

(No Model.)

3 Sheets—Sheet 1.

J. E. GASTON.
ELECTRIC ARC LAMP.

No. 463,035.

Patented Nov. 10, 1891.

Fig. 1.

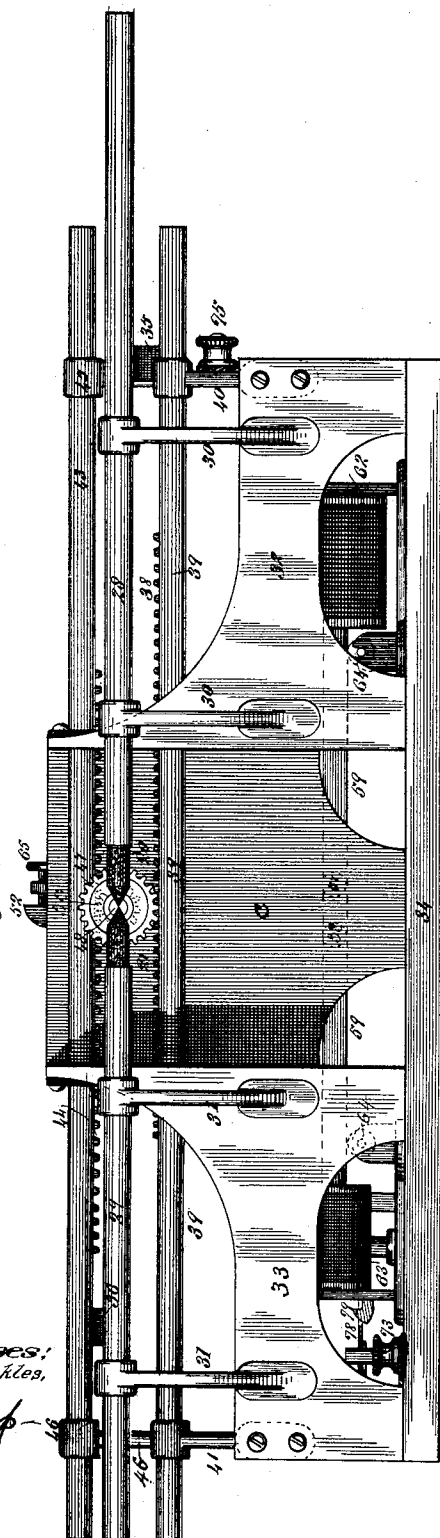
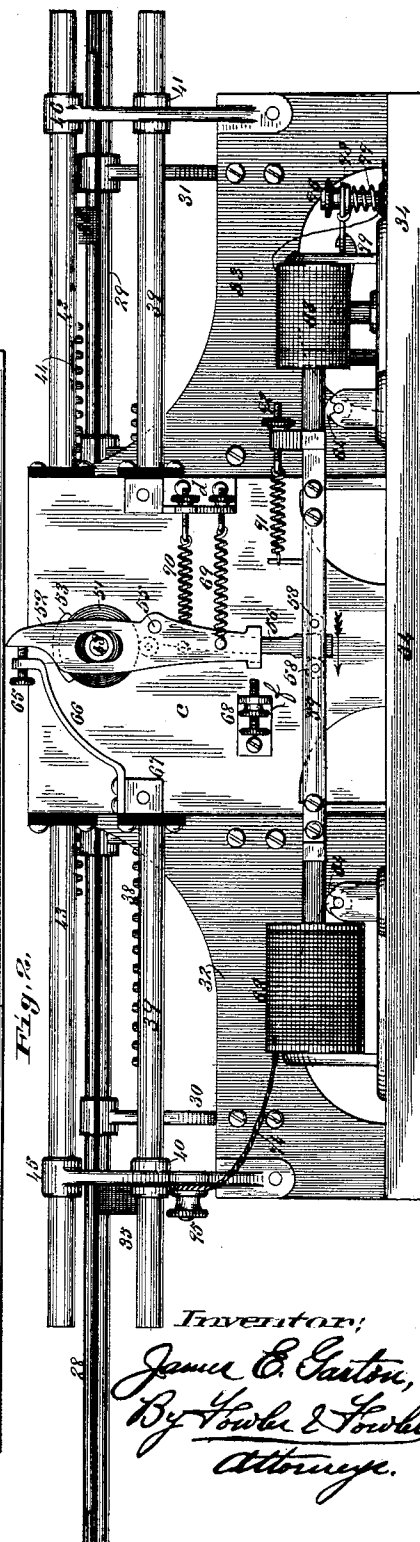


Fig. 2.



