(No Model.)

B. A. FISKE.

ARC LAMP REGULATING MECHANISM.

No. 324,311. Patented Aug. 11, 1885.

Fig. 1.

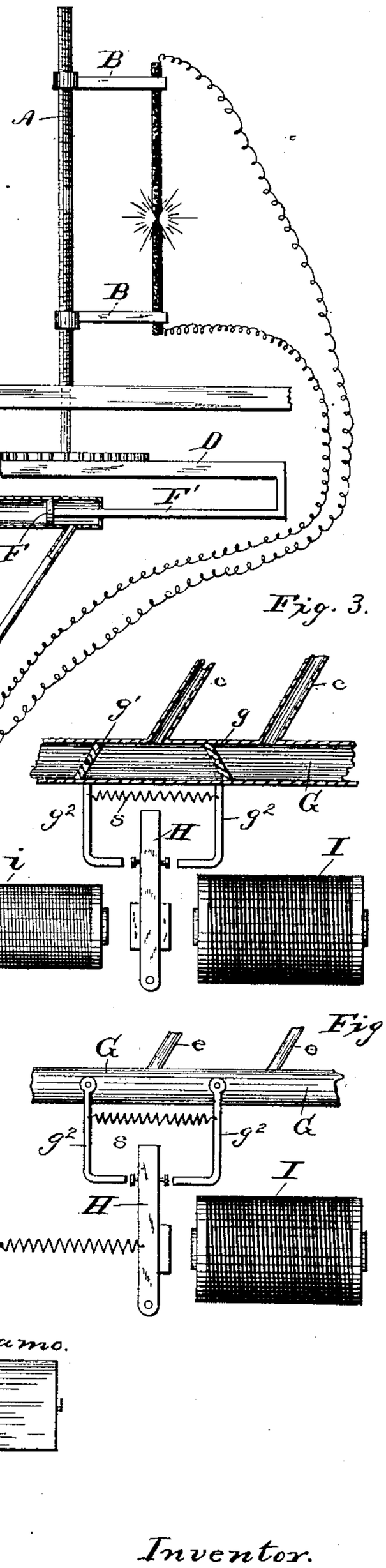


Fig. 2.

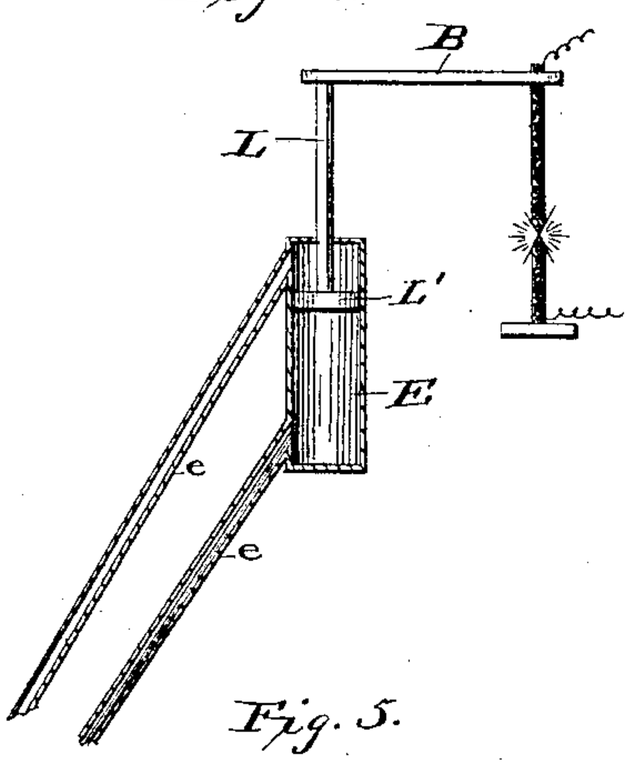
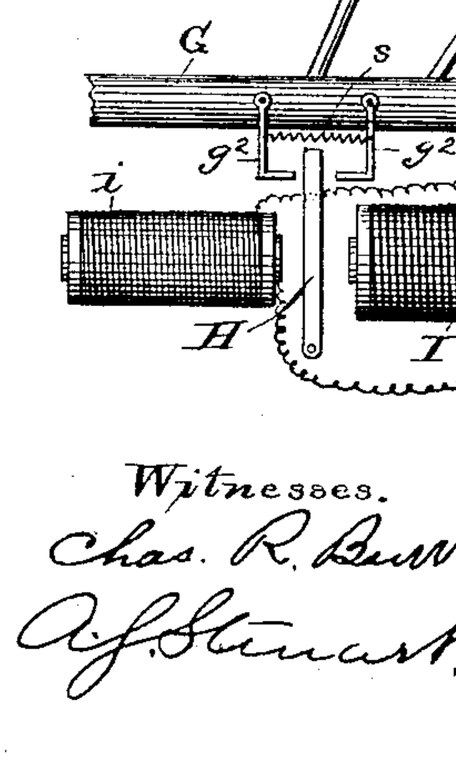


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.



