(No Model.) 2 Sheets—Sheet 1.

# F. D'A. GOOLD.

## ELECTRIC ARC LAMP.

No. 498,387. Patented May 30, 1893.

Fig. 1.

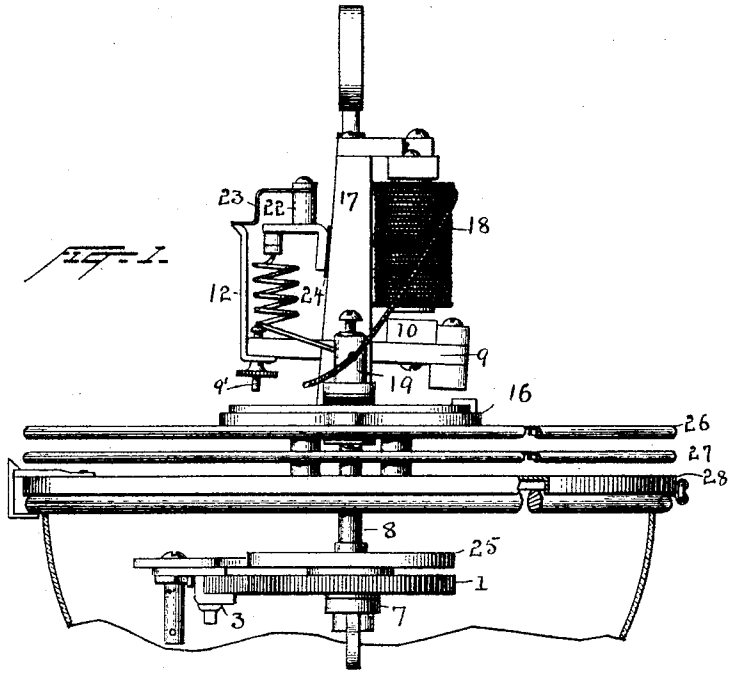
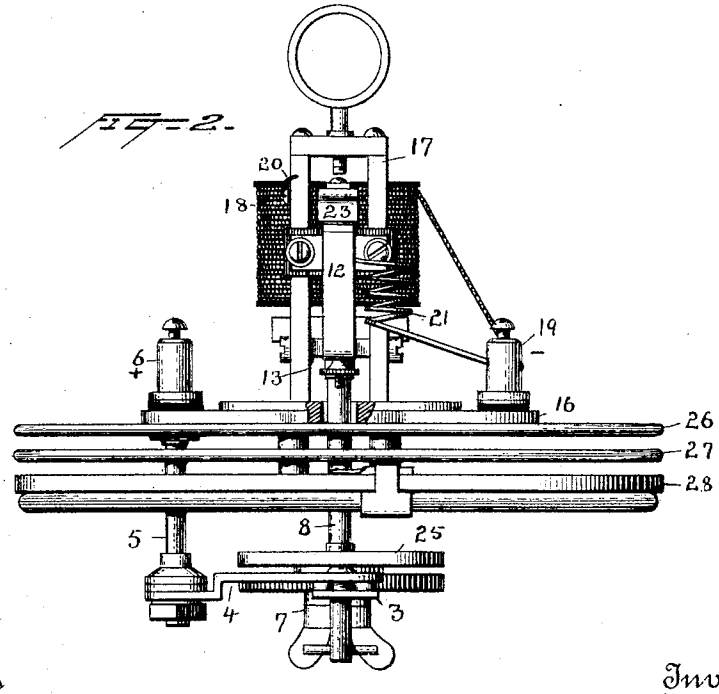



Fig. 2.




Witnesses
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Inventor
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By his Attorneys
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(No Model.) 2 Sheets—Sheet 2.

# F. D'A. GOOLD.

## ELECTRIC ARC LAMP.

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Fig. 5.

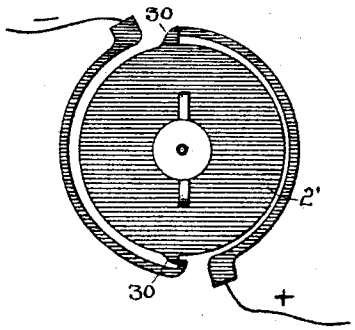



Fig. 3.

