W. K. HOWE.

BURNED OUT LAMP REPLACER.

APPLICATION FILED JULY 13, 1914.

1,276,766.

Patented Aug. 27, 1918.

2 SHEETS—SHEET 1.

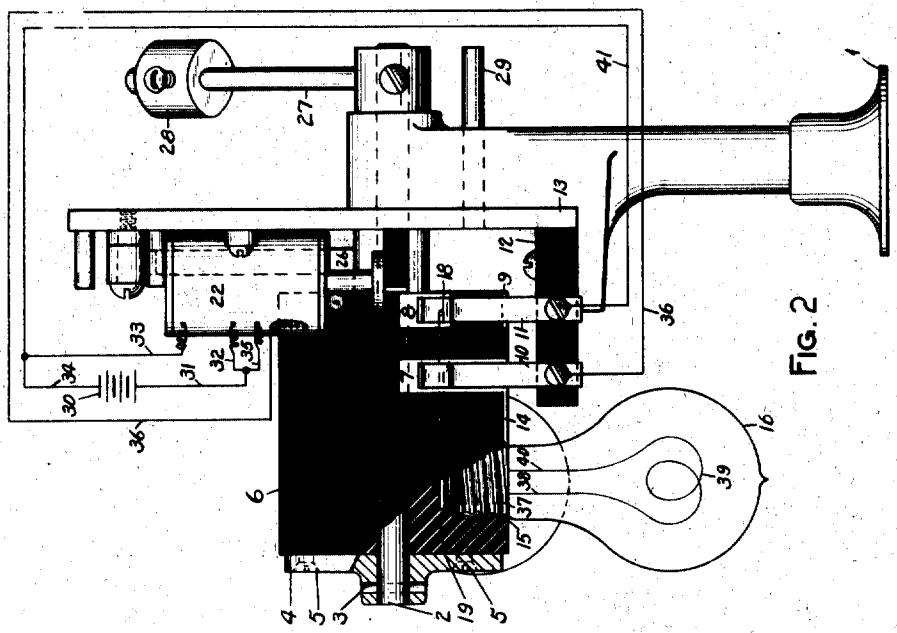

FIG. 2

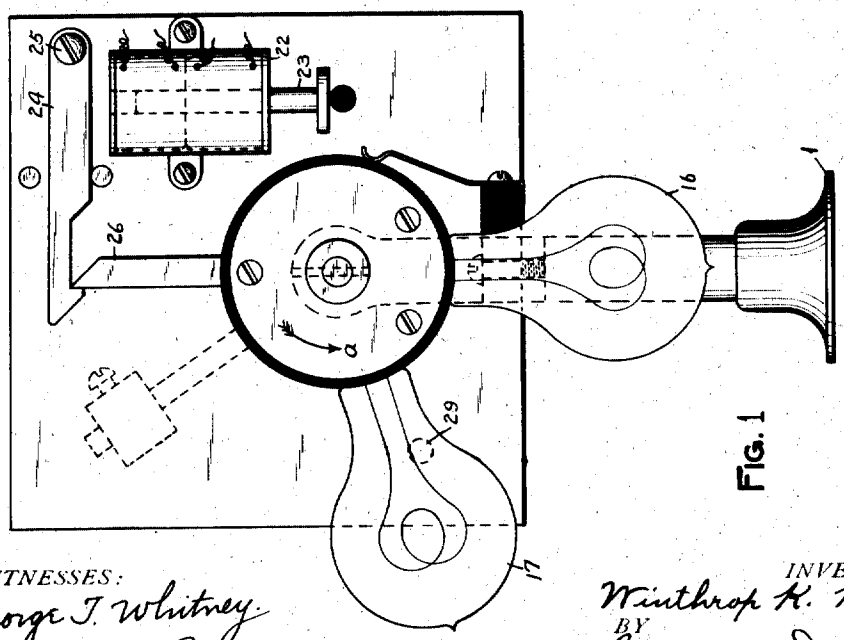

FIG. 1

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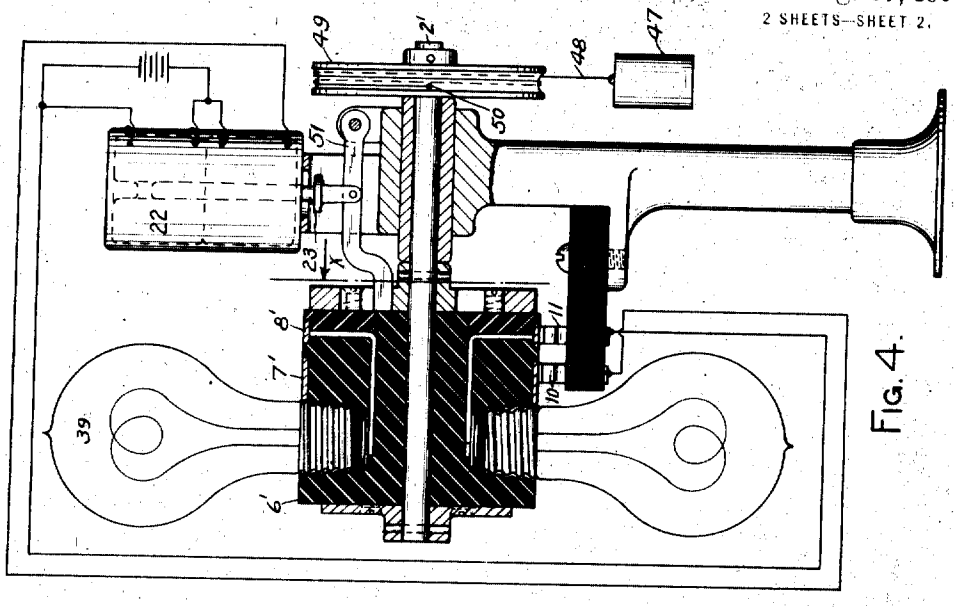

FIG. 4.

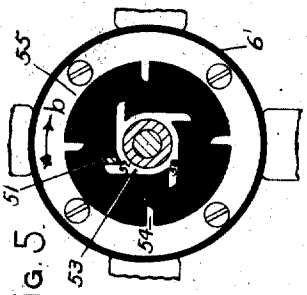

FIG. 5.

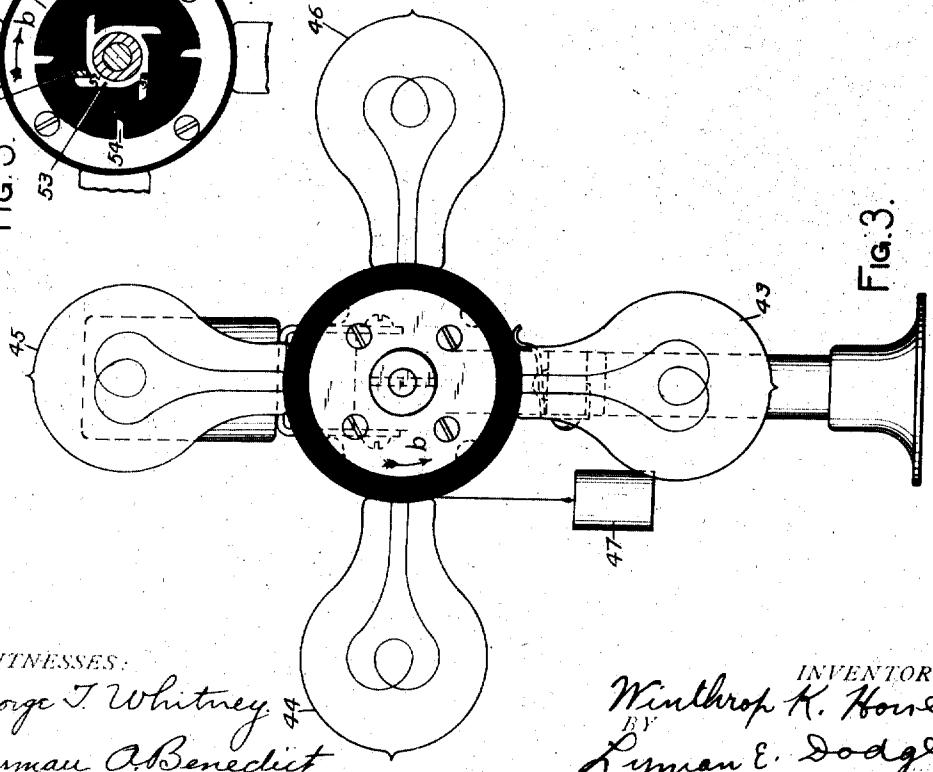

FIG. 3.

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UNITED STATES PATENT OFFICE.

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BURNED-OUT-LAMP REPLACER.

1,276,766. Specification of Letters Patent. Patented Aug. 2 , 1918.

Application filed July 13, 1914. Serial No. 850,720.

To all whom it may concern:

Be it known that I, WINTHROP K. HOWE, a citizen of the United States, and a resident of the city of Rochester, in the county of Monroe and State of New York, have invented a new and useful Burned-Out-Lamp Replacer, of which the following is a specification.

This invention relates to electric lighting and more particularly to a device for replacing a burned out lamp by a perfect lamp.

The main object of this invention is the construction and arrangement of a simple, inexpensive structure, not likely to be easily deranged, by which a burned out lamp, particularly such as is used in railway signaling, may be replaced automatically by a perfect lamp.

