No. 684,619. Patented Oct. 15, 1901.

C. M. SHAFER.

ELECTRIC ARC LAMP.

(Application filed June 26, 1901.)

(No Model.) 2 Sheets—Sheet 1.

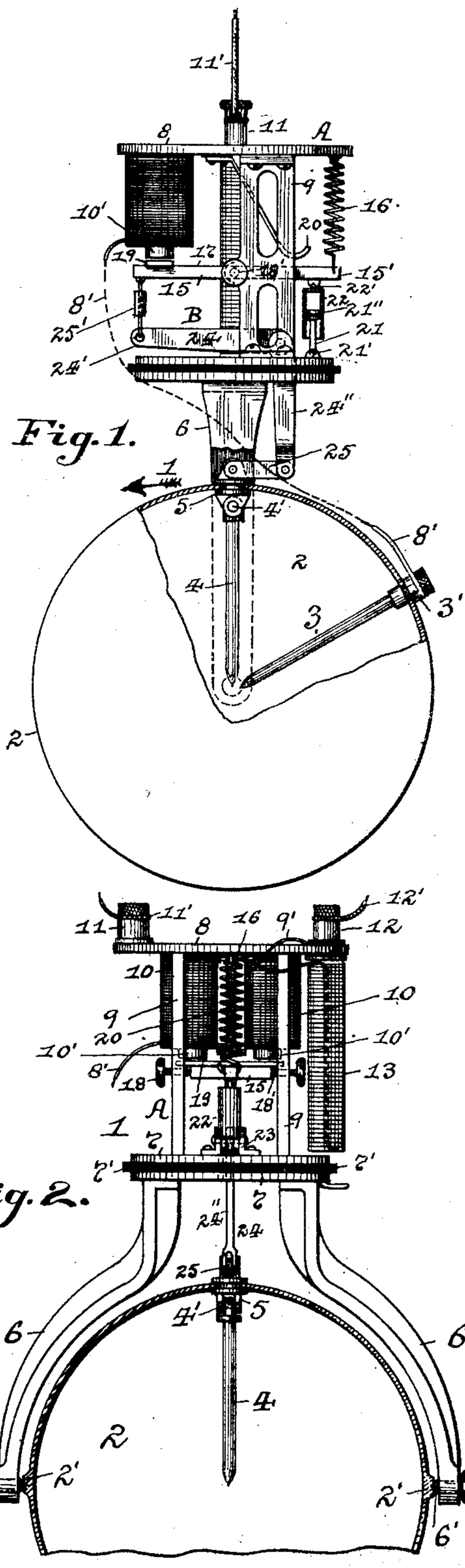

Fig. 1.

Fig. 2.

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Fig. 3.

