

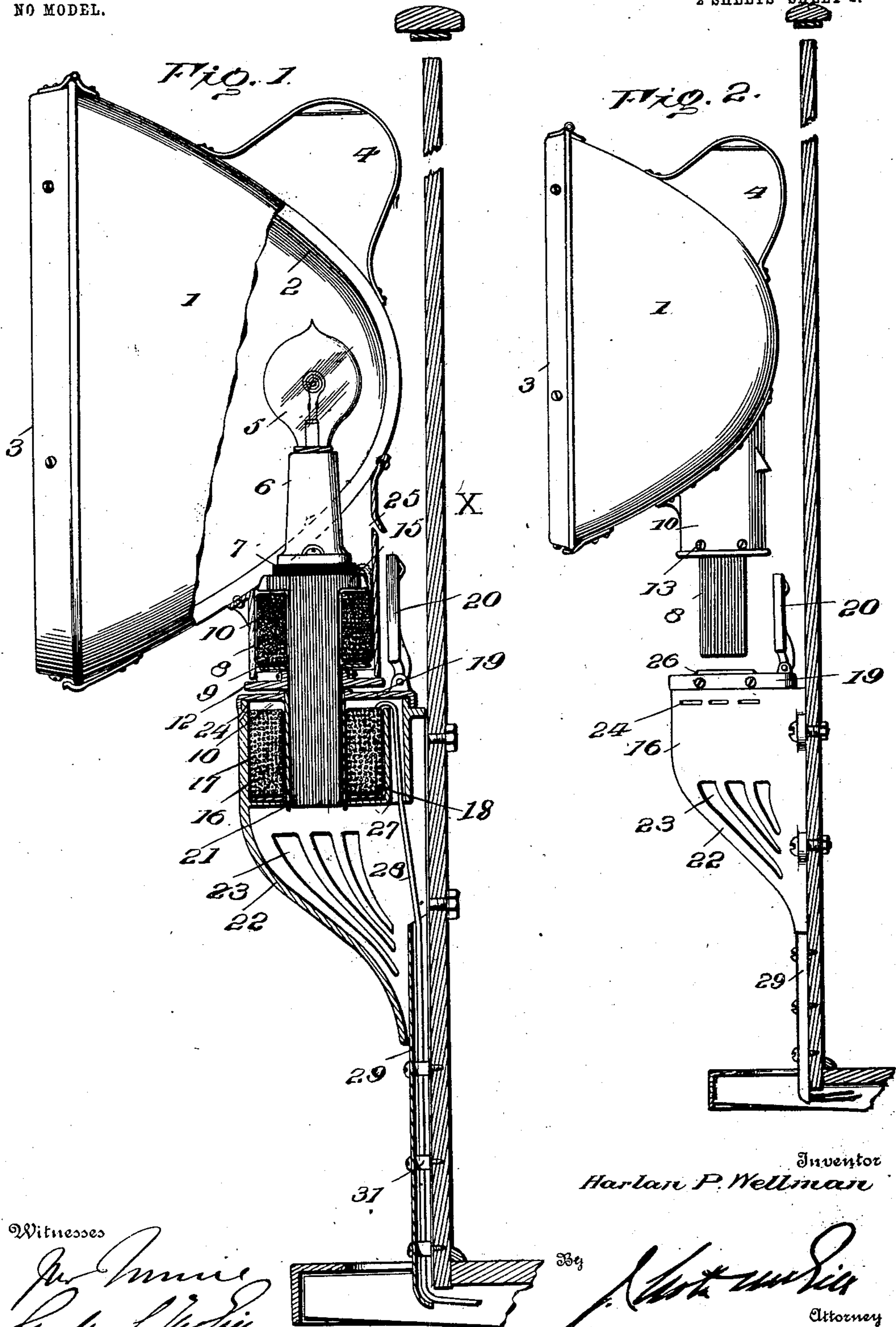
No. 728,789.

