No. 744,130. PATENTED NOV. 17, 1903.

E. THOMSON.

ELECTRIC ARC LAMP.

APPLICATION FILED MAY 21, 1901.

NO MODEL.

Fig. 2.

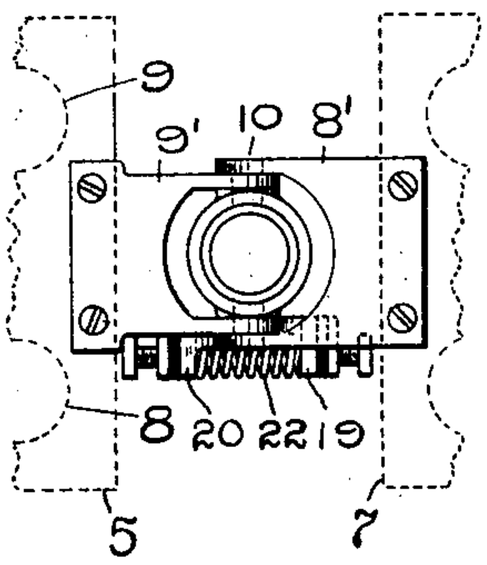

Fig. 1.

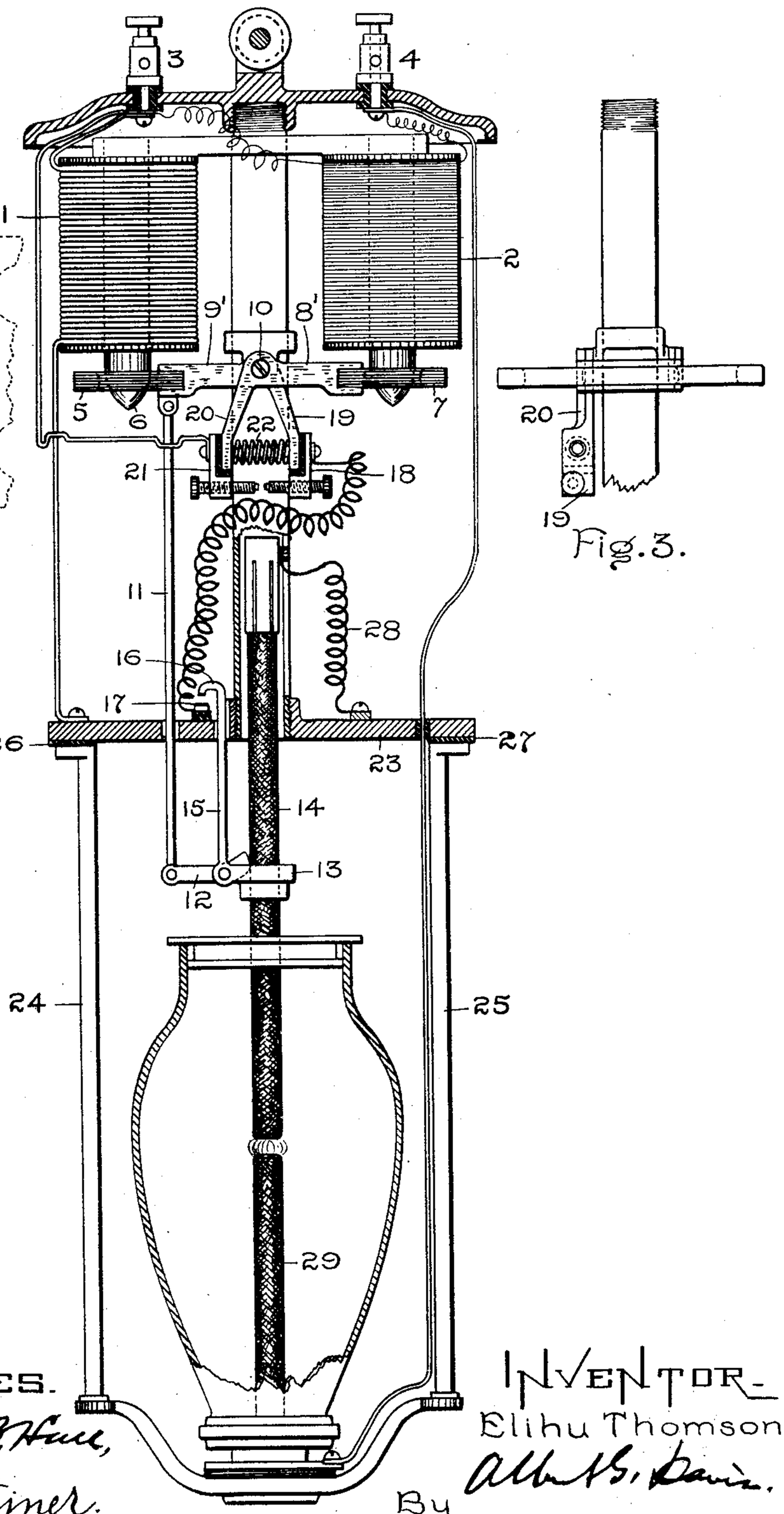

Fig. 3.

WITNESSES.

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No. 744,130. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 744,130, dated November 17, 1903.

Application filed May 21, 1901. Serial No. 61,302. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Arc-Lamps, of which the following is a specification.

In many forms of arc-lamps the opening of the clutch requires force to be exerted by the derived-circuit magnets in opposition to the action of the series magnet or magnets. The force thus required to open the clutch is variable and depends upon circumstances—such, for example, as the friction of the parts and the firmness with which the carbon itself is bound by the clutch. The variable pull thus required of the derived circuit or differential magnets, which are in shunt to the arc, therefore gives rise to irregular voltages and arc lengths.

It is one of the objects of my present invention to secure definite and positive feed of the carbons or other electrodes, thereby preventing the possibility of an abnormal arc due, for example, to a sticky clutch or to the fact of the clutch itself reaching the feeding-point and taking off weight from the mechanism, thereby sustaining the arc until the derived-circuit magnet has acquired power sufficient to forcibly open the clutch.

The features of novelty of my invention will be particularly pointed out in the claims appended hereto, while the details and mode of operation of the invention itself will be set forth more at length in the following description, which is to be taken in connection with the accompanying drawings, in which—

Figure 1 is a view of an arc-lamp embodying my invention, and Figs. 2 and 3 detail views of parts thereof.

I have shown my invention as applied to an arc-lamp of the differential type suitable for use on series constant-current circuits. The series magnet, which acts to separate the carbons and strike the arc, is indicated at 1. This magnet or magnets, as the case may be, coöperates with the differential magnet or magnets 2, connected in shunt across the terminals of the lamp, which terminals are indicated at 3 and 4.