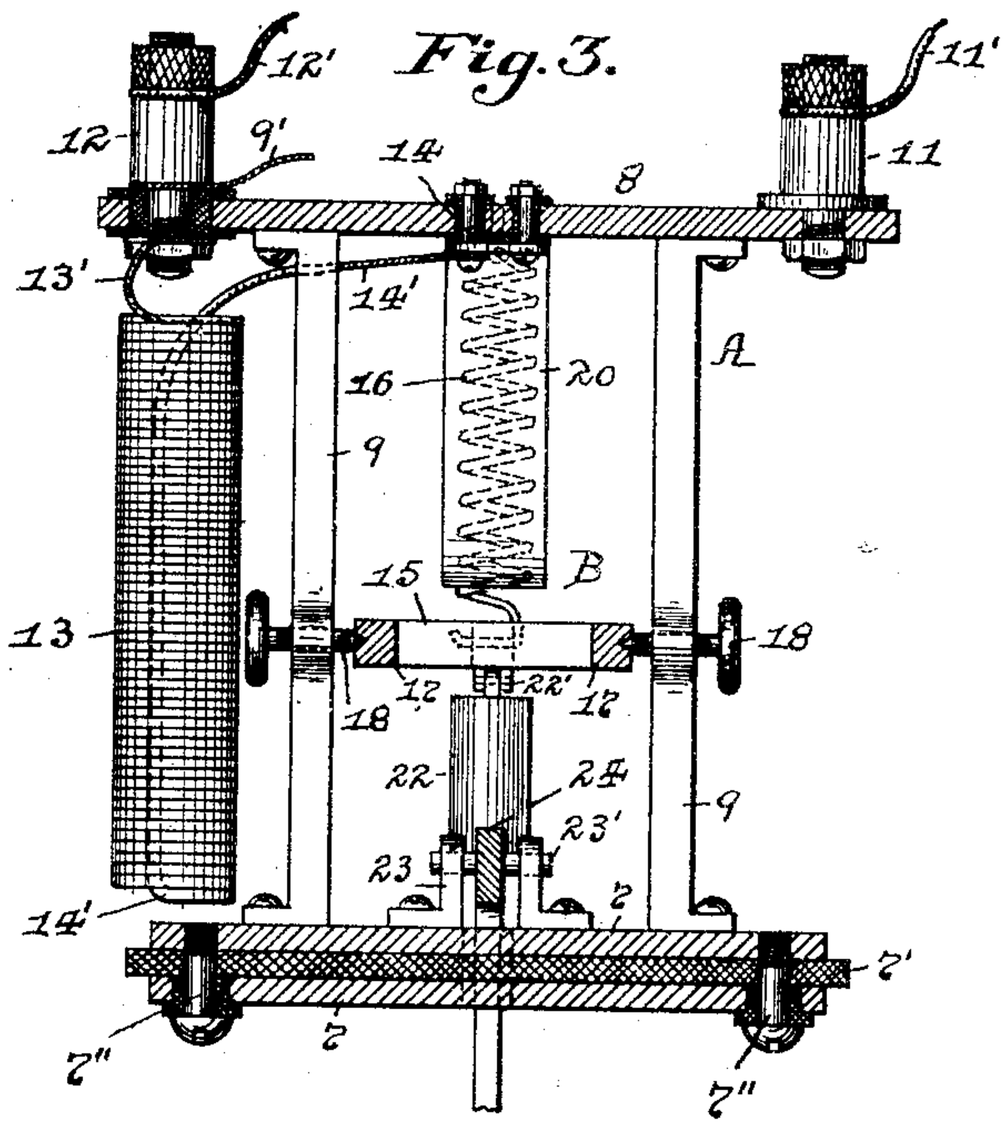
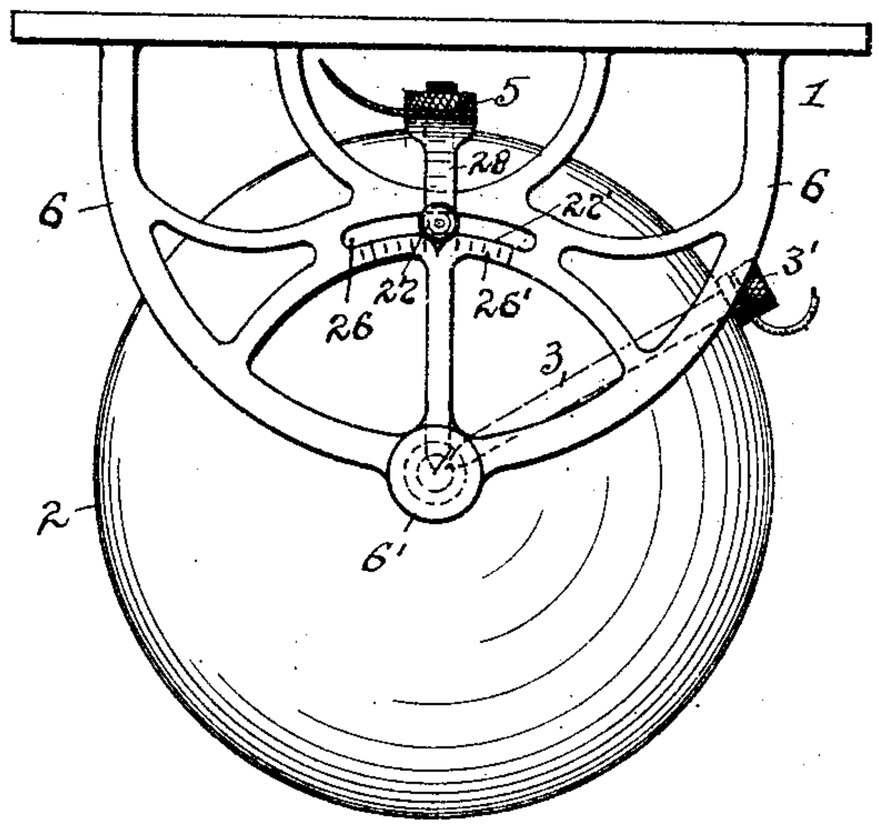


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 684,619, dated October 15, 1901.

Application filed June 26, 1901. Serial No. 66,091. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. SHAFER, a resident of McDonald, in the county of Washington and State of Pennsylvania, have invented a new and useful Improvement in Electric Lamps; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to electric lamps, and has for its object to provide an electric lamp which is so arranged as to permit the carbons on the same to burn for an indefinite length of time without having to be renewed, as well as one which is cheap and simple in its construction and operation.

My invention consists, generally stated, in the novel arrangement, construction, and combination of parts, as hereinafter more specifically set forth and described, and particularly pointed out in the claims.

