(No Model.)

2 Sheets—Sheet 1.

W. G. LEVISON.

ELECTRIC LAMP.

No. 335,368. Patented Feb. 2, 1886.

Fig. 1.

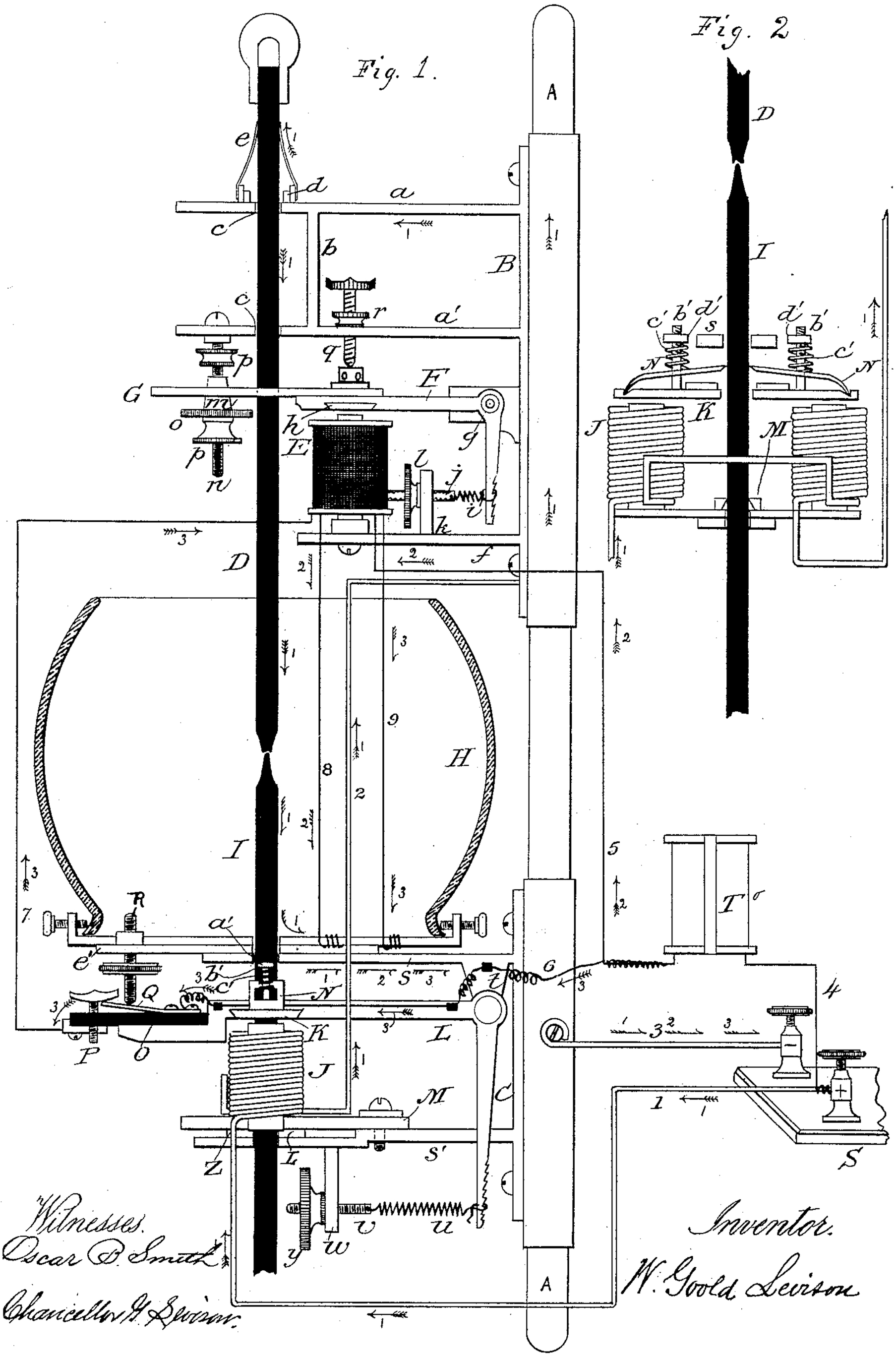

Fig. 2.

