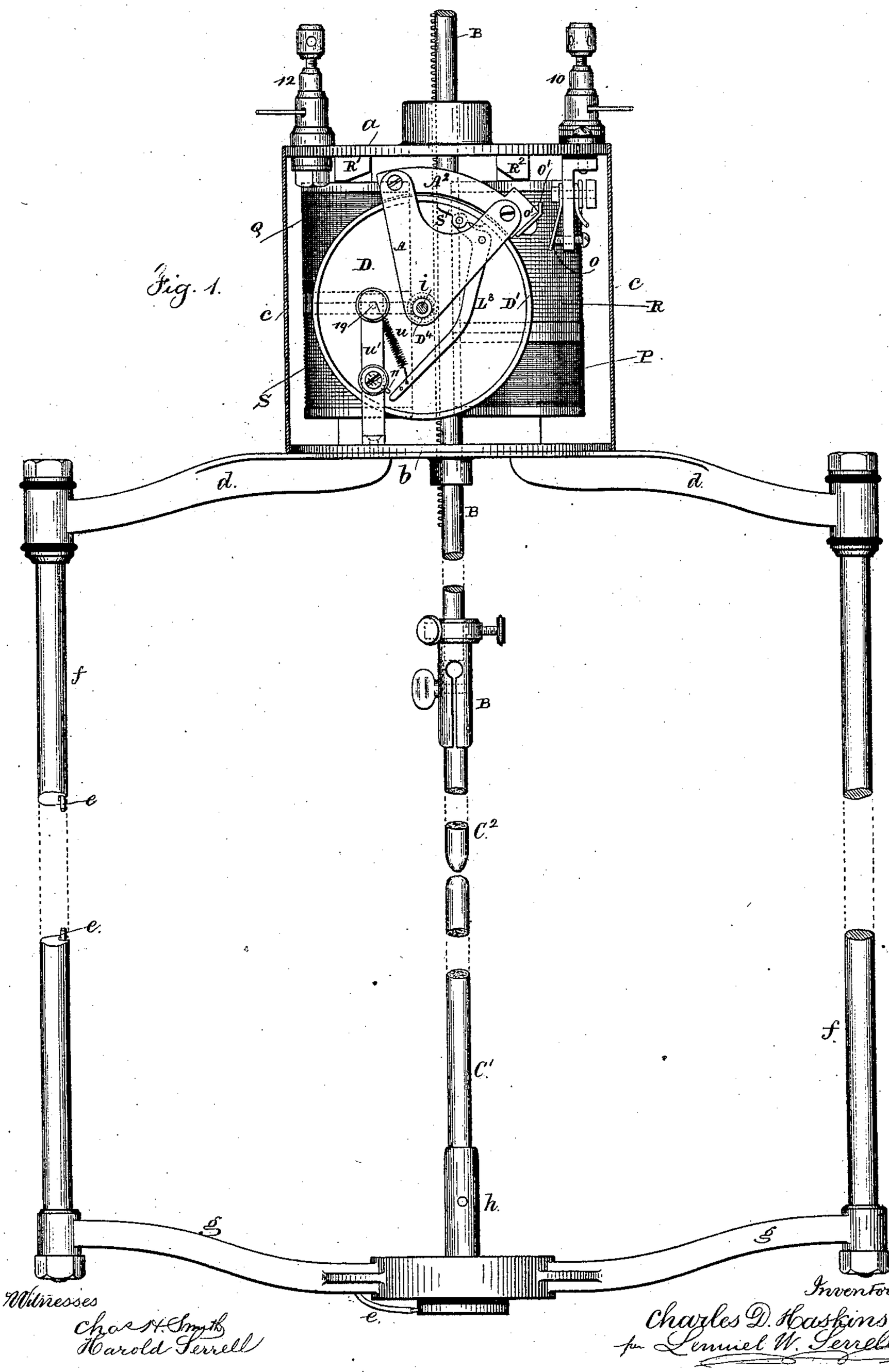
(No Model.) 2 Sheets—Sheet 1.

C. D. HASKINS.

ELECTRIC LAMP.

No. 283,482. Patented Aug. 21, 1883.

Fig. 1.



