

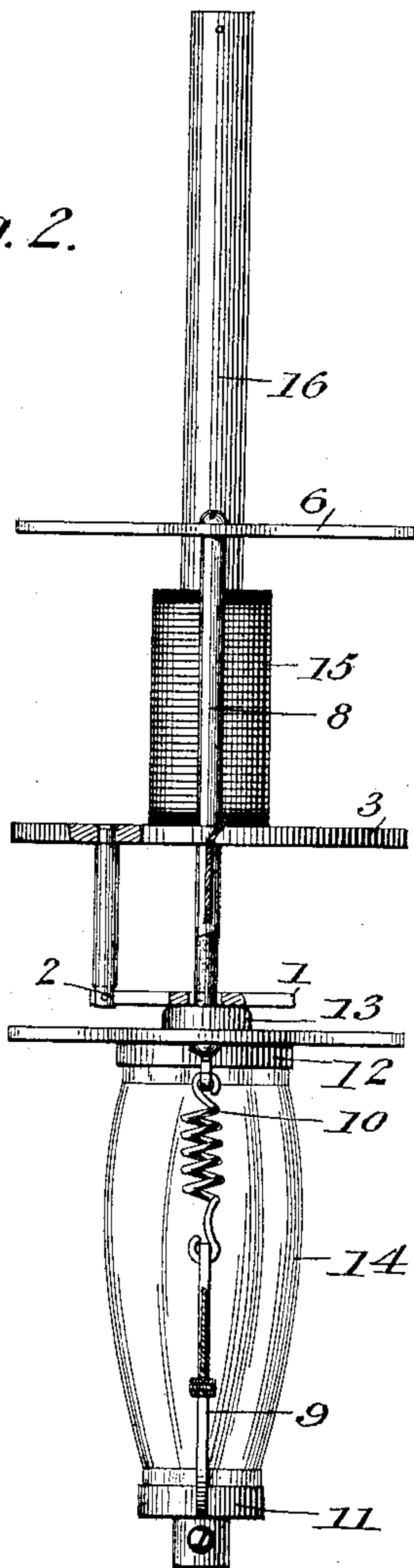
(No Model.)

J. H. DUNCAN.  
ELECTRIC ARC LAMP.

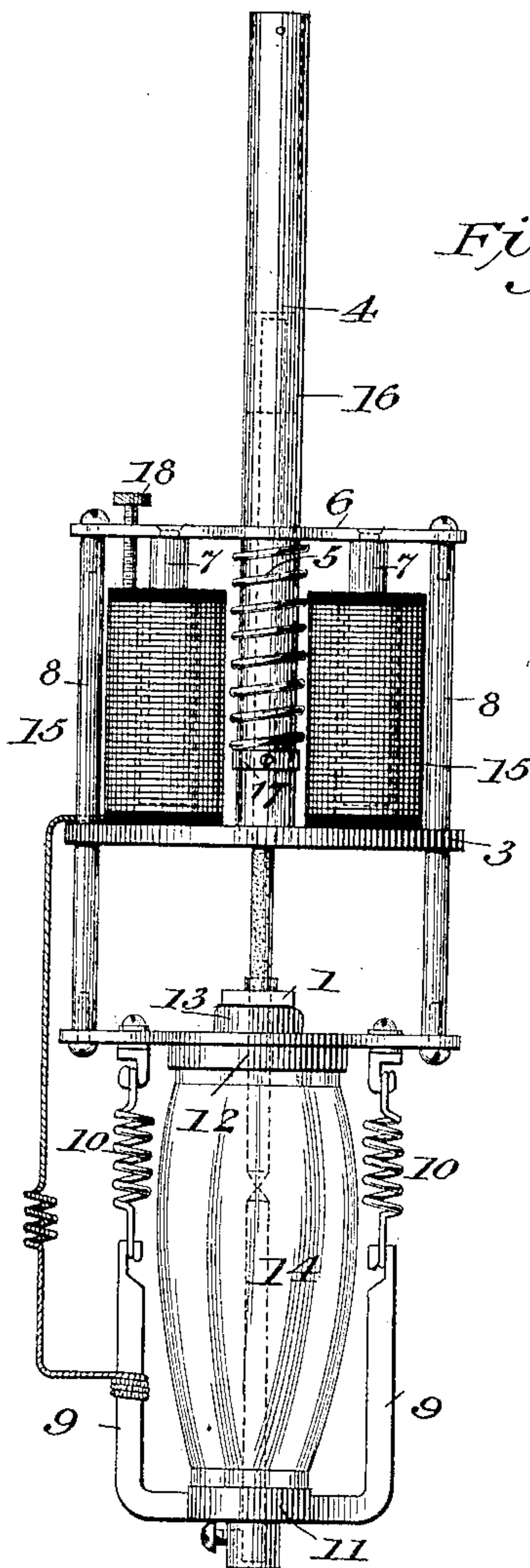
No. 600,277.

Patented Mar. 8, 1898.