Witnesses:
Charles Richles,
G. Shoop

Inventor:
James E. Gaston,
By Fowler & Fowler
Attorneys.

(No Model.)

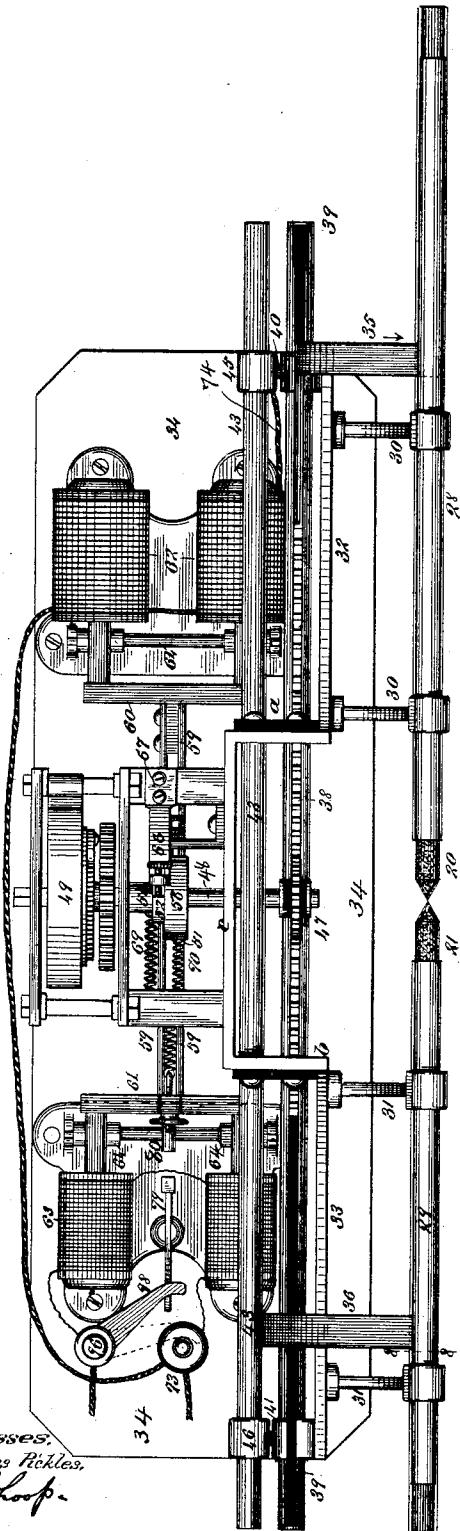
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Fig. 3



Witnesses:
Charles Rickles,
A. Shoop.

Fig. 5.

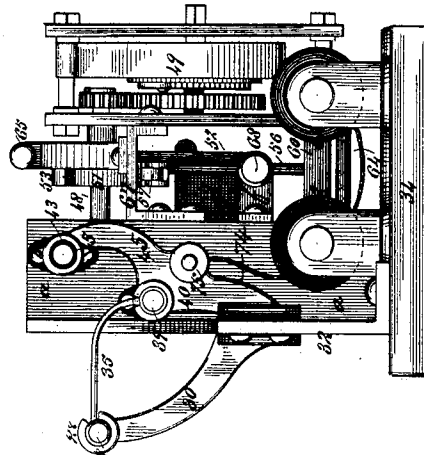


Fig. 4.

