No. 607,589. Patented July 19, 1898.

J. H. J. HAINES.

ELECTRIC ARC LAMP.

(Application filed Oct. 29, 1896. Renewed May 12, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

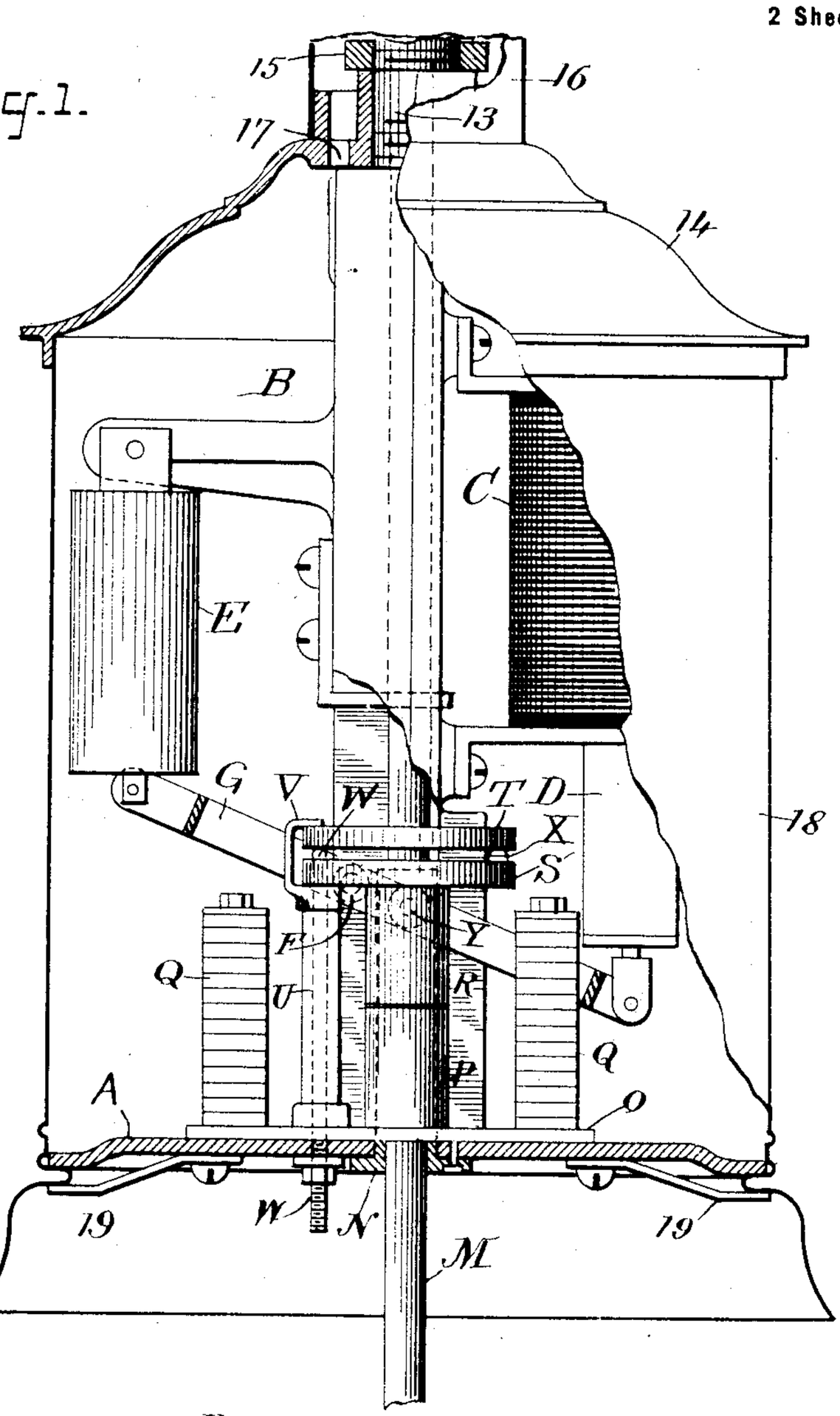
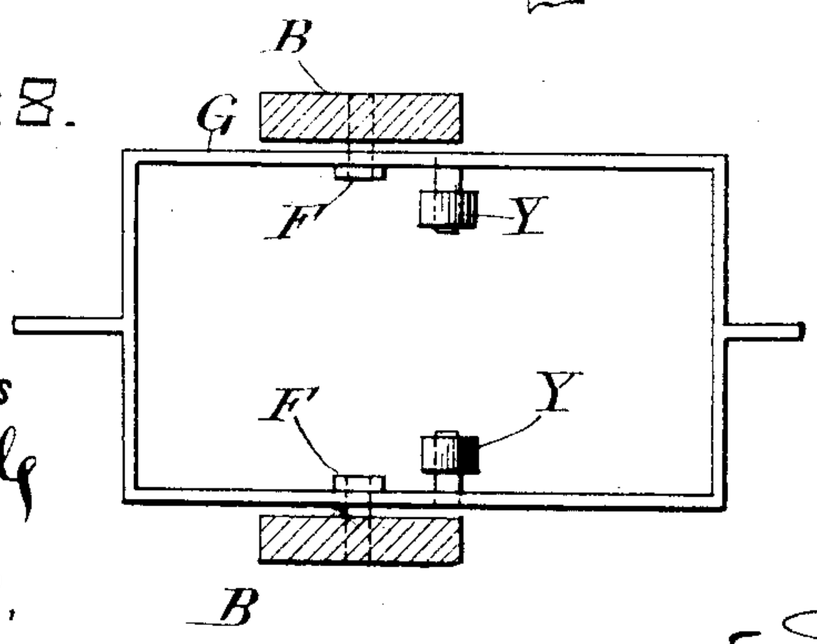