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2 Sheets—Sheet 2.

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Fig. 3.

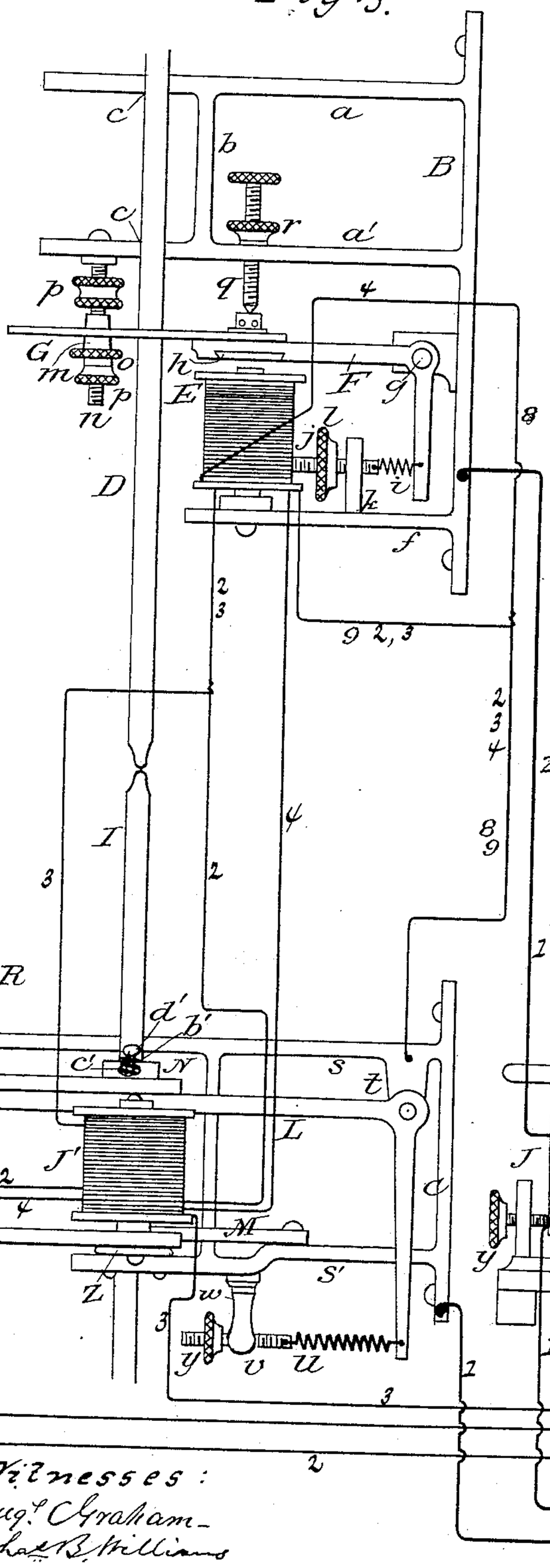
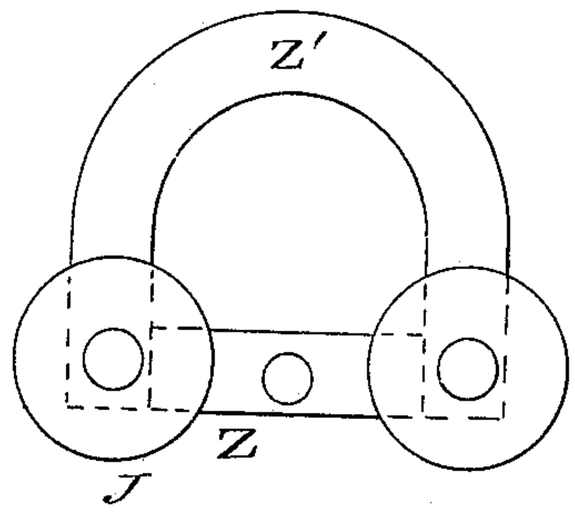


Fig. 4.



