No. 608,497. Patented Aug. 2, 1898.

H. P. WELLMAN.

ELECTRIC HEADLIGHT LAMP.

(Application filed Dec. 10, 1897.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

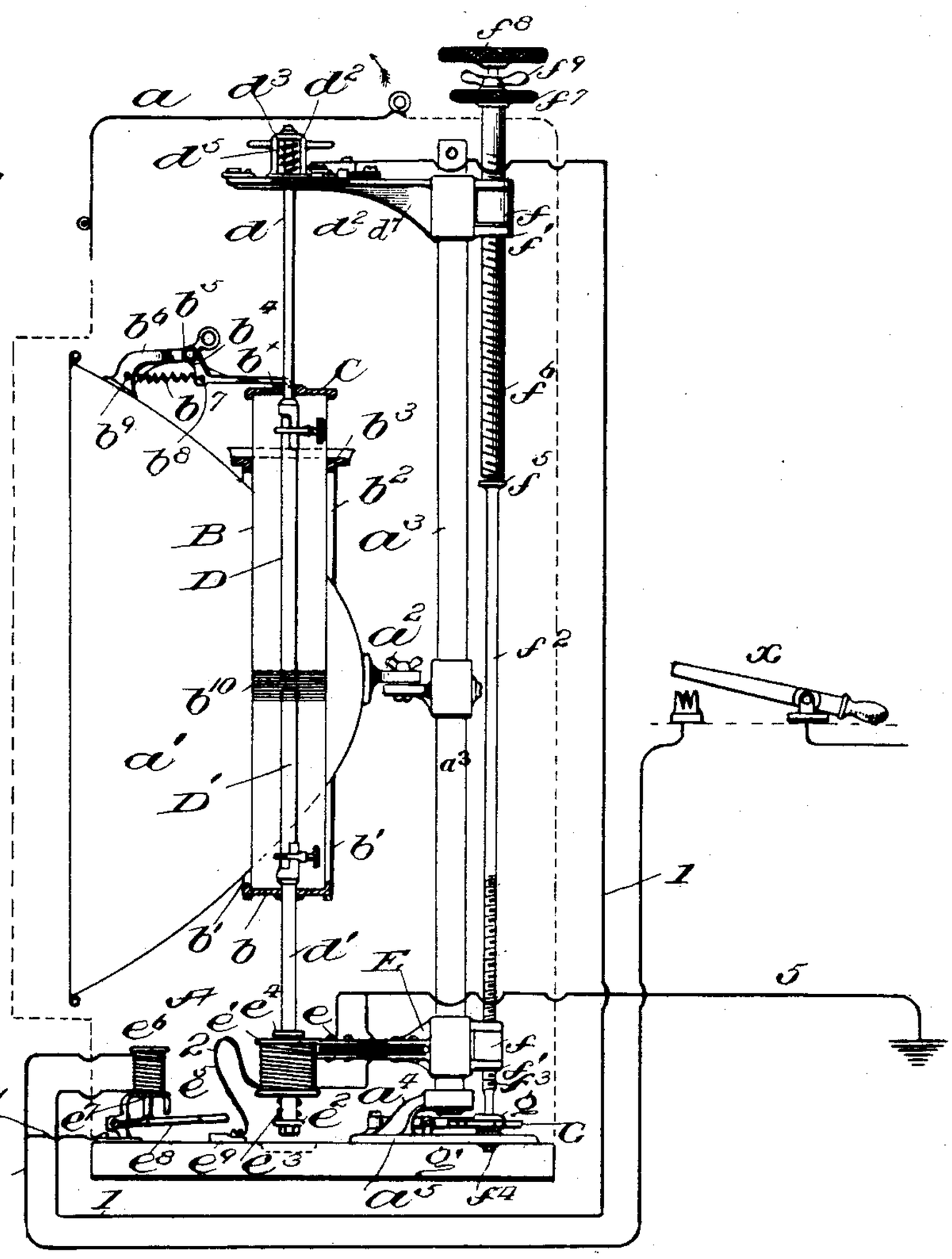
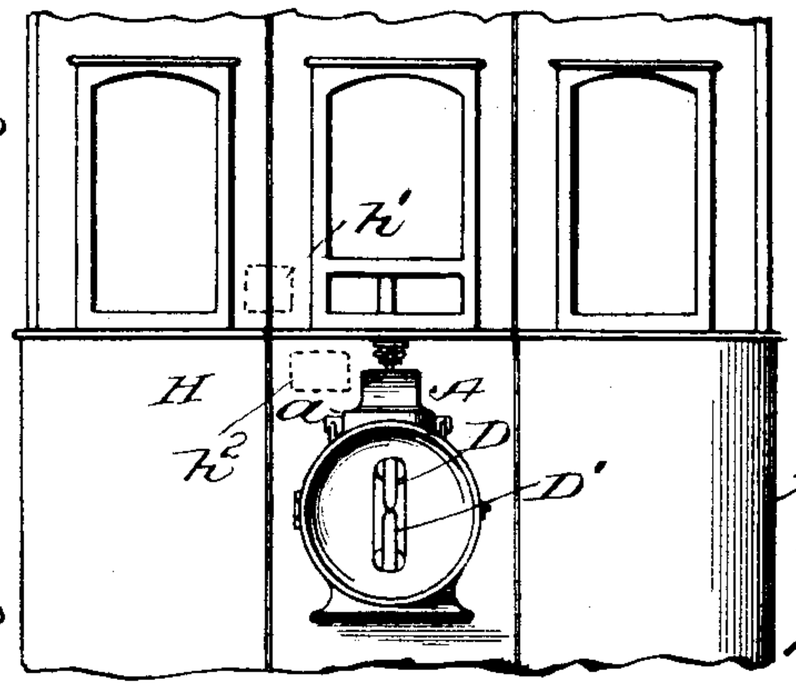


