. It may be of any ordinary construction.

Referring now to Figs. 7 and 8, the carbons P and bars or pieces T, of refractory material, are arranged in the form of a cylinder, which may be supported by hangers G in a horizontal position. The cylinder is composed of two insulating-disks, B, held together by tie-rods *o* in such manner as to hold the pieces T directly or through pieces or bars S, of refractory material. On the right-hand end of the cylinder are radial pieces P^2, to which the carbon-holders P′ are jointed, and springs may be employed to maintain the carbons P constantly against the refractory pieces T. In the exterior of the eye formed on the holder P′ is a notch or groove, and in the exterior of the eyes of the support P^2 are other notches or grooves. When the carbons of a pair have been burned out so that they assume the position indicated by X′, Fig. 7, the notches coincide. The cylinder has before been held by the eye of the carbon-holder bearing against the stop; but the notches being now in coincidence pass over

said stop, and the cylinder makes an eighth or other fraction of a turn before it is arrested by the next carbon-holder striking against the stop. I designates one of two contacts, to one of which is connected the wire F, and the other of which is connected by a wire, F′, with the hanger G. As the cylinder makes its fraction of a turn, the supports of the carbon-holder carrying used-up carbons are removed from the contact-pieces I, and two other carbon-holder supports are moved into contact with said pieces. The contacts I act, therefore, as a commutator. This form of apparatus is particularly adapted for lighting large spaces. It enables the apparatus to be placed in a globe, and all light emitted is directed downward in case the lamp is placed horizontally without any shadow.

I do not here make any specific claim to the construction shown in Figs. 7 and 8, but may make it the subject of a future application for Letters Patent.

In lieu of employing the mechanism shown in Figs. 3 and 4 for turning the rod E, I may employ the devices shown in Fig. 9. In this construction the rod E has a pin, *g*, projecting from it, and J designates an arm, pivoted at *g′*, and provided with two pins, g^2, which may engage with the pin *g* as the arm is swung on its pivot, and so turn the rod E in one or the other direction. Upon the pivoted arm J is fixed a piece, J′, of soft iron, which serves as an armature for a magnet, *h*, and which itself carries a coil, *h′*. The coil *h′* may be adjusted on the core J′, and serves as a counter-weight, which tends to keep the arm J in the position shown in dotted lines in Fig. 9. In this position, which is that when the lamp is not operating, the magnet *h* and core J′ are separated. When the current is thrown into the circuit it magnetizes the bobbins *h h′* and the core J′ is attracted, thereby moving the arm J into the position shown in full lines. By this movement one of the pins g^2 is caused to act on the pin *g*, and thereby turns the rod E and withdraws the carbon piece Y from the carbons P, and creates the voltaic arc. When the arm J moves in the reverse direction, the other pin g^2 acts on the pin *g* and the rod E is turned in the reverse direction, carrying the piece of carbon Y into contact with the carbons P.

The bar or piece T, of refractory material, may be composed of chalk, lime, earth, gypsum, magnesia, or other similar and suitable matters, either alone or mixed with other substances, to color the light. The addition of powdered coke to the substance of which the said bar or pieces are made renders them better conductors, diminishes the resistance, and renders the consumption of the carbons slower. I employ for these refractory bars or pieces substances calcined without fusion, for with other substances the liquid drop which forms between the points of the carbons acts as a lens, and by its ebullition produces irregularity in the light.

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

1. The combination of a bar of refractory material and carbon-holders carrying carbons which extend in a direction lengthwise of said bar, and are inclined relatively to the bar and to each other and rest against the face of the bar, substantially as herein described, whereby the carbons are caused to gravitate against the face of the bar and to burn opposite different portions of the bar as they are consumed.

2. The combination of the bar T, of refractory material, provided on its face with the tongue or rib *a*, and the carbons P, extending in a direction lengthwise of said bar, and inclined relatively to the said bar and to each other, and which rest against the face of the said bar on opposite sides of said tongue or rib *a*, substantially as herein described, whereby the carbons are held against the face of the bar, and are caused to burn opposite different portions thereof as they are consumed.

3. The combination, with the refractory bar T, of carbons P, extending lengthwise thereof, inclined relatively to the said bar and to each other, and resting against the face of said bar, whereby the carbons are caused to burn opposite different portions of the face of said bar as they are consumed, and a device for sustaining said bar capable of being drawn out to release said bar and allow it to fall, substantially as herein described.

4. The combination, with a piece or bar of refractory material and carbons inclined relatively thereto, and having their points bearing against the face thereof, of the vertically-sliding runners for retaining said carbons against said piece or bar, substantially as herein described.

5. The combination, with the piece or bar of refractory material and the inclined carbons resting against the face thereof, of the rod E, the hub or piece C′, adapted to slide thereon, and carrying a piece of carbon, Y, and a magnet for turning said rod, substantially as and for the purpose described.

This specification signed this 18th day of November, 1882.

PIERRE TIHON.

Witnesses:
I. P. A. MARTIN,
GERMAIN JEAN.