No. 752,005. PATENTED FEB. 9, 1904.

F. SINDINGCHRISTENSEN.

ELECTRIC ARC LAMP.

APPLICATION FILED AUG. 29, 1902.

NO MODEL.

Fig. 1,

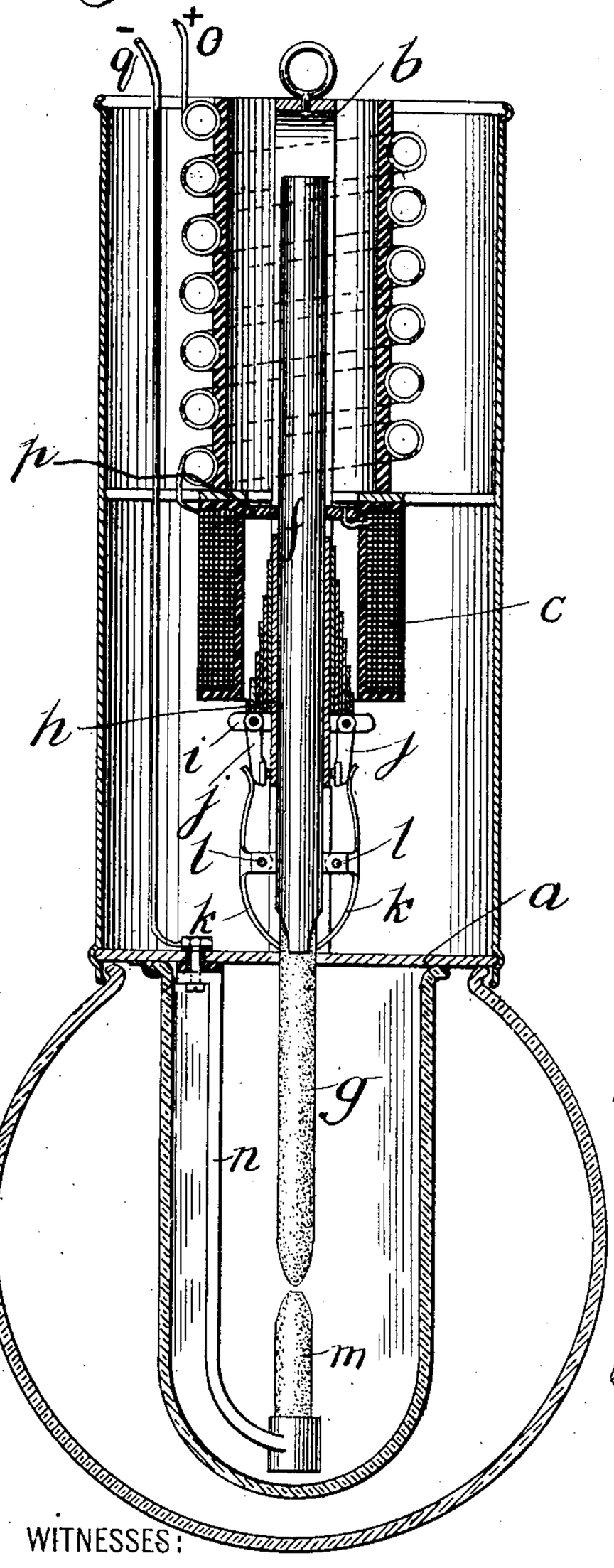
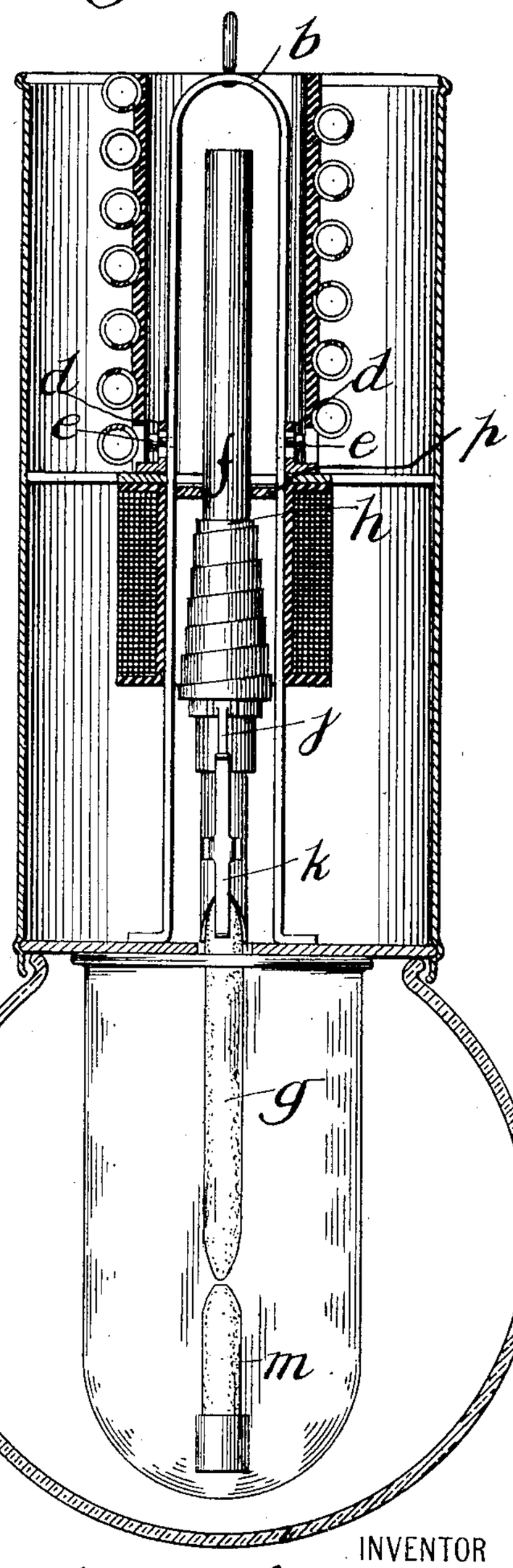


