(No Model.)

A. G. WATERHOUSE.

ELECTRIC ARC LAMP.

No. 451,250. Patented Apr. 28, 1891.

Fig. 1.

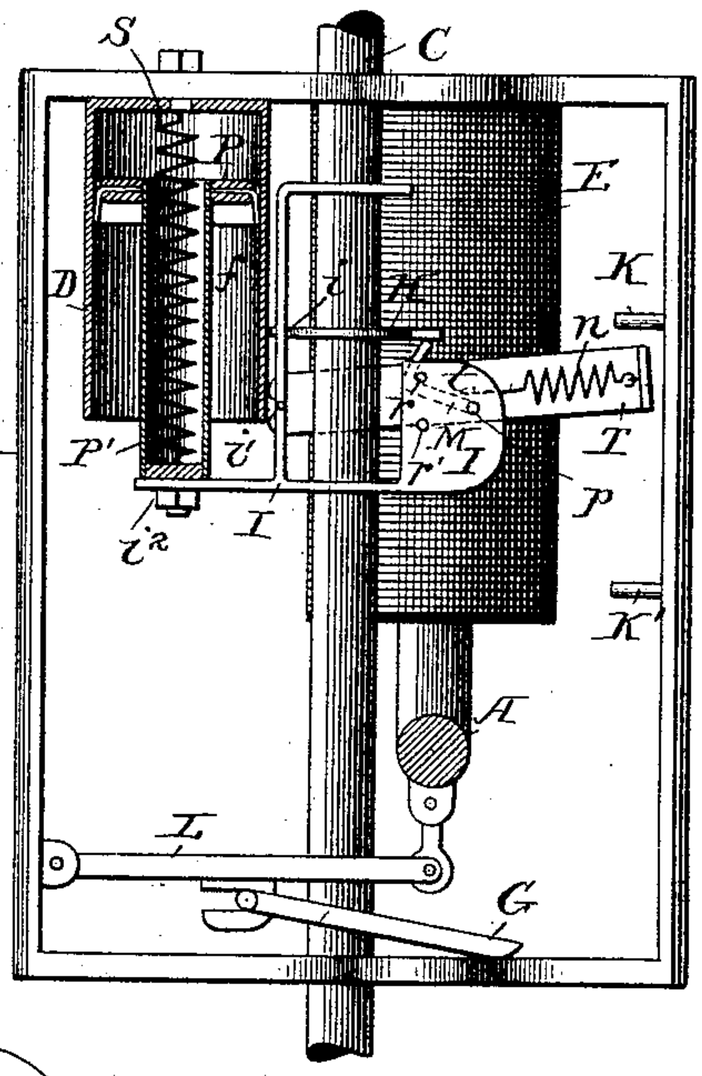


Fig. 2.

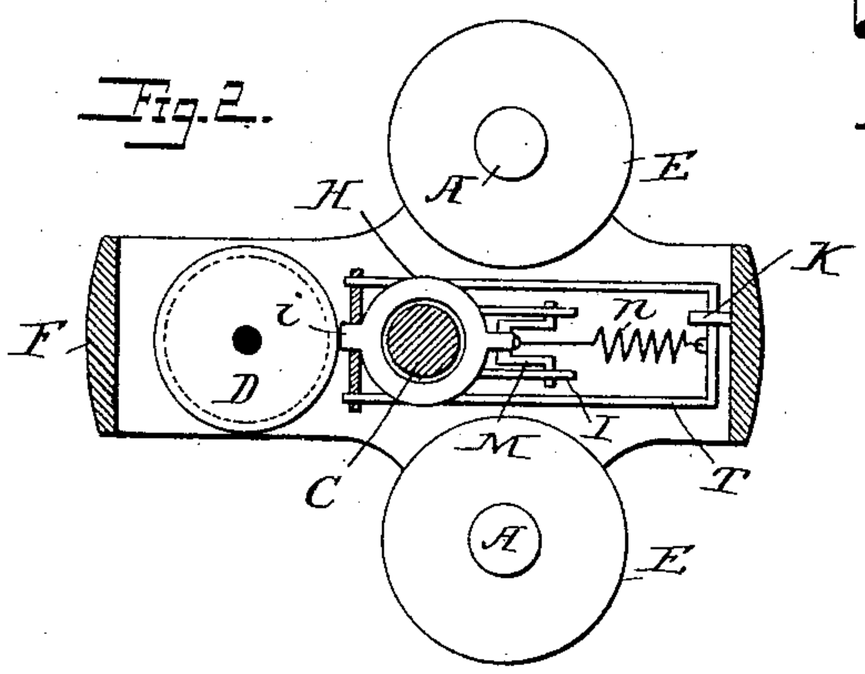


Fig. 3.

