(No Model.)

A. W. REPPY.

ELECTRIC ARC LAMP.

No. 444,104. Patented Jan. 6, 1891.

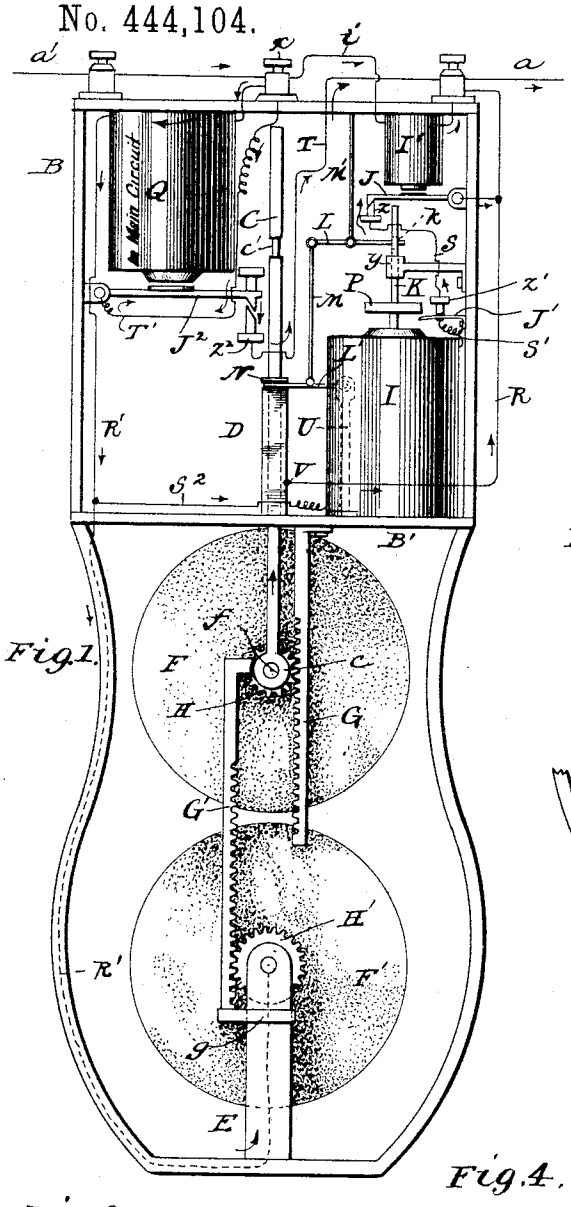

Fig. 1.

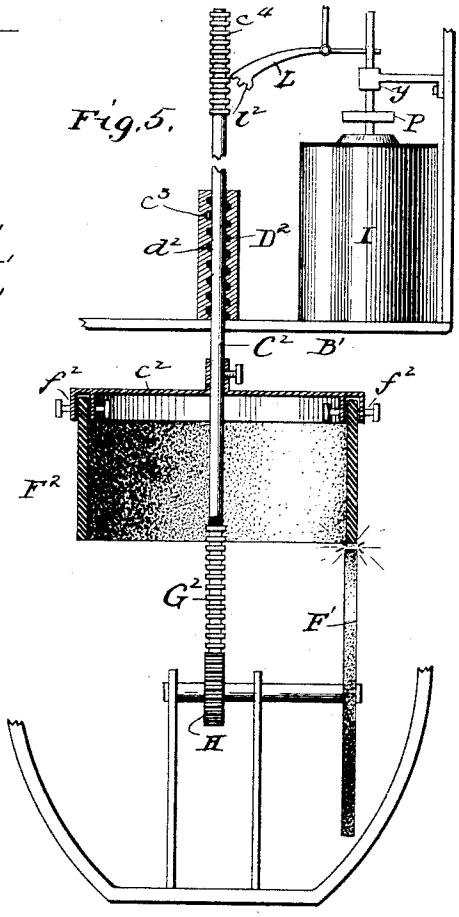

Fig. 5.

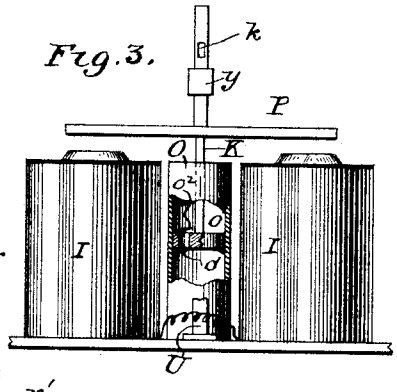

Fig. 3.

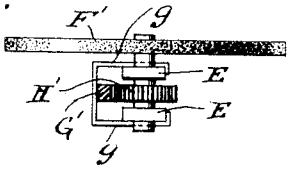

Fig. 2.

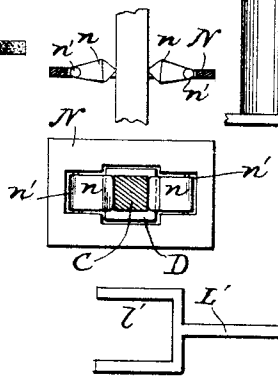

Fig. 4.

