

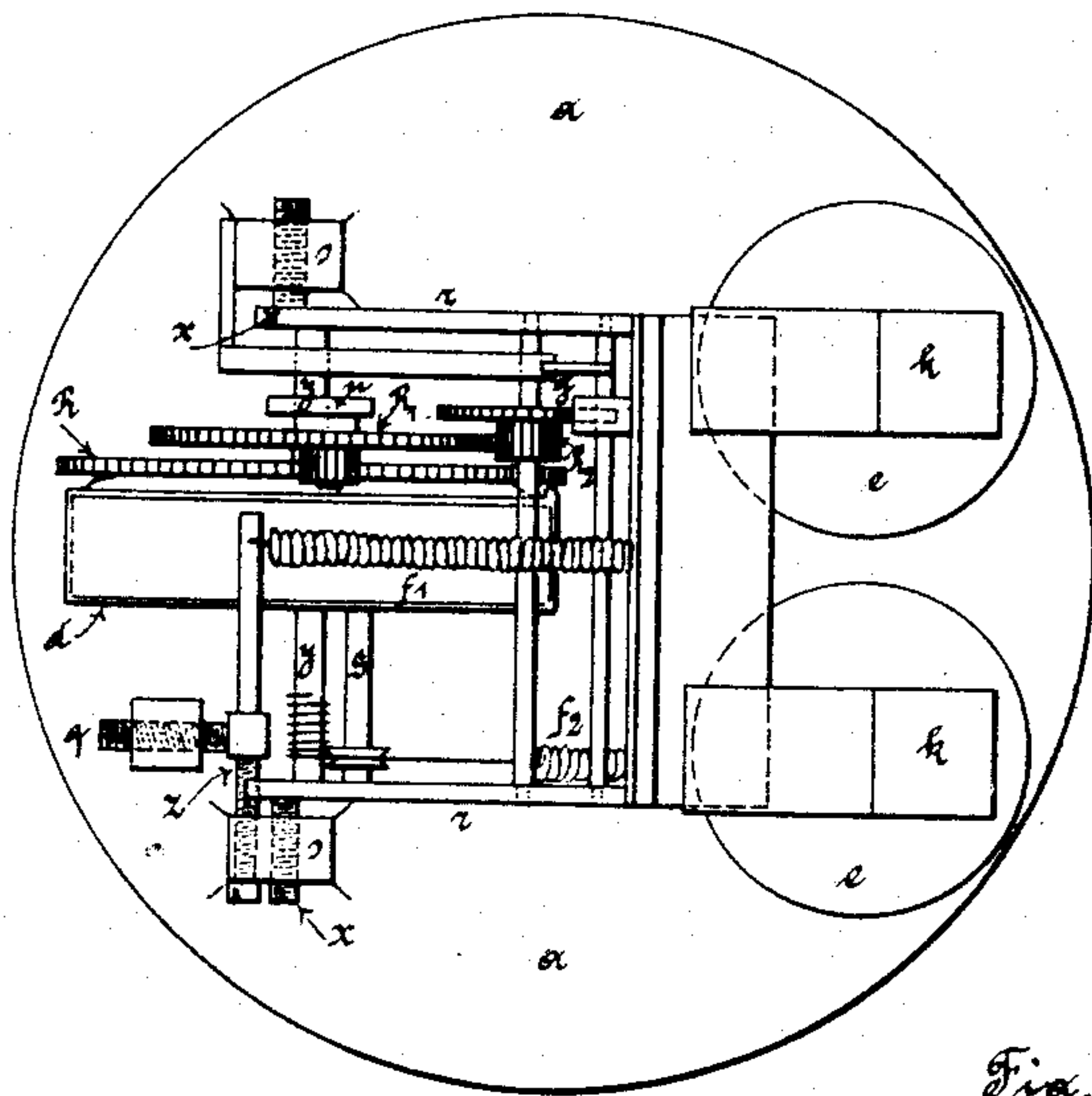
