No. 757,564. PATENTED APR. 19, 1904.

W. H. NORTHALL.

ELECTRIC HEADLIGHT.

APPLICATION FILED MAR. 20, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 2.

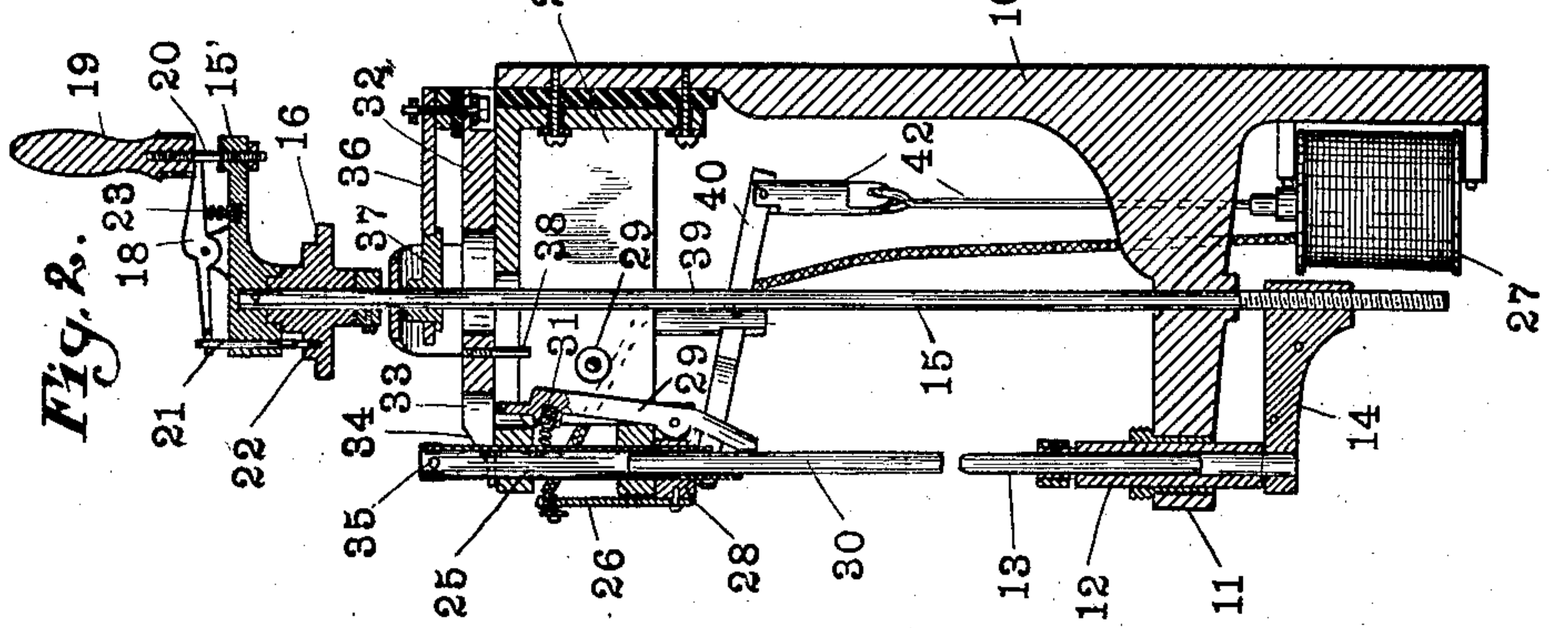
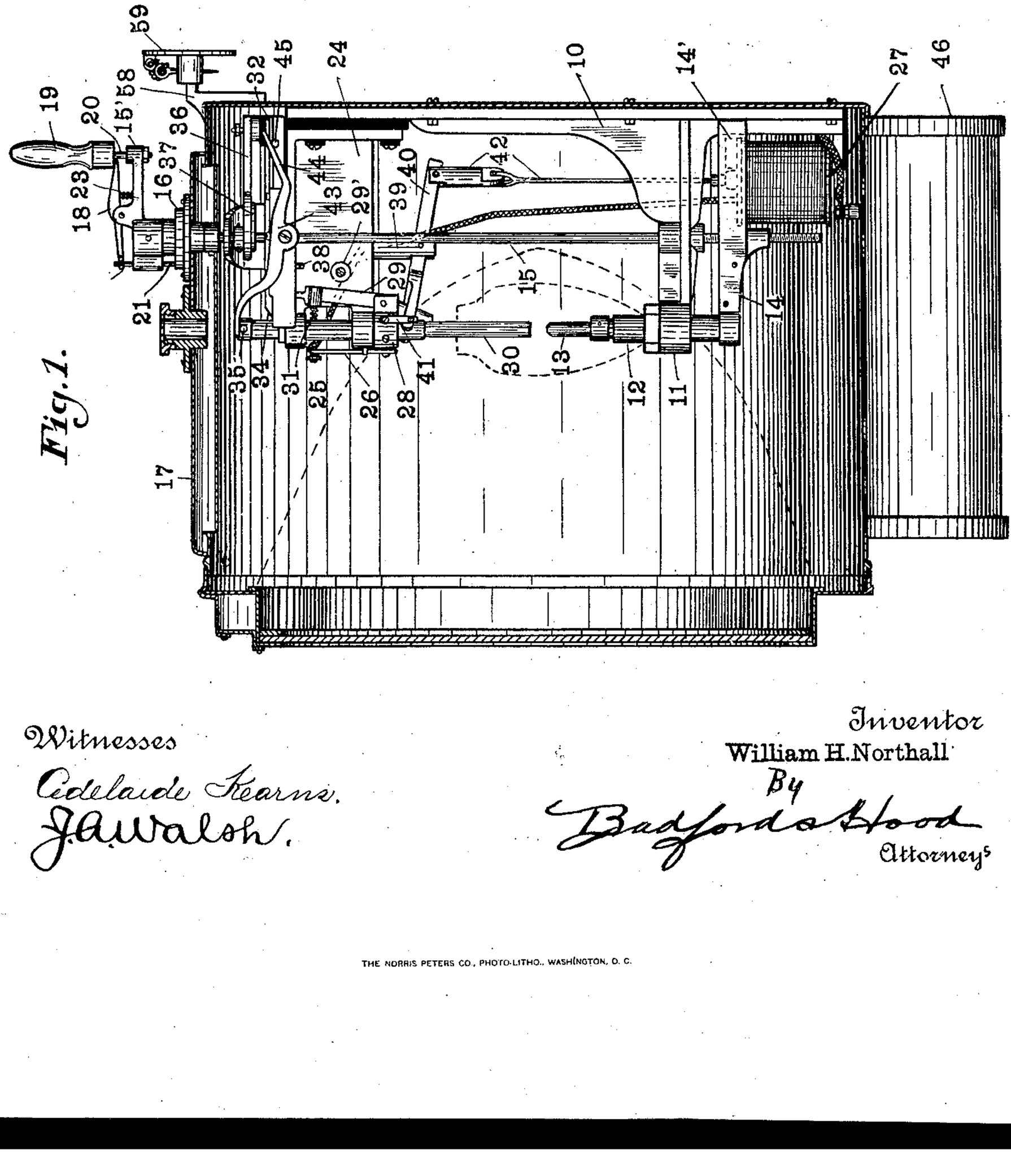