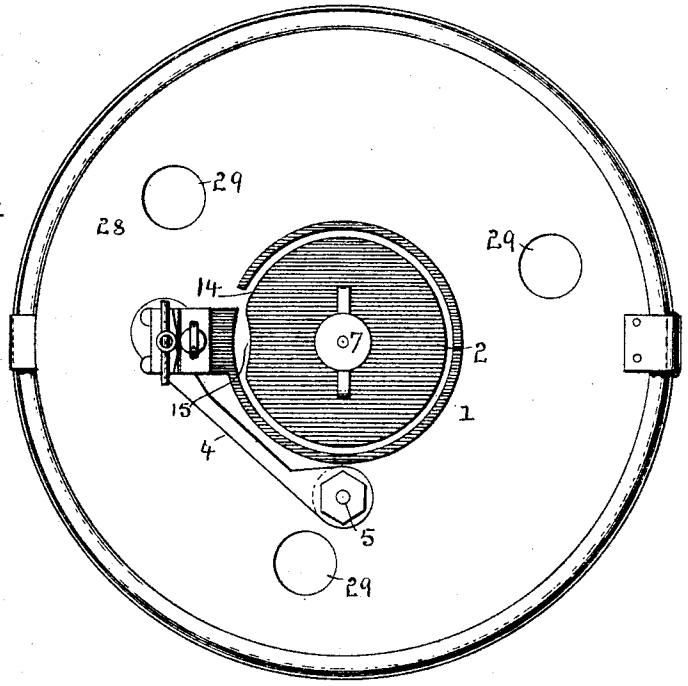



Fig. 4.

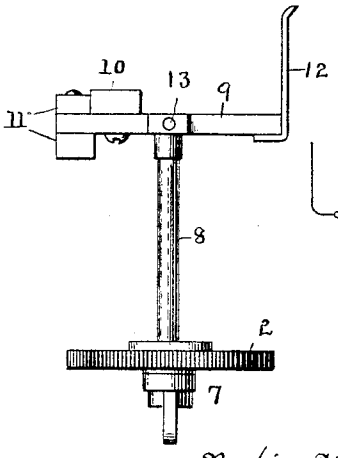
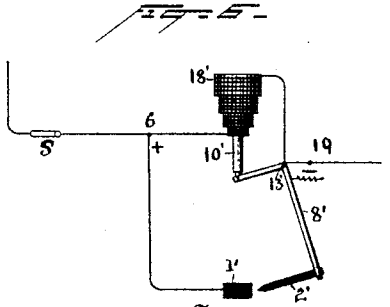



Fig. 6.

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# UNITED STATES PATENT OFFICE.

FREDERICK D'A. GOOLD, OF NEW YORK, N. Y., ASSIGNOR TO THE EDISON GENERAL ELECTRIC COMPANY, OF SAME PLACE.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 498,387, dated May 30, 1893.

Application filed November 7, 1891. Renewed December 31, 1892. Serial No. 456,945. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK D'A. GOOLD, a citizen of the United States, residing at New York city, in the county and State of New York, have invented a certain new and useful Improvement in Arc Lamps, of which the following is a specification.

The present invention relates to arc lamps, and especially to that class in which one of the carbons is moved away from the other carbon or carbons to establish the arc, but in which the carbons are both stationary while the lamp is in use, although certain features are applicable to feeding lamps.

The main objects of the invention are to provide an improved arrangement of carbons, and means for controlling the same to establish and to maintain the arc or arcs, also to protect the mechanism of the lamp from the heat of the arc, to provide for maintaining several arcs in series by means of a single arc lamp mechanism, and to improve certain other features of the lamp, as hereinafter specifically set forth.

In the accompanying drawings, Figure 1 is a side view of an arc lamp embodying my improvements, a section of the globe being shown. Fig. 2 is a view at right-angles to Fig. 1, the globe being omitted. Fig. 3 is a bottom view of Fig. 2. Fig. 4 shows a different arrangement of carbons. Fig. 5 shows a detail of the support for the movable carbon; and Fig. 6 is a diagram showing a modification.