PATENTED MAY 19, 1903.

H. P. WELLMAN.  
ELECTRIC HEADLIGHT LAMP.  
APPLICATION FILED JAN. 3, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

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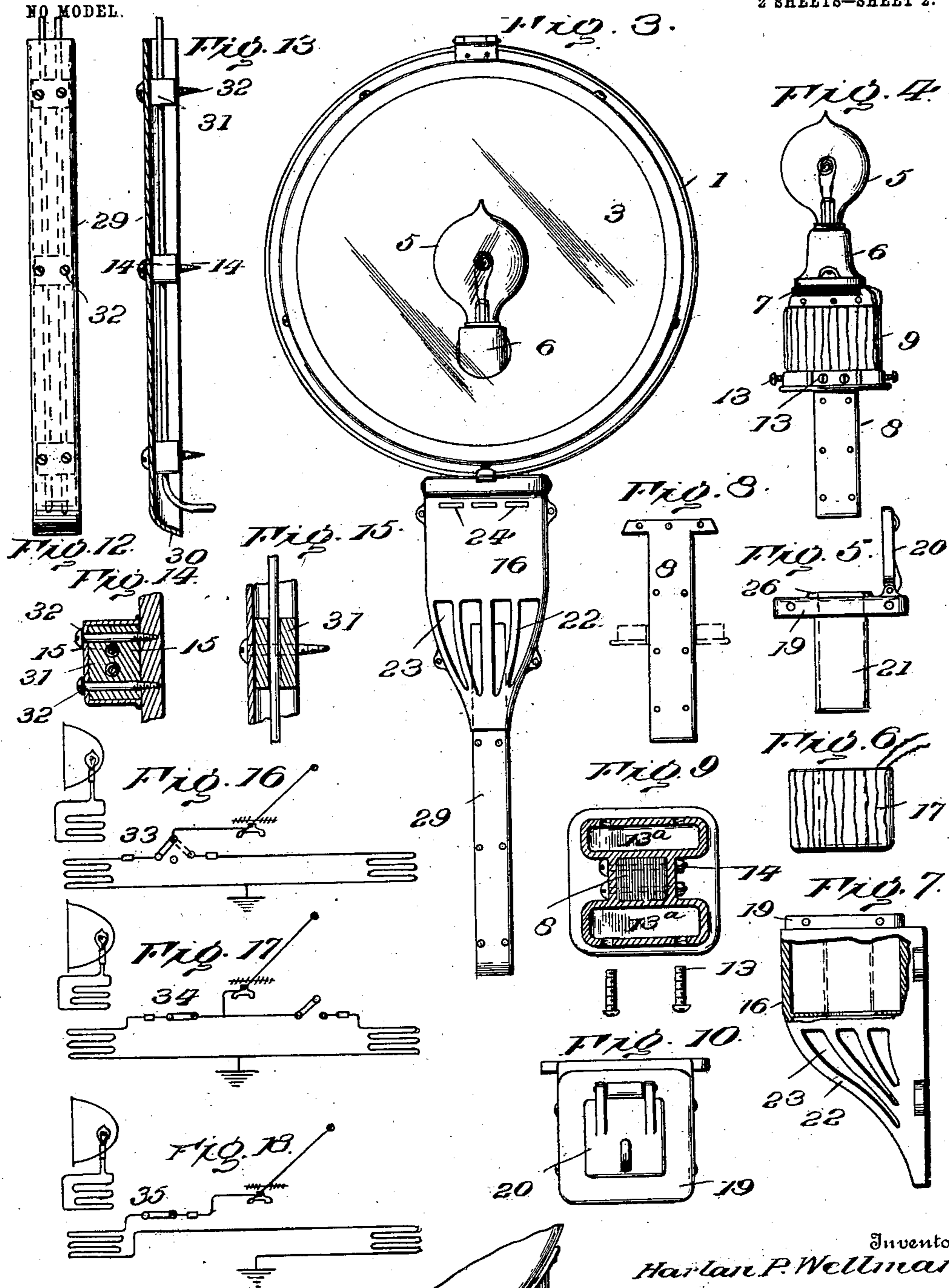
