No. 757,079. PATENTED APR. 12, 1904.

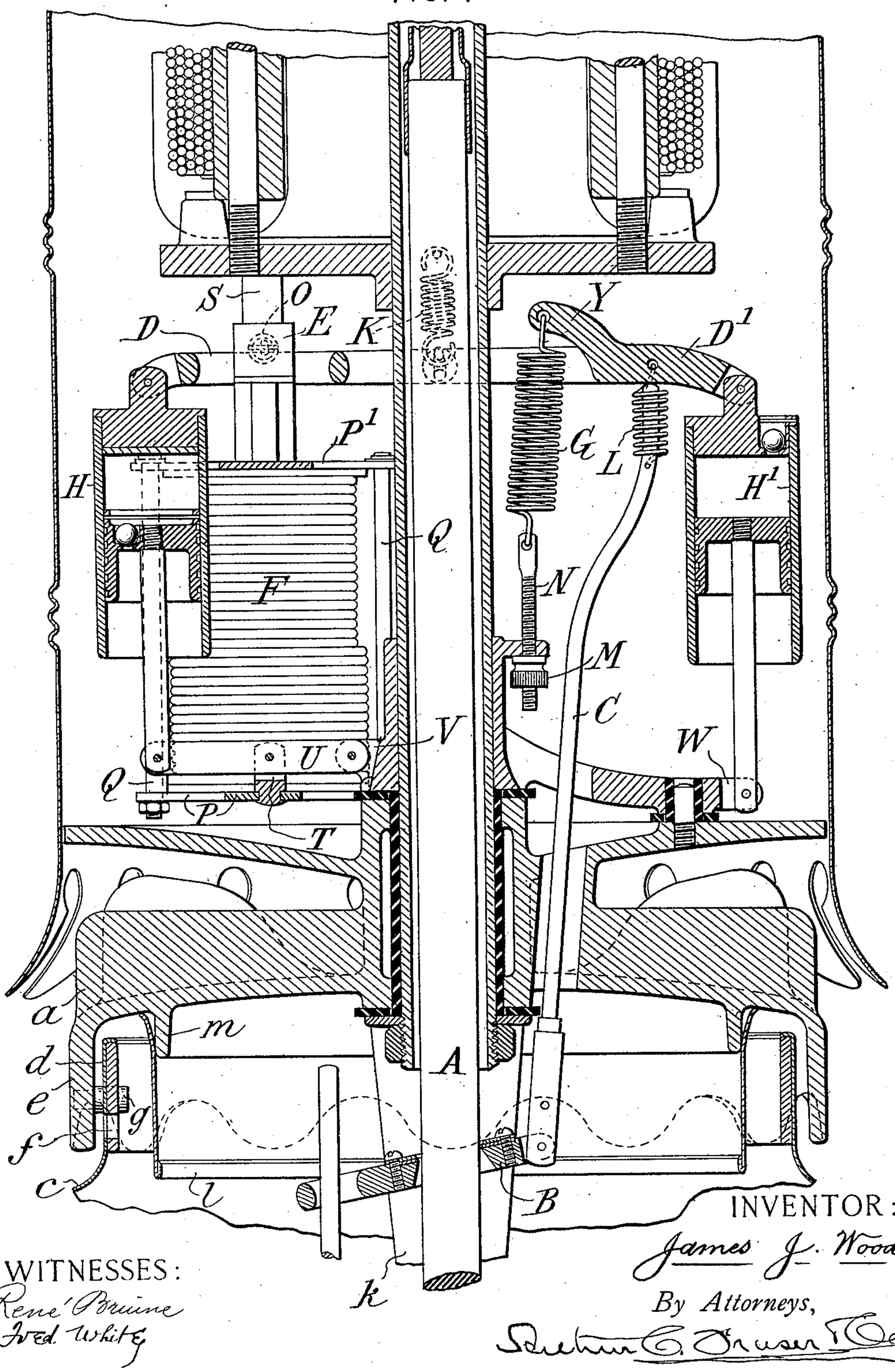
J. J. WOOD.