In the lamp first to be described I dispense with the long carbon and carbon-carrying rods, with complicated feeding mechanism, usually employed in arc lamps, and employ in place thereof an electrode 1, shown in Figs. 1 and 3 of ring shape, and a central disk-shaped carbon 2, within the ring. The electrode 1 is supported by a clamp 3 carried by an arm 4 at the base of the rod 5, which extends to the positive terminal 6 of the lamp, said terminal and rod being insulated from the frame. The central carbon is held in a clamp 7, at the lower end of a rod 8, which extends through suitable perforations in the plates above the carbon to the arm 9, which carries the armature 10, and the weight 11 at one end, and a spring or arm 12 at the other end. The rod 8 and frame or arm 9 are rigidly connected so that when the latter is turned on its pivot 13 the carbon 2 is moved toward the right or toward the left separating it from the other carbon, against which it rests when the lamp is out of use, establishing the arc. In the position occupied by the carbons in Fig. 3, the central carbon has been moved to establish the arc at the point 14, the screw 9′ being so adjusted that carbon 2 will be centrally within carbon 1. As the carbon burns away the arc travels slowly around the central carbon, and the arc will be very steady, since no feeding of the carbon takes place. The carbon 2 is cut away slightly at 15 so that the arc will not form between the central carbon and the clamped end of the other carbon, but will form at the point above mentioned.

16 is a metal plate supporting the frame 17, which in turn supports the solenoid or magnet 18, one terminal of which is connected to the binding-post 19 which is the negative terminal of the lamp, and which is insulated from the plate, and the opposite end of the magnet coil is connected to the frame at 20.

21 is a coil of German silver or other resistance wire, one end of which is connected to the post 19, and the other end of which is connected to the post 22, which carries a spring 23 in position to co-operate with the arm or spring 12.

24 is a layer of mica or other insulating material separating the post 22 from the frame. This connection places the resistance coil and the magnet 18 in multiple arc.

The springs or arms 23, 12, are so arranged that when the armature of the magnet is in its retracted position the cut-out shunt circuit is closed, but when the magnet attracts its armature the shunt circuit is opened. When the lamp is used on incandescent circuits this cut-out shunt is unnecessary.

Just above the carbon is placed a marble or other refractory disk or plate 25. During operation of the lamp this becomes highly heated and adds to the brilliancy of the light, in a well-known manner. The heat of the arc is very intense, and to prevent injury to the working mechanism of the lamp I interpose between the arc and said mechanism a

heat insulating screen in the form of several sheet metal or other plates 26, 27, 28, separated from each other by an air space. The lower plate, and preferably the one next above it, is provided with perforations 29 to allow escape of heated air from the globe. This heated air is carried off toward the sides of the lamp, and thus directed away from the terminals and mechanism of the lamp. The plates 26, 27, 28, as well as the plate 16, have central perforations somewhat larger than the rod 8, through which said rod passes, and in which the rod may be moved the distance necessary to establish the arc without coming in contact with the sides of the perforations.

I have above described my lamp in connection with two carbons and a single arc, but I prefer to so arrange the carbons that I shall have several arcs in series, all of which are simultaneously struck and controlled by a single mechanism. This is illustrated in Fig. 4, in which the central carbon 2′ is supported by a device such as that already described in connection with first lamp, and shown in Fig. 5, and is moved in the same manner. This disk-shaped carbon I provide with small lugs 30, and instead of using a single carbon extending nearly around the disk, I employ several shorter carbons, two being shown, each partially surrounding said disk, and when the lamp is out of use being in contact therewith through the lugs 30. When the disk carbon is moved, in establishing the arcs, the lugs will leave the ends of the arc-shaped carbons, and arcs will be established at these points, and will gradually move around the disk as the carbon burns away. The positive terminal of the lamp is connected to one of the outer terminals, and the negative terminal is connected to the other outer carbon. This puts the arcs which are formed in series, and allows the use of a single lamp on a circuit of high potential, instead of requiring two, or more separate lamps, or a lamp and idle resistance, as heretofore.

In the lamp above described the carbons are arranged side by side in a horizontal plane, and the whole lamp is short and compact. A full sized lamp of this character need not be over nine inches in length, and this is an important advantage in many places, for example, in cars or in low-posted rooms.

While I have described the carbons as of circular or arc-shape, these shapes are not essential, and in many cases will not be preferred.

