

(No Model.)

J. R. DALES & E. L. ADAMS.

ELECTRIC ARC LAMP.

No. 334,353.

Patented Jan. 12, 1886.

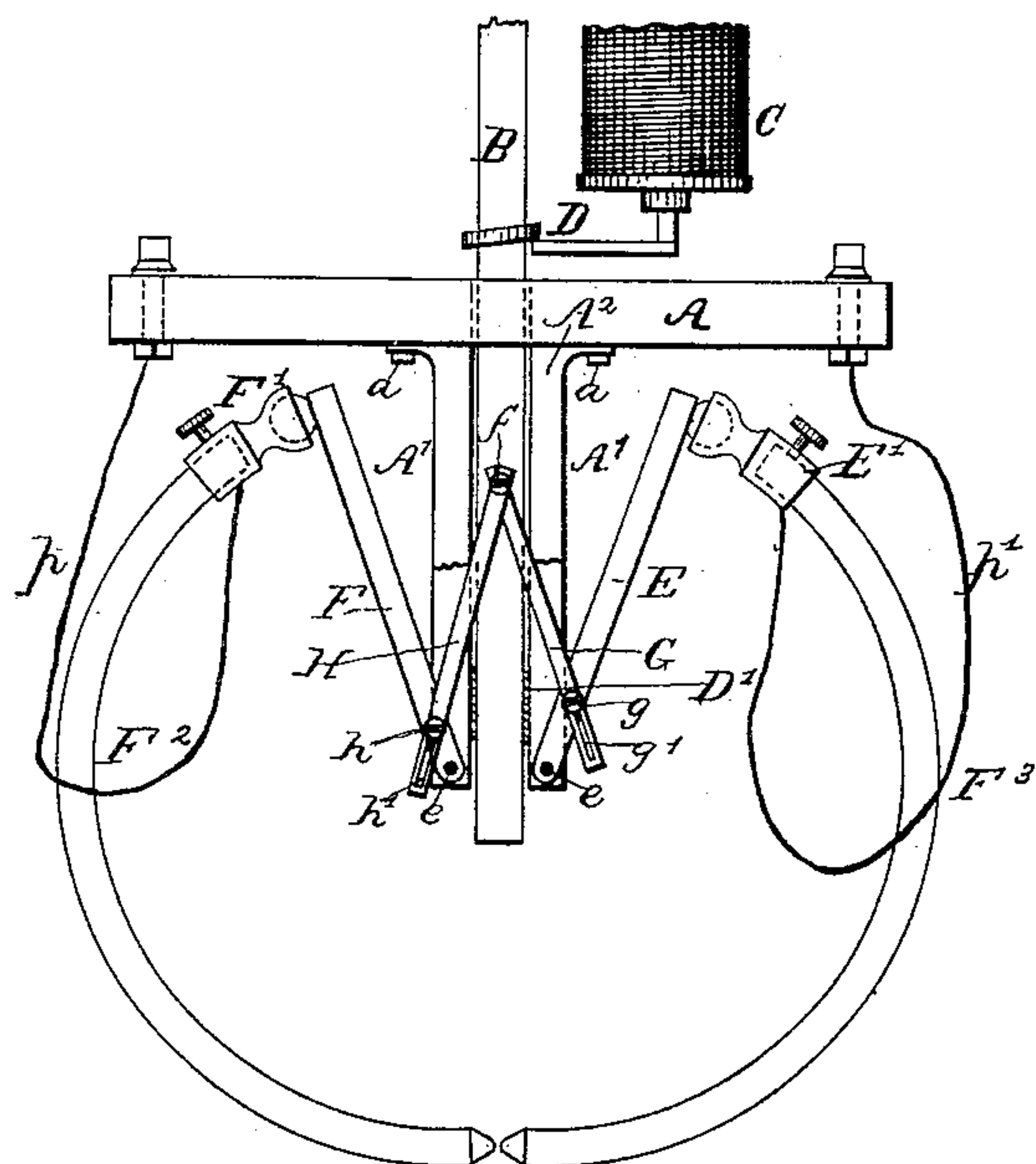


Fig. 1

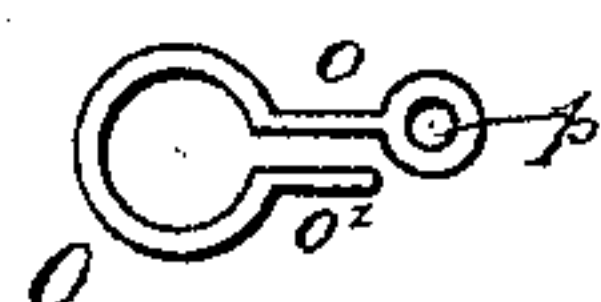


