(No Model.)

W. MATHIESEN.

ELECTRIC ARC LAMP.

No. 519,726. Patented May 15, 1894.

Fig. 1.

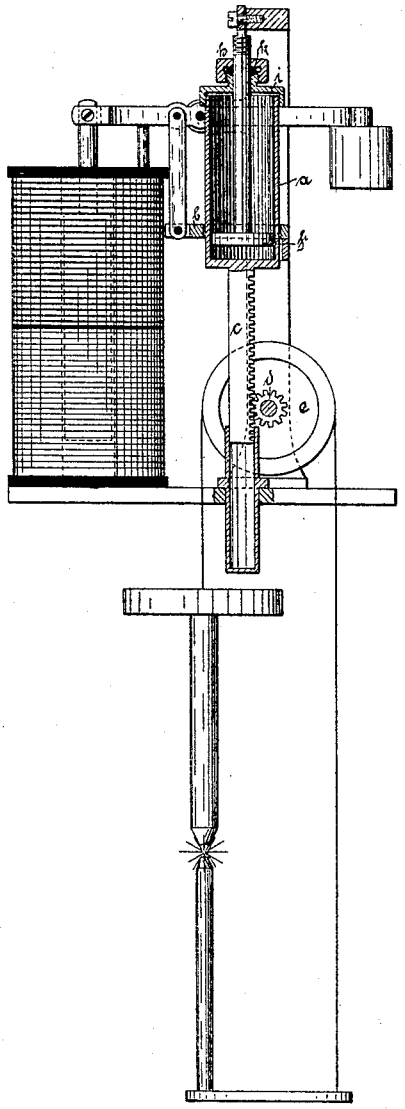
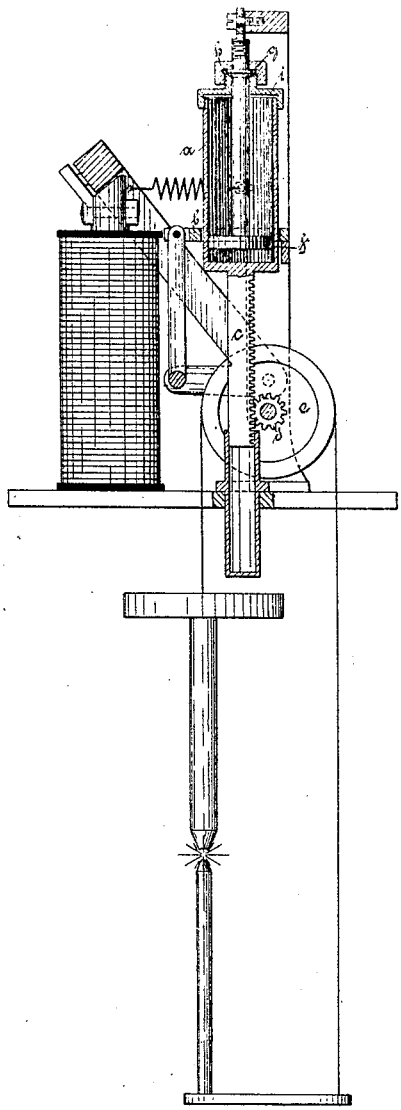


Fig. 2.



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WILHELM MATHIESEN, OF LEIPSIC, GERMANY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 519,726, dated May 15, 1894.

Application filed May 29, 1893. Serial No. 475,896. (No model.)

To all whom it may concern:

Be it known that I, WILHELM MATHIESEN, of Leipsic, in the Kingdom of Saxony, Germany, have invented a new and useful Electric-Arc Lamp, of which the following is a specification.

My invention relates to improvements in arc-lamps.

The object of my invention is to produce a simple regulating device for arc-lamps, which will not easily get out of order.

My invention consists of such features, details, and combinations of parts, as will first be described in connection with the accompanying drawings, and then particularly pointed out in the claims.

In the drawings—Figure 1 is a side elevation, partly in section, of one form of arc-lamp embodying my invention. Fig. 2 is a similar view of another modification of my invention. Fig. 3 is a detail view of the packing gland.

