No. 693,705. Patented Feb. 18, 1902.

J. A. HEANY.

ELECTRIC ARC LAMP.

(Application filed July 12, 1901.)

(No Model.) 4 Sheets—Sheet 1.

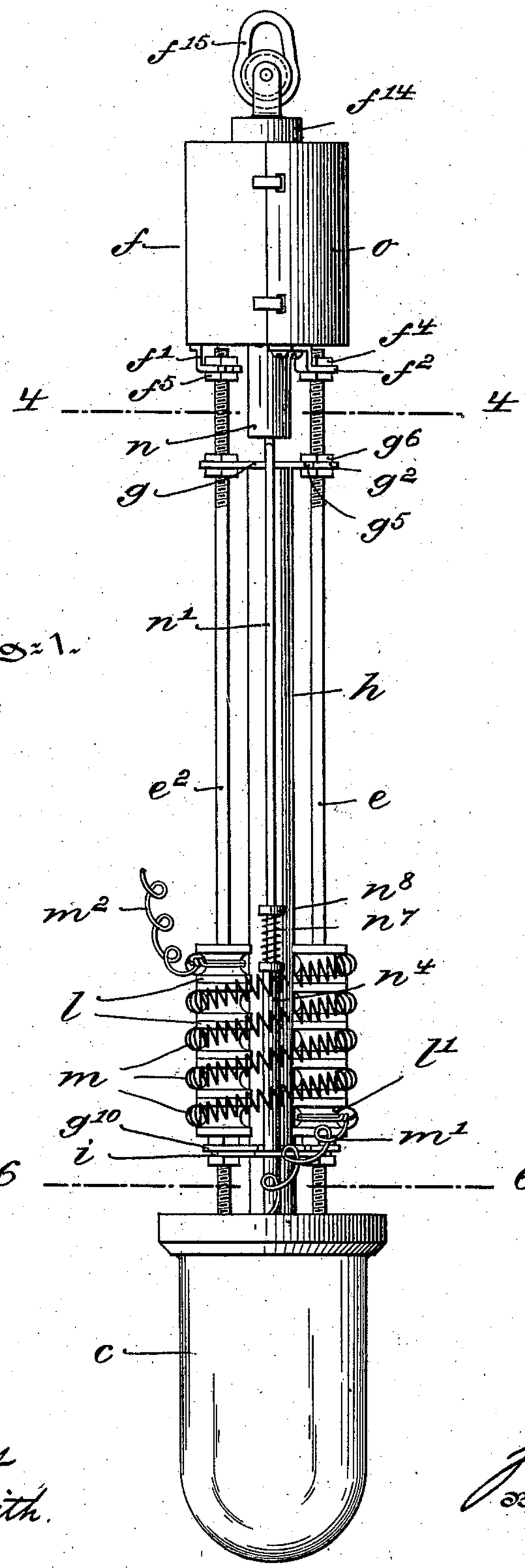