Fig. 8.



WITNESSES

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Fig. 2.

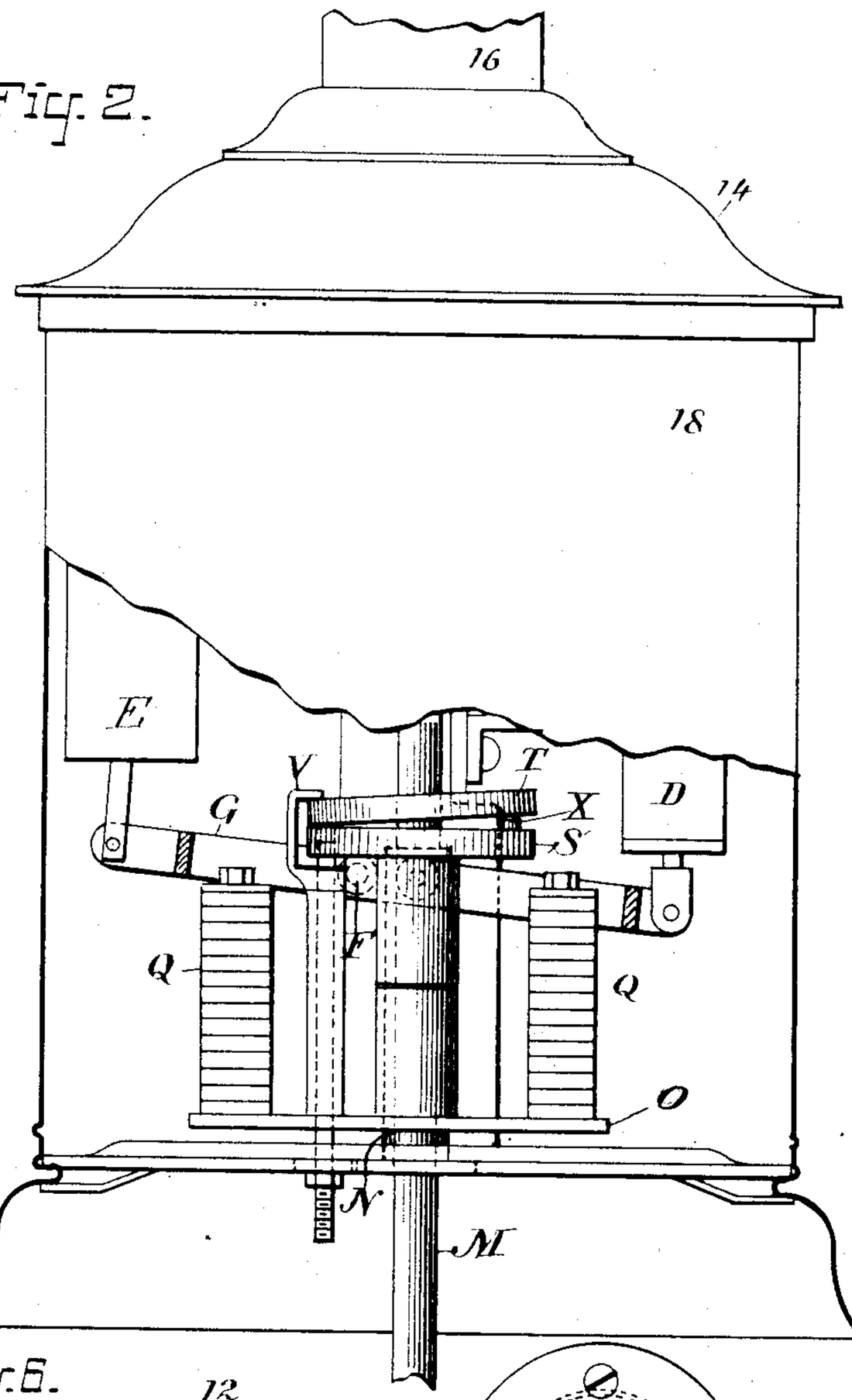

Fig. 7.

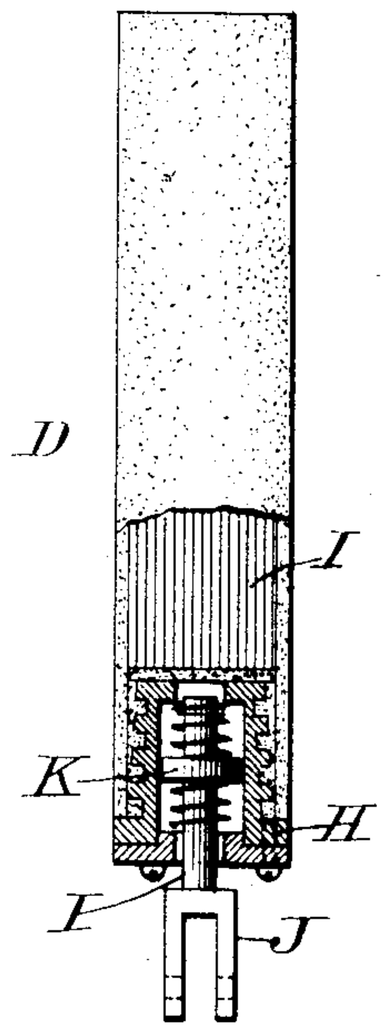

Fig. 6.

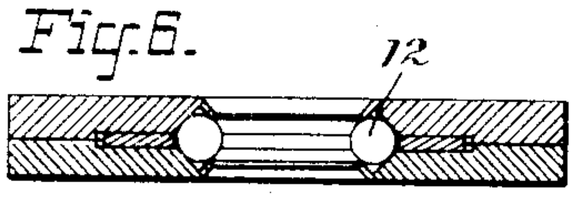

Fig. 5.

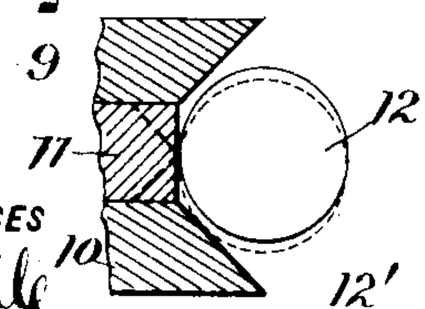

Fig. 3.

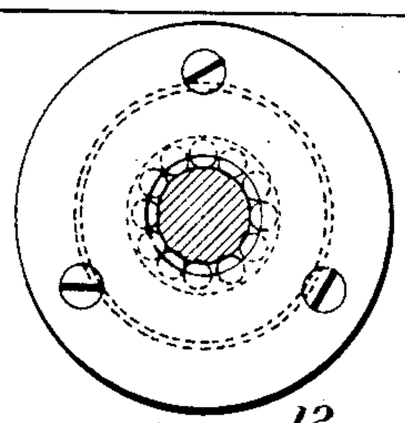

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN H. J. HAINES, OF NEW YORK, N. Y., ASSIGNOR TO THE HAINES ELECTRIC COMPANY, OF JERSEY CITY, NEW JERSEY.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 607,589, dated July 19, 1898.

Application filed October 29, 1896. Renewed May 12, 1898. Serial No. 680,520. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. J. HAINES, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a certain new and useful Arc-Lamp, of which the following is a specification.