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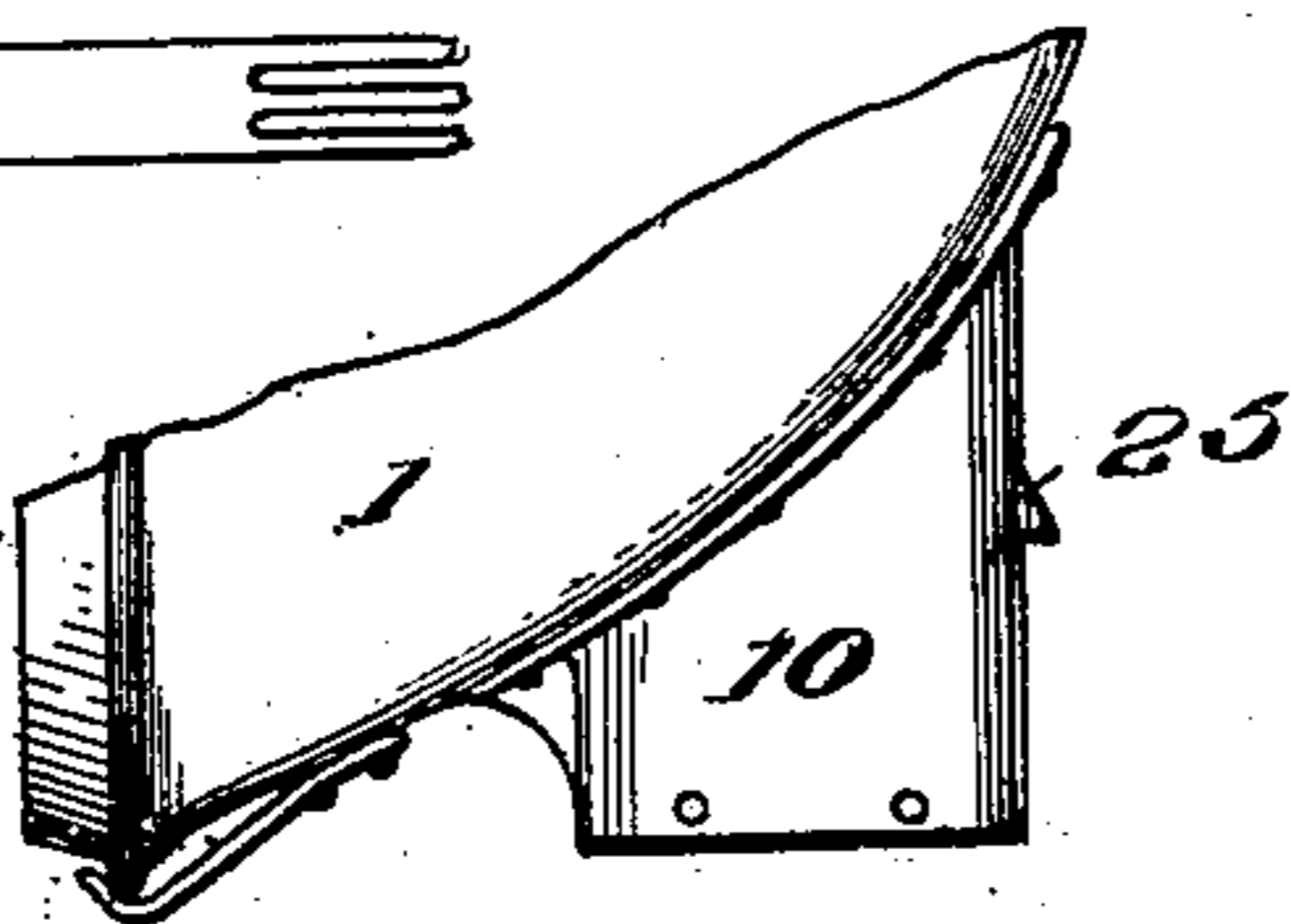
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

HARLAN P. WELLMAN, OF ASHLAND, KENTUCKY.