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

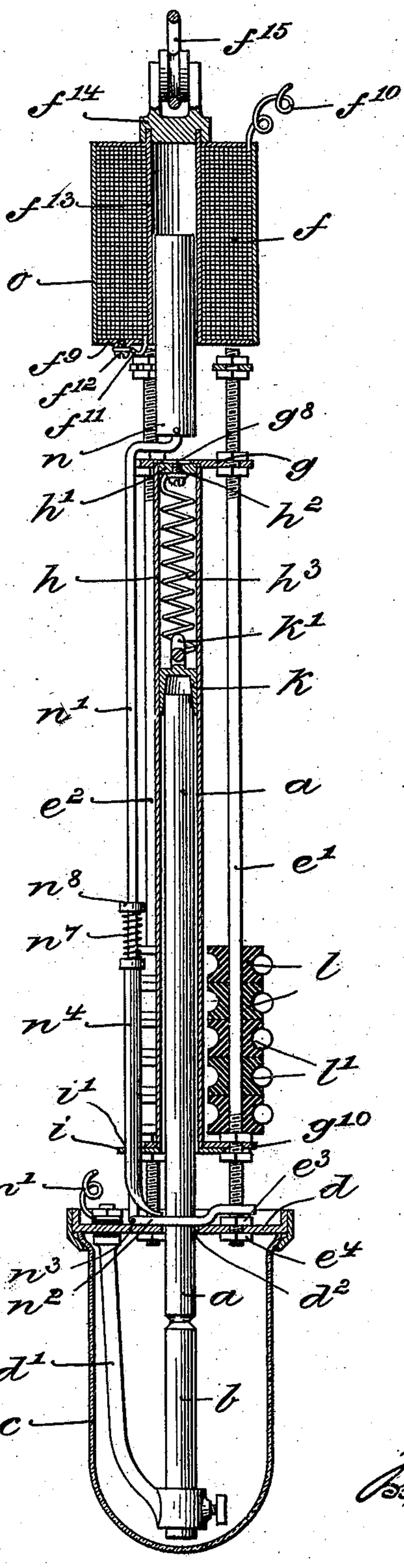

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

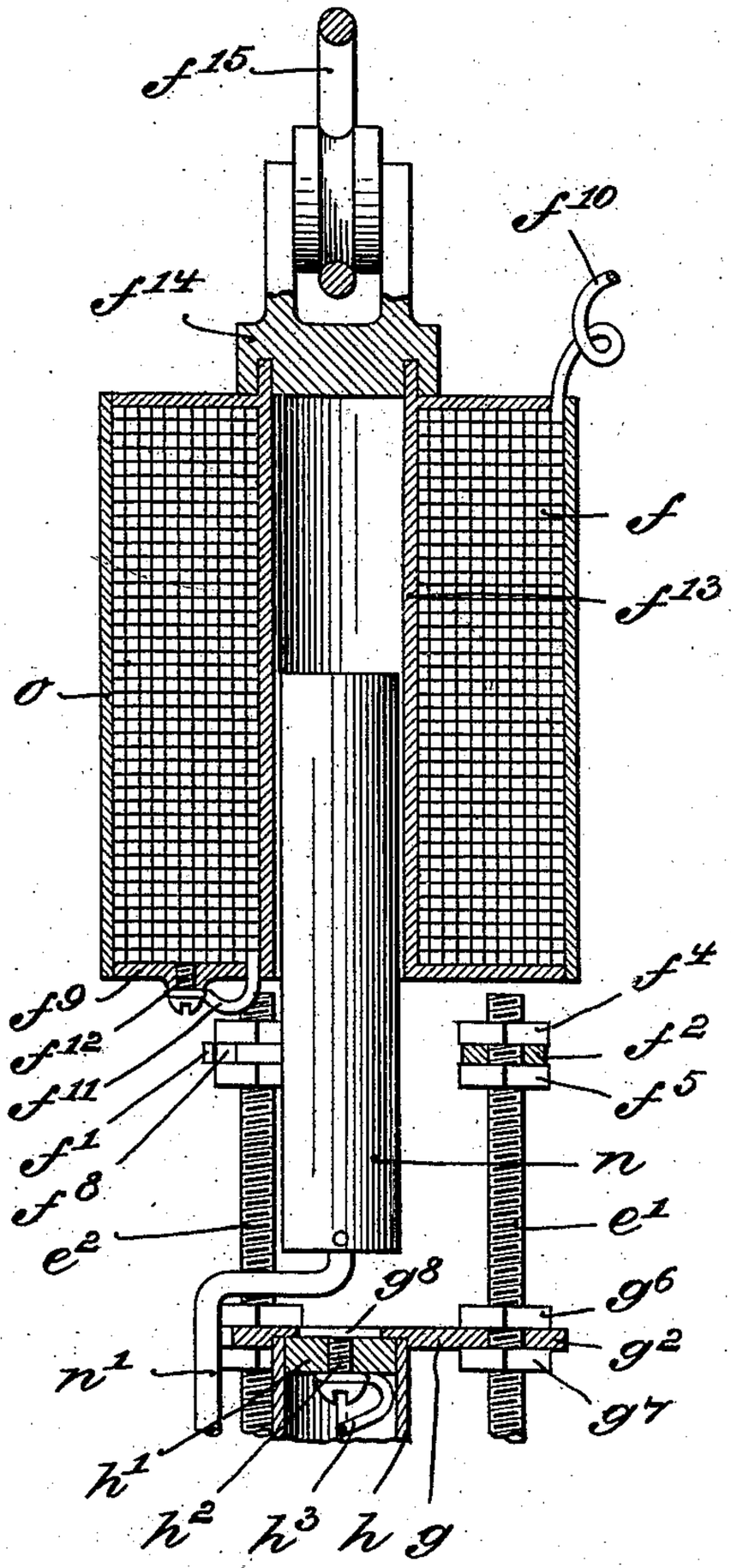


Fig. 4.