Fig. 4

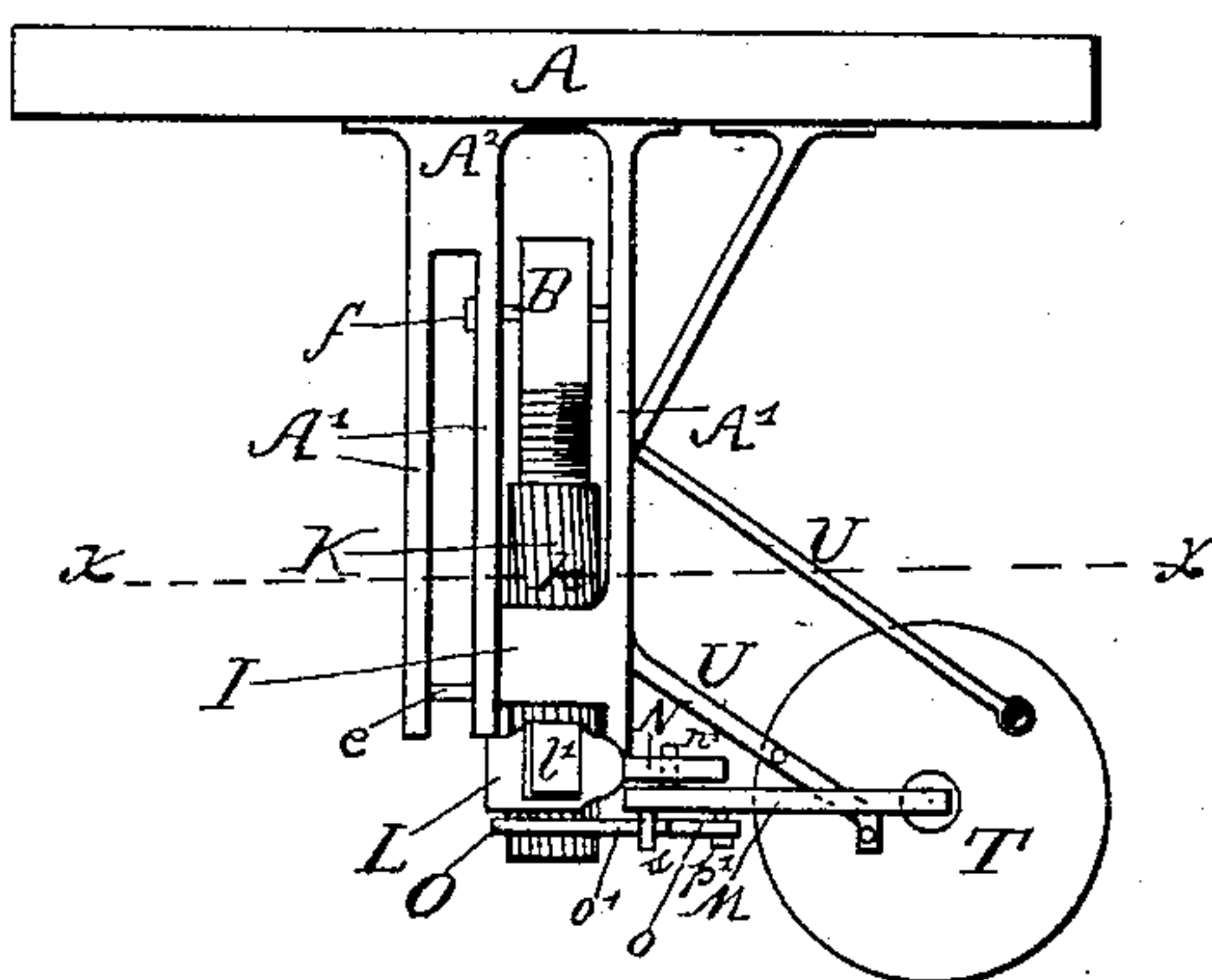


Fig. 2

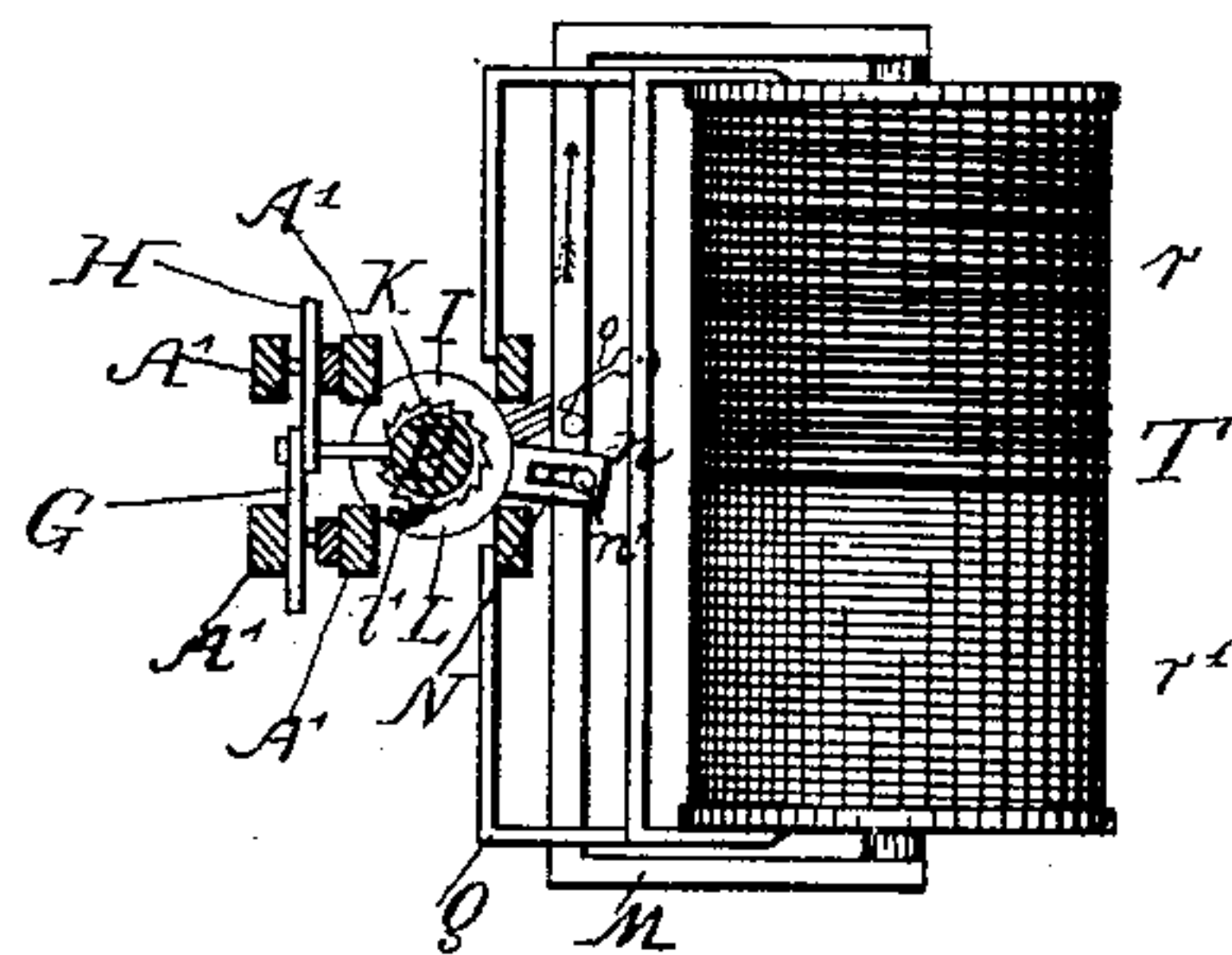


Fig. 3

Witnesses

A. A. Connolly  
Daniel Scott H.

Inventors

Joseph R. Dales

Edwin L. Adams

by Connolly Bros.  
Attys

# UNITED STATES PATENT OFFICE.

JOSEPH R. DALES AND EDWIN L. ADAMS, OF PHILADELPHIA, PA.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 334,353, dated January 12, 1886.

