(No Model.)

F. EMERY.

ELECTRIC ARC LAMP.

No. 550,365. Patented Nov. 26, 1895.

Fig. 1.

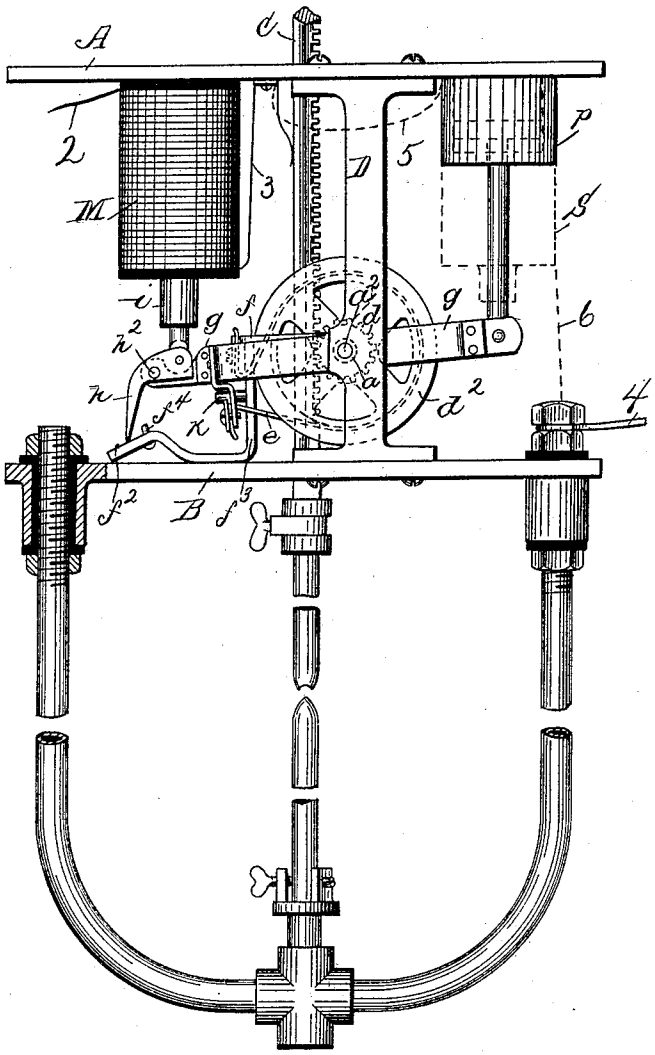


Fig. 4.

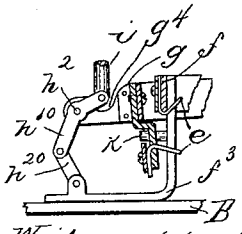


Fig. 2.

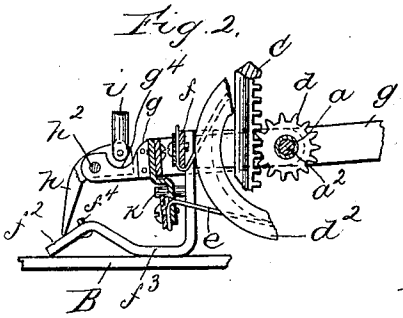
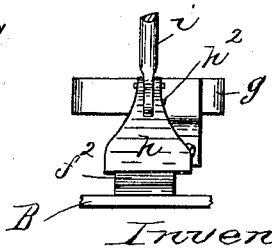


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

FRANK EMERY, OF NEW YORK, N. Y., ASSIGNOR TO THE STANDARD THERMOMETER COMPANY, OF PEABODY, MASSACHUSETTS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 550,365, dated November 26, 1895.

Application filed April 22, 1895. Serial No. 546,680. (No model.)

To all whom it may concern:

Be it known that I, FRANK EMERY, of New York, county of New York, State of New York, have invented an Improvement in Electric-Arc Lamps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to an electric-arc lamp and is an improvement which may be embodied in a lamp of the kind shown in Letters Patent No. 531,422, to Edwin J. Murphy, dated December 25, 1894, to which reference may be had. As shown in said Murphy patent, the gravity feed of the upper carbon is controlled by means of a brake-wheel connected to the carbon rod or support, so as to have a rotary movement in harmony with the upward or downward movement of the carbon-rod, the said rotary movement of said brake-wheel and consequent descent of the carbon-rod being restrained by a brake-band encompassing the wheel and having its ends connected with levers, by which the band may be tightened to check or wholly arrest the movement of the brake-wheel and carbon or may be loosened to permit a slip of the brake-wheel, so that the carbon will descend by gravity. As shown in the said Murphy patent, one only of the said levers was directly operated by a magnet or magnets responsive to changes in current strength due to varying resistance at the arc, while the other lever was controlled by the force of gravity upon it and by a stop which supported it at certain times, so that its weight would cease to pull upon the end of the band connected with it.