To enable others skilled in the art to which my invention appertains to construct and use the lamp, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view, partly in section, of my improved electric lamp. Fig. 2 is a like view looking at right angles to Fig. 1. Fig. 3 is an enlarged vertical section of the upper portion of said lamp, and Fig. 4 is a side view of another form of the lamp.

Like symbols of reference herein indicate like parts in each of the figures of the drawings.

My improved electric lamp 1 is formed of the air-tight glass globe 2, which has the negative stationary carbon 3 rigidly supported therein and connected to said globe 2 by a holder 3′ and on an angle to the positive movable or swinging carbon 4, which is supported within the globe 2 in a substantially vertical position and is pivoted or hinged at 4′ to a holder 5, passing through the globe 2. The globe 2 is supported by brackets or arms 6, extending down the lower horizontal supporting-plate 7 of the frame A, and which are provided with pointed set-screws 6′, which extend through the ends of the arms 6 and engage with lugs 2′ on said globe 2 to pivotally support said globe with the arms 6. The lower supporting-plates 7 have the insulated plate 7′ between them and are held together by the insulated screws 7″, while supported above and connected to the lower supporting-plates 7 by the vertical standards 9 is the upper horizontal supporting-plate 8, which has the magnets 10 extending down therefrom and on which plate 8 is the binding-post 11 and the insulated binding-post 12, to which lead the current-supply wires 11′ and 12′, while a wire 8′ connects the holder 3′ with the magnets 10 and a wire 9′ connects the insulated post 12 with said magnets 10. Within the frame A is the resistance-coil 13, which is connected at one end, 13′, to the insulated binding-post 12 and by its opposite end, 14′, to the insulated connection 14 on the plate 8. Hung within the frame A and connected to the carbon 4 is the regulating mechanism B, which is composed of the lever 15, having the spiral spring 16 connected to one end, 15′, thereof and to the upper plate 8, while the opposite end of said lever 15 is forked, as at 17, and pivoted to said standards 9, as at 18′, by means of the pointed set-screws 18. An armature-bar 19 extends across the forked ends 17 of the lever 15 adjacent to the poles 10′ of the magnets 10, and a spring-bar 20 extends down from the insulated connection 14 on the upper plate 8 for engaging with the end 15′ of said lever 15. Pivoted at 21′ to the top plate 7 is the piston-rod 21, which is provided with the piston 21″ thereon, working within the air cushion or cylinder 22, pivoted at 22′ on the end 15′ of the lever 15. Pivoted at 23′ in bearings 23 on the top plate 7 is the bell-crank lever 24, one end 24′ of which is pivotally connected, by means of a turnbuckle 25′, to the forked ends 17 of the lever 15, while the opposite end 24″ passes through an opening in the plates 7 and 7′ and has a link 25 pivoted thereto and to the holder 5 for the swinging carbon 4.

The use and operation of my improved lamp are as follows: When the lamp is burning, the current passes from the wire 11′, connected with the dynamo, to the binding-post 11, and from said post 11 through the upper plate 8 and standards 9 of the frame A to the lever 15 of the regulating mechanism B, through the set-screws 18, which will act to attract the armature-bar 19 on the end 17 of