Fig. 1.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 5.

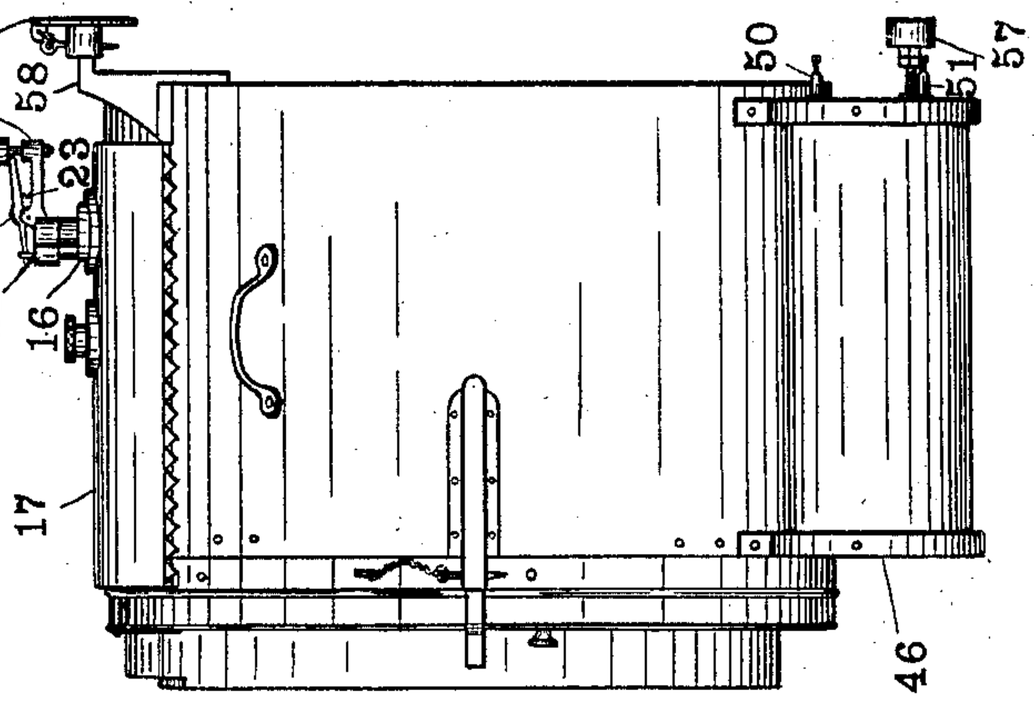


Fig. 4.

