(No Model.)

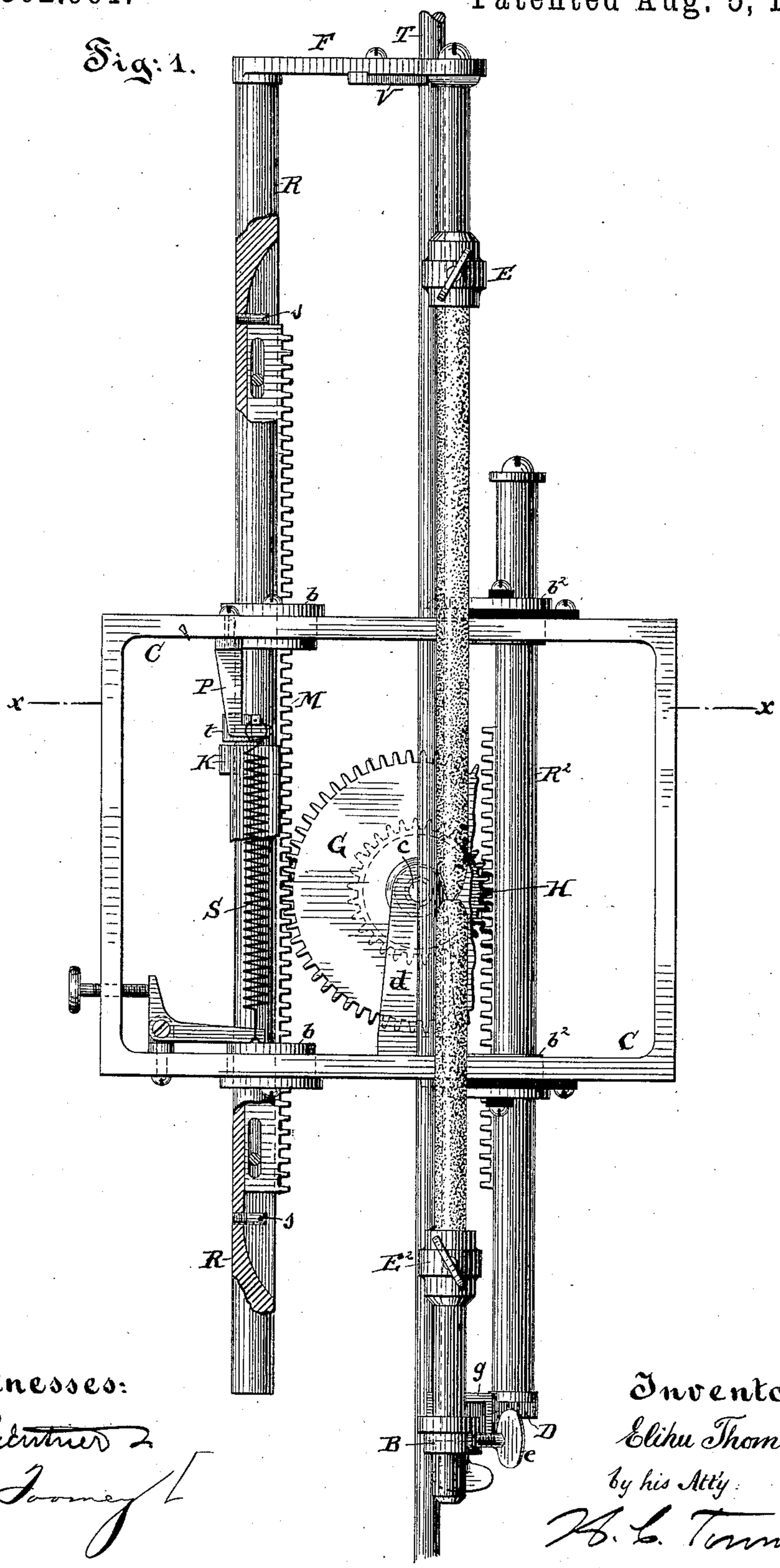
3 Sheets—Sheet 1.

E. THOMSON.

FOCUSING ELECTRIC ARC LAMP.

No. 302,961. Patented Aug. 5, 1884.

Fig. 1.



Witnesses:

A. H. Gentner 2nd

Thos. Toomey

Inventor:

Elihu Thomson

by his Atty:

H. L. Townsend

(No Model.) 3 Sheets—Sheet 2.

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Fig: 2.