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ALBERT W. REPPY, OF OAKLAND PIER, CALIFORNIA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 444,104, dated January 6, 1891.

Application filed September 27, 1890. Serial No. 366,324. (No model.)

To all whom it may concern:

Be it known that I, ALBERT W. REPPY, a citizen of the United States, residing in Oakland Pier, in the county of Alameda and State of California, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates to electric-arc lamps; and my improvements refer particularly to the form of the carbons and the mechanism for feeding them.

The principal object of my invention is to produce a construction that while assembled in a space much smaller than that occupied by the ordinary lamp having pencil-carbons will permit of a continuous or intermittent burning without trimming for a much longer time than the period of such ordinary lamp.

To this end my invention consists in the combination, with two rotary carbons mounted edge to edge, of means for rotating and feeding them; and my invention further consists in the construction and combination of parts, as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of the lamp complete. Fig. 2 is a detail view of the guide for the lower end of the movable rack, said view being at a right angle to Fig. 1. Fig. 3 is a detail at a right angle to Fig. 1 of the arc-striking magnet and the oil-cylinder or dash-pot, the latter being shown as partly broken out. Fig. 4 is a detail in several views of the lifting-clamp; and Fig. 5 is a side elevation of a lamp embodying some modifications in the form of carbons and operating mechanism, the upper carbon rod and the helically-grooved tube being shown partly in section.

Similar letters in the several views indicate corresponding parts.

a a' are the main-line wires; B, the frame of the lamp, and B' a horizontal strip or partition, above which is the square hollow bearing D for the square upper carbon-rod C, so constructed to prevent turning of one within the other. At the lower end of rod C is a horizontal bearing *c* for the axle *f* of a disk of carbon F, which axle at its end opposite the carbon has a pinion H, engaging the teeth of the rack G, which is secured at its upper end to the partition B'. Projecting downward from rod C, secured thereto and in line therewith, is a slender rack G', which engages with the pinion H' of the lower disk carbon F', that is mounted in bearings carried by uprights E, projecting upward from the base of the lamp-frame. The pinion H' is larger than the pinion H of the upper disk, in order that as the rod C, disk F, and rack G' move downward the lower and slower-burning carbon disk will revolve slower than the upper disk. To guide the rack G' in its vertical movements, its lower end is provided with two laterally-projecting forks *g*, that embrace the uprights E, which form the bearings for the axle of the lower carbon. By this construction of racks and pinions, &c., it will be seen that the descent of the upper carbon by gravity causes it to rotate to present a new portion of the edge of the disk to the point for the formation of the arc, and also causes the lower carbon to rotate simultaneously with it, but slower. The rack G' is of course insulated from rod C, or the rack itself might be of insulating material.

Projecting upward from partition B' is an upright U, to the upper end of which is pivoted a lever L', having its outer end forked, as at *l'*, to embrace the rod C just at the top of the standard D. Above the fork *l'* rests the lifting-clamp N, consisting of a rectangular frame carrying two jaws *n*, loosely pivoted at *n'*, and of such dimensions that when in a horizontal plane the opposing edges of the jaws will be a distance apart less than the cross-section of rod C. This clamp being lifted by the fork *l'*, the jaws *n* will bite on opposite sides of the rod and lift it, and when the fork is lowered the outer ends of the jaws strike the top of standard D and are forced upward, thus releasing the rod and allowing it to feed.

I is the arc-striking magnet having its armature P carried by a rod K, guided at its upper end in bearing *y*, and carrying at its lower end a piston *o*, fitting the cylinder O, located between the spools of magnet I. This piston fits only reasonably tight in the cylinder, so as to allow a gradual escape of the oil in the cylinder past the piston when the latter is moved upward. The piston has an opening *o'* covered by a flap-valve o^2, that will

open and permit easy passage of the piston when moving downward. The rod K at k is slitted to receive the end of lever L, pivoted to hanger M′ and connected at its outer end by means of rod M to the lever L′. Thus it will be seen that energization of magnet I causes a quick lifting of clamp N to strike the arc, while a slow feed afterward results.

I′ is a small high-resistance coil in a shunt-circuit, and has an armature J, adapted to drop when the current through coil I is off or light, and make contact with pin z, that is connected by wire S with pin z', against the under side of which a spring J′ normally presses. The outer end of spring J′ passes under armature P to be removed from contact with pin z', as hereinafter described.

R is the wire from the main wire a to the upper-carbon-rod bearing at V, and R′ is the wire from the lower-carbon standard at V′ to the main wire a'. Armature J is connected with wire R, and spring J′ is connected by wire S′ with magnet I, which is connected by wire S^2 with the wire R′ on the other side of the lamp. Thus when the current is first turned on, the armature J being in contact with pins z, magnet I is energized and the arc struck, and the descent of armature P pulls the spring J′ away from pin z', breaking the circuit through magnet I and allowing the slow feed to occur, and at the same time forcing the proper current through coil I′ to lift armature J and break contact at z. When the resistance at the arc becomes less by the feeding of the carbons, the current through coil I becomes less and armature J drops away, making contact at z, and again sending a current through magnet I to lift the upper-carbon rod, it being understood that the spring J′ has in the meantime made contact with pin z', owing to the rise of armature P in feeding and the consequent release of said spring to make such contact. In order to insure good contact at the pins referred to, I prefer to make said pins with an inclined side, and to form on the end of the armature and spring a similarly but oppositely inclined lug.

