J. A. RIGNON.

ELECTRIC ARC LAMP.

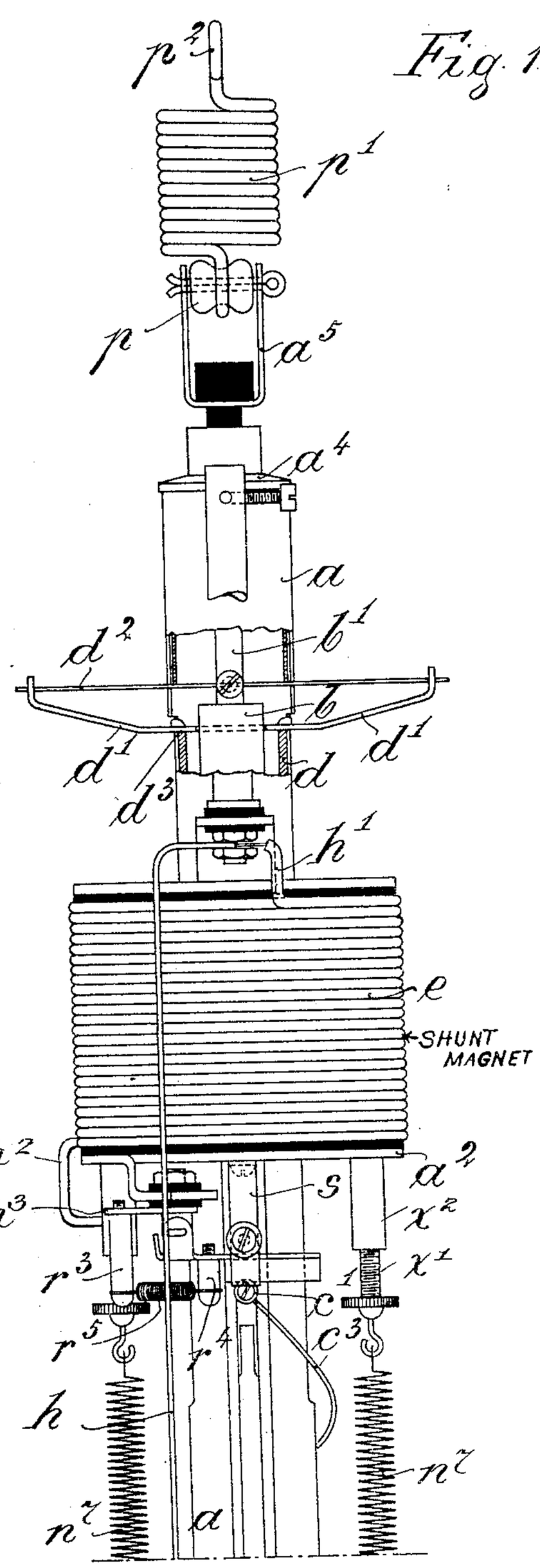
APPLICATION FILED SEPT. 4, 1906.

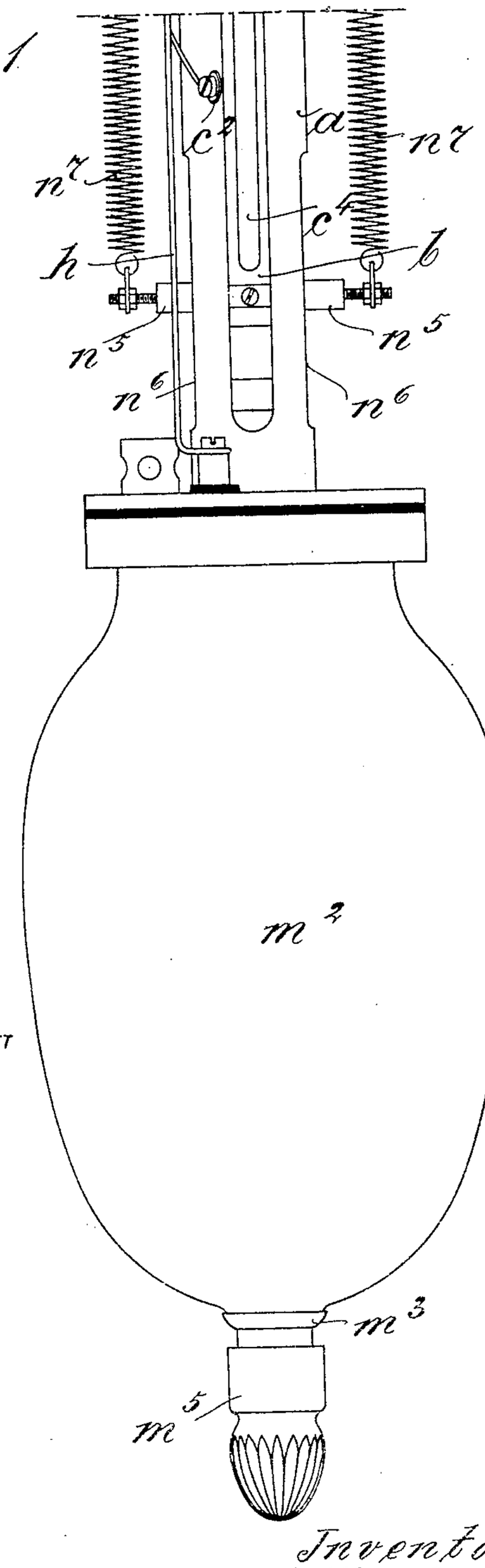
953,859.