Witnesses
Chas. H. Smyth
Harold Serrell

Inventor
Charles D. Haskins
per Samuel W. Serrell Atty

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

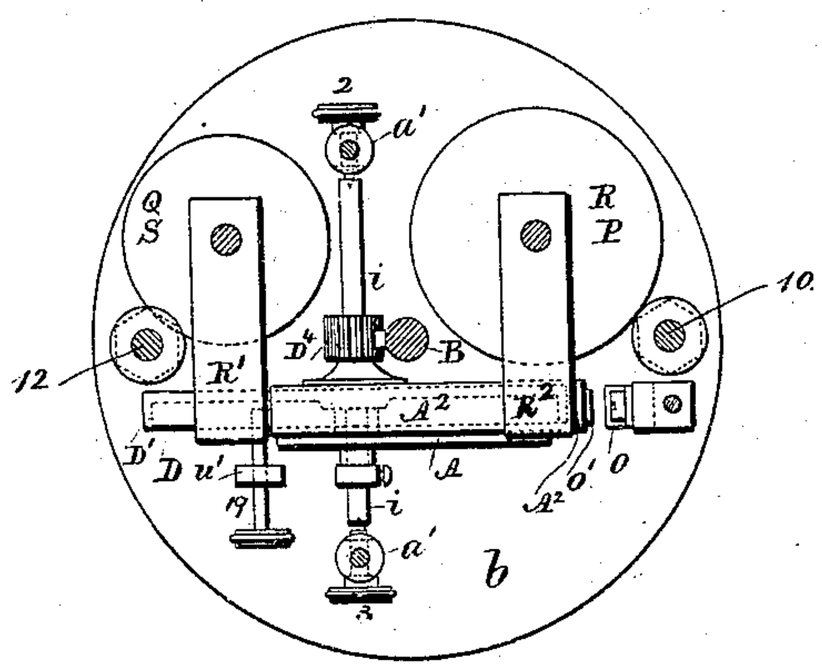
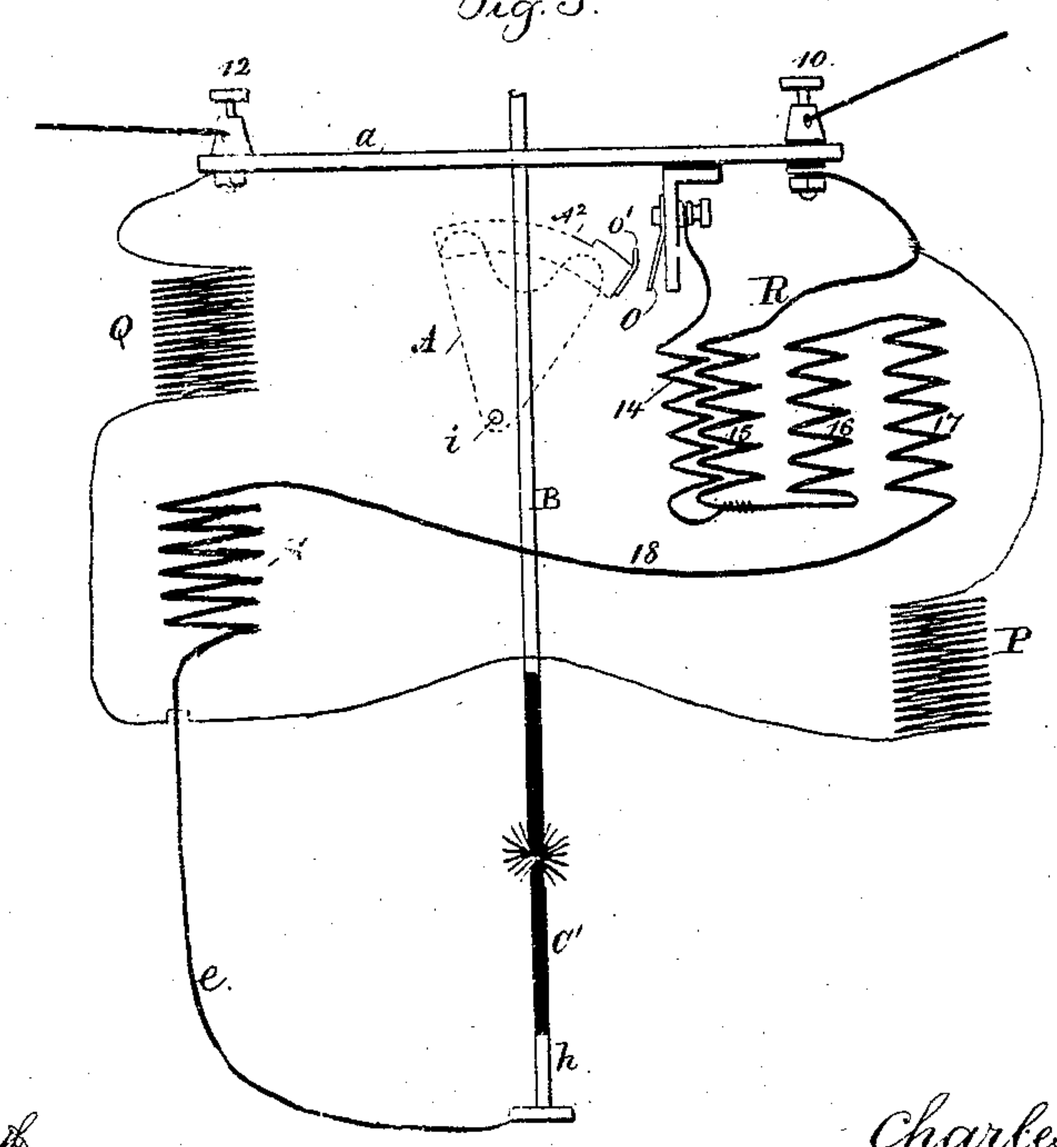


Fig. 3.