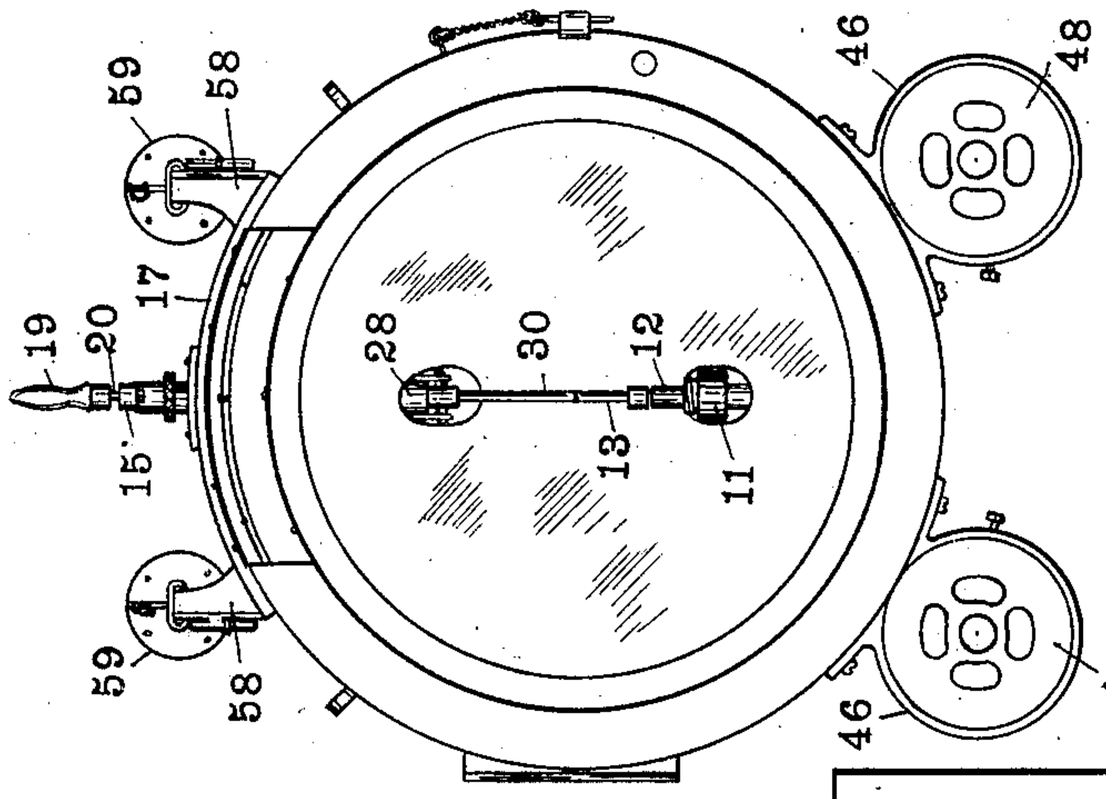
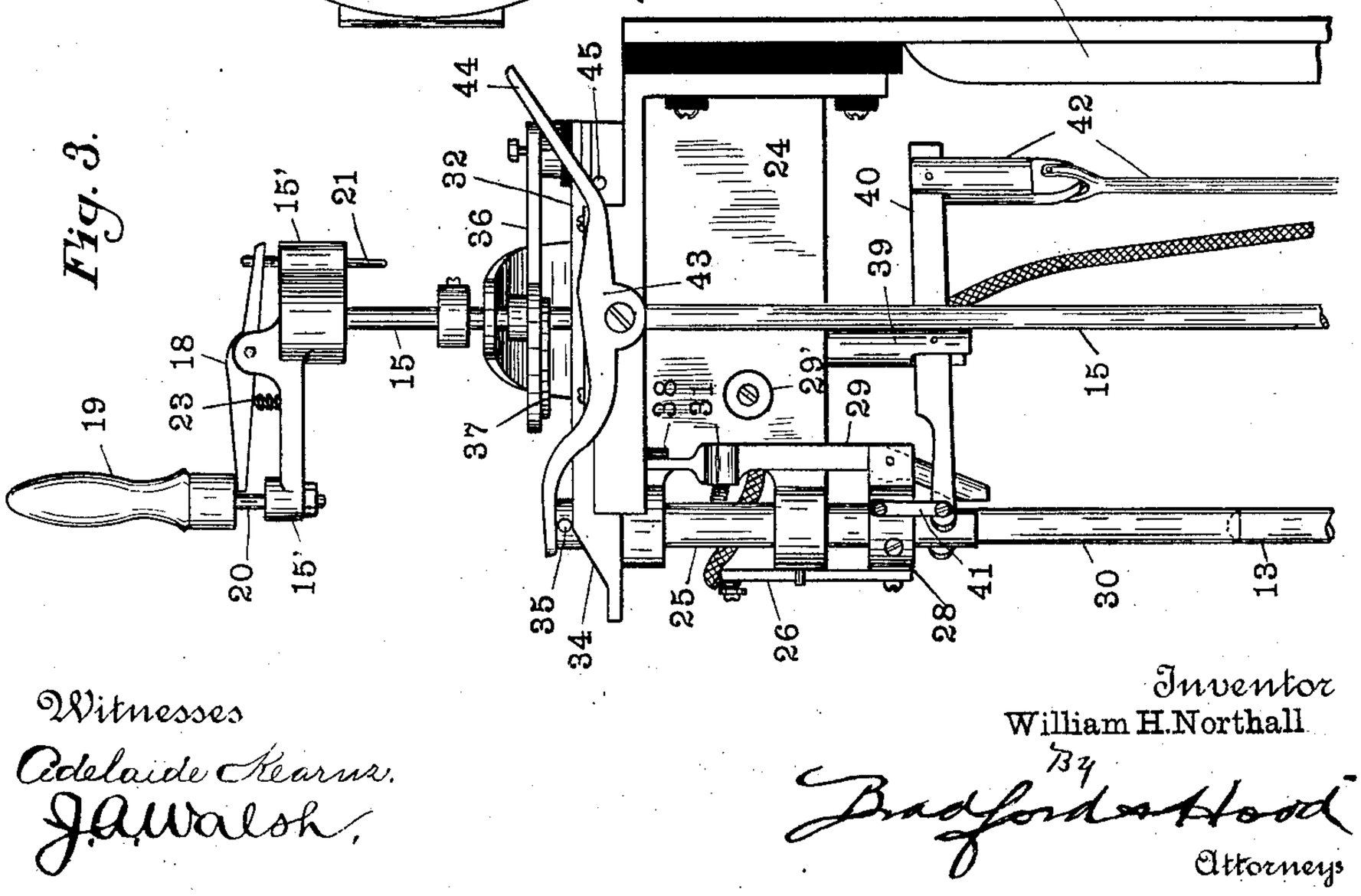