Patented Apr. 5, 1910.

3 SHEETS—SHEET 1.

Fig. 1





Witnesses:
Paul Wollenberg.
Emil Kayser.

Inventor:
Joseph Albert Rignon.
by Robert Dewey
Attorney.

J. A. RIGNON.

ELECTRIC ARC LAMP.

APPLICATION FILED SEPT. 4, 1906.

Patented Apr. 5, 1910.

3 SHEETS—SHEET 2.

953,859.

Fig. 2.

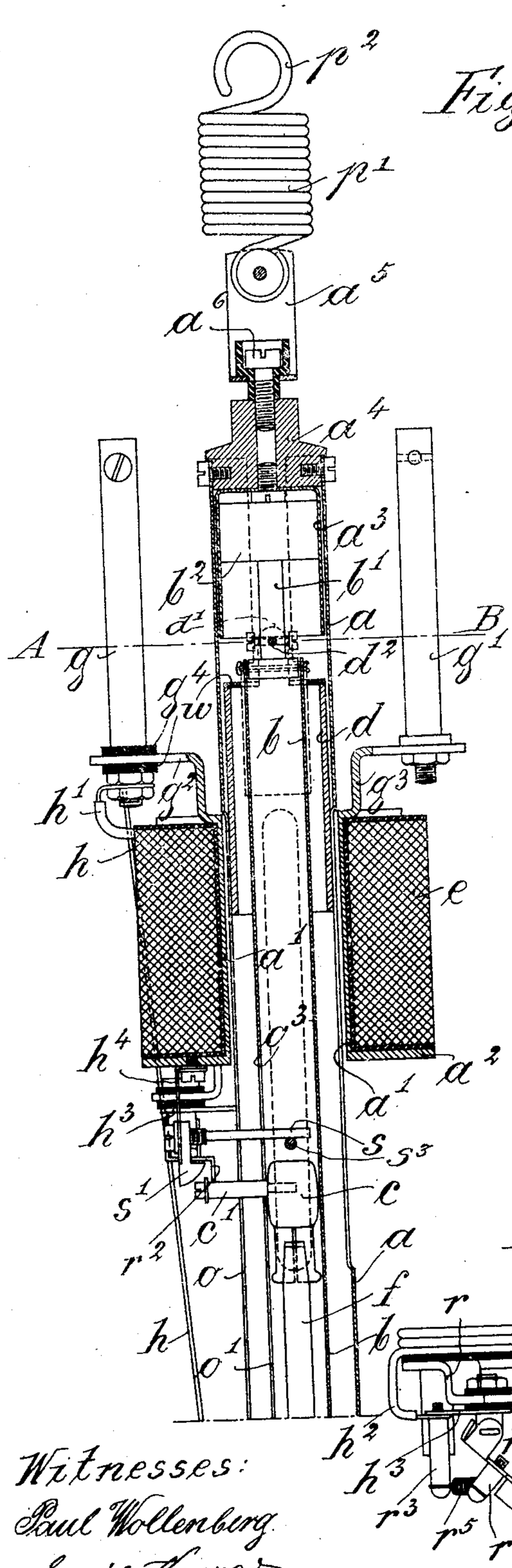