Fig. 2,



WITNESSES:

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UNITED STATES PATENT OFFICE.

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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 752,005, dated February 9, 1904.

Application filed August 29, 1902. Serial No. 121,444. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK SINDINGCHRISTENSEN, a subject of the Crown of Denmark, and a resident of New York city, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in electric-arc lamps, and particularly to improvements in devices for feeding and otherwise operating the upper carbon thereof.

There are three essentials to the efficient operation of an electric-arc lamp of the present day. First, it is essential that the carbon points or pencils shall be in contact when there is no current through the lamp, this for the reason that contact is required between the carbon pencils in order to complete electric circuit when the line is first closed through the switch; second, it is essential to draw the carbon pencils apart after circuit has been completed in order to establish an arc, and, third, it is essential to feed the upper and lower carbons together, as one or both of the said pencils become disintegrated at the points or worn away from use.

In feeding the carbon pencil to compensate for loss it has been common heretofore to hold the pencils stationary for a while until a certain amount has been burned away and then to feed the upper pencil down for a short distance, to again hold it stationary, and so intermittently feed and hold the pencil during the burning of the lamp. The ideal conditions are of course an initial separating of the carbon pencils the exact distance required to make the best arc and subsequently a relative feeding together of the pencils exactly in proportion as the distance between the points tends to become greater, thus maintaining at all times a uniform arc.

The object of this my present invention is to fulfil the foregoing conditions and to constantly feed the upper pencil toward the lower one exactly in proportion as the point or points wear away or become disintegrated to maintain a uniform arc.

I attain the foregoing by the employment of a magnetic floating clutch and an electromagnet, preferably of the solenoid form, for operating said clutch.

My invention further consists in certain novel details of construction and combination of parts, as hereinafter set forth.

I will now proceed to describe an electric-arc lamp embodying my invention and will then point out the novel features in claims.

In the drawings, Figure 1 represents a central vertical section of an electric-arc lamp embodying my invention; and Fig. 2 is a view in central vertical section of the same, the plane of section being taken at right angles to the plane of section of Fig. 1.

