

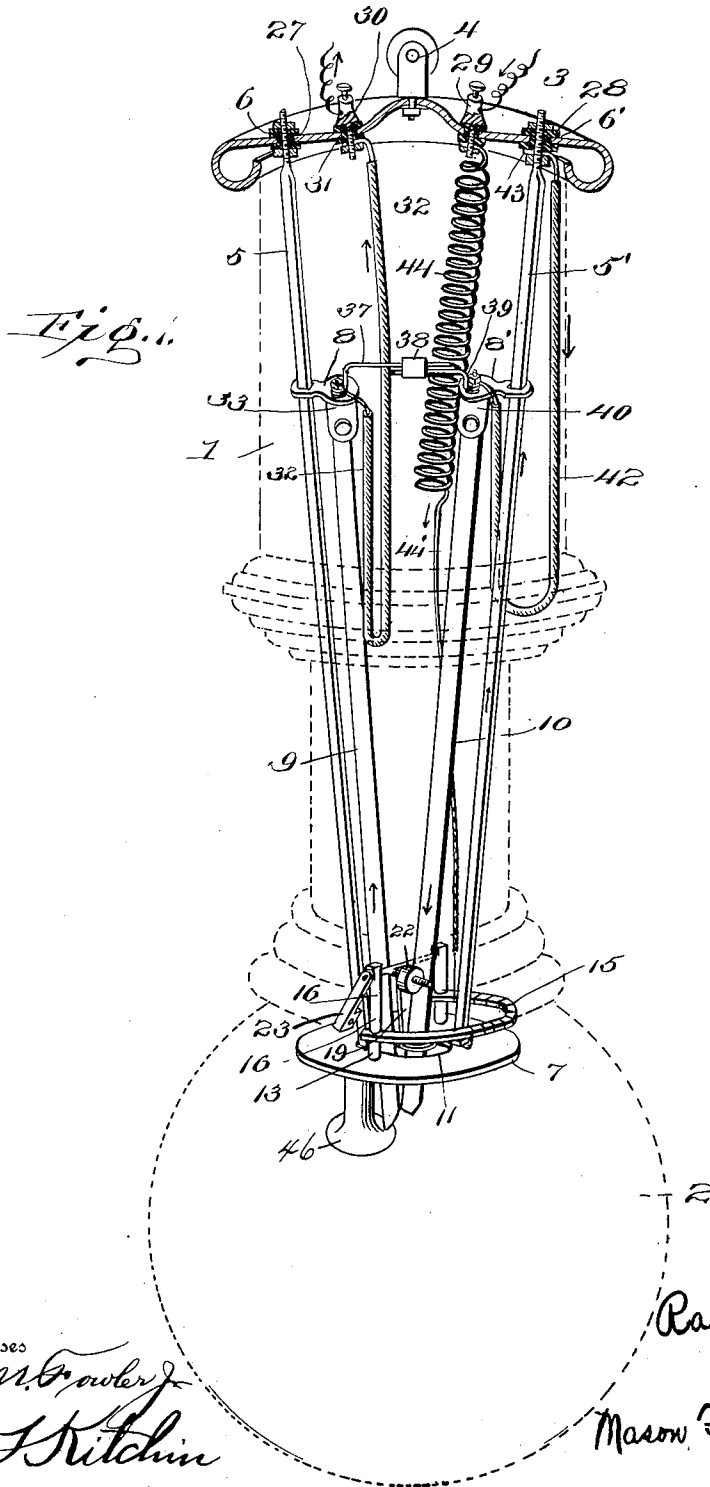
R. SCOTT.
ARC LAMP.

APPLICATION FILED SEPT. 24, 1906.

1,055,361.

Patented Mar. 11, 1913.