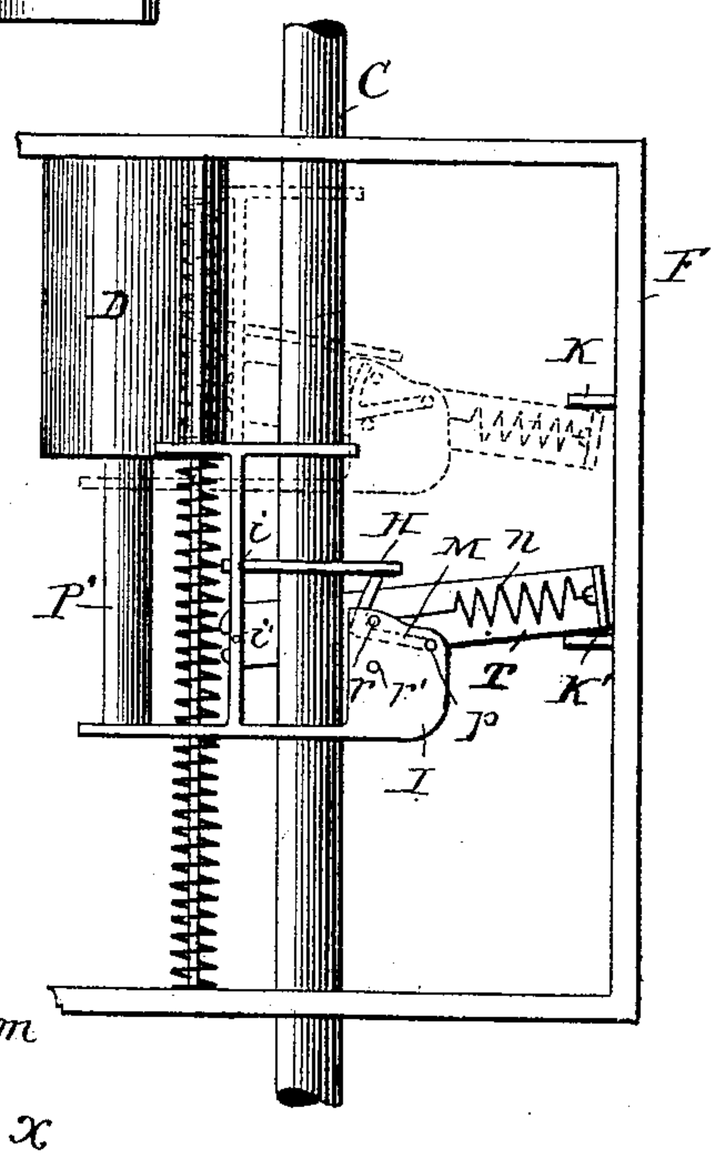


Fig. 4.

