No. 612,556. Patented Oct. 18, 1898.

C. A. VIGREUX & L. V. BRILLIÉ.

ELECTRIC ARC LAMP.

(No Model.) (Application filed Mar. 30, 1898.)

2 Sheets—Sheet 1.

Fig. 2

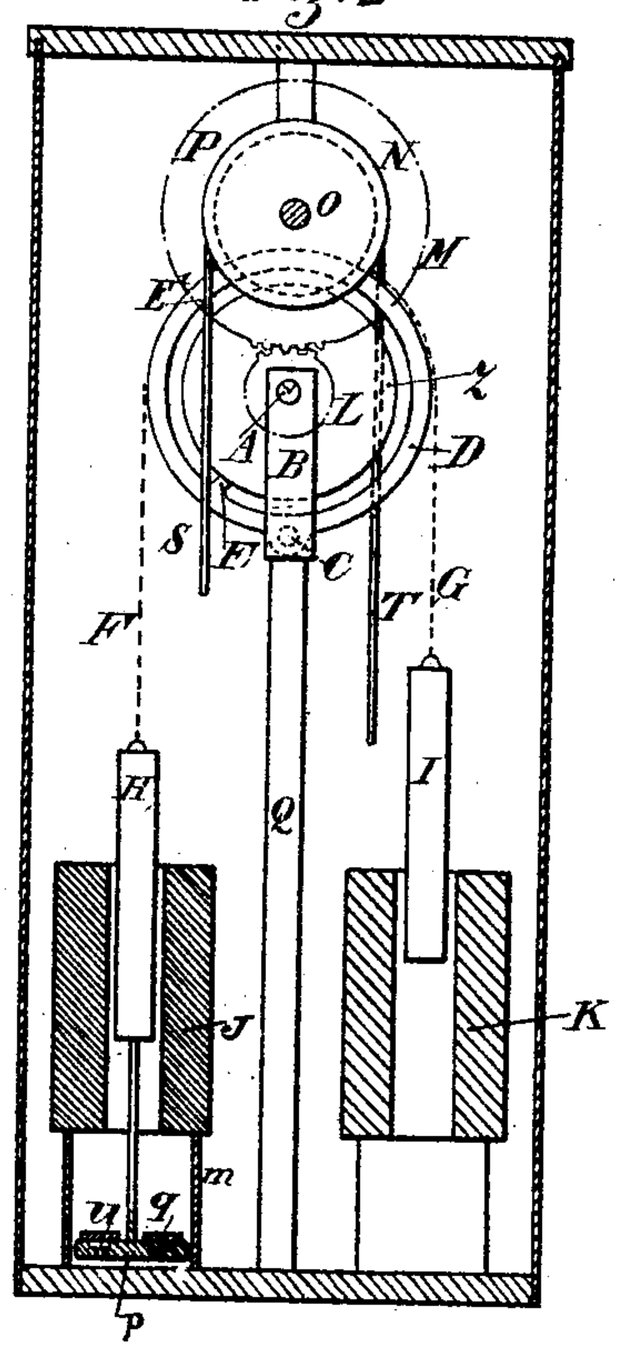

Fig. 3

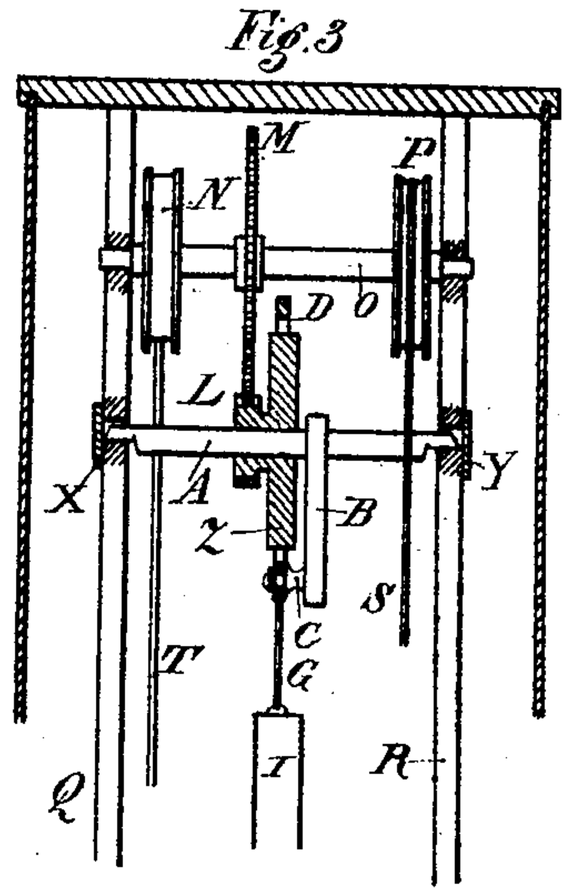

Fig. 8

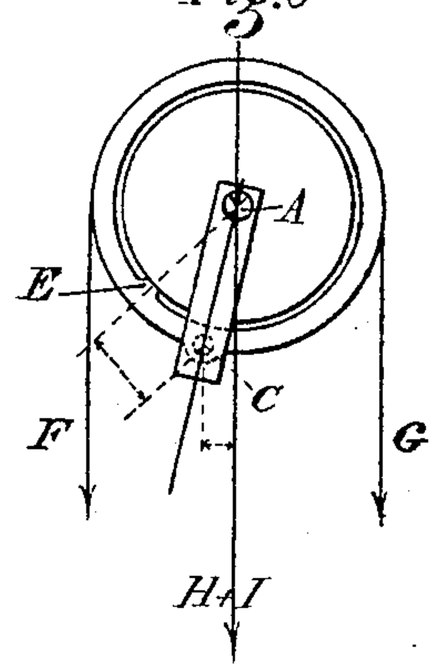

Fig. 1

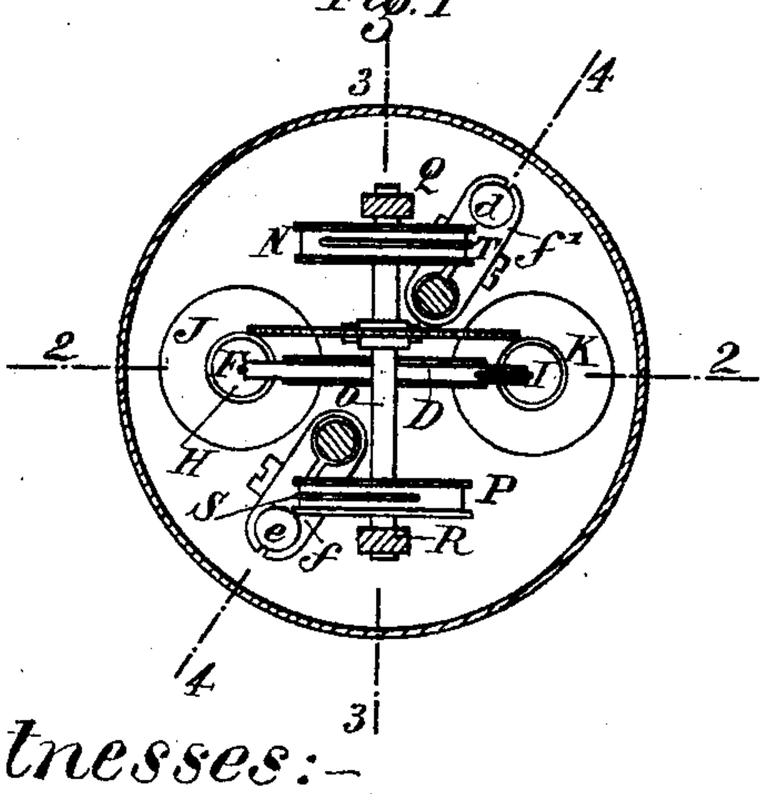

Fig. 9

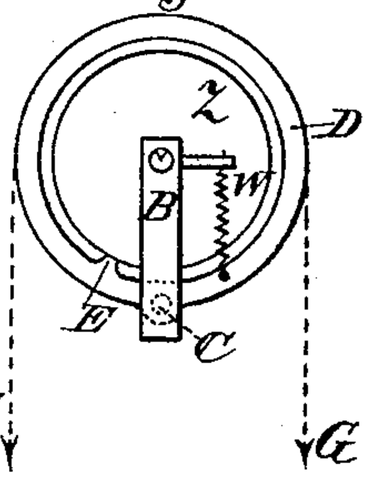

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Fig. 4

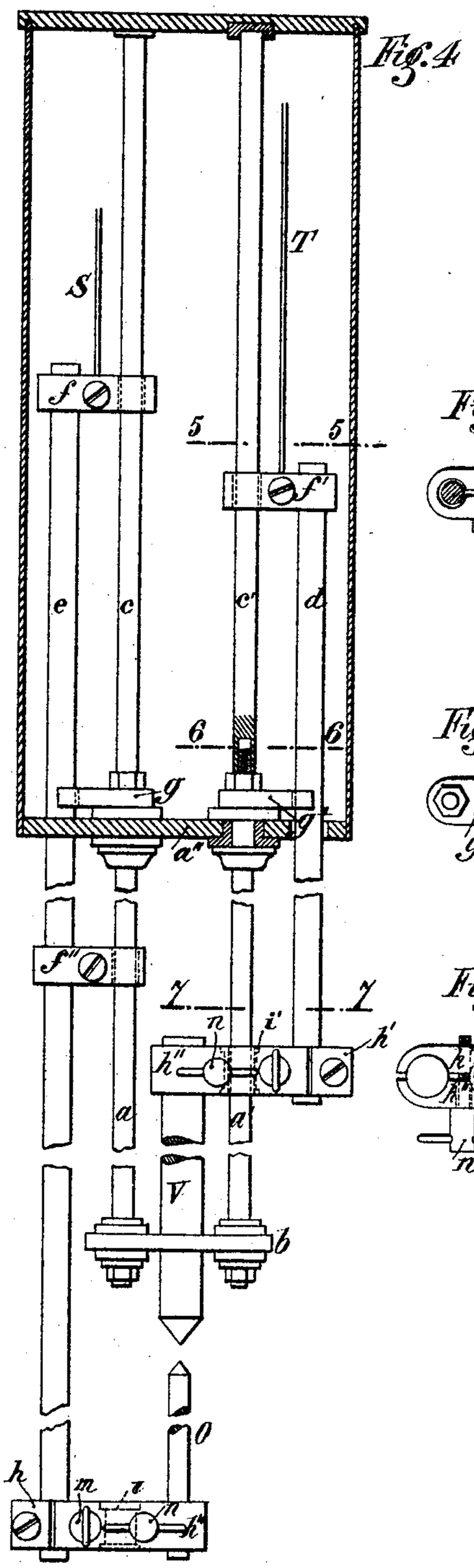


Fig. 5

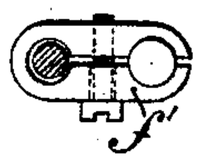


Fig. 6

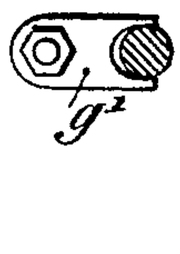


Fig. 7

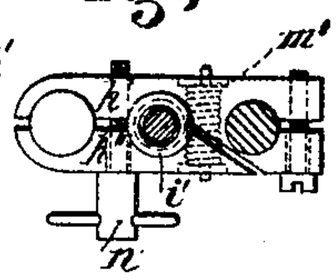
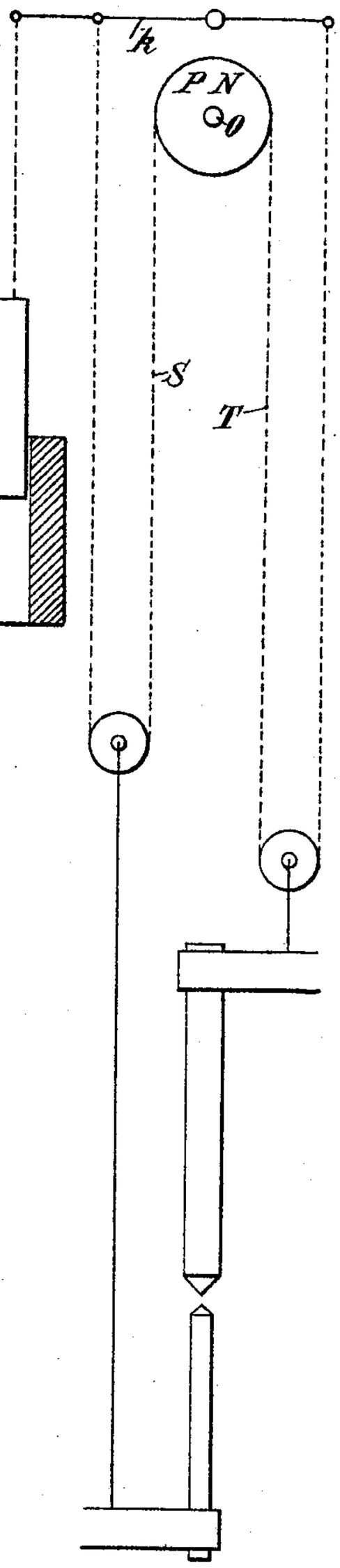


Fig. 10



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UNITED STATES PATENT OFFICE.

CHARLES ANTOINE VIGREUX AND LUCIEN VICTOR BRILLIÉ, OF LEVALLOIS-PERRET, FRANCE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 612,556, dated October 18, 1898.