2 SHEETS—SHEET 1.



Witnesses

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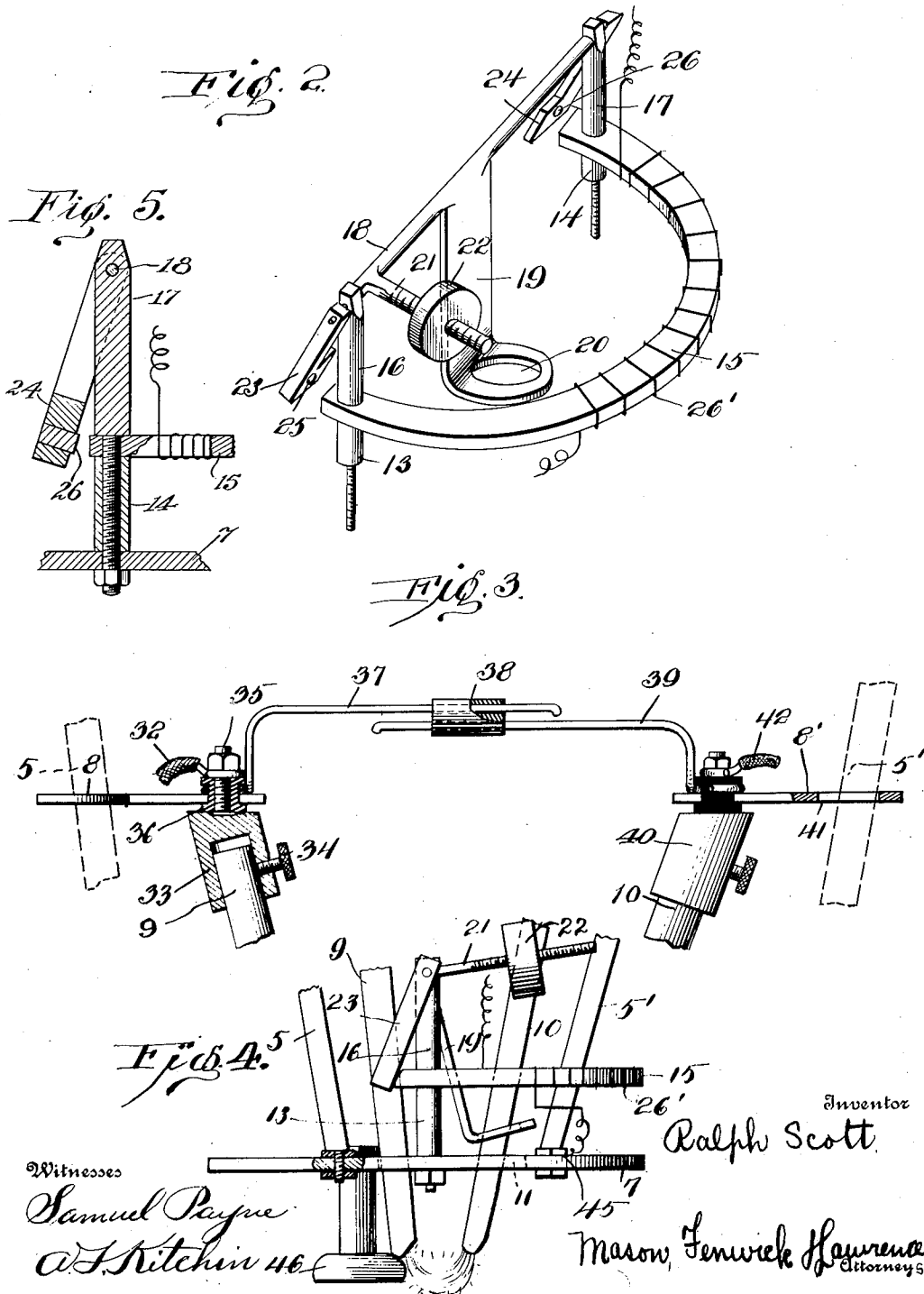
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UNITED STATES PATENT OFFICE.

RALPH SCOTT, OF WILKES-BARRE, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO SCOTT ELECTRICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF MAINE.

ARC-LAMP.

1,055,361.

Specification of Letters Patent.

Patented Mar. 11, 1913.

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To all whom it may concern:

Be it known that I, RALPH SCOTT, a citizen of the United States, residing at Wilkes-Barre, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Arc-Lamps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in electric arc lamps, and more particularly to that kind known as flaming arc lamps.

The invention comprises the production of movable carbons, means for regulating the distance between the ends of said carbons and means for deflecting the flame passing from one carbon to the other.

The object in view is the production of an arc lamp that will give a variable sized arc by the use of an electromagnetic system in conjunction therewith.

Another object in view is the production of an arc lamp having converging or parallel carbons that project a suitable distance into the globe of the lamp, and means for varying the arc distance between the ends of said carbons; for regulating the size of the arc and the current used.

