(No Model.) 3 Sheets—Sheet 1.

O. KARTZMARK.

ELECTRIC ARC LAMP.

No. 266,161. Patented Oct. 17, 1882.

Fig. 1.

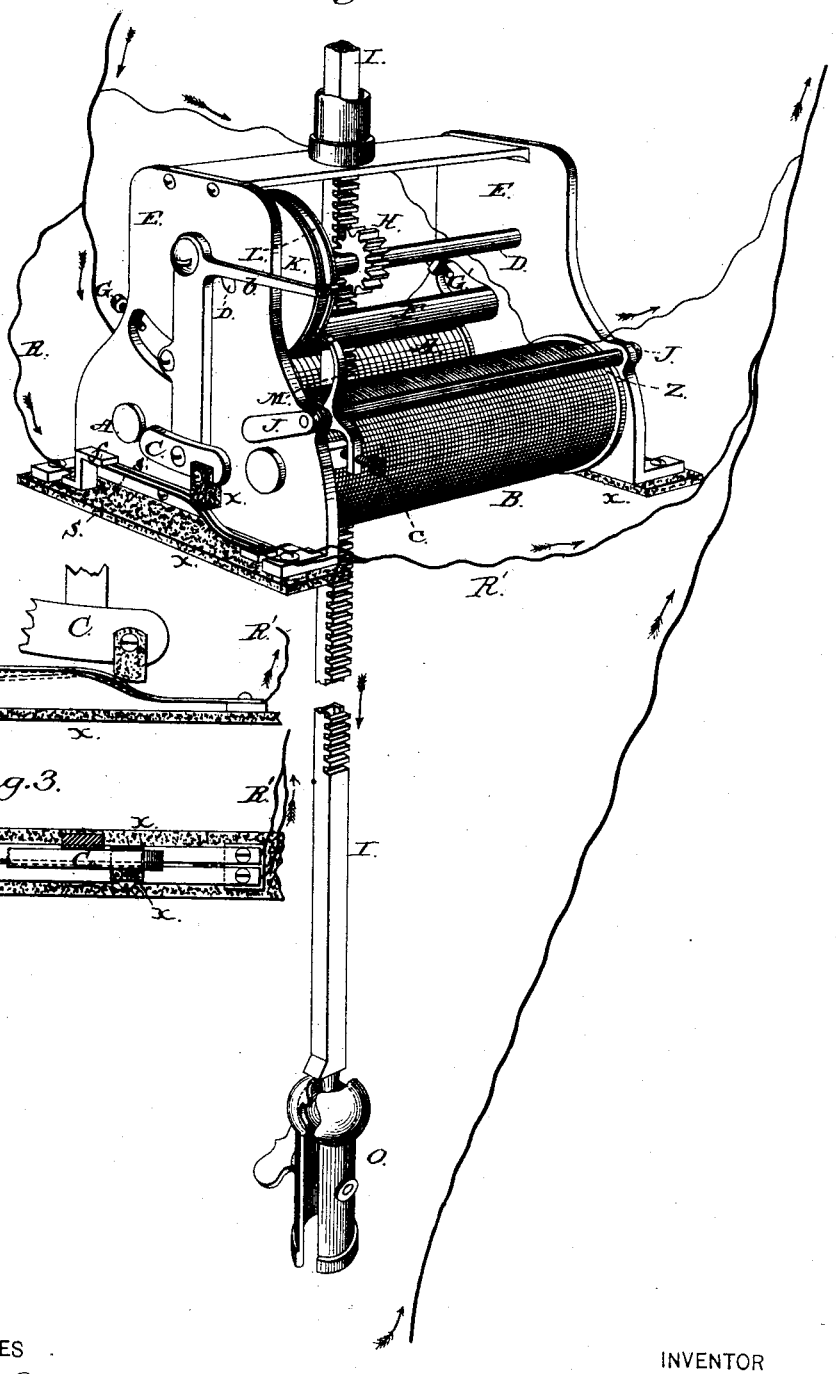


Fig. 2.

Fig. 3.

WITNESSES

John A. Ellis.