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

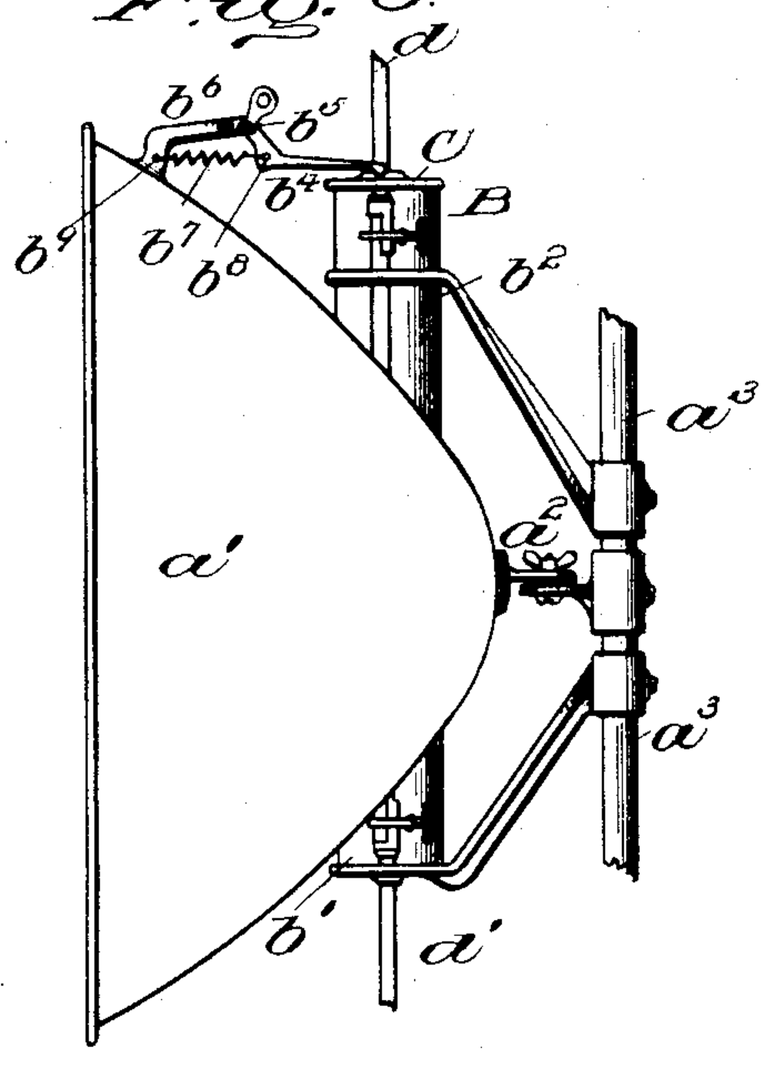


Fig. 4.