Application filed March 30, 1898. Serial No. 675,661. (No model.)

To all whom it may concern:

Be it known that we, CHARLES ANTOINE VIGREUX and LUCIEN VICTOR BRILLIÉ, engineers, citizens of the Republic of France, and residents of 30 Boulevard de Villiers, Levallois-Perret, France, have invented a new and useful Improvement in Electric-Arc Lamps, of which the following is a specification.

This invention relates to arc-lamps in which the excess of weight of the upper-carbon holder over the lower one tends to turn a fly-wheel which is arrested by a brake-block that is controlled by one or more regulating-solenoids or electromagnets.

The essential feature of the present invention consists in the brake being rotatable around the axis of the fly-wheel and in being so arranged that the regulation is entirely independent of the coefficient of friction of the contact and of vibrations, &c., there being always an equilibrium between the solenoids and the weight of the carbon-holders and springs being dispensed with in the regulating mechanism.

We will now give a full description of our invention with the aid of the annexed drawings, which show an efficient means of performing the same, and in which—

Figure 1 is a horizontal section of the lamp-casing. Figs. 2, 3, and 4 are vertical sections through lines 2 2, 3 3, and 4 4 of Fig. 1, respectively. Figs. 5, 6, and 7 are sections through lines 5 5, 6 6, and 7 7 of Fig. 4, respectively, intended to show some details. Fig. 8 is a diagram to show the equilibrium conditions. Figs. 9 and 10 represent secondary arrangements which can advantageously be used in some cases.

In the example represented by the drawings the regulation is effected by two solenoids J K, one of which is in a shunt of the lamp-circuit while the other is in series with such circuit. The cores H I of these solenoids are each suspended from one of two cords, chains, or bands F G, coiled in contrary directions around a ring D, surrounding a fly-wheel Z, which tends to revolve under the action of the excess of weight of the upper-carbon holder, the ring having on its inner periphery a brake-block E, which can be made to act upon the periphery of the fly-wheel, so as to arrest or retard its rotation. The fly-wheel revolves loose upon its spindle A, and the surrounding ring is pivoted at one point C to one end of a radial arm B, the other end of which is fixed to the said spindle, and the brake-block is situated to one side of the ring's connection with the said arm. The fly-wheel is connected by suitable gearing L M with a spindle O, carrying two pulleys N P, on which are coiled in contrary directions the cords, chains, or bands T S, from which the upper and lower carbon holders are respectively suspended, so that when no current is passing through the lamp the excess of weight of the upper-carbon holder in bringing the carbons together causes the fly-wheel to be rotated in a certain direction.

