(No Model.)

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## ELECTRIC ARC LAMP.

No. 328,022. Patented Oct. 13, 1885.

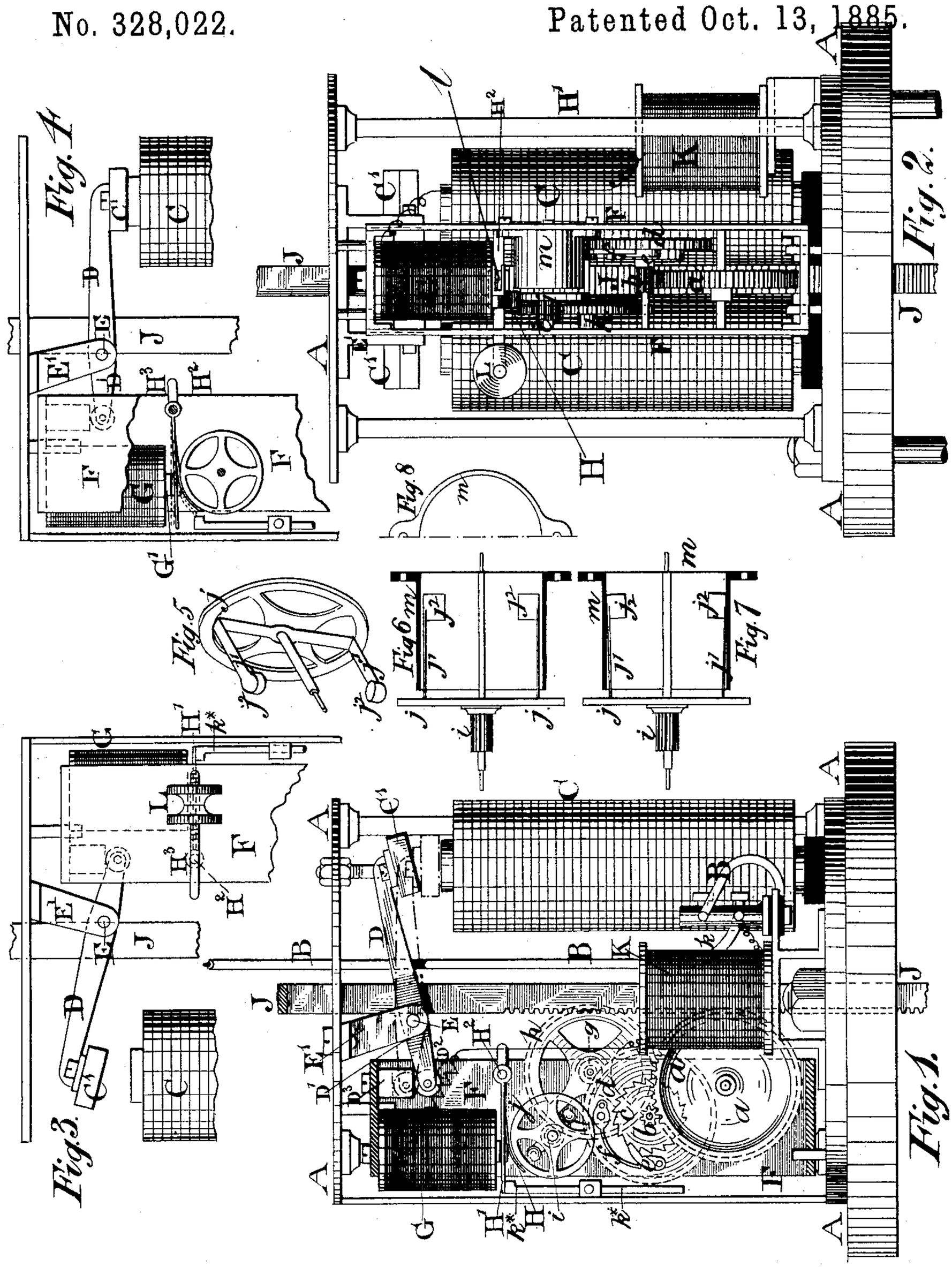

Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.

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# UNITED STATES PATENT OFFICE.

ALEXANDER LESLIE FYFE AND JOHN MAIN, OF BRIXTON, COUNTY OF SURREY, ENGLAND.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 328,022, dated October 13, 1885.

Application filed August 21, 1883. Serial No. 104,283. (No model.) Patented in England September 2, 1881, No. 3,821, and in Germany April 18, 1882, No. 22,292.

*To all whom it may concern:*

Be it known that we, ALEXANDER LESLIE FYFE and JOHN MAIN, subjects of the Queen of Great Britain, residing at Brixton, in the county of Surrey, England, have invented certain new and useful Improvements in Electric-Arc Lamps, (for which we have received Letters Patent in Great Britain, No. 3,821, dated September 2, 1881, (of which the following is a specification.

This invention has for its object improvements in electric-arc lamps; and it consists in mechanism actuated by the electric current, whereby the voltaic arc and the feed of the carbons are automatically maintained uniform.

In the accompanying drawings, Figure 1 is a front elevation of the mechanism of a lamp, and Fig. 2 an end elevation thereof. Fig. 3 is a part elevation of the back side of the lamp, showing the lowest position of the gearing-frame. Fig. 4 is a part elevation of the front side of the lamp, showing the gearing-frame in its highest position. Fig. 5 is a perspective view of the fly-wheel. Figs. 6 and 7 are vertical sections through the cylinder with the fly-wheel. Fig. 8 is a half end view of said cylinder.