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ARC-LAMP-REGULATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 324,311, dated August 11, 1885.

Application filed February 26, 1885. (No model.)

To all whom it may concern:

Be it known that I, BRADLEY A. FISKE, of Washington, in the District of Columbia, have invented certain new and useful Improvements in Arc-Lamp-Regulating Mechanism; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

My present invention relates to and comprehends what is regarded as a novel and improved method or system for actuating and controlling the movements of the carbon-carrying devices of electric-arc lamps.

It has heretofore been customary to depend upon the action of gravity, a mechanical motor, or electro-magnetic propelling devices to effect the necessary movement of the carbon or carbons to feed and form the arc, suitable regulating or controlling mechanism being employed to retard or supplement the motions thus produced by the propelling mechanism.

The object of my present invention is to dispense with the movable gravitating devices, mechanical motors, and electro-magnetic devices heretofore employed for driving or propelling the carbon-carriers, and to employ in lieu thereof a motor driven by a fluid—elastic or inelastic—maintained under pressure, the application or delivery whereof to the motor being automatically governed by suitable electro-magnetic devices included in the lamp-circuit, whereby the movements of the carbon or carbons are positively and accurately effected, and the mechanism carrying the carbons held and maintained in position after adjustment, so that if subjected to a swinging motion, or to shocks and jars, the carbons or their operating mechanism will not be injuriously affected, as is liable to be the case when gravity is depended upon to propel the carbons or actuate the feed-controlling mechanism.

With this end in view my said invention consists, generally, in the combination, with a mechanism adapted to carry or communicate motion to the movable carbon or carbons, of a propelling device or motor, a fluid-supply communicating therewith, and an interposed automatic governor actuated or controlled by the current in the lamp-circuit, and operating to regulate the application of the fluid to the said propelling device.

One mode of applying the said invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation, partly in section, of an arrangement of apparatus, showing how my invention may be applied in practice to a focusing-lamp, and Fig. 2 illustrates its application to a non-focusing lamp. Figs. 3 and 4 are detail views of governing mechanism such as may be employed for controlling the application of the fluid to the propelling device or motor. Figs. 5 and 6 illustrate modifications in the structure of the motor.

Similar letters of reference in the several figures indicate like parts.

The carbon-carrying mechanism may be of any approved form—such as a shaft, A, having right-and-left screw-threads, to which are applied the carbon-holders B, as is well understood. When the shaft A is rotated in one direction, it will cause the simultaneous approach of the carbon-carriers, and when rotated in the opposite direction will cause them to separate. To the shaft A or other prime motor of the lamp may be transmitted, through appropriate devices, the motions of the propelling device or motor. In the present instance a pinion or gear-wheel, C, is fastened to the shaft A, and a rack, D, is so disposed and supported that its teeth shall engage those of the gear C.

The propelling device or motor is in the present instance composed of a cylinder, E, and piston F working therein. To the piston F is attached a piston-rod, F′, extending through a stuffing-box in one end of the cylinder and connected to the rack D in such manner that the two shall move in unison. The cylinder E is connected at either end by pipes *e e* with a main pipe or conduit, G, leading from a steam-boiler or an air, gas, or liquid reservoir, wherein the fluid for actuating the propelling

device is maintained under pressure. Located in the main G, at a point intermediate the pipes *e e*, is a valve, *g*, of any approved construction, and beyond the second pipe *e* is another similar valve, *g'*. To the stems of the valves *g g'* are connected levers g^2, and between the latter plays a lever, H, which alternately makes contact with one of the levers and opens its valve. This lever H constitutes, or is connected by suitable devices with, the armature of an electro-magnet, I, in the main circuit, an electro-magnet, *i*, in a derived circuit being arranged to act upon said armature in opposition to the main electro-magnet I. A spring, *s*, connected to and extending between the levers g^2, serves to hold both valves closed when not operated upon by the armature.