The cores of the solenoids are so adjusted that the core H of the shunt-solenoid J is heavier than the other one, and consequently when no current is passing the former in descending raises the core I of the series solenoid K. By this motion the shunt-solenoid effects the turning of the before-mentioned ring D upon its pivot, so that its brake-block E (which is on the same side of the center line as the shunt-solenoid) is brought into a position in which it exerts no pressure upon the fly-wheel, so that this is free to revolve for bringing the carbons together. If now a current be passed through the lamp, the series solenoid in attracting its core I, and consequently drawing it downward, will effect the turning of the brake-ring on its pivot C, so as to bring the brake-block E into close contact with the fly-wheel Z, whereupon on the continued attraction and downward motion of the said core the ring will carry the fly-wheel around with it, at the same time raising the shunt-solenoid core H. By this rotation in the contrary direction of the fly-wheel this will, through its before-mentioned gearing, turn the pulleys supporting the carbon-holders, so as to separate the carbons until a state of equilibrium between the weight of the carbon-holders, that of the cores, and the attractive force of the two solenoids is brought about.

The sensitiveness of the above apparatus may be increased by supporting the spindle

A of the brake-ring upon the knife-edges at its center line, as this spindle only has an oscillating motion.

As the carbons burn away and the attraction of the series solenoid decreases, while that of the shunt one increases, the core of the former will again be drawn upward by the preponderance of the core of the latter, and the ring will be moved over, so as to cause the brake-block to more or less release its hold on the fly-wheel, whereupon this will be free to turn in allowing the carbons to approach each other until this approach is again stopped by the increasing attraction of the series solenoid. The practical effect of this action will be that there will be continual slight fluctuations in the pressure exerted by the brake-block on the fly-wheel, which will result in a practically continuous rotation of the fly-wheel in the direction for feeding the carbons together.

Either the one or the other solenoid can be replaced by a weight if the lamp is to work either entirely in series or entirely in shunt. If such a weight is used for a shunt-circuit lamp, it must of course be heavier than the core of the solenoid, and the brake will always be applied when the lamp is not working. In that case the weight must be capable of being lifted by means of an external lever for enabling the carbons to be changed.

For preventing the taking off of the brake-pressure in the position in which the ring is in unstable equilibrium a slight spring W, Fig. 9, is advantageously applied to the arm carrying the ring in such manner as to counteract such tendency. This spring, however, does not have any influence upon the above-described mode of regulation.

In some cases, in particular when the lamps are employed with currents of great intensity, the sensitiveness of the above-described regulating apparatus can be increased by increasing the displacement of the solenoid-cores relatively to that of the carbons. In this case as the carbons would not be moved sufficiently far apart on starting the lamp to produce the luminous arc a special solenoid connected in series is employed for producing the core. The core of this solenoid *j*, Fig. 10, is connected to one arm of a two-armed lever *k*, to which are connected the ends of the cords or chains S T, fixed to the pulleys P N, and having loops, with pulleys, from which the carbon-holders are hung, so that on the core being drawn downward on the passage of a current the resulting motion of the lever *k* and cords S T causes the separation of the carbons. If the starting-solenoid *j* is arranged to operate only with a current of greater strength than that with which the lamp works normally, it will not operate the above device after once starting the arc.

In order to obviate the irregular action of the arc in starting the lamp, such as occurs in all equilibrated arc-lamps, we provide below the above-described regulating shunt-solenoid J a closed cylinder *m*, in which works loosely a piston or disk *p*, connected by a rod to the lower end of the core H, which piston has passages *i* through it, closed at top by valve *q*, so that when the core is attracted by the shunt-solenoid it can move downward comparatively freely for liberating the fly-wheel and causing the approach of the carbons, as the air below the piston can pass through the valve-openings thereof; but when the core is drawn upward by the descent of the series-solenoid core for separating the carbons the piston will operate as an air-brake in controlling the speed of such motion. The cylinder and piston will also effect a certain braking action in both directions for small variations during normal working. The arrangement may also be applied to the series-solenoid core or to a lever-arm B on the spindle carrying the brake-ring instead of to the shunt-core.