## ELECTRIC HEADLIGHT-LAMP.

SPECIFICATION forming part of Letters Patent No. 728,789, dated May 19, 1903.

Application filed January 3, 1903. Serial No. 137,703. (No model.)

*To all whom it may concern:*

Be it known that I, HARLAN P. WELLMAN, of Ashland, in the county of Boyd and State of Kentucky, have invented certain new and useful Improvements in Electric Headlight-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 that class of electric headlight-lamps to which the lamp shown and described in Letters Patent No. 629,631, issued to me July 25, 1899, belongs, the same being applicable to electric-railway cars operated by an alternating current.

The objects are, first, to provide an incandescent electric headlight-lamp which in itself forms an entirety and is totally independent of the regular car-lights and which may be of any commercial candle-power irrespective of the candle-power of the latter; secondly, to enable all the parts to be readily and easily removed and replaced; thirdly, to provide for thorough ventilation of both the primary and secondary coils without danger of water entering through the ventilating-openings, and, lastly, to increase the efficiency and durability and promote the economy of operation of an electric headlight-lamp.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a view, mainly in vertical section, with some of the parts in side elevation, a portion of the lamp-casing being broken away. Fig. 2 is a side elevation with the lamp removed from its support. Fig. 3 is a front elevation. Fig. 4 is a view of the incandescent lamp and its adjuncts removed from the inclosing casing. Fig. 5 is a view of the top of the primary-coil casing. Fig. 6 is a view of the primary coil removed. Fig. 7 is a view, partly in section, of the primary-coil casing. Fig. 8 is a view of one of the integral elements of the laminated core. Fig. 9 is a plan view of the base of the secondary-coil chamber. Fig. 10 is a top plan view of the casing of the primary coil. Fig. 11 is a fragmentary view of the lower portion of the reflector-casing. Figs. 12 and 13 are respectively an elevation and

a vertical longitudinal section of the wire-conduit. Fig. 14 is a cross-sectional view on line 14 14, Fig. 13. Fig. 15 is a sectional view on line 15 15, Fig. 14. Figs. 16, 17, and 18 are diagrammatic views of the car-wiring and showing the arrangement of the lamps relative thereto.

Referring to the drawings, 1 designates the reflector-casing, preferably of sheet metal, and which is, as shown, of approximately parabolic formation. It has an inner lining 2, of spun brass or other suitable material, forming a reflector, which latter is of the same general formation as the casing itself. It is equipped with a glass-covered door 3 and a handle 4.

5 is an incandescent lamp, the socket 6 of which is preferably of porcelain and mounted on an insulating-block 7 on the core 8 of a secondary coil 9. This secondary coil is removably positioned within a chamber 10 of a casing depending from the lamp-casing 1. The bottom of this chamber is closed by a base 12, held to the casing by screws 13, such base having vent-openings 13<sup>a</sup> on opposite sides of the core. The latter is built up of a series of thin sheets of iron or steel securely riveted together and is held to base 12 by screws 14 (see Fig. 9) and at its upper end 15 is flanged, so as to bear directly upon the coil. This end 15 of the core serves as a support for the incandescent lamp and helps to diffuse the magnetic lines of force to the casing of chamber 10 and through the latter to the casing 16 of the primary coil 17, thus producing a completely-inclosed magnetic circuit and casing for carrying the lines of magnetic force through both the primary and secondary coils when the lamp is in operative position. The base 12 is preferably of non-magnetic material. By removing the retaining-screws 13 of this base the incandescent lamp, the secondary coil, and its core, composing what might be termed the "interiorly-inclosed" parts of the headlight proper, may be removed as an entirety for repairing or renovating the parts.