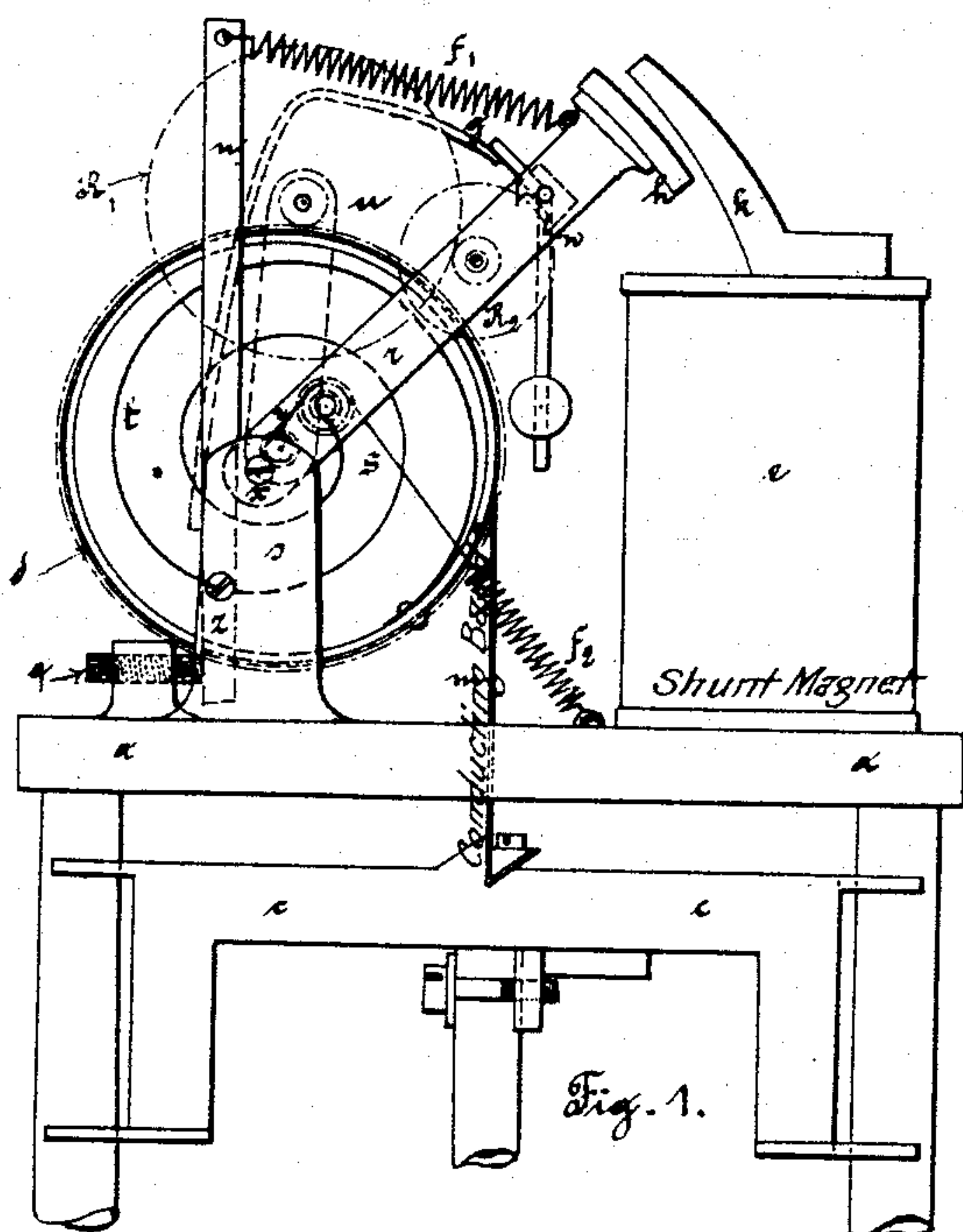
(No Model.)

