(No Model.)

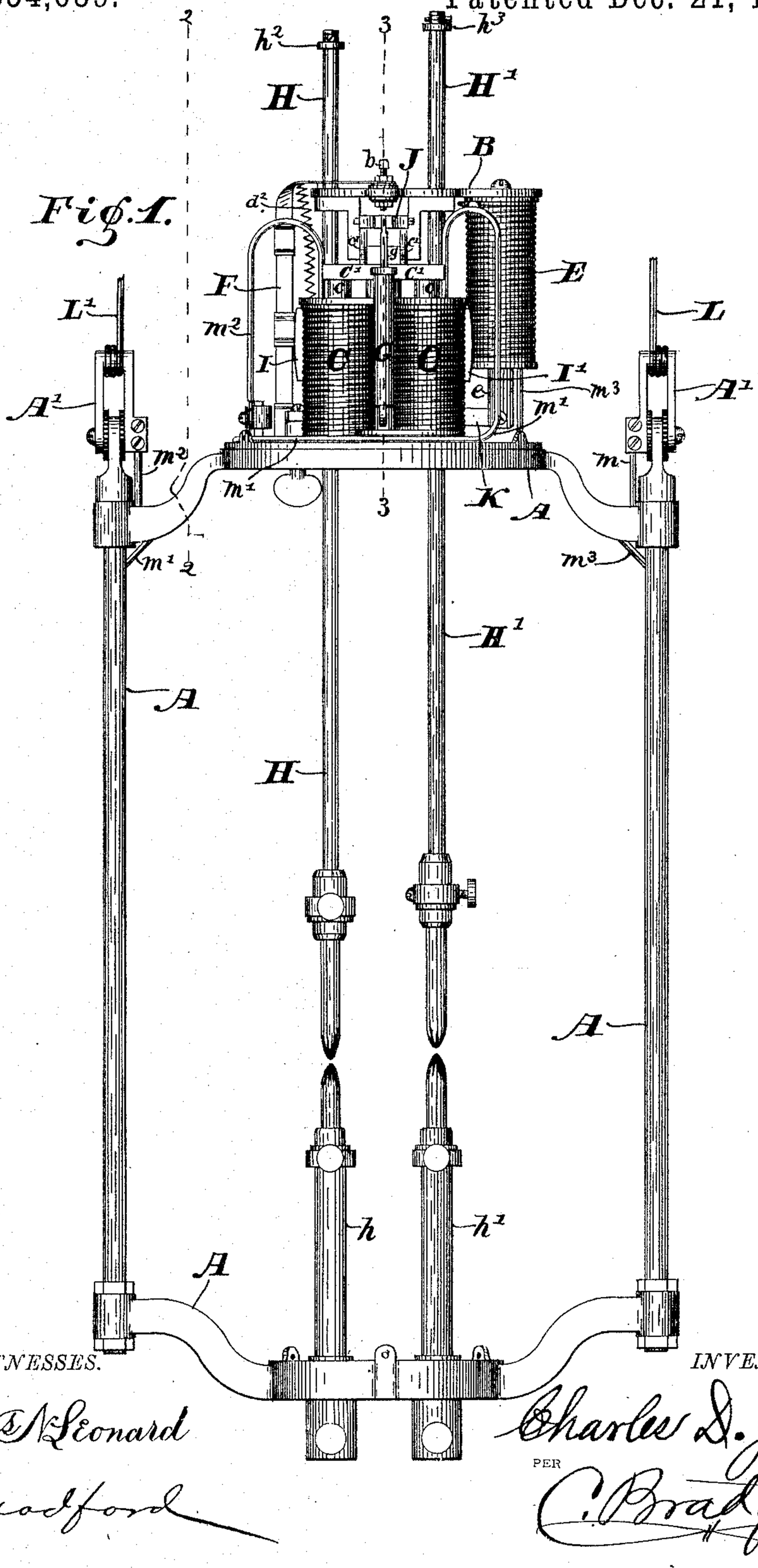
3 Sheets—Sheet 1.

C. D. JENNEY.

ELECTRIC LAMP.

No. 354,639. Patented Dec. 21, 1886.

Fig. 1.



WITNESSES.

Chas. S. Leonard

E. W. Bradford

INVENTOR.

Charles D. Jenney,

PER

C. Bradford,

ATTORNEY.

(No Model.) 3 Sheets—Sheet 2.

C. D. JENNEY.

ELECTRIC LAMP.

No. 354,639. Patented Dec. 21, 1886.

Fig. 2.

