(No Model.) 2 Sheets—Sheet 1.

J. A. MOSHER.

ELECTRIC ARC LAMP.

No. 582,664. Patented May 18, 1897.

Fig. 1.

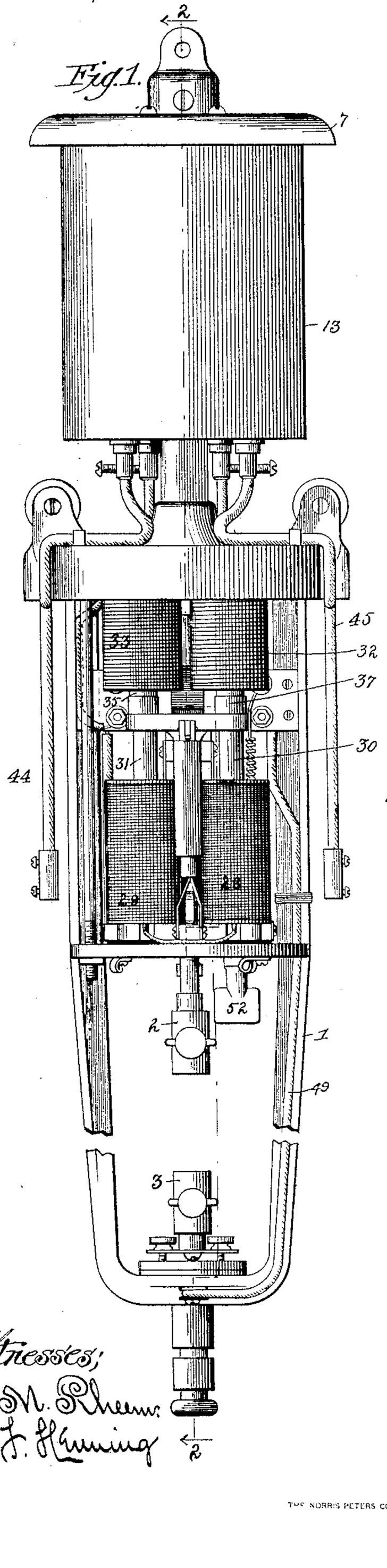
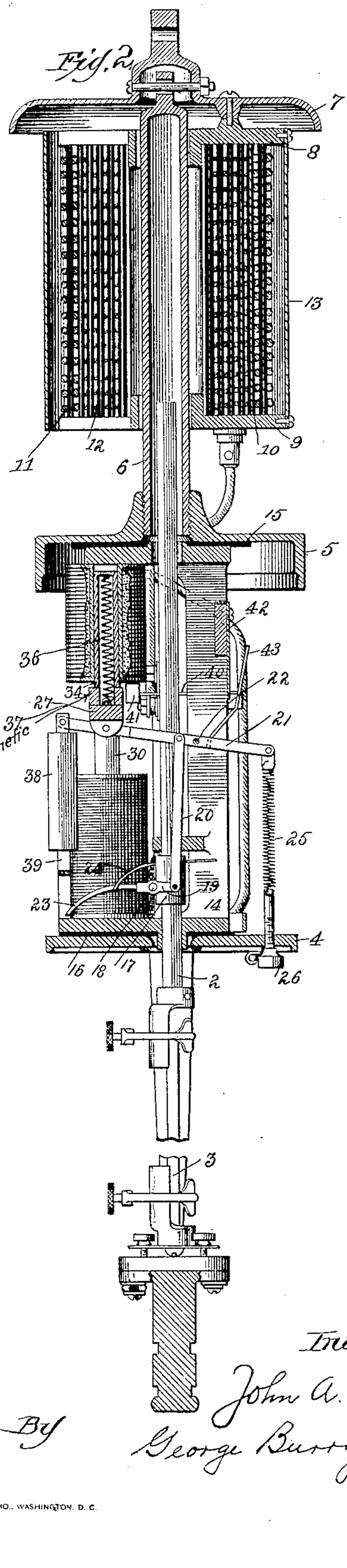


Fig. 2.