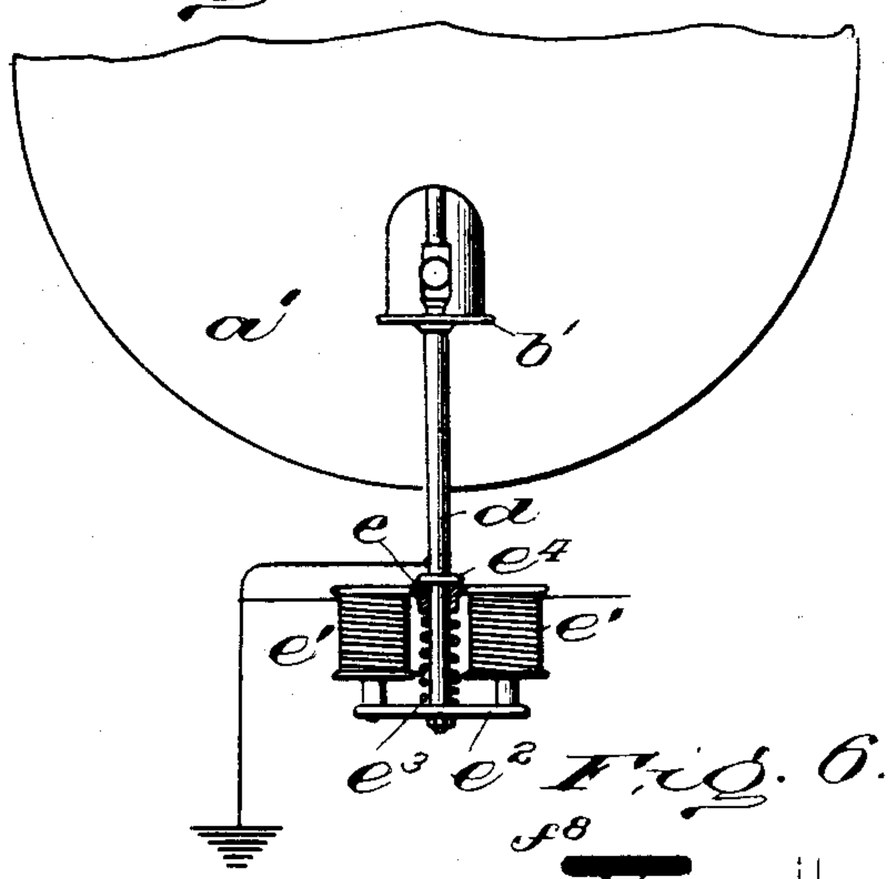


Fig. 6.

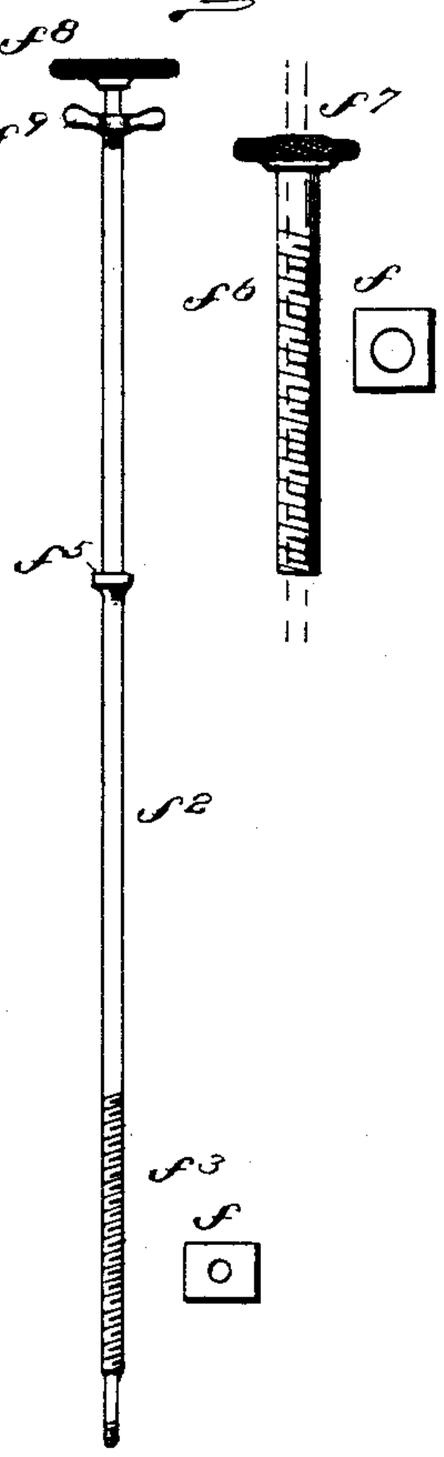


Fig. 5.