Another object in view is the production of an arc lamp having a plurality of guided carbons; means for oscillating one of said carbons and a magnet for actuating said operating means and for magnetically regulating the amount of deflection of the arc passing between said carbons.

In the accompanying drawings: Figure 1 is a perspective view of the operating parts of an arc lamp embodying the features of the present invention; the frame and globe being shown in dotted lines to show the relative position thereof. Fig. 2 is an enlarged detail perspective view of the magnet and carbon operating structure. Fig. 3 is an enlarged detail view of the upper ends of the carbons and the means whereby they are caused to feed downwardly to the same extent. Fig. 4 is a detail, fragmentary side elevation of the lower end of the carbons and surrounding mechanism. Fig. 5 is a section taken through the standard 17 and adjacent parts, the end of magnet 15 shown in connection therewith being partly broken

away. The section also shows the projection of the non-magnetic block 26 beyond the face of the armature.

In arc lamps, it has heretofore been customary to employ a heterogeneity of carbons, dashpots, magnet housings and solenoids mounted therein, one of which carbons is stationary and the other movable, through the interposition of the solenoids and a suitable clutch mechanism. By the use of the solenoid and clutch mechanism the movable carbon pencil is allowed to feed toward the stationary pencil and thus maintain the continuity of the arc.

In the present invention, on the contrary, a non-oscillatable carbon is placed parallel to or convergent with one capable of oscillatory movement and both carbons move downward simultaneously in equal amounts.

Referring again more particularly to the drawings, 1 indicates any desired housing or casing, 2 any suitable globe and 3 any preferred metal covering or top provided with suspension means as 4. Mounted in the housing 1 are guide rods 5 and 5' which are secured to the top at 6 and 6' and to a plate 7, preferably made of porcelain, at the lower end thereof. Sliding upon and guided by the guide rods 5 and 5' are carbon guiding members 8 and 8' which have secured thereto carbons 9 and 10. The carbon 9 is preferably held firmly against oscillatory movement and is adapted to move vertically under the action of gravity through an oblong aperture 11 in the plate 7 when the lamp is in operation. The carbon 10 is secured to the guiding member 8' at 12 and is adapted to descend through the oblong aperture 11. The construction of the guiding member 8', as will be clearly seen in Fig. 3 of the drawings, is such as to allow the pencil 10 to swing or oscillate freely in the aperture 11, while when said member descends, the pencil 10, will correspondingly move through said aperture.

The carbon 10 is preferably adapted to swing through but a comparatively small angle as the distance between the lower extremity thereof and that of carbon 9 is at no time very considerable. For this reason it is possible to depend upon the flexibility of the connecting rods 37, 39, and the play between said rods and the connecting block 38, and between the rods and the insulation

36, for the means whereby such small amount of oscillatory movement, as is required, may be had. Obviously other means may be employed, but I prefer the construction shown.

5 Secured to the plate 7 are a pair of supports or uprights 13 and 14. Upon these uprights is secured a substantially semi-circular electromagnet 15, as will be clearly
10 seen in Fig. 2 of the drawings. Mounted upon the magnet 15, above the same, are non-magnetic uprights or standards 16 and 17 which are shown reduced and threaded at their lower end, and pass through the magnet and the paramagnetic supports 13 and
15 14 as well as the plate 7, in order to provide means for rigidly securing the same in place on the latter. In assembling the lamp, the magnet and uprights are arranged as shown in Fig. 2 of the drawings, and then the reduced portions of the uprights 16 and 17 are
20 passed through the plate 7, and nuts or other suitable securing means are placed thereon for rigidly securing the uprights in position. Pivottally mounted in the upper ends of the
25 uprights 16 and 17 is a shaft or bar 18, preferably made from soft iron, and which has rigidly secured thereto or formed integral therewith a depending member 19. The depending member 19 is bent approximately
30 at right angles near its lower end and has formed therein an aperture 20 through which passes the oscillating carbon 10. Secured at any suitable point along the bar 18, preferably near one end is an arm 21, which
35 is threaded for receiving a suitable weight 22, which in turn is internally threaded for adapting the same to be adjustable upon the member 21. The weight 22 acting through
40 the member or arm 21 will normally tend to hold the movable arm 19 in position for holding the oscillating carbon 10 against the carbon 9. Rigidly secured to each end of the shaft 18 are armatures 23 and 24 made
45 preferably from soft iron. Secured to each of the armatures 23 and 24 are mounted non-magnetic blocks, as 25 and 26. The blocks 25 and 26 are used simply to prevent the armatures from adhering to the magnet,
50 by reason of the residual magnetism, after the same has been demagnetized; and are preferably so arranged as to project a slight distance beyond the surface of the armatures.