Witnesses;
Wm. N. Rheem.
Wm. F. Fleming.

Inventor;
John A. Mosher.
By George Burry Atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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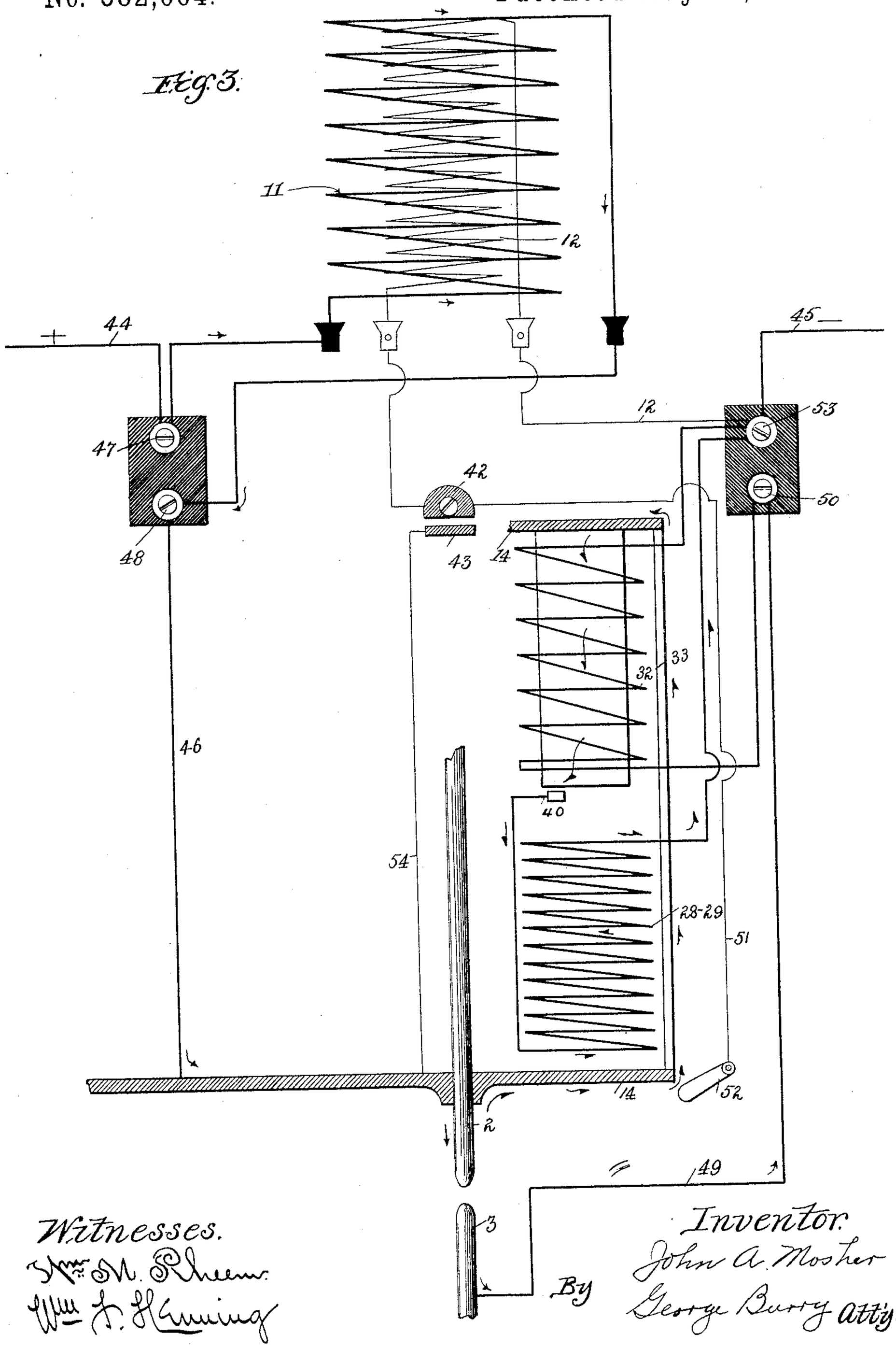
Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN A. MOSHER, OF CHICAGO, ILLINOIS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 582,664, dated May 18, 1897.