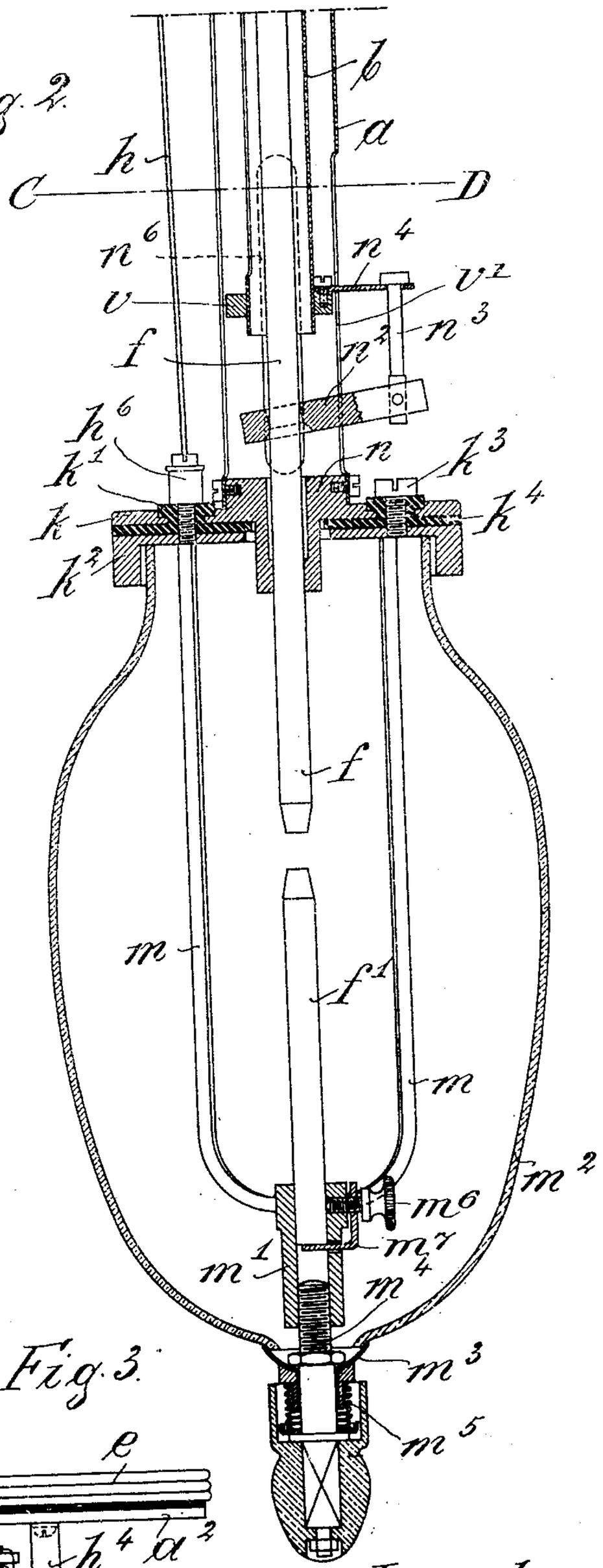


Fig. 3.



Witnesses:

Paul Wollenberg.

Emil Kayser.

Inventor:

Joseph Albert Rignon.

by Robert Dobbie.

Attorney

953,859.

J. A. RIGNON.

ELECTRIC ARC LAMP.

APPLICATION FILED SEPT. 4, 1906.

Patented Apr. 5, 1910.

3 SHEETS—SHEET 3.

Fig. 4.