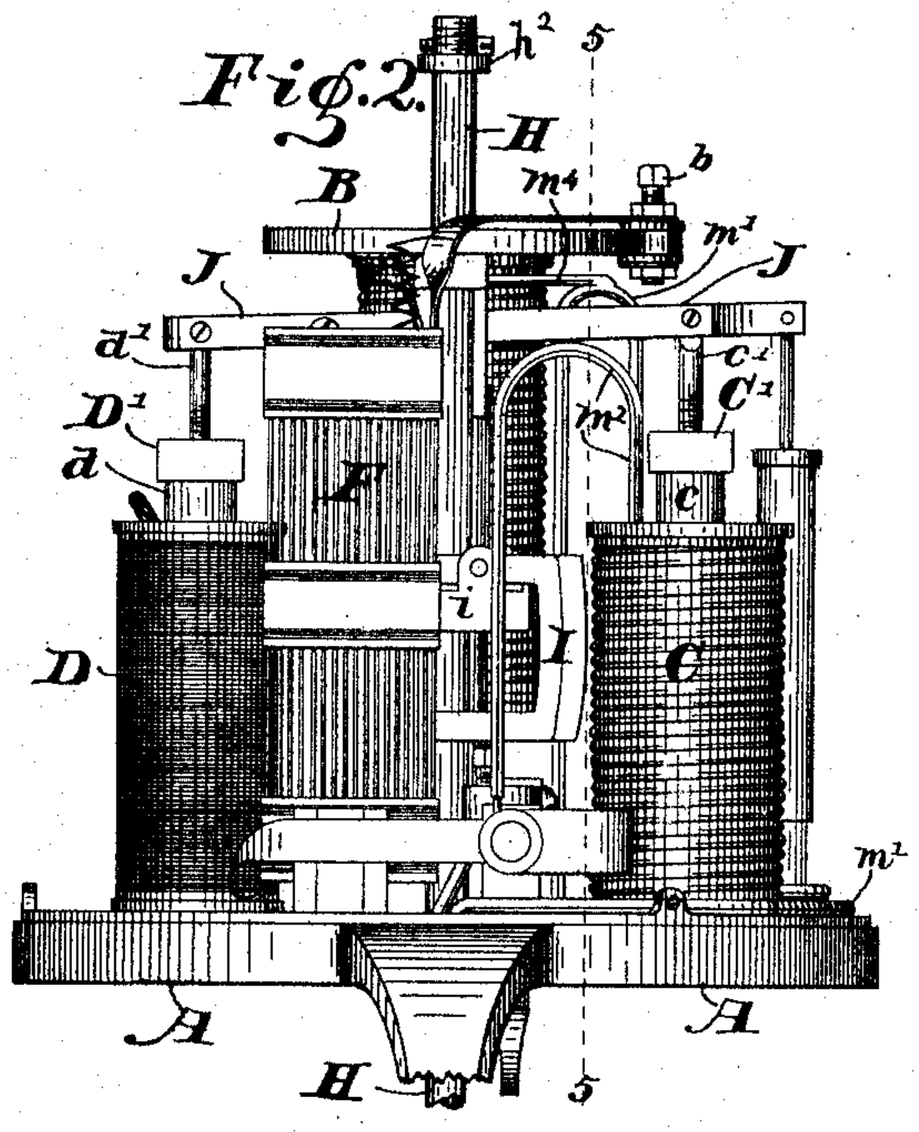


Fig. 3.