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UNITED STATES PATENT OFFICE.

W. GOOLD LEVISON, OF BROOKLYN, NEW YORK.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 335,368, dated February 2, 1886.

Application filed December 9, 1882. Serial No. 78,873. (No model.)

To all whom it may concern:

Be it known that I, WALLACE GOOLD LEVISON, of 314 Livingston street, city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Electric Lamps; and I hereby declare the following to be a full, clear, and exact description of my invention, such as will enable others skilled in the arts to which it belongs to make and use it, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to the class of electric-arc lamps known as "focusing lamps;" and it consists in the combination, with the positive carbon rod or rod-holder, of a spring-operated clutch connected with an armature within the influence of a differential shunt-circuit magnet, and capable of being released from the carbon rod by a fixed cone arranged to separate the arms of the clutch and release the carbon rod when the armature connected with the clutch is operated upon by the differential electro-magnet.

My invention further consists in the combination, with the negative carbon or carbon-holder, of a main-circuit electro-magnet, an armature-lever carrying a clutch engaging the negative carbon, a stationary clutch for holding the negative carbon after it is moved by the armature-lever, and a variable-contact-circuit breaker in the shunt-circuit controlled by the main-circuit magnet.

Figure 1 is a side elevation, partly in section, of my improved focusing lamp. Fig. 2 is a front view of the lower or negative carbon feeding mechanism. Fig. 3 is a side elevation of my improved focusing lamp with the variable-contact and circuit breaker removed therefrom, and Fig. 4 is a plan view of the main-circuit magnet.

Similar letters of reference indicate like parts in the different figures of the drawings.

The drawings represent a bracket-lamp embodying my improvements; but my invention is equally applicable to hanging lamps.

To a non-conducting back piece, A, are secured two brackets, B C, for supporting the upper and lower carbon feeding mechanism. The upper bracket, B, is provided with two horizontal parallel arms, *a a'*, connected by a bar, *b*, and provided with apertures *c*, for receiving and guiding the positive carbon D.

Around the aperture *c* in the arm *a*, on the upper side of the said arm, is formed a collar, *d*, to which is fitted a metallic brush, *e*, made of converging wires or strips of metal, and forming a complete electrical connection between the arm *a* and the carbon rod D.

Upon an arm, *f*, of the bracket B is placed a differential electro-magnet, E, having bobbins formed of two wires wound in opposite directions. A right-angled lever, F, fulcrumed on a stud, *g*, projecting from the back plate of the bracket B, carries upon its longer arm an armature, *h*, which is within the influence of the differential magnet E. The shorter arm of the lever F receives one end of a retractile spring, *i*, whose other end is secured to an adjusting-screw, *j*, projecting through a vertical stud, *k*, rising from the arm *f*, and provided with a milled nut, *l*, for adjusting the tension of the spring *i*.

To the top of the longer arm of the lever F, at the free end, is secured a forked clutch, G, which receives between its two arms the carbon rod D, and a conical sleeve, *m*, which is internally threaded and placed on a screw-threaded stud, *n*, projecting downward from the arm *a'*. The sleeve *m* is provided with a milled head, *o*, by which it may be turned, and above and below the sleeve *m* on the stud *n* are placed jam-nuts *p*, for binding the said sleeve in any desired position. The sleeve *m* is larger at its large end and smaller at its small end than the carbon rod D and the slot in the forked clutch G, so that when the said forked clutch is moved downward by the action of the differential magnet E on the armature *h* the fork will be spread and the carbon rod D released, and when the armature *h* is released from the magnet E the forked clutch G will be raised by the retractile force of the spring *i* out of contact with the sides of the sleeve *m*, first bringing the clutch-forks against the sides of the carbon-rod, and then lifting both the clutch and the carbon rod. The upward movement of the lever F is limited by a set-screw, *q*, passing through the arm *a'* and provided with a lock-nut, *r*. The upper arm,