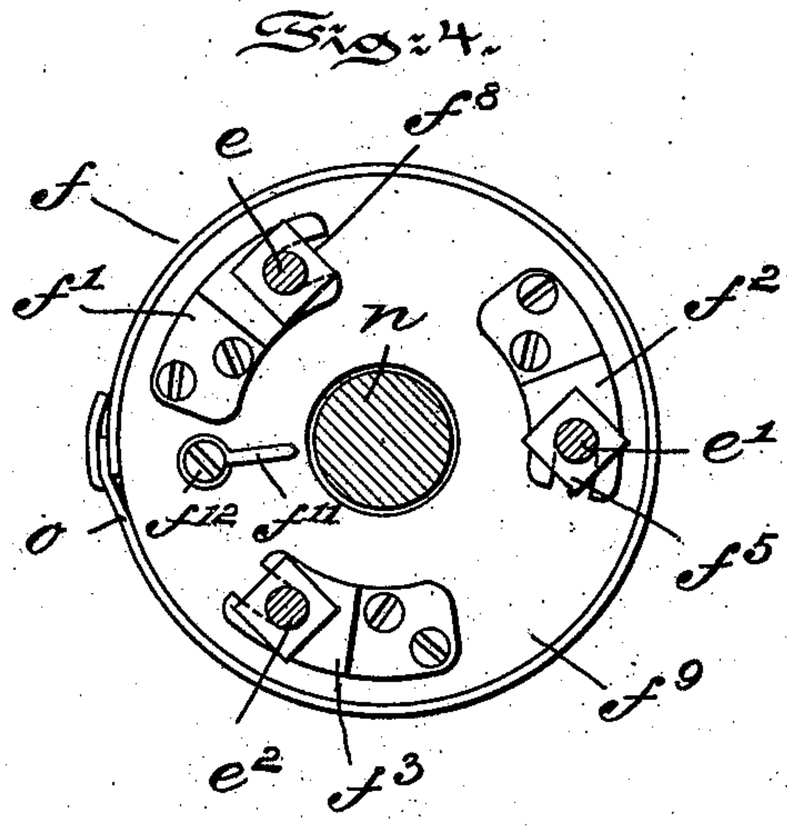
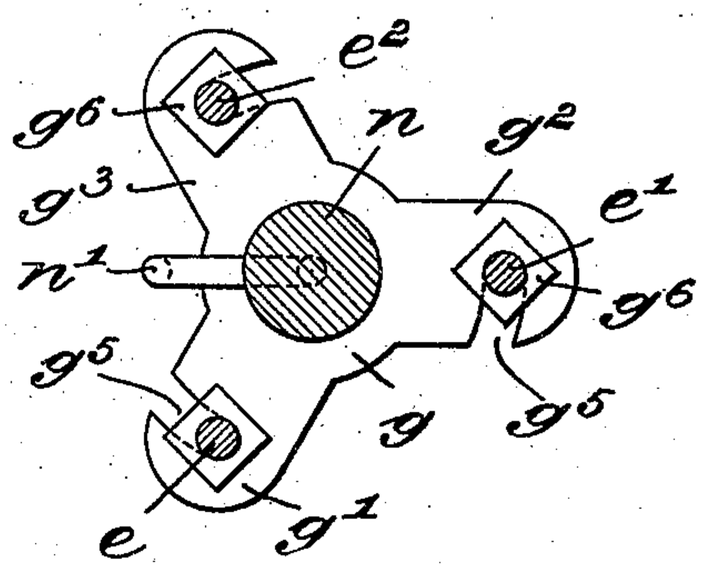


Fig. 5.



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(No Model.) 4 Sheets—Sheet 4.

Fig. 6.