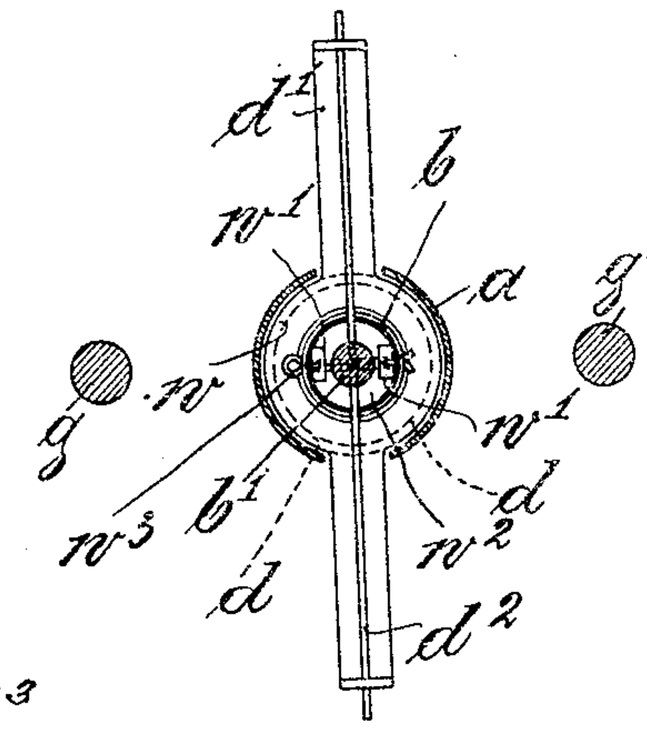


Fig. 6.

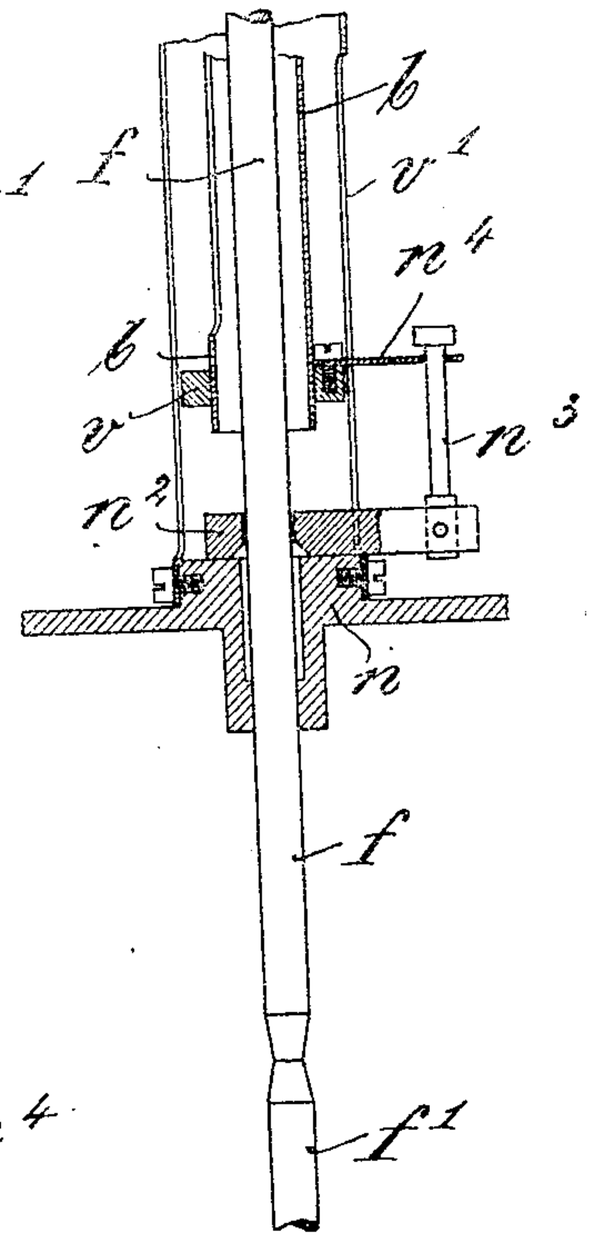


Fig. 7.