Fig. 3.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.

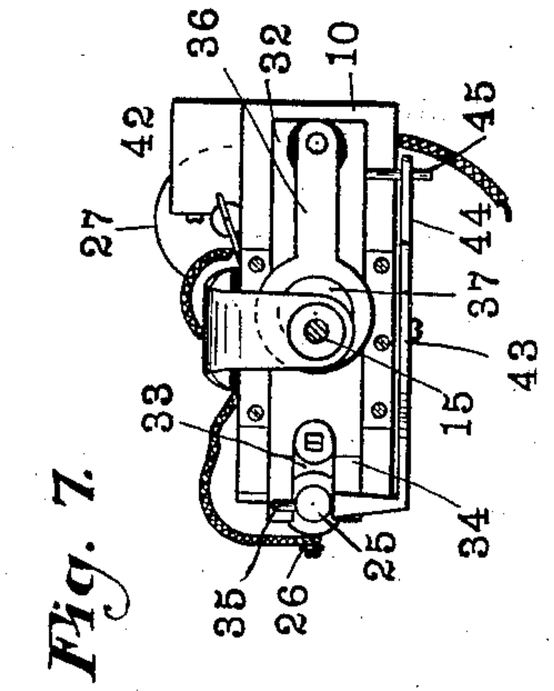
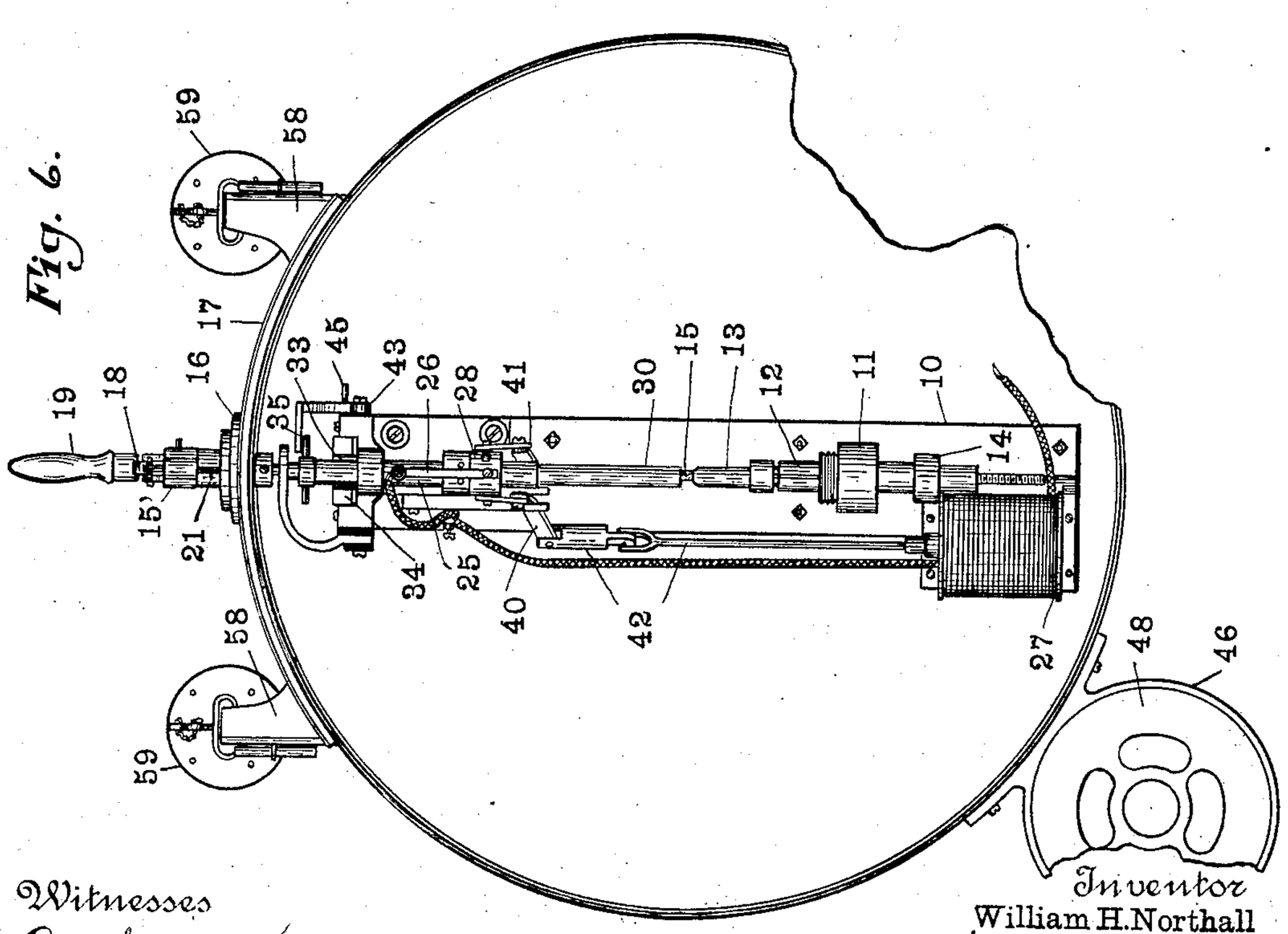


Fig. 6.



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No. 757,564. Patented April 19, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM H. NORTHALL, OF ELWOOD, INDIANA.

ELECTRIC HEADLIGHT.

SPECIFICATION forming part of Letters Patent No. 757,564, dated April 19, 1904.

Application filed March 20, 1903. Serial No. 148,705. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. NORTHALL, a citizen of the United States, residing at Elwood, in the county of Madison and State of Indiana, have invented certain new and useful Improvements in Electric Headlights, of which the following is a specification.

The object of my invention is to produce an electric-arc lamp especially adapted for headlights in which the two carbons may be readily shifted so as to bring the arc to any desired position with relation to the focus of the reflector, the construction being such, however, that the length of arc may be automatically maintained under normal conditions.

A further object of my invention is to produce means by which the length of arc may be adjusted, thereby permitting the lamp to be readily "turned down," this construction being particularly valuable when the headlight is used on interurban cars, where it is desirable that the power of the light be diminished within the limits of any town or city.

A further object of my invention is to provide such other improvements in construction as may be hereinafter pointed out.

The accompanying drawings illustrate my invention.

