(No Model.)

3 Sheets—Sheet 1.

E. THOMSON.

ELECTRIC ARC LAMP.

No. 272,920. Patented Feb. 27, 1883.

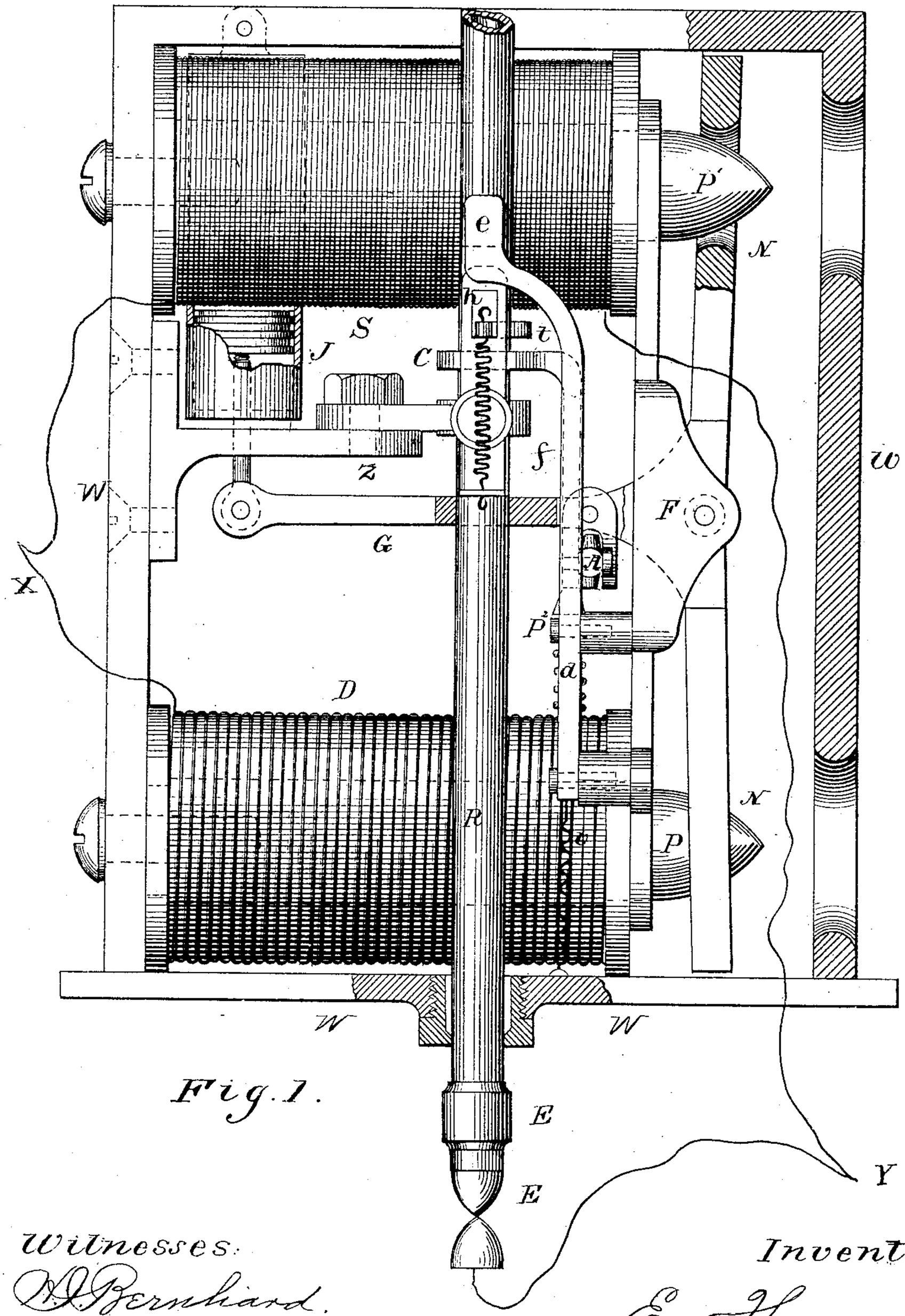

Fig. 1.

