(No Model.)

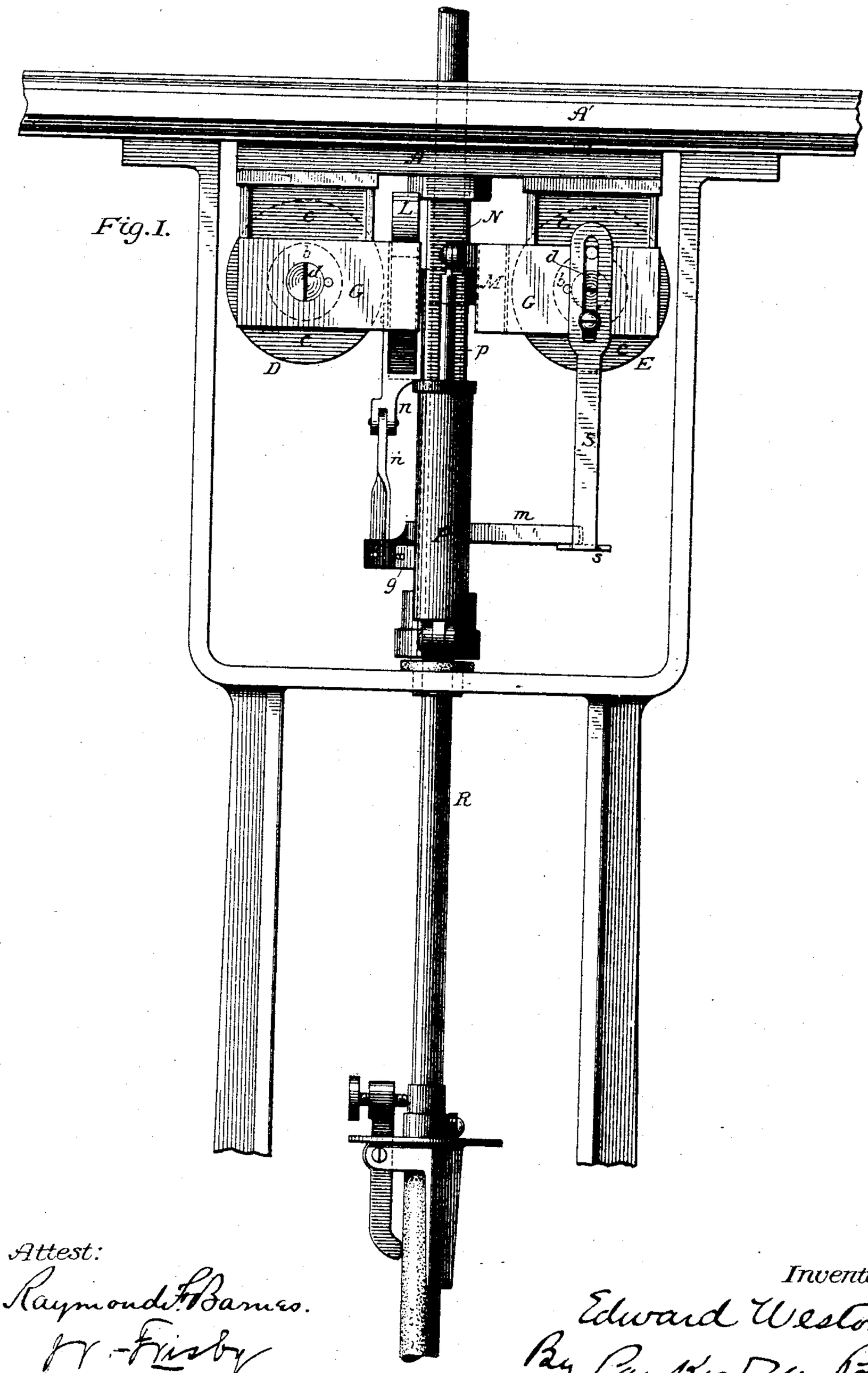
3 Sheets—Sheet 1.

E. WESTON.

ELECTRIC ARC LAMP.