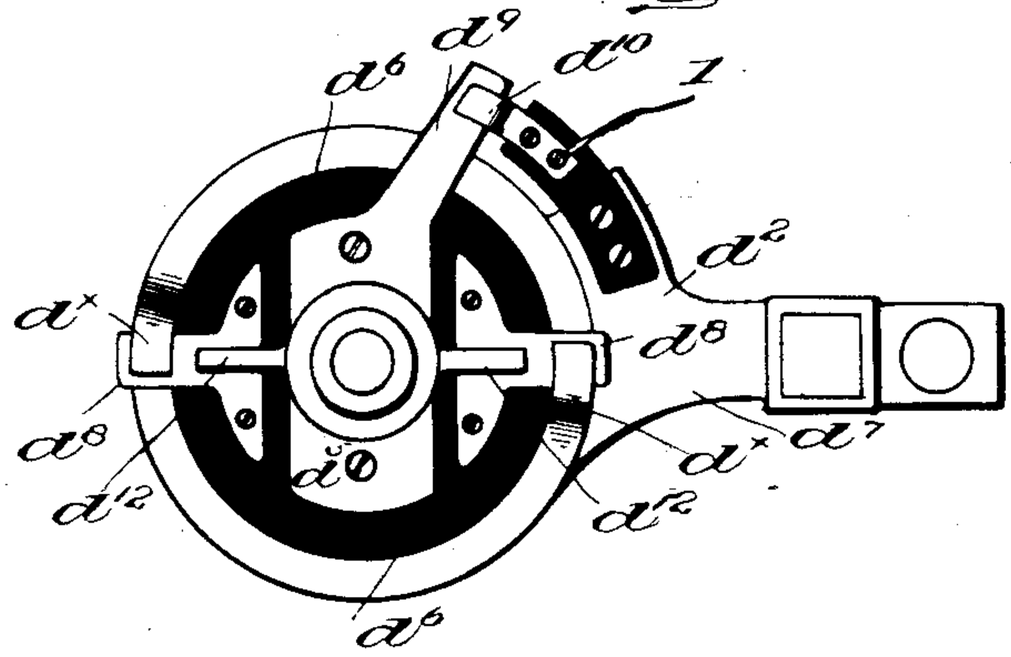
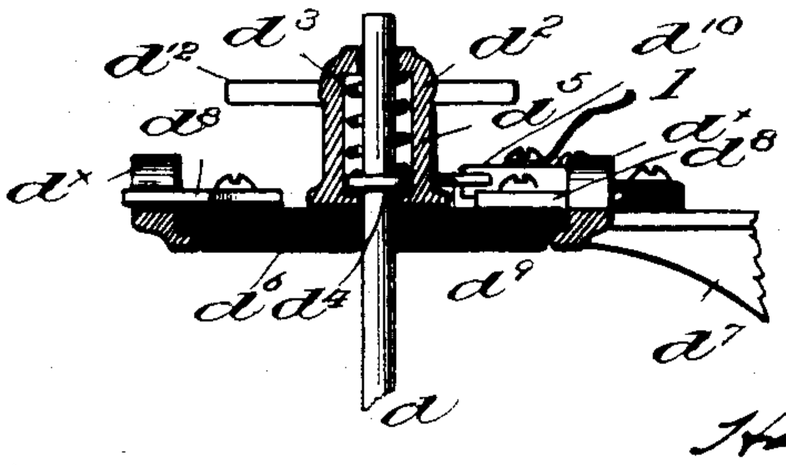


Fig. 7.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 8.