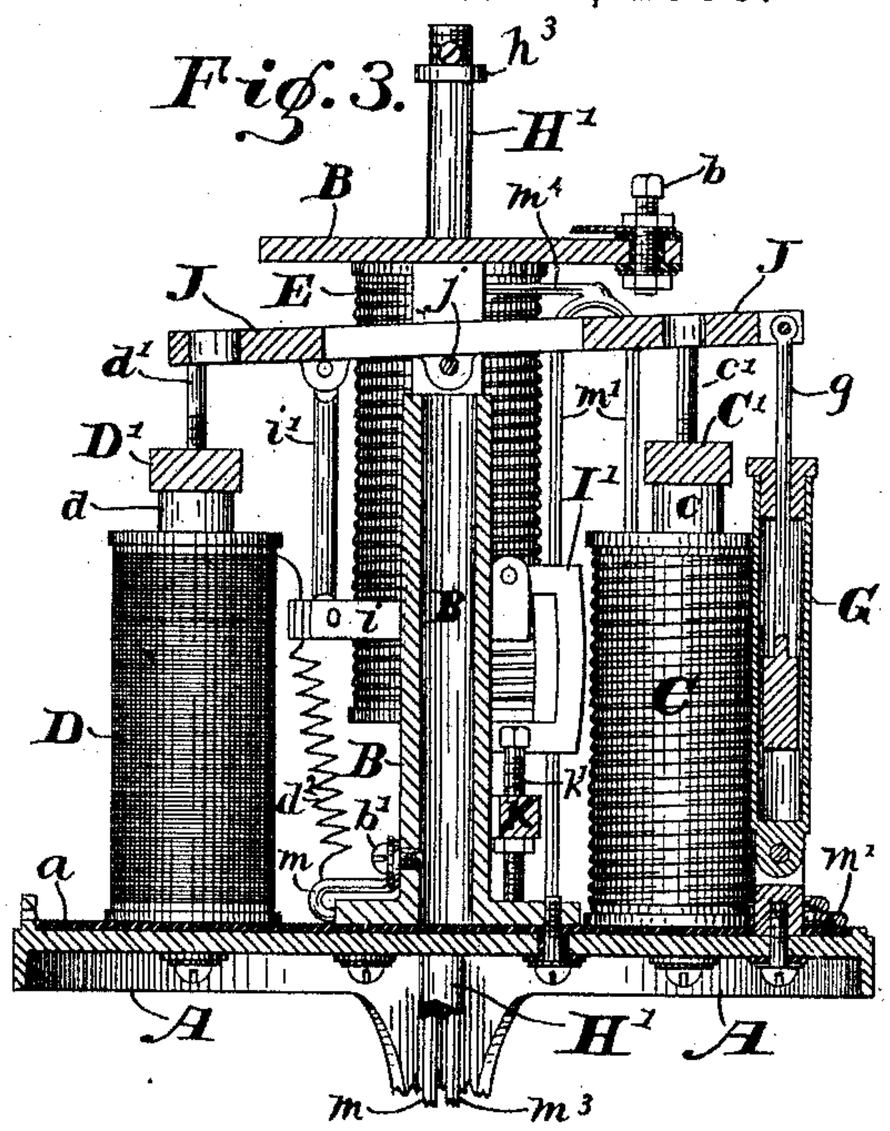


Fig. 4.