Witnesses
Chas. H. Smith
Harold Serrell

Inventor
Charles D. Haskins
per Lemuel W. Serrell
Atty

UNITED STATES PATENT OFFICE.

CHARLES D. HASKINS, OF NEW YORK, N. Y., ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 283,482, dated August 21, 1883.

Application filed January 29, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. HASKINS, of the city and State of New York, have invented an Improvement in Electric Lamps, of which the following is a specification.

The object of my invention is to employ but one magnet, and by it to raise the carbon for forming the arc, feed the carbon very gradually as the current to the carbons weakens, release the carbon-holder, so that it may slide down to restore contact, if broken, and then immediately separate the carbons by a powerful magnet and armature-lever as soon as the current passes through the lamp, and thereby draw the electric arc; and in case the carbon breaks or the lamp fails to work an automatic switch is brought into action to short-circuit the current between the + and — binding-posts and cut out the other parts of the magnet-helix; but the moment the current is re-established through the carbons the switch is moved and the shunt-circuit broken, so as to re-establish the lamp in its operation. All these movements are effected by one electro-magnet and the circuit connections for the same, as herein described.

In the drawings, Figure 1 is an elevation of the lamp mechanism, the carbons and frame being shortened. Fig. 2 is a plan below the top plate, and Fig. 3 is a diagram of the circuit connections and helices.

The top plate, *a*, and bottom plate, *b*, are connected by columns *a'* (not shown in Fig. 1) for greater clearness, and *c* is a movable case or cylinder inclosing the works. The top frame, *d*, extends from the plate *b* to the columns *f*, and the lower frame, *g*, is attached to said columns. The lower carbon-holder, *h*, is preferably insulated from the frame *g*, and the electricity passes to said holder by a covered insulated wire, *e*, that occupies grooves in the frames and column.

C' is the lower carbon, and C^2 the upper carbon.

B is the carbon-holder, having rack-teeth on one side, and sliding through the top and bottom plates, *a b*.

The friction-wheel D has a rim, D', as in my Patent No. 261,091, granted July 11, 1882. It is upon an arbor, *i*, that is supported by the pointed screw-bearings 2 and 3, entering the recessed ends of such arbor *i*. These screws adjust the arbor, but cause very little friction on the same, and said screw-bearings 2 and 3 pass through the columns *a'*.

Upon the arbor *i* there is a pinion, D^4, gearing to the rack-teeth on the carbon-holder B; or a strap may take the place of the rack-teeth, as in aforesaid patent.

Upon the arbor *i* the armature-lever A is pivoted. It has an armature-bar, A^2, that is in proximity to the lateral poles R' R^2 of the electro-magnet. This armature-lever is free to swing on the arbor *i*, and its downward movement is limited by contact with the adjustable limiting screw or switch *o*, there being a bracket on the plate *a* to hold such spring-switch, and a screw to adjust the spring. It is also preferable to have a contact-spring, *o'*, at the end of the armature. This spring *o'* comes into contact with the switch *o* when the magnetism ceases and the armature-lever falls. The switch *o* is insulated, and connected, as hereinafter described, to a helix that is in a shunt to the insulated positive binding-post 10. The negative binding-post 12 upon *a* is not insulated, and the current from the upper carbon-holder passes to this plate. So, also, does the current passing through *o* when the armature-spring *o'* drops into contact with the spring *o*.

Upon one arm of the armature-lever A is pivoted the lever L^3 of the friction-clamp *s*. There is a spring, *u*, that draws upon the longer end of the lever L^3, which spring is adjustable by the turn-shaft and cord 19, and there is a fixed stop, 11, extending out from the standard *u'*. The operation of this part is that the spring *u* holds the friction-clamp *s* in contact with the rim D', except when the longer end of the lever is pressed against the fixed stop 11, in consequence of the wheel D, rim D', armature-lever, and lever L^3 moving together in feeding down the carbon; and it will be apparent that, as the armature moves to the right and downwardly and the pinion feeds the carbon-holder B downwardly, the long end of the lever is pressed upon the fixed

stop, which causes said lever L^3 to draw the clamp off the rim and lessen its hold on the wheel D; and hence the rim of the wheel D slides over the clamp *s* and the carbon and holder will be fed down by gravity, the operation being similar to that in my aforesaid patent.