To effect a complete cut-out of the lamp in case of rod C failing to feed from any cause and the arc is broken, I run the main circuit from R′ to a' through a magnet Q, the armature J^2 of which has a shunt-wire T′, leading from its pivoted end to one side of the magnet. A pin z^2 under the free end of armature J^2 is connected by wire T with the opposite side of the lamp or wire a. While the lamp is burning or any current passing through the wires R R′, and consequently the carbons, the magnet Q is excited, thus holding armature J^2 away from pin z^2. If there is no current through the carbons, there is none through magnet Q, and the armature J^2, being released, falls on contact-pin z^2, thus making a short circuit through wire T, armature J^2, wire T′, and line a', thus cutting out the lamp and magnet Q, but not the magnet I′, the shunt-wire i' of which meets the wire T′ and the wire from magnet Q to line a' at x. Should, however, the carbons come together again, enough current would pass through magnet Q to energize it and lift armature J^2 away from contact-pin z^2 and break the short circuit.

Near the top of the rod C at a point that would reach clamp N when the upper-carbon disk is nearly burned out I provide reduced portions c' on each side of sufficient length to allow the carbon to drop and remain in contact with the lower carbon, the jaws of the clamp failing to bite on such reduced portion of the rod, thus leaving the lamp at rest, with the whole force of the current passing through the carbons assisted by the shunt-wires.

Referring to Fig. 5, a construction is shown in which all the parts not specifically described may be supposed to be the same as that hereinafter described. In said figure the principal modification consists of an upper carbon in tubular form, as shown at F^2, and the necessary changes in the means for feeding the said carbon while rotating in a horizontal plane instead of a vertical plane, as in the case of carbon F. This tubular carbon F^2 is secured by means of lugs f^2 to a horizontal plate or spider c^2, carried at the lower end of a round rod C^2, and which rod has a round rack G^2, secured to and insulated from it, extending down below the carbon F^2 for operating the pinion of carbon F′, in manner and construction similar to that of the other form of lamp before described. The round rod C^2 passes up through partition B′ and through a bearing D^2, which has an internal helical groove d^2, a pin and roller c^3, projecting from the side of the rod C^2, entering said groove d^2. Thus the upper carbon in its gradual descent or feed will be forced to revolve on its axis and present new portions of its edge in proximity to the uppermost edge or portion of the periphery of the lower disk carbon F′, the latter being also forced to slowly revolve by the rack G′ engaging its pinion H′. The rod C^2 extending above the bearing D^2, is provided with a series of annular teeth c^4, engaged by the teeth of a short segment-shaped rack l^2, carried by the lever L. The rack l^2 is so shaped relatively to the position of lever L when the rod K is in its uppermost position that the upper teeth of the segment-rack will then be disengaged from the annular teeth of rod C^2 and allow the latter to feed. When magnet I is energized, the rack l^2 will engage the rod C^2 and lift it.

It will be seen that in both forms illustrated the carbons are automatically rotated edge to edge and fed by gravity, and that the weight of the upper carbon causes the rotation of the lower carbon.

Having thus described my invention, I claim—

1. In an arc lamp, the combination of the two rotary carbon disks having the pinions

of unequal diameters, the stationary rack engaging the smaller pinion, and the rack carried by the carbon having the smaller pinion, said rack engaging the larger pinion, whereby the carbons rotate at unequal rates of speed, substantially as described.

2. In an arc lamp the combination of the two rotary carbon disks F F′ in movable and stationary bearings, respectively, the pinion H on disk F, the stationary rack G, engaging said pinion, the moving rack G′, carried by the carbon disk F, and the pinion H′, of greater diameter than pinion H, attached to the carbon-disk F′ and engaging the moving rack, substantially as described.

3. In an arc lamp, the combination of the vertically-movable feed-rod and the moving rack connected thereto with the rotary carbon disk F, having its bearing on the feed-rod and provided with the pinion H, the stationary rack engaging said pinion, and the rotary carbon disk F′, having a fixed bearing, and the pinion H′, engaging the moving rack, said pinion being of greater diameter than the pinion H, substantially as described.

4. In an arc lamp, the combination of the feed mechanism, the magnet I, having the armature P attached to and operating the feed mechanism, the switch-armature J and spring-switch J′, normally in circuit with the said magnet, said switch-spring being in the path of and adapted to be operated by the armature, and the high-resistance magnet in shunt-circuit for actuating the switch-armature J, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ALBERT W. REPPY.

Witnesses:
C. E. PRIOR,
H. A. GRAVES.