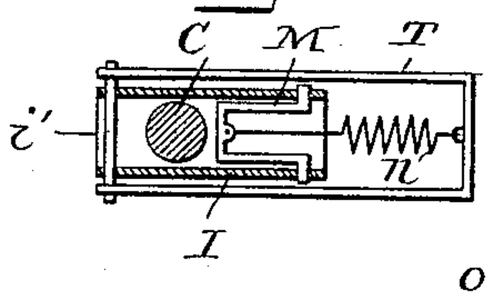
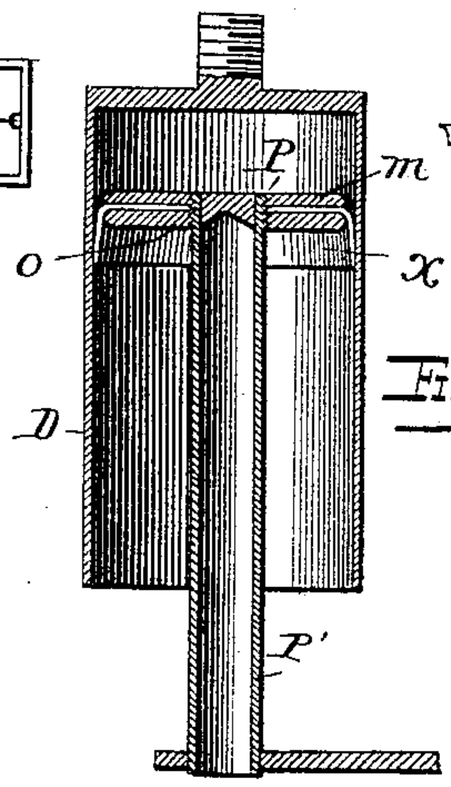


Fig. 5.



WITNESSES

Jno. G. Hinkel

H. S. McArthur

INVENTOR

A. G. Waterhouse

by Fackler & Freeman

Attorney's

UNITED STATES PATENT OFFICE.

ADDISON G. WATERHOUSE, OF HARTFORD, CONNECTICUT.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 451,250, dated April 28, 1891.

Application filed July 3, 1890. Serial No. 357,700. (No model.)

To all whom it may concern:

Be it known that I, ADDISON G. WATERHOUSE, a citizen of the United States, and a resident of Hartford, in the State of Connecticut, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates to the construction of electric-arc lamps to improve the certainty of action in evenly feeding the carbons together as they are consumed, and in providing a peculiar form of dash-pot.

My invention consists in certain details of construction and combinations of parts described in connection with the accompanying drawings, and will be set forth in the claims.

The feeding mechanism herein described consists of two separate and independently actuating clutches which engage the carbon-rod, one clutch being actuated by the regulating-magnets of the lamps, by means of which the carbons are separated and allowed to feed together by gravitation as they are consumed in the manner common in arc lamps. This I call the "regulating-clutch." The second clutch, which I call the "retarding-clutch," is made to engage the rod and be carried down with it as it feeds; but this clutch is attached to a dash-pot, which only permits it and the rod which moves it to move very slowly, so that after the carbons have fed so as to compensate for the distance burned away the magnets, by means of the regulating-clutch, have plenty of time to arrest any undue descent of the upper carbon. This second or retarding clutch is provided, as stated, with a dash-pot, and also with a counter-weight or a lifting or retraction spring for raising the clutch up to its highest position after it has been drawn down by the carbon-rod to a fixed point. There is also provided with this clutch what I call a "trigger," which liberates the clutch from the rod after it has been drawn down a certain distance, which allows the retraction-spring to quickly draw the clutch back or up to its higher position, when the trigger again causes the clutch to engage the rod and be ready for another slow descent.

Another feature of my invention is the peculiar form of dash-pot used, and to be hereinafter described.

Figure 1 is a part sectional elevation of that part of an arc lamp which embodies my invention. Fig. 2 is a plan of Fig. 1. Fig. 3 is a sectional elevation of the retarding-clutch and its belongings, shown by means of dot lines in two positions. Fig. 4 is a plan of part of Fig. 3. Fig. 5 is a sectional elevation of the dash-pot.