No. 285,715. Patented Sept. 25, 1883.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

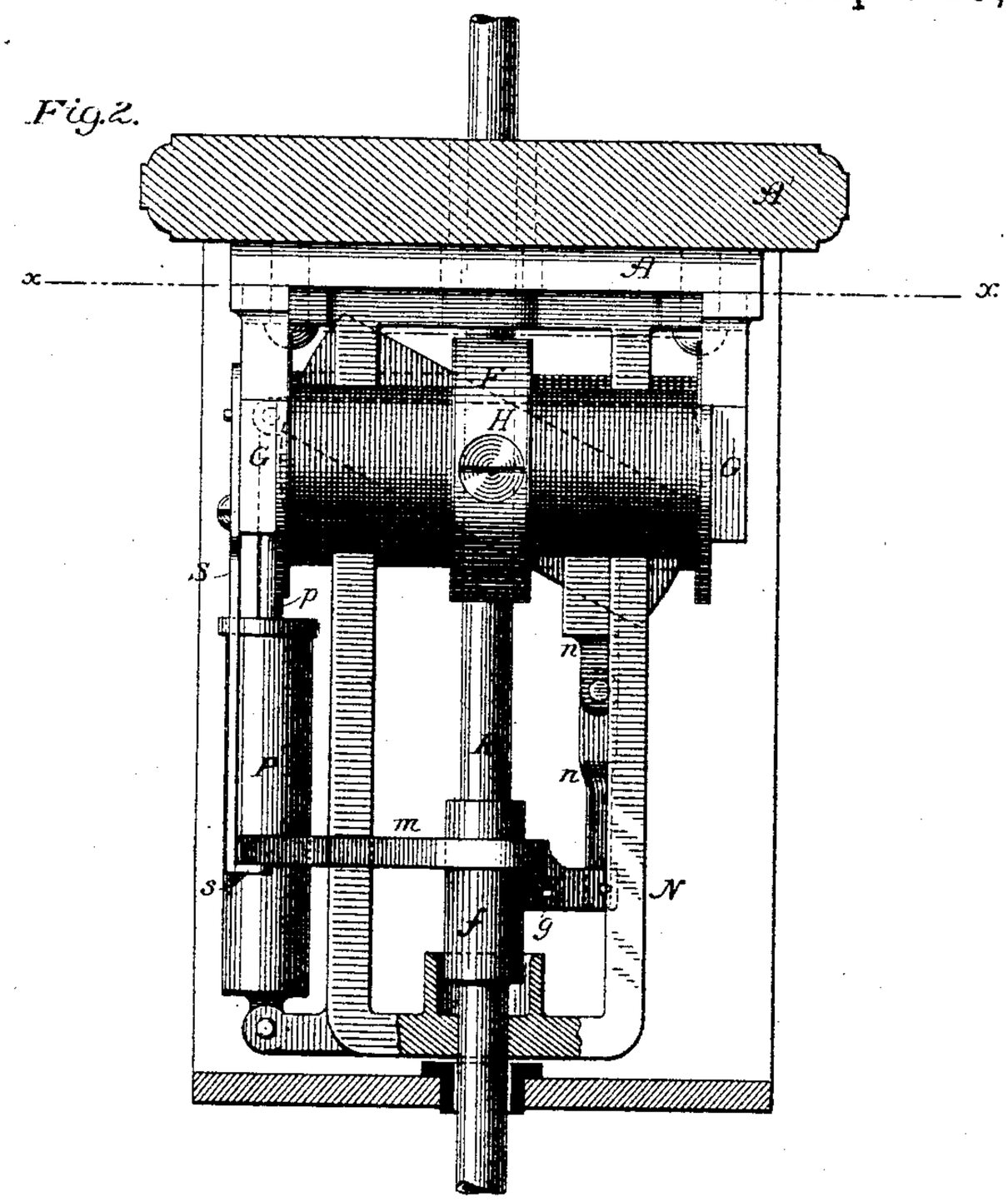
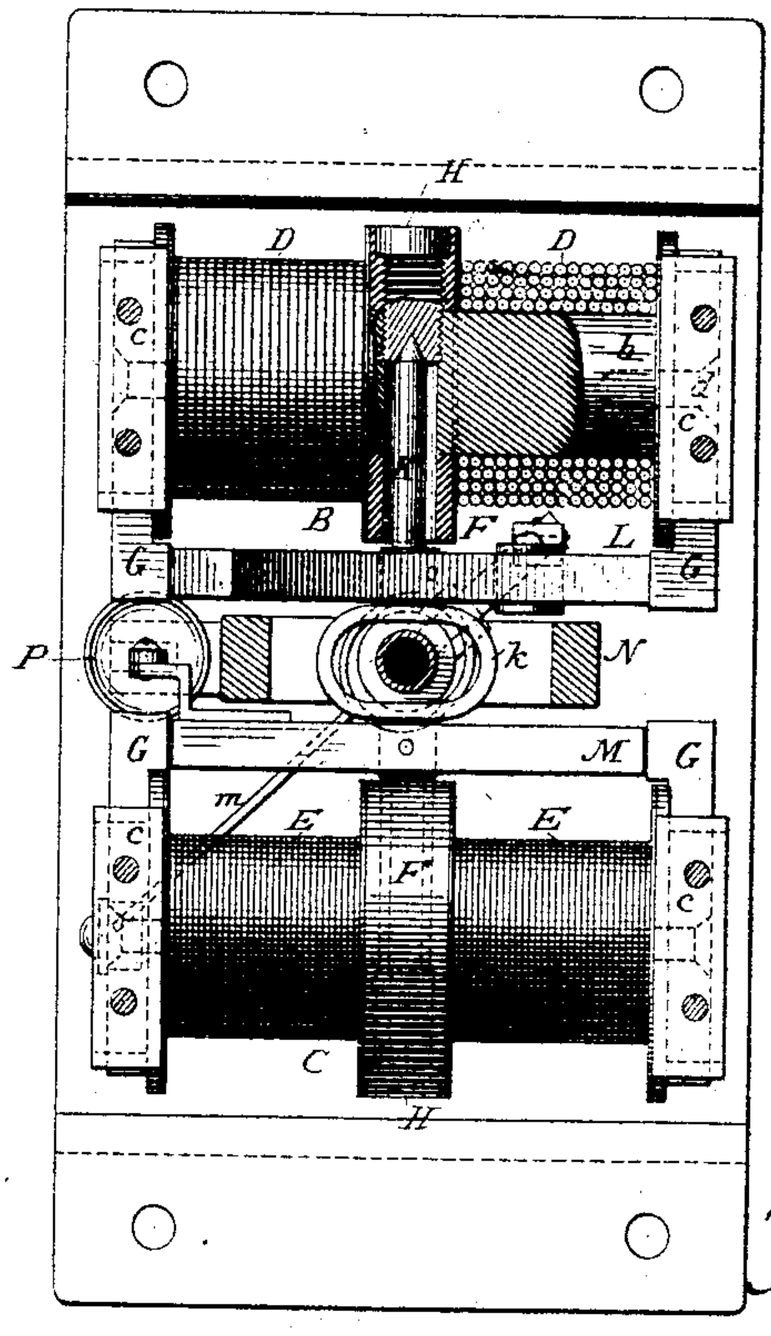