It will be apparent that when the lamp is in operation the movement of either the armature-lever or the lever-clamp will be very small, because as the armature-lever and wheel turn to the right and feed down the carbon the friction of the clamp is lessened by the contact of the lever L^3 on the stop 11, and the wheel D turns by the weight of the carbon-holder and the arc is lessened and the magnetism of the lateral poles R' R^2 is instantly increased, and the armature is attracted and moved to the left to draw the electric arc to the proper distance.

The mode of winding the helices of the magnet and the directions of the current will be apparent from the diagram and the following description: The current enters at 10 and divides, one portion going through the fine-wire helices P Q to the binding-post 12. The other part of the current passes through the coarse-wire helices R S and by the wire *e* through the carbon-holders and carbons and by the frame *a* to the post 12. The helices Q S are wound upon one core of the magnet, and the helices P R are upon the other core of the magnet. The helices R S are of but little resistance. Hence the larger portion of the current goes directly through these and the carbons. The helices P Q are of high resistance, and only a small current passes through them. These helices P Q R S are wound differentially on their respective cores, so that the magnetism set up by R S is lessened by that set up by P Q. Hence when the lamp is working in its normal condition the feed will be very delicate, the resistances and the mechanism being so adjusted as to maintain the proper length of arc. Thus, if the arc becomes too long the resistance thereof is increased and the magnetism set up by R S is lessened, while that set up by P Q is increased, and the armature A^2 is moved by the change of magnetism so as to feed the carbon; and when the arc between the carbons is too small the reverse condition prevails and the increased magnetism set up by R S moves the armature to draw the carbons apart and increase the arc. By these operations the electric arc is regulated with great accuracy.

I provide a helix, 14, preferably of german-silver wire wound around outside the helix R. I have shown the coils 15 16 17 of wire composing this helix R to illustrate that the wire from the binding-post 10 passes to the outer layer, 15, of the coils, and that the wire 18 to the coil S is connected with the inner layer. Of course the number of those layers may be more or less. The helix 14 is connected at one end with the outer layer, 15, of the helix R, and the other end is connected to the switch *o*. The direction in which the helix 14 is wound is preferably such that the current passing over the same neutralizes that set up by the current in passing through the helix 15. The consequence is that when a carbon breaks or the current through the carbons is interrupted by the carbon-holder sticking in its supports or otherwise, so that the magnet does not hold up the armature, the spring *o'* falls into contact with *o* and becomes a switch that short-circuits the current from 10 through helices 15 and 14, and by *o o'*, lever A, and plate *a*, to binding-post 12, thereby shunting the coils 16 17 of magnet R and the whole of S; but so soon as the carbons fall into contact or are moved by hand, or a new carbon inserted, the resistance of the german-silver helix 14 is sufficient to divert a portion of the current through 16 17 S *e*, and the carbons and the magnetism set up by the current in 16, 17, and S moves the armature A^2 and separates *o'* from *o*, and the parts are automatically restored to their normal working condition. The differential coils P Q render the feed more delicate and uniform, but these may be dispensed with. The helix 14, being wound so as to neutralize the magnetism set up by the current in the helix 15, prevents the magnetism from becoming sufficient to break the circuit at *o* until after the circuit through the carbons has been re-established. Thereby the current will not be pulsated, as it would be by the magnetism set up by the shunt-current breaking the circuit at *o*.

In improving my lamp I have discovered certain features in the operation of the devices and combinations of devices that were not fully apparent to me when making my application for Patent No. 261,091, and as said devices have not been in public use more than two years I include the same herein.

I claim as my invention—

1. The combination, in an electric lamp, of carbons and carbon-holders, an electro-magnet, armature, and mechanism for feeding the carbons, a switch operated by the armature when the current ceases to flow through the carbons, a shunt-circuit connection passing from the plus to the minus binding-post through the switch and through a helix wound around and in the reverse direction to one of the helices of the electro-magnet and joined to the said helix, substantially as set forth, so that when the current is interrupted at the carbons the shunt-current will pass through coils that neutralize each other and prevent magnetism or vibration of the switch, and thence by the switch to the negative binding-post; but when the carbons again come into contact a portion of the current passes through them and energizes the electro-magnet, and the shunt-circuit at the switch is broken and the lamp is automatically brought into action, substantially as specified.

2. The combination, in an electric lamp, of

the carbons, carbon-holder, the friction wheel and clamp, the armature-lever, the electro-magnet, the helices of which are in the circuit to the carbons, a switch operated by the armature, a helix connected with part of the helices of the electro-magnet, and serving to neutralize the magnetism set up by the portion of the helix that is included in the shunt-circuit between the + and — binding-posts when the current ceases to pass through the carbons, substantially as set forth.

Signed by me this 26th day of January, A. D. 1883.

CHAS. D. HASKINS.

Witnesses:
GEO. T. PINCKNEY,
CHAS. H. SMITH.