The present invention is shown as embodied in a lamp having a brake-wheel and brake-band operated by levers connected thereto, as just described; and the invention consists, mainly, in the combination, with said levers and the electromagnet or solenoid governing the same, of a direct operating connection between the magnet and both of said levers, shown as a cam-lever or equivalent connected with the magnet and brake-levers in such manner that the said intermediate or cam-lever acts directly upon both brake-levers, tending to move the same positively in the direction to tighten the band or permitting a movement by which the said band is loosened.

Figure 1 is a front elevation of a sufficient portion of an electric-arc lamp to illustrate this invention; Fig. 2, a sectional detail showing the brake-operating mechanism; Fig. 3, a detail showing in end elevation the brake-controlling levers, and Fig. 4 a detail showing a modified construction to be referred to.

The framework supporting the carbons and feed mechanism may be of any suitable or usual construction, being shown in this instance as comprising horizontal plates A B, containing guides for the upper-carbon rod C and being connected together by uprights D, between which is pivotally supported a shaft a, which is connected with the upper-carbon rod, so as to have a rotary movement in harmony with the longitudinal movement of said carbon-rod. As herein shown, the said shaft a is tubular and turns upon a rod a^2, supported in the uprights D, said shaft being provided with a toothed wheel or pinion d, meshing with the rack or toothed rod C that carries the upper carbon. The said tubular shaft a^2 also has fixed upon it a brake-wheel d^2, having a grooved periphery encircled by a brake-band e, shown as a piece of wire cord, one end which is made fast to a lever f, fulcrumed on the bearing-rod a^2 of the brake-wheel, while the other end is made fast to the lever g, also fulcrumed on the said rod a^2. The said levers are made in the form of open frames or yokes, the one f being contained within the one g and both embracing the brake-wheel and carbon-rod within them. A downward movement of the end of the lever f, connected with the band e, relative to the end of the lever g, connected with the other end of the said band, thus produces a tightening of the band upon the wheel, so as to restrain its rotation, while a relative upward movement of the said end of the lever f and downward movement of the lever g loosen the said band, permitting the wheel to turn freely and thus permitting the carbon-rod to descend by gravitation. The parts thus far described may be and are shown as substantially the same as in said Murphy patent and are not of themselves herein claimed.

In order to produce the desired relative movement of the brake-band levers to effectually control pressure of the brake-band on the wheel, the said levers are in accordance with the present invention combined with an intermediate connection, shown in Figs. 1 to 3 as an elbow-lever h, fulcrumed at h^2 in the lever g and having one arm engaged with an inclined surface f^2 on a bracket f^3, connected with the lever f. The other arm of said lever h is connected with the core or armature i of the controlling magnet or solenoid M, connected in series with the carbons, as indicated. By this construction an upward movement of the end of the lever h, connected with the core i, tends to force its end that engages with the inclined plane f^2 farther up on said plane and thus tends to separate the end of the lever g from the said bracket f^3, connected with the lever f, or, in other words, to produce a relative upward movement of the lever g and downward movement of the lever f, which will tighten the brake-band, the said levers f and g being thus moved by the intermediate lever h until the tension of the brake-band prevents further movement, when if the upward movement of the core i is continued further the adjacent ends of both levers will be lifted bodily simultaneously, and since the band is now tightened a corresponding rotary movement of the brake-wheel d^2 and pinion d will be produced, which will lift the carbon-rod C and upper carbon, thus drawing the arc in, starting the lamp. Then as the arc lengthens and the current in the magnet M is correspondingly weakened, the core i descends until the bracket f^3 comes to rest on the base-plate B or any suitable stop, after which further descent of the core i will permit the lever h to turn on its fulcrum and travel down the incline f^2, thus permitting the end of the lever g to slacken the brake-band e and thereby permit the pinion d to turn and the carbon to feed. A stop k on the bracket f^3 prevents further relative downward movement of the lever g after it has completely slackened the band, so as to leave the wheel d practically free to run. The lever g is extended to the other side of the wheel d^2 and may be connected, as shown, with a piston working in a dash-pot p to prevent too sudden movements of the levers and thus to prevent irregularity in feed.