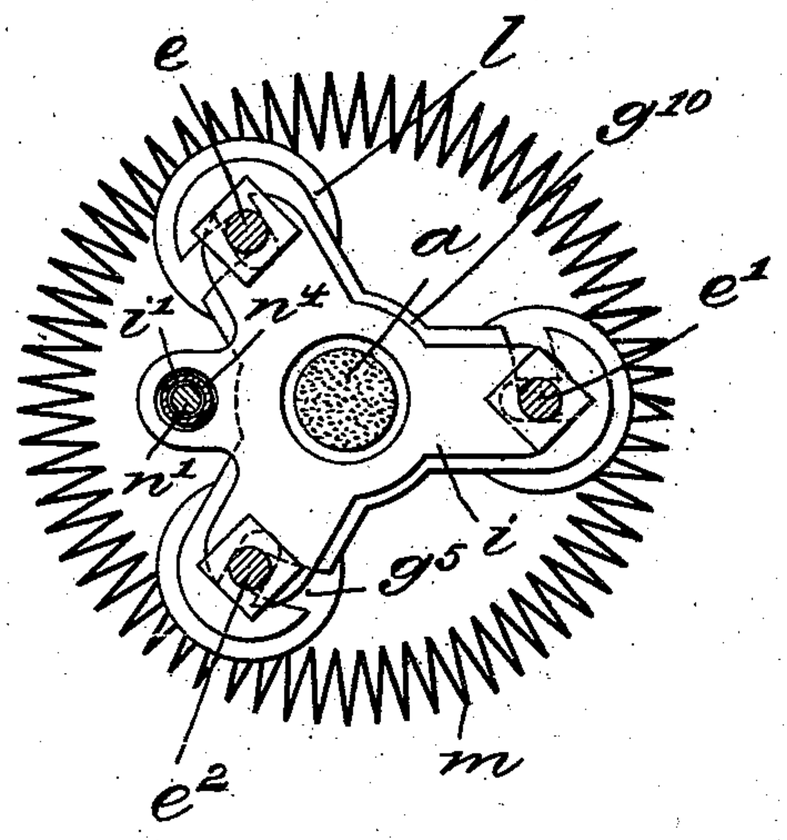


Fig. 7.