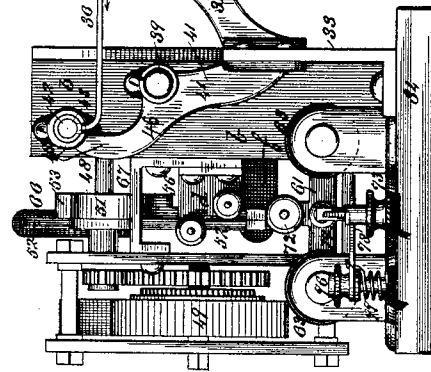


Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



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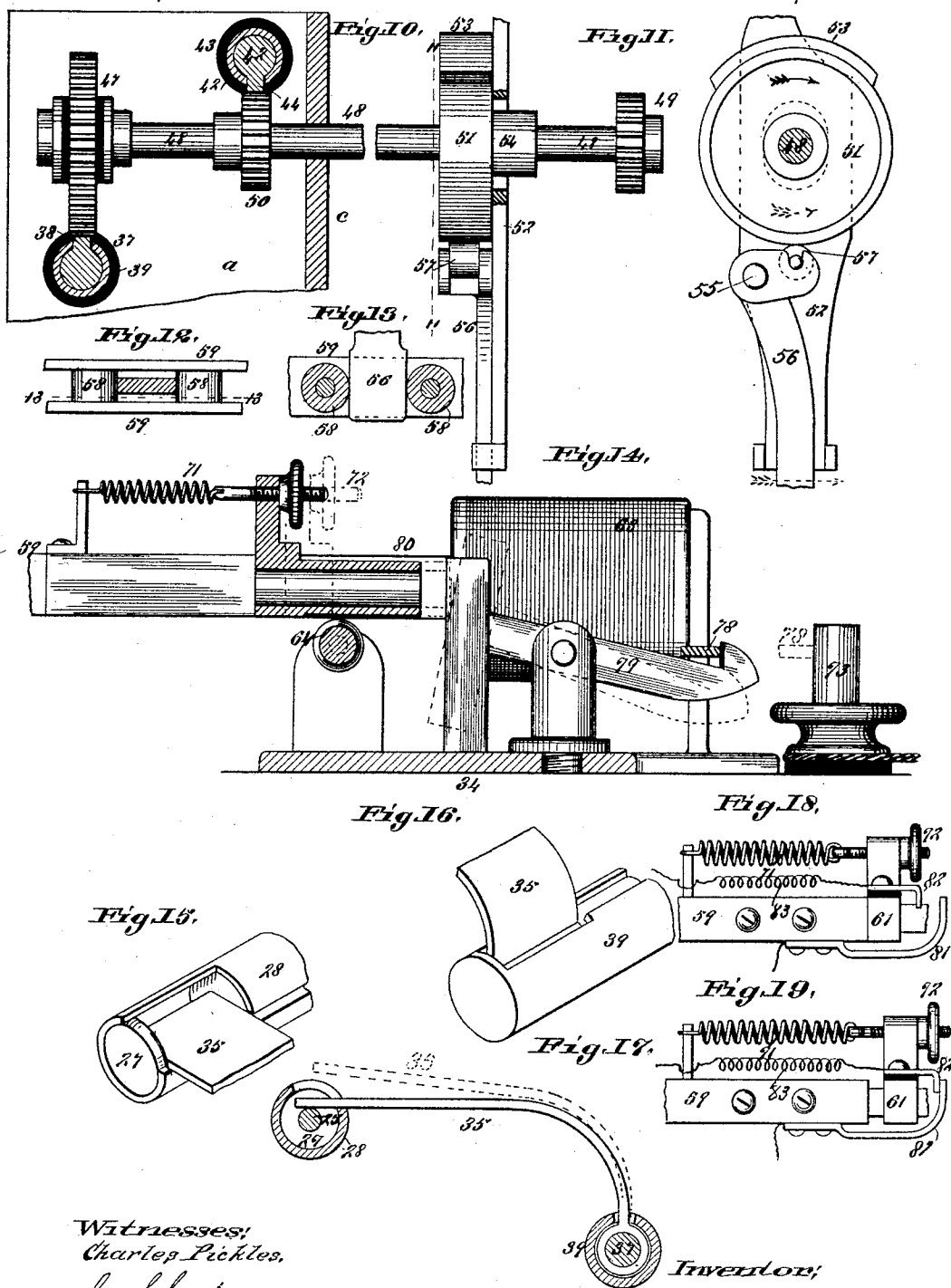
(No Model.)

3 Sheets—Sheet 3.

J. E. GASTON.
ELECTRIC ARC LAMP.

No. 463,035.

Patented Nov. 10, 1891.



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UNITED STATES PATENT OFFICE.

JAMES E. GASTON, OF SPARTA, ILLINOIS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 463,035, dated November 10, 1891.

Application filed January 15, 1891. Renewed October 17, 1891. Serial No. 409,054. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. GASTON, a citizen of the United States, residing at Sparta, Randolph county, in the State of Illinois, have
5 invented certain new and useful Improvements in Electric-Arc Lamps for Locomotive Head-Lights, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it ap-
10 pertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The present invention is designed as an improvement on an apparatus patented to me
15 on July 10, 1888, by United States Letters Patent No. 385,705.

The object of the invention is to render more certain and smooth the operation of the aforesaid-patented apparatus and at the same
20 time to simplify the construction thereof.