F. VON HEFNER-ALTENECK & C. HOFFMAN.

ARC LIGHT.

No. 412,141.

Patented Oct. 1, 1889.



Witnesses;
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UNITED STATES PATENT OFFICE.

FRIEDRICH VON HEFNER-ALTENECK, OF BERLIN, AND CARL HOFFMANN, OF CHARLOTTENBURG, PRUSSIA, GERMANY.

ARC LIGHT.

SPECIFICATION forming part of Letters Patent No. 412,141, dated October 1, 1889.

Application filed April 5, 1889. Serial No. 306,051. (No model.) Patented in Germany June 25, 1887, No. 42,900; in Belgium November 16, 1887, No. 79,560; in France November 16, 1887, No. 187,029; in Italy December 31, 1887, No. 22,804; in Norway January 7, 1888, No. 854, and in Austria-Hungary September 25, 1888, No. 17,015 and No. 40,063.

To all whom it may concern:

Be it known that we, FRIEDRICH VON HEFNER-ALTENECK, a subject of the King of Bavaria, and a resident of Berlin, in the Kingdom of Prussia and German Empire, and CARL HOFFMANN, a subject of the King of Prussia and German Emperor, and a resident of Charlottenburg, in the Kingdom of Prussia and German Empire, have invented certain new and useful Improvements in Electric-Arc Lamps; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Figure 1 is a vertical projection of our improved lamp. Fig. 2 is a plan view.

The object of this invention (which has been patented in Germany by Letters Patent No. 42,900, dated June 25, 1887; in Belgium No. 79,560, dated the 16th day of November, 1887; in France No. 187,029, dated November 16, 1887; in Italy, No. 22,804, dated December 31, 1887; in Norway No. 854, dated January 7, 1888, and in Austria-Hungary No. 17,015, tome 38, folio 2,356, dated September 25, 1888, and No. 40,063, tome 22, folio 2,323, dated September 25, 1888) relates to improvements in electric-arc lamps; and it consists, mainly, in a shunt-circuit lamp in which the upper-carbon carrier C is suspended by a metal ribbon *m* or metal cord, which is coiled upon a drum *d*, turning on a shaft around the axle *y*, the said band *m* conducting the current into the carrier C. This drum, like the barrel of a clock, is provided with a spring *t*, which winds up the metal ribbon as soon as the upper-carbon carrier C is lifted. This carbon-carrier, however, is so heavy that if left free it will turn the drum toward the spring. Into the drum gears a wheel-work, the last shaft of which carries a fly-wheel and a pendulum, the latter having an escapement. When the frame *rr* is up—i. e., withdrawn by the spring *f* from the magnet *e*—the pendulum, hanging vertical, forces the escapement into the teeth of the wheel, and thus prevents its rotation, and consequently that of the drum, which is

geared thereto, and prevents a descent of the carbon-carrier.

The drum, with the wheel-work, is arranged in a frame *rr*, which near the center of the drum is pivoted at *xx* to standards *s*, carried by the plate or table *a* of the lamp. An electro-magnet *e e*, carried by the said plate *a*, on attracting its armature *h*, secured to the said frame, will turn this frame, which, by an adjustable spring *f'*, is drawn away from the electro-magnet. The said frame *rr* on being turned by the attraction of the armature will first cause the drum to turn so that the upper-carbon carrier is lowered, whereupon the frame, still continuing to turn, the pendulum *n* falls by gravity and hangs vertical, and is thus removed sufficiently far from the periphery of the wheel to permit the escapement on the pendulum to act, by which the wheel is permitted to turn tooth by tooth, and thus the drum slowly revolves, unwinding the metallic ribbon and lowering the upper carbon, till it enters into contact with the lower carbon. At this moment, however, the electro-magnet in shunt-circuit to the arc of light becomes currentless, as a short circuit for the electro-magnet has been closed through the carbons. The power exercised by the antagonistic spring *f'*, which tends to draw the frame back and to stop the motion of the wheel-work, as also by the retrocessive motion of the frame to turn the drum equally backward, will exceed the attraction force exercised by the magnet on its armature till the upper-carbon carrier has been lifted so far and the arc of light has become so extensive that by the electrical tension hereby increased near the arc of light the attraction of the electro-magnet on the armature *h* is in equilibrium with the tension of the antagonistic spring *f'*. If in the progress of burning, the arc of light is growing, and with it the tension near it, the frame *rr* will more and more become attracted by the electro-magnet and the upper-carbon carrier lowered till, finally, the stop-motion of the wheel-work is withdrawn and the upper-carbon carrier led downward proportionately to the carbons being consumed.

