(No Model.)

J. B. TIBBITS.

ELECTRIC ARC LAMP.

No. 287,067. Patented Oct. 23, 1883.

Fig. 1.

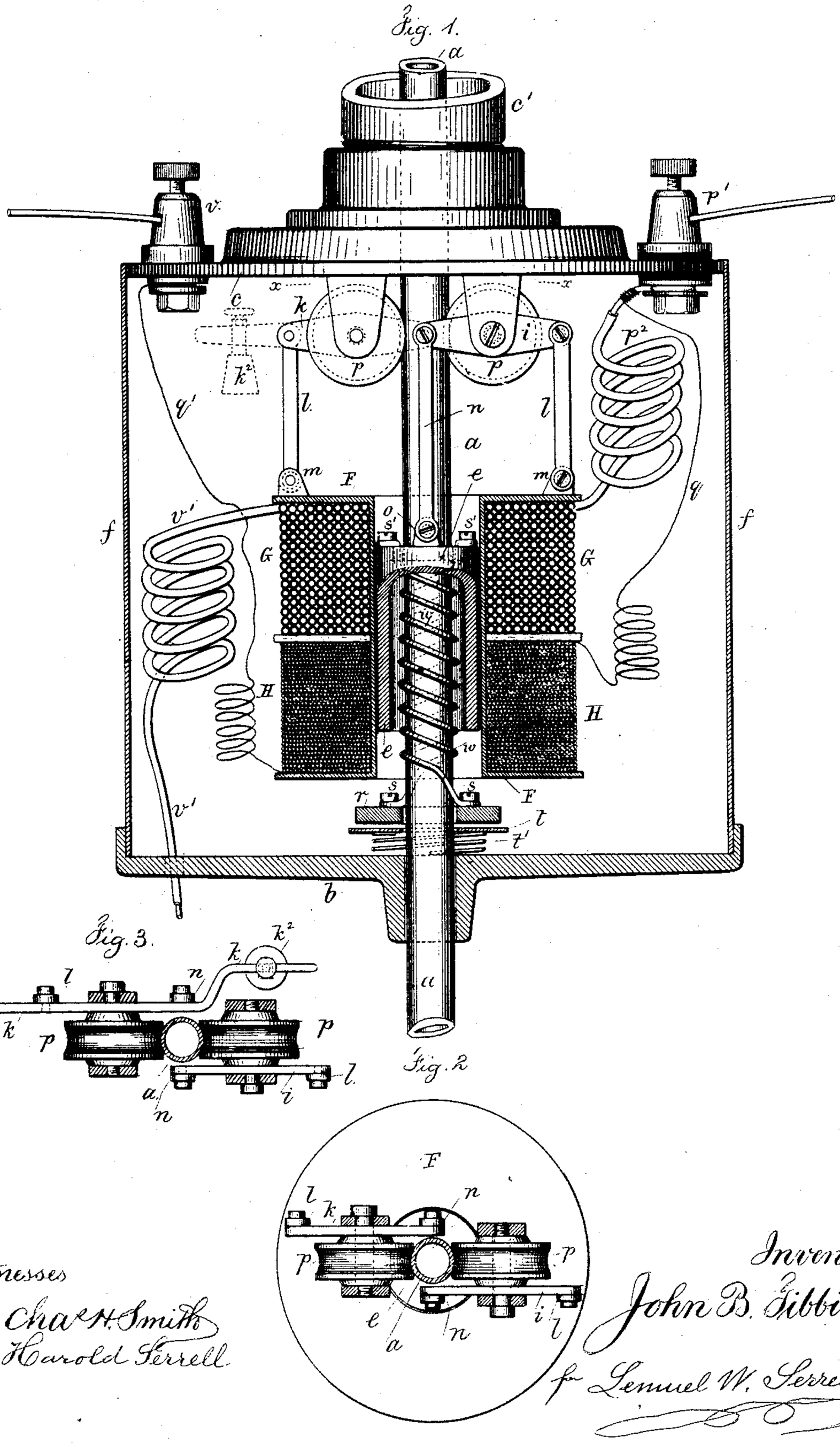

Fig. 3.

Fig. 2.

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JOHN B. TIBBITS, OF HOOSIC, NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 287,067, dated October 23, 1883.

Application filed February 15, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. TIBBITS, of Hoosic, in the county of Rensselaer and State of New York, have invented an Improvement in Electric Lamps, of which the following is a specification.

In arc lamps the carbon has been acted upon by a solenoid-core, and two helices have been used—one in the main circuit through the carbons and the other in a shunt between the + and —binding-posts—and in a prior application, filed September 27, 1882, I have shown a peculiar helix for feeding the carbon and grasping the carbon-holder while drawing the arc.

My present invention has for its object the more delicate adjustment of the forces that act upon the carbon, so that such forces may be balanced like a scale and respond to the least difference of the resistance at the arc between the carbons. The helix employed forms a counterpoise to the carbon-holder and the solenoid acting on the same, the parts being connected by levers and links, by which both are suspended at opposite ends of the levers, and a frictional clamp is employed to grasp the carbon-holder, and this frictional clamp is released sufficiently for the carbon-holder to slide through it and lessen the distance between the carbon electrodes. The magnetism set up by the current that passes through the suspended helix or helices becomes one element in the balancing of the forces, because it acts to move the solenoid-core in either one direction or the other and raise or lower the moving carbon at the same time the helix itself moves in the opposite direction, thus dividing up the motion and making the adjustment much more delicate than it could be if only one of the parts moved.

In the drawings, Figure 1 is an elevation, with part of the case and the magnet in section; and Fig. 2 is a plan below the line $x\ x$. Fig. 3 is a similar view, showing a movable weight applied to one of the levers.