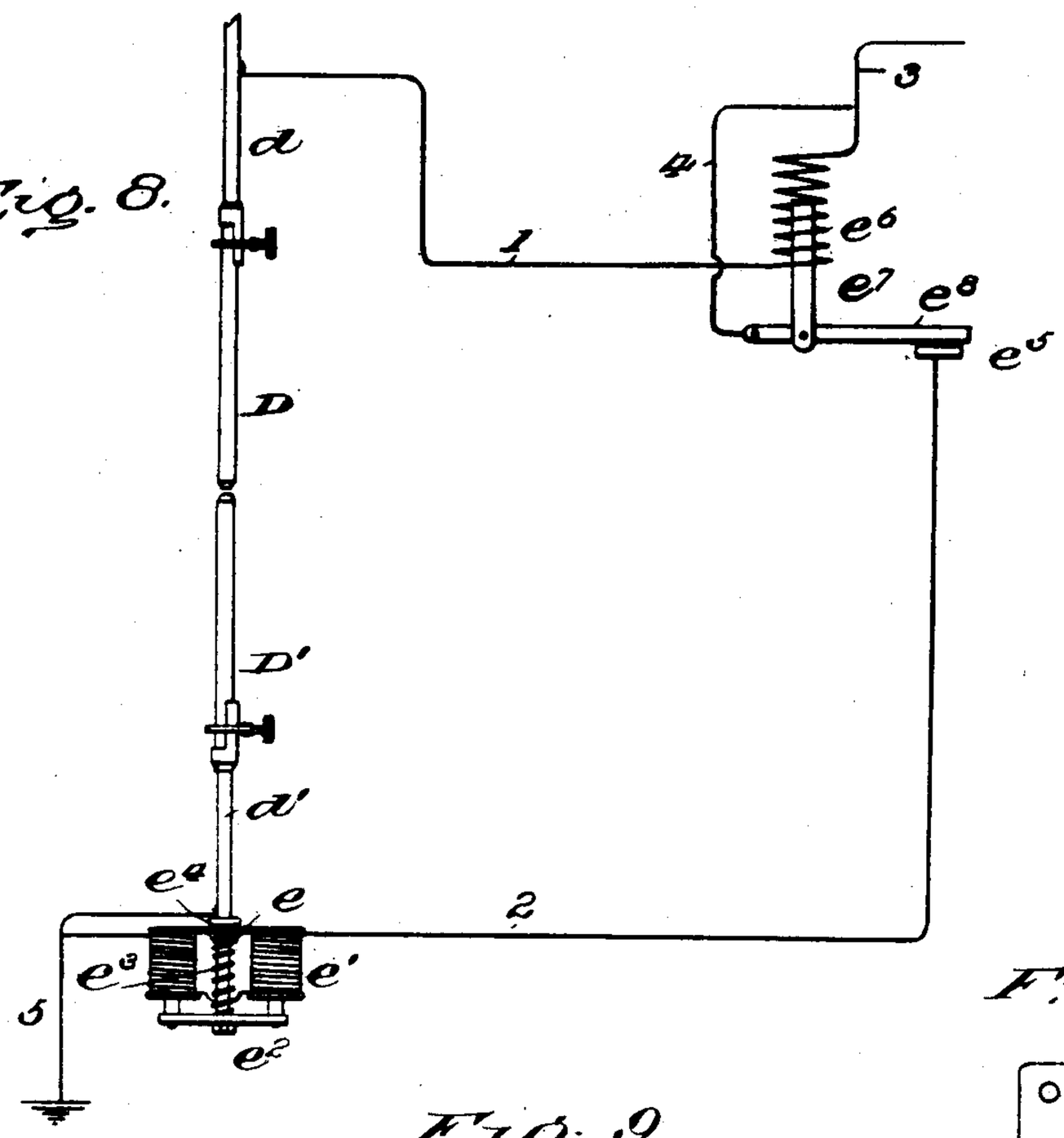


Fig. 12

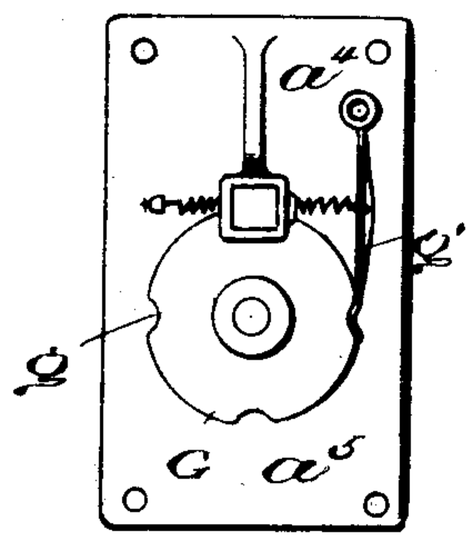


Fig. 9

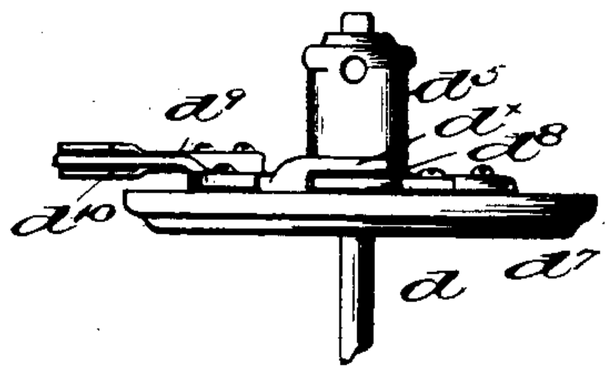


Fig. 11

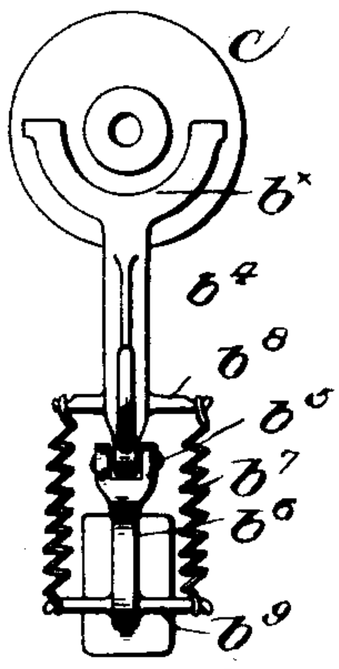
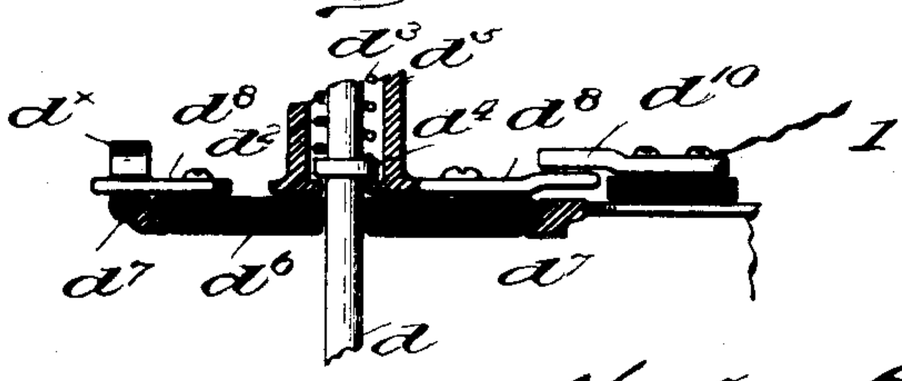


Fig. 10.