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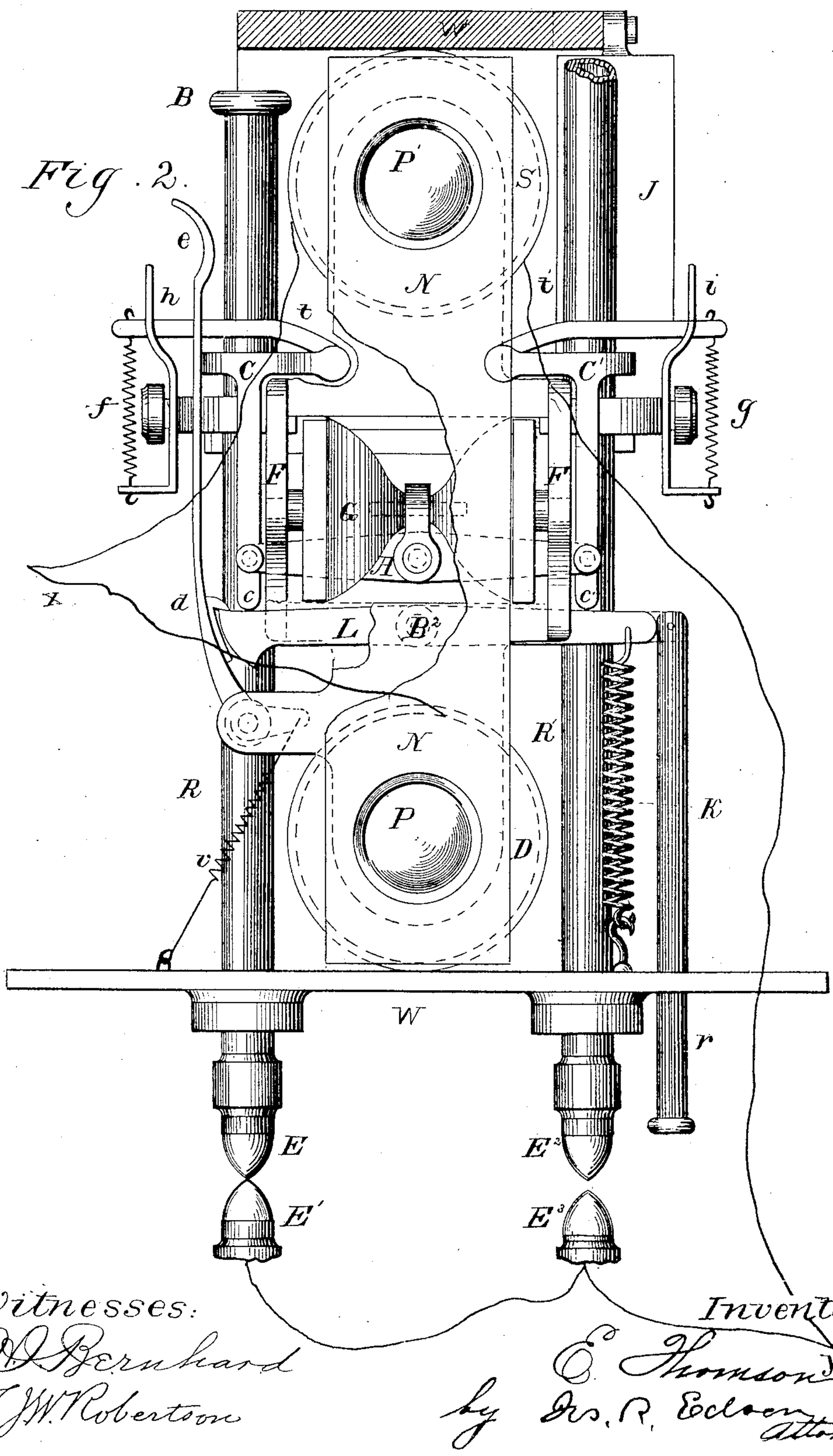
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 3.