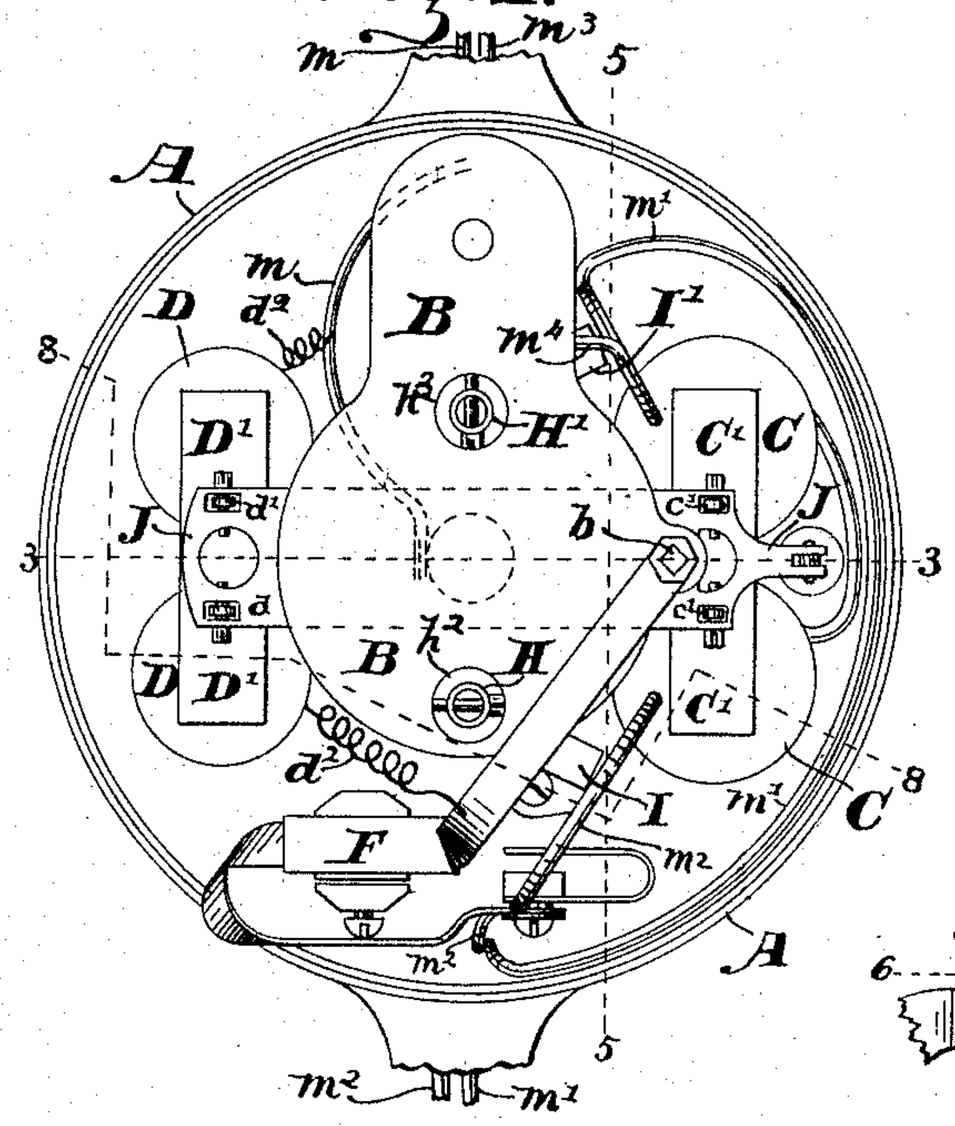
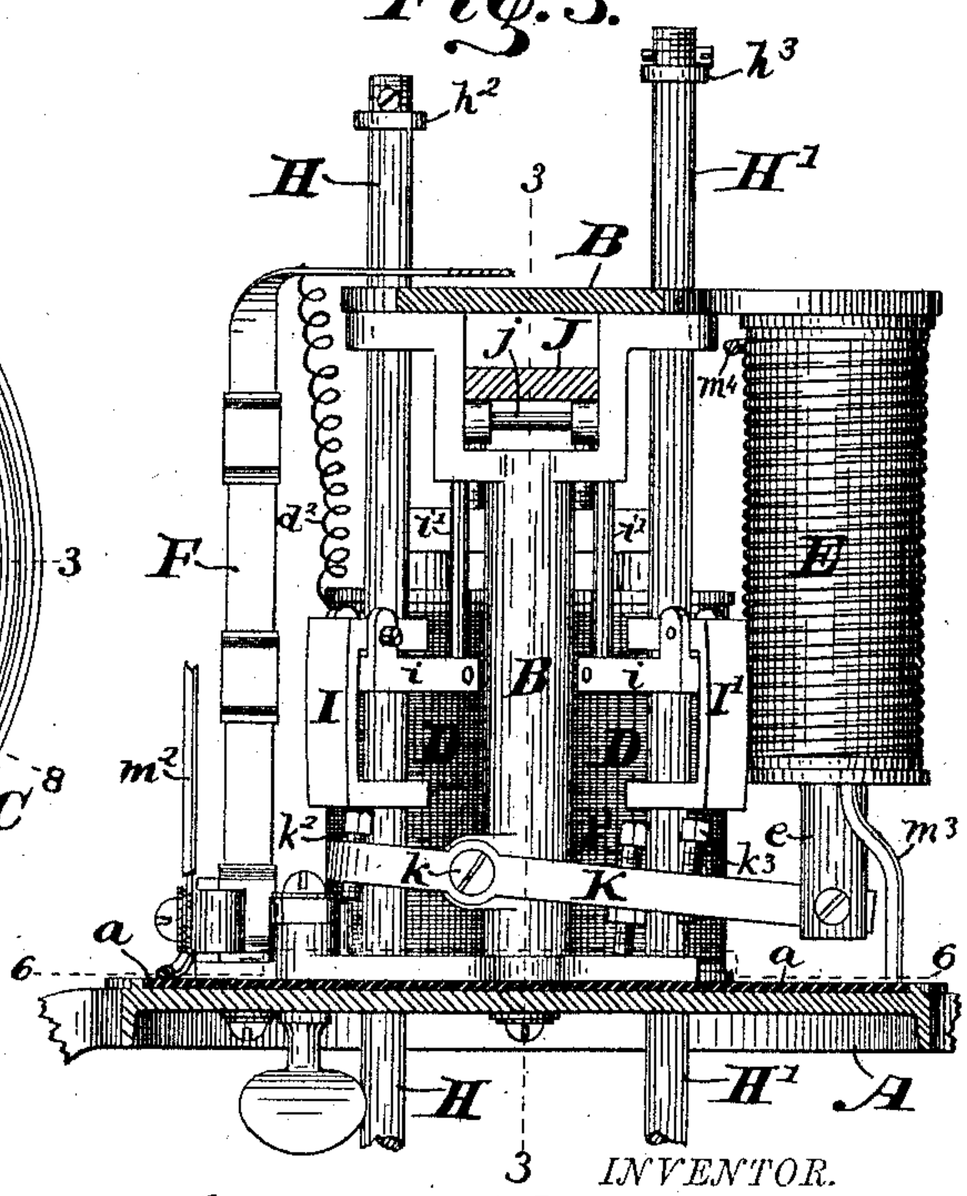