Our invention will be best understood with reference to the drawings, where similar letters of reference indicate corresponding parts.

The current is directed to the lamp-case A, and that of the opposite polarity by the lead B to the electro-magnet C. The purpose of the electro-magnet C is to establish the arc by attracting the armature C′, secured to the lever D, which is pivoted at E, to the bracket E′, and the opposite end, D′, engages with the gearing-frame F. This gearing-frame is raised vertically by the attraction of the armature C′ to the electro-magnet C, opposite the fulcrum. The gearing-frame F contains a solenoid, G, a brake, H, and a train of wheels. The first wheel, *a*, of the train of wheels gears into the rack formed on the one side of the carbon-holder J. The wheel *a* drives the pinion *b*, on whose axis is keyed a ratchet-wheel, *c*, while mounted freely on the axis is a toothed wheel, *d*, which carries a pawl, *e*, and a spring, *f*, bearing on said pawl *e*, to cause the same to engage with the teeth of the ratchet-wheel *c*, by the adaption of which the carbon-holder J can be raised to insert a new carbon without rotating the wheels. The toothed wheel *d* of the train engages with the pinion *g*, and the spur-wheel *h* engages with the pinion *i*. On its axis is mounted a fly-wheel, *j*, having a smooth periphery, which being the last of the train revolves at a very high velocity by reason of the descent of the carbon-holder J.

The solenoid G, before referred to, is in a shunt-circuit. One end of the wire is connected to the coupling *k* of the lead B, and before being coupled to the said solenoid G it is connected to the high-resistance coil K, so that when the resistance of the arc exceeds that of the electro-magnet C and the resistance-coil K, sufficient current will pass through to excite the solenoid G and so release the brake H, and the carbon-holder J will descend by its own weight and feed the carbons until the resistance of the arc is again less than that of the shunt-circuit, then the solenoid G will be inactive and the brake H be applied to the periphery of the fly-wheel *j*. In the normal position of the armature C′ and gearing-frame F, when little or no current is passing through the lamp, the projecting part H′ of the brake H makes contact with an adjustable stop, *k**, and the brake H is raised from the periphery of the fly-wheel *j*. The short end D′ of the armature-lever D carries a small truck, $D^2$, which bears against the under side of the block $D^3$, secured on the gearing-frame in order to lessen the friction when the gearing-frame F is being raised, and by the attraction to the electro-magnet C of the armature C′, the one end H′ of the brake is raised from contact with the stop *k**, and the brake H thereby caused to bear on the periphery of the fly-wheel *j*. Fig. 3 is a part elevation of the opposite side of the lamp with the gearing-frame F in the normal position and the detent H′ in contact with the stop *k**.

The brake H and detent H′ are made out of one piece of flat metal and pivoted at $H^2$, and projecting therefrom is a wire, $H^3$, brought around to the opposite side of the fulcrum $H^2$, and provided with a pair of nuts, L, to determine the pressure of the brake H on the fly-wheel *j*, when the gearing-frame F is in the

position shown at Fig. 4. In this figure the gearing-frame is shown raised or in the working position and the arc established. The core G′ of the solenoid G is provided with an opening, *l*, on the one side, which embraces the detent portion H′ of the brake H, so as to raise it to the position assumed when part of the current is passing through the solenoid G, whereby the feed of the carbons is effected.

In order to obviate a too sudden feed, we propose to further control the rotation of the train of wheels, in addition to the brake H, by applying a governor on the fly-wheel *j*, as shown in Figs. 5, 6, and 7. Fig. 5 is a perspective view of the fly-wheel *j*, provided with very light governing-arms *j′*, which carry at their ends each a small governor $j^2$. These arms *j′* revolve within a cylinder, *m*. (Shown in section at Figs. 6 and 7, and in half-end elevation at Fig. 8.) When the gearing is not rotating, these arms *j′* assume the position shown at Fig. 6, but when the fly-wheel *j* and its arm *j′* are revolving, when the brake H is released, then by centrifugal action the free ends $j^2$ of the arm *j′* will descend from the horizontal line and rub on the interior surface of the cylinder *m* during its revolution, and so retard to the desired extent the rotation of the train of wheels. It will thus be seen that the disadvantages of too great a speed of the fly-wheel, and a quick feed of the carbons is obviated.

I am well aware that governors in shape of fly-wheels with centrifugal arms rubbing against the inside periphery of a friction-cylinder have already been in use in telegraph apparatus, and I hereby disclaim the same; but

What I claim is—

In electric-arc lamps, in combination, the electro-magnet C, within the main circuit operating the armature C′ on end of the fulcrumed lever D D′, said lever engaging, by means of truck $D^2$, the gearing-frame F, the train of wheels *a b d g i* mounted therein, with the fly-wheel *j* and ratchet-wheel *c*, with pawl *e* and spring *f*, the fly-wheel with centrifugal arms *j′ j²*, *j′ j²* rubbing against inside of friction-cylinder *m*, said fly-wheel with frictional periphery, against which bears the brake H, which is operated by detent H′ and core G′ of solenoid G, said solenoid attached to gearing-frame and inserted together with the resistance-coil K within a shunt-circuit, all substantially as shown and described, and for the purpose to operate as set forth.

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Witnesses:
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