Figure 1 is a partial central vertical longitudinal section, the lamp mechanism being shown in full lines. Fig. 2 is a similar section of the lamp mechanism. Fig. 3 is a side elevation, on an enlarged scale, of the upper part of the lamp mechanism. Fig. 4 is a front elevation, on a reduced scale, of the complete headlight. Fig. 5 is a side elevation on the same scale as that shown in Fig. 4. Fig. 6 is a front elevation of the parts shown in Fig. 1, the front of the inclosing casing, however, having been removed. Fig. 7 is a top plan of the parts shown in Fig. 2.

In the drawings, 10 indicates a base or body provided with an arm 11, within which is sleeved for vertical movement a carbon-holder 12, adapted to receive and hold a carbon or other terminal 13. Holder 12 is carried by an arm 14, through which is threaded the lower end of an adjusting-rod 15, the arm 14 being vertically movable upon rod 15. Arm 14 is provided with a rearwardly-extending finger 14′, which engages a vertical portion of the body or base 10 in opposition to the sleeve or carbon-holder 12, so that as the arm 14 is moved up and down by rotation of rod 15 there is no tendency to pinch. Rod 15 is journaled at its lower end in arm 11 and at its upper end in a boss 16, secured to the top side of the lamp-casing 17. Secured to the upper end of rod 15 is an arm 15′, by which the rod 15 may be rotated. Pivoted upon a horizontal axis upon arm 15′ is a lever 18, one end of which is engaged by an operating-handle 19, vertically movable on arm 15′ by means of a connection 20. The opposite end of lever 18 carries a plunger 21, which passes down through arm 15′ into any one of a series of openings 22, formed in boss 16, the arrangement being such that arm 15′ may be locked in any position with relation to boss 16. Plunger 21 is normally held down by means of a small spring 23.

Secured to the upper end of base 10 and insulated therefrom is an arm 24, in which is sleeved for vertical movement a carbon-holding tube 25. An arm 26, to which one end of the coil of a usual solenoid 27 may be secured, is carried by a collar 28, secured to the tubular holder 25. Pivoted to collar 28 is a lever 29, the lower end of which is normally held in engagement with the carbon or terminal 30 by means of a spring 31, the arrangement being such that lever 29 normally serves to hold terminal 30 in a fixed relation to the holder 25. Mounted upon arm 24 is a roller 29′ in such position that when collar 28 is moved downward the upper end of lever 29 will be brought into engagement with said roller and forced inward against the action of spring 31, so as to release carbon 30.

Slidably mounted upon arm 24 is a cam-bar 32, provided at its forward end with a yoke or bifurcated portion 33, the arms of which straddle the upper end of the holder 25. Each finger of the yoke 33 is provided with a vertically-rising cam 34, which when the solenoid does not operate may be brought beneath and into engagement with a pin 35, which projects from opposite sides of the holder 25. Pivoted to the rear end of cam-bar 33 is an eccentric-strap 36, which embraces an eccentric 37, carried by rod 15. Secured to the

under side of cam-bar 32 is a pin 38, which may be brought into engagement with the upper end of lever 29 when the cam-bar 32 is projected toward the carbon-holder 25, said engagement taking place immediately before the extreme of projection of the cam-bar.

Pivoted to a suitable standard 39, carried by the arm 24, is a lever 40, one end of which is bifurcated to straddle the lower end of holder 25, and this bifurcated end of lever 40 is connected by links 41 to collar 28. The opposite end of lever 40 is connected by links 42 with the core of the solenoid 27. Pivoted to arm 24 is a lever 43, the forward end of which lies above one end of pin 35, so that holder 25 may be forced downward by the lever against the action of the solenoid. The opposite end of the lever 43 carries a vertically-inclined tail 44, beneath which extends a pin 45, carried by cam-bar 32.

Any usual form of reflector (shown in dotted lines in Fig. 1) is mounted within casing 17, so as to inclose the carbons, and the adjacent ends of the carbons may or may not be inclosed within a globe. (Indicated in dotted lines in Fig. 1.)