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4.

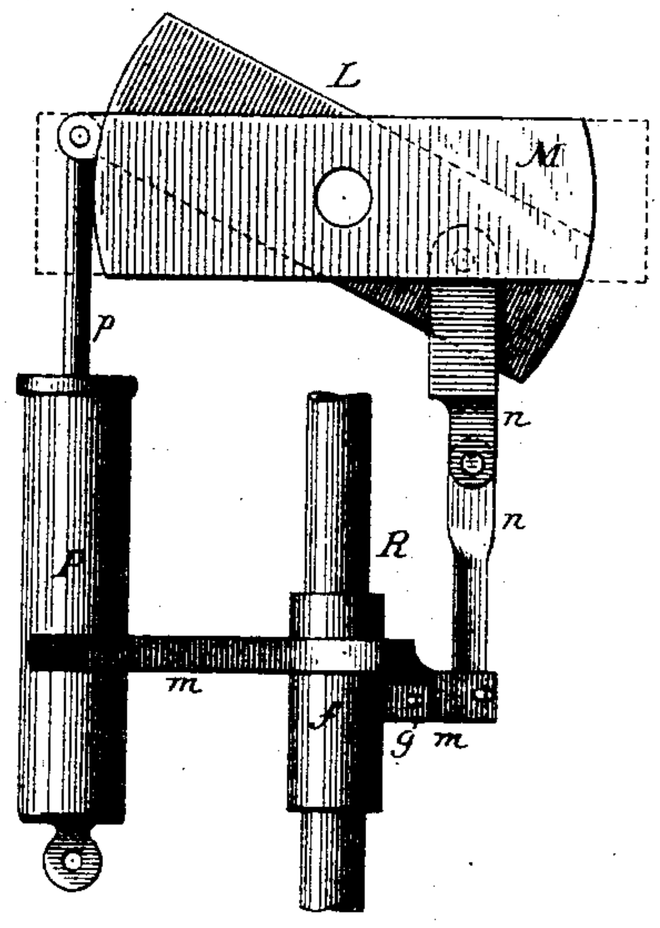
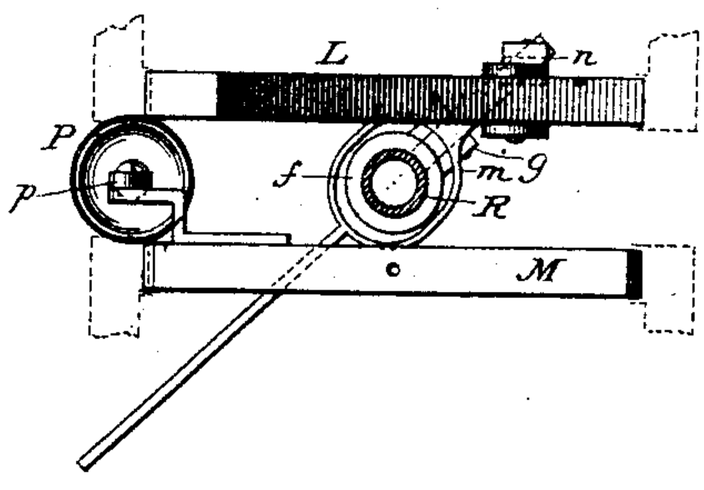