The invention will be best understood by referring to the accompanying drawings, making a part of this specification, in which drawings—

25 Figure 1 is a front elevation of my improved electric-arc lamp for locomotive head-lights. Fig. 2 is a rear elevation thereof, the clock-work at the back of the apparatus being removed to more clearly show the construction.
30 Fig. 3 is a plan view thereof. Fig. 4 is an end view of the same, looking from the left hand of Figs. 1 and 3 and the right hand of Fig. 2. Fig. 5 is an end elevation taken at the opposite end from Fig. 4, looking from
35 the right hand of Figs. 1 and 3 and from the left hand of Fig. 2. Figs. 6, 7, 8, and 9 are detail views, on an enlarged scale, of my improved carbon-holder, Fig. 7 being taken on the line 7 7 of Fig. 9, Fig. 8 being taken on
40 the line 8 8 of Fig. 9, and Fig. 9 on the line 9 9 of Fig. 6. Fig. 10 is a side elevation, on an enlarged scale, of my wheel and roller or shoe clutch for regulating the feed of the carbons. Fig. 11 is a sectional elevation thereof
45 on the line 11 11 of Fig. 10. Figs. 12 and 13 are views of details, Fig. 13 being taken on the line 13 13 of Fig. 12. Fig. 14 is a side elevation, partly in section, on an enlarged scale, of a cut-out for automatically switching the
50 lamp out of circuit under certain conditions. Figs. 15, 16, and 17 are detail views, on a greatly enlarged scale, of the carbon-support-

ing tube. Figs. 18 and 19 are views of modifications.

20 is the positive carbon, and 21 the negative one, both of which are adapted to be se- 55
cured to a carbon-holding device 22, consisting, preferably, of two semi-tubular jaws, one of which may be pivoted by a pin 23 to a plug 24 in the interior thereof. Into the plug 24 60
passes a screw-threaded rod 25, which carries a tapering plug or stopper 26 intermediate of the screw-threaded portion and the extreme outer end thereof, which is fashioned to form a knob 27. When the screw-threaded 65
rod 25 is screwed into the block or plug 24, the tapering plug or stopper 26 is drawn between the jaws of the carbon-holding device and forces the other end of the pivoted jaw of said device tightly against the carbon. By 70
screwing the rod outward the pivoted jaw relaxes its hold upon the carbon and the carbon may be withdrawn from the holder. The carbons and the carbon-holders are adapted to slide in slotted tubes 28 and 29, sustained 75
by brackets 30 30 and 31 31, supported, respectively, by upright frame-plates 32 and 33, extending from the base 34 of the lamp or by any other suitable means. The carbon 20 and its carbon-holder is controlled, preferably, by 80
a broad flat arm 35, which engages the carbon-holder between the knob 27 and the plug or stopper 26. The other end of the arm 35 is connected to mechanism, to be hereinafter described, for moving the carbon back and forth 85
to regulate the arc. The carbon 21 and its holder are controlled by a similar flat arm 36 in the same way as the carbon 20 and its holder. The outer ends of the slotted tubes 28 and 29 are cut away, as shown in Figs. 2, 90
3, 15, and 17, so that the arms 35 and 36 may readily be made to engage the carbon-holders.

The arm 35 is connected to a rod 37, which has a rack 38 cut upon it. The said rod slides in a slotted tube 39, supported at each 95
end by brackets 40 and 41, secured, respectively, to and insulated from the upright plates 32 and 33 of the lamp. The arm 36 is connected to a rod 42 and slides in a slotted tube 43, the same as the rod 37, and has a 100
rack 44 upon it. The slotted tube 43 is sustained at each end by brackets 45 and 46, extending from the brackets 40 and 41, respectively, previously referred to. The slotted

tubes 39 and 43 are sustained intermediate of their ends by side plates *a* and *b*, extending and insulated from the front plates 32 and 33 of the frame of the lamp and supported by the base-plate 34 thereof. The side plates *a* and *b* are joined by a central rear plate *c*, extending from the base 34 and forming a recess or niche at front containing parts now to be described.