Fig. 6 shows an arrangement designed especially for incandescent circuits. Instead of the magnet 18 is the high resistance solenoid 18′, of the well known stepped form. The core 10′ is connected to one end of the angle lever 8′ at the outer end of which is carried carbon 2′. When the circuit is open at switch S carbon 2′ moves away from stationary carbon 1′, but when S is closed the core is attracted and carries carbon 2′ against 1′ short circuiting the coil and allowing the carbon 2′ to fall back a short distance, thus establishing the arc. The coil 18′ thus both forms and maintains the arc. The carbon 2′ is preferably, though not necessarily, in the form of a plate of considerable width instead of being in the form of a pencil.

I am aware that non-feeding carbons have been mounted in parallel or converging planes with wide faces instead of edges adjacent to each other, and this I do not claim. By placing the carbons in the same or substantially the same plane I am enabled to place them horizontally and to have the arc formed between them in such manner that no shadow will be cast downward.

What I claim is—

1. The combination, in an arc lamp, of a magnet adapted to be connected in a circuit, an armature therefor, a non-feeding, non-rotary carbon fixed to the armature or to an armature lever so as to be moved with it, a second carbon approximately concentric therewith against which the first mentioned carbon rests when the lamp is out of use to close the circuit at the carbons, said carbons being in the same plane so that their edges are adjacent whereby when the circuit is closed to the lamp the armature is attracted carrying one carbon away from the other and holding it there during the entire operation of the lamp, substantially as described.

2. The combination, in an arc lamp, of carbons, which when in burning position have parallel edges, one carbon surrounding or partially surrounding the other and being in electrical communication therewith when the lamp is out of use, a coil or magnet adapted to be connected in the lighting circuit, an armature for the magnet, a mechanical connection between the armature and one of the carbons for moving it away from the other carbon or carbons, whereby when the circuit is closed the arc is struck and the movable carbon held stationary during the entire operation of the lamp, substantially as described.

3. The combination, in an arc lamp, of a magnet adapted to be connected in the lamp circuit, an armature, an armature lever, a rod carried thereby, a non-rotary carbon disk fixed to the rod, a co-operating carbon surrounding or partially surrounding the first carbon against which the carbon disk rests when the lamp is out of use to close the circuit at the carbons, said carbons having long edges side by side whereby when the circuit is closed to the lamp the armature is attracted carrying one carbon away from the other and holding it there during the operation of the lamp, substantially as described.

4. The combination, in an arc lamp, of horizontal non-feeding carbons, electrically connected when the lamp is out of use, a coil or magnet adapted to be connected in the lighting circuit, an armature for the magnet, a mechanical connection between the armature and one of the carbons for moving it away from the other carbon or carbons, the fixed

and movable carbons being arranged one within another a cut-out or shunt for the magnet, a circuit controller therefor moved to open the shunt by a magnet in the main circuit, whereby when the circuit is closed the shunt is broken, the arc is struck and the carbon held stationary during the operation of the lamp, substantially as described.

5. The combination of carbons between which an arc is formed, a mechanism for moving one of the carbons, and an interposed heat insulating screen consisting of several plates side by side but separated by a small space or small spaces, substantially as described.

6. The combination, in an arc lamp, of carbons between which an arc is formed, mechanisms for controlling the same, and an interposed heat insulating screen consisting of several layers of sheet metal separated by a small space or small spaces substantially as described.

7. The combination, in an arc lamp, of carbons between which an arc is formed, mechanisms for controlling the same, and an interposed heat insulating screen consisting of several layers of sheet metal separated by a space or spaces, the lower plate or plates being perforated, substantially as described.

8. The combination, in an arc lamp, of carbons between which the arc is formed, mechanisms for controlling the same, an interposed heat insulating screen consisting of several layers of sheet metal separated by a space or spaces and a refractory block or plate between the arc and screen, substantially as described.

9. The combination, in an arc lamp, of a magnet in series with the arcs, an armature for the magnet, a non-feeding carbon connected to the armature so as to be moved thereby, and several other non-feeding carbons in position to co-operate therewith, and connected in series whereby several arcs are formed in series between the movable carbon and the other carbons, substantially as described.

This specification signed and witnessed this 30th day of October, 1891.

FREDERICK D'A. GOOLD.

Witnesses:
CHARLES M. CATLIN,
J. A. YOUNG.