S. S. Kane.

INVENTOR

Otto Kartzmark

By David A. Burr

ATTORNEY

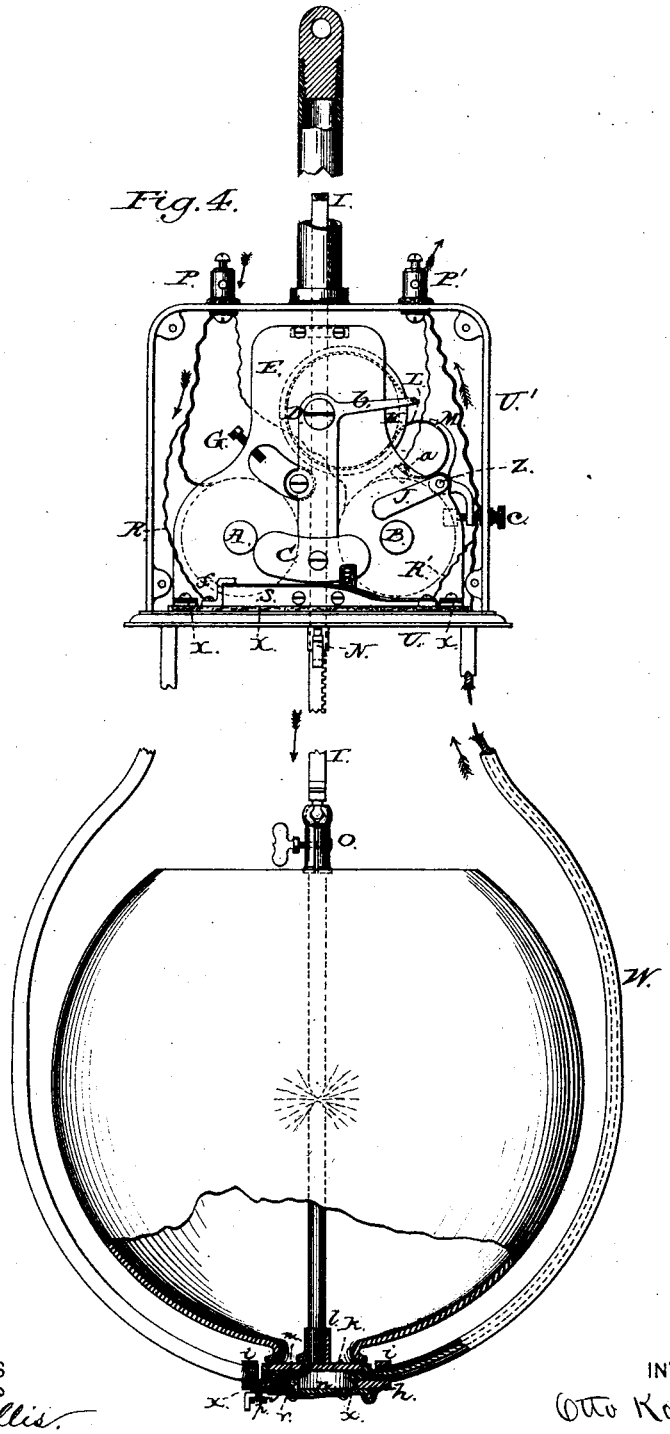
(No Model.) 3 Sheets—Sheet 2.

O. KARTZMARK.

ELECTRIC ARC LAMP.

No. 266,161. Patented Oct. 17, 1882.

Fig. 4.



WITNESSES

John A. Ellis.

D. D. Kane,

INVENTOR

Otto Kartzmark

By David A. Burr

ATTORNEY

(No Model.) 3 Sheets—Sheet 3.

O. KARTZMARK.

ELECTRIC ARC LAMP.

No. 266,161. Patented Oct. 17, 1882.

Fig. 5.

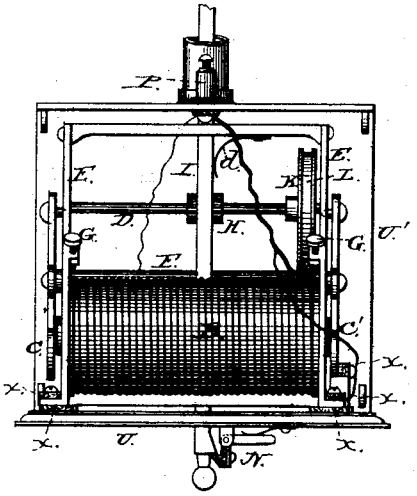


Fig. 6.