Referring to the drawings, *a* is a cylinder having a neck, *a'*, at its upper end, and a rack-bar, *c*, at its lower end. Within the cylinder is a piston, *f*, to which is attached a piston-rod, *f'*, passing through the neck of the piston and secured at its outer end to any suitable part of the lamp frame, A, preferably by means of a screw, A', as shown. It will be understood that the piston-rod and piston are stationary, while the cylinder moves longitudinally. The cylinder is filled with any suitable fluid, preferably oil, the friction of which will retard the movement of the cylinder, and, to prevent the escape of this fluid, the neck, *a'*, of the cylinder, is threaded, and provided with a screw-threaded follower or cap, *h*, between which and the end of the neck, *a'*, is placed a suitable packing, either an elastic material, *k*, as in Fig. 1, or a conical plug, *k'*, as in Fig. 2. In the latter case, the neck of the cylinder is also coned to form a seat against which the coned end of the plug, *k'*, may be forced by screwing down the follower, *h*.

To permit the insertion of the piston into the cylinder, the head, *i*, of the latter is made removable, preferably by screw-threading it onto the end of the cylinder, as shown in the drawings.

The lower end of the rack-bar, *c*, moves longitudinally in a guide, *c'*, secured to the frame of the lamp.

On a shaft, *s'*, revolubly mounted in the frame, is fixed a gear-pinion, *s*, meshing with the rack, *c*, and on the same shaft with the pinion is fixed a drum, *e*, around which passes a chain, *e'*, that part of the chain which passes down one side of the drum carrying an arm, B', which actuates the lower carbon-holder, B, while that part of the chain which passes down the opposite side of the drum actuates the upper carbon-holder. By having one side of the chain to actuate one carbon-holder and the other side the opposite carbon-holder, it is plain that any movement of the drum synchronously operates both carbon-holders, and in opposite directions. That is to say, if the upper carbon-holder rises, the lower one falls, and vice versa, according to the direction of rotation of the drum, so that the luminous point is always retained in the same position, a matter of great importance in using arc-lamps in connection with reflectors or lenses.

To control the action of the cylinder, I provide a clutch or clamp device, which consists of a ring, *b*, surrounding the cylinder and sufficiently loose thereon to permit the cylinder to fall freely through the ring, when the latter is in a horizontal position, yet clamping the cylinder and frictionally holding it when the ring is out of the horizontal position. One side of the ring rests on a stop or shoulder, *b'*, carried by the frame, and forming a fulcrum. The opposite side of the ring has a projection, b^2, to which is pivotally attached the ring-operating mechanism, two forms of which I have shown, one in Fig. 1 and the other in Fig. 2.

In Fig. 1, a link, *l*, connects the projection, b^2, to a lever, *m*, which is fulcrumed at *m'*, and provided with a counterweight, m^2, at its outer end. The inner end of the lever carries a core, *n*, which moves in a solenoid electro-magnet, N, which has its coils included, either in the main circuit, which supplies the current to the carbon points, or in a shunt

circuit therefrom. A stop-pin, n', attached to the top of the magnet, serves to limit the downward movement of the lever to a position which will retain the clamp device in a horizontal plane.

In Fig. 2, a link, l, connects the projection, b^2, to the short arm, o, of a bell-crank lever pivoted at o', and having its long arm, o^2, provided with an armature, o^3, arranged to contact with a core, p, of an electro-magnet, P, the core also being provided with a stop, p', which limits the movement of the bell-crank lever to a position which retains the clamping ring, b, in a horizontal plane. A spring, Q, serves to draw the bell-crank armature away from its magnet-core.

From the above description, it will be seen that the clutch or clamping ring, b, raises the cylinder during the formation of the arc, and, during the regulation of the arc, the cylinder is caused to descend, by reason of the excess of weight of the upper carbon-holder over the lower one. If necessary, the upper carbon holder may be provided with a weight, as shown at C'. The cushioning medium in the cylinder, a, gradually passes from one side of the piston to the other, this cushioning medium being either liquid or air. When the carbons have been consumed, the carbon-holders may be separated by depressing the lower carbon-holder, which causes the cylinder, a, to be raised, whereby the fluid contained in the cylinder is compelled to pass to the other (upper) side of the piston. The two carbon-holders move away from each other at a comparatively rapid rate, inasmuch as the ratio of the radii of the drum or chain wheel, e, to the pinion, s, causes a considerable pressure to be exerted within the cylinder, a, which forces the fluid from below the piston with great energy.