A pivoted armature 5 coöperates with paraboloidal ends 6 of the cores of the series magnet or magnets 1. In a similar manner a pivoted armature 7 coöperates with similarly-shaped core ends of the derived-circuit magnet 2. Fig. 2 shows somewhat more clearly the arrangement of these pivoted armatures. The armature 5 is indicated in Fig. 2 by the corresponding numeral and will be seen to include two openings 8 and 9, which are intended to coöperate with corresponding cores, only one of which appears in the view in Fig. 1, since the other being directly behind the first is concealed thereby. The armature 7 is likewise indicated in Fig. 2, and both of these armatures are carried by forked members, (indicated, respectively, at 8′ and 9′,) the arms of the forks being pivoted together, as indicated at 10.

Returning to Fig. 1, it will be seen that the armature 5 carries the clutch-rod 11, the upper end of which is pivoted to the armature and the lower end to the jaw 12 of the clutch, the other member of which consists of a ring 13, surrounding the carbon or other electrode 14. Integral with the ring 13 is an upwardly-extending arm 15, the top end of which, 16, is bent over so as to engage upon its downward movement a fixed contact 17, which serves the double purpose of completing an electric circuit and of tripping the lamp-clutch. This contact 17 is carried by but insulated from the lamp-frame and is connected electrically to an insulated contact-piece 18, carried by a downwardly-extending arm 19, this arm being joined mechanically to the pivoted member which carries the armature 5. The pivoted member which carries the armature 7 has a similar downwardly-extending arm 20, which carries in its turn an insulated contact 21, this contact being connected electrically, as shown, with the terminal 3 of the lamp. Fig. 3 is a side view showing the downwardly-extending arms 19 and 20. These arms, as will be seen, are urged apart by a compression-spring 22 of moderate force.