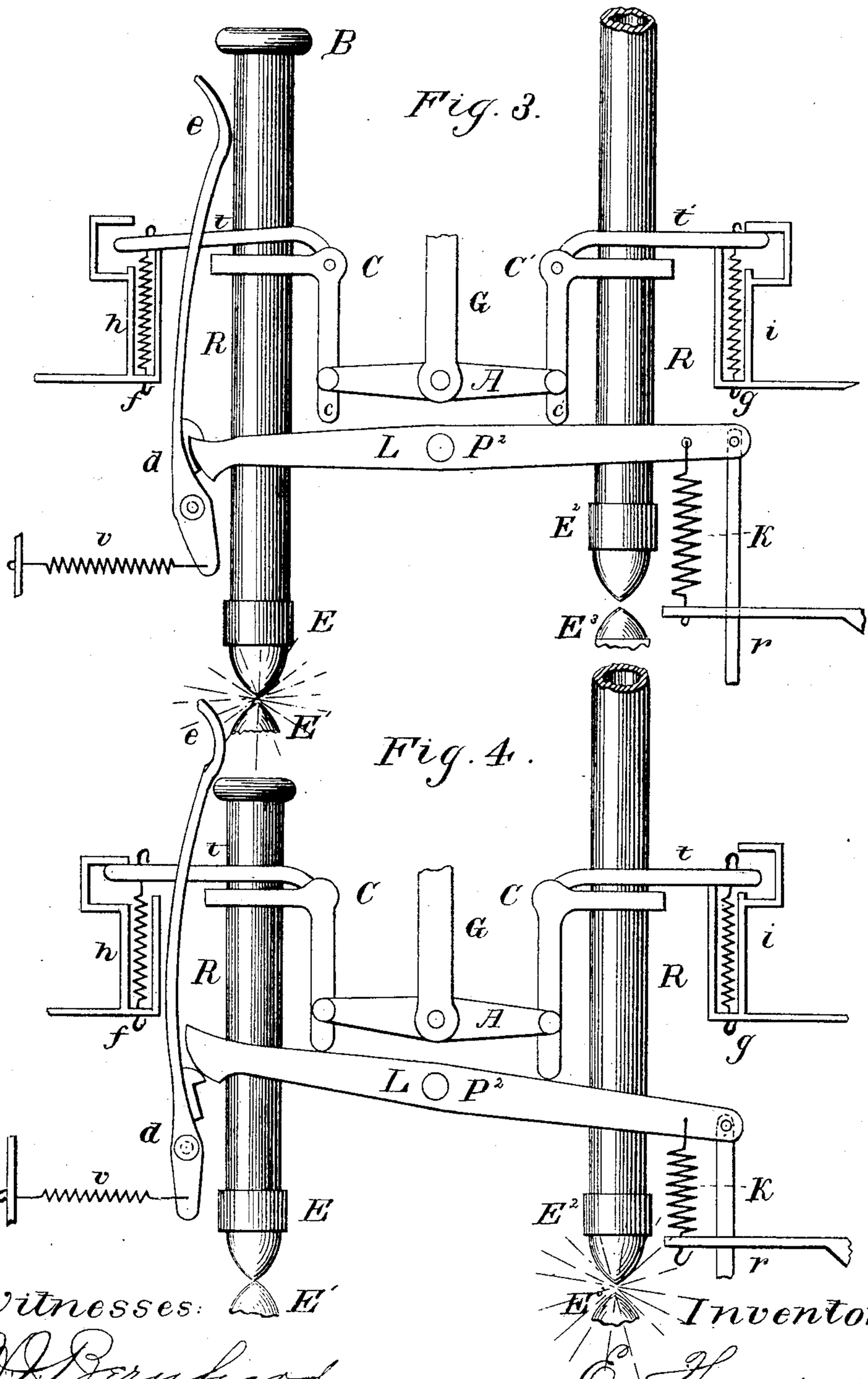

Fig. 4.

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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE AMERICAN ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 272,920, dated February 27, 1883.

Application filed August 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of New Britain, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification.

My invention relates to electric lamps of the arc type, and the object is to combine in a single lamp two sets of carbons or carbon-carrying rods, which shall act in turn, one set being held from action while the carbons of the other set are being consumed, and the latter acting upon the completion of the feeding movement to release the carbons of the first-named set, so that they in turn may be fed.

My invention consists broadly in the combination, with two sets of carbons or carbon-carriers, of suitable locking or holding mechanism for preventing the feeding of one set and suitable releasing devices acting with or by the agency of the other set in such a way that when the carbons of said set are consumed, or nearly consumed, the carbons of the first-named set will be directly or indirectly released.

My invention further consists in certain specific combinations of devices whereby the objects of the invention are effected.

I have herein shown and described my invention as applied to electric lamps in which the feed of the carbons is governed by the action of a clutch or clamp operated by an electro-magnet; but I do not limit myself to lamps of this general description, as I believe that I am the first to interpose between two carbon-carriers suitable locking mechanism for one of said carriers, arranged to be mechanically released by the descent of the other carrier, and my invention might be applied to lamps in which the carriers are fed or governed by wheel-work.

In carrying my invention into practice I prefer to make use of the feed-controlling clamp as one of the elements of the mechanism, which serves to hold the carrier out of action, said clamp being held in locking position by suitable devices released by the descent of the other carbon-carrier; but it is to be understood that I do not confine myself to this particular arrangement, and it would be within the scope of my invention to make the locking mechanism entirely independent of the feed-controlling devices. For the sake of simplicity, I however prefer to use the feed-controlling clutch or clamp as one of the elements of the mechanism. I also in practice operate the clamps or feed-controlling devices for both sets of carbons by the same electro magnet or magnets, although they might, if desired, be operated by separate magnets or magnet-systems. The former method is the preferable, as one set of magnets or one magnet system is dispensed with. My invention is not, however, limited to such an arrangement, and the desired object—viz., the locking of one set by mechanism arranged to be released mechanically by the descent of the other at the proper time—could be accomplished and would be as valuable if the operating-magnets for the two sets were independent of one another.