Other objects and advantages will appear as the description of the invention progresses, and the novel features of the invention will be particularly pointed out in the appended claims.

In describing the invention in detail, reference is had to the accompanying drawings, wherein I have illustrated a preferred physical embodiment of my invention, and wherein like characters of reference designate corresponding parts throughout the several views, and in which:—

Figure 1 is a front elevation; Fig. 2, is a side elevation with parts broken away; Fig. 3, is a front elevation of a modification; Fig. 4, is a side elevation of the device shown by Fig. 3 with parts in section; and Fig. 5, is a rear detail vertical section taken on the line *a—a* in Fig. 4, and as viewed in direction of the arrow X.

Referring particularly to Figs. 1 and 2, 1 is a standard which is formed into a bearing at its upper end, through which passes and by means of which is supported the shaft 2, which has a flange 4 fastened thereto by means of pin 3, which flange 4 has fastened to it by means of screws 5 the insulating drum 6.

The drum 6 has two metallic segments, 7 and 8 fastened to its periphery and a further segment 9 also fastened to its periphery.

Two metallic springs, 10 and 11, are supported by an insulating member 12 fastened to the standard 1 in such a position that they bear upon the periphery of the drum 6 at such a point that spring 10 always contacts with segment 7; and spring 11 contacts with segment 8 when lamp 16 is in the position shown, but with segment 9 when lamp 17 has been rotated, as hereinafter described into the position now occupied by lamp 16.

Metallic segment 7 is connected by means of a conductor 14 with the metallic lining 15 of the sockets into which the lamps 16 and 17 are screwed. Metallic segment 8 is connected by means of a wire 18 with the metallic plate 19, positioned in the bottom of the socket into which lamp 16 is screwed, and which is insulated from the metallic lining 15. The metallic segment 9, in the same manner as segment 8, is connected with a similar metallic disk located at the bottom of the socket into which the lamp 17 is screwed.

Fastened to the member 13 is a solenoid 22, which has two separate and distinct windings relatively so proportioned as regards ampere turns that if currents of equal values flow through each winding no resulting magnetic effect will be produced, that is, their magnetic effect is equal and opposite with equal current flowing therethrough. When one winding only is energized a magnetic effect is produced which causes core 23 to be raised, so that its upper end will strike latch 24. Latch 24 is pivoted at 25 and engages with the end of a member 26, which is rigidly attached to shaft 2. The engagement of latch 24 with member 26 prevents a rotative movement of shaft 2 in the direction of the arrow *a*, Fig. 1.

The shaft 2 has an arm 27 attached thereto which has a weight 28 fastened to its outer end. This arm extends away from the shaft in such a direction, best shown in Fig. 1, that if the shaft is free to turn, the weight acting on the arm will cause the shaft 2 to turn counterclockwise carrying with it the drum 6, so that the lamp 17 will be brought into the position shown occupied by lamp 16, and there remain because of the arm 27 striking against the stop 29.

Referring to Fig. 2 it will be seen that a circuit is normally closed through one winding of the solenoid, which circuit, including the battery 30, is as follows: Positive terminal of battery 30, wires 31 and 32, one coil of solenoid 22, wires 33 and 34 to the other terminal of the battery 30. The current in the above traced path flows at all times, and

if no current flows through the other coil of solenoid 22 the core 23 will be raised and disengage latch 24 from arm 26.

With all of the parts in normal position, that is, with lamp 16 in the position as shown in Fig. 1, a proper current flows through one coil of solenoid 22, and so neutralizes the effect of the current flowing in the other coil of solenoid 22 through a circuit which includes the battery 30 and the lamp 16 as follows: Positive terminal of battery 30, wires 31 and 35, coil of solenoid 22, wire 36, spring contact 10, metallic segment 7, wire 14, metallic lining 15, metallic band 37 of lamp 16, end 38 of filament 39 of lamp 16, end 40 of filament 39, metallic plate 19, wire 18, metallic segment 8, spring contact 11, and wires 41 and 34 to the other terminal of the battery 30. Current flowing through the above traced path will cause filament 39 to become incandescent, and by reason of one coil of solenoid 22 generating an equal and opposing magnetic effect to that generated by its other coil there will be no tendency to raise the solenoid core 23. If filament 39 of lamp 16 should become broken, the last above described circuit would be broken, so that one coil of solenoid 22 would be the only one which would be operative, and it consequently would cause core 23 to rise and move latch 24, so that arm 26 would be free, whereby weight 28 acting through arm 27 would cause lamp 17 to be revolved into the position now occupied by lamp 16 as shown in Fig. 1, and so be in a proper position to cast its rays to the proper place. The movement of lamp 17 into the position occupied by lamp 16 would also cause the drum 6 to be moved so that, although spring contact 10 still rested upon metallic segment 7, the spring contact 11 would then rest upon metallic segment 9, so that the current flowing in wire 36 from the battery 30 through one coil of solenoid 22, would flow by means of wire 14 to the metallic lining of the socket into which lamp 17 is screwed, passing through the filament of lamp 17 and thence to the metallic disk similar to 19, and thence to metallic segment 9 and to spring contact 11, which is then resting upon metallic segment 9, and thence by means of wires 41 and 34 to the other terminal of the battery 30, thus causing the lamp 17 to be lighted.