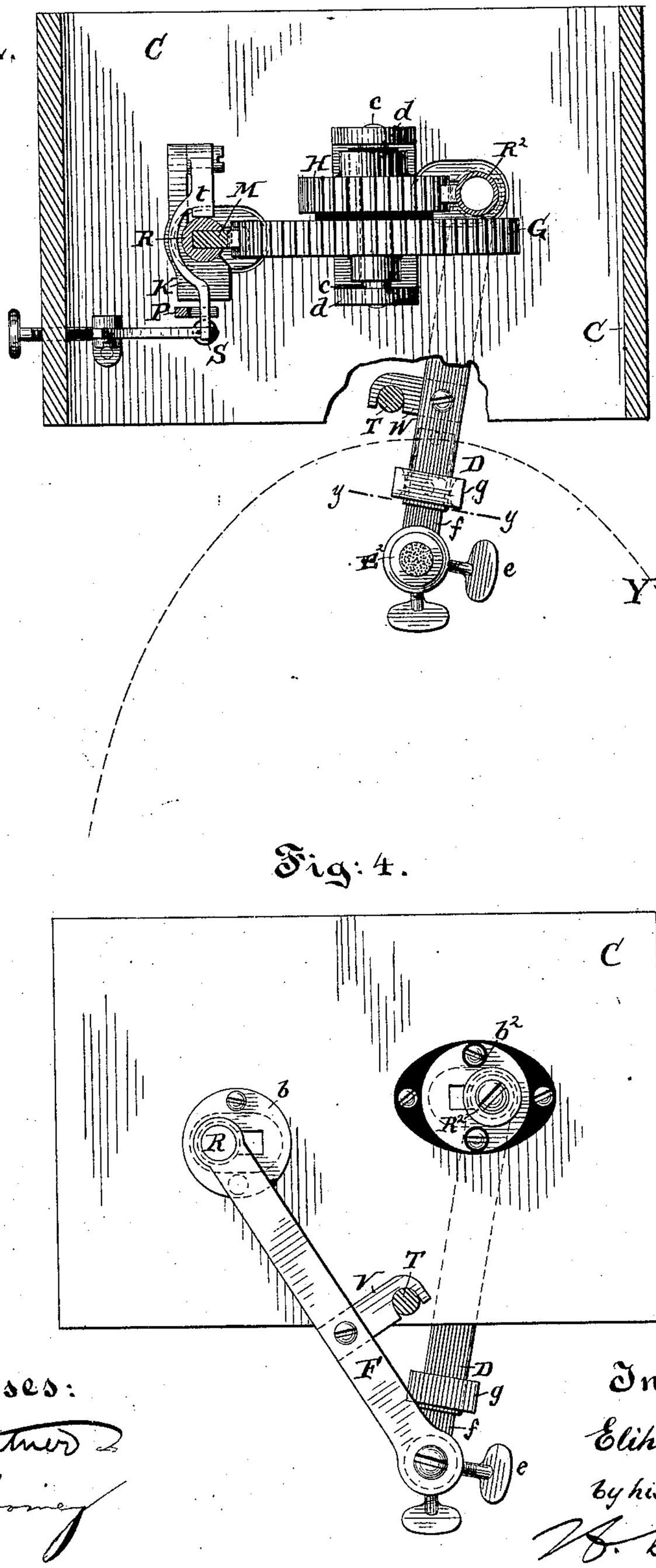

Fig: 4.

Witnesses:

A. H. Gentner Jr.

Thos. Toomey

Inventor:

Elihu Thomson

by his Att'y:

W. C. Townsend

(No Model.) 3 Sheets—Sheet 3.

E. THOMSON.

FOCUSING ELECTRIC ARC LAMP.

No. 302,961. Patented Aug. 5, 1884.

Fig: 3.

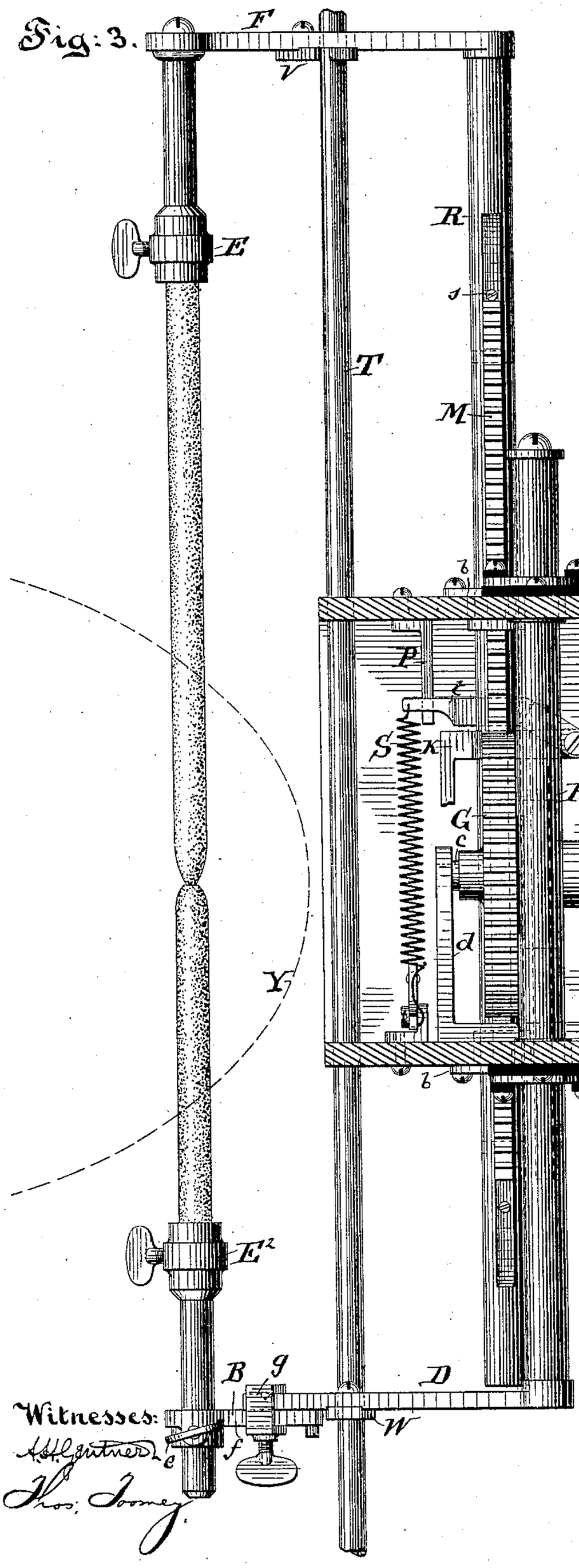

Fig: 5.

