(No Model.) 2 Sheets—Sheet 1.

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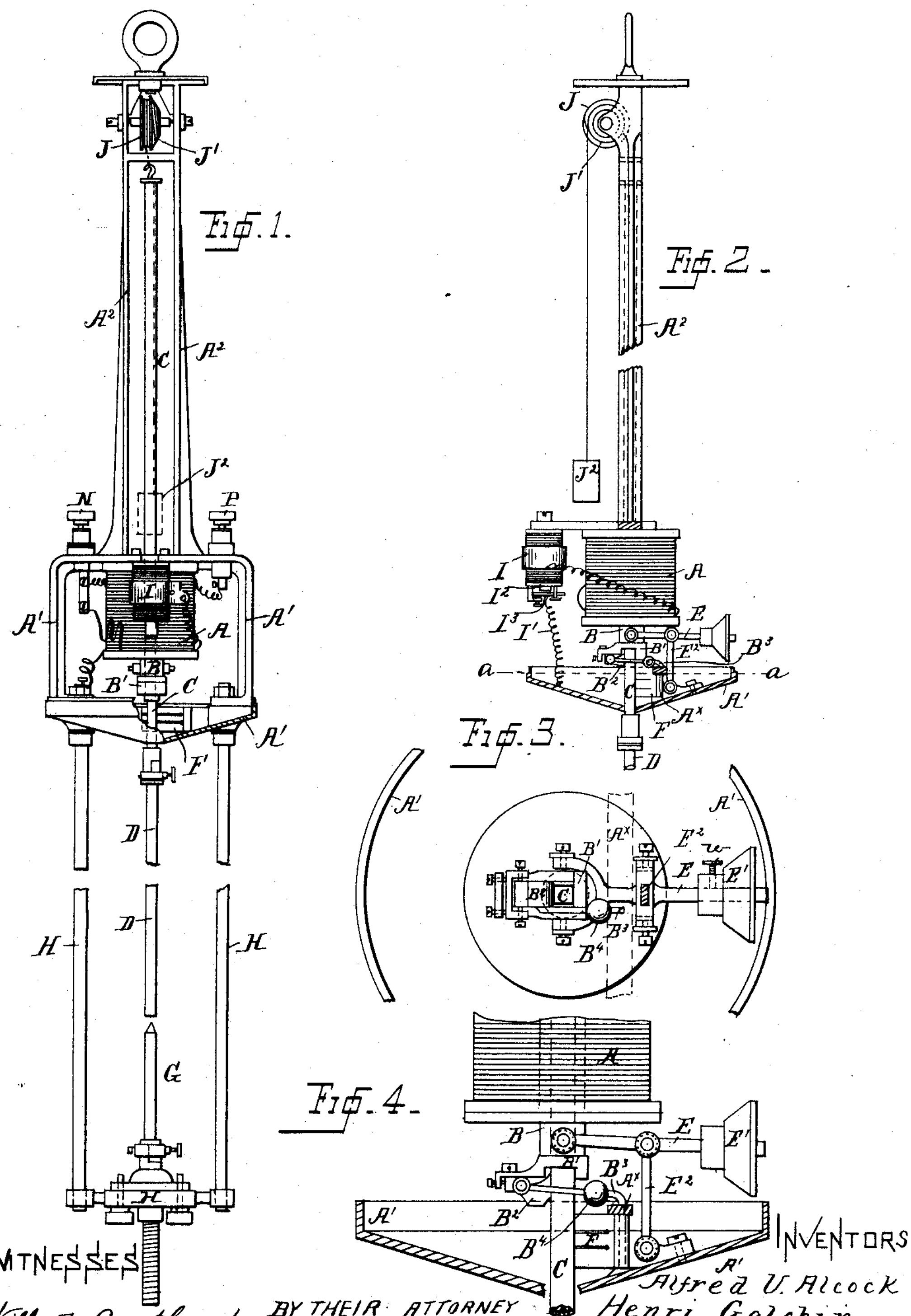
ARC LAMP.

No. 430,260. Patented June 17, 1890.