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UNITED STATES PATENT OFFICE.

HARLAN P. WELLMAN, OF ASHLAND, KENTUCKY.

ELECTRIC HEADLIGHT-LAMP.

SPECIFICATION forming part of Letters Patent No. 608,497, dated August 2, 1898.

Application filed December 10, 1897. Serial No. 661,396. (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 contemplates certain new and useful improvements in headlight-lamps for electric-railway cars, having reference to those employing an electric arc.

The object of the invention is to provide an improved arc-light operated by the full-line working potential of an electric railway and one having an automatic starter or restarter which is operated as soon as current is cut into the lamp-circuit. After the light is once established the automatic switch breaks the circuit in which it is placed and the arc is thereafter constantly maintained at a uniform point by suitable hand-operated mechanism within convenient reach of the motorman. The means for effecting the relative adjustment of the carbons is such that the motorman can gage to a nicety the requirements for operating the same to insure the proper location of the opposed ends of the carbons. To at least partially offset any disturbance to the focal center of the lamp, I provide a transparent inclosure with an opal or ground-glass ring, within the field of which the opposed ends of the carbons are always maintained. In this way the annoyance consequent upon the effects of the tendency of the inclosed arc to rotate or migrate from side to side of the blunt ends of the carbons is reduced to a minimum.

A further object is to reduce the frequency of manual adjustment of the lamp to a minimum. To this end I provide a transparent inclosure for the arc, thereby prolonging the life of the carbons by the exclusion of air from the arc.

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

In the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of my improved headlight-lamp. Fig. 2 is a front end view of a portion of a car, showing the lamp in position. Fig. 3 is a side view with the inclosing frame removed, a slight modification being indicated. Fig. 4 is a rear view of a portion of the lamp, parts being removed and others broken away. Fig. 5 is an enlarged top plan view of the support for the upper-carbon rod. Fig. 6 is a vertical sectional view thereof. Fig. 7 is a view showing the several parts of the carbon-adjusting rod. Fig. 8 is a diagrammatical view showing the lamp-circuit. Fig. 9 is a side view of the support for the upper-carbon rod. Fig. 10 is a vertical sectional view showing a slightly-modified form of the latter. Fig. 11 is a top plan view of the clamp for holding the cap on the upper end of the arc-inclosing casing. Fig. 12 is a top plan view of a supporting base-plate.

Referring to the drawings, A designates the frame of a headlight-lamp, and a a pivoted section of the top thereof, through which access may be had to the interior.

a' is a parabolic reflector located in frame A and secured at its apex by a clamp a^2 to an upright bar a^3. This bar at its lower end is supported by an overhanging arm a^4 of a base-plate a^5 on the bottom of the lamp-frame.

B is a cylindrical casing extended vertically through reflector a' near the apex thereof. This casing rests on an insulating-cushion b, supported by a depending tubular portion b' of the reflector. This cushion forms the closure for the lower end of the casing. An opposite upper tubular portion b^2 of the reflector encircles the casing B and supports an upper ring-like cushion b^3, which surrounds said casing. The upper end of this casing is closed tight by a cap C, which is securely held in place by a clamping-lever b^4, fulcrumed at b^5 on a bracket b^6, fast on the upper outer portion of the reflector. This lever has a forked end $b^\times$, which is normally held down against the cap by springs b^7, secured to arm b^8 thereof, and also to arms b^9 of bracket b^6. This inclosing casing is transparent or translucent, being preferably made of glass. At that point on line with the apex of the reflector at which the arc is constantly maintained is formed a ring b^{10}, which may be a ground-glass or an opal ring, the width of which is sufficient to cover the full length of the arc when the lamp is burning. This

ring partially, at least, obviates the effects of the tendency of the inclosed arc to rotate or migrate from side to side of the blunt-ended carbons. The ring is not so heavy or opaque as to seriously intercept the arc-rays.

D D′ represent the two carbons, the former being the upper or positive and the latter the lower or negative poles of the circuit. They are respectively secured to rods d d', which extend through the cap C and cushion b, the clamping ends of the rods being within the casing. The upper rod d is flexibly supported. It extends into a holder d^2, and is encircled by a spring d^3, which bears against a flange d^4, formed on said rod. This spring is inclosed by a tubular housing d^5, mounted on an insulating-disk d^6, which fits in an annular groove in the ring-like portion of a bracket d^7, supported by bar a^3. From opposite points of this disk project arms d^8, which are designed to fit beneath overhanging clamp-ears $d^\times$ of bracket d^7. A third arm d^9, extending from this disk, is designed to contact with a suitably-insulated plate d^{10}, to which a wire 1 is connected. This contact-plate d^{10} is supported by bracket d^7. By grasping lateral arms d^{12} of housing d^5 the disk can be readily turned and, together with the upper carbon and its rod, may be removed from the supporting-bracket. In Fig. 10 I have shown one of the arms d^8, forming the electric contact with the plate d^{10}.