Fig. 5.



WITNESSES.

Chas. S. Leonard.

W. W. Bradford.

INVENTOR.

Charles D. Jenney,

PER

C. Bradford.

ATTORNEY.

(No Model.) 3 Sheets—Sheet 3.

C. D. JENNEY.

ELECTRIC LAMP.

No. 354,639. Patented Dec. 21, 1886.

Fig. 6.

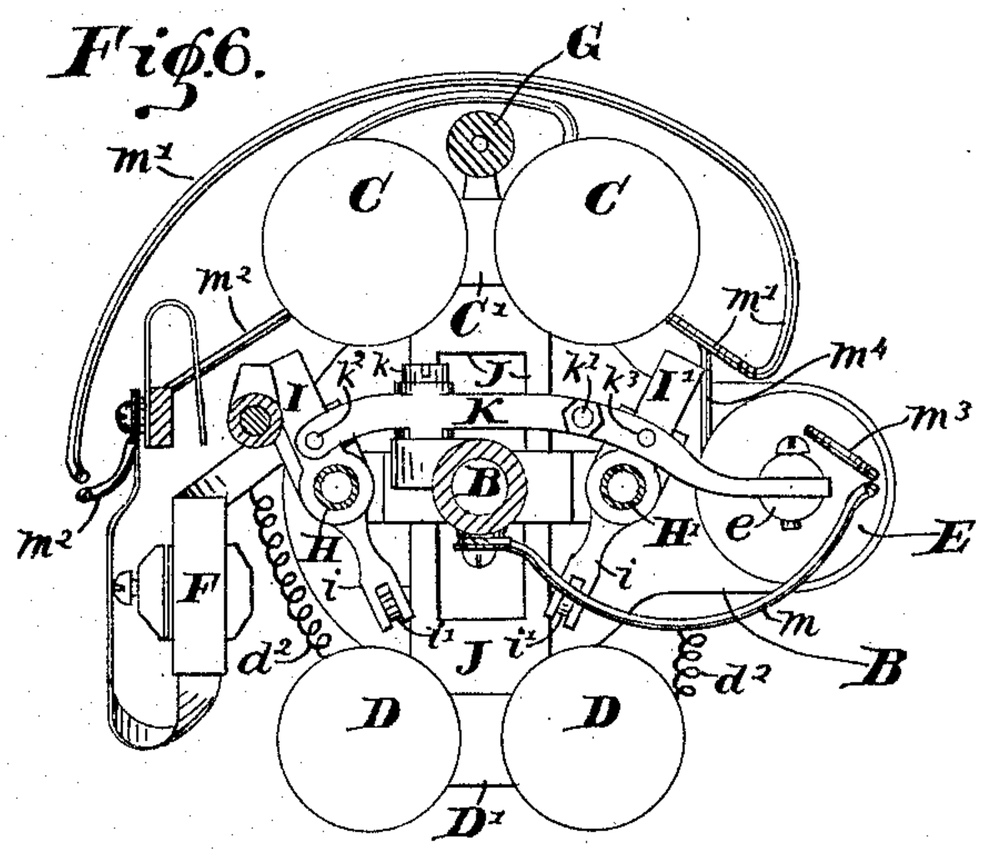


Fig. 7.

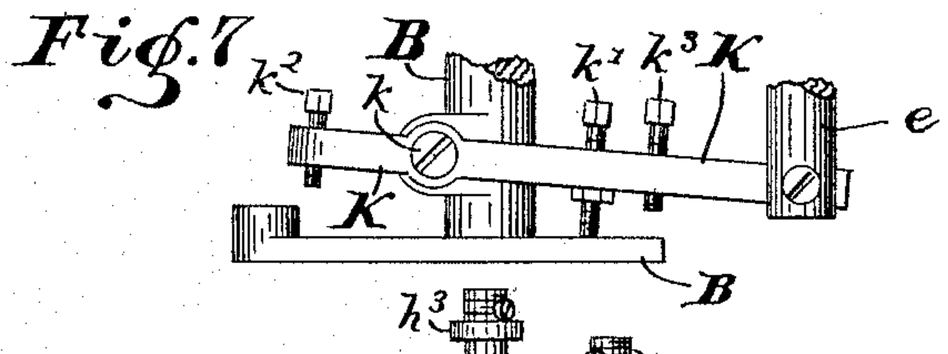
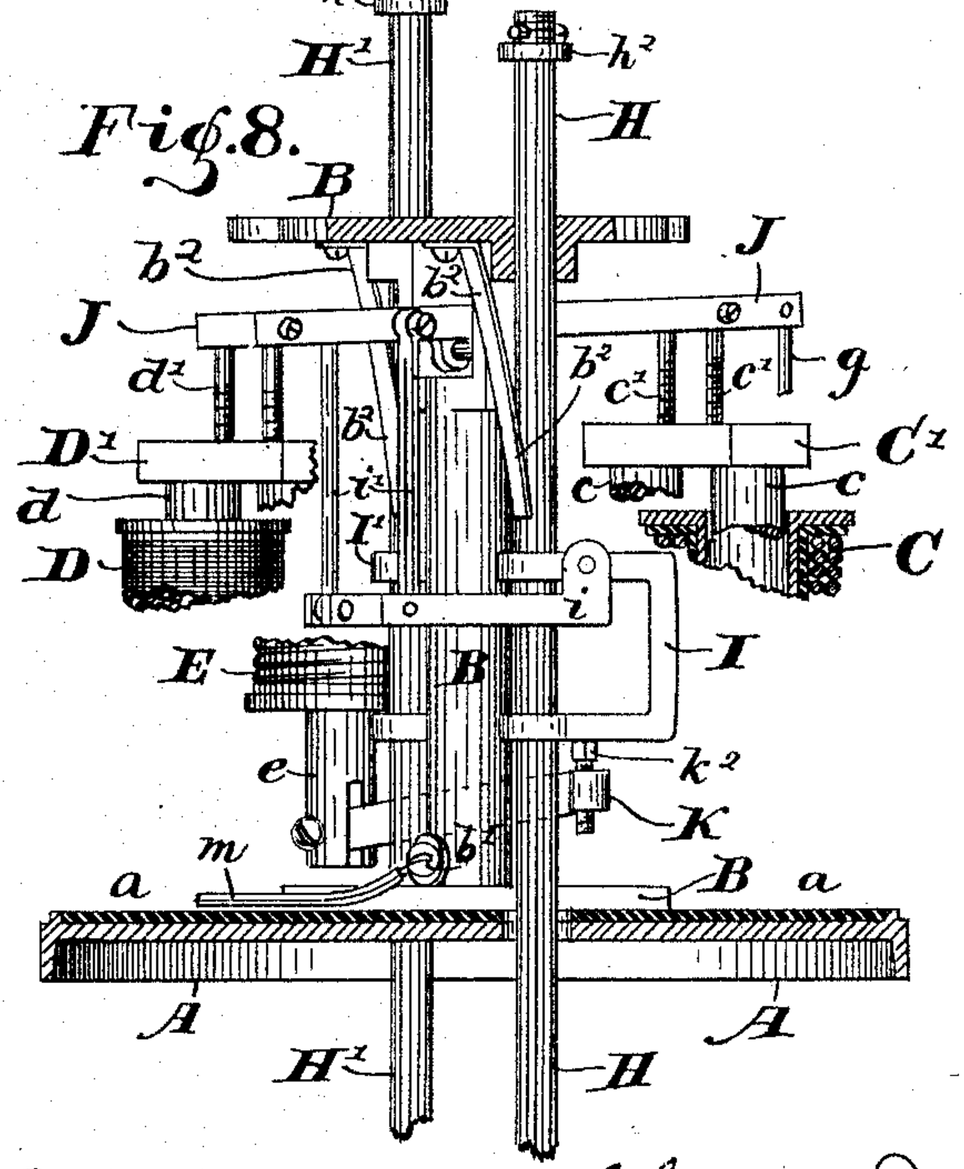