WITNESSES

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BY THEIR ATTORNEY

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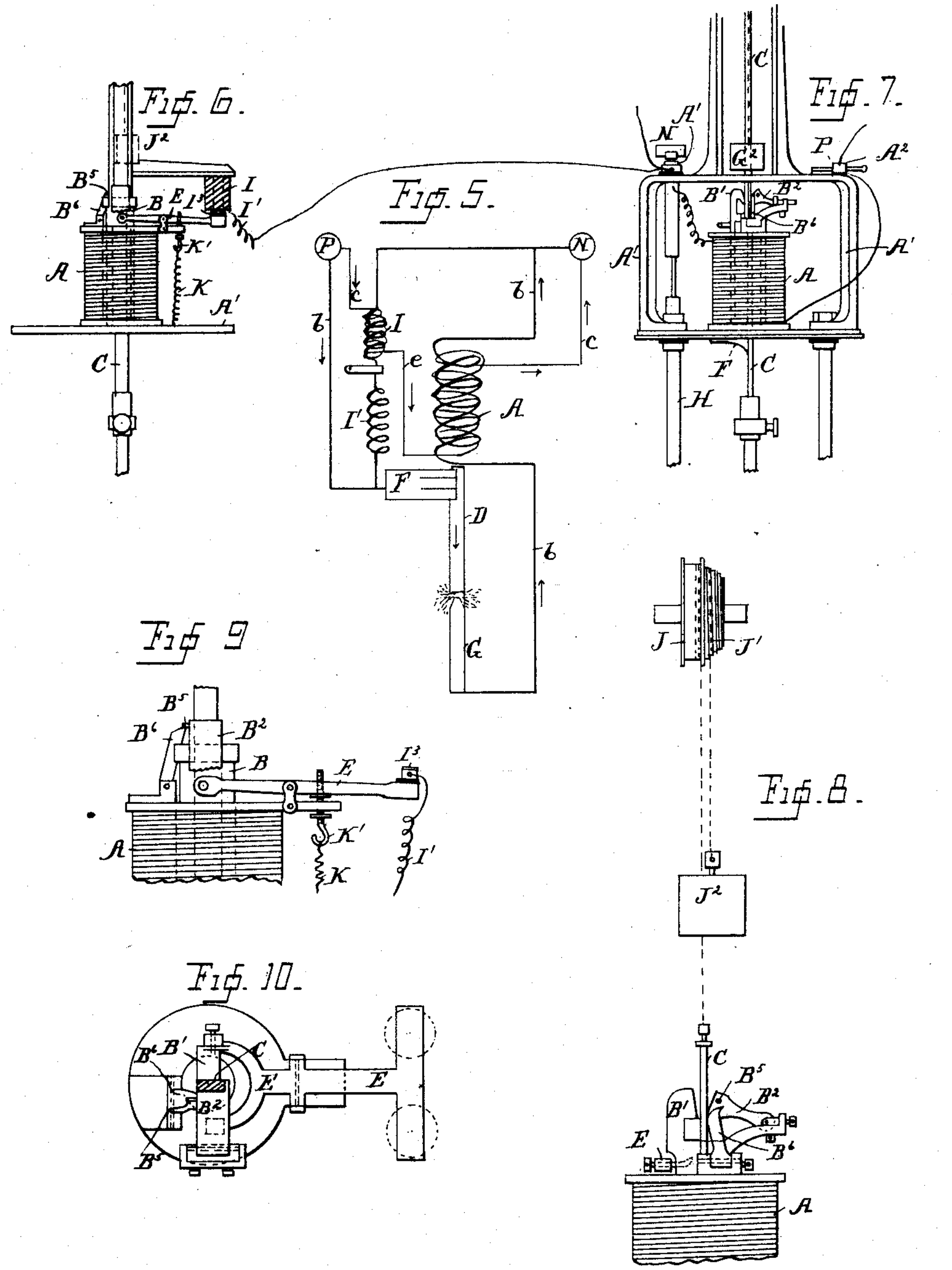

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UNITED STATES PATENT OFFICE.

ALFRED U. ALCOCK AND HENRI GALOPIN, OF MELBOURNE, VICTORIA.

ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 430,260, dated June 17, 1890.

Application filed April 25, 1889. Serial No. 308,602. (No model.) Patented in New Zealand October 4, 1888, No. 3,283, and in Victoria October 9, 1888, No. 6,249.

To all whom it may concern:

Be it known that we, ALFRED UPTON ALCOCK, electrical engineer, of Corr's Lane, and HENRI GALOPIN, scientific engineer, of Temple Court Place, both British subjects, residing at Melbourne, in the British colony of Victoria, have invented an automatic Compensating-Feed Electric-Arc Lamp, (for which we have obtained Letters Patent in Victoria, No. 6,249, bearing date October 9, 1888, and in New Zealand, where an application numbered 3,283 was filed October 4, 1888,) the following being a specification of our invention.