ELECTRIC ARC LAMP.

APPLICATION FILED SEPT. 4, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

FIG. 1



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NO MODEL. 3 SHEETS—SHEET 2.

FIG. 2.

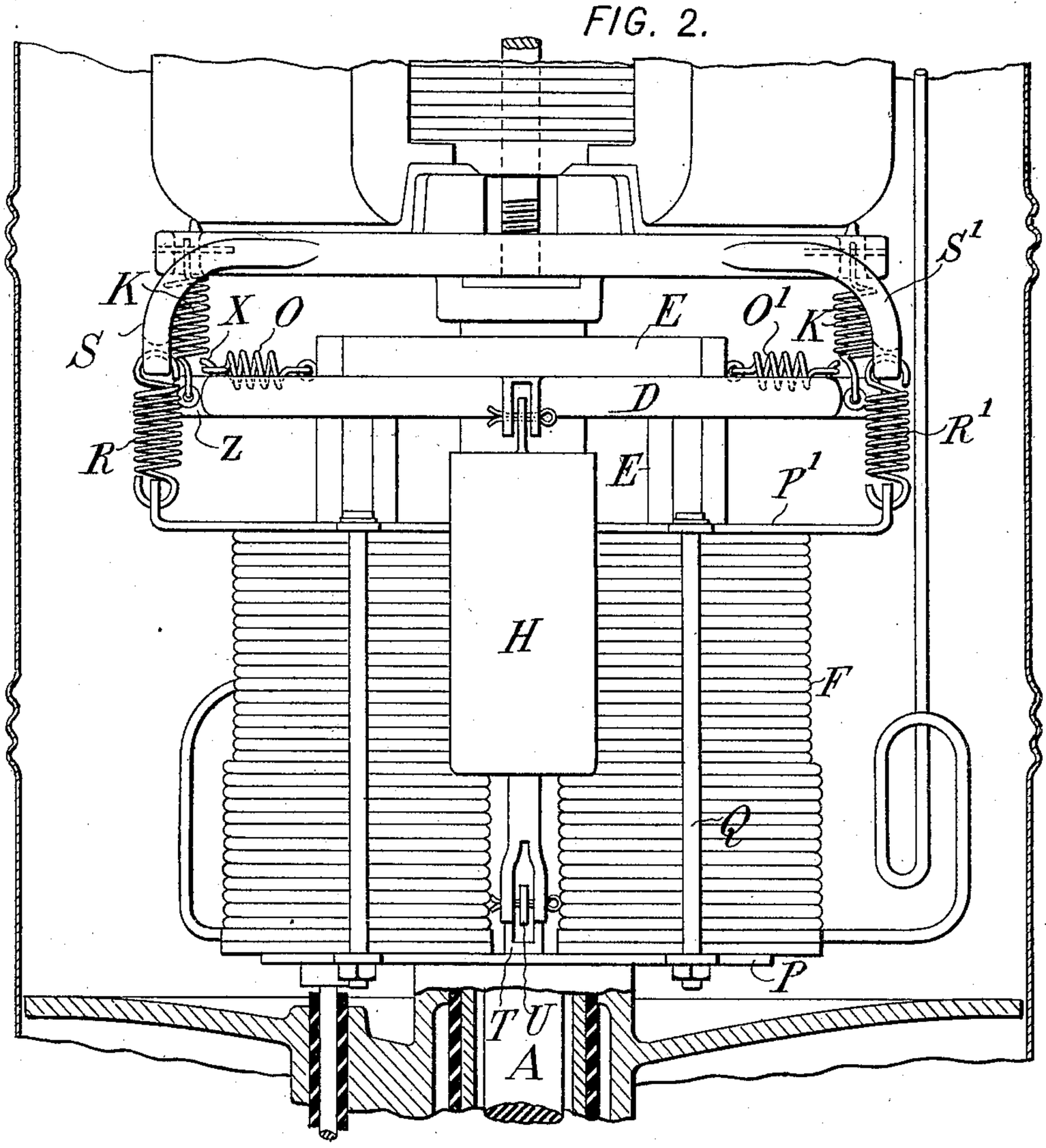
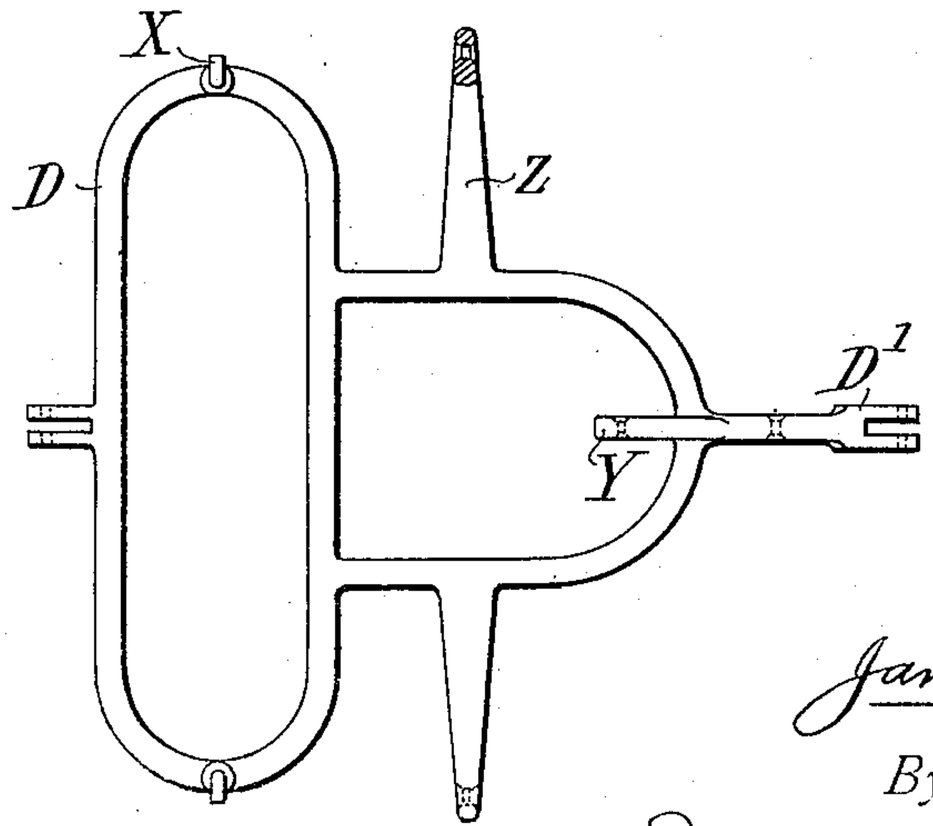