In the construction represented in the drawings a frame is provided comprising a diaphragm *a* and a strap *b*, by which the lamp as a whole may be suspended. A solenoid *c* is arranged upon the suspension-strap *b* and may be adjustably secured thereto by angle-brackets *d*, rigidly secured to the upper face of the solenoid and slotted to receive bolts *e*, tapped into the strap *b*. A brass tube *f*, constituting a shield or receiver for the upper carbon pencil *g*, surrounds the carbon pencil above the diaphragm *a* and passes through the solenoid *c*. Secured to the tube *f* at a point within and in proximity to the solenoid *c* is a soft-iron sleeve *h*, which with certain connected parts constitutes the core or armature of the solenoid. The sleeve *h* is preferably wrapped around with a thin sheet of soft-iron plate formed in blank in substantially the shape of a right-angle triangle, so that when wound several times around the said sleeve the wrapping and the sleeve together will form a tapered core, substantially as shown. The sleeve *h* is further provided with an iron clamp *i*, secured around the lower end of the sleeve *h* and beneath the overwound portion just described. Two oppositely-disposed arms or levers *j*, also composed of iron, are pivoted at their upper ends to the said iron clamp and at their lower ends are adapted

to contact with the lower projecting end of the sleeve *h*. Two oppositely-disposed spring clamping-fingers *k* are pivoted at *l* to opposite sides of the tube *f*. The upper ends of the spring clamping-fingers *k* engage, respectively, with the lower ends of the arms or levers *j* and tend to press them inwardly toward the sleeve *h*, while the lower ends of the spring clamping-fingers *k* engage the sides of the upper carbon pencil *g*. The spring clamping-fingers *k* are preferably made of brass or other suitable non-magnetic material.

The lower carbon pencil *m* is suitably supported by an arm or bracket *n*, secured to the diaphragm *a* of the frame, but insulated therefrom.

The electric connections are as follows: A wire *o*, leading from a source of electric supply, passes through suitable resistance to the solenoid *c*. Thence current passes through a guide-collar *p*, secured to the solenoid or to the strap *b* and in sliding contact with the tube *f*, to the said tube *f*, and thence through the spring clamping-fingers *k* to the upper carbon *g*. The current returns through the lower carbon *m*, its supporting bracket *n*, and negative wire *q*, back to the source of electrical supply.

The operation is as follows: Current supplied to the lamp will pass through the solenoid, energizing same and causing said solenoid to attract and lift its core or armature *h*, together with the connected parts, which comprise the tube *f*, the clamp *i*, the arms or levers *j*, and the spring clamping-fingers *k*. The arms or levers *j* being composed of soft or magnetic iron and being connected to the core or armature will be within the magnetic field and being of the same polarity as the sleeve will tend to be forced outwardly or away therefrom. In moving outwardly they will act upon the spring clamping-fingers to force the lower ends thereof against the carbon pencil *g*, so as to hold or clamp same to the tube *f*. When, therefore, the tube *f* is lifted under such conditions, the carbon pencil *g* will be lifted therewith. The extent of movement of these parts is limited by the clamp *i* coming in contact with the lower face of the solenoid *c*.

By the foregoing it will be seen that immediately after circuit is closed by a suitable switch in the line the carbon pencil *g* will be lifted up the required distance to form the desired arc. As now the lower end of the carbon pencil *g* wears or burns away or becomes disintegrated the resistance at the arc will be higher and less current will pass through the solenoid. The magnetic field then becoming weaker the arms or levers *j* will have less tendency to fly apart and will gradually approach the sleeve *h* until the weight of the carbon *g* will overcome the lessening frictional hold of the spring clamping-fingers and will be permitted to feed slightly downward. As the carbon pencil *g* so feeds downwardly the resistance at the arc is lessened, the magnetic field strengthened, and the pencil again held by the spring clamping-fingers. By the foregoing a balance may be effected between the resistance at the arc and the pressure of the clamping-fingers, so that the carbon pencil may be fed downwardly exactly in proportion as it burns or otherwise wears away, and a uniform arc may be automatically maintained. When circuit is finally broken, as by the opening of a switch in the line, the tube *f*, with the armature and its correlated parts, will fall, and the carbon pencil *g* will drop into contact with the carbon pencil *m*, so as to be in proper condition for the next lighting of the lamp.