The primary-coil casing 16 is fixedly supported on the car-dash X, and within its chamber 18 is the primary coil 17. This chamber is closed by a cap-piece 19, of non-magnetic metal, and to this cap-piece is pivotally secured a lid 20 for closing an opening

centrally of the primary coil when the headlight-lamp is not in place. A laminated tubular sleeve 21 depends from cap-piece 19 through the central opening of the primary coil and a corresponding opening in the bottom of chamber 18. This sleeve protects the primary coil from damage by the insertion and withdrawal of the laminated core of the secondary coil, as occurs in the frequent positioning and removal of the headlight. The casing 16 is made of magnetic metal and thin in cross-section, so as to avoid overheating by idle or stray currents. The lower portion of casing 16 is of concavo-convex skeleton formation, as shown at 22, so as to present a smooth rounded surface to avoid the trolley-rope being caught, and thereby disengaging the trolley from its wire. This lower portion of casing 16 is formed with ventilating-openings 23, while near its upper end it is formed with upwardly-inclined ventilating-openings 24. Similar openings 25 are formed in the casing of chamber 10. By thus slanting these openings perfect ventilation is provided, but the danger of water entering the chambers is avoided. For this reason a slight flange 26 is formed around the opening in cap-piece 19. Air entering through openings 13<sup>a</sup> in the non-magnetic base 12 serves to thoroughly ventilate the secondary coil.

A small conduit 27 is formed within casing 16 at one side of chamber 18 for the passage of the primary-coil-circuit wires 28. These wires are passed through a conduit 29, so that these portions of the wires between the primary-coil casing and the bottom of the car will not be exposed. This conduit extends from within the primary-coil casing to the car-bottom and is preferably composed of a thin metallic sheet bent into approximately U shape in cross-section and slightly curved at its lower end 30, so as to direct the wires beneath the car. The wires are held within the conduit by being passed through insulating-blocks 31, secured in place by screws 32.

In the diagrammatic view, Fig. 16, I have shown a three-point circuit-switch 33 at one end of a car for cutting the current into either of the primary coils at the ends thereof. In Fig. 17 each of the primary coils is shown as connected by a separate circuit-switch 34 at each end. In Fig. 18 the primary coils are connected in series, with only one circuit-switch 35. In this arrangement both primary coils are in series and continuously in circuit when the switch is thrown, and when this is once done no further manipulation thereof is necessary when the lamp is being transferred from one end to another.

In practice a primary coil in its protective inclosing casing is located at each end of a car and connected to the trolley and ground returning circuits. The motorman closes the switch at any convenient time so as to cut the current into the primary-coil. To position the lamp, it is only necessary to raise it as a

whole above the primary-coil casing, and after elevating the lid 20 the lamp is lowered, with its laminated core projected through the primary coil, whereupon light will be given from the incandescent lamp. The headlight can readily be inserted or withdrawn from the primary-coil casing with or without the current being cut off and without danger of shock to the operator or injury to the lamp. No holding means other than the extension of the core into the primary coil is necessary.

A headlight constructed as herein described is admirably adapted for the low-frequency alternating currents used in modern electric-railway systems. In order to avoid the pulsating or blinking of an incandescent light when using low-frequency currents, it is necessary to use a very low voltage lamp having a filament of relatively large cross-section with a correspondingly lower heat inertia. This does not allow of the filament cooling too rapidly, thus avoiding all disagreeable effects from the use of the low-frequency current. Both the primary and secondary coils may be wound for any practical voltage and current necessary for lighting the single incandescent lamp within the reflector, which lamp may be of a high or low candle-power, depending entirely upon the winding of the coils. It is obvious that incandescent lamps of different voltages may be used in the headlight by so winding the primary and secondary coils or by having terminal taps on secondary coil for the various voltage connections.