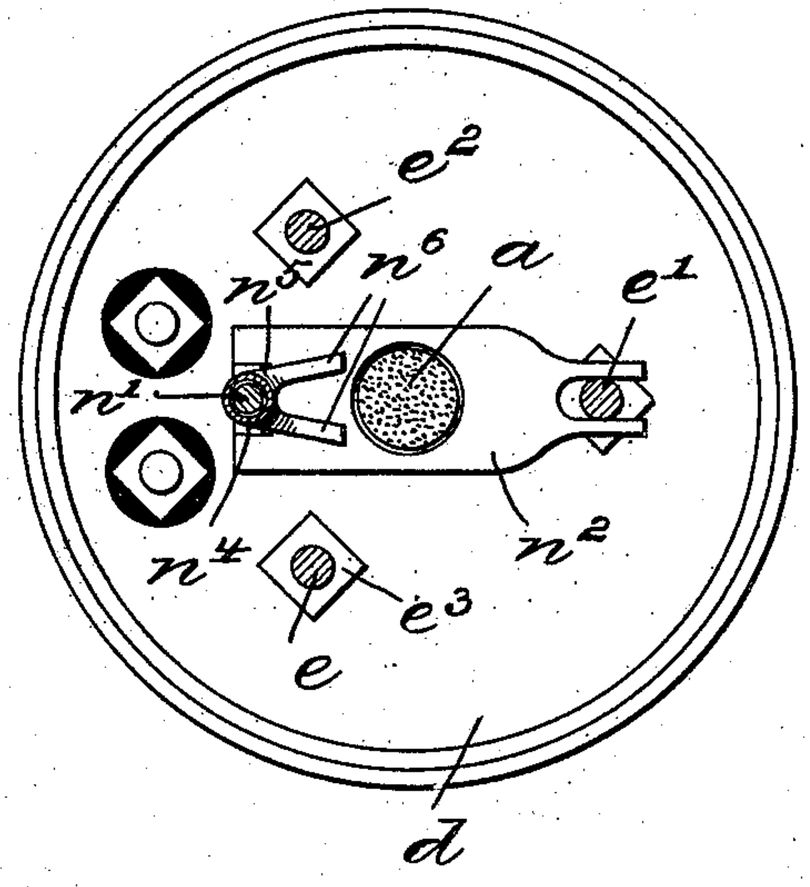
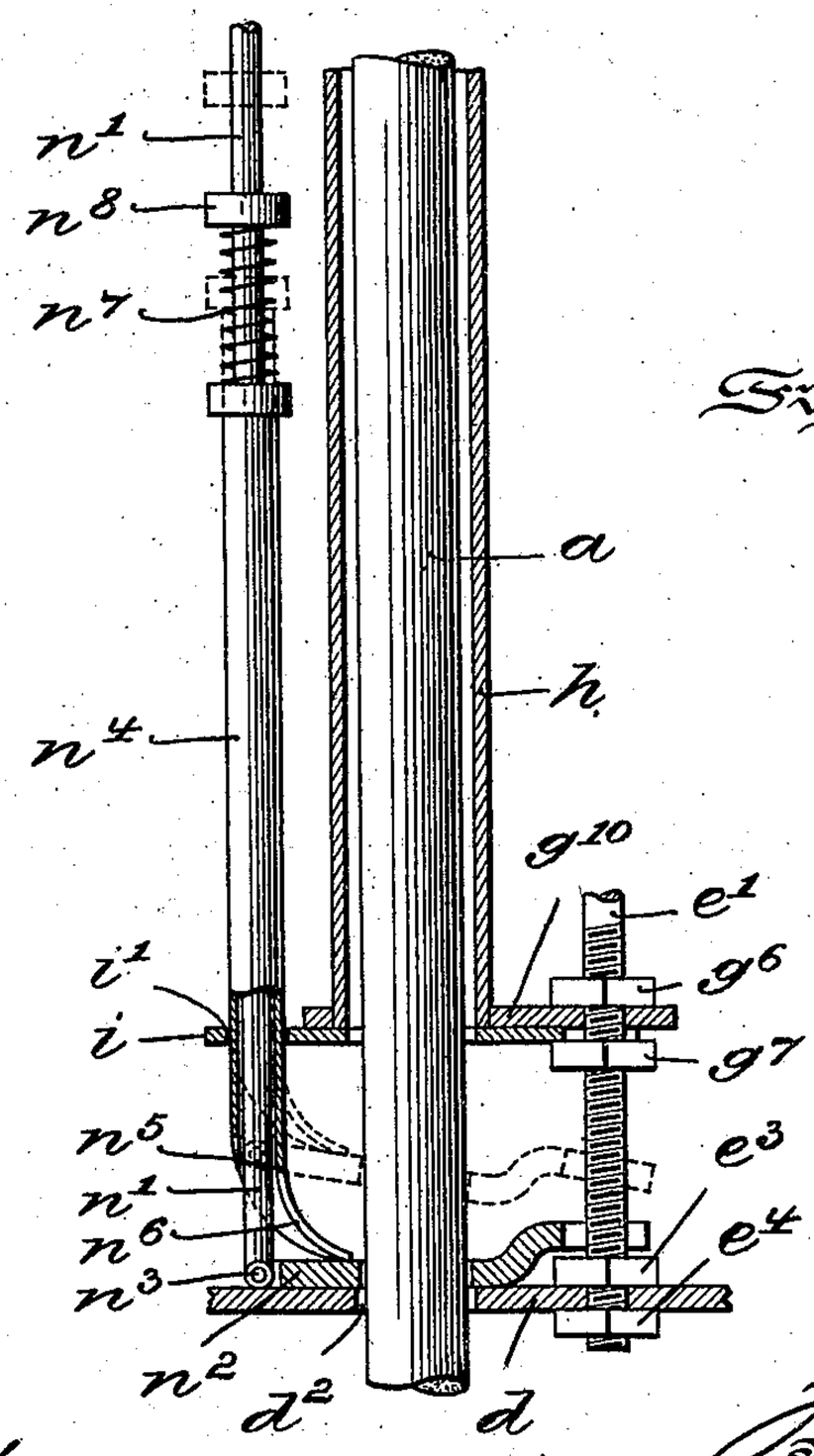


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN A. HEANY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE TETER-HEANY DEVELOPING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, AND CHARLESTON, WEST VIRGINIA, A CORPORATION OF WEST VIRGINIA.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 693,705, dated February 18, 1902.

Application filed July 12, 1901. Serial No. 67,939. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. HEANY, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention has relation to an electric-arc lamp; and in such connection it relates to the construction and arrangement of parts constituting such a lamp.