At first I will refer to Fig. 1, in which E indicates any form of electro-magnet used for regulating the arc. F is the frame of a lamp; C, the carbon-rod; A, the armature actuated by the magnets E. L is the clutch-lever, which is moved by the armature A and in which the regulating-clutch G is hung. H is the retarding-clutch, supported in the sliding frame I The clutch H surrounds the rod C and is hung to the frame I at *i*. The frame I is connected to the dash-pot plunger P, which is so formed as to move slowly in the dash-pot D while moving down, but can move quickly while moving up. The spring S is made to lift the sliding frame I, with the clutch H, up to the top of the lamp-frame F whenever the clutch H is disengaged from the carbon-rod C, so that it can slide up the rod. T is the trigger, which is pivoted to the sliding frame at i' and is provided with a spring n, one end of which is connected to the trigger at t and the other end is connected at t' to a snap-hammer M. This hammer M is free to swing upon its pivots p, between the two stop-pins r and r', as the trigger T is swung up or down past the plane of the two pivots i' and p. The spring n snaps the hammer M from one of the stops r r' to the other, as in Fig. 1. The trigger T, being inclined upward, causes the spring n to hold the hammer M against the stop r. This causes the bent point of the hammer M to hold the free end of the clutch H up, so that it will lie horizontally across the carbon-rod C, and will not allow it to engage or grip it. In this condition the clutch H and frame I is free to move up the rod C. Therefore the spring S, which in this case is connected at the top of the dash-pot D, which is rigidly fixed to the lamp-frame F, while the other end is stretched out and connected to the sliding frame I at i^2, immediately draws the frame I and clutch H up toward the top of the lamp-frame F. As the spring S draws

the frame I and clutch H up the rod the trigger T strikes against the stationary pin K. This swings the trigger T down as the frame I, upon which it is pivoted, moves up, until the angle of T passes the plane of the two pivots *i* and *p*, when the spring *n* causes the hammer M to snap from the stop *r* to the lower stop *r'*, thus allowing the free end of the clutch H to fall and grip the rod C, so that the frame I and clutch H cannot be moved up any higher by the spring S. Now as the clutch H has gripped the rod C the rod is fed downward by the action of the magnets E, acting through the lever, regulating-clutch G causes the rod C to feed downward, and in most cases where a clutch is used this downward motion would be too quick for the magnets E to arrest in time, so that the carbons would be brought too close together. This trouble is avoided by means of the retarding-clutch H, which, as shown, has engaged the rod C, so that the rod cannot move down without carrying the clutch H with it, and they both cannot move faster than the dash-pot D will allow its plunger to move, which in this case is very slow, so that as the rod C slowly descends and brings the carbon points (not shown herein, as it is not necessary) together the magnets E have ample time to act through the regulating-clutch G and arrest the motion of rod C. The downward motion of the clutch H can be prolonged for any convenient distance. I propose such a length of movement as will represent the downward feed of carbons for one hour's burning. After the clutch H and frame I has been drawn down a certain distance the trigger T will strike upon the lower stop or reversing pin K', so, as the frame I moves down, the angle of the trigger T will be forced up until it passes the plane of the two pivots *i* and *p*, when the spring *n* will snap the hammer M from stop *r'* to *r*. This will cause the bent point of the hammer M to strike the clutch H and force it up to a horizontal position, where it will hold it, as shown in Fig. 1, thereby freeing the clutch from the rod C and allowing the spring S to draw the frame I and clutch H up again until the trigger T again strikes the upper reversing stop, when the action is again repeated.

It is plain that instead of having upper and lower reversing stops K and K', upon which the trigger T strikes, the striking end of T can be held in one place and the frame I and clutch H be allowed to move up and down a distance which will cause the trigger T to assume the angle both up and down which will cause the hammer M to snap from one stop to the other. The strength of the spring *n* can be so proportioned to the weight of the rod C that when the rod is liberated by the lower or regulating clutch G and its whole weight hangs on the retarding-clutch H, that the spring *n* will not have the power to break the grip of the clutch H until after it has fed enough, so that the magnets cause the lower or regulating clutch G to arrest its motion. In doing this the weight of the rod C is taken from the clutch H, when the spring *n* will then be able to break its grip and raise it to a horizontal position. In this way there will be no time but what the rod C will be supported by one of the clutches, and therefore a drop of the upper carbon or overfeeding will be impossible.

Fig. 2 is a plan of Fig. 1, just above described, and requires no special explanation.

Fig. 3 is a detail showing the retarding-clutch H and sliding frame I, with accompanying parts represented by the same letters as used in Fig. 1. The two positions of these parts are shown, one in solid lines, where the trigger T strikes the lower reversing stop K', and the other in dotted lines, where the trigger strikes the upper reversing-stop K. In this case I have shown the lifting-spring S in another form and position from that shown in Fig. 1, as in this it rests upon the bottom of the lamp-frame F at F', and presses up against the sliding frame I at I', in a way that will raise it and the clutch H, as above described. For this purpose any form of spring or counter-weight may be used that will raise the sliding frame I and clutch H; or any form of dash-pot D or slow-moving mechanism may be used that will cause a slow downward motion to the clutch H. In place of a dash-pot, a gear and escapement may be used.