It is understood that I do not restrict myself to the exact means herein described, and shown in the drawings, and that changes may be made without departing from the scope of my invention.

I claim as my invention—

1. The combination with an electric-railway car, a casing mounted on one end thereof, a primary coil located within such casing, and an electrical connection between such coil and the electrical wiring of the car, of an electric-headlight-lamp casing having a depending chamber, a secondary coil located within such chamber, a core carried by such secondary coil and designed to extend into the primary coil, an incandescent lamp in circuit with such secondary coil, and means for retaining both coils within their chambers whereby the same may be readily removed therefrom, as set forth.

2. The combination with an electric-railway car, a casing mounted on one end thereof having a chamber, a primary coil therein, a cap-piece removably located over such chamber, and an electrical connection between such primary coil and the electrical wiring of the car, of the headlight-casing having a depending chamber, a secondary coil within such chamber, a core extended through said coil and cap-piece and into the primary coil, and an incandescent lamp mounted on said core in circuit with said secondary coil, and

means removably connecting said core to said chamber of the headlight-casing, substantially as set forth.

3. The combination with an electric-rail-  
5 way car, a casing having a chamber therein, a cap-piece removably secured over such chamber having a central opening, a sleeve depending from said cap-piece in line with such opening, and a primary coil located with-  
10 in such chamber around such sleeve, said coil being in circuit with the electrical wiring of the car, of the headlight-casing having a depending chamber, a secondary coil within such chamber, a laminated core extending  
15 through such secondary coil and designed to project through the sleeve centrally of the primary coil, and an incandescent lamp mounted on such core and in circuit with the secondary coil, substantially as set forth.

20 4. The combination with an electric-railway car, a casing on one end thereof having a chamber, a primary coil within such chamber and in electric connection with the car-wiring, the cap-piece removably secured to  
25 such casing over such chamber, having a central opening, and a lid designed to fit over such opening, of a headlight-casing, a secondary coil carried thereby, a core extended through said secondary coil and designed to  
30 fit in the opening in the cap-piece and the primary coil, and an incandescent lamp mounted on said core and extending into said casing, such lamp being in circuit with the secondary coil, as set forth.

35 5. The combination with an electric-railway car, a casing on one end thereof, and a primary coil within such casing having a central opening, of a headlight-casing having a depending chamber, a secondary coil lo-  
40 cated within such chamber, a core extending through said secondary coil and designed to project through the primary coil when the headlight is positioned on the casing of the

latter, a base-piece for said chamber removably secured thereto and to the core, and an  
45 incandescent lamp in circuit with said secondary coil, substantially as set forth.

6. The combination with an electric-headlight-lamp casing having a chamber opening  
50 into such casing, of a coil within such chamber, a removable bottom for such chamber forming a support for the coil, a core extended through such coil, and an incandescent lamp connected with said coil and ex-  
55 tended into said lamp-casing, said coil, core and lamp being removable as a whole from the chamber and casing, as set forth.

7. The combination with the headlight-casing having a depending chamber, a base-piece removably secured to the bottom of  
60 such chamber, a secondary coil within such chamber, a core extended through said secondary coil and said base-piece and having an upper flanged end bearing on the second-  
65 ary coil, and an incandescent lamp mounted on said core in circuit with said secondary coil, of a primary coil in circuit with the wiring of an electric-railway car, and a casing  
70 for such primary coil having a central opening designed to receive the projecting portion of said core, as set forth.

8. In an electric headlight-lamp having a secondary coil, a casing therefor, a core pro-  
75 jecting through such coil and casing, a primary coil in circuit with the wiring of an electric-railway car, and a casing for such primary coil, both of said casings having upwardly-slanted openings, as and for the purpose set forth.

In testimony whereof I have signed this  
80 specification in the presence of two subscribing witnesses.

HARLAN P. WELLMAN.

Witnesses:

W. C. RICHARDSON,  
RAYMOND O. FISHER.