Fig. 8.



WITNESSES.

Chas. N. Leonard.

E. W. Bradford.

INVENTOR.

Charles D. Jenney,

PER

C. Bradford.

ATTORNEY.

UNITED STATES PATENT OFFICE.

CHARLES D. JENNEY, OF INDIANAPOLIS, INDIANA.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 354,639, dated December 21, 1886.

Application filed October 27, 1885. Serial No. 181,052. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. JENNEY, of the city of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

My said invention relates to that class of electric-arc lamps which are provided with two sets of carbons, which are successively adapted to be brought into use, whereby, owing to the double supply of carbons, less attention is required, and which are generally known as "double lamps."

The object of my invention is to produce such a lamp, in which both the carbon-holding rods will be supported at all times when the lamp is in operation by the magnets, and in which the several parts shall be simple, durable, and efficient in operation; and it consists in the improvements in construction and arrangement of parts, hereinafter more particularly described and claimed.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a front elevation of a complete lamp embodying my said invention; Fig. 2, a side elevation of the upper portion thereof, as seen from the dotted line 2 2 on an enlarged scale; Fig. 3, a central vertical sectional view as seen when looking toward the right in Figs. 1 and 5 and upwardly in Fig. 4 from the dotted line 3 3; Fig. 4, a top or plan view of so much of the lamp as is shown in Fig. 2; Fig. 5, a vertical sectional view looking toward the left from the dotted line 5 5 in Figs. 2 and 4; Fig. 6, an under side plan of the working parts of the lamp as seen when looking upwardly from the dotted line 6 6 in Fig. 5; Fig. 7, a detail elevation of the bar K and adjacent parts, being a similar view to a portion of Fig. 5; and Fig. 8, a vertical sectional view looking toward the center of the lamp from the dotted line 8 8 in Fig. 4, nearly all of the helices and some of the other portions being omitted.

In said drawings, the portions marked A represent the general frame-work of the lamp; B, a second frame mounted upon the frame A and insulated therefrom, and which carries the carbon-holders and governing devices; C, coarse-wire helices or solenoids connected with or set into the main circuit; D, fine-wire helices or solenoids set into the shunt-circuit; E, a coarse-wire helix or solenoid connected to the coarse-wire helices C; F, a resistance-coil; G, a dash-pot; H H′, the carbon-holding rods; I I′, clutches therefor; J, a pivoted bar to which said clutches, the piston of the dash-pot, and the ⊓-shaped magnets or cores which enter the helices C and D are connected; K, a pivoted bar connected to the magnet or core of the helix E; L L′, the line-wires; and *m*, *m′*, *m²*, *m³*, and *m⁴*, various connecting-wires or electrical connections.

The frame A is generally of iron or other suitable metal, and carries the frame B and the helices C and D, which are rigidly mounted thereon, but insulated therefrom. It is preferably of the general form shown, although the form is not essential, and any other of suitable character might be employed.

The frame B is secured to the top plate of the frame A; but is insulated therefrom by a sheet of insulating material, *a*, laid over the upper surface of said top plate, as shown most plainly in Figs. 3, 5, and 8. Upon it are mounted the pivoted bar J, the solenoid or helix E, the bar K, and other portions.

The coarse-wire helices or solenoids C are rigidly and securely mounted upon the upper plate of the frame-work A, as previously stated, and are connected with or set into the main circuit of the lamp, so as to be in circuit with the carbons when the lamp is in operation, as will be hereinafter more fully explained. The cores or magnets *c* of these solenoids are connected by a bar, C′, as shown, (see particularly Figs. 1, 3, and 8,) and said two cores thus become in effect a ⊓-shaped magnet, which is connected by links or rods *c′* to one end of the pivoted bar J. The fine-wire helices or solenoids D are similarly mounted, and are set into the shunt-circuit, as is usual. Their cores or magnets *d* are connected by a bar, D′, and this bar is connected to the other end of the bar J by rods or links *d′* in like manner as is the bar C′, just described.

The helix or solenoid E is secured to the frame-work B and depends therefrom, and is connected to the main circuit in such a manner that it will remain idle while one set of the carbons is being consumed; but when said set of carbons is burned out, or is held in any

manner from feeding, and the other has been thrown into operation, a current will be sent through this helix, whereby it will be energized, and through its core or magnet *e* will pull up the bar K, thus changing the relative position of the stops or trips carried by said bar and reversing the order of engagement of the clutches with the carbon-holding rods, as and with the effect hereinafter explained.