Fig. 5 is a peculiar form of dash-pot employed in the lamps, which avoids the objectionable features of dash-pots now in use, those in which fluids are used being sloppy and unreliable, and those in which air is used require such a fine adjustment and close fit in order to produce a slow motion that they are very liable to stick and get out of order. Besides, when a slow motion one way and a fast the other is required, valves must be used which are in many ways objectionable. To avoid these objections I make a dash-pot as shown in Fig. 5, in which air is used. D is a cylinder closed at one end. The piston P is made perfectly loose, to avoid any danger of sticking. The piston-head is composed of two plates *m* and *o*. *m* is the larger of the two, made so as to nearly fill the cylinder. Between these two plates I make what I call an "apron-packing" *x*, composed of thin soft material, preferably sheet asbestus or silk, molded in the form of a pan, with the sides flaring, so that the open end will have a diameter to fit the cylinder, while the closed end, which is clamped between the plates *m* and *o*, will be of less diameter and loose in the cylinder. Now while the piston moves up in the cylinder the sides of the packing *x* will collapse and let the air pass; but when the piston is drawn out or down the air trying to pass will expand the packing and form a tight joint. I do not confine myself to any particular material for this packing nor to the exact form shown; but it represents a flexible packing in the dash-pot of a lamp which will collapse

and allow the air to pass freely one way and expand and prevent the air from passing the other way, and in case a dash-pot is required in which a slow motion is required both ways two packings *x* can be placed between the plates *m* and *o*, with their open sides or ends placed in opposite directions. In showing the sliding frame I, which carries the retarding-clutch H and its belongings, I have shown the frame I formed so as to slide on the carbon-rod C; but all that is necessary is that the retarding-clutch H should slide on or surround the rod C, and the frame I can be held by any outside guide or be in the form of a swinging lever. In fact, its form and way of securing it in the lamp can be modified and changed many ways, as is also the case with the trigger T, snap-hammer M, and dash-pot D; but

What I claim as my invention is—

1. In an electric-arc lamp, the combination, with the carbon-rod, of a feeding mechanism which will regulate the arc, a retarding mechanism provided with a clutch to engage the carbon-rod and to travel downward with the rod, and a tripping mechanism carried by the retarding mechanism for controlling the position of the clutch, substantially as described.

2. In an electric-arc lamp, the combination, with the carbon-rod, of a feeding mechanism to regulate the arc, a retarding mechanism traveling with the rod and provided with a clutch for engaging the rod, a tripping device connected to the retarding device for operating the clutch, and a retracting device for drawing the retarding mechanism upward when the clutch is disengaged from the rod, substantially as described.

3. In an electric-arc lamp, the combination, with the carbon-rod, of a feeding mechanism to regulate the arc, a retarding mechanism consisting of a moving frame sliding on the carbon-rod, a clutch connected to the frame engaging the carbon-rod, a trigger carried by the frame controlling the clutch, and a retracting device for the frame, substantially as described.

4. In an electric-arc lamp, the combination, with the carbon-carrying rod, of a frame which will slide up said rod by means of a spring or counter-balance, said frame being provided with a clamping device capable of firmly connecting said frame to the rod and causing the frame to move downward with the rod, a dash-pot which will cause the frame and rod to move down slowly and allow the frame to move up the rod quickly, and a liberating device for unclamping the frame from the rod after it has moved down a certain distance and reclamping it after it has been drawn up the rod, substantially as and for the purposes set forth.

5. In combination with the carbon-carrier of an electric-arc lamp, the sliding frame I, the retarding-clutch H, the trigger T, with spring *n* and snap-hammer M, dash-pot D, and retraction spring or mechanism S, with stops K K′, substantially as and for the purposes set forth.

ADDISON G. WATERHOUSE.

Witnesses:
JAMES P. POLAND,
JAMES A. GRAHAM.