This invention relates to electric-arc lighting, and particularly to the feeding mechanism for the carbon or carbon-holder of an arc-lamp.

The object of the invention is to produce a feeding mechanism which shall be simple in construction and capable of perfectly regulating and maintaining the arc.

To this end the invention consists in the construction, combination, and arrangement of parts hereinafter fully described and set forth.

In the accompanying drawings, which form a part of this specification, Figure 1 represents the hooded portion of an arc-lamp containing the features of the invention, parts of the mechanism being broken away. Fig. 2 is a similar view showing the parts in working position. Fig. 3 is a plan of the ring-clutch. Fig. 4 is a transverse section thereof. Fig. 5 is an enlarged sectional view of a portion of said ring. Fig. 6 shows a modification of the ring. Fig. 7 is a partially-sectionized side elevation of the solenoid-core. Fig. 8 is a plan view of the main operating-lever.

This feeding mechanism in its general features partakes somewhat of the nature of the old ring-clutch. In that mechanism, however, it was impossible to secure an even feed, since under unvarying load the ring would not grip uniformly and with the variations in load due to the consumption of carbons the grip became still more uncertain.

The present invention embodies an improvement upon the ring-clutch by means whereof a uniformity of speed is attained, such that to the eye the movement of the carbon is imperceptible, so even and continuous is it.

In the drawings, A indicates the base of the lamp, upon which is mounted the frame B.

C is the feeding-magnet, here shown in the form of a solenoid, which is mounted upon the frame B. D is the core of said solenoid.

E is a dash-pot pivoted to a projection on the frame B. Upon the frame B is pivoted at F the open frame-lever G, common in arc-lamps, one end of this lever being connected to the piston of the dash-pot and the other end to the core of the solenoid. These are all old and well-known features.

The connection between the core D and the lever G, as shown in Fig. 7, is one of the novel features of this invention. It is common to provide a resilient connection between these two parts, but this is an improvement upon those connections now in use. In the lower end of the core is secured the socket H, in which is located the stem I of the clevis J. Upon this stem is formed or secured a collar K, and between this collar and the ends of the socket H are placed spiral springs, as indicated. In this manner the resilient connection between the lever G and the core are safely housed. The upper portion of the core consists of a bundle of iron wires L, which are placed within the insulated jacket of the core and held therein in any suitable way. One way which I have adopted for securing them in place is to pour in among them some silicate of soda, which binds them together *en masse*.

M indicates the carbon-rod, which reciprocates vertically through the plate A and the bracket B, passing through a tube N, which is preferably secured to the under side of the plate A and projects upwardly around the carbon-rod, as indicated. About the tube N is placed a plate O, having a collar P serving as a guide therefor upon said tube. This plate carries weights, as indicated at Q, for the purpose hereinafter described. Above the collar P and also located about the guide-tube N is a collar R, which carries at its upper end a platform S, which serves as the tripping-place for the ring-clutch T. Arising from the plate O is a tubular projection U, which rests under the platform S and has connected to the upper end a lip V, extending over the upper edge of the ring T.

Secured in the plate A and extending up through the tubular post U and platform S is

a post W, which projects slightly above the platform S when the parts are in their normal position of rest. Secured to the platform S diametrically opposite to the post W is a stud or projection X, upon which the ring T normally rests. Upon the sides of the frame G, I secure studs Y, preferably provided with antifriction-rollers, which engage the under side of the platform S and serve to lift the same as the solenoid-core is drawn into the helix.

It will be noted that the ring-clutch T is detached from all surrounding parts and freely movable about its axis.

For the sake of illustration I have chosen to disclose this invention as applied to an alternating-current lamp. It is obvious, however, that it may be applied to a direct-current lamp by making the usual changes in the location of the magnet, as well understood by electricians.

The circuits of alternating-arc lamps being so well known and not entering into the features of the present improvement have not been indicated in the drawings.