The upper-carbon holder or rod a passes vertically through the bottom plate, b, and top plate, c, of the case that contains the magnet. These plates b and c are to be connected together by pillars or any suitable device, and the removable case f protects the parts from dust or dirt. I have shown the top plate, c, as provided with a socket to screw upon the pipe c' or other device for suspending the lamp and holding it in a vertical position.

The lower-carbon holder and carbon are made in any desired manner, and they are supported in a frame that is fastened to the bottom plate, b. As my improvement is available for almost any of the known forms of lamp, I have not shown the frames or the carbons supporting the lower-carbon holder.

Around the carbon-holder I place the tubular solenoid-core e, and the same is within a spool, F, that has two helices wound upon it, the helix G being of coarse wire, and the helix H of fine wire. The levers $i\ k$ are pivoted upon hanging brackets below the top plate, c, or in any other suitable manner, and the links l connect the outer ends of these levers to joints m upon the spool F, and the links n connect the inner ends of these levers to joints o upon the top of the solenoid-core e.

The carbon-holding rod a is guided between friction-rollers p, which, for convenience, are upon the pivot-pins of the levers $i\ k$, and the parts are so proportioned that the spool F and helices will nearly counterbalance the solenoid-core and the carbon-holder.

Around the carbon-holder there is a clamp, w, which by preference is composed of a helix of wire, or of two helices, the ends of which are connected to a small weight, r, and to the solenoid, respectively, as at s and s', this clamp being similar to that shown in my aforesaid application.

I place around the carbon-holder and below the weight r a yielding rest composed of a washer, t, with a spring, t', below it. The current passes from any suitable conductor to the insulated binding-post p', thence by wire p^2 to the wire of the helix G, and a shunt-wire, q, passes to the fine-wire helix H, thence by a wire, q', to the negative binding-post v. The other end of the helix G passes to the wire v', and thence to the lower-carbon holder, and the current traverses the carbons, and by the upper-carbon holder and the rollers p reaches the top plate, c, and negative binding-post.

The wires between the helices G and H and the respective binding posts or connections are to be sufficiently long or coiled in a helix or spiral, so that they will spring and allow the spool F and helices G H to rise or fall without being obstructed by the stiffness of the wire.

The operations of the parts are as follows: The current passing through the helices G H differentially sets up magnetism that acts on the solenoid-core. When the magnetism in G increases, it tends to draw up the solenoid-core, and by the helical clamp lift the carbon-holder *a* and upper carbon. When the magnetism in H increases, it tends to draw down the core *e*, and thereby feed the carbon. These forces act in the usual manner in differential magnets—that is to say, when the electric arc between the carbons lengthens in consequence of the carbons being consumed or breaking off, the current in G lessens in consequence of the greater resistance, and it increases in shunt-helix H and acts to draw down the solenoid and feed the carbons. It will, however, be apparent that the levers *i k* and links *l n* connect the core and helices; hence the core cannot be drawn down by the magnetism without the helix going up at the same time, and the reverse; hence the action and reaction are subdivided and rendered of the most delicate character. As soon as the weight *r* at the lower end of the helix rests upon the spring-washer *t*, the helix is expanded by being shortened in length by the movement of the core; hence the frictional grasp of the helix on the carbon-holder is lessened, and the latter slips through the former a very small distance, and the carbon is fed. In this way the parts of the lamp occupy a certain normal position when the lamp is burning, and the feed is frequent and very small, and great uniformity is attained. When the lamp is not burning, the upper carbon descends by gravity, together with the solenoid-core, and the arc is drawn by the magnetism set up by the current in G, raising the solenoid-core. If a heavier solenoid-core is required, the same may be made longer than the spool, and it will act in the same manner as the shorter core.

If desired, the fulcrum of the levers may be nearest their outer ends, so as to give greater leverage to the core in suspending the spool of helices, or the reverse.

The rod holding the upper carbon may be tubular and weighted above said carbon with sand or fine shot or other suitable material, and thus facilitate and render more accurate the adjustment of the balance.

If desired, the fulcra may be made adjustable, or the pivots by which the links *l n* are connected to the levers *k i'* may be movable, so as to vary the leverage and adjust the balance. The same object may be attained by extending either or both levers *k i* in the form shown in Fig. 3 and by dotted lines in Fig. 1, so that a movable weight, k^2, may be placed upon either end, and adjusted so as to properly balance the respective parts and cause the carbons to rest upon each other previously to being lighted, and to draw apart when the current is applied.

I claim as my invention—

1. The combination, with the carbon-holder in an electric lamp, of a core, a helix, levers, and connections by which the parts are balanced, and the core moves in one direction as the helix moves in the other direction, and a clamp acting upon the carbon-holder rod and being acted upon by the solenoid, substantially as set forth.

2. The combination, with a carbon-holder rod in an electric lamp, of a tubular solenoid-core surrounding the rod, a helical clamp around the rod and within the core, a connection at the top of the helical clamp to the core, a weight connected at the lower end of the helical clamp, and a yielding rest for the weight, substantially as set forth.

3. In an electric-arc lamp, two helices upon one spool—one of coarse, the other of fine, wire—levers and links for suspending such spool, a solenoid-core within the spool, links connecting the same to said levers, a carbon-holding rod, and a clamp for holding and moving such rod, and a connection between the clamp and the solenoid, substantially as set forth.

4. In an electric-arc lamp, a carbon-holding rod supported and moving vertically, a tubular solenoid-core around the same, a clamp connected to said solenoid-core and acting on the rod, a spool and differential helices around the solenoid-core, circuit-connections to the differential helices and carbons, a lever, and variable connections between the lever and spool or solenoid, so as to afford a ready means for balancing the respective parts, substantially as specified.

Signed by me this 5th day of February, A. D. 1883.

JOHN B. TIBBITS.

Witnesses:
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