The lamp constructed as has been described may be successfully used with alternating currents, or, if desired, the end of the lever g may be connected with the core or armature of a magnet or solenoid, as shown in dotted lines at S, in a shunt or derived circuit around the arc, thus producing a differential lamp. A stop f^4, near the upper end of the incline f^2, serves to prevent excessive movement of the lever h, or, in other words, to prevent it from becoming wedged between the levers f and g, so as not to free itself upon a relaxation of the upward pull on the core i.

It obviously is not essential that the connection between the levers by which the force of the magnet is transmitted to both levers to tighten the band should be of the specific construction shown in Fig. 1. The construction shown in Fig. 4 illustrates an equivalent therefor wherein the intermediate lever h^{10}, instead of acting upon an inclined or cam surface on the lever f, is connected thereto by a link h^{20}, which, with the arm of the lever h^{10}, constitutes substantially a toggle-joint connection between the brake-levers f g, which toggle is straightened by the pull of the magnet and thereby presses the levers f g in the direction to tighten the band.

Various modifications having substantially the same mode of operation and effect will be readily suggested to persons familiar with mechanics, and the invention is not limited to the specific construction shown in the drawings of the connecting mechanism between the brake-levers.

The circuit entering the lamp connects with one terminal of the magnet M, as shown at 2, and continues from the other terminal thereof, as shown at 3, to the carbon-rod C, and thence through the carbons and arc to the other terminal 4 of the external circuit, which connects with the lower carbon, the supporting-frame and holder for which are insulated from the main lamp-frame in any suitable manner.

If a shunt-magnet be used, as in a differential lamp, its terminals will be connected to the upper and lower carbons, as indicated in dotted lines at 5 6, Fig. 1.

When no current is flowing, the lever f is supported by the bracket f^3 resting on its stop, and the core i rests supported on the lever g at g^4, Fig. 2, which constitutes a stop for the downward movement of the core i, and the end of the lever h is then at the lower end of the incline f^2, so that the lever g rests on the stop k, with the band e completely slackened, so as to give freedom of movement to the wheel d^2, so that the upper carbon will descend until it rests in contact with the lower carbon, closing the circuit through the lamp. Then, when the current is turned on, the core i will be strongly attracted and will turn the lever h on its fulcrum at h^2, and owing to the engagement of the end of said lever h with the incline f^2 the latter and the lever f will be prevented from rising until the lever g has a sufficient relative upward movement to fully tighten the band e, when the further upward movement will lift both levers, turning the wheel d^2 and drawing the arc, as before described. When the arc is established at a normal length, the parts will stand substantially in the position shown in the drawings, with the bracket f^3 resting on its stop and the lever h in an intermediate position with relation to the incline f^2, the levers f and g being then in such position as to tighten the band sufficiently to permit a retarded movement of the wheel, by which the carbon is permitted to feed in proportion as it is consumed.

I claim—

1. In an electric arc lamp the combination with the carbon rod and brake wheel connected to turn in harmony with the movement thereof; a brake band applied to said wheel; and levers connected with the opposite ends of said band, of a magnet and connection therefrom for operating both said levers, as set forth.

2. In an electric arc lamp the combination with the carbon rod and brake wheel connected to turn in harmony with the movement thereof; a brake band applied to said wheel; and levers connected with the opposite ends of said band, of an intermediate lever fulcrumed upon one of said levers and having one arm engaged with the other of said levers, and its other arm operated by a magnet, substantially as and for the purpose described.

3. In an electric arc lamp the combination with the carbon rod and brake wheel connected to turn in harmony with the movement thereof; a brake band applied to said wheel; and levers connected with the opposite ends of said band; of a fixed stop for one of said levers and a stop on said lever for the other of said levers, and a magnet and connection therefrom for operating both said levers substantially as and for the purpose set forth.

4. In an electric arc lamp the combination with the carbon rod and brake wheel connected to turn in harmony with the movement thereof, a brake band applied to said wheel; and levers connected with the opposite ends of said band of a magnet and connection therefrom, for operating both said levers, and a dashpot for cushioning the movement produced by said magnet, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK EMERY.

Witnesses:
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