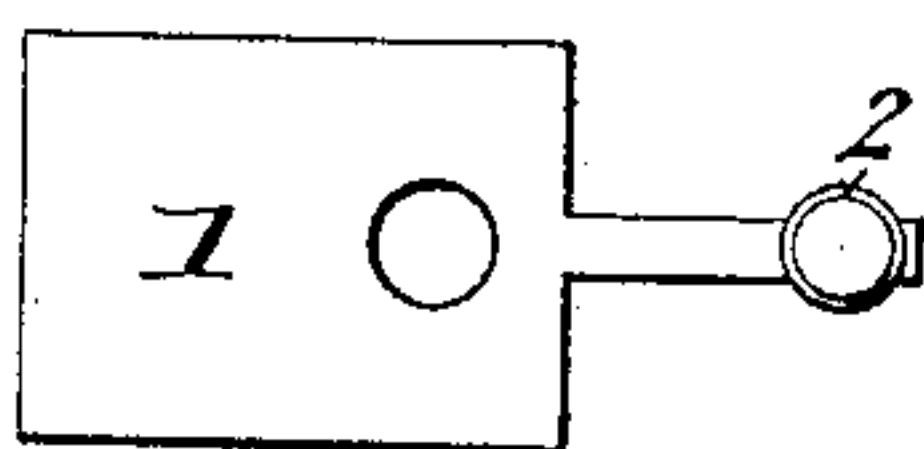
*Fig. 2.*



*Fig. 1.*



*Fig. 3.*



*Witnesses.*

*Chas. S. Ackermann*

*Wm. V. Lockwood*

*Inventor.*

*James Henry Duncan*  
*by J. P. Medina*  
*His Attorney*



# UNITED STATES PATENT OFFICE.

JAMES HENRY DUNCAN, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO  
ROBERT BRUCE ELDER, OF SAME PLACE.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 600,277, dated March 8, 1898.

Application filed July 13, 1897. Serial No. 644,440½. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES HENRY DUNCAN, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Apparatus for Lighting by Electricity; and I do hereby declare the following to be a full and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

The kind of arc-lamp to which my improvement especially relates is the kind using an inner globe of glass around the carbons. These lamps as hitherto constructed are complicated and expensive, their operation attended with waste, and the trimming of their carbons accomplished with difficulty.

The object of the within-described improvement is to lessen the first cost of manufacture by simplifying the design, to lessen the cost of operating, as will more fully appear in this specification, and to facilitate the operation of trimming the carbons.

More specifically this invention relates to improvements in the mode of alining, clutching, and feeding the carbons and of springing the arc.

For a more comprehensive understanding of my invention reference is had to the accompanying drawings, of which—

Figures 1 and 2 are general sectional views of the lamp; and Fig. 3, a view of a certain detail—namely, the clutch.

This clutch 1 has this peculiarity, that it is disconnected from all electromagnetic control. It is simply a gravity-clutch hinged at 2, supported from base 3, and by its stationary character adapted, in conjunction with the sliding contact 4, to keep the upper carbon in alinement. Its further characteristics will appear when we come to examine the process of springing the arc and feeding the carbons.

A further new and useful device in arc-lamps is claimed in the lower frame, which is a device for springing the arc and tripping the clutch and consists of a spring 5, armature 6, plungers 7, connecting-rods 8, springs 10, lower globe and carbon holder 11, upper-globe holder 12, gas-check 13, and inner globe 14, of which the essential parts are the means

for springing the arc and tripping the clutch, as will further appear.

The spring 5 acts like a dash-pot on starting the arc and is further used to regulate the normal length of the arc by altering its tension. This is done by shifting the movable collar 17. This spring is further used to hold the carbons together when no current is passing and to give upward motion to the lower frame. The armatures and plungers 6 and 7 are acted on by the solenoids 15, these being supported and magnetically yoked by the base 3, which is also rigidly attached to the dome 16. The connecting-rods 8 serve to communicate the motion imparted by the magnetism of the solenoids 15 or the resiliency of the spring 5 to other parts of the lower frame. The lower globe and carbon holder 11, with its upright arms 9, springs 10, and globe 14, serves to unite the upper and lower parts of the lower frame.

From the foregoing description the operation of the lamp will be readily understood. When no current is passing, the carbons are in contact. The outer edge of clutch 1 is resting on the top of the gas-check 13 and the upper carbon is supported on the lower carbon by the upward pressure of the spring 5 through the lower frame. When current starts, the solenoids 15 become energized and attract the plungers 7 and armature 6. The lower frame moves to a distance downward determined by the adjusted resistance of the spring 5 and absolutely limited by the set-screw 18. It is then that the gravity-controlled clutch 1 grips the upper carbon positively and with comparative freedom from slip that may be caused by the jars and vibrations of a movable clutch. The carbons are separated to the adjusted length of the arc, and so the arc is sprung. It is thus seen that striking the arc is accomplished simply by giving motion electromagnetically to the lower frame. It will now be seen that feeding is also accomplished by precisely the same means, for while the arc is burning, an upward movement of the lower frame tends to be imparted by the spring 5, as the arc tends to increase beyond its normal length by the consumption of the carbons and the current through the solenoids becomes weaker by the added resistance of



the arc. The upward movement of the lower frame brings its top surface in contact with the clutch, lifting said clutch and allowing the upper carbon to fall. This renews the strength of the solenoids by shortening the arc again and the lower frame is once more depressed. Now a little consideration will show that both these upward movements and the following downward movements are from the nature of the combination infinitesimal in their lengths, the one following the other within such short distances and times as to make the arc appear of stationary length, and thus the feeding is accomplished by the action of the lower frame, which operates the upper-carbon clutch as well as its own carbon-holder and obviates all necessity for electromagnetic control of the upper-carbon clutch. This relation between the clutch and the lower frame is found to increase the sensitiveness of control of the lamp, so that an arc of sev-

enty or eighty volts can be maintained with a current of from two and a half to two amperes.

Having described my invention, what I claim as new, and desire to secure protection in by Letters Patent of the United States, is—

In an arc-lamp, the combination of a fixed upper frame or base carrying the actuating-magnets, upper carbon and clutch mechanism therefor, a lower movable frame normally upheld by a spring carrying the lower carbon and acting as a trip for the clutch mechanism and connections, whereby the lower movable frame is controlled by the actuating-magnets.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

JAMES HENRY DUNCAN.

Witnesses:

CHAS. L. ACKERMANN,  
M. CONNOR.