E. THOMSON.

ARC LAMP.

APPLICATION FILED DEC. 1, 1909.

1,041,197.

Patented Oct. 15, 1912.

2 SHEETS—SHEET 1.

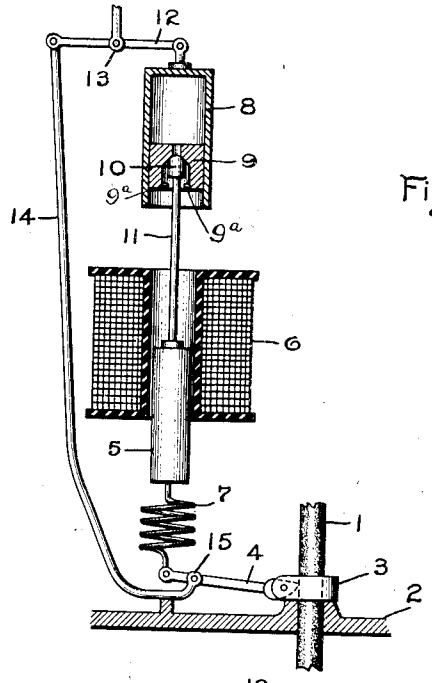

Fig. 1.

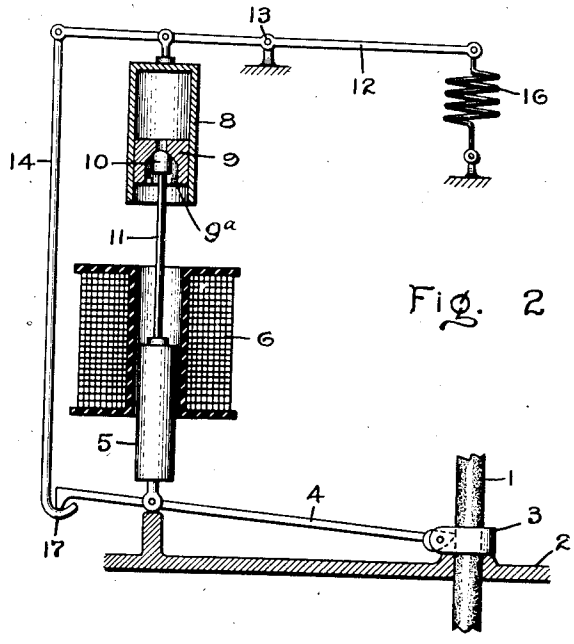

Fig. 2

WITNESSES:

Lester H. Fulmer.

J. Ellis Glen

INVENTOR

ELIHU THOMSON.

BY Albert G. Davis

HIS ATTORNEY.

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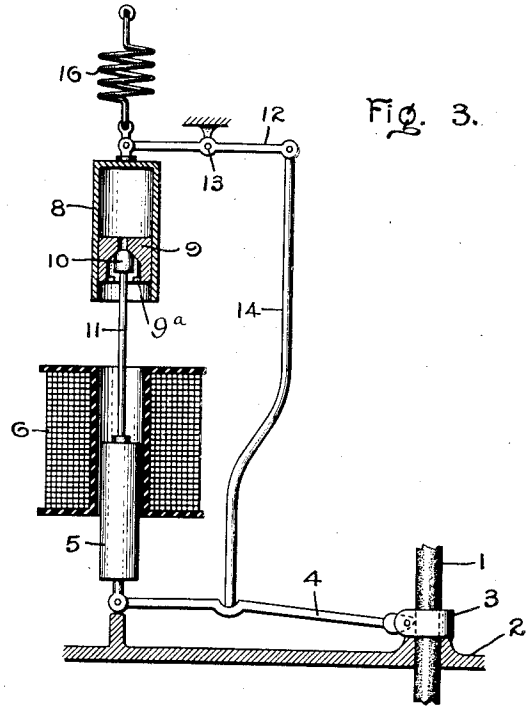

Fig. 3.