The construction of the carbon-holders and their guiding appliances is as follows: From the top of the lamp-casing extend downward two guide-rods *c a c' a'*, connected by a transverse bar *b* at the lower end, on which rods are mounted sliding blocks *f f'*, to which the suspension cords, chains, or bands S T of the regulating apparatus are attached and which are fixed on the upper ends of another pair of rods *e d*, that carry at their lower ends the carbon-holders, of which the upper one has a hole by which it slides up and down the lower part of the guide-rod *a'*, while the rod *e*, carrying the lower-carbon holder, has fixed to it a second block *f''*, that slides upon its guide-rod *a*. In addition to these parts fixed forked guides *g g'* are also provided for the carbon-holder rods *e d* on the lower end of the casing inclosing the regulating mechanism.

The carbon-holders are formed as a pair of jaws *h' h''*, Fig. 7, pivoted together at the middle, their one end being adapted to receive the carbon between them, while the other end of the one jaw is attached to the above-mentioned rod *d* or *e*, and the tail of the second jaw is connected to the first one by a spring *m'*, tending to draw them together, and thus to open the end of the jaws that hold the carbon, these being drawn together by a thumb-screw *n* in opposition to the spring for nipping the carbon.

We claim as our invention—

1. In an arc-lamp, the combination of two carbon-holders, a brake fly-wheel, means to connect said fly-wheel to the carbon-holders, an arm suspended from the axis of the fly-wheel, a ring surrounding the fly-wheel and pivoted on the above-mentioned arm, a brake-block formed at the internal circumference of the ring, and means to electrically rotate the ring in order to regulate the pressure of the brake-block on the fly-wheel and thereby effect the regulation of the electric arc.

2. In an arc-lamp, the combination of two carbon-holders, a brake fly-wheel, means to connect said fly-wheel to the carbon-holders,

an arm suspended from the axis of the fly-wheel, a ring surrounding the fly-wheel and pivoted on said arm, a brake-block formed at the internal circumference of the ring, a spring applied between said arm and ring for releasing the brake-block, and means for electrically rotating the ring to regulate the pressure of the brake-block on the fly-wheel and thereby effect the regulation of the electric arc.

3. In an arc-lamp, the combination, of two carbon-holders, pulleys from which the carbon-holders are suspended, two cords, chains or bands coiled around such pulleys, a lever to which said cords, chains or bands are attached at one end, a solenoid the core of which is suspended from said lever, a brake fly-wheel, means to connect said fly-wheel to the other end of the above-mentioned cords, chains or bands, an arm suspended from the axis of the fly-wheel, a ring surrounding the fly-wheel and pivoted on the aforesaid arm, a brake-block formed on the internal circumference of the ring and means to electrically rotate the ring in order to regulate the pressure of the brake-block on the fly-wheel and thereby control the length of the electric arc.

4. In an arc-lamp, the combination of two carbon-holders, vertically-movable rods at the lower part of which the carbon-holders are fixed, sliding blocks fixed to said rods, stationary guiding-rods along which the sliding blocks move, stationary guiding-forks through which the movable rods pass, a brake fly-wheel, means to connect the fly-wheel to the above-mentioned movable rods, an arm suspended from the axis of the fly-wheel, a ring surrounding the fly-wheel and pivoted on the aforesaid arm, a brake-block formed on the internal circumference of the ring and means to electrically rotate the ring in order to regulate the pressure of the brake-block on the fly-wheel and thereby effect the regulation of the electric arc.

5. In an arc-lamp, the combination of two carbon-holders, a brake fly-wheel, means to connect said fly-wheel to the carbon-holders, an arm suspended from the axis of the fly-wheel, a ring surrounding the fly-wheel and pivoted on the above-mentioned arm, a brake-block formed at the internal circumference of the ring, means to electrically rotate the ring in order to regulate the pressure of the brake-block on the fly-wheel and thereby effect the regulation of the electric arc, an air-brake cylinder provided with a valve opening in one direction, and means to connect the piston of said air-cylinder to the above-mentioned ring.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 17th day of March, 1898.

CHARLES ANTOINE VIGREUX.
LUCIEN VICTOR BRILLIÉ.

Witnesses:
EDWARD P. MACLEAN,
ALCIDE TABE.