Application filed February 14, 1885. Serial No. 155,930. (No model.)

*To all whom it may concern:*

Be it known that we, JOSEPH R. DALES and EDWIN L. ADAMS, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Arc Lamps; and we do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

Our invention has relation to electric-arc lamps of that class employing curved or arc-shaped carbons, and has for its object the provision of means whereby the arc may be maintained constantly at a particular point.

A further object of our invention is the provision of means whereby the necessary operating mechanism of the lamp, the carbon-holders, and all other appurtenant parts are contained in a smaller space than heretofore, thereby facilitating the use of the lamp in positions where the vertical length of the lamps heretofore commonly used has rendered their employment undesirable or impossible.

A still further object of our invention is the provision of means whereby both the positive and negative carbons are supported from above the arc, thereby avoiding the casting of shadows beneath the lamp.

The extraordinary length of the ordinary electric-arc lamp has been a serious objection to its use in certain positions, as, for instance, where they are to be placed in an apartment having a low ceiling. In such case it is frequently necessary, in order to properly distribute the light, that an opening be cut in the ceiling of the apartment above the lamp, so as to provide for the reception of the carbon rod and the upper portions of the lamp.

Another objectionable feature of the ordinary arc lamp is that the globe-holder and the lower carbon-holder, being situated below the arc, intercept a large portion of the light and cast a deep and extensive shadow immediately beneath the lamp.

In carrying our invention into effect we employ curved or arc-shaped carbons, whose upper ends are attached to pivoted arms, which are in turn attached, through pivoted levers, with a vertically-moving rod, corresponding

to and operated substantially in the manner of the carbon-rod of the ordinary arc lamp, whereby the curved carbons are caused to contact at a point below the entire operating mechanism of the lamp, thereby avoiding the casting of shadows downwardly from the arc.

Our invention primarily consists in the novel method of mounting and feeding the curved and arc-shaped carbons, and this part of our invention is applicable to any of the present forms of feeding mechanism; but we have invented and will presently describe a novel arrangement of devices for effecting the movement of the pivoted arms which carry the arc-shaped carbons.

Our invention further consists in the novel construction, combination, and arrangement of parts hereinafter described, and specifically claimed.

In the accompanying drawings, Figure 1 is an elevation of a portion of an electric-arc lamp having a well-known device for effecting the proper movement of the carbon-rod and with our improvement attached thereto, the lower carbon-holder of the ordinary form of lamp being dispensed with. Fig. 2 is an elevation of our improved lamp, showing the device which we employ for effecting the vertical movement of the rod, which in turn effects the proper movement of the curved carbons. Fig. 3 is a vertical section on the line *x x* of Fig. 2. Fig. 4 is a detail of our invention.

We will first describe the arrangement of parts for effecting the movement of the curved carbons toward one another and without regard to the particular means for effecting the movement of the vertical rod, which corresponds to the upper carbon-rod of the ordinary vertically-feeding lamp.

Referring, then, to Fig. 1 of the drawings, A designates the base or board to which are attached the magnets and other working parts of the feeding devices.

B designates a rod passing through said board.

C is the magnet for effecting the proper vertical movement of the rod, and D the clutch, through the medium of which the magnet when energized effects the elevation of the rod. This much of the apparatus corresponds to the



ordinary and well-known form of lamp now extensively used, and need not, therefore, be particularly described. It should be understood, however, that the lower carbon-holder 5 is dispensed with, both carbons being supported upon a frame depending from the bottom of the base or board A, and being caused to approach and recede from each other by the vertical movement of the rod B, as 10 will be presently described.