55 As will be seen from Fig. 2 of the drawings; when the magnet is energized, the armatures 23 and 24 are drawn toward the ends thereof and rest against the same; the magnetism will then flow from one pole of the magnet to one of the armatures, from
60 said armature through shaft 18, from said shaft 18 through the other armature to the other pole of the magnet. When the magnet is energized, and attracts the armatures, the weight 22 will be raised and the depending

member or arm 19 will be moved so as to oscillate the carbon 10, and consequently move the same from contact with carbon 9. When the current first passes through the winding 26 on the armature 15, the leakage or stray
70 magnetism is at a maximum due not only to the heavy starting current, but also to the low permeability of the magnetic system by reason of the two wide air-gaps at the armatures. As the armatures are attracted, this
75 effect decreases in an inverse proportion to the length of the air-gaps; however, the arc, when initiated, requires a heavy downward or blowout effect, otherwise, it would tend to remain at the shortest point of separation of
80 the carbon tips and fuse or freeze them together. When the arc has been formed in its required horse-shoe shape this blowing or deflecting effect decreases, otherwise the arc would be disrupted.

85 When the armatures 23 and 24 are in contact with the magnet 15, the greater part of the flux passes across the rod 18, as this is a much easier path for the lines of force than the air space intervening between the poles
90 of 15. There is always some air-gap introduced, by reason of the non-magnetic button 25, which projects any desirable distance from the armatures, and which thereby results in considerable stray magnetism.
95 These stray lines of force radiate from one end or pole of magnet 15 to the other, some of them traveling above the plane of the magnet while others travel below it. Those lines which travel downward at substantially right angles to the plane of the magnet and of the arc cause the arc of flame to
100 lengthen, in a direct relation to the amount of this magnetism the latter varying in a measure, substantially as the strength of the current passing around the coil 26'. It
105 therefore follows that the greater the current passing through the arc, the greater will be the deflecting force on this arc, and the greater its length; thus increasing its resistance and in turn decreasing the current. This decrease in current further
110 causes a decrease in the stray magnetism, thereby producing a decrease in the length of the arc and its resistance, and proportionately increasing the current. This mutual action regulates the arc; and the current passing through the lamp is kept constant; if the line voltage decreases, the stray
115 magnetism of the magnet 15 would correspondingly decrease and shorten the length of the arc; increasing the current, and keeping the light at a constant predetermined value. Thus the arc is automatically regulated in a purely electromagnetic manner,
120 which results in its constant maintenance, without feeding or disruption, as long as the current continues.

The guide rods 5 and 5' are mounted on each side of the top 3, and are insulated
130

therefrom by the insulation 27 and 28. The binding post 30 is carefully insulated from the top of the lamp by the insulation 31. Connected to 30 is a flexible feedwire 32 of any desired construction, but flexibly insulated preferentially by glass or porcelain beads, so as not to short circuit the current in case the same should come in contact with any live parts of the lamp. The lower end of the cord 32 is secured to a carbon holding member 33, as shown in Fig. 3 of the drawings. Referring more particularly to this figure, it will be seen that the carbon 9 is rigidly held in the member 33 by a clamping arrangement 34. 33 is reduced at its top for forming a threaded extension 35, which passes through an insulation 36 and has secured at its upper end the wire 32. By reason of this structure it will be seen that the current can pass from the wire 32 to the carbon 9 without any danger of being short circuited. A rod 37 is passed around the insulation 36 at one end, and at the other through a connecting block 38, preferably composed of insulation. Passing through the block 38, is another rod 39, similar to rod 37, which connects to the carbon clamp 40 similar to 33, which therefore needs no further description. The rods 37 and 39 thus join the carbons 9 and 10 at their upper ends and cause them to feed downwardly to the same extent. As will be clearly seen in Fig. 3 of the drawings, the supporting member 8' is made with an aperture 41 sufficiently large for permitting the carbon 10 to oscillate and slightly move at its upper end as may be desired, in order to permit the lower end of said carbon to move into and out of engagement with carbon 9, as heretofore described. Secured to the member 40 is a wire 42, which is adapted to convey current to the carbon 10 from the guide rod 5', and in order to accomplish this it is electrically connected at 43 to said guiding rods.