Fig. 5.



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UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE UNITED STATES ELECTRIC LIGHTING COMPANY, OF NEW YORK, N. Y.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 285,715, dated September 25, 1883.

Application filed April 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, a subject of the Queen of Great Britain, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

In describing the nature and objects of my invention reference will be made to the accompanying drawings, in which—

Figure 1 is a front view, in elevation, of the feed mechanism and upper portions of the frame of a lamp constructed in accordance with my invention. Fig. 2 is a side view, in elevation, of the feed mechanism, portions of the casing being cut away. Fig. 3 is a plan and part section on line *x x* of Fig. 2. Fig. 4 is an illustration of the armature and clutch mechanism; Fig. 5, a plan view of the same.

Similar letters of reference indicate corresponding parts in all the figures.

The main objects of my invention are to simplify and cheapen the construction of the working parts of the lamp, to provide for a greater range, and consequently greater simplicity of adjustment, and to produce a lamp which, by reason, mainly, of a construction which relieves the moving parts of strain and wear, shall possess greater durability than those now in common use.

To this end I have devised a feed mechanism in which are combined two electro-magnets—one in the direct or arc circuit, the other in a shunt or derived circuit around the arc—and two armatures, one for each magnet, the armatures being rigidly connected to a rock-shaft, and so placed that the preponderance of magnetic attraction of one magnet over the other exerts a twisting effect upon the rock-shaft that turns it in its bearings, the direction of the movement imparted to it being determined by that magnet which exerts the greater attractive power. I have also constructed and arranged the parts named in such manner that the maximum magnetic effect of which the magnets are capable is utilized, and in certain other respects the construction of the mechanism is improved, the nature of the improvements being more fully hereinafter set forth.

For the casing or frame I employ by preference that shown and described in former patents granted to me and in applications by me made, and the feed mechanism I mount on a plate or base, A, which is attached in a proper manner to the under side of the insulated cover or top A′.

On opposite sides of the plate A are secured the electro-magnets B C, each composed of a core of soft iron, *b*, the ends of which pass through the non-magnetic plates *c c*, that are secured to the plate A. The cores *b* contain each two coils, D E, the coils D being of comparatively coarse wire and included in the main or arc circuit, the coils E being composed of fine wire of high resistance and included in a shunt around the arc. The coils are separated by a metal ring, F, the direction of winding being such as to make the ends of the cores of opposite magnetic polarity. Pole-pieces or plates of iron, G G, are fastened to the ends of the cores *b* by screws *d*, that serve also to bind the cores to the plates *c c*. Holes are bored through the rings F and the center of the cores *b*, and screws H H inserted therein, which serve to hold the rings F in place upon the cores *b*, and provide pivotal bearings for a rock-shaft, K, that extends into the holes through the rings and cores.

Upon shaft K are fixed two armatures or magnetic plates, L M, out of line or at an angle to each other, so that when one occupies a horizontal position between the pole-pieces of its magnet the other will be tilted, so that the pole-pieces between which it swings will be one above and one below its ends, substantially as shown in Fig. 4.

To the armature L, or that which lies between the poles of the main magnet B, is connected the clutch or feeding mechanism. This may be of any suitable character, though I prefer to use a cylinder of brass or other metal, *f*, surrounding the carbon-carrier R, which passes vertically through guides in the top of the casing and in the lower portion of a frame, N, that depends from the plate A. The carrier also passes through the rock-shaft K, the latter being divided at *k* for the purpose.

Ears or lugs *g* extend from the side of cyl-

inder *f*, and between them is pivoted a lever, *m*, which is open or formed with two arms, that inclose the cylinder *f*. The short arm of lever *m* is connected by one or more links, *n*, with the armature L.