FIG. 3.



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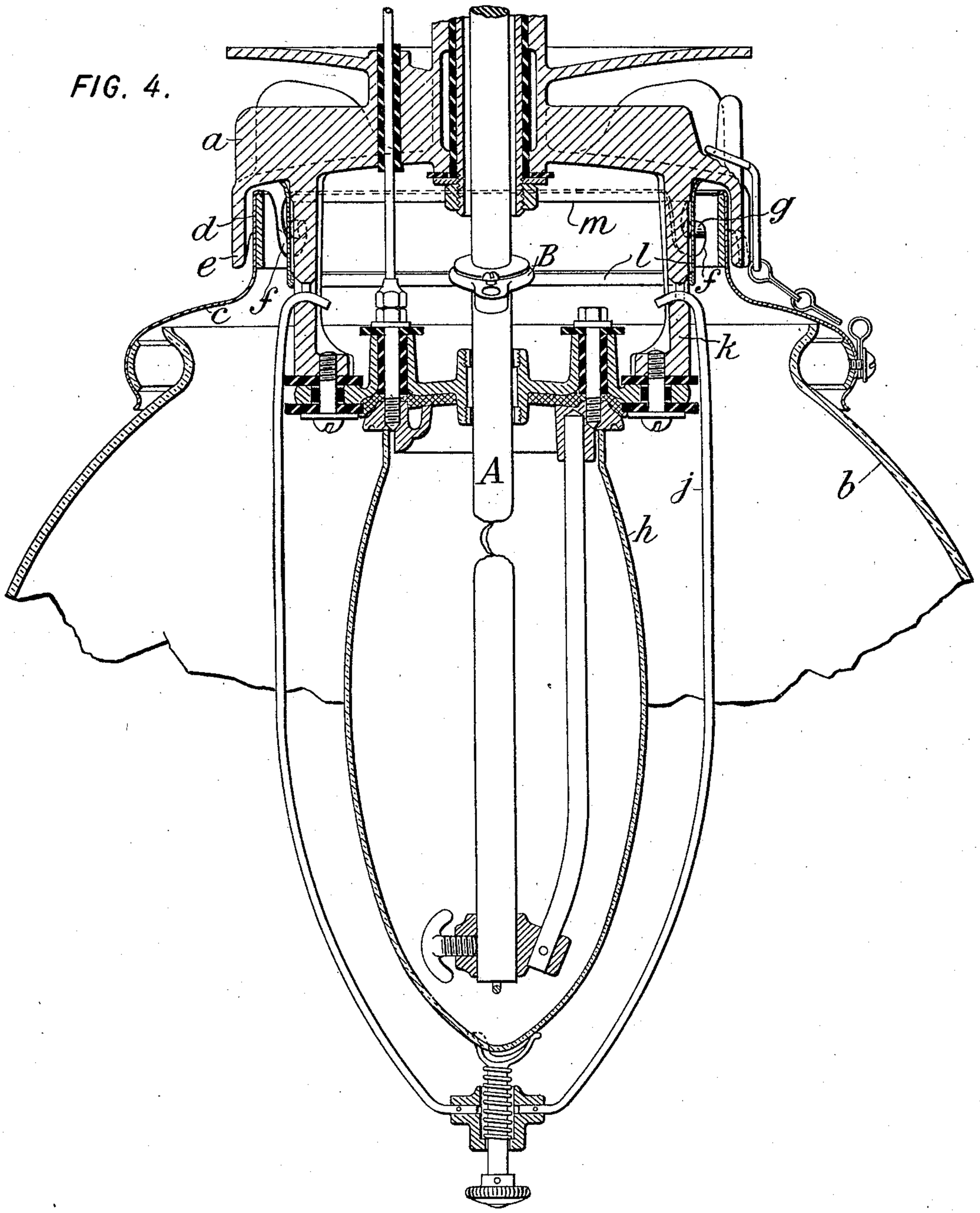
NO MODEL. 3 SHEETS—SHEET 3.

FIG. 4.



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UNITED STATES PATENT OFFICE.

JAMES J. WOOD, OF FORT WAYNE, INDIANA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 757,079, dated April 12, 1904.

Application filed September 4, 1903. Serial No. 172,022. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. WOOD, a citizen of the United States, residing in Fort Wayne, in the county of Allen, in the State of Indiana, have invented certain new and useful Improvements in Arc-Lamps, of which the following is a specification.

My invention aims to provide certain improvements especially useful in alternating-current electric-arc lamps and by means of which the operation is made steadier and less noisy than in such lamps now in use.

There is a vibration in the mechanism of alternating-current lamps caused by the rapid alternations of the current, which vibration is objectionable for several reasons. It tends to cause a premature feeding of the carbons together unless special means are provided to prevent this. It also creates a humming noise, which is very objectionable. Also the action of the regulating-magnet at starting is so sudden as to give practically a sharp blow to the parts.