To the member 39 is secured any suitable steadying resistance as 44,—from the resistance 44 a wire 44' is passed down to one end of the magnet 15 and is given any predetermined number of turns around said magnet, and then connected to the lower end of the upright 5' at 45. The current is adapted to be taken in at post 29, from which it passes through the resistance 44, wire 44', winding 26 on the magnet, guide rod 5', wire 42, the carbon clamp 40, carbon 10, the arc, carbon 9, carbon clamp 33, wire 32 and out through post 30. While the lamp and circuit, therefore, has been described as carrying and using direct current; it is to be understood that alternating currents may be used with equal advantage; and without structural changes. Secured to the plate 7 is a stop or support 46. This stop or support is preferably made from soft steel, which permits

of rapid coiling and withstands a high temperature, being held in depending position on plate 7 by any suitable securing means.

The carbon 9, which is adapted to simply move vertically, rests normally upon the stop 46. From this it will be seen that the stop 46 supports the carbon 9, the guiding member 8, and the surrounding parts. In supporting the member 8 it also supports the rods 37 and 39 and block 38, and consequently carbon 10 and guiding devices.

As will be clearly seen from Fig. 4 of the drawings, the arc is formed more to one side of the carbon than on the center of the end thereof and consequently does not directly touch the stop 46'; consequently the stop is subjected to but little of the heat created by the arc. After the lamp has been used a short time the stop 46 will oxidize and become coated with a sufficient amount of deposits from the burned carbon to protect the same from fusing or burning due to the heat of any arc that may pass between the carbons. After the lamp has been used a considerable length of time, the stop is thoroughly covered with deposits, and therefore, will firmly support said carbons at all times in their proper relation,—in the practical working of the lamp, when using direct current, I preferably use a larger carbon for the carbon 10 than the carbon 9, as the carbon 10 is particularly adapted to be used as the positive carbon, and consequently will burn away a trifle faster than the carbon 9, but by using a slightly larger carbon this inequality of length will be obviated. When using alternating current, both carbons are preferably of the same size. In practical operation impregnated carbons are preferably used with either direct or alternating current, in order to give a longer and better arc. By using impregnated carbons, the arc passing between the carbons will appear somewhat on the order of a flame. Although impregnated carbons are preferable for forming this arc and consequently producing a so-called flaming arc lamp, it will be understood that the invention is equally adapted to the ordinary carbons now on the market, and may be used with either to advantage.

As the carbons burn away, carbon 9 feeds down and remains against stop 46, the feeding of this carbon 9 also allows the carbon 10 to feed, but does not in any way disturb the passage of the arc from one carbon to the other, and consequently, there is no flickering of the light, nor the slightest cessation thereof. It will be observed also from Fig. 4 of the drawings that the stray magnetism acting upon the arc will force the same downward a considerable distance below the stop 46 beneath which there is no other part of the lamp which can obstruct the light.

Having described my invention, I claim:

1. In an arc lamp, a pair of convergent
guiding rods, a plate having an opening
and joining said rods at their lower ends,
5 electrode-holders guided by said rods and
having electrodes extending downward
through said opening, laterally projecting
rods extending toward one another from
said electrode-holders, and a block co-acting
10 with said rods to constrain the electrodes to
move together in their downward displacement,
each of said rods passing through said
block, and the latter being slidable on both
rods.
- 15 2. In an arc lamp, a pair of downwardly
convergent guiding rods, a member 7 uniting
said rods, electrode-holders guided on
said rods, a pair of electrodes projecting

downward from said holders, means for
guiding said holders to move downward to- 20
gether, an electro-magnet having means for
mounting the same on member 7 aforesaid
and having upwardly projecting iron rods
16 on its poles, an iron spindle joining said
last mentioned rods, a pair of armatures for 25
the poles of said electro-magnet fixed to said
spindle, and means projecting from said
spindle to displace one of said electrodes
laterally to strike the arc.

In testimony whereof I affix my signature 30
in presence of two witnesses.

RALPH SCOTT.

Witnesses:

W. J. TREMBATH,
FRANK SCOTT.