It is obvious that the device herein is capable of many modifications within the spirit and scope of my invention and that the foregoing is but one embodiment of the same. I do not, therefore, desire to be limited to the precise details of construction and combination of parts; but

What I claim is—

1. In an electric-arc lamp, the combination with a frame and an electromagnet supported thereby, of an armature for said electromagnet, and a magnetic clutch for the movable carbon of said lamp, comprising a moving member in magnetic connection with said armature but located at a point outside of the direct influence of attraction of said magnet and operated by the repulsive force exerted between the armature and moving member, due to their similar polarity.

2. In an electric-arc lamp, the combination with a frame and an electromagnet supported thereby, of an armature for said electromagnet, and a magnetic clutch for the movable carbon of said lamp comprising a plurality of moving members in magnetic connection with said armature but located at a point outside of the direct influence of attraction of said magnet and operated by the repulsive force exerted between the armature and moving members, due to the similar polarity of the armature and the moving members.

3. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of a core or armature for said solenoid, and a magnetic clutch for the movable carbon of the said lamp comprising a movable member in magnetic connection with said core or armature but located at a point outside of the direct influence of attraction of said magnet and operated by the repulsive force exerted between the armature and moving member, due to their similar polarity.

4. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of an armature or core for said solenoid, and a carbon-clutch-operating lever of magnetic material, pivoted to the said core at a point beneath the said solenoid, and arranged

entirely outside thereof, said lever in magnetic contact with said core, whereby said lever constitutes a relatively movable portion of the said core but has the same polarity.

5. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of an armature or core for said solenoid, and two oppositely-disposed carbon-clutch-operating levers of magnetic material, pivoted to the said core and in magnetic contact therewith, whereby said levers constitute relatively movable portions of the said core but have the same polarity.

6. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of a core or armature for said solenoid, a plurality of levers of magnetic material, pivoted in magnetic contact with the said core, whereby said levers constitute relatively movable portions of the said core but have the same polarity, and clamping-fingers engaging said levers, but magnetically insulated therefrom, and adapted to engage the sides of the movable lamp-carbon.

7. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of an armature or core for said solenoid, a plurality of levers of magnetic material, pivoted in magnetic contact with the said core, whereby said levers constitute relatively movable portions of the said core but have the same polarity, and spring clamping-fingers engaging said levers, and adapted to engage the sides of one of the lamp-carbons.

8. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of an armature or core for said solenoid, a plurality of levers of magnetic material, pivoted in magnetic contact with the said core, whereby said levers constitute relatively movable portions of the said core but have the same polarity, and spring clamping-fingers of non-magnetic material engaging said levers, and adapted to engage the sides of one of the lamp-carbons.

9. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of a carbon shield or holder arranged to pass through the said solenoid, a core or armature surrounding the said shield or holder within, and in proximity to, the said solenoid, levers *e* of magnetic material and pivoted in magnetic connection with said core, and spring clamping-fingers of non-magnetic material pivoted to said shield or holder, and at their upper ends engaging the said levers, and at their lower ends adapted to engage the sides of the upper lamp-carbon.

10. In an electric-arc lamp, the combination with a frame and a solenoid supported thereby, of a carbon shield or holder arranged to pass through the said solenoid, a tapered core of magnetic material surrounding the said shield or holder at a point within, and in proximity to, the solenoid, a plurality of levers *e* pivotally mounted in magnetic connection with said core, and a plurality of spring clamping-fingers *f* of non-magnetic material, pivoted to said shield or holder, the upper ends of which bear against the levers *e* and tend to press them inwardly toward the core, and whose lower ends bear against that carbon of the lamp adapted to be received within the shield or holder, the said solenoid and carbon adapted to be connected electrically in series in a line-circuit.

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Witnesses:
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