Application filed December 17, 1892. Serial No. 455,473. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. MOSHER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, 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, in which—

Figure 1 is a side elevation of a portion of a lamp, the cover which protects the working parts being removed. Fig. 2 is a vertical section on the line 2 2 of Fig. 1. Fig. 3 is a diagrammatic view showing the wire connections.

My invention relates to electric-arc lamps, and has for its object to produce an improved arc-lamp provided with means for maintaining the strength of the current constant whether the lamp is burning or not and which will thereby be adapted for use on an incandescent circuit.

Another object of my invention is to improve the construction and operation of arc-lamps in general.

I accomplish these objects as illustrated in the drawings and as hereinafter specified.

That which I regard as new will be set forth in the claims.

In the drawings, 1 indicates the frame of the lamp, which is of the usual construction.

2 indicates a carbon rod mounted in the frame 1 and vertically movable in the usual manner.

3 indicates a lower carbon-holding clamp supported at the lower end of the frame 1, as shown in Figs. 1 and 2.

4 indicates a plate mounted horizontally in the upper portion of the frame 1 and adapted to support the mechanism for controlling the feeding of the carbon.

5 indicates an upper protecting-plate mounted a short distance above the plate 4.

6 indicates a tube which is carried by the plate 5 and rises centrally therefrom, as shown in Fig. 2.

7 indicates a protecting-plate mounted at the upper end of the tube 6, as shown in Fig. 2.

8 and 9 indicate the upper and lower plates of a framework, carried on and supported by the plate 7, under which they are placed.

10 indicates insulating-strips which extend between the plates 8 and 9 at short intervals apart and serve to carry the two resistance-coils 11 and 12. The coil 11 is the one usually employed in lamps used in circuit of constant potential. The resistance of the coil 12 is about equal to the resistance of the lamp when burning. The coil 12 is considerably longer than the coil 11 and is made of finer wire, so that its resistance is much greater. It is preferably placed within the coil 11, as shown, but it may be placed otherwise and need not be in the form of a coil, the essential thing being the resistance.

13 indicates a protecting-case which incloses the coils 11 and 12, as shown in Figs. 1 and 2. The object of the coils 11 and 12 will be set forth more fully hereinafter.

14 indicates a framework which is mounted between the upper and lower plates 4 and 5 and is insulated therefrom by any suitable material 15 and 16, as shown in Fig. 2.

The clutch 17 is of the form shown and described in Letters Patent No. 446,459, granted to me February 17, 1891, and consists of a block through which the carbon-rod 2 passes vertically, as shown in Fig. 2. The clutch-block is mounted upon a rock-shaft 18, which carries a lever 19 at one end, as shown in Fig. 2. One end of the lever 19 is connected by a connecting-rod 20 to a lever 21, mounted upon a pivot 22 in the frame 14, as shown in Fig. 2. To the opposite end of the lever 19 is connected a downwardly-projecting arm, the end of which is adapted to be moved into engagement with some fixed object—as, for instance, the bottom of the frame 14—when the clutch 17 is moved downward.

24 indicates a spring which is mounted in the frame 14 and bears downward on the arm 23.

25 indicates a spring which at its upper end is connected to the lever 21 on the opposite side of the pivot 22 from that to which the connecting-rod 20 is connected to said lever. The lower end of the spring is connected to a pin 26, attached to the plate 4. By this construction when the connecting-rod 20 and the arm of the lever 19, to which it is attached, are in an elevated position the arm 23 is thrown

downward. The arrangement of the clutch 17 is such that when the parts are in this position the carbon-rod 2 will be firmly held by the clutch and prevented from moving downward independently thereof.