Having indicated the general character and nature of my invention, I will proceed to describe one of the methods that may be adopted for carrying the same into practice.

Figure 1 is a side elevation of an electric lamp embodying my invention. Fig. 2 is a front elevation of the same. Figs. 3 and 4 are views of the interlocking devices detached from the other parts, showing the locking devices set and unset.

Referring to Figs. 1 and 2, W indicates the frame of the lamp, while D and S are respectively the main and derived circuit magnets, by whose varying attractive influence upon a suitable armature or core the lifting or retarding action of the clamps or clutches for the two sets of carbons is controlled. I have in the present instance shown the pole-pieces P P of these magnets as of paraboloidal or tapered form, and as arranged to act upon a perforated armature, N N′, pivoted at its middle portion at F, from ears or standards rising from a plate of suitable material, which is seated against the heads of the magnet-spools of the magnets D S. This form of pole-piece and armature is the same as that described in prior Letters Patent granted to me February 21, 1882, No. 253,928.

Extending at right angles from the armature N N′ is an arm, G, connected at its extremity to an air dash-pot, J, or other suitable retarding device, and supporting at a point nearer the fulcrum a lever, A, which is hung in a link depending from arm G, and to which are connected the clamps or clutches for the two carbon-carriers. R and R′ indicate the upper carriers for the two sets, while C and C′ are respectively the clutches for said carriers. These clutches may be of any desired form that is adapted to lift and hold the carrier from action. They are here shown as consisting of a curved or circular body or portion, C or C′, and a pivoted locking-toe, *t* or *t′*, mounted thereupon, and held in engagement with the carbon-carrier by a coiled spring, *f* or *g*, applied to the extended arm of the toe. The locking-toe is semicircular in shape, and it is arranged to be disengaged by a stop, *h* or *i*, when the clamp-body is lowered sufficiently to cause the extended arm, which plays in a slot, as shown, to come into engagement with said stop.

The clamp-bodies C C′ are mounted on opposite ends of the lever A, and each is provided with an extension or projection, *c* or *c′*, which is arranged to be operated by a lever, L, which is pivoted at P^2 from the rear of the plate joining the heads of the magnets D S, and which lever serves to hold one or the other of the clamp-bodies C C′ lifted, according as it is locked or unlocked. This lever I term a "transfer" or "feed-shifting" lever. A catch or detent, which serves to hold the lever L locked in position, so that the clutch C′ *t′* will be lifted and the carbon-carrier R′ will be prevented from feeding, is shown at *d* as pivoted from the plate supporting the lever. Said catch or detent is held in engagement with the lever by the action of a light spring, *v*, or other means, and is provided at its upper end with a curved portion, *e*, arranged in the path of a button or projection, B, upon the carbon-carrier R, so that when the carbon has fed down to a point where it is nearly consumed the detent *d* will be removed from engagement with the lever L, so as to allow a stiff spring, K, or other suitable device, to throw the lever into its other position. In the latter position the clamp-body C′ is allowed to fall, and the carbon-carrier R′ is released, while at the same time the clamp-body C is lifted, raising and holding the carbon-carrier R. A setting rod or handle, *r*, attached to lever L, may be used for resetting the lever L into position, where it is locked by the detent or catch *d*.

The circuits are as follows: The current, entering at X, passes through the direct magnet-coils D, and then divides to each carbon rod, as shown, passing to either arc according to conditions. Leaving the lower carbon, it passes to the point Y, where it is met by the branch or derived circuit, that starts from X and passes through the high resistance of the shunt or derived circuit magnet S.