This invention of an automatic compensating-feed electric-arc lamp has been designed to produce an arc lamp composed of a few moving parts and having, first, an automatic feed device which imparts a practically-continuous feed to the upper carbon, such device being controlled by the electric current, and, second, an automatic compensating-balance for the upper carbon. This lamp may either be arranged for running in series or parallel, the attached drawings exhibiting two forms of series lamps—viz., differential and shunt.

In the differential lamp the feed device is located under the solenoid and upon the end of a hollow soft-iron core, which is within the solenoid, and through which core the upper-carbon-supporting bar passes. When the regulating-coil is arranged as a shunt only, then the feed device is secured upon the top of the soft-iron core and above the solenoid. Such feed device consists of a grip or friction cam or clutch, between which and a rigid jaw the upper-carbon-supporting bar passes, such cam being caused to release its grip of the bar when a pin or device attached to the cam contacts with a rigid part of the lamp-frame. This action takes place when the upper carbon is being fed down.

The automatic compensating-balance is constructed by suspending the upper-carbon-supporting bar by a cord, wire, or other flexible support from a small barrel having attached to its side a fusee, from which is suspended (in an opposite direction to the carbon-bar cord) a balance of the requisite weight. As alternatives for the fusee and its cord and weight, a spiral spring may be combined with the barrel or a coiled spring with its one end secured to a cord attached to the barrel and its other end secured to the lamp-frame.

In the accompanying drawings, Figures 1 and 2 show views partly in section of the differential lamp taken at right angles to one another, Fig. 2 being without the lower frame-work and carbons. Fig. 3 is a plan looking upward from the line *a a* in Fig. 2, drawn to a larger scale and exhibiting the cam or clutch mechanism. Fig. 4 is a side view of Fig. 3, and Fig. 5 is a diagram of the differential lamp. Figs. 6 and 7 are views at right angles to one another of the working parts of the alternative construction of lamp, and Figs. 8, 9, and 10 are enlarged details of its grip-clutch and the compensating-balance.

In Figs. 1 to 5, A is the solenoid, A′ the lamp-frame, and P and N the terminals of the lamp; B, the soft-iron core having at its end the rigid block B′ and the pivoted cam or clutch B^2, the latter having an extended side arm B^3, which is arranged to strike a rigid bar $A^{\times}$ of the lamp-frame. Such arm is furnished with an adjustable weight B^4. C is the upper-carbon-supporting bar, and D the upper carbon. E is a counterbalance-lever furnished with an adjustable weight E′, and having its inner bow end attached by pins to the core B. E^2 is a sway-support for such lever. F is a brush forming a connection between the frame A′ and the rod C. G is the lower carbon, and H the lower frame-work of the lamp. I is the cut-out, the purpose of which is to serve as a by-passage for the current through lamp should the carbons be burned out or any accident happen to the lamp mechanism. It consists of resistance I′ equal to arc, an electro-magnet I^2, and armature I^3. The upper end of rod C is attached by a flexible connection to a small barrel J, arranged and secured on the same spindle as a fusee J′, such spindle being supported at the upper end of the lamp-frame A^2. The fusee J′ supports by another flexible connection a balance-weight J^2, and such weight acting upon the variable diameter of the fusee at all times counterbalances the weight of the upper carbon D, and also imparts a constant strain on the clutch-feed device from the time the lamp starts to burn until the carbon has burned out. The weight E′ is shown in the drawings as adjustable for the reason that it is so made as to slide on the lever E, and may be fixed in any position thereon by means of the set-screw *w*. In a similar manner the small weight B^4 may be made adjustable, except that the set-screw is shown omitted, as the said weight will remain by friction in any place it is put.

In Figs. 6 to 10, which show the shunt-lamp, parts marked by letters before referred to represent corresponding parts.

The clutch-feed device and the cut-out being differently arranged will be now described. The cam B^2 has a pin B^5 projecting from its side, and under such pin is arranged another pawl B^6, centered on a small bracket seated upon the solenoid A. The lever E is centered upon an arm-extension from the solenoid, its outer end being under the cut-out I. The armature I^3 in this lamp is arranged upon and insulated from the lever E and connected to resistance I′, whose other end is connected to terminal N. K is a tension-spring acting upon lever E, and K′ a screw-hook for adjusting such tension.