27 indicates an armature which is mounted upon the lever 21 on the same side of the pivot 22 as the connecting-rod 20, as best shown in Fig. 2.

28 and 29 indicate a pair of solenoids mounted vertically upon the base-plate of the frame 14 immediately under the armature 27, as shown in Figs. 1 and 2. The solenoids 28 and 29 are of fine wire and are connected in shunt with the main circuit of the lamp.

30 and 31 indicate two soft-iron cores which are fitted in the solenoids 28 and 29, respectively, and are vertically movable therein. The upper ends of the cores 30 and 31 are secured to the armature 27, whereby by moving the armature 27 vertically the cores 30 and 31 will be moved into or withdrawn from their respective solenoids.

32 and 33 indicate a second pair of solenoids which are supported from the upper portion of the frame 14 immediately over the solenoids 28 and 29. The solenoids 32 and 33 are composed of coarse wire and form part of the main circuit of the lamp.

34 and 35 indicate hollow cores which are fitted into the solenoids 32 and 33, respectively, and are vertically movable therein, and when the lamp is in operation they are held constantly in their highest position.

36 indicates springs the upper ends of which are secured in the upper ends of the cores 34 and 35, and the lower ends are secured to the armature 27.

37 indicates non-magnetic blocks which rest upon the upper side of the armature 27 under each core 34 and 35, as best shown in Figs. 1 and 2. The blocks 37 are perforated to permit the passage of the springs 36. By this construction the lower ends of the cores 34 and 35, which rest upon the non-magnetic blocks 37, are held at a distance from the armature 27, thereby preventing the armature from adhering to the cores when they are magnetized. By providing the springs 36, as above described, the upward pull on the armature 27 is rendered more uniform, for when the armature 27 is at its greatest distance from the cores 34 and 35, and therefore least under the influence of their magnetism, the springs are at their greatest tension and therefore pulling upward most strongly. As the armature approaches the cores 34 and 35 the tension of the springs becomes less and their strength is correspondingly diminished.

The tube 38 and the plunger 39 constitute the usual dash-pot, which is connected to the end of the lever 21 and supported upon the frame 14 and is for the purpose of preventing "pumping" as used in the art.

40 indicates a spring cut-out, which is in circuit with the shunt-solenoids 28 and 29 and is provided with an armature 41, located near the solenoid 33, which has an iron end.

The arrangement is such that when the lamp is not in circuit the armature 41 will be out of contact with the iron end of the solenoid 33. When the lamp is burning, the iron head of the solenoid 33, being magnetized, will attract the armature 41, thereby closing the circuit through the shunt-solenoids. By this construction if for any cause the solenoids should cease to attract the armature 41 the shunt-solenoids will be at once cut out, instead of being burned out.

42 indicates a contact-plate which is electrically connected with the resistance-coil 12.

43 indicates a contact-plate carried by the lever 21 and adapted to be moved into engagement with the contact-plate 42 when said lever is in the position which it occupies when the lamp is not burning. When the lamp is burning, the passage of the current through the solenoids 32 and 33 will raise the armature 27, thereby depressing the opposite end of the lever 21 and throwing the contact-plate 43 out of contact with the plate 42. The object of this construction will be hereinafter set forth.

44 and 45 indicate the line-wire connections, the current passing in on wire 44 and out on wire 45. The wire 44 is connected to the resistance-coil 11, which is used on circuits of constant potential and which in turn is connected by wire 46 to the frame 14, which supports the solenoids 28 29 and 32 33, as shown in Fig. 3.

47 and 48 indicate binding-posts, by means of which the above-mentioned connections are made, as best shown in Fig. 3.