A' A' designate two depending legs proceeding from a common base, A<sup>2</sup>, which is secured to the bottom of the base-board A by screws *a a*. The carbon rod B passes down 15 between the legs A' A', and is guided by a collar, D', attached to said legs at the bottom thereof.

E F designate two similar lever-arms which are pivoted at their lower ends by screws *e e* 20 to the lower ends of the legs A' A'. These levers E F have each at its upper end a carbon-holder, E' F', in which are secured the positive and negative carbons F<sup>2</sup> F<sup>3</sup>, respectively. The carbons F<sup>2</sup> F<sup>3</sup> are arc-shaped, and 25 they conform to the circumference of a circle whose radius is the length of the arms E F.

G H designate two levers, which are pivoted at *f* to the carbon rod B, and whose lower ends are pivoted, respectively, to the lever-arms E 30 F by means of screw-pivots *g* and *h*, which pass through holes in the arms E F and through slots *g' h'* in the levers G H. The distance between pivotal points *e* and *g* on lever E is twice as great or about twice as great as the 35 distance between the pivotal points *e* and *h* of lever F, the result of which arrangement is that any movement of the vertical rod B will cause the positive carbon carried by the lever-arm E to travel twice as far as the negative carbon carried by the lever-arm F. 40

The operation of the described device is as follows: The carbons being in contact at their points, the current is switched into the lamp, and energizing the magnet C causes the elevation of the clutch D and of the rod B. The 45 upward movement of the rod B being communicated to the lever-arms E F through the arms G H, the former are drawn in toward the legs A' A' and the points of the carbons slightly separated, forming the arc. As the 50 carbons burn away, the rod B descends, as in the ordinary form of lamp, and the arc is maintained until the carbons are entirely consumed. The current may be conveyed to one 55 of the carbons through the rod B and the levers E G, while the other carbon-holder is insulated and the current conveyed to that carbon by means of a flexible conductor, *p*, or the current may be conveyed to both carbons 60 through flexible conductors *p p'*, as shown.

Having described that part of our invention which is applicable to arc lamps of the ordinary construction, we will now proceed to describe the novel feeding mechanism which we 65 have devised for effecting the vertical movement of the rod B. This part of our invention is illustrated in Figs. 2, 3, and 4. In these

figures the vertical rod, the levers connecting the same to the carbon-holders, and the construction and arrangement of the carbon- 70 holders and the carbons are the same as in Fig. 1, and the same letters of reference designate these parts. In these figures, however, the rod B is formed with a screw-thread of very fine pitch, and passes through a similarly- 75 screw threaded sleeve, K, which is sustained against a lateral movement by a collar, I, on one of the legs A'.

The sleeve K, in addition to being screw-threaded in its interior, is provided on its exterior with ribs *k k k*, running from end to end and in a slightly-inclined or spiral direction. These ribs have each a straight and an inclined 80 side, so that in cross-section the sleeve conforms in configuration to a ratchet-wheel. 85

L designates a ring, which surrounds the sleeve K at its lower end, and is provided with a spring-pawl, *l*, which engages with the ribs *k k k*, and serves to turn the sleeve when the ring is turned in one direction, and to allow of the ring turning in the opposite direction independently of the sleeve. The ring L is sustained upon a rectangular frame, M, of which the armature or core of a compound electro-magnet forms the other side. An arm, 95 N, on one side of the ring L, has a slot, *n*, through which projects a pin, *n'*, on the frame M, so that when the said frame is moved in a horizontal direction the ratchet on the ring will engage with the ribs on the sleeve, and, 100 turning the same, will elevate the rod B a short distance, and thereby separate the carbons.

Beneath the ring L is placed a split collar, O, having two legs, *o o'*. The leg *o* has an eye, *p*, through which passes a pin, *p'*, into the frame Q, which supports the magnet R. The other arm, *o'*, of the split collar O passes 105 beneath the rectangular frame M, and a pin, *s*, in said frame comes in contact with the arm *o*, and causes the ring to bind upon the sleeve K when the frame M moves in the direction of the arrow. The purpose of this split collar is to sustain the sleeve K and the carbon rod 110 after the partial revolution of the sleeve has caused the carbon rod to be lifted, and it will be observed that the split collar is caused to bind upon the sleeve only after the same has partly revolved. 115

T designates the compound magnet through 120 the medium of which the rectangular frame is caused to move in a horizontal direction, and thereby operate the ring L and the split collar O. Said magnet is composed of the main coil *r*, of coarse wire, and the shunt-coil 125 *r'*, of fine wire, the former being in the direct circuit leading to a positive carbon and the latter in a shunt around both carbons, as in the electric lamps of the ordinary construction. Said magnet is secured to the rectangular frame Q, and is braced by means of diagonal bars U U, running from the leg of the 130 hanger A'.