The operation of the parts above described is as follows: The carbons being together, as usual in alternating-current lamps, upon current being turned on the core D will be drawn into the helix, and as it rises it will carry up the platform S, and as the ring rests at one edge upon the stud X it will be tilted and will clutch the rod M and carry said rod with it in the further movement of the core D. As the ring T rises the weighted plate O will be raised thereby, because of the lip V engaging with the edge of the ring, and as said lip engages with the ring at a point opposite to the stud X it is clear that the weight thus imposed upon the ring will add to the clutch action thereof upon the rod. Then as the core D descends the ring T will first meet with the platform S and then with the upper end of the post W, and as the rod gradually descends the angle of the ring will be decreased until its grip upon the rod is loosened sufficiently to allow the carbon to feed. Then when the arc is sufficiently shortened the core will ascend and cause the ring to again grip the rod and prevent the further descent thereof. As the sleeves P and R are guided in their vertical movement by the tube N they are prevented from adding friction to the movement of the carbon-carrying rod, said rod being left to the sole action thereon of the ring T.

We have now come to the special construction of the ring T by which it has been made practical. Said ring has formed upon its inner periphery a raceway in which are located antifriction devices for engagement with the carbon-carrying rod. These antifriction devices may be in the form of rollers or balls, and the ring may be formed in any suitable manner to contain these rollers or balls; but it has been found in practice that the best mode of construction of this ring consists in forming it in two parts 9 and 10, the inner peripheries of which are cut at an angle of approximately forty-five degrees, and these two parts are secured together in any suitable manner, as by the screws shown in Fig. 3. These two plates are also countersunk near their inner periphery, and in the countersink is located a ring 11, whose diameter is sufficiently less than that of the inner edge of the inclined surfaces of the raceway to prevent the balls 12 from touching both inclined surfaces of the raceway at the same time, as shown in Fig. 5. This prevents any wedging action that might take place between the balls and said inclined surfaces. In the gripping action of the balls upon the carbon-carrying rod they rest between said rod, the lower plate 10, and the ring 11, as indicated in dotted lines at 12', thereby providing the necessary frictional contact and yet preventing any possibility of the balls being wedged between the surfaces engaging them. It is also preferable to make the ring 11 somewhat smaller than the countersink in which it is placed, so that it may have sufficient lateral movement to adjust itself to the balls as the clutch-ring changes its angle to the carbon-rod. This movability of the ring 11 also insures keeping the balls free in the raceway, as it will prevent any tendency the balls may have to embed themselves upon the plate 10. The movability of the ring W about the carbon-carrying rod will also assist in preventing the balls from wearing grooves or channels in said rod. The inner edge of the ring 11 may, if desired, be made angular, as indicated in dotted lines in Fig. 5, so as to present less frictional surface to the balls. The ball raceway may also be so shaped or formed as to retain the balls therein, thereby enabling them to be assembled in the ring before the ring is put into the lamp. One way of doing this is shown in Fig. 6, wherein the thin edge of the raceway is shown as turned down against the inner surface of the series of balls. The plates 9 and 10 may be turned in this shape, or the said edges may be rolled down, as found most expedient in manufacture.

The use of the balls in the manner just described is more than the mere adaptation of antifriction devices to the old ring-clutch. This construction provides for engaging the rod at a series of points with rounded surfaces of rolling parts, thereby taking a firm hold of the rod without biting into it. In the old ring-clutch the engagement with the rod is by opposite rigid angular surfaces and no uniformity of pressure can be relied upon. Then, too, in the present construction a slight increase in the pressure upon the rod will allow the balls to roll slightly and the rod to feed in proportion to the freedom with which the balls are allowed to move. The control of the rod is by this means so absolutely uniform that the movement of the carbon is imperceptible to the eye.

In addition to the features above described improvements have also been made in the

construction of the hood. As before stated, the bracket B is secured to the plate A. Then into the upper end of this bracket is turned a screw-threaded tube 13. The cap-plate 14 is preferably constructed of cast metal and made to slip freely over this tube and to rest upon the upper end of the bracket B. A jam-nut, as 15, upon the tube 13 is then turned down tightly against the cap and the shield 16 placed around a projection upon the cap 14, suitable holes, as 17, being formed through the cap within the tube 16 for the passage of the conductors, as indicated in Fig. 1. By constructing the lamp in this form the cap 14 and the plate A serve to support the lamp while in the course of manufacture or during repairs, so that no weight or strain can be brought to bear upon the feeding mechanism.

The cylindrical jacket 18 is made to enter within a downwardly-projecting flange upon the cap 15 and has preferably formed near its lower edge a bead, as shown, which engages with the under edge of the plate A. Then to hold this jacket in place buttons, as 19, may be pivoted to the under surface of plate A, as indicated. With this construction it is an easy matter to get at the feeding mechanism of the lamp. To do this, it is simply necessary to drop the globe, turn the buttons 19, and lower the jacket 18.