49 indicates a wire which extends from the lower carbon 3 to a binding-post 50.

52 indicates a switch mounted upon the lower plate 4, but insulated from the frame 14. The switch 52 is adapted to be moved into contact with the frame 14, as shown in Fig. 3. One end of the wires which compose the solenoids 28 and 29 is connected, as hereinbefore stated, with the cut-out 40, the other end being connected to a binding-post 53, as shown in Fig. 3. One end of the wires which compose the solenoids 32 and 33 is connected to the binding-post 50, the other end being connected to the binding-post 53. One end of the wire which composes the resistance-coil 12 is connected to the binding-post 53, the other end being connected to the switch 52, as shown in Fig. 3.

54 indicates a wire which connects the frame 14 with the contact-plate 43, as shown in Fig. 3, in which the contact-plate 42 is shown opposite the plate 43 and connected to one end of the wire which forms the coil 12.

The course of the current is as follows: The switch 52 being open the current passes in on wire 44, thence through coil 11, and along wire 46 to the frame 14. The greater portion of

the current thence passes through the carbon 2 to carbon 3, forming the arc, thence along wire 49 to the binding-post 50, thence through the solenoids 32 and 33 to the wire 45. A greater or less portion of the current will pass from the frame 14 through the cut-out 40 and 41 and the shunt-solenoids 28 and 29 to wire 45. If the lamp for any cause should go out, the circuit will be closed through the contact-plates 42 and 43, above described, and the current, instead of passing through the carbons 2 and 3 and the solenoids 32 and 33, will pass along wire 54 and the contact-plates 42 and 43 to the resistance-coil 12, and thence out through wire 45. By closing the switch 52, instead of passing through the carbons 2 and 3, the current will pass through the switch to the resistance-coil 12, and thence out by wire 45. By this arrangement the strength of the current is made constant whether the lamp is burning or not, for, as hereinbefore stated, the resistance of the coil 12 is equal to the resistance of the lamp when burning. It is also impossible to burn out the shunt-solenoids, because if the lamp should go out for any cause the cut-out 40 will operate to cut out the shunt-solenoids.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of an electromagnet, an armature under its influence but separated therefrom by a non-magnetic block or substance, and a spring connected with and influencing the armature in the same direction as the magnet, all so arranged that when the armature is least influenced by the magnet it is most influenced by the spring, substantially as described.

2. The combination of a solenoid, a movable core working therein, an armature influenced by but separated from the magnetized core, and a spring connecting the core with the armature and influencing the armature in the same direction as the magnetized core, all so arranged that when the armature is least influenced by the magnet it is most influenced by the spring, substantially as described.

3. The combination of a solenoid, a movable core working therein, an armature influenced by the magnetized core, but separated therefrom by a non-magnetic block or substance, and a spring connecting the core with the armature and influencing the armature in the same direction as the magnetized core, all so arranged that when the armature is least influenced by the magnet it is most influenced by the spring, substantially as described.

4. The combination of a solenoid, a hollow, movable core working therein, an armature under the influence of the magnetized core, but separated therefrom by a non-magnetic block or substance, a spring in the hollow core and passing through the non-magnetic substance and connecting the core with and influencing the armature in the same direction as the magnetized core, all so arranged that when the armature is least influenced by the magnet it is most influenced by the spring, substantially as described.

5. The combination of a solenoid, a movable core therein, an armature under the influence of the magnetized core but separated therefrom and a spring acting upon said armature, substantially as described.

6. The combination with an armature 27, main-circuit solenoids 32 and 33, cores 34 and 35 in said solenoids, springs 36 in said cores and secured to said cores at their upper ends, their lower ends being secured to the armature, non-magnetic blocks or substances 37 between the cores and the armature, of shunt-solenoids under said armature with cores therein connected to said armature, substantially as described.

JOHN A. MOSHER.

Witnesses:
CHARLES H. JACKSON,
EDWIN M. MCKINNEY.