According to my invention the movable member of the magnet has its motion transmitted to the clutch or other carbon-feeding device by means of an armature-lever or the like of any usual or suitable construction, the distinguishing feature of which is that it is yieldingly supported. This yielding support is remarkably efficient in reducing the noise in the lamp, and it serves also to modify the suddenness with which the movements of the movable member of the magnet are transmitted to the carbon-feeding device. Preferably, also, the lever is yieldingly connected to the movable member of the magnet, ordinarily the armature, and also the coil of the magnet is yieldingly supported from the frame of the mechanism.

Certain other improvements are provided in the manner of mounting the parts and in details of the mechanism, as are hereinafter specified.

The accompanying drawings illustrate a lamp in which my invention is embodied.

Figure 1 is a central vertical section through the mechanism-case and adjacent parts. Fig. 2 is a side elevation of the mechanism within the case with certain parts in section. Fig. 3 is a plan view of the armature-lever. Fig. 4 is a vertical sectional view on the plane perpendicular to that of Fig. 1 and illustrating on a slightly smaller scale the lower part of the lamp.

A is the upper carbon, which is to be fed downward to maintain the arc, as usual.

B is a carbon-feeding clutch of familiar type.

C is a clutch-rod for transmitting the necessary movements to the clutch to draw the arc or to feed the carbon.

D D′ is an armature-lever connected to the movable armature E of the regulating-magnet, whose coils are indicated at F.

In operation the current upon its first passage through the coils F attracts the armature E, pulling down the attracted end D of the armature-lever D D′ and lifting the opposite end, which in turn raises the rod C, which is attached to the clutch B and lifts the carbon A to draw the arc. As the length of the arc increases, and with it the resistance, the attraction of the coils F upon the armature E is lessened. The weight of the carbon A, preferably assisted by the spring G, pulls down the corresponding end of the armature-lever and releases and feeds the carbon in the well-known manner. In order to convert the practically sudden blow produced by the first passage of the current into a gradual movement, the armature-lever is provided, preferably at both ends, with dash-pots H H′ in position to retard the attracted movement of the armature—that is to say, the downward movement of the end D and the upward movement of the end D′ of the lever—but to permit freely a movement in the opposite direction. In order to still further retard the transmission of the blow to the carbon, the lever is hung yieldingly at its pivot, as by means of the pair of springs K, Fig. 2. The first effect of the pull on the armature E is to pull down the end D of the lever, (slowly on account of the resistance of the dash-pot H.) An upward movement of the end D′ of the lever is resisted by the weight of the carbon A, clutch B, and rod C by the spring G and also by the dash-pot H′. Consequently the spring K first yields gradually until its ten-

sion is sufficient to overcome the resistance of the several parts connected to the end D′, whereupon the latter end is lifted. The spring K serves also to absorb in great part the vibrations of the lever consequent upon the alternation of the current and to so reduce the portion of such vibrations which is transmitted to the connected parts as to reduce the noise to a minimum. The same reduction of vibration prevents the gradual shaking of the carbon through the clutch, which might otherwise occur. The suddenness of the first separation of the carbons is further lessened by the use of a peculiar connection between the lever and the clutch-rod C, whereby the separating movement is transmitted yieldingly to the clutch and the feeding movement is transmitted unyieldingly. This effect may be very simply obtained by the introduction of a spring L, connecting the lever and the clutch-rod and holding the end of the clutch-rod in contact with the lever. When the lever moves upward, its movement is softened by the spring L before being transmitted to the rod C. The feeding movements of the lever are of less violence and magnitude, and it is desirable to transmit them directly to the clutch, which is acccomplished by the bearing of the lever on the head of the clutch-rod. When the arc lengthens and the current weakens, as explained, the armature E is released to a corresponding degree and the opposite end D′ of the lever is pulled down by the spring G and the weight of the several parts connected to it, the dash-pots H H′ permitting a free movement of the lever in this direction. The spring G is a long helical spring connected at one end to the fixed frame and at its opposite end to a point on the lever adjacent to the pivotal axis thereof, so that its tension is substantially constant for all positions. The tension is adjustable by means of a nut M on a screw N, to which the lower end of the spring is attached. The vibration of the armature is also taken up immediately and the transmission of its sudden movement to the armature-lever somewhat relieved by its manner of connection with the lever. The ends of the armature are connected to the armature-lever, Fig. 2, by means of springs O O′, pulling against each other in a direction perpendicular to the movement of the armature, so that they suppress the communication of the armature's vibrations to the lever, but communicate the bodily movements thereof. This feature of improvement is of peculiar value in the combination here illustrated, but is not in itself new, being disclosed and explained at length in my Patent No. 638,789, dated December 12, 1899.