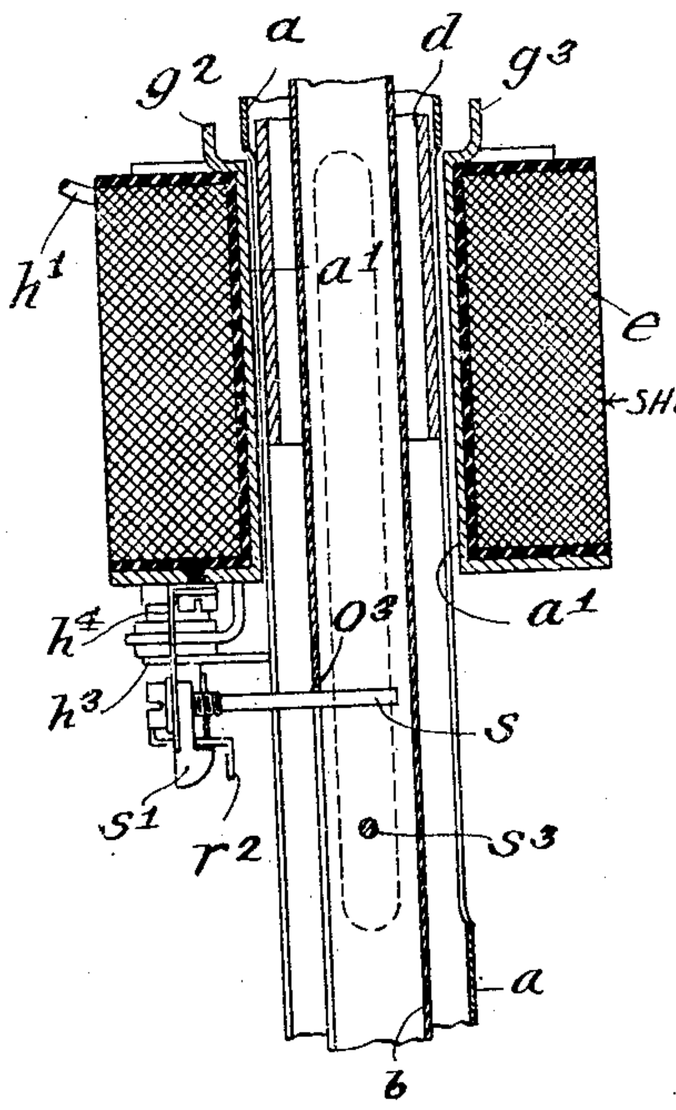
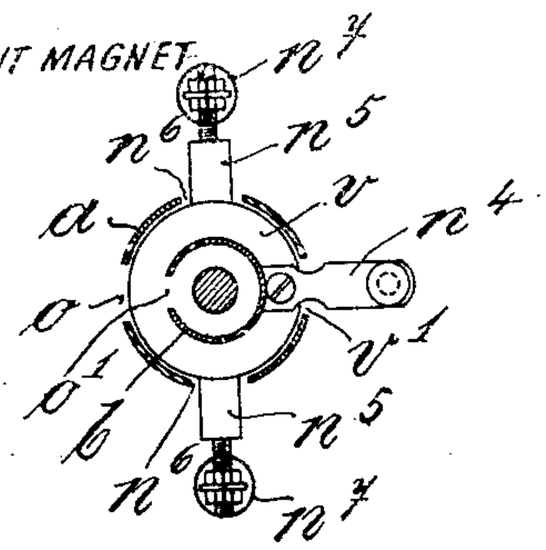


Fig. 5.



Witnesses:
Paul Wollenberg.
Emil Kayser.

Inventor
Joseph Albert Rignon.
by Pierce & Pierce
Attorney.

UNITED STATES PATENT OFFICE.

JOSEPH ALBERT RIGNON, OF GROSS-LICHTERFELDE-OST, NEAR BERLIN, GERMANY.

ELECTRIC-ARC LAMP.

953,859. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed September 4, 1906. Serial No. 333,247.

To all whom it may concern:

Be it known that I, JOSEPH ALBERT RIGNON, a subject of the King of Italy, and resident of 7 Graben street, Gross-Lichterfelde-Ost, near Berlin, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is an exact specification

This invention relates to electric arc lamps of the closed type for use with either alternating or continuous current. In such lamps the carbons have been arranged vertically and the top carbon fed automatically by the combined action of gravity and a solenoid regulator. When the carbon has been consumed to the safe limit means operated by the carbon or carbon holder in its resulting position have been employed for switching out the lamp. The present invention relates to a novel form of such means.

The accompanying drawings illustrate one example of a complete arc lamp with the present invention applied thereto.

In these drawings Figure 1 is an outside view of a lamp which has been divided in its center and the two halves arranged side by side the part to the lift being the upper part. Fig. 2 shows the lamp with the halves arranged as in Fig. 1, and in this case the lamp is shown in section in a plane at right angles to the plane of Fig. 1. Fig. 3 is a detail of the mechanism used for switching out the lamp. Fig. 4 is a section on the line A—B of Fig. 2. Fig. 5 is a section on the line C—D of Fig. 2. Fig. 6 is a partial section showing the carbon clutch in the position occupied when the carbons are in contact. Fig. 7 is a partial view showing the position of the parts just before the lamp is switched off by the descent of the inner governing tube.