The principal objects of my invention are, first, to provide in an arc-lamp a substantially air-tight receptacle wherein the carbons are adapted to be consumed and a skeleton framework of improved construction adapted to support the solenoid-coil and its core in a position remote from the heat-emitting portions of said lamp; second, to provide in an arc-lamp a tubular guide for the upper carbon which is held separate from the lamp and resistance and from the solenoid-coil by the skeleton frame to prevent any transmission of heat from the arc of the lamp and coil to said guide and from the same to the solenoid coil and core; third, to provide in an arc-lamp a clutch mechanism for the upper carbon comprising a plate normally resting on the lamp proper and encircling the upper carbon, a rod connecting said plate with the solenoid-core, arranged at the upper end of the lamp, and a spring-controlled sleeve arranged on said rod tending to bring the plate into an oblique position at the beginning of the upward movement of the solenoid-core and during other movements thereof to securely grip and lift or lower the upper carbon; fourth, to provide in an arc-lamp bracing or stiffening plates carrying the tubular guide for the upper carbon and having slots arranged in an arc of a circle engaging rods or supports for the solenoid-coil and its core, and which bracing or stiffening plates by the loosening or tightening of nuts and a slight turning thereof can be readily removed or secured to said rods, and, fifth, to provide an arc-lamp with a coil having depending slotted arms adapted to engage the upper ends of rods or supports holding the same a distance above the heat-emitting parts of the lamp to prevent transmission of heat from the same to the coil and removably secured thereto.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a side elevational view of an arc-lamp embodying the main features of my invention. Fig. 2 is a central sectional view of the same. Fig. 3 is an enlarged sectional view of the upper portion of the lamp. Figs. 4 and 5 are respectively enlarged transverse sectional views on the line 4 4 of Fig. 1 looking, respectively, in directions toward the upper and lower ends of the lamp. Figs. 6 and 7 are similar sectional views on the line 6 6 of Fig. 1; and Fig. 8 is an enlarged detail view illustrating, partly in elevation and partly in section, the clutch mechanism of the lamp.

Referring to the drawings, *a* represents the upper, and *b* the lower, carbons. The abutting ends of these carbons are inclosed in a globe *c*, secured at its open end to a disk or plate *d*, which in conjunction with the globe *c* forms the air-tight receptacle in which the carbons *a* and *b* are adapted to be consumed. The disk *d* also supports a depending holder *d'* for the lower or fixed carbon *b*, which holder is suitably insulated from said disk *d*. The disk is furthermore provided with a centrally-arranged opening d^2, through which the upper or movable carbon *a* passes and is adapted to slide therein during the formation and continuation of the arc formed between the ends of the carbons. Surrounding this opening d^2, at equal distances apart, are arranged, preferably, three rods or posts *e*, *e'*, and e^2, which removably engage at their threaded lower extremities with the disk *d* and are clamped thereto by means of nuts e^3 and e^4, as fully illustrated in Figs. 2 and 8 of the drawings. The upper threaded ends of the projecting posts or rods *e*, *e'*, and e^2 are engaged by arms *f'*, f^2, and f^3, depending from

the under side of a solenoid-coil f. Each of the horizontally-bent ends of the arms f', f^2, and f^3 are provided with a slot f^8, and all of the slots f^8 are arranged in an arc of a circle. This arrangement allows the engagement and disengagement of the arms f', f^2, and f^3 to and from the projecting rods or posts e, e', and e^2 by a slight turn of the coil f either to the right or left. These arms are also clamped to the said posts or rods by means of nuts f^4 and f^5, and by the loosening of these nuts the solenoid-coil f can be readily removed from said rods or posts e, e', and e^2, which is advantageous in the replacing or repairing of said coil and for the dismantling and ready assembling of the lamp. At some distance from the ends of the rods e, e', and e^2 are arranged two superposed stiffening or bracing plates g and g', each being provided with radiating arms g^2, g^3, and g^4, having slots g^5 in their respective ends. These slots g^5 are also arranged within an arc of a circle, so that the plates g and g^{10} may readily engage and be disengaged from the posts e, e', and e^2 by a slight turn. Nuts g^6 and g^7 are employed to hold and clamp these plates securely, and yet they are readily removable from the posts e, e', and e^2. Besides stiffening and bracing the rods or posts e, e', and e^2 the plates g and g^{10} also serve to support a tube h in a position above the centrally-arranged opening d^2 of the disk d of the lamp proper, so that the upper end of the movable carbon a, passing through said opening, will be received and properly guided by said tube h. The upper end of the tube h is located in an opening g^8 of the plate g, whereas the lower end of the tube rests on a plate i, arranged below the plate g^{10} for a purpose to be hereinafter more fully described. The rods or posts e, e', and e^2, projecting from the disks d of the lamp proper, in conjunction with the plates g and g^{10}, form a light skeleton framework especially adapted to allow a free circulation of air through the same, so as to cool the frame. Furthermore, the location of the solenoid-coil f above the rods or posts e, e', and e^2 in a position remote from the light and heat emitting parts of the lamp insures against any transmission of heat from the lamp to the solenoid-coil and in such manner as has not hitherto been attained. Likewise the arrangement of the tubular guide h for the upper carbon away and separate from the arc and the solenoid-coil f prevents possible transmission of heat from the arc to the solenoid-coil by said tube for a purpose to be hereinafter more fully explained.