From the above description it will be seen that the burning out of lamp 16 automatically causes another lamp to take its place and be lighted.

In the modification shown by Figs. 3, 4 and 5 one lamp 43 is normally in the position to give the desired light, but lamps 44, 45 and 46, that is three other lamps, may each in turn take a position corresponding with that of lamp 43.

A constant tendency to revolve shaft 2^1 is imparted by means of weight 47 fastened to the end of chain 48, which is wound about pulley 49, and then fastened to the pulley at 50.

In the modification the core 23 is attached to a pivoted pawl 51, the end of which, when in the lower position as shown in Fig. 4, contacts with the tooth 52 of ratchet 53, and so prevents the weight 47 from revolving the shaft 2^1. When one of the coils of the solenoid 22 is deenergized, the core 23 is raised, causing pawl 51 to be raised, so that the end of the pawl 51 disengages the tooth 52 of ratchet wheel 53, so that the shaft 2^1 is revolved counter-clockwise, that is in the direction of the arrows *b* as shown in Figs. 3 and 5. The movement of shaft 2^1 causes the drum 6^1 to revolve until the tooth 54 formed on the inner periphery of annulus 55 fastened to drum 6^1 comes in contact with the end of pawl 51, whereupon the drum is stopped. In its movement, however, the drum has caused another set of segmental contacts, such as 7^1 and 8^1, connected as 7 and 8 are shown connected in Fig. 2, to come into contact with the two metallic springs 10 and 11, thus completing the circuit between those springs so that the lamp 44, which has been moved into the position formerly occupied by lamp 43 is caused to be lighted, and a circuit is also completed through the deenergized coil of the solenoid 22 so that the core is allowed to drop carrying with it the pawl 51, thus allowing a further slight rotated movement of drum 6^1 until tooth 58 of the ratchet wheel 53 comes into contact with pawl 51, which has meantime dropped, because of the fact that teeth 58 and 54 are staggered.

When lamp 43 burns out, lamp 44 takes its place, and lamp 45 takes the place formerly occupied by lamp 44, and lamp 46 takes the place formerly occupied by lamp 45, so that when lamp 44 in turn burns out, each lamp will again rotate forward the angular distance between two of the teeth on the ratchet wheel in the manner as hereinbefore described, so that a project lamp will at all times occupy the position now occupied by lamp 43.

Although I have particularly described the construction of one physical embodiment of my invention and a modification thereof, and explained the operation and principle thereof; nevertheless, I desire to have it understood that the forms selected are merely illustrative, but do not exhaust the possible physical embodiments of idea of means underlying my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In an electric lighting device, a carrier, a number of lamps supported by said carrier, means tending to move said carrier in one direction, detent mechanism adapted when released from its actuated position to

permit the carrier to advance one step and when again actuated to permit the carrier to advance a further step, a normally closed circuit, means for connecting said lamps into said circuit successively as they are advanced to a predetermined position by the movement of the carrier, and electro-magnetic means included in said circuit for releasing and actuating said mechanism when deënergized and energized respectively.

2. In an electric lighting device, a carrier; a number of lamps supported by said carrier; means tending to move said carrier in one direction; a solenoid having two opposing windings and core; a pawl operatively connected to said core of said solenoid; stops connected to said carrier and arranged in staggered relation to coöperate with said pawl; two normally closed circuits each including a source of current and one of the windings of said solenoid; and means for connecting each lamp into one of said normally closed circuits when that lamp reaches a predetermined point in the travel of said carrier, the ampere turns of the windings of said solenoid being normally substantially equal.

3. In an electrical lighting apparatus, a carrier, a number of lamps supported by the carrier, means tending to move the carrier in one direction, mechanism for permitting step by step movement of the carrier in said direction, said mechanism comprising a toothed annulus and a ratchet wheel connected to the carrier and arranged one inside the other with their respective teeth opposing and in staggered relation, together with a detent adapted to coöperate with said teeth, an electromagnetic device having two opposing windings for controlling said mechanism, two normally closed circuits each including a source of current and one of the windings of said device, and means for connecting said lamps into one of said circuits successively as each lamp reaches a predetermined point in the movement of the carrier, the resistance in said circuits being proportioned so that the ampere turns of said windings are normally substantially equal.

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Witnesses:
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