In the form of the invention illustrated the frame tube a encircles a governing inner tube b within which the upper carbon holder c slides freely. To the upper end of the inner tube b there is attached by means of a resilient connection the armature d of the regulating solenoid e. The nature of the resilient attachment will be clearly seen from Fig. 1. It comprises a bow d' having a central hole to allow the tube b to pass through and fixed at d^3 by bifurcated parts to the end of the armature d. Across the bow there is stretched a wire d^2 which passes through the rod b' of the dash pot piston b^2 arranged to work in the inverted cylinder a^3 which is fixed in the head piece a^4 of the frame tube a. The piston rod b' is coupled to the regulator tube b. The head piece a^4 is secured by a screw a^6 to a hanger bracket a^5 having an insulating roller p. A suspension spring p' having a hook p^2 engages the insulating roller p.

To the frame tube a there is fastened a cylinder a' having a flange a^2 at its lower end on which the solenoid e is supported. The cylinder a' is provided with two bracket supports g^2 and g^3 which carry the posts g and g' which form the terminals. The post g is insulated by means of washers g^4 from the bracket g^2 and a connection h' leads from this post to the solenoid winding. The post g' on the other hand is in electrical connection with the frame tube a. The lower end of the solenoid coil is connected by the wire h^2 see Figs. 1 and 3 with a bearing bracket h^3 supported by a bracket r and insulated therefrom by washers r'. The bearing bracket h^3 forms the pivotal support for a switch arm r^2 which is provided with a stud r^4 to which is fastened one end of a spring r^5 whose other end is fastened to a stud r^3 carried by the bearing bracket h^3. The switch arm is normally held in the horizontal position illustrated in Fig. 1 by means of a detent h^4 which is in the form of a spring band fixed at its upper end to the flange a^2 and carrying at its lower end the head s' (see Fig. 2) by which it holds the spring switch arm r^2. The circuit of the solenoid is thus completed through the connection h' winding of the solenoid, connection h^2 bearing bracket h^3 switch arm r^2, band h^4, flange a^2, cylinder a' bracket g^3 to the post g'. This is the circuit which is broken by the descent of the inner tube b when the upper carbon is consumed to the safe limit or to the limit compatible with efficient working.

As stated the inner tube b is slidable within the frame tube a and is adapted to be resiliently pulled downward by the armature d through the medium of the bow d' this motion being steadied by the piston b^2. The resilient connection d' is provided as known for the purpose of preventing vibrations being transmitted from the solenoid armature or core d to the tube b. The tube b and core d are, while the lamp is out of use, held in their upper positions by means of the springs n^7

which are supported from studs x^2 fixed to the flange a^2 and are adapted to be adjusted in their tension by means of screws x'. The lower end of the tube b is provided with a boss or ring v having spider arms n^5 to which the lower ends of the spring n^7 are fixed. The spider arms n^5 are adapted to move in slots n^6 on the outer tube a. In the outer tube a at its lower end there is also a slot v' through which passes another spider arm n^4 which is provided with a hole through which loosely passes a bolt n^3 carrying pivoted at its lower end the carbon clutch n^2 which operates in the well known manner; that is to say in the inclined position the carbon clutch washer n^2 grips the carbon f but when the clutch is in the horizontal position shown in Fig. 6 the carbon f is free to drop downward till it rests on the lower carbon f'. This horizontal position is attained when the central tube b has moved so far down as to cause the washer n^2 to rest on the boss of the cover plate n.

The central tube b is provided with a slot o and the outer tube a with a slot o' through which slots there projects a pin c' attached to the carbon holder c. The pin c' is long enough to engage with the switch arm r^2 as seen in Fig. 2 when the carbon holder is at its extreme upper position. Thus if the switch arm r^2 is in the open position shown in Fig. 3 the carbon holder when pushed upward brings the pin c' against the under side of the arm r^2 and thereby brings that arm into engagement with the detent s' as shown in Fig. 1. To the springband h^4 which carries the detent s' is fixed a stud s which projects into the slot o of the tube b and is adapted to be pressed downward by the upper end o^3 of the slot o' when the tube is moved down an excessive distance as herein after described. By pressing the pin s the detent s' is pushed to the left in Fig. 2 and the switch arm r^2 is under the action of the spring r^5 thrown open thereby breaking the circuit of the solenoid winding.