As thus constructed and arranged, when the current is established in the lamp-circuit, if the carbons are in contact the electro-magnet will, by attracting the armature H, open the valve *g*, thereby admitting the gas or liquid contained in the main under pressure to both ends of the cylinder. The area of the piston on the side attached to the piston-rod and subjected to the action of the fluid-pressure is less than on the other side, being diminished by and in proportion to the diameter of the piston-rod. A differential pressure is therefore exerted upon the piston when the fluid is admitted to both ends of the cylinder by the opening of the valve *g*, the valve *g'* being closed, and the piston is forced in a direction to produce a separation of the carbons to form the arc.

When, now, the strength of the current in the electro-magnet I is diminshed by the elongation of the arc, and that of the electro-magnet *i* in the derived circuit proportionally increased, the armature H is gradually shifted from the lever of the valve *g* to that of the valve *g'*, closing the former and opening the latter. The pressure of the fluid being at all times maintained in one end of the cylinder, as the valve *g* is closed, cutting off the inlet to the opposite end of the piston, the piston is cushioned and held stationary; but upon the opening of the valve *g'* the fluid in that end of the cylinder is allowed to gradually escape, and the piston is driven forward by the fluid in the opposite end, communicating motion to the carbon-carriers in a direction to bring their points more nearly together and diminish the resistance of the arc.

It will thus be seen that, according to the arrangement shown, when pressure is admitted to both ends of the cylinder, the piston is moved back to separate the carbons and form the arc; when the escape is opened, the piston is moved forward by the pressure of fluid in the main to feed the carbons; and when both the inlet and outlet valves are closed, the carbons are maintained firmly in position; and all these movements are governed and controlled by the current in the lamp-circuit.

As will be obvious to those skilled in the art, my improved system, involving the use of a fluid-pressure apparatus for actuating the carbon-carriers, may be applied in many different forms and to a variety of lamp mechanisms with but little if any modification in structure. Moreover, the particular apparatus shown is susceptible of considerable modification without departing from the spirit and substance of my invention. Thus a constant pressure may be maintained upon one end of the piston from a separate fluid-supply, a weight, or spring, as shown in Fig. 5, the fluid-pressure on the opposite face of the piston being varied by the automatic action of the valves. Two pistons of different areas may be employed instead of a single piston—as, for example, in Fig. 6—and, if desired, the electro-magnet *i'* in the shunt-circuit may be replaced or supplemented by a spring acting in opposition to the main electro-magnet I. The form, proportion, and structure of the various parts shown may be changed and varied at pleasure without departing from my invention, so long as the essential features of an automatic feed-propelling device actuated by a fluid delivered under pressure is retained.

In Fig. 2 is shown a simple form of apparatus for actuating a single carbon, the device being duplicated and applied to both carbons, if desired. The carbon-carrier is attached directly to the rod L, whose piston L' is contained within the cylinder and operated in the same manner as described, with reference to Fig. 1.

Having described my invention, I claim—

1. In an electric-arc lamp, and in combination with the carbon-carrying mechanism thereof, a motor or propelling device driven by a fluid maintained under pressure, a fluid-supply pipe, an exhaust aperture, a valve, and an automatic governor controlling the admission and escape of the fluid in the motor, substantially as described.

2. In combination with the carbon-carrying mechanism, the fluid motor or propelling device applied thereto, a fluid-supply reservoir, a conduit connecting said reservoir and motor, an escape-orifice, and an automatic governor interposed between the motor and reservoir controlling the induction and eduction passages, substantially as described.

3. In an electric-arc lamp, and in combination with the carbon-carriers thereof, a fluid-reservoir, a conduit leading therefrom, a cylinder connected at both ends to said conduit, a piston in said cylinder whose piston-rod is connected to the mechanism for actuating the carbons, a valve system for controlling the admission and escape of the fluid pressure in the cylinder, and electro-magnetic devices for actuating said valve system, substantially as described.

4. In an electric-arc lamp, and in combination with the carbon-carrying devices thereof, a motor adapted to be driven by a fluid maintained under pressure, and consisting, essentially, of a cylinder, a piston working therein and having operating faces of unequal area,

a fluid-pressure supply acting continuously upon one face of the piston, a valve mechanism controlling the admission and discharge of the fluid to the other face of the piston, and an automatic electric governor included in the lamp-circuit controlling the said valve mechanism, substantially as described.

5. As a means for controlling the application of fluid-pressure to the actuating mechanism in accordance with the strength of current traversing an electric circuit, the combination, with the fluid-motor and the supply-reservoir, open connections between the reservoir and both faces of the piston of the motor, and a valve mechanism controlling the admission and escape of the fluid from one face of the piston, said valve mechanism being operated and controlled by electro-magnetic devices, substantially as described.

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