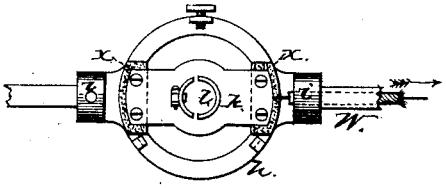
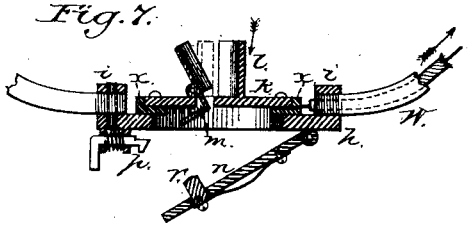


Fig. 7.



WITNESSES

John A. Ellis.

A. T. Kane.

INVENTOR

Otto Kartzmark

By David A. Burr

ATTORNEY

UNITED STATES PATENT OFFICE.

OTTO KARTZMARK, OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 266,161, dated October 17, 1882.

Application filed February 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, OTTO KARTZMARK, of the city, county, and State of New York, have invented certain new and useful Improvements in Electric-Arc Lamps; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to that class of electric lamps which employ carbon points in connection with a regulating-magnet in circuit therewith, adapted to regulate and control the distance between the points, so as to keep it uniform, and in which provision is made for maintaining the resistance of the entire circuit embracing a series of lights by means of an auxiliary circuit in each lamp, which becomes instantly connected into the general circuit by the movement of the armature of the regulating-magnet in case the arc in the lamp is extinguished.

It consists of improvements in the devices for the adjustment of the carbon, the opening and closing of the auxiliary circuit, the removal and replacement of the carbon points, and the insulation of the circuit through the lamp, as hereinafter described.

In the accompanying drawings, Figure 1 is a view in perspective of my improved electric lamp; Fig. 2, a side elevation of the spring device for automatically opening and closing the auxiliary circuit, Fig. 3 being a top view of Fig. 2. Fig. 4 is a side view of the lamp, partly in section; Fig. 5, a side view of the primary regulating-magnet and of the case; Fig. 6, a top view, and Fig. 7 a central vertical section, of the bottom of the lamp and its negative carbon-holder.

A is the primary regulating-magnet, which is in circuit with the carbon.

B is a second magnet, encircled by a coil of greater resistance than that of the first magnet, A, and which is arranged parallel thereto.

Duplicates armatures C and C′ (see Figs. 1 and 5) are suspended to swing loosely over the ends of the magnet A from pivot-pins upon the ends of the frame E, in which the magnets are supported. Each of these armatures C C′ is so weighted and proportioned as that when the lamp is not in operation the armature shall be automatically withdrawn from the pole of the regulating-magnet A, and the two armatures are connected so as to move in unison by means of a transverse rod, F, extending from the one to the other through slots in the frame, these slots being so extended as to permit the necessary free vibration of the armatures, thus establishing a magnetic field which shall increase the power of the magnet. The play of the armatures is limited and adjusted at pleasure by the means of set-screws G G′, working against the connecting-rod F, as shown in Fig. L.

A shaft, D, supported in the frame E E parallel with the magnets A B, carries a pinion, H, gearing with a rack on the positive-carbon holder I, and carries also a grooved disk or pulley-wheel, K, secured thereon close inside the frame E, at one end thereof. Over this wheel H is led an elastic friction band or brake, L, of steel, which is made fast at one end to the side of the frame at *a*, about on a line with the bottom of the wheel, and is curved and bent back in a circle and led under the wheel and around over it, so as to be finally secured to the end of an arm, *b*, projecting from the armature C at the point of its pivotal connection to the frame, as illustrated in Figs. 1 and 2.