The connections to the carbons are effected as follows. As described above the outer tube a is in electrical connection with the standard g' but not with the standard g. To the outer or frame tube a there is fixed a pin c^2 which holds a wire c^3 connected at c' to the carbon holder c. From the standard g a wire h is led to a terminal h^6 insulated by a washer k' from the cover piece k which is in turn insulated from the lower cover plate k^2 by means of an insulating layer k^4. The terminal h^6 screws into the lower cover plate k^2 to which the hangers m for the lower carbon f' are also fixed. The hangers m carry at their lower end a socket m' for the lower carbon which is supported on an angle plate m^7 fixed by a screw m^6 to the socket. The closing globe m^2 is held against the lower cover plate k^2 by means of a screw m^4 having a cap m^3 and screwed into the sleeve m'. The cap m^3 is resiliently held against the end of the globe by means of a porcelain or like end knob m^5 and a spring.

The operation is as follows: When no current is supplied to the lamp the carbons are held apart by means of the springs n^7 which draw the central feeding tube b and armature d to their highest position as shown in Figs. 1 and 2. When current is supplied to the lamp, either continuous or alternating, the regulator or solenoid e is energized and the armature d drawn down thereby also draws down the central feeding tube b till the carbon clutch comes into the position shown in Fig. 6. In this position the carbon f falls and in consequence closes the circuit from the standard g to the standard g' through the wire h, hangers m carbons f' f, carbon holder c wire c^3 and frame tube a. The current through the solenoid winding is thereby reduced and the springs n^7 pull the central tube b and solenoid armature d upward. This upward movement causes the carbon clutch n^2 to grip the carbon and pull the upper carbon f away from contact with the carbon f' thereby establishing the arc. The feeding of the carbon thereafter proceeds automatically in the well known manner that is to say when the distance between the carbon tips is increased by the consumption of the carbons the resistance of the current is also increased so that the current through the solenoid winding becomes greater and the armature again pulled down as above. If the top carbon is consumed to the desirable degree the carbon holder c rests on the ring v or its pin c' comes against the lower end of the groove o' in the tube b. Thus if the carbon is so small that in this position the arc is too great, the solenoid remains sufficiently energized to draw the armature still farther down than is necessary to release the clutch n^2. By this movement the end o^3 of the groove o' in the inner feeding tube b is brought against the pin s and the switch arm r^2 operated as described above. The contact between the end o^3 and the pin s it will be noticed is merely a mechanical contact and not electrical. The solenoid e is thus deënergized and the carbon f and tube b drawn upward by means of the springs n^7 into their highest position. When a new carbon is inserted the pin c' comes against the under side of the switch arm r^2 in the manner above described and thereby establishes the necessary conditions for working once more.

I claim:—

1. In combination in an arc lamp a slidable carbon feeding tube having a longitudinal slot therein, a spring controlled switch arm, a spring held detent for said switch arm and a pin on said spring detent project-

ing into the slot on said carbon regulating tube and operated by engagement with one end of said slot when an excessive downward motion occurs.

2. In an electric arc lamp the combination of a frame tube, an inner axially slidable feeding tube, springs tending to hold said slidable tube in its upper position a supporting flange a^2 on said frame tube, a solenoid on said flange, an armature for said solenoid, a flexible connection from said armature to said feeding tube said armature being arranged to move the feeding tube downward against the action of the springs, a spring switch arm in said solenoid circuit supported on said flange, and a spring detent for said switch and co-acting with said slidable tube when said slidable feeding tube makes an excessive movement.

3. In an electric arc lamp the combination of a frame tube, an inner axially slidable feeding tube, springs tending to hold said slidable tube in its upper position a supporting flange a^2 on said frame tube, a solenoid on said flange, an armature for said solenoid, a flexible connection from said armature to said feeding tube said armature being arranged to move the feeding tube downward against the action of the springs, a dashpot cylinder for cushioning the movements of said armature, a spring switch arm in said solenoid circuit supported on said flange, and a spring detent for said switch and co-acting with said slidable tube when said slidable feeding tube makes an excessive movement.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOSEPH ALBERT RIGNON.

Witnesses:

WOLDEMAR HAUPT,

WILLIAM MAYORS.