The guide-tube h for the movable carbon a is closed at its upper end by a disk h', to which is secured by a binding-screw h^2 the end of a spirally-wound wire h^3, the other end of which is connected to a projection k' of a cap k, into which the carbon a fits. This cap k slides within the guide-tube h and serves to conduct the current to the carbon a, as well as to hold said carbon in a central position and also in alinement with the opening d^2 of the disk d of the lamp proper. On the rods or posts e, e', and e^2 and resting on the lower bracing-plate g^{10} are arranged insulating-pieces l, preferably of porcelain, the grooves l' of which serve to support a coiled and spirally-arranged resistance-wire m, as fully illustrated in Fig. 1 of the drawings. One end m' of the resistance-wire m is connected with the holder d' of the lower or fixed carbon b, while the other end m^2 is connected with a return-wire. (Not shown.) The electric current enters the lamp first by a wire f^{10}, passing to the solenoid-coil f. From this coil it passes by a wire f^{11} and binding-screw f^{12} to the metal casing f^9 of the coil f, thence through the arms f', f^2, and f^3 to the rods e, e', and e^2, thence to the upper bracing-plate g, disk h' of the tubular guide h, binding-screw h^2, wire h^3, cap k, to the upper and lower carbons a and b, and from the same into the holder d' for the lower carbon b, to the resistance through the same, to a return-wire m^2, thus completing the circuit through the lamp.

The solenoid-coil f is wound on a tube f^{13}, the upper end of which is closed by a cap f^{14}. This cap carries, properly insulated therefrom, a ring f^{15}, by means of which the arc-lamp may be suspended. Within the tube f^{13} fits the solenoid-core n in such a manner that the air during the upward movement of the core will slowly be displaced from the tube f^{13}. Likewise in the downward movement of the core n the air will be slowly admitted to the tube f^{13} to prevent a quick movement of the core, the object of which will be presently more fully explained.

To the lower end of the solenoid-core n is secured a depending rod n', the end of which in the point n^3 is pivotally connected to a plate n^2, encircling the movable carbon a and normally resting on the disk d, as illustrated in Figs. 1 and 8 of the drawings. The free end of the plate n^2, forming the gripping-plate for the carbon a, is forked and engages the rod e', as shown in Figs. 7 and 8 of the drawings. The rod n' passes through an opening i', arranged in the plate i, located below the lower bracing-plate g^{10} for the guide-tube h, and is thus securely held in a vertical position, as will be readily understood from Figs. 1, 2, 6, and 8 of the drawings.

On the rod n' and also passing through the opening i' of the plate i is located a loose sleeve n^4, the lower end n^5 of which is bent sidewise and preferably formed into two arms n^6, resting on the plate n^2. Surrounding the rod n' and resting on the upper end of the sleeve n^4 is a spring n^7, which bears against a ring n^8, fixed to the rod n'. The gripping-plate n^2, rod n', sleeve n^4, with its projecting arms n^6, spring n^7, and ring n^8 form the clutch mechanism of the lamp, which is actuated by the solenoid-core n. When the solenoid-core n is drawn upward in its tube f^{13} by the influence of the solenoid-coil f in a well-understood manner, the gripping-plate n^2, by means

