(No Model.)

A. G. WATERHOUSE.

ELECTRIC ARC LAMP.

No. 495,077. Patented Apr. 11, 1893.

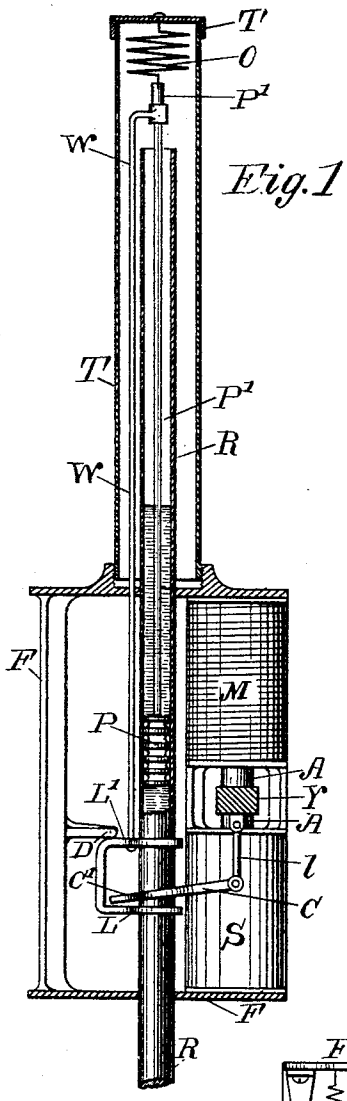


Fig. 1

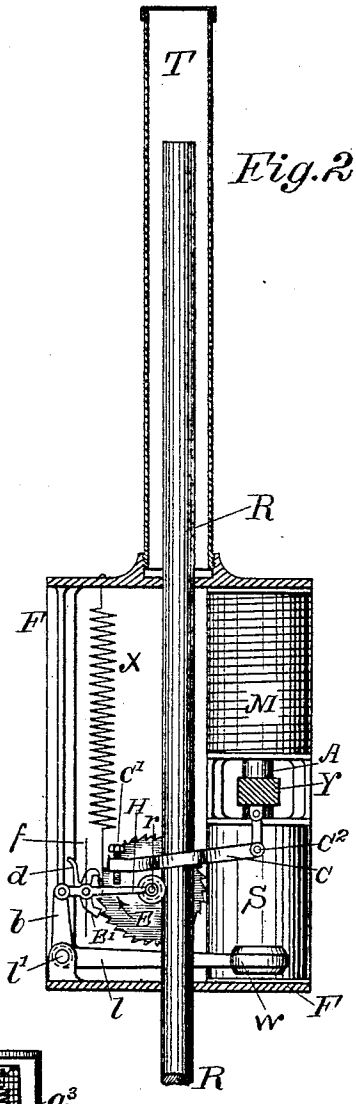
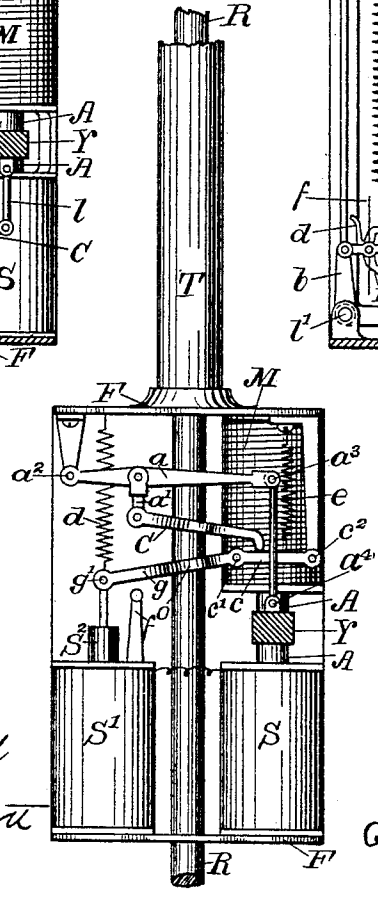


Fig. 2

Fig. 3



Witnesses:
Albert E. Chappell
Charles B. Hollett

Inventor:
Addison G. Waterhouse

UNITED STATES PATENT OFFICE.

ADDISON G. WATERHOUSE, OF HARTFORD, CONNECTICUT.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 495,077, dated April 11, 1893.

Application filed November 28, 1892. Serial No. 453,312. (No model.)

To all whom it may concern:

Be it known that I, ADDISON G. WATERHOUSE, a citizen of the United States, residing in the city 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, reference being had to the accompanying drawings, made a part thereof.

My invention relates to improvements in, that class of lamps known as gravity clutch feed, and consists of means for producing a constant and steady feed of the carbon rod, by causing the liberating point to move away from the clutch as the carbon rod moves downward; to be hereinafter described.