Referring now to the essential features of my present device as exhibited in Figs. 3 and 4, the following is the action: The parts being in the position as at the start, Fig. 3, the detent *d* is locked upon L by the spring *v*, the clamp-body C′ lifted by the sustaining action of L upon the part *c′*, and the toe *t′* locked upon the rod R′ by the spring *g*. The carbons at E^2 E^3 are therefore separated and maintained in a fixed position, so that no current can pass between them. The clamp C is under this condition of the parts relieved at *c*, and contact is established at E E′. When the regulating-magnet system begins to elevate the part G, it immediately acts to lock the clamp C and lift the rod R, establishing an arc at E E′. This is the condition as shown in Fig. 3, and the feed of the carbon rod R is now controlled in the ordinary way by the regulating-magnets. The joint of A at C′ is virtually a fixed fulcrum, and the action is to all intents and purposes independent of the presence of all parts of the lamp, save those immediately concerned in adjusting the rod R—viz., the clamp C and connections to A and G; but when the carbons E E′ are nearly consumed the button B, carried by the rod R, comes into contact with the curved plate *e*, and forces the detent *d* out of engagement with the lever L. At this moment the lever L, acted on by the spring K, takes the position shown in Fig. 4, where the clamp C is borne upward by L, and the toe *t* locked upon the rod R, as shown, and the carbons E E′ held fixed and separated. Meanwhile the clamp C′, relieved of its support, has dropped, the carbons E^2 E^3 have come into contact, and an arc has been established, while the parts A G now act to feed and control the rod R′ and arc at E^2 E^3. When the lamp is recarboned the rod *r* is used to reset the parts in their original positions.

I do not limit myself to any particular construction of lifting or controlling clutch or clamp, nor to any particular method of imparting motion thereto from the governing electro magnet or magnets.

It is obvious that the form and construction of the various parts might be varied in many ways without departing from the spirit of the invention, and that, instead of the lever L, other mechanical devices might be arranged so as to alternately act upon the clutches.

Other devices besides the button B and the part *e* might be used for causing the necessary movement of the detent or other device whereby the mechanism which locks the carbon-carrier is released, and other mechanisms may be employed for locking and unlocking the carbons, provided they be suitably constructed, or combined with other devices controlled by the descent of a carbon-carrier, to be unlocked and to release the carbon-carrier when the unlocking device or the device controlling the unlocking devices has descended to the proper position with the other carrier.

What I claim as my invention is—

1. The combination, with two carbons or carbon-carriers, of mechanism for locking or

holding one of said carriers from movement, and a device connected to or moving with the other carrier, and arranged to cause, either directly or indirectly, the release of said mechanism, so as to allow the first-named carrier to feed when the carbon of the other is consumed.

2. The combination, with two sets of carbons or carbon-carriers, of mechanism for holding one of said carbons or carriers in lifted position, and a stud, projection, or its equivalent, connected to or moving with the other carrier, and arranged, in the manner described when the carbon is nearly consumed, to directly or indirectly cause the release of the first-named carrier.

3. The combination, with two carbon-carriers, of separate feed clamps or clutches, mechanism for holding the feed-clamp for one carrier in position where it will prevent said carrier from feeding, and a releasing-lug, projection, or other suitable device connected to or moving with the other carrier.

4. The combination, with two carbon-carriers, of feed-controlling mechanisms for said carriers, a feed-shifting lever arranged to act in turn upon the feed-controlling mechanisms, and means for causing the operation of said lever when one of said carriers has completed its feed movement.

5. In an electric lamp having two sets of carbons, the combination, with two clamps or clutches, one for each upper carbon, of a transfer-lever, L, and a button or projection upon the first acting carbon-holder operating directly or indirectly to cause said lever to shift.

6. In a double electric-arc lamp, the combination of a pivoted lever, clamps, or clutches, supported at opposite ends thereof, so that they may be raised or lowered in turn thereby, and a support for said lever connected to or operated by a lamp-magnet.

7. The combination, with two carbon rods or carriers, of clamps or clutches, one for each carrier, a lever connected to both clutches, and supported at its middle portion by the operating devices of the lamp, and a transfer-lever and detent therefor.

8. The combination, with a double system of lifting and feeding devices, of a spring-actuated transfer-lever, L, detent *d e*, carbon-carrier R, and button B.

9. The combination, with two sets of feed-controlling devices, of a spring-actuated transfer-lever, a detent or catch for the same, and actuating rod or bar connected to the lever for setting the same.

10. The combination, with the clutches for two independent carbons, of a pivoted lever adapted to act on the clutches and cause them to engage with or disengage from the carbons, and means for shifting said lever, as and for the purpose described.

11. The combination of the lever A, supported from the armature-lever, the clutches mounted in opposite ends thereof, and the lever L, arranged to lift one or the other of the clutches, according to its position.

12. The combination, with two carbon-carriers, of separate feed clamps or clutches connected to a common pivoted support, a feed-controlling magnet operating the latter, and mechanism for operating the common support, so as to cause one or the other of the clamps to be put into operative condition, controlled by the descent of a carbon-carrier.

Signed at New Britain, in the county of Hartford and State of Connecticut, this 12th day of August, A. D. 1882.

ELIHU THOMSON.

Witnesses:
A. J. SLOPER,
F. M. GOODRICH.