of the rod n', is raised at one end and tilted in an oblique position to the upper carbon. The sleeve n^4, bearing with its arms n^6 on the gripping-plate n^2 under pressure of the spring n^7, will assist and insure the tilting of the gripping-plate n^2 of the clutch mechanism, so that at the beginning of the upward movement of the core n' the gripping-plate will first grip the carbon a and then raise the same. The slow displacing of the air in the tube f^{13} by the solenoid-core n will prevent the quick or sudden upward movement of the movable carbon a in order to form the arc between the same and the fixed carbon b and will in this manner overcome the flickering or dancing of the upper carbon a. Furthermore, the prevention of any quick downward movement of the carbon a by the slow admission of air into the tube f^{13} will obviate sudden changes in the resistance of the lamp, resulting in a uniform amperage in the lamp.

In order to utilize almost the entire carbon a, the gripping-plate n^2 of the clutch mechanism is located in close proximity to the arc. The arc, however, is not influenced by said plate, as all the parts of the clutch mechanism are made of non-magnetic material, such as brass or the like.

In order to insure a proper working of the solenoid-coil and its core continuously, the coil and its core in the lamp, as described, have been placed in a position remote from the heat-emitting parts of the lamp, such as the arc and the resistance, which in the present instance are located in close proximity to each other. The skeleton framework interposed between the lamp proper and the coil allows at all times a free circulation of air and also prevents any transmission of heat through the guide-tube h of the upper carbon through the separating and locating of the same some distance from the lamp proper and solenoid-coil and its core. By this arrangement the greatest obstacles hitherto encountered in arc-lighting—that is, the heating of the solenoid-core—is effectually overcome, which heating, as is well known, increased the resistance in said core proportional to the increase of heat. A solenoid-core so heated does not respond to the magnetic influence of the coil, so that there was hitherto no regularity as to control of the arc in such lamps. The solenoid-coil f is surrounded by an iron cover o, which is adapted to act as a conductor for the magnetic lines of force, and thus increases the efficiency of the solenoid-coil in action in the lamp.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric-arc lamp, a globe and a roof-plate forming a substantially air-tight receptacle wherein the carbons are adapted to be consumed, a series of posts or uprights projecting upward from and supporting said roof-plate, an upper and a lower plate connected to and supported by said posts, a tube forming a guide for the upper carbon and extending between the upper and lower plates and within the posts, a solenoid-coil supported by the posts above said upper plate, and a resistance-coil supported by said posts intermediate of the two plates, substantially as and for the purposes described.

2. In an electric-arc lamp, a solenoid-coil, a tube around which the coil is located, a core fitting snugly in the tube, a rod depending from said core, a clutch-plate perforated to permit of the passage of one of the carbons, said plate pivotally connected at one side to the lower end of said rod, a sleeve loosely supported on said rod and having at its lower end prongs or projections engaging the clutch-plate beyond its pivotal connection with the rod, a spring normally tending to depress the sleeve and a guide-post for the free side of said clutch-plate, substantially as and for the purposes described.

3. In an electric-arc lamp, a globe, a roof-plate closing the upper end of said globe, a skeleton framework extending upward from said roof-plate and detachable therefrom, said framework comprising a series of posts or uprights, plates detachably secured to said posts or uprights near respectively the upper and lower extremities thereof, a tube forming the guide for the upper carbon and connecting said plates, said tube lying within the posts or uprights, a solenoid-coil adapted to be detachably connected with the upper extremity of each of said posts, and a solenoid-core controlling the feeding of the carbons, said core adapted to traverse the solenoid-coil above the uppermost plate of the framework.

4. In an electric-arc lamp, a disk forming part of an air-tight receptacle in which the carbons are adapted to be consumed, rods secured to said disk and supporting at their upper extremities a solenoid-coil and a solenoid-core, plates carried by said rods adapted to brace the same, and slots arranged in said bracing-plates to receive said rods and to be brought by said slots into and out of engagement therewith by a slight movement thereof, substantially as and for the purposes described.

5. In an electric-arc lamp, a solenoid-core and a skeleton frame, arms connecting said core with said frame and slots arranged in said arms to engage said frame, and nuts adapted to clamp said arms to said frame, substantially as and for the purposes described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JOHN A. HEANY.

Witnesses:
J. WALTER DOUGLASS,
THOMAS M. SMITH.