In operation one end of the main line is connected to the casing 17 or to the base 10, while the opposite end of the main line is connected to the solenoid 27. Under normal conditions cam-bar 32 is retracted from holder 25, as shown in Figs. 1 and 2, and before any current is passing through the system carbon 30, together with the holder thereof, will of its own weight drop down until it rests upon carbon 13. As soon as current passes through the system the solenoid 27 operates to swing link 40 so as to throw carbon-holder 25 up and retract the carbon 30 from carbon 13, maintaining the arc distance throughout any jarrings of the apparatus so long as a current remains in the system until the arc becomes too great, whereupon the current is immediately interrupted, the solenoid fails to maintain the separation, carbon 30, together with its holder, drops, and brings lever 29 into engagement with roller 29′, so as to release carbon 30. Immediately the current is reëstablished the solenoid operates to swing lever 40, the collar 28 and holder 25 are moved upward, (lever 29 slipping upon the carbon until the lever is passed beyond the action of the roller 29′,) the carbon 30 is reseparated from the carbon 13, and the arc again established. Before this automatic readjustment of the arc has taken place the carbon 13 has been reduced in length, and as a consequence the reëstablished arc is no longer at the focus of the reflector. In order to bring the arc to the focal point, the motorman has merely to reach forward, grasp handle 19, and after depressing the same turn rod 15 in the proper direction to draw arm 14 upward, the rotation being continued until the upper end of carbon 13 is brought to the upper position to bring the arc to the focal point. Of course a reverse rotation of rod 15 will lower the upper end of carbon 13, if such lowering is necessary to bring the arc to the required focal point. The rotation of rod 15 results in the following operation: Eccentric 37, through eccentric-strap 36, projects cam-bar 32 forward toward holder 25 until the highest portion of the cam lies beneath pin 35. The forward motion of the cam-bar 32 brings pin 45 into engagement with the cam-tail 44 of the lever 43 and swings said lever, so as to force the carbon-holder 25 downward against the action of the solenoid, this downward movement of the holder 25 bringing lever 29 into engagement with roller 29′, so that by the time carbon 30 is lowered to carbon 13 it will have been released from the holder 25. At the same time pin 38 engages the upper end of lever 29 and insures the release of carbon 30. The rotation of rod 15 causes arm 14 and carbon 13 carried thereby to move upward, (or downward, according to the direction of revolution;) but the shifting of position of carbon 13 is compensated by reason of the release of carbon 30. As soon as arm 15′ is returned to its normal position, pin 45 being retracted from tail 44, the solenoid automatically throws the carbon-holder 25 upward, the lever 29 automatically gripping carbon 30, so as to separate the two carbons the same distance that they were separated before. The new arc is therefore of the original length. Suppose now that it is desired to turn down the light. The operator has merely to rotate the rod 15 enough to move pin 45 forward against tail 44, so as to swing lever 43 and move carbon-holder 25 downward against the action of the solenoid as much as may be desired, it being possible to regulate the arc through a considerable range and shorten it until lever 29 engages roller 29′ and is engaged by pin 38.

Casing 17 is of the usual cylindrical form, and secured to the bottom thereof equidistant from the medial vertical line are two cylindrical casings 46 46, which together form feet upon which the device may stand and each of which is adapted to receive a rheostat preferably of the form which forms the subject-matter of a divisional application. Casing 17 may also be provided with rearwardly-projecting fingers 58, to be detachably secured to fittings 59, carried by the front of the car in the usual well-known manner.

I claim as my invention—

1. In an electric-arc lamp, the combination with a pair of carbon-holders, of electrically-operated means for supporting one of said holders, means for adjustably moving the other holder toward and from the first holder, and means operated by said adjusting means for releasing and refastening the carbon in the first holder to compensate for the adjustment of the second holder.

2. In an electric-arc lamp, the combination

of a pair of carbon-holders, of a solenoid, connections between said solenoid and one of said carbon-holders for supporting the same, a threaded rotatable rod threaded into the other holder and supporting the same, means for grasping a carbon in one of said holders, and means operated by the rotation of the rotatable rod for releasing said grasping means at one point in its rotation to compensate for the movement of the adjustable holder.

3. In an electric-arc lamp, the combination with a suitable support, of a carbon-holder movably mounted therein, electrically-operated means for controlling the position of said carbon-holder, a lever arranged to engage said carbon-holder and move it in opposition to said electrically-operated means, a carbon-grasping means carried by said carbon-holder, a second carbon-holder, means for adjusting said carbon-holder, and intermediate connections between said adjusting means and the lever.

4. In an electric-arc lamp, the combination with a suitable support, of a pair of carbon-holders, electrically-operated means for supporting one of said holders, and means for moving said electrically-operated holder toward the other holder against the action of the electric operating means whereby the length of the arc may be adjusted.

5. In an electric-arc lamp, the combination with a pair of carbon-holders, of a solenoid, a connection between said solenoid and one of the holders, and means for moving the solenoid-operated holder toward the other holder against the action of the solenoid.

6. In an electric-arc lamp, the combination with a suitable support, of a carbon-holder movably mounted therein, a solenoid, a connection between said solenoid and said carbon-holder, a lever arranged to engage said carbon-holder and move it in opposition to said solenoid, means for operating said lever, and a coöperating second carbon-holder.

7. In an electric-arc lamp, the combination with a suitable support, of a carbon-holder movably mounted therein, a solenoid, a connection between said solenoid and carbon-holder, a lever arranged to engage said carbon-holder and move it in opposition to the solenoid, a second carbon-holder, a rotatable threaded rod threaded into said second carbon-holder and supporting the same, a cam-bar adapted to move the first carbon-holder in a direction opposite to that caused by the lever, means carried by the cam-bar for operating the lever, and connections between said cam-bar and rotatable rod.

8. In an electric-arc lamp, the combination with a suitable support, of a carbon-holder movably mounted therein, a solenoid, a connection between said solenoid and carbon-holder, a lever arranged to engage said carbon-holder and move it in opposition to the solenoid, a second carbon-holder, a rotatable threaded rod threaded into said second carbon-holder and supporting the same, a cam-bar adapted to move the first carbon-holder in a direction opposite to that caused by the lever, means carried by the cam-bar for operating the lever, connections between said cam bar and rotatable rod, carbon-grasping means carried by the first carbon-holder and normally holding the carbon therein, and means carried by the cam-bar for engaging said grasping means to intermittently release the carbon.

9. In an electric-arc headlight, the combination with the casing thereof, of a pair of carbon-holders, electrically-operated means for normally maintaining the arc distance, and means operable from the exterior of the casing for moving one of the carbon-holders toward the other against the operation of the electrically-operated arc distance-controller.

10. In an electric-arc headlight, the combination with a casing, of a pair of carbon-holders movably mounted therein, a solenoid, connections between said solenoid and one of said carbon-holders for supporting the same, a threaded rotatable rod threaded into the other carbon-holder, to support the same and extending to the exterior of the casing, means carried by the extended end of the said rotatable rod by means of which it may be operated from the exterior of the casing, means for grasping the carbon by one of the holders, and means operated by the rotation of the rotatable rod for releasing said grasping means at one point in its rotation to compensate for the movement of the adjustable holder.

11. In an electric-arc headlight, the combination with a suitable casing, of a carbon-holder movably mounted therein, electrically-operated means for controlling the position of said carbon-holder, a lever arranged to engage said carbon-holder and move it in opposition to said electrically-operated means, a carbon-grasping means carried by said carbon-holder, a second carbon-holder, means for adjusting said carbon-holder, intermediate connections between said adjusting means and the lever, and means for rotating the adjusting means from the exterior of the casing.

12. In an electric-arc headlight, the combination with a suitable casing, of a pair of carbon-holders, electrically-operated means for supporting one of said holders, means for moving said electrically-operated holder toward the other holder against the action of the electric-operated means, whereby the length of the arc may be adjusted, and means for operating said moving means from the exterior of the casing.

13. In an electric-arc headlight, the combination with a suitable casing, of a pair of carbon-holders, a solenoid, a connection between said solenoid and one of the holders, means for moving the solenoid-operated holder toward the other holder against the action of

the solenoid, and means for operating said moving means from the exterior of the casing.

14. In an electric-arc headlight, the combination with a suitable casing, of a carbon-holder movably mounted therein, a solenoid, a connection between said solenoid and said carbon-holder, a lever arranged to engage said holder and move it in opposition to said solenoid, means outside of the casing for operating said lever, and a coöperating second carbon-holder.

15. In an electric-arc headlight, the combination with a suitable casing, of a carbon-holder movably mounted therein, a solenoid, a connection between said solenoid and carbon-holder, a lever arranged to engage said carbon-holder and move it in opposition to the solenoid, a second carbon-holder, a rotatable threaded rod threaded into said second carbon-holder to support the same, a cam-bar adapted to move the first carbon-holder in a direction opposite to that caused by the lever, means carried by the cam-bar for operating the lever, connection between said cam-bar and rotatable rod, and means for rotating said rod from the exterior of the casing.

16. In an electric-arc headlight, the combination with a suitable casing, of a carbon-holder movably mounted therein, a solenoid, a connection between said solenoid and carbon-holder, a lever arranged to engage said carbon-holder, a rotatable threaded rod threaded into said second carbon-holder and supporting the same, a cam-bar adapted to move the first carbon-holder in a direction opposite to that caused by the lever, means carried by the cam-bar for operating the lever, connection between said cam-bar and rotatable rod, carbon-grasping means carried by the first carbon-holder and normally holding the carbon therein, means carried by the cam-bar for engaging said grasping means to intermittently release the carbon, and means for rotating the rotatable rod from the exterior of the casing.

In witness whereof I have hereunto set my hand and seal, at Elwood, Indiana, this 17th day of January, A. D. 1903.

WILLIAM H. NORTHALL. [L. S.]

Witnesses:

FRED C. HANKER,

CARL BUTLER.