The clock-spring t in the meantime will speedily run off as the coupling $R' R^2$ is being disengaged.

It must be stated here that the nose of the clock-spring is secured to the pin S , which is screwed to the inside of the frame r . The end of the spring is secured to the inside of the drum d . It is apparent now, and may be seen from the drawings, that the spring, being wound up during the descent of the upper-carbon carrier, will act in the opposite direction as soon as the weight of said upper carrier is released. Now the wheel R rests on the piece u , mounted on its shaft y , the pinion of which piece u being in gear with the barrel-wheel R . The force of the unwinding-spring therefore presses the wheel R upon the coupling $R' R^2$. Hence the escapement during the rotation of the drum needs not to be moved, and of the copper band m such length is wound upon the drum as corresponds to the amount of lift of the upper-carbon carrier. If the carbon-carrier is set free, its weight presses, by the coupling $R' R^2$, the wheel R' into the pinion R^2 , and now ensues the checking action of the escapement.

To counterbalance the weight of the upper carbon a special device has been applied. The same consists in a small spiral spring f^2 , which, in the same proportion as the upper carbon gets shorter, becomes more and more stretched, and thereby draws down the frame $r r$ to the same amount to which the weight of the upper carbon is diminishing.

Having now described our invention and also the manner how and the means with which it is to be performed, what we claim, and desire to get secured by Letters Patent of the United States, is—

1. In an electric-arc lamp, the combination, with a carbon-carrier and a drum, of a flexible conductor of electricity carrying the carbon-carrier and wound upon the drum, from which it is unwound by the weight of the carbon-carrier, a reacting device connected with the said drum which winds the flexible conductor thereon when relieved of the weight of the carrier, a pivotally-mounted frame carrying the said drum, and a pendulous escape-

ment also carried by the frame and regulated in its operation by the inclination thereof, as and for the purposes described.

2. In an electric-arc lamp, the combination, with a movable carbon-carrier and a drum, of a flexible electrical conductor carrying the said carbon-carrier and wound upon the drum, from which it is unwound by the weight of the said carrier, and a reacting device connected with the said drum which winds the flexible conductor thereon when relieved of the weight of the carrier, as and for the purposes described.

3. In an electric-arc lamp, the combination of a pivoted frame, a carbon carried thereby, a spring drawing the frame in a direction opposite to that in which it is drawn by the weight of the carbon, and an auxiliary spring which, in the consumption and consequent loss of weight of the carbon, stretches and has its strength increased in proportion to the loss of weight of the carbon, as and for the purposes described.

4. In an electric-arc lamp, the combination, with a movable carbon-carrier, of an electromagnet in shunt-circuit to the lamp, a pivoted frame forming an armature for the said magnet, a drum provided with an escapement mounted in the said frame, and a flexible electrical conductor wound upon the said drum and carrying the carbon-carrier, as and for the purposes described.

5. In an electric-arc lamp, the combination, with a movable carbon-carrier, of an electromagnet in shunt-circuit to the lamp, a pivoted frame forming an armature for the said magnet, a drum provided with an escapement mounted on the said frame, a flexible electrical conductor coiled upon the said drum and carrying the carbon-carrier, and a reacting device opposed to the attraction of the said magnet, as and for the purposes described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRIEDRICH VON HEFNER-ALTENECK.
CARL HOFFMANN.

Witnesses:

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