The coils of the regulating-magnet may also be supported yieldingly, so as to minimize the humming noise. For example, as illustrated most clearly in Fig. 2, the coils may be carried on spools with upper and lower brass plates P P′, connected together by means of rods Q. The upper plate P′ is supported at its ends from springs R R′, attached to arms S S′, depending from the fixed structure. Intermediate between the two spools the lower plate P is reduced in width, as shown in Fig. 1, and provided with an upwardly-extending fork T, which is pivotally connected to a link U, which in turn is pivoted at its inner end to a lug V on the fixed structure. The pivotal connection with the link U guides or holds the coils in position without interfering with the function of the supporting-springs R R′.

The dash-pot H′ at one end of the lever reacts against any suitable point, such as the fixed support W. The dash-pot H at the opposite end of the lever has its piston-rod pivotally connected to the outwardly-extending end of the link U. The dash-pot is thus interposed directly between the coil and the armature-lever and indirectly (through the intermediation of said lever and the springs O and O′) between the coil and its armature or core. This is a very simple and convenient construction and has a further advantage in that the dash-pot reacts against the coil when the latter attracts the armature, and thus prevents the upward movement of the coil under the influence of such attraction and the described resistance to the movement of the armature.

The preferred shape of the armature-lever is shown in Fig. 3. The armature end D of the lever is in the form of a wide loop, as shown, with bearing pins or hooks X, Fig. 2, at opposite ends for the convenient attachment of the armature-springs O O′. The clutch end D′ is provided with an upwardly-extending arm Y, which permits of the use of a long spring G, the central portion of the lever being also bifurcated to permit the extending of the spring through it. The central bifurcated portion of the lever extends from the base of the arm Y to a distance sufficient to pass beyond the inclosed central tube of the structure, and the pivoting of the lever is at the outer ends of arms Z, projecting laterally from the central bifurcated portion of the lever. This construction provides a long and even axial bearing, which is of peculiar value in connection with the yielding supports K therefor.

The inner globe of an inclosed-arc lamp is always extremely hot, and though it is usually well protected from the weather by the outer globe, which fits closely into the supporting-head, yet I have found that in bad weather the rain is blown in and sometimes cracks the inner globe. In the lamp illustrated the globe-supporting head *a* is in general of the same type as that described in my Patent No. 724,366, of March 31, 1903. The outer globe *b* is engaged around its upper edge by a ring *c* of sheet metal, the upper part of which is contracted and reinforced to form a neck *d*, which projects up within a depend-

ing flange *e* on the supporting-head *a*. The neck *d* is formed with bayonet-slots *f*, Fig. 4, with which engage pins *g*, which project inward from the flange *e* of the head. The globe is thus connected to the head by pushing it up and turning it until the pins engage the slots in the well-known manner. The inner globe *h* is supported by means of bails *j*, which hook into a pair of opposite depending arms *k*. In order to permit the application and removal of the outer globe, there must be a little looseness of the ring *d* in the depending flange *e;* but in bad weather, as above stated, water is driven up between the two and splashes over and down on the inner globe. To prevent this, I provide a deflecting-plate *l*, which may be a substantially cylindrical sheet-metal plate. Preferably the supporting-head *a* is provided with an inner annular flange *m*, about which the deflecting-plate *l* fits frictionally. Thus it can be very easily inserted in place or withdrawn. Preferably the deflecting-plate *l* also surrounds the depending arms *k*, which carry the inner-globe-supporting bails *j*. As illustrated in Fig. 4, the lower edge of the deflecting-plate is a short distance above the point of connection of the bails and the projections which they form. If it should drop a little lower than this, it will be stopped by the projecting bails and still held in operative position.