the lever 15 to the poles 10′ on the magnets 10 and lower the end 15′ of the lever 15, and with it the air-cylinder 22 around the piston 21″ on the rod 21, which will cause the spring 16 on the said end 15′, connected to the plate 8, to be drawn out. The current passes from the lever 15 through the turnbuckle 25′ to the bell-crank lever 24, link 25, and holder 5 to the positive carbon 4, which will act to raise the end 24′ of the lever 24 and move the opposite end 24″ and link 25 in the direction of the arrow, Fig. 1, and on account of the link 25 being pivotally connected to the end 24″ and holder 5 and such holder being rigidly connected to the globe 2 the said globe 2 will move in the direction of the said arrow and with it the stationary negative carbon 3, and so permit the positive or movable carbon 4 to swing out and away from the carbon 3 to form an arc and the light therewith. While the carbons 3 and 4 are thus burning the current will return through the negative stationary carbon 3 by the wire 8′, leading from the holder 3′ to the magnets 10, and from the magnets 10 through the wire 9′, connected thereto and to the insulated post 12, and thence from said post 12 through the current-wire 12′, connected thereto, to the dynamo. In case the light goes out or the ends of the carbons 3 and 4 swing too far from each other from any cause, which will allow the ends 17 of the lever 15 of the regulating mechanism B to drop down and pull the armature-bar 19 away from the poles 10′ of the magnets 10, while the opposite end 15′ of the lever 15 will come in contact with the spring-bar 20 by the spiral spring 16 and so allow the current to pass from the wire 11′ through the post 11, plate 8 to the spring-bar 20 through the insulated connection 14, after which the current passes from the bar 20 and connection 14, by means of the end wire 14′, through the resistance-coil 13 to the insulated post 12 through the end wire 13′ and thence from said post 12 through the wire 12′ to the dynamo. When the lever 15 of the mechanism B is in this position, the globe 2 is drawn back through the medium of the end 24′ of the bell-crank lever 24 being connected to the lever 15 by the turnbuckle 25′ and the opposite end 24″ being connected to the holder 5 carrying the swinging carbon 4 by the link 25, which will allow the ends of the carbons 3 and 4 to be connected again and so pass the current from the spring-bar 20 through the lever 15 to the bell-crank lever 24, connected thereto and to the holder 5 carrying the carbon 4 connected to the lever 24 by the link 25. The return-current will pass from the carbon 3 through the holder 3′ to the wire 8′, and thence through said wire 8′ to the magnets 10, after which it passes from the magnets 10 by means of the wire 9′ through the post 12 and through the current-wire 12′ to the dynamo. This will cause the armature-bar 19 on the lever 15 to be again attracted to the poles 10′ of the magnets 10 and free the end 15′ of the lever 15 from the spring-bar 20, while the arc and light will be formed by the points or ends of the carbons 3 and 4, so permitting the globe 2 to be moved in the direction of the arrow and the currents to pass through such carbons 3 and 4 and their connecting parts, as before described, the spring-bar 20 in this case acting as a relighter for use on street and like lamps. When it is desired to use the lamps for house or indoor purposes on an alternating current, the automatic regulating mechanism B is done away with and the globe 2 is turned by mechanical means, such as is shown in Fig. 4, in which case one of the arms 6 is provided with a slotted opening 26, formed therein and in a circular path, having a graduated face 26′ around the sides 27′ of the same, while an insulated knob 27 is formed on the pointed end of a bar 28, connected to the holder 5 of the carbon 4 for moving the globe 2, carrying the carbons 3 and 4 to the position desired. In this use the wires are connected directly with the holders 3′ and 5 for the carbons 3 and 4, respectively, and the lamp 1 connected and used as in the case of the ordinary approved incandescent electric lamp. It will thus be seen that my improved electric lamp will prevent the rapid burning out of the carbons and will permit the carbons to be used for a long period of time. They can easily be replaced or renewed when desired and when in position can always be kept connected together to form the arc for lighting. In street use the lamp is so arranged as to prevent the other lamps arranged upon the same line from becoming extinguished when any one lamp or several are out from any cause, and when any such lamp or lamps are out they are easily and quickly relighted automatically. The lamp will throw no shadows when in use and will always be positive and rapid in its movements.

Various modifications in the construction and design of the various parts may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An electric lamp, consisting of a globe, a swinging carbon supported within said globe, a stationary carbon supported within said globe at an angle to the swinging carbon, and means for moving said globe to form the arc and connect the carbons.

2. An electric lamp, consisting of a globe, a swinging carbon supported within said globe, a stationary carbon supported within said globe at an angle to the swinging carbon, and means for automatically moving said globe to form the arc and connect the carbons.

3. An electric lamp, consisting of a globe, a frame, magnets within said frame, a swinging carbon supported within the globe, a stationary carbon supported within the globe at an angle to the swinging carbon, and connections between said magnets and the globe for

automatically moving said globe to form the arc and connect the carbons.

4. An electric lamp, consisting of a globe, a frame, magnets within said frame, a lever within said frame adapted to engage with said magnets, a swinging carbon supported within the globe, a stationary carbon supported within the globe at an angle to the swinging carbon, and connections between said lever and the globe for automatically moving said globe to form the arc and connect the carbons.

5. An electric lamp, consisting of a globe, a frame, magnets within said frame, a lever within said frame adapted to engage with the magnets, a swinging carbon supported within the globe, a stationary carbon supported within the globe at an angle to the swinging carbon, and a bell-crank lever connected to said first-named lever and to the globe for automatically moving said globe to form the arc and connect the carbons.

6. An electric lamp, consisting of a globe, a frame, magnets within said frame, a lever within said frame adapted to engage with said magnets, a swinging carbon supported on a holder within said globe, a stationary carbon supported on a holder within said globe and at an angle to the swinging carbon, a bell-crank lever pivoted on said frame having one end connected to said first-named lever by a rod, and a link pivoted to the opposite end of the bell-crank lever and to the holder for the swinging carbon for automatically moving said globe to form the arc and connect the carbons.

In testimony whereof I, the said CHARLES M. SHAFER, have hereunto set my hand.

CHARLES M. SHAFER.

Witnesses:
J. N. COOKE,
JAMES L. WEHN.