The resistance-coil F is interposed in the cut-out circuit which is established when the pivoted bar J is in contact with the cut-out screw *b*, and gives enough resistance in said circuit to cause sufficient current to pass through the helices C to enable them to pull down the pivoted bar J, and thus break said cut-out circuit, and then lift the carbon-holding rods and establish the arc.

The piston of the dash-pot G is connected to the outer end of the pivoted bar J by its rod *g*, and operates to govern the movement of said pivoted bar in the usual and well-known manner.

The carbon-holding rods H and H′ pass up through suitable openings in the frame-work B, and are adapted to move freely up and down therein, but are prevented from dropping entirely through the frame by the collars or heads h^2 h^3 upon their upper ends. A certain electrical connection with said frame-work is insured by the contact-springs b^2, which are secured to said frame-work and rest against said rods. Said rods are provided with suitable sockets on their lower ends for securing the carbons, and are adapted to be operated by means of the clutches I and I′, as will be hereinafter more fully described. It will be understood, of course, where the carbons are extended up through the lamp and separate rods are dispensed with that the operation will be the same with my lamp as in any other where such a method is employed. It will therefore be understood that when I use the term "carbon-holding rods" or "carbon rods" in this case I mean to include the construction wherein the carbons themselves form their own rods.

The clutches I and I′ each consist, essentially, of a ⌊⌋-shaped piece of metal provided with holes in its extremities, through which the carbon-holding rod passes, and a clutch-lever, *i*, having upwardly-projecting ears, which are pivoted to the upper arm of the ⌊⌋ and connected at its other or outer end by means of a connecting-rod, *i′*, with the pivoted bar J, as shown. The operation is, when the pivoted bar J is pulled down by the operation of the solenoids C to draw up the outer end of this clutch-lever *i*, thus forcing its inner portion against one side of the carbon-holding rod and gripping said rod between said clutch-lever and the main or ⌊⌋-shaped portion of the device.

The pivoted bar J is mounted on a pivot, *j*, in the frame B, and is connected by various connecting links or rods *c′ d′ g* to the piston of the dash-pot, to the magnets or cores of the helices or solenoids C and D, and to the clutches which engage with the carbon-holders, and operates in connection therewith in the manner which will be hereinafter described.

The pivoted bar K is secured to the frame-work B by a pivot, *k*, and carries three adjustable screws, *k′* k^2 k^3, one of which, *k′*, serves to limit its movement in a downward direction, and the others, k^2 and k^3, of which serve as trips for the clutches I I′, respectively, as will be presently more fully described.

The incoming line-wire L, the several connecting-wires or electrical connections *m* *m′* m^2 m^3 m^4, and the outgoing line-wire L′ are simply the usual wires and connections over which the electrical current passes in the various operations of the lamp.

In order that the operation of my lamp may be clearly understood, I will briefly indicate the electrical connections thereof. The current comes in over the line-wire L, which is secured to the lamp in any suitable manner, (generally to the hangers A′;) thence directly by means of a connection, *m*, to the frame-work B, to which it is secured by a binding-screw, *b′*, passing thence to the carbon-holding rods H and H′, being aided in this by the contact-springs b^2; thence down through said rods to the carbons, and when said carbons are in contact to the lower carbon-holders, *h* *h′*; thence up on the side of the lamp in which are the carbon-holding rod H and carbon-holder *h*, through a connection, *m′*, to the coarse-wire helices C, and up the side of the lamp in which are the carbon-holding rod H′ and carbon-holder *h′*, by means of the connection m^3, to the coarse-wire helix E; thence by means of the connection m^4 to the connection *m′*, and thus to the helices C; from said helices by means of the connection m^2 to the line-wire L′, and out over said line-wire. When the carbons carried by the carbon-holding rod H and carbon-holder *h* are in operation to the exclusion of the others, (the others carried by the carbon-holding rod H′ and carbon-holder *h′* being held apart or "cut out,") no current passes through said rod H′, holder *h′*, its carbons, the connections m^3, and the helix E, and the course of the current in that case is consequently from the line-wire L to the frame B, down the carbon-holding rod H, through the carbons to the carbon-holder *h*, through the connection *m′*, the helices C, connection m^2, and out over the line-wire L′ exclusively, which and the reason therefor will be fully understood from the description of the operation hereinafter.