Figure 1, shows a form, in which a plunger is employed working inside of the carbon rod. Fig. 2, shows the use of a clock work mechanism. Fig. 3, shows the employment of magnetic means for producing the result.

Fig. 1, shows the regulating part of an electric arc lamp, to which my invention relates, consisting of, a frame F, which holds the main or lifting magnet M, and the shunt or feeding magnet S; one spool of each magnet is shown to work on an armature A; the cross yoke V, is shown in cross-action. Connected to yoke Y, by link L, is the lifting clutch C, which engages the carbon rod R, and by the action of the magnet M, acting through the clutch C, the carbon rod R, is raised and supported for the purpose of forming and maintaining an arc; while the opposite action of the shunt lowers the carbon rod, and by causing the tail C′ of the clutch C, to press against the liberating surface, formed by the saddle L, allowing the carbon rod R, to feed or slide through the clutch C. So far, the action is the same as in the common form of clutch feed lamp. Here my invention comes in, and consists in causing the first downward movement of the rod to move the saddle L, away from the clutch C, and compel the clutch C, to arrest the motion of the rod; then before the rod R, can feed any farther, the saddle L, must slide up the rod R, until it strikes the clutch C, when the rod feeds again, and at the same time carries the saddle L, away from the clutch; so that it again arrests the feed of the rod, and in that way the motion is repeated, and the rod caused to feed a minute distance each operation; until the carbon comes close enough to reduce the resistance between the carbons, when the shunt magnet S, weakens and allows the main magnet M, to move the clutch upward slightly; so that the saddle L, will strike against the detent D, and arrest its upward motion before it reaches the clutch C; the feed motion is then suspended until the lengthening of the arc again moves the clutch down until it presses against the saddle L, when the operation of feeding is again resumed, until checked as last described.

So far the description relates to all those of the forms shown in the drawings; the means employed are those, which will perform these functions: First, to hold a movable liberating point or surface for the clutch to press against, in order to cause the carbon rod to slide through the clutch; second, to cause the first downward motion of the rod, to carry the liberating point or surface away from its contact with the clutch, so as to cause the clutch to immediately arrest the downward motion of the rod; third, to cause the said liberating point or surface to slowly move up the rod, while the rod is held stationary, until it again presses against the clutch, while the said clutch remains within the reach of its motion. All of these functions are performed in different ways, by means of the mechanism shown in Figs. 1, 2, and 3. Fig. 1, performs these duties by means of a plunger P, hung inside of the carbon rod R, and surrounded with glycerine, or other mucous matter, so as to cause the plunger to move slowly in the rod. The plunger P, is connected to the rod P′, and hung, by the spring O, to the top of the lamp tube T. There is also connected near the top of the rod P′, a side rod or wire W, which extends downward along the outside of carbon rod R, to the saddle L, to which it is connected; this saddle L, is free to slide on the rod R, and offers a liberating point or surface upon which, if the clutch C presses, causes it to liberate the rod and allow it to, feed by gravitation. The saddle L, wire W, rod P′ and plunger P, are all rigidly connected together, and hung by the spring O, which has just tension enough to support the parts and hold them up; so that the saddle L, will press

upward against the detent point D, and also hold hard enough to stand the downward pressure of the tail C′, of the clutch C, so as to cause it to allow the rod R, to slide through. Now the action of these parts is as follows: When the controlling magnets cause the clutch C, to press downward on L, the carbon rod R, slides down and carries with it the plunger P, which stretches the spring O, and at the same time acting through the rod P′, and wire W, moves the saddle down and away from its contact with the clutch C, causing the clutch to instantly arrest the motion of the rod R; while the rod R, is held suspended by the clutch, the spring drawing on the plunger, slowly moves it up in the fluid, and with that the saddle L, which returns to the detent D, again presses against the clutch, and causes the rod to feed, when the operation is again repeated; and the rod working down by slow degrees reduces the resistance between the carbons, so that the controlling magnet raises the clutch above the reach of the saddle L, or so that the saddle will strike against the detent D, before it can reach the clutch, until the clutch is again lowered, and the feeding motion is again resumed.