The drum or chain-wheel, e, being large in diameter compared with the pinion enables me to considerably reduce the length of the cylinder, a, so that the superstructure of the lamp may be reduced, while the carbons are of great length.

By means of the packing device at the top of the cylinder around the piston-rod, the cylinder, or dash-pot, may be filled at the factory, and the lamp shipped ready for use without incurring the danger of spilling the contents of the cylinder or dash-pot. When it is desired to use the lamp, it is sufficient to loosen the screw-cap or follower, h, in the form of packing shown in Fig. 2, to permit the cylinder to slide on the piston-rod. In the construction, shown in Fig. 1, however, it is necessary, for this purpose, to completely unscrew the cap from the cylinder-neck.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an arc-lamp, a fixed piston, a movable cylinder, a rack-bar attached to one end of the cylinder, a pinion operated by the rack, and a carbon-holder actuated by the pinion, substantially as set forth.

2. In an arc-lamp, a fixed piston, a movable cylinder, a rack bar attached to one end of the cylinder, a pinion operated by the rack, a shaft on which the pinion is fixed, a drum larger in diameter than the pinion and fixed on the shaft, and a carbon-holder actuated by the drum, substantially as set forth.

3. In an arc-lamp, a fixed piston, a movable cylinder, a rack-bar attached to one end of the cylinder, a pinion operated by the rack-bar, a shaft on which the pinion is fixed, a drum on the shaft, a chain passing over the drum, and a carbon-holder attached to each side of the chain, substantially as set forth.

4. In an arc-lamp, a fixed piston, a movable cylinder filled with fluid, a rack-bar attached to one end of the cylinder, a pinion operated by the rack-bar, and a carbon-holder actuated by the pinion, substantially as set forth.

5. In an arc-lamp, a fixed piston, a movable cylinder, a rack-bar attached to one end of the cylinder, a pinion operated by the rack-bar, a shaft on which the pinion is fixed, a drum fixed on the shaft, a chain passing over the drum, a pair of carbon-holders actuated by the chain, and a clamping device engaging the cylinder, to control its movement, substantially as set forth.

6. In an arc-lamp, a fixed piston, a movable cylinder, a rack-bar attached to one end of the cylinder, a guide in which the end of the rack-bar moves, a pinion operated by the rack-bar, and a carbon-holder actuated by the pinion, substantially as set forth.

7. In an arc-lamp, a fixed piston, a movable cylinder, a rack-bar attached to one end of the cylinder, a pinion operated by the rack-bar, a carbon-holder actuated by the pinion, a clamping ring through which the cylinder passes, one end of the clamping ring resting on a stop, a lever pivotally attached to the other end of the ring, and an electro-magnet energized by the lamp circuit and actuating the lever, substantially as set forth.

8. In an arc-lamp, a fixed piston, a movable cylinder, a carbon-holder actuated by the cylinder, a clamping ring through which the cylinder passes, a stop on which one side of the ring rests, a link pivoted to the opposite side of the ring, a lever attached to the link, means for drawing the lever in one direction, and an electro-magnet energized by the lamp circuit and drawing the lever in the opposite direction, substantially as set forth.

9. In an arc-lamp, a fixed piston, a movable cylinder, a rack-bar attached to one end of the cylinder, a guide in which the rack-bar moves, a pinion operated by the rack-bar, a shaft on which the pinion is fixed, a drum mounted on the shaft, a chain passing over the drum, a pair of carbon holders secured to the chain, one on each side, the upper carbon-holder being heavier than the other, a clamping ring through which the cylinder

passes, a stop on which one side of the ring rests, a link pivoted to the opposite side of the ring, a bell-crank lever having its short arm attached to the link, a spring secured to the long arm of the lever, an armature on the lever, an electro-magnet core arranged to contact with the armature, an electro-magnet coil energized by the lamp circuit, and a stop device secured to the core and limiting the motion of the lever in the direction of the magnet, substantially as set forth.

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

WILHELM MATHIESEN.

Witnesses:
MAX MATTHAI,
CARL BORNGRAEBER.