s, of the bracket C supports a globe, H, and together with the arm s′ forms a guide for the lower or negative carbon rod, I, which passes through apertures in the said arms, and the apertures in these arms are in line with the apertures in the arms *a a′*, so that the carbon rods D I are axially in line with each other. The lower arm, s′, of the bracket C supports the main-circuit electro-magnet J, whose armature K is secured to the longer arm of a right-angled lever, L. The lever L is pivoted to a stud, *t*, projecting downward from the arm s, and its shorter arm is connected with one end of a retractile spring, *u*. The opposite end of the spring *u* is connected with a screw, *v*, extending through a stud, *w*, projecting downward from the arm s′. The screw *v* is provided with a milled nut, *y*, for adjusting the tension of the spring *u*. The yoke *z* of the electro-magnet J and the arm s′ are apertured to admit of the passage of the negative carbon I, and a curved auxiliary yoke, *z′*, is provided to compensate for the weakening of the yoke *z* by the aperture. The arm s′ is offset for the yoke *z*, and a forked clutch, M, is secured to the arm s′ and extends forward over the yoke *z*, resting thereon, and embraces the negative carbon rod I. The inner edges of the clutch M are angled, forming sharp corners to engage the carbon rod and hold it in the position to which it is raised by the feeding mechanism. The negative carbon rod I passes through an aperture in the armature K, and is engaged by two curved knife-edged clutches, N, whose outer ends rest in slots in the ends of the armature K, and whose inner ends engage opposite sides of the carbon rod I. Screw-threaded studs *b′*, projecting from the armature K, carry spiral springs *c′*, which are held under compression by nuts *d′* and press the clutches N into engagement with the carbon rod I.

To the free end of the long arm of the lever L is secured a block, O, of insulating material, carrying near its outer end a screw, P, the said block having attached to its upper surface a spring, Q, capable of touching the under surface of the head of the screw P. The under surface of the screw P and the upper surface of the spring Q, which contact with each other, are platinum-faced. The screw R projects downward from an insulating-plate, *e′*, attached to the arm *s* in position to touch the spring Q when the long arm of the lever L is raised by the retractile force of the spring *u*.

The lamp is ready for operation when both levers F and L are raised, the contact of the spring Q with the screw P is broken, and the carbons separated. The current from the generator S cannot then pass through the carbons, owing to their separation, neither can the current pass through wires 6, 7, and 8, because the contact between spring Q and the screw P is broken. It therefore traverses the continuous branch 4 and 5 and the inner part of the differential magnet E and return-wire 8, excites the said magnet, which instantly pulls down armature *h* and draws the clutch G down upon the cone *m*, spreading the arms of the clutch, and allowing the carbon rod D to drop into contact with the lower carbon rod, I. The main current is thereby directed through the carbons D I, the current passing from the generator S through wire 1, magnet J, wire 2, bracket B, brush *e*, carbon rods D I, and clutch M, bracket C, wire 3, back to the generator. The electro-magnet J, being excited, pulls down its armature K, releases the spring Q from the screw R, thereby allowing the said spring to touch the screw P and close the circuit of the shunt 6, 7, and 9, including the outer part of the differential magnet E. The power of the differential magnet is by this means neutralized, the armature *h* is released, the lever F rises and carrying upward the clutch G, which being disengaged from the cone *m*, clamps the carbon rod D, lifting the said rod, so as to produce the lighting-arc. The cone *m* and screw *q* are adjusted, so that the arc then produced is slightly less than the normal arc required; but after burning for a short time the arc lengthens and the main current weakens, thereby strengthening the current in both parts of the coil of the differential magnet E, but without producing any other effect upon the lamp. When the current weakens so far as to permit the spring *u* to raise the lever L, it carries up the negative carbon I a short distance, but not enough to restore the arc to its normal length, for before the lever L rises to its greatest limit the contact between the spring Q and the screw P is rendered light or actually broken, so that the current through the wires 6 7, the outer part of the differential magnet E, and the wire 9 is weakened, though not actually interrupted. In proportion as the current in this circuit is weakened the current in the constant branch is strengthened, and the core of the differential magnet E being energized draws down the armature *h* and lever F, carrying the positive carbon rod D downward until the arc is restored to its normal length. The contact between the spring Q and the screw P is seldom broken, but the current is varied by the variable contact between the spring Q and the screw P; but even though the circuit be broken at this point no appreciable spark occurs between the platinum surfaces, because the quantity of current that comes to this contact is limited by the resistance-coil T, and can be carried by the other or constant branch of the circuit. This feature of my device avoids the burning of the contact-surfaces, and thus obviates the principal objection to a circuit-breaker. By disengaging the clutches N the lower carbon will no longer be fed by the main feed-lever L, but the said lever will control the contact between spring Q and screw P, and the lamp will then be a simple non-focusing lamp, the upper carbon only being fed as consumed. When a single-feed lamp only is desired, the circuit-breaker of the variable-contact lever of the magnet can be removed

