

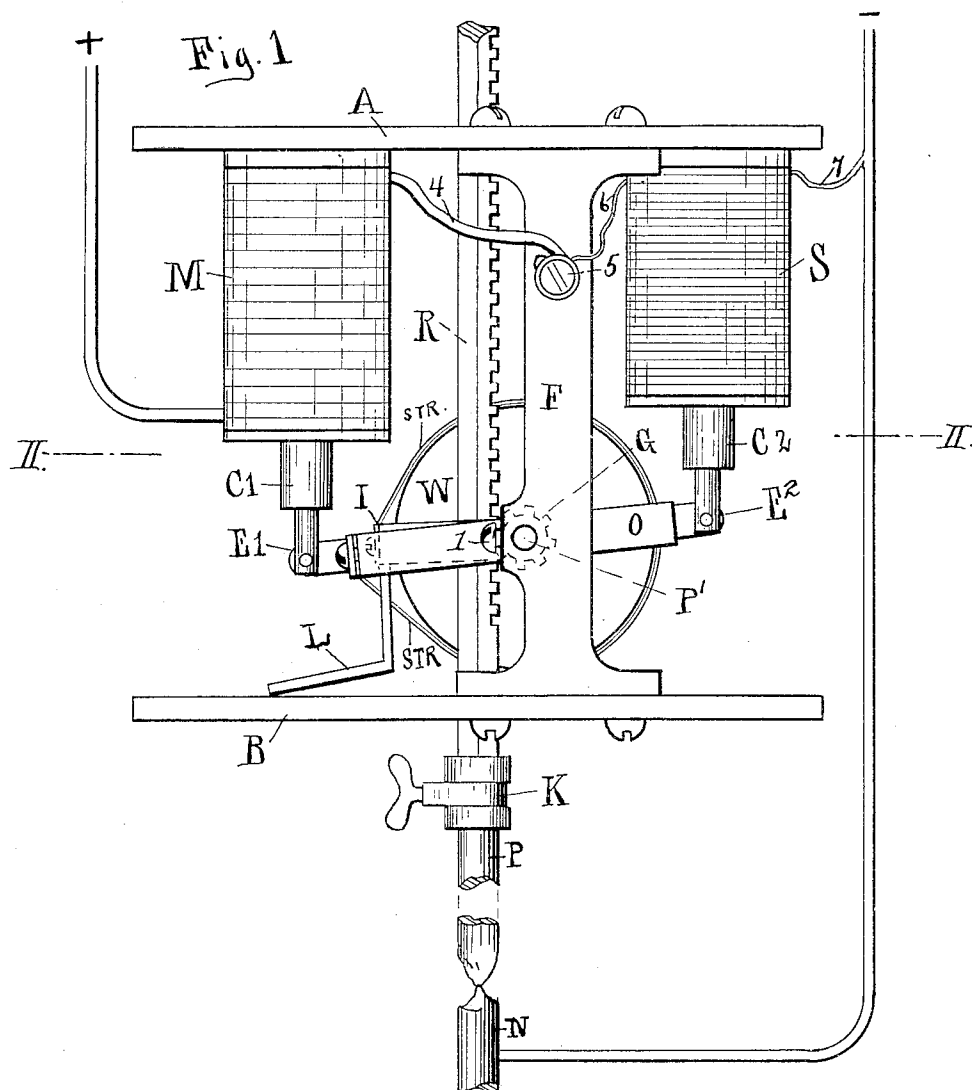
(No Model.)

2 Sheets—Sheet 1.

E. J. MURPHY.  
ELECTRIC ARC LAMP.

No. 531,422.

Patented Dec. 25, 1894.



WITNESSES:

*Chas. W. Garker*  
*Jos. H. Milans*

INVENTOR

*Edwin J. Murphy*

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(No Model.)

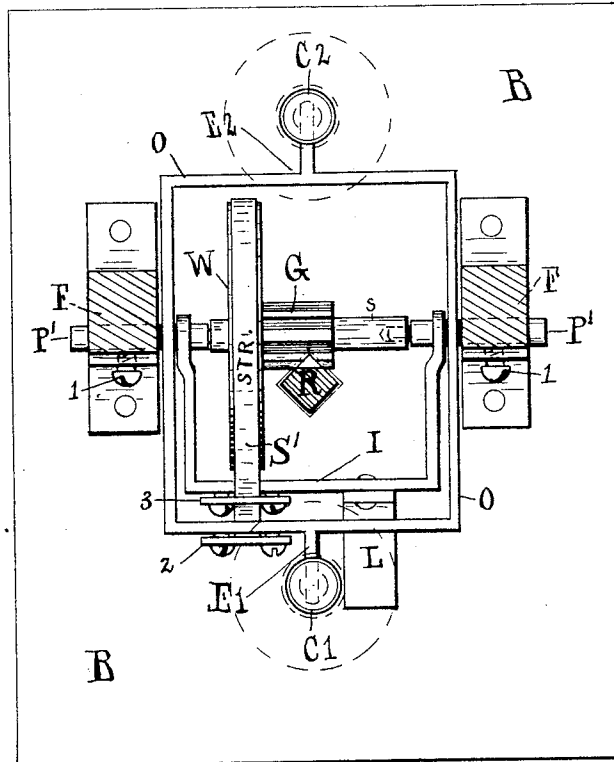
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Fig. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