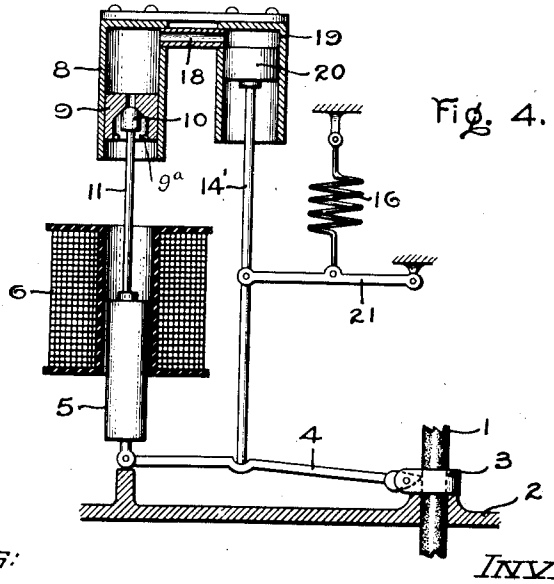

Fig. 4.

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UNITED STATES PATENT OFFICE.

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

ARC-LAMP.

1,041,197. Specification of Letters Patent. Patented Oct. 15, 1912.

Application filed December 1, 1909. Serial No. 530,711.

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.

This invention relates to electric lighting, and more especially to electric arc lamps. It is customary to lift the upper electrode of such lamps by means of a friction clutch, consisting, for instance, of a ring encircling the electrode and having pivoted in one side a lever whose toe bites the electrode when the outer end of said lever is lifted by the lamp magnet or solenoid. It may happen that the action of the solenoid is so sudden that the clutch is thrown up with a violent motion which causes it to lose its grip.

The object of the present invention is to secure freedom from this slip or vibration of the clutching action in lifting the electrode. Heretofore it has been proposed to attain this result by using a dead resistance to the movement of the lever, but this involves putting some additional work on the lamp mechanism, and I have therefore designed a checking device in which the steadying effect of a dash pot is utilized, causing the incipient motion of the lever to develop the air pressure which produces this effect, said pressure being afterward dissipated.

In the accompanying drawings, Figure 1 is a diagrammatic section of a portion of the operating mechanism of an arc lamp embodying one form of my invention. Figs. 2, 3 and 4 are respectively similar sections of mechanism showing modifications of the same idea.

The electrode 1 is the upper electrode of the lamp, and passes through an orifice in the stationary platform 2 of the lamp frame. The clutch ring 3 encircles the electrode, and has pivoted in one side the clutch lever 4, whose toe is adapted to bite against the side of the electrode and lift it when the ring is lifted. When the ring drops upon the platform, the clutch is released to let the electrode feed downward.

The free end of the lever is connected to the lower end of the movable core 5 of a stationary solenoid 6. In Fig. 1 a helical spring 7 is interposed between the lever and the core, but in the other figures this spring is omitted; though its use is optional in any of the forms shown. In axial alinement with the core is the cylinder 8 of a dash pot, whose piston 9 has an aperture controlled by a valve 10 carried on the upper end of a piston rod 11 preferably attached to the upper end of the core. The piston moves somewhat stiffly in the dash pot, so that when the core rises the valve will close the aperture and restrain the escape of air from above the piston as it is pushed up by the core, thus causing a compression of the air in the upper part of the cylinder. I utilize this air pressure to steady the movement of the clutch lever, and the several figures of the drawings show several ways of doing this.

In Fig. 1 the cylinder 8 is suspended from one end of a lever 12, fulcrumed at 13. The other end of said lever is pivoted to a rod 14 which extends downwardly and has its lower end pivoted to the clutch lever, at a point 15 between the clutch ring and the end of the lever where the core is connected. The operation of this structure is, as follows:—When the solenoid is energized, the core is lifted and with it the piston of the dash pot, producing a compression of the air in the cylinder, which forces the cylinder upward. By reason of its attachment to the lever 12, this movement of the cylinder produces a downward thrust on the rod 14, and this thrust is communicated to the clutch lever in such manner as to check any tendency of said lever to be thrown upward violently by the sudden movement of the core. The lever is shifted, but so steadily as to engage the electrode surely and without vibration, thus avoiding all chattering of the electrode or the possibility of its slipping through the clutch ring.