A movement of the armature toward the regulating-magnet A, operating to depress the end of the arm *b*, will cause the friction-band to bind upon the periphery of the wheel K with sufficient tension to produce by the movement of the arm a rotation of the wheel and its shaft and a corresponding elevation of the positive-carbon holder I. The extent of the vibration of the armatures C C′ is determined by the set-screws G G′.

A second pair of armatures, J J, are secured to the end of a transverse rod, Z, turning in bearings in the frame parallel to, in front of, and slightly above the adjusting-magnet B, so that the armatures may swing to and from the poles of said magnet, one at each end thereof, the connection of said armature by means of the rod Z serving to establish a magnetic field, and to increase thereby the power of the magnet. A curved shoe, M, adapted to fit upon and embrace the outer curve of the elastic fric-

tion-band L, is secured to this transverse rod Z, and as the vibration of the armatures J J causes the rod to turn back and forth the shoe is made to bear more or less against the band, so as to increase or reduce its tension and friction upon the wheel K. The extent of this movement is adjusted by means of a set-screw, *c*, passing through an arm projecting from the shoe, as shown in Figs. 1 and 3.

The coil of the regulating-magnet A is connected at one end to the positive binding-post P on the casing of the lamp, (see Fig. 2,) its opposite end being connected directly to the frame, and the circuit is completed therefrom to the positive carbon by the contact of the rod or carbon-holder I with the frame, constant and complete contact being insured by means of a spring, *d*, Fig. 5, secured to the frame to bear uniformly against the rod.

The finer longer coil of the secondary adjusting-magnet B is connected at one end to the circuit-wire leading from the positive binding-post P and at the other to the wire leading from the lower negative carbon to the negative binding-post P′, so as to form a short circuit of greater resistance from the one to the other.

When the current flows through the regulating-magnet and carbons to form the light the armatures C C′ are attracted toward said magnet, the arm *b* depressed, the brake or friction-band L made to bear upon the wheel K, and the positive carbon raised to give the proper interval between the carbon points by the movement of the wheel and of the pinion H engaging the carbon-holder I. So soon, however, as the separation of the points becomes too great, and the resistance in the circuit through the carbons is consequently increased beyond that of the circuit established through the coil of the secondary magnet B, the current will pass through said coil, so that while the attraction of the primary regulating-magnet A upon the armatures C C′ will be diminished that of the secondary adjusting-magnet upon its armatures J J will be increased, and these armatures, being drawn toward the latter magnet, will cause the shoe M to bear against the curved loop of the friction-band, and, releasing its tension upon the wheel K, will allow the carbon-holder I to drop until the proper normal interval is re-established. The tension of the friction-band, to produce with the utmost nicety the precise adjustment required, is determined by means of the set-screw *c*. If the current through the magnets be wholly cut off or interrupted, the weight of the armatures C C′ will cause them to swing away automatically from the magnet A far enough to wholly release the hold of the brake L upon the wheel K, so that the wheel and its shaft, left free to revolve, will permit the carbon-holder geared thereto to drop until the carbon points are in contact.

The carbon-holder I is formed of a rectangular hollow rod, and the teeth for the gearing are simply sawed out in the side of it, as appears in the drawings, Fig. 1. When run up for the insertion of a carbon in its clamp or socket O, the carbon-holder I is supported by means of a catch, N, Figs. 4 and 5, fitted on the under side of the frame to engage a notch on the lower end of the holder.

To prevent the damage and derangement which would otherwise result from a momentary break in an extended circuit including a number of lamps consequent upon a sudden extinguishment of light in any one of the lamps, each lamp is fitted with a short cut-out circuit having a resistance about equal to the arc of the light, and which is established between the positive and negative posts P P′ through wires R R′ and connecting-springs S S′. These springs are placed immediately under the armature C, in such relation thereto as that when a break occurs in the general circuit by the extinguishment of the light or other cause the armatures C C′, swinging toward the secondary magnet B, will permit the springs S S′ to come into contact with a bent plate, *f*, (see Figs. 1 and 2,) and thus close the cut-off circuit through the wires R R′; but so soon as the circuit is re-established through the primary magnet, A, and the armatures C C′ are consequently drawn toward it, this movement will operate, by means of an insulated lug, *e*, upon the armature C, to depress one spring, S, and then the other, S′, and thus break the cut-off circuit in two moves. Where a single spring is employed to open and close the cut-off circuit automatically, it will soon become inoperative, owing to the burning of its contact-points; but in my invention, wherein the spring-connection is subdivided and two or more contact-points are made to operate successively for the purpose of opening and closing the circuit, the resistance in the cut-off is first so far increased by depressing one spring, S, and diminishing proportionately the area of the conducting-surface as that the current will be directed therefrom into the circuit now established through the magnet, and the secondary spring S′ will be left free to open without shock.