The course of the several currents in the lamp shown in Figs. 1 to 4 will be best understood by describing same with reference to diagram, Fig. 5, in which the thick wire *b* is for the main current and the fine wire *c* the shunt, while the arrows indicate the course of currents. Now, assuming carbons to be together, and consequently not lighted, the current entering at P will pass along main wire *b*, thence to brush F onto upper carbon D, and from it to lower carbon G, thence to main wire *b*, (or frame-work H,) through solenoid, and onto main wire leading to terminal N. The shunt-current or fine wire is connected across from terminal to terminal, and is of a suitably high resistance, say about one hundred and eighty to two hundred ohms. The shunt-current enters at P and passes through cut-out, thence around main solenoid in a reverse direction to it and with a considerably more number of turns, and thence out by terminal N. Another course for main current is from P through cut-out, and thence through wire leading to terminal N.

The action of the lamp is as follows: The current from P passes through carbons, and thence through main coil, which will suck in soft-iron core, the clutch of which raises the upper-carbon bar and carbon, so as to form the arc, which, assuming the current constant, will take up a definite length. The arc having taken up this position will now continue burning until its length will have slightly increased, causing a greater difference of potential at terminals, and consequently greater flow through the shunt, thereby decreasing power of main coil, which gradually lowers clutch device, causing pin projecting from cam to rest slightly on lamp-frame, which releases carbon-holder and allows it to pass through until the arc has again assumed its normal length, and this action is repeated until carbons are burned out.

The action of cut-out is as follows: Suppose the iron core were to stick or the carbon-holder to have fed its whole length. The arc would gradually increase in length until an extra strong current would pass through shunt-coil, which also passes around cut-out, and so increases the power of electro-magnet to attract armature and short-circuit lamp. Through resistance the current would then flow through thick-wire coil of electro-magnet, which would retain armature so long as a current is passing. Again, if iron core were released, allowing the carbons to come together, then the current would divide and the electro-magnet would now become too weak to retain armature, when the whole current would follow original course and lamp would become again lighted.

The action of the lamp shown in Figs. 6 to 10 when it is switched into circuit is as follows: The carbons are normally separated in order to insure the proper operation of the lamp. The current will take its course through the shunt-coil A, which sucks the iron core B in and causes pin B^5 on cam B^2 to engage with cam B^6, when the latter, pressing under said pin B^5, causes cam B^2 to rise and allow the upper-carbon rod C to descend until the two carbons come together, which will short-circuit the shunt-coil and allow counterbalance-lever E and tension-spring K to lift iron core B and with it rod C, which is now clutched between the grip-jaws B′ and B^2, and so the carbons are retained at a sufficient distance apart to form the arc. As the arc lengthens its resistance will increase and so cause a greater flow through coil A, it in turn sucking iron core B in until the pin B^5 again bears on cam B^6 and opens cam B^2 to allow the rod C to gradually descend until the arc is again at its normal length.

Having thus described the nature of our said invention and the manner of performing same, we would have it understood that what we claim as of our invention is—

1. In an arc lamp, the combination of an upper-carbon-supporting bar, a friction-cam pressing thereon, an arm to said cam provided with an adjustable weight, the said arm resting upon a stationary support, such as the frame of the lamp, a solenoid provided with a hollow core through which passes the said bar and to which is pivoted the said cam, counterbalancing-weights for the said bar and the said core, and a lower carbon in circuit with the said solenoid and the upper carbon.

2. In an arc lamp, the combination of a solenoid-core, a lever pivoted thereto and to a rod, which is in turn pivoted to a rigid support, such as the frame of the lamp, and an adjustable weight applied to said lever.

3. In an arc lamp, the combination of a movable solenoid-core provided with friction-cam pressing against the upper-carbon-supporting bar, a counterbalanced arm secured to said cam and resting upon the frame of the lamp as to one arm, the other end being the pivoted end, which is attached to the cam, a rod attached by a pivot-joint to the frame of the lamp and carrying a pivoted lever, one end of which is pivoted to the said core and the other end of which is supplied with an adjustable weight.

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HENRI GALOPIN.

Witnesses:
BEALINGTON BODYCOMBE,
WILLIAM HENRY CUBLEY.