To either armature, or in a similar manner connected with the rock-shaft, is the piston *p* of a dash-pot, P, pivoted at its bottom to the frame N. From one of the pole-pieces or the plate A depends also an adjustable arm, S, that at its lower end is bent over to form a step or rest, *s*, for the end of lever *m*.

When thus constructed, the lamp operates in the following manner: Normally, the armatures occupy the position shown in Fig. 4. The weight of the carbon-carrier, or the influence of a spring, which is not shown, may be employed and connected with one of the moving parts in such manner as to assist the armature M in assuming a horizontal position. When, therefore, the circuit is completed through the lamp, the greater attractive power of magnet B tends to bring armature L into a horizontal position. An increase of resistance in the main circuit, as by the lengthening of the arc, diverts a greater amount of current through the shunt-magnet C, so that it gains in strength, while the other loses. Armature M, in consequence, is brought nearer the horizontal, while armature L is tilted. The requisite movement is thus obtained for effecting the feed and adjustment of the carbons. When the armature L, by the attraction of magnet B, is brought toward a horizontal position, the short arm of lever *m* is raised, by this means binding the lever against the cylinder *f*, and causing it in turn to bind the carbon-carrier R, which, by the further movement of the armature, is raised and the arc formed. On the backward movement of armature L the end of lever *m* is brought into contact with the step or rest, by which the cylinder *f* is freed and the carrier R permitted to slide downward until its motion is again arrested by the raising of the armature L. These movements, which constitute the operation of feeding, are in the practical operation of the lamp so minute, of course, as to be scarcely perceptible.

Having now described the most practicable embodiment of my invention and the principle of the operation of the same, I will indicate more specifically the features of construction that contribute most to the utility of the lamp, and also the more obvious ways in which the construction of the several parts may be modified without departing from the invention.

With reference to the magnetic system, it will be seen that by pivoting an armature between the poles of the same magnet in such manner that the attractive forces acting upon it tend only to change the position of said armature in the same plane, the bearings of the shaft on which the armature is mounted will be protected from wear. This part of the invention is applicable to lamps containing a single magnet, as B, with any of the well-known substitutes for magnet C, to act in opposition to the attraction of the magnet.

Another novel feature in the magnet system is the employment of two armatures, which, by extending from pole to pole of each magnet and nearly completing the magnetic circuits, secure the maximum power of the magnets without adding to the load which the latter sustain.

A lamp of this kind, when properly constructed, requires little or no adjustment. Should it be necessary, however, to vary the attractive influence of the magnets on the armatures, any of the well-known means of adjustment may be employed, such as a retractile spring connected with either armature, or a device for separating to a greater or less degree the armature and magnet-poles.

The several parts of the lamp feeding mechanisms are all carried by the plate A, so that they may be removed bodily from the casing whenever it is necessary. They are also constructed in a simple manner, and so as to require comparatively little time or expense in their production or assemblage.

I reserve the right to make subject of other applications for Letters Patent features of novelty herein shown or described, but not claimed.

What I now claim as my invention is—

1. In an electric-arc lamp, the combination of two electro-magnets—one in the main, the other in a shunt, circuit—a rock-shaft set at right angles to the magnets, and armatures fixed to the rock-shaft, and arranged to move in face of the poles of the magnets, in substantially the manner set forth.

2. In an electric-arc lamp, the combination of two electro-magnets—one in the main, the other in a shunt, circuit—a rock-shaft set at right angles to the magnets, and two armatures fixed to the shaft at different angles, and arranged to move in parallel planes in face of the poles of the magnets, in substantially the manner set forth.

3. In an electric-arc lamp, the combination, with a plate, of two electro-magnets in the main and shunt circuits, respectively, and secured to the plate, a rock-shaft pivoted in the center of cores of the magnets, two armatures fixed to the shaft at different angles, and arranged to move in face of the poles of the magnets, and feed mechanism connected with the armatures, as set forth.

4. The combination, in an electric-arc lamp, with regulating-magnets in the main and shunt circuits, respectively, of pole-pieces at right angles to the cores, armatures arranged to move or rotate between the pole-pieces in the manner described, and feed mechanism connected with said armatures, as set forth.

5. The combination, with the plate A, of cores *b b* and coils D E, secured to plate A, rock-shaft K, journaled in said core, armatures

L M, and feed mechanisms connected therewith, as described.

6. The combination, with the plate A, of feed mechanism secured thereto, an arm or frame, N, depending from the plate and forming a guide for the carbon-carrier, and a dash-pot, P, hinged to the frame, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 2d day of April, 1883.

EDWARD WESTON.

Witnesses:
W. FRISBY,
RAYMOND F. BARNES.