The negative-carbon rod d^4 is supported by a suitably-insulated bracket E, which is capable of being raised and lowered on bar a^3. To a lateral bar e of this bracket, through which rod d' is extended, are secured the coils of a magnet e', which is designed under certain conditions to attract an armature e^2, carried by the rod d' at the lower end thereof. Between this armature and the bar e the rod d' is encircled by a spring e^3. A flange e^4 on rod d' limits the downward movement of the latter under the tension of its spring. The coils of magnet e' are in a shunt-circuit around the positive and negative carbons. A cut-out switch e^5 is located adjacent to the magnet e'. It consists of a magnet-coil e^6, a central armature e^7, and a pivoted arm e^8, carried by said armature. This arm is designed when the armature is not attracted by the coil e^6 to contact with a terminal e^9 in circuit by a wire 2 with magnet e'. The magnet-coil e^6 is connected in series between the source of current-supply x by a wire 3 and the positive-carbon rod by wire 1, and the shunt-circuit is connected by a wire 4 between the source of current-supply and the magnet-coil e^6 of the cut-out switch. The coils of magnet e' are connected to the ground or rail-return by a wire 5 or to negative terminal of lamp.

When the lamp is burning, current circulates through the magnet-coil e^6 of the cut-out switch, the armature of which, being elevated, holds arm e^8 away from terminal e^9, and hence the shunt-circuit is open. If the lamp be deprived of its source of current, such as the opening of the lamp-switch or opening of the circuit-breaker at the power-station, no current will circulate through the magnet-coil e^6. Hence armature e^7 will fall and arm e^8 will contact with terminal e^9. Upon current being again supplied to the lamp, there being an open circuit between the ends of the carbons, the current traverses the shunt-circuit only, and the coils of the magnet e' then attract the armature e^2, lifting the carbon-rod d' until contact is made with upper or positive carbon. This establishes the circuit through the magnet-coil e^6 of the cut-out switch, and the armature thereof being raised the arm e^8 is removed from terminal e^9, thereby opening the shunt-circuit and cutting the current out of the coils of magnet e'. The action of gravity, assisted by the encircling spring e^3, will effect the lowering of the lower rod d', and consequently the separation of the two carbons, thus forming the arc. This action may be repeatedly performed with like results. There can be but little arcing at the contacts of the cut-out switch, as the circuit is not opened through the shunt-circuit until established through the carbons. This automatic arc-forming mechanism is not affected by the sudden movements or jumping of a car while in motion.

I will now describe the manner employed for permitting a motorman to adjust by hand the positions of the carbons so as to compensate for consumption of the latter. The brackets d^7 and E are capable of being moved up and down on bar a^3. Each is provided with an interiorly-threaded nut f, located between parallel ears f'. The thread of the lower nut is for a right-hand screw and that of the upper nut for a left-hand screw. A rod f^2, parallel with bar a^3, has a lower right-hand thread f^3 for engaging the nut of bracket E, said rod being supported by base-plate a^5, to which it is held by a nut f^4. Inclosing the upper portion of rod f^2 and resting on a shoulder f^5 thereof is a sleeve f^6, which is formed with an exterior left-hand thread to engage the nut carried by the bracket d^7. The upper edge of this sleeve is provided with a milled-edge flange f^7, while above it is a similar flange f^8 on the upper end of rod f^2. Between these two flanges is a thumb-nut f^9, by which the threaded sleeve f^6 is firmly held, as against turning, on rod f^2. Hence by rotating this rod the brackets d^7 and E can be made to move toward or away from each other, thereby regulating the distance between the ends of the carbons, or either may be moved independently by loosening nut f^9. On the lower end of rod f^2, above base-plate f^5, is mounted a ratchet-wheel G, consisting of a flat disk having a series of grooves g in its periphery, with which is designed to engage a spring-held pawl g'. This tends to hold the rod f^2 as against accidental turning, and also serves as a guide for the motorman

in regulating the extent to which the rod is to be turned, according to a predetermined arrangement based on the consumption of the carbons.

In practice the lamp is suspended from the dash H of a car, with the top thereof in convenient reach of the motorman. If the platform is vestibuled, a trap-door h may be formed in the front window-frame, or openings such as indicated by dotted lines at h' and h^2 may be formed in the framework.

While I have shown and described the preferred means for carrying out my invention, yet I do not restrict myself thereto, since change may be made in various details. In Fig. 3, for instance, I have indicated the arc-inclosing casing as being supported by arms I, held fast on bar a^3, in lieu of the tubular extensions of the reflector. It will be observed from the illustrations of Figs. 1 and 3 that the transparent inclosure for the arc projects entirely through the reflector, one end being extended farther from the axial center or apex of such reflector than the other. This is for the purpose of employing a positive carbon of greater length than the negative carbon, the arc being in the focal center of the reflector. The inclosing casing is closed at both ends, and both carbon-rods have their clamp ends extended into said casing. It will also be noted that the opal or ground-glass ring of the arc inclosure is in line with the focal center of the reflector and is of such width as to cover the field of the arc when in the proper focus.