The rack 38 of the rod 37 engages with a spur-wheel 47, arranged upon a shaft 48, which shaft has a tendency imparted to it to rotate in a given direction by a clock-train 49, that need not be described in detail, it being substantially the same as other clock-work mechanism used for a similar purpose. This shaft is journaled in the frame-plate *c* and clock-frame. Upon said shaft 48 is also a spur-wheel 50, at some distance from the spur-wheel 47 and one-half the size thereof. This spur-wheel 50 meshes with the rack 44 on the sliding rod 42. The clock-work mechanism, by the connections and gearing described, tends to drive the carbons in contact with each other and feeds the positive carbon through twice the distance that it does the negative carbon, owing to the fact that the spur-wheel 47, governing the feed of the positive carbon, is twice as large as the spur-wheel 50 controlling the feed of the negative carbon.

Upon the shaft 48, controlled by the clock-train, is a friction-wheel 51. Adjacent to this wheel is a vertical swinging lever 52, carrying at its upper end a brake-shoe 53, which normally bears on the periphery of the friction-wheel 51. The swinging lever 52 has an elliptical bearing on the hub 54 of the friction-wheel 51, so as to give it play up and down in a vertical direction. Pivoted to this swinging lever 52 at 55 is a bell-crank lever 56, carrying on the short arm thereof a friction roller or shoe 57, which is adapted to bear against the periphery of the friction-wheel 51.

The lower end of the bell-crank lever 56 is embraced between anti-friction rollers 58 58, carried by horizontal bars 59 59 of non-magnetic material secured to the yoke-pieces 60 and 61 of two oppositely-arranged magnets or solenoids, one of which 62 is arranged in the circuit of the main line and the other 63 in shunt-circuit from the main line. These magnets or solenoids are supported in any suitable way from the base-plate 34 of the lamp and are arranged but a slight distance above said base-plate. The cores of the solenoids are adapted to run upon anti-friction rollers 64, suitably supported from the base-plate 34. Normally the clock-train forces the carbons in contact with each other, and when the current is turned on the larger part thereof at first passes through the main coils 62 by way of the contacting carbons. This draws the bars 59 toward the main-line magnets or solenoids 62 and moves the bell-crank lever 56 in the direction of the dotted arrows shown

at the lower part of Fig. 11, so as to force the friction roller or shoe 57 up against the friction-wheel 51 and grip said wheel tightly between the brake-shoe 53 and said roller or shoe 57. Further movement of the bars 59 in the direction of the main magnet 62 will draw the bell-crank lever and the swinging lever 52 farther in the direction of the dotted arrow at the lower part of Fig. 11 and slightly rotate the friction-wheel 51 in the direction of the dotted arrow in said figure. This causes the carbons to separate, the movement being in the reverse direction to that of the clock-train movement illustrated by the arrows in full lines in Fig. 11. The arc having been drawn and the light established, part of the current now passes through the shunt-coils and draws the bars 59 in the reverse direction. When the carbons burn away, so as to make the arc too long and increase the resistance in the main circuit, the major part of the current traverses the shunt-coils and draws the bars 59 in the direction of the shunt-magnet 63, which takes off the clutch from the friction-wheel 51 and allows the clock-train to feed the carbons. The adjustment of the arc depends upon the regulating effect of the two oppositely-arranged solenoids in the shunt and main circuit, controlling the friction-wheel 51, either thereby restraining the tendency of the carbons to feed or permitting them to feed, or moving the carbons from each other.

The swinging lever 52 has an adjustable stop 65 at the top of the lamp, carried by an arm 66, secured to a bracket 67, fastened to the frame of the machine, and is also provided with a second adjustable stop 68, secured to the frame of the lamp by a bracket *f* for limiting its play in the other direction. The said swinging lever 52 is also furnished with a spring 69 for normally maintaining it in the required position. The bell-crank lever 56 is provided with a spring 70 for returning it to its original position. These springs 69 and 70 are secured to a suitable bracket *d* extending from the frame of the lamp.

Fastened to the movable bar 59 of the lamp is a spiral spring 71, the other end of which is secured to an adjusting-screw 72, carried by the yoke 61 of the shunt-magnets. The movable bar 59 is supported at this end by a reduced part *e*, which is adapted to slide back and forth through the yoke 61 and in the extension 80, to be hereinafter described. This spring acts independently of and in opposition to the springs 69 and 70, before referred to, and returns the parts to and maintains them in their normal positions.