EDWIN J. MURPHY, OF NEW YORK, N. Y.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 531,422, dated December 25, 1894.

Application filed February 16, 1894. Serial No. 500,405. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN J. MURPHY, a citizen of the United States of America, residing at the city, county, and State of New York, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention relates generally to improvements in electric arc lamps and more particularly to the means for controlling and regulating the feed of the carbon or carbons of such lamps.

The present improvements have for their object, among other things, to generally improve and simplify the construction of arc lamps, and to provide means by which a smooth, continuous and regular feed of the carbon or carbons is automatically effected and absolutely controlled to produce a steady light.

To these ends the improvements consist in the novel structure and devices hereinafter fully set forth.

As a more ready understanding of the invention will be had from a detailed description of a mechanism designed to practically carry out the improvements, such description will now be given, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of so much of an arc lamp provided with the improvements as is necessary to a proper understanding thereof. Fig. 2 is a horizontal section of the same taken on the line II—II of Fig. 1.

The improved arc lamp with its feed mechanism is supported in the main, by a frame-work consisting of horizontal top and bottom plates A, B, with a pair of interposed uprights or columns F to the opposite flanged or footed ends of which the plates A, B, are fastened, such frame work with any suitable inclosing case, not herein shown, serving to support and inclose the feed mechanism.

The top plate A carries or supports the main current electro magnet M and the shunt or derived current electro magnet S, each of which magnets may be of the ordinary solenoid forms having the sliding cores C', C<sup>2</sup> which as will hereinafter appear are arranged to exert different power on the carbon controlling or feeding mechanism.

The invention is illustrated for the pur-

poses of this case with a lamp having a stationary lower carbon N which may be secured in any desired manner, not necessary to show or describe, and a movable upper carbon, P, the whole representing the ordinary differential type of lamp with a gravity feed.

The upper carbon P is secured in any proper manner as by a clamp K to the lower end of a carrying rod R, which in this instance is rectangular in cross section, arranged to slide vertically through like shaped openings, not shown, in the top and bottom plates A, B, which thus serve to properly guide the carrying rod in its sliding movements. This rod R is set, as seen in Fig. 2, with its vertical flat faces at an angle to the parallel vertical planes through the lamp so that one of the corners of the rod which is formed in a toothed rack is presented in position to engage a pinion G that is carried by a cross shaft s.

In order to render the rotary movement of the pinion and its shaft s exceedingly delicate or as easy as may be needed, said shaft is mounted on pivot pins P' which pass through openings in the uprights F so that the reduced ends of the pins enter sockets in the opposite ends of the shaft s, the pins P' being removable and secured in properly adjusted positions by set screws 1.

In addition to the pinion G, the shaft s, has connected with it, as for instance by being directly secured to it a wheel or disk W.

The pivot pins P' may also and do preferably support a loosely mounted oscillating lever O which in this case is in the form of a rectangular open frame to escape and not interfere with the shaft s and its pinion G and wheel W. One end of the lever O is connected as by an arm E' with the lower end of the main solenoid core C', and the other end of said lever is connected by a similar arm E<sup>2</sup> with the lower end of the shunt solenoid core C<sup>2</sup>. The pivot pins P' may also and do preferably support another loosely mounted vibrating lever I of U-shape and arranged within the lever O, its one end being connected as by a clamp 3, with one end of brake band or strap S' which more or less encircles the wheel W, and has its other end connected as by a clamp 2, with one end of the lever O. The one end of the lever I carries a stop

L arranged in one position of said lever to strike some limiting portion of the lamp or its frame work as for instance the top of the bottom plate B, and thus limit the vibrating movement of the lever I in one direction.

With this general description of the construction and arrangement of the lamp it will be understood that the circuits of the lamp are as follows, see Fig 1: The current enters by the + wire, traverses the coil of the main magnet M, leaving by the wire 4 to the lamp frame F as by a post 5, thence by the framework to the carrying rod R and upper carbon P to the arc and lower carbon N and leaves the lamp by the - wire. The shunt or derived current starts from the post 5 by a wire 6 to the coil of the magnet S and thence by the wire 7 to the said - wire.