Many changes in the form and construction of the parts described and illustrated may be made aside from those above mentioned without departing from my invention.

While I have described my improved clutch as applied to an electric lamp, I do not limit myself to such use, but claim the same, broadly, as a new mechanical device.

What I claim as my invention is—

1. In an electric-arc lamp, a detached tilting clutch freely movable about its axis and provided on its inner periphery with rotary friction devices, for the purpose set forth.

2. In an electric-arc lamp, a tilting clutch provided with a raceway on its inner periphery, and a series of balls located in said raceway, as and for the purpose set forth.

3. In an electric-arc lamp, a tilting clutch consisting of two plates inwardly beveled on their inner periphery to form a raceway and secured together, and a series of balls located in said raceway.

4. A clutch for arc-lamps consisting of a series of balls and a tilting ring provided with a ball-raceway on its inner periphery formed by two inwardly-inclined surfaces separated by a surface of sufficiently less diameter than the inner periphery of the inclined surfaces to prevent the balls from simultaneously engaging both inclined surfaces, as and for the purpose set forth.

5. A clutch for arc-lamps consisting of a series of balls and a tilting ring formed of two plates inwardly beveled on their inner periphery, and a ring loosely inserted between the members of the tilting ring and having an internal diameter sufficiently less than that of the inner edges of the beveled surfaces to hold the balls from simultaneous engagement with both beveled surfaces.

6. A clutch for an arc-lamp consisting of a series of balls and a tilting ring formed of two inwardly-beveled countersunk plates, and a ring mounted in the countersink and of such internal diameter as to keep the balls from simultaneous engagement with both of said plates, as and for the purpose set forth.

7. A clutch for an arc-lamp consisting of a tilting ring formed of two united plates each provided with an undercut groove on its inner periphery, and a series of balls confined in the raceway formed by said grooves.

8. In an arc-lamp, the combination of a tilting clutch freely movable about its axis and provided on its clutching-surface with rotary friction devices, a movable platform under said clutch, means on the platform for tilting the clutch, and means controlled by the current of the lamp for raising and lowering the platform.

9. The combination with the carbon-carrying rod, the ring-clutch, the platform, and means thereon for tilting the clutch, of means for raising and lowering the platform and ring, and a part fixed in the path of the clutch for tripping it.

10. In an arc-lamp, the combination of the detached ring-clutch freely movable about its vertical axis, means for tilting and lifting the clutch, a weight normally out of engagement with the clutch but assumed thereby as the clutch is lifted, and a tripping device for the clutch, substantially as and for the purpose set forth.

11. The combination with the carbon-carrying rod, of the ring-clutch, the platform having a projection engaging one edge of the ring, means for raising the platform, a movable weight for engaging the ring at the edge opposite said projection, and means for tripping the ring, substantially as set forth.

12. In an arc-lamp, the combination of the detached ring-clutch freely movable about its axis, the vertically-movable platform supporting the clutch and provided with means for tilting it, the tripping device, the lever loosely engaging the platform, and the electromagnet for tilting said lever, as and for the purpose set forth.

13. The combination with the solenoid-core provided with the socket in its end, of the clevis having its shank located in said socket, and provided with a collar or projection, and springs engaging the said collar or projection and the ends of the socket, as and for the purpose set forth.

14. A tilting ring-clutch having a number of freely-moving balls confined in a raceway on its inner periphery, as and for the purpose described.

15. A ball-clutch having a loose ring or washer inserted in the ball-race.

16. An antifriction-ball race, having a loose ring or washer of slightly less diameter than

the mean diameter of the raceway, for the purpose set forth.

17. The combination with the solenoid-core, provided with a socket in its lower end, of the feeding-lever, and a connection between the core and said lever-spring seated within said socket, substantially as and for the purpose set forth.

18. In an arc-lamp, the combination of the detached ring-clutch freely movable about its vertical axis and provided on its inner periphery with rotary friction devices, means for tilting and lifting the clutch, a weight normally out of engagement with the clutch but assumed thereby as the clutch is lifted, and a tripping device for the clutch, substantially as and for the purpose set forth.

Signed at New York, in the county of New York and State of New York, this 26th day of October, A. D. 1896.

JOHN H. J. HAINES.

Witnesses:
WM. H. CAPEL,
D. H. DECKER.