Though I have described with great particularity of detail a lamp embodying my invention, yet it is to be understood that the invention is not limited to the specific construction disclosed. Various modifications thereof in detail and in the arrangement and combination of the parts may be made by those skilled in the art without departure from the invention.

What I claim is—

1. In an alternating-current arc-lamp in combination, a regulating-magnet, and a feed mechanism including a lever yieldingly supported at its pivotal point for transmitting movement from the magnet to the carbon.

2. In an alternating-current arc-lamp in combination, a regulating-magnet, a lever connected at one end to the movable member of said magnet and at the other end to the carbon-feeding device and yieldingly supported at its intermediate pivotal point.

3. In an alternating-current arc-lamp in combination, a regulating-magnet, and a feed mechanism including a yieldingly-supported lever for transmitting movement from the magnet to the carbon, said lever being also yieldingly connected to the movable member of said magnet.

4. In an alternating-current arc-lamp in combination, a regulating-magnet having a yieldingly-supported coil, and a feed mechanism including a lever yieldingly supported at its pivotal point connected to the armature of said magnet.

5. In an alternating-current arc-lamp in combination, a regulating-magnet having a yieldingly-supported coil, and a feed mechanism including a lever yieldingly connected to its support at its pivotal point and also yieldingly connected to the armature of said magnet.

6. In an alternating-current arc-lamp in combination, a regulating-magnet having a coil yieldingly supported, a link pivotally connected at one point to the fixed structure and pivotally connected at another point to the coil, and a feed mechanism connected to the armature of said magnet.

7. In an alternating-current arc-lamp in combination, a regulating-magnet having a coil yieldingly supported, an armature, a feed mechanism connected to said armature, and a dash-pot connected to said coil and arranged to retard movement of said coil toward said armature.

8. In an alternating-current arc-lamp in combination, a regulating-magnet having a coil yieldingly supported, an armature, means for retarding the attracted movement of said armature, and a dash-pot connected to said coil and arranged to retard movement of said coil toward said armature.

9. In an alternating-current arc-lamp in combination, a regulating-magnet having a coil yieldingly supported and connected to the fixed structure by a link, a feed mechanism including a lever connected to the armature of said magnet, and a dash-pot having one of its parts connected to said lever and the other to said link so as to retard movement of said coil toward said lever.

10. In an alternating-current arc-lamp in combination, a regulating-magnet, a lever connected at one end to the movable member of said magnet and at the other end to the carbon-feeding device and yieldingly supported at its intermediate pivotal point, and a dash-pot at the end connected to the carbon-feeding device and acting to retard the separating movement of this end of the lever.

11. In an alternating-current arc-lamp in combination, a regulating-magnet, a lever connected at one end to the movable member of said magnet and at the other end to the carbon-feeding device and yieldingly supported at its intermediate pivotal point, and dash-pots one at each end of said lever and both acting to retard the separating movement thereof.

12. In an alternating-current arc-lamp in combination, a regulating-magnet, a carbon-feeding device in direct engagement with the carbon, and means in unyielding connection with said device when moved in a direction for transmitting the feeding movement to the carbon and in yielding connection with said device when moved in a direction for trans-

mitting the separating movement to the carbon.

13. In an alternating-current arc-lamp in combination, a regulating-magnet, a lever operated thereby, a carbon-feeding clutch, an operating-rod therefor, said lever bearing directly on said rod to transmit a feeding movement unyieldingly, and a spring connection between said lever and rod to transmit a separating movement yieldingly.

14. In an arc-lamp in combination, a regulating-magnet having a movable coil and a movable core, and a dash-pot interposed between the coil and the core to resist the approach of one toward the other.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES J. WOOD.

Witnesses:
ARTHUR N. EDROP,
THEODORE T. SNELL.