In Fig. 2, the cylinder is suspended as before from a lever 12, and its weight is counterbalanced by the spring 16 attached to said lever on the other side of its fulcrum 13. The rod 14 depending from the lever, is not positively attached to the clutch lever but has a hooked end 17 engaging under the end of the clutch lever at a point beyond the point of attachment of the core, and not as in the former instance, between said point and the clutch ring. The operation is, however, substantially the same as before. The upward pull on the rod 14, due to the compression of the air in the upper part of the cylinder, produces on the outer end of the

clutch lever an upward lift greater than that of the core. The lever, pivoting on the lower end of the core, exerts a downward push on the clutch ring, and so prevents it from being thrown violently upward by the pull of the core. As the air leaks out of the cylinder, this holding down action gradually diminishes, allowing finally the lifting of the clutch ring.

In Fig. 3 the weight of the cylinder is counterbalanced by the spring 16, which, in this instance, is arranged in line with said cylinder, and the movement of the cylinder is communicated by the lever 12 to the rod 14 whose lower end in this instance rests on the clutch lever at a point between the clutch ring and the core of the solenoid. Here, as in Fig. 1, the push of the rod is downward, and the steadying effect is evident.

In Fig. 4, the cylinder 8 is stationary, and communicates by a pipe 18 with a second cylinder 19 in which is a piston 20 whose rod 14′ rests on the clutch lever at a point between the clutch ring and the core. The weight of this piston and rod is counterbalanced by the pivoted arm 21 and the spring 16, so that these parts do not exert any dead resistance upon the clutch lever. This also is true of the other modifications, the weight of the rod in Figs. 1 and 3 being counterbalanced by that of the cylinder, while in Fig. 2 the rod does not rest upon the clutch lever. In other words, in all of these embodiments of my invention, the lifting lever is perfectly free to move under the influence of the lifting magnet, but the instant after it begins to move, the dash pot exerts a steadying effect upon it to check any tendency to violent and excessive movement, liable to let the electrode slip or chatter.

In all these modifications, it will be seen that when the core descends it positively pulls down the piston of the dash pot, after opening the valve, the latter being arrested by a number of pins 9^a projecting from the valve cavity into the path of the valve 10. In this manner there is provided a means for producing an initial damping action when the core first exerts its lifting effect, and this is all that is required, because after the clutch has gripped, and the core of the magnet has lifted the electrode, the grip of the clutch is secure. The leaking of the air from the dash pot is therefore of no consequence after the first steadying effect has been secured.

While I have shown a ring and lever as constituting the clutch, it is evident that any type of clutch may be used which can be tightened by a downward pressure between the electrode and the lifting core.

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 with the arc establishing clutch, the lever for operating the same and the electromagnet for actuating the lever, of means for damping the action of the electromagnet and for reinforcing the bite of the clutch by and in accordance with the action of the electromagnet.

2. In an electric arc lamp, the combination with the arc establishing clutch, the lever for operating the same and the electromagnet for actuating the lever, of a dash-pot having two mutually reacting movable members, one of said members being operatively connected with the armature of the magnet and the other reacting upon the clutch lever to re-inforce the bite of the clutch by and in accordance with the action of the electromagnet.

3. In an electric arc lamp, the combination with the clutch, of a lever for operating the same, a lamp magnet having a movable core attached to said lever, a dash pot for said core having its cylinder movable, and means for reinforcing the bite of the clutch by the movement of said cylinder.

4. In an electric arc lamp, the combination with the clutch, of a lever for operating the same, a lamp magnet having its core attached to said lever, a dash pot for said core, a lever to which the cylinder of said dash pot is attached, and a rod attached to said second lever and acting upon the clutch lever to reinforce the bite of the clutch.

5. In an electric arc lamp, the combination with the clutch, of a lever for operating the same, a lamp magnet having its core attached to said lever, a dash pot for said core, a lever to which the cylinder of said dash pot is attached, and a rod attached to said second lever and engaging with the clutch lever at a point between the clutch and the point of attachment of the core to said clutch lever.

6. In an arc lamp, a clutch, means for operating said clutch and means dependent upon and responsive to the movement of said first named means for reinforcing the bite of the clutch.

In witness whereof, I have hereunto set my hand this 29th day of November, 1909.

ELIHU THOMSON.

Witnesses:
JOHN A. MCMANUS, Jr.,
CHARLES A. BARNARD.