Current as it enters the lamp passes through the terminal 3, through the series winding 1, and then to a plate 23, forming a portion of the lamp-frame. The depending rods 24 and 25, which carry the lower carbon and coöperating mechanism, are, however, insulated

from this plate, as shown at 26 and 27. From the plate 23 the current passes through the flexible conductor 28 to the carbon 14, thence to the lower carbon 29, and out of the lamp at the terminal 4. Upon starting the lamp the hooked or overturned end 16 of the upwardly-extending arm 15 of the clutch member 13 rests upon the fixed contact 17, the contacts 21 and 18 being at the same time held apart through the instrumentality of the spring 22. As soon as current passes through the series magnet the armature 5 is attracted, thereby closing the jaw 12 of the clutch and separating the carbons. As the carbons separate the voltage at the terminals of the derived-circuit magnet 2 increases correspondingly, thereby increasing the power of the magnet, which acts in opposition to the magnet 1. The opposing forces of these two magnets compress the spring 22 and bring the contacts 18 and 21 together, after which the carbons continue to separate until the forces of the series and derived-circuit magnets come into equilibrium. As the carbons slowly burn away the derived-circuit magnet temporarily increases in strength and causes a feeding together of the carbons until equilibrium is again reached, this process resulting in a gradual lowering of the upper carbon. This lowering continues until the hooked or overturned end 16 of the clutch mechanism makes contact with the fixed contact 17. This contact completes a short circuit about the series magnet 1, which thereupon instantly loses its power, and the derived-circuit magnet 2 being no longer opposed by the force of the series magnet immediately causes a vigorous and positive downward thrust of the clutch-carrying rod 11, which thereupon trips the clutch-jaw 12 and allows the upper carbon to drop into contact with the lower carbon, whereupon the derived-circuit magnet is deënergized, contacts 18 and 21 open by the spring 22, and the series magnet 1 is again brought into action, after which the operation is again repeated when the parts again reach the feeding-point.

The purpose of the spring-separated contacts 18 and 21 is to enable the lamp to start when the clutch is in its lowest position. In this position the contacts 16 and 17 are together and were it not for the spring-separated contacts would maintain a short circuit about the starting-magnet. After the lamp starts the contacts 18 and 21 automatically close, thereby permitting the proper action of the contacts 16 and 17 when the feeding-point is reached, as has been described above.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an electric-arc lamp, the combination of an arc-striking magnet in series with the arc, a derived-circuit magnet tending to shorten the arc, a shunt-circuit about the arc-striking magnet, and means for maintaining said circuit open when the electrodes of the lamp are together and for closing it when the electrodes are about to feed together.

2. In an electric-arc lamp, the combination of an arc-striking magnet, a clutch mechanism controlled thereby, and means for shunting said magnet as the clutch mechanism commences to trip.

3. The combination of electrodes, a clutch mechanism for one of said electrodes, a magnet coöperating with the clutch mechanism for separating said electrodes, and means for deënergizing said magnet when the clutch mechanism is at one of the limits of its movement.

4. In an electric-arc lamp, the combination of electrodes, a magnet for separating said electrodes, and means for deënergizing said magnet as the electrodes are about to feed together and reënergizing the magnet as the electrodes come together.

5. In an electric-arc lamp, the combination of a series magnet, clutch mechanism controlled thereby, a derived-circuit magnet cooperatively related to the series magnet, and means controlled both by said magnets and said clutch mechanism for closing a circuit about said series magnet.

6. The combination of electrodes, a clutch mechanism operatively related to one of said electrodes, a magnet for operating said clutch mechanism, means for shunting said magnet when said clutch mechanism reaches the feeding-point, and means for opening said shunt-circuit or maintaining it open when said electrodes are in contact.

7. The combination of electrodes, a clutch mechanism operatively related to one of said electrodes, a series magnet, a derived-circuit magnet for controlling said clutch mechanism, and a plurality of circuit-closing devices in series with a circuit in shunt to said series magnet, one of said circuit-closing devices being controlled by the position of the clutch mechanism and another by the opposing force exerted between said series magnet and said derived-circuit magnet.

8. In an electric-arc lamp, the combination of a series magnet, a derived-circuit magnet, and coöperating contacts controlled respectively by said magnets and in a shunt-circuit about said series magnet.

9. In an electric-arc lamp, the combination of a series winding, a derived-circuit winding, and means dependent upon the coöperative action of current in said windings for withdrawing current from the entire series winding.

In witness whereof I have hereunto set my hand this 18th day of May, 1901.

ELIHU THOMSON.

Witnesses:
DUGALD MCK. MCKILLOP,
JOHN J. WALKER.