I claim as my invention—

1. An electric lamp having a parabolic reflector, a translucent elongated cylindrical casing projected at its ends through said reflector, closures over the ends of said casing, a support for said casing outside of said reflector, carbon-carrying rods extended through said closures, and carbons secured to the inner ends of said rods and located wholly within said casing, substantially as set forth.

2. An electric lamp having a parabolic reflector, a translucent casing projected at its ends through said reflector, a greater portion of said casing extending above said reflector than below the latter, closures of insulating material over the ends of said casing, carbon-carrying rods extended through said closures, and carbons secured to the inner ends of said rods, the opposed ends of said carbons being on the line of the focal center of said reflector, said casing having an opal or ground-glass encircling ring on said line, substantially as set forth.

3. The combination with the lamp-frame, and the upright bar therein, of a parabolic reflector secured to said bar, the translucent casing projected through said reflector, supports therefor outside of said reflector, closures over the ends of said casing, and the carbons secured to the inner ends of said rods, substantially as set forth.

4. The combination with the lamp-frame, and the reflector, of a casing projected transversely through the latter, closures over the ends of said casing, a spring-held movable clamp bearing on the upper closure, and the carbons located in said casing, substantially as set forth.

5. The combination with the lamp-frame, of the reflector having opposite upper and lower openings and a tubular portion in line with said lower opening, an insulating-cushion supported by said lower tubular portion, a casing extended through said openings and resting on said cushion, a cap over the upper end of said casing, and a spring-held movable clamp bearing on said cap, and the carbons located in said casing, substantially as set forth.

6. The combination with the lamp-frame, of the reflector having opposite upper and lower tubular portions, an insulating-cushion supported by said lower tubular portion, a casing fitted in said tubular portions resting on said cushion, a second cushion supported by said upper tubular portion, a cap over the upper end of said casing, a spring-held movable clamp bearing on said cap, carbons within said casing, and rods therefor extended through said cap and lower cushion, substantially as set forth.

7. The combination with the lamp-frame, an upright bar, and the reflector, of upper and lower carbon-carrying rods, brackets movable on said bar supporting said rods and having parallel ears projecting therefrom, threaded nuts located between said ears, an adjusting-rod extended through said ears and having a lower threaded portion engaging the nut of the lower bracket, an exteriorly-threaded sleeve on the upper portion of said rod having a flanged end, said sleeve engaging the nut of the upper bracket, and means for binding said sleeve on said rod, substantially as set forth.

8. The combination with the lamp-frame, an upright bar, and the reflector, of upper and lower carbon-carrying rods, brackets movable on said bar supporting said rods and having parallel ears projecting therefrom, threaded nuts located between said ears, an adjusting-rod extended through said ears and having a lower threaded portion engaging the nut of the lower bracket, an exteriorly-threaded sleeve on the upper portion of said rod having its upper end flanged, said sleeve engaging the nut of the upper bracket, and a thumb-nut on said rod for binding said sleeve thereon, substantially as set forth.

9. The combination with the carbon-carrying rods, of the upper and lower brackets, the bar forming a guide for the latter, a rod having right and left hand threads engaging threaded nuts of said brackets, a wheel on said rod having notches in its periphery, and a spring-held pawl engaging said wheel, substantially as set forth.

10. In an electric lamp having upper and lower carbon rods, brackets supporting said

rods, one of said brackets having overhanging portions and an electric terminal, an insulating-disk with which one of said rods engages, and arms on said disk for engaging said overhanging portions and terminal, substantially as set forth.

11. In an electric lamp having upper and lower carbon rods, brackets supporting said rods, one of said brackets having an electric terminal, and overhanging ears, an insulating-disk with which one of said rods engages having an arm for contacting with said terminal and also arms for engaging said ears, substantially as set forth.

12. In an electric lamp having upper and lower carbon rods, brackets supporting said rods, one of said brackets having an electric terminal, an insulating-disk having an arm for contacting with said terminal, a housing on said disk, and a spring therein, one of said rods being extended through said disk into said housing and having a shoulder against which said spring bears, substantially as set forth.

13. In an electric lamp having upper and lower carbon rods, brackets supporting said rods, one of said brackets having an electric terminal, a cut-out circular portion and overhanging ears, an insulating-disk fitted in said cut-out having arms engaging said ears and terminal, a housing extending up from said disk into which the upper rod projects, a spring in said housing bearing on said rod, and arms extended from said housing, substantially as set forth.

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

HARLAN P. WELLMAN.

Witnesses:
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OSCAR HENTHORNE.