The circuit enters the lamp by way of a binding-post 73, insulated from the base 34 of the lamp, and then proceeds direct to the main-line solenoid 62, and thence it passes by a wire 74 to a binding-post 75 in electrical communication with the carbon feeding-rod 37 and its slotted tube 39, whence the current is conducted by the arm 35 to

the carbon-holder and carbon 20, passing *via* the arc and the negative carbon through the frame and base of the lamp to a binding-post 76, which is in electrical communication with the other terminal of the main circuit. It will be understood, of course, that the binding-post 75, the slotted tube 39, and parts connected therewith, are carefully insulated from the frame of the lamp in order to prevent a short circuit. About the binding-post 76 is a spiral spring 77, that engages with a cut-out finger 78, which, through the instrumentality of said spring, tends to seek contact with the binding-post 73, but is restrained therefrom by a pivoted latch 79, against the other end of which is adapted to come an extension 80 from the yoke of the shunt-solenoids 63. Should the arc become too long and the mechanism fail to act, the current will be caused to traverse the shunt-magnets and will cause the extension 80 to strike against the pivoted latch 79 and let the contact-finger 78 come against the binding-post 73, and thus cut the lamp out of circuit, the current passing direct from the main line to the binding-post 73, and thence by way of the contact-finger 78 to the binding-post 76, which is in communication with the other terminal of the main line. The cut-out described is substantially similar to that set forth in my aforesaid patent.

In Figs. 18 and 19 I show a modification of cut-out which is the preferred form. In this modification there is a contact 81 secured to the moving bar 59, the free end of which comes opposite to a contact 82, which is carefully insulated. The plate 81 is connected to one terminal of the main line and the plate 82 to the other terminal of the main line through a suitable resistance 83. In other words, these contacts are connected in a derived circuit of the necessary resistance from the main line. The normal position of parts is that represented in Fig. 18. Should the arc become abnormally long and the mechanism fail to operate from any cause, the contact 82 will be drawn by the shunt-magnets against the contact 81. The current will then traverse the circuit named and the shunt-coils. When the carbons come together, the contacts described will be short-circuited and the current will pass through the main magnets *via* the carbons, the shunt-magnet being also short-circuited, so that it allows the spring 71 to draw the contact 82 away from the contact 81, and thus automatically cuts the lamp in circuit.

In the cut-out previously described the lamp can only be put in circuit after being automatically cut out by manually resetting the parts, but in the cut-out last described the lamp is automatically cut out and in circuit.

Having fully set forth my improvements,

what I desire to claim, and secure by Letters Patent of the United States as my invention, 65 is—

1. A carbon-holder for electric-arc lamps, consisting of two semi-tubular jaws suitably pivoted intermediate of their ends to a block within the interior thereof and adapted to receive the carbon at one end, a screw-threaded rod carried by said block, and a tapering plug upon said rod extending from the other end of the device, whereby the carbon may be gripped and released by turning said plug in one or the other direction. 70

2. The combination, in an electric-arc lamp adapted for a locomotive head-light, of two substantially horizontally-arranged carbons, slotted retaining-tubes for supporting and guiding said carbons in said tubes, a tubular carbon-holder for each carbon, consisting of two jaws suitably pivoted intermediate of their ends to a block within the interior thereof and adapted to receive the carbon at one end, a screw-threaded rod carried by said block, and a tapering plug upon said rod extending from the other end of the device, a knob carried at the outer end of said screw-threaded rod, and a swinging arm resting between said plug and knob and connected with the mechanism of the lamp for regulating the arc. 75

3. The combination, in an electric-arc lamp, of a suitably-impelled shaft, mechanism controlled thereby for feeding the carbons or holding them in contact, a friction-disk carried by said shaft, a loosely-swinging vertical lever carrying a brake-shoe bearing on said friction-disk and hung about said shaft, a second lever pivoted to the first-mentioned lever and adapted to grip the friction-disk between it and the brake-shoe, a horizontal bar controlling the last-mentioned lever, and magnets governing said horizontal bar, substantially as described. 80

4. The combination, in an electric-arc lamp adapted for a locomotive head-light, of two oppositely-arranged solenoids in main and shunt circuits, respectively, a horizontal bar between said solenoids, two horizontally-arranged carbons, a clock-train for feeding the carbons toward each other, and a brake mechanism consisting of vertical levers controlled by the movements of the aforesaid horizontal bar for restraining such action and for separating or moving farther apart the carbons to regulate the arc. 85

In testimony whereof I have hereunto set my hand and affixed my seal, this 10th day of January, 1891, in the presence of the two subscribing witnesses. 90

JAMES E. GASTON. [L. S.]

Witnesses:

DANIEL P. BARKER,
A. C. FOWLER.