The negative wire from the lower carbon is conducted from the lower-carbon holder to the binding-post P′ in the upper casing of the lamp through a tube, W, constituting one of the arms of a pendent bracket supporting the holder. The holder consists of an annular plate, *h*, secured to these arms by means of threaded apertures in lateral offsets *i i*, these apertures being threaded to the right and left, so as to be readily screwed simultaneously upon the threaded ends of the arms. Upon the annular plate *h* a narrow transverse plate, *k*, carrying a cylindrical holder or socket, *l*, is secured, (see Fig. 6,) being, however, insulated therefrom by an interposed layer of hard rubber or its equivalent. The socket *l* is constructed in two divisions—one fixed and the other hinged at its base to swing away from the first—as shown in Fig. 7. The hinged division is fitted with a bent lever, *m*, to project from its lower end through an aperture in the place beneath, and whose weight will tend automatically to

throw the division open, as shown in Fig. 7; but the division is closed and the socket made to embrace the carbon inserted therein by means of an insulated stud, *r*, upon a spring on a lid, *n*. This lid is pivoted at one side to the lower face of the annular plate *h*, and when closed up against said plate to cover the central space therein is caught and held by a spring-catch, *p*. On closing the lid its stud *r* strikes against the arm of the bent lever *m*, and, forcing it up, closes the socket.

The recess within the annular plate forms an ash-receptacle. Upon opening the lid *n* the ashes collected thereon will drop out, and the socket will simultaneously open to admit of a ready removal of the old and the insertion of a new carbon.

The glass globe W of the lamp fits accurately upon the annular plate *h*, so that when the lid *n* is closed the bottom of the lamp is completely shut in, preventing all danger from falling sparks.

The lamp is completely insulated at all points by interposed strips *x x x* of insulating material, so that all danger of a shock to the person handling it is prevented.

The insulated wire to the negative carbon, led through the interior of the tubular arm W of the bracket, is connected directly to the socket *l*, which is so insulated from the lid as that the lid may be opened and shut without danger, while the automatic opening of the socket obviates the necessity of touching it. The frame E E, containing the magnets, is likewise perfectly insulated from its bottom plate, U, and outer casing, U′, by means of insulating-plates *x x* inserted between the frame and bottom plate. The cut-off springs, the binding-posts, and the heads of all the adjusting-screws are likewise insulated, as illustrated by the dotted surfaces in the drawings.

I do not claim the duplication in a short circuit of contact points or springs to be opened or closed successively, and thereby increase or diminish the resistance of said circuit.

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

1. In an electric lamp, the combination, with a shaft geared to the upper or movable carbon-holder, a friction-band led over a pulley upon said shaft, and an adjusting-magnet in a shunt-circuit of greater resistance than the general circuit, of a lever actuated by the armature of the adjusting-magnet and adapted to release the tension of the friction-band when said magnet is excited, substantially in the manner and for the purpose herein set forth.

2. In an electric lamp, an insulated offset upon the armature of the regulating-magnet A, in combination with double contact-springs S S, placed in a cut-out circuit and actuated by said offset, each independently and successively, to open or close the circuit as the armature moves to or from its magnet, substantially in the manner and for the purpose herein described.

3. In an electric lamp, a support, *h*, for the lamp-shade, closed from below by a hinged lid, *n*, and combined with a divided socket, *l*, for holding the lower carbon, adapted to be closed by the closing of the lid and to open by gravitation when the lid is opened, substantially in the manner and for the purpose herein set forth.

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

O. KARTZMARK.

Witnesses:
DAVID A. BURR,
J. F. ACKER.