With this understanding, the operation of the lamp and the improved devices will be readily seen. The current energizes the main magnet M and causes the core C' to move upward rocking the lever O on its pivot or pivots and drawing on one end of the brake strap S' and applying friction to the wheel W determined in amount by the weight of the lever I to which the other end of the brake strap is connected and thus gripping the wheel W sufficiently primarily to retard or stop rotary movement of the pinion G and consequently a vertical movement of the carrying rod R and its carbon P. The pinion G thus being in a measure connected to the core C', further upward movement of the said core rocks the levers O, I, wheel W and pinion G bodily as a single piece and consequently raises the carrying rod R and carbon P and serves to separate the carbons to cause the arc to be established or "struck." As soon as the arc has increased beyond the normal length of the consumption of the carbons, the resistance in the circuit through the carbons is sufficiently great to cause the current through the coil of the magnet S to increase to such an extent as to overbalance that of the magnet M which results in the core C' rising and rocking the lever O in the opposite direction to that imparted by the core C', the lever I by reason of its weight also partaking of a similar movement until its stop L meets the plate B stopping further downward movement whereupon the core C' continuing to rise rocks the lever O still more and loosens the brake-strap S' from the wheel W so that all obstruction to the gravitating movement of the carrying rod R and carbon P is removed and the arc is again made normal. As soon as this occurs the current through the shunt magnet S lessens, allowing the magnet M to now act to rock the levers O and I sufficiently to raise the stop L from the plate B so that the brake strap again closes upon the wheel W and arrests further feed of the carbon P.

From the foregoing it will be seen that so long as the arc is normal the main magnet exerts sufficient force on the lever I as to keep

the brake applied and prevent any feeding movement of the carbon. As soon however as the arc lengthens the shunt magnet overbalances the force of the main magnet and causes the brake to be relieved to permit the carbon to feed. In addition however to these actions the carbon is so connected or clutched to the main magnet that it may be bodily raised to establish the arc; and it also follows that not necessarily, upon the reverse or counter action of the shunt magnet the carbon is likewise bodily lowered or fed, owing to the simultaneous movement of the lever I with the lever O, the free gravitating movement of the carbon P following as soon as the movement of the lever I is stopped and the hold of the brake consequently relaxed.

It will be observed that I have simply shown as much of an arc lamp as is necessary to properly understand the improved devices, it being obvious that additions, modifications and refinements of construction both in the lamp and in the said devices may be adopted without materially affecting its operations and the scope of the invention.

It should also be understood that it is not deemed essential that the controlling mechanism be operated by two magnets, as by slight and obvious change one magnet only need be used.

What is claimed is—

1. In an electric arc lamp, the combination with a vertically movable upper carbon carrying rod, and a shaft for moving said rod, of a brake wheel connected with said shaft, a brake strap applied to said wheel, two levers connected to opposite ends of the strap, and a magnet for operating one of said levers, as set forth.

2. In an electric arc lamp, the combination with a vertically movable upper carbon carrying rod, and a shaft for moving said rod, of a brake wheel connected with said shaft, a brake strap applied to said wheel, two levers connected to opposite ends of the strap, a stop for limiting the movement of one lever, and a magnet for operating the other of said levers, as set forth.

3. In an electric arc lamp, the combination with the shunt magnet and the main magnet, of a shaft connected with a brake wheel, a brake strap for said wheel, two levers connected to opposite ends of the strap and one of said levers connected to the magnets and a carbon carrying rod having connection with said shaft, as set forth.

4. The combination with a fixed lower carbon, a vertically moved upper carbon carrying rod and a shaft for moving said rod, of a brake wheel connected with the shaft, a brake strap applied to said wheel, two levers connected to opposite ends of said strap, a stop for limiting the movement of one lever and main and shunt magnets for moving the other lever, as set forth.

5. The combination with the pinion shaft, its pivot pins and a brake wheel and its strap

connected with said shaft, of a U-shaped lever connected to one end of said strap, another lever connected to the other end of said strap and a main and shunt magnet for rocking  
5 said last named lever, as set forth.

6. The combination of a movable carbon carrying rack rod for the upper carbon, a brake wheel connected with said rod and having a brake strap, a pair of rocking levers  
10 concentric with the axis of the brake wheel

and connected to opposite ends of said strap, and two magnets connected to opposite ends of one of said levers, as set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

EDWIN J. MURPHY.

Witnesses:

E. L. TODD,

GEO. H. GRAHAM.