The operation is as follows: When the circuit in which the lamp is placed is at rest, or no current is being forced through it, or when the lamp is cut out of the circuit by means of its switch, the pivoted bar J rests in contact with the cut-out point *b*, the clutches remain loosely on the carbon-holding rods, and the carbons, if in place, are in contact. When the lamp is put in operation, either by turning the switch or turning on the current, said current enters the lamp, a part at first takes

each of the two courses just described, and a part also at first, by means of the contact-point *b*, passes to and through the resistance-coil F. The resistance in this coil is enough to force a sufficient portion of the current through the helices C to energize said helices and pull down the pivoted bar J, causing the clutches to engage with the carbon-holding rods and lift them somewhat, thus breaking one lamp-circuit and establishing an arc in the other and lighting the lamp. At first, before the bar K has been operated, as will be presently described, the adjustable screw k^2 is somewhat higher than the adjustable screw k^3, and thus holds the clutch I, which comes in contact therewith somewhat higher than the clutch I′, is held by said adjustable screw k^3, permitting said clutch I′ to drop down somewhat lower than the clutch I, and consequently, when the helices C are energized and the clutches thus lifted said clutch I′ engages with the carbon-holding rod H′ somewhat before the clutch I engages with the carbon holding rod H, lifting said carbon-holding rod H′ first, and thus breaking the lamp-circuit through its side of the lamp, and also generally lifting said rod H′ through a greater space than the rod H is lifted. Thus the arc is first established between the carbons carried by the carbon-holding rod H and the carbon-holder *h*, and said carbons are first consumed, the proper length of arc being continually re-established between said carbons by means of the operation of the fine-wire helices or solenoids D and the coarse-wire helices or solenoids C in the usual and well-known manner. When, however, these carbons are consumed, or for any reason the feeding of the carbon-holding rod H is interrupted, the current will be forced through the fine-wire helices D until they are sufficiently energized to pull the bar J to that point where the carbon-holding rod H′ will be released, when the current will pass down through said carbon-holding rod H′, the carbon-holder *h*′, and the carbons held thereby, and thence up through the connection m^3 and through the solenoid or helix E, which will energize said helix sufficiently to draw up the end of the bar K, which is connected to its core, thus raising the adjustable screw k^3, which forms the trip for the clutch I′ above the trip for the clutch I, whereby the clutch I′ will be tripped in operation in advance of the clutch I. The lamp-circuit, in which are the carbons carried by the rod H and holder *h*, will thus be broken, and the carbons carried by the carbon-holding rod H′ and carbon-holder *h*′ will then be consumed in like manner as were the others in the arrangement previously described. Should both the carbon-holding-rods become fast or both the carbons consumed, the fine-wire helices or solenoids D will become sufficiently energized to draw down the end of the pivoted bar J until the other end is brought into contact with the cut-out point *b*, and thus send the current through said cut-out point and the resistance-coil F without damage to the lamp.

While the carbon-holding rods are provided with collars or heads h^2 and h^3 for the purpose of preventing them from slipping down through the frame-work, it is not intended that these heads shall serve any other purpose when the lamp is in ordinary operation than to provide against accident, as the design is that both of said carbon-holding rods shall at all times be supported by the magnets. From the description of the bar K and its operation it will be seen that the carbon-holding rod which carries the idle carbon, or the stump of the carbon which has been consumed so far as is practicable, is caught and lifted by the clutches in advance of the carbon-holding rod which carries the carbon in active operation, and thus the weight of both the carbon-holding rods is always sustained by the magnets, which is very desirable, as the magnets thus carry substantially the same load at all times, which obviously tends to uniformity in their operation, and a uniform and equal operation of the lamp is a matter of high importance.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a double electric lamp, the combination of two carbon rods, a clutch for each of said rods, a pivoted bar to which both of said clutches are connected, magnets for operating said bar, a second bar mounted on a horizontal pivot and carrying trips for said clutches, and a solenoid connected to and operating said bar, said trips being arranged to be held at different heights, whereby when said bar is in one position one of said clutches will be caused to operate in advance of the other, and when by the action of the electric current passing through its operating-magnet said bar is given a different position the other clutch will be caused to operate in advance of the first, substantially as and for the purposes set forth.

2. The combination, in an electric lamp, of the frame-work, carbon-holding rods mounted therein, coarse-wire helices arranged on one side of said frame-work, connected with or set into the main circuit, fine-wire helices arranged on the other side and set into the shunt-circuit, clutches engaging with said carbon-holding rods, a dash-pot, a pivoted bar extending through the frame and connected to the cores of said helices, to the piston of said dash-pot, and to said clutches, and adjustable stops or trips for said clutches, whereby each of said clutches may by an adjustment of said stops or trips be operated in advance of the other, the adjustment of said stops being effected substantially as described, and both carbon rods being at all times supported through their clutches by the magnets, all substantially as set forth.

3. The combination, in an electric lamp, of the carbon rods, clutches therefor, a bar, K, mounted on a horizontal pivot, *k*, and provided

with stops or trips for the clutches, and a magnet to which it is connected, whereby it is given a vertical movement, substantially as and for the purposes set forth.

4. The combination, in an electric lamp, of the frame-work, the coarse-wire helices, the fine-wire helices, the clutches, a pivoted bar to which the cores of said helices and said clutches are connected, the carbon rods, a pivoted vertically-movable bar carrying trips for said clutches, a solenoid connected to said bar, and the electrical connections hereinbefore described, whereby said clutches may be operated, as specified, to hold the carbon rods at different heights, and at the same time to sustain both rods continually upon the magnets, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 14th day of October, A. D. 1885.

CHARLES D. JENNEY. [L. S.]

Witnesses:

C. BRADFORD,

CHARLES L. THURBER.