Fig. 2, shows another form of mechanism, adapted for performing the same duties, consisting of a swinging frame H, which is pivoted to a bell crank *l*; this crank *l*, is composed of an upright part *b*, which is pivoted at *l′*, and has a horizontal arm weighted at W, so that the weight W, will swing the part *b*, toward the carbon rod R, and cause the pulley friction roller *r*, which is placed in the swinging end of the frame H, to press against the carbon rod R; and roll or revolve, as the carbon rod is moved up or down. The escapement wheel E, is connected to the roller *r*, so as to revolve with it; the anchor or pallet E′, is pivoted to the frame H, and engaged with the wheel E, so as to prevent it and the roller *r*, from revolving beyond a certain speed, which, in this case, is made quite slow; the fan or pendulum blade *f*, is connected to the pallet E′. The frame H, roller *r*, wheel E, and pallet E′ are supported by the spring X, which is screwed in the top of the lamp frame E, and which draws the frame H, up until the finger *d*, strikes against the frame F, and holds it in place firm enough; so that when the clutch C lowers, and its tail screw presses down on the frame H, its allows the carbon rod R, to slide through and feed. As soon as the carbon rod R, moves down, it carries the frame H, with it, that is, the end holding the roller *r* by reason of the friction due to contact between *r* and R; this of course, swings H, down and away from clutch C, and compels it to engage the rod R, and arrest its motion; then while the rod is held by C, the spring X draws upward on frame H, causes the roller *r*, to roll up on the rod R, slowly as its motion is retarded by the wheel E, and pallet E′. After H, moves up it again presses against the clutch C, and the feeding operation is resumed, until the regulating magnets raise the clutch above the reach of the frame H.

Fig. 3, shows another form of mechanism adapted for obtaining the same results. In the form, M and S are the regulating magnets, which work the lifting clutch C, through means of the upright link, which leads from the armature yoke Y, to the free end a^3, of the lever "*a*," which is pivoted to the lamp frame E, at a^2, the lightning clutch C, is hung to the lever "*a*," by means of the link *a′*; the tail end of the clutch C rests upon a lever C, which forms a liberating point, or surface, for enabling the clutch to press on, and cause the carbon rod R, to feed; the lever E, is pivoted to the lamp frame at C^2, and at its end *c′*, is hung or pivoted a second clutch O, which engages the carbon rod R, and is arranged so that when the carbon rod R, is allowed to feed or slide through it, the second clutch O, is carried down with it, and it in turn carries the free end of the lever *c* down and away from the tail end of the clutch C, which causes it to arrest the motion of the carbon rod R. Now what makes the second clutch O, engage the rod R, is that it is held up at one end by the lever *c*, which in turn is supported by the spring *e*, while the other end of clutch O, is drawn down by the second shunt magnet S′, which has its armature S^2, hung to the tail of clutch O. The second shunt magnet S′, is hitched in series with the controlling shunt magnet S, so that when the controlling magnet S, is strong enough to cause the lamps to feed by drawing down on armature A, A, Y, the second shunt magnet S′, is strong enough to overcome the strain of the spring *d*, and pull the tail end of the clutch O down and cause it to engage with, and be carried down with the rod R, but, as soon as the lamp carbons have fed together enough to weaken the shunt S, and allow the main magnet M, to raise, or support the rod R, then the second shunt magnet S′ has also weakened, so as to allow the spring *d*, to overcome it, and draw up the tail end of the clutch O, and loosen its contact with the rod R, when, in that case, the spring *e*, will draw the lever *c* and clutch O, up again, so as to press against the tail end of main clutch C, as soon as it is moved down again by the strengthening of the shunt magnets, due to the increasing resistance between the carbons, when the operation is again repeated. It is plain that many mechanical forms may be employed to produce the same results, and that the same idea can be used in a rack feed lamp, by causing the detent used in such cases to be moved away from its contact with the clock gearing, by the first movement of the carbon rod; but, as it is my object to avoid the disadvantages of a rack feed, I have not shown that kind of lamp.

What I claim as my invention is—

1. In an electric arc lamp, a feeding mechanism, consisting of a main or lifting clutch actuated by the controlling magnets, and a

liberating point or surface against which the said clutch can press, in order to cause the carbon rod to feed or slide through the clutch; said liberating point or surface being provided with a mechanism adapted for causing the feeding motion of the carbon rod to remove it from its contact with the clutch, thereby, causing the clutch to arrest the motion of the rod, and with mechanism to cause said liberating point, or surface, to slowly return to its former position, after the motion of the carbon rod is arrested; substantially as and for the purposes set forth.

2. In an electric arc lamp, a feeding mechanism consisting of main lifting clutch, actuated by the controlling magnet, and a liberating point adapted for being moved away from its contact with the main clutch, by the first movement of the carbon rod, and having means for returning it to its original position; substantially as and for the purposes set forth.

3. In an electric arc lamp, a movable detent or liberating point, adapted for being moved away from the position at which it is capable of causing the carbon rod to feed, by the downward movement of the carbon rod, and a slow moving mechanism for drawing the liberating point back to its original position; substantially as and for the purposes set forth.

ADDISON G. WATERHOUSE.

Witnesses:
FRANK G. WATERHOUSE,
CHARLES B. WOLCOTT.