from the frame of the lamp and fixed at any distance away, the connections remaining the same. In either of these cases the tension of the spring *u* determines the length of the arc, so that by turning the nut *y* the arc of the lamp may be altered, even though the lamp may be distant from the adjusting device.

When the adjusting device is removed from the lamp, as described, an additional contact-spring, Q′, may be connected with the lever T, and an additional contact-screw, P′, may be inserted in the said lever, and this circuit-breaker may be connected with the three-wire high-resistance differential electro-magnet J′, Fig. 3, placed on the lower bracket, C, in the place occupied by the coarse-wire electro-magnet J in Fig. 1, and the lower-carbon-feeding mechanism already described is operated by the three-wire differential magnet J′. In this case the coarse-wire magnet J, carrying the main lighting-current, is removed from the lamp, as shown in Fig. 3, and operates the circuit-breaker which controls the upper and lower feeding devices operated by the differential magnets in the shunt-circuits, as described. The differential magnets J′ E are controlled by the contact-spring Q′ and contact-screw P′, carried by the lever T′, in a manner similar to that in which the differential magnet E, Fig. 1, is controlled by the spring Q and screw P. With this construction and arrangement the regulating of the arc may be accomplished at any point where the adjusting mechanism may be located, the regulation being effected by simply turning the adjusting-nut *y*, thus varying the tension of the spring *u*.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric lamp, the combination, in carbon-feeding mechanism constructed as herein specified, of a differential shunt electro-magnet having one part thereof in a constant shunt-circuit around the arc, the other part of the shunt electro-magnet being variable by the main-circuit magnet, substantially as shown and described.

2. The combination, in an electric lamp, of a variable branch of the differential shunt-magnet, and a contact-breaker worked by the main-circuit magnet and adapted to interrupt or vary the current flowing through the variable branch of the shunt-magnet, substantially as and for the purpose herein specified.

3. In the lower-carbon-feeding mechanism of an electric lamp, the combination of the forked clutch M, pivoted to a fixed support and having angled inner edges for engaging the carbon rod, and a plain-faced spoke, *z*, serving as a support to the free ends of the clutch-arms, substantially as herein shown and described.

4. In an electric lamp constructed as herein described, the combination of an armature-lever, L, adjustable spring *u*, armature K, carried by the lever L, electro-magnet J, arranged to act upon the armature K, the insulating-block O, carried by the armature-lever L, the spring Q, secured to the block O, the threaded block U, secured to the insulating-block O, and the platinum or carbon faced screw P, fitted to the block U and adapted to be touched by the spring Q to form a variable-contact or circuit breaker in the shunt 6 7, as herein specified.

5. The combination, in an electric lamp, of a differential magnet, a divided shunt including the said magnet, a variable-contact or circuit breaker placed in and controlling one branch of the said divided shunt, and means for operating the circuit-breaker, as specified.

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