From the foregoing it will be observed that,



by reason of the fact that the devices for effecting the feeding of the carbons being all within the space of the circumference of a sphere formed by the revolution of the curved carbons on their axes the lamp occupies but a small space, and may be entirely inclosed in a globe sufficiently large to inclose the carbons. There being no parts of the lamp beneath the arc, there is consequently no obstruction to the passage of the light, and the casting of shadows beneath the arc is avoided.

The peculiar shape of the carbons enables us to use carbons of considerably greater length than in the lamps now ordinarily employed. For instance, in a lamp whose diameter is twelve inches in every direction, we are enabled to employ carbons of nearly eighteen inches in length.

The arc being maintained constantly at a definite point, the lamp is well adapted for use in connection with a reflector requiring a focused light.

What we claim as our invention is as follows:

1. In an electric-arc lamp, the combination, with a vertically-reciprocating rod, and means, substantially as described, for effecting a movement of the same, of arms pivoted at one end to the frame of the lamp and carrying both carbons, and connected to the vertical rod by levers attached to said rod and to the said arms, substantially as described.

2. In an electric-arc lamp, the combination, with a vertically-reciprocating rod, and means, substantially as described, for effecting the movement of the same, of lever-arms pivoted at one end to the frame of the lamp and carrying both carbons, and connected to the vertical rod by levers attached to said rod and to the said arms at different distances from the fulcra of the same, whereby when the verti-

cal rod is reciprocated one of said rods and its attached carbon will move a less distance than the other, substantially as described.

3. In an electric-arc lamp, the combination, with pivoted arms connected to a vertically-movable screw-threaded rod by pivoted levers, of a screw-threaded sleeve fitting said rod, a clutch adapted to engage with said sleeve and turn the same, and electro-mechanical devices, substantially as described, for operating said clutch, as set forth.

4. In an electric-arc lamp, the combination, with pivoted arms connected to a vertically-movable screw-threaded rod by pivoted levers, of a screw-threaded sleeve fitting said rod, a clutch adapted to engage with said sleeve and turn the same, and electro-mechanical devices, substantially as described, for operating said clutch, and a split collar adapted to grasp said sleeve and sustain it and the threaded rod when the clutch-operating devices are brought into play, substantially as described.

5. In an electric-arc lamp of the focusing class, the combination, with a vertically-movable rod and devices for operating the same, and swinging arms having carbon-holders upon their free ends, of pivoted levers secured to said rod at one point and pivotally attached to said swinging arms at different distances from the fulcra thereof, whereby any movement of the said rod will move the carbon-holders different distances, substantially as described.

In testimony that we claim the foregoing we have hereunto set our hands this 6th day of February, 1885.

JOSEPH R. DALES.  
EDWIN L. ADAMS.

Witnesses:

EDWARD E. PAXSON,  
WILL H. POWELL.

It is hereby certified that in Letters Patent No. 334,353, granted January 12, 1886, upon the application of Joseph R. Dales and Edwin L. Adams, of Philadelphia, Pennsylvania, for an improvement in "Electric-Arc Lamps," errors appear in the printed specification requiring correction, as follows: In line 39, page 2, the reference letter "E" should be stricken out and the reference letter *F* inserted; in line 40, same page, the reference letter "F" should be stricken out and the reference letter *E* inserted; in line 107, same page, the reference letter "R" should be stricken out and the reference letter *T* inserted instead; and that the Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 9th day of March, A. D. 1886.

[SEAL.]

H. L. MULDROW,  
*Acting Secretary of the Interior.*

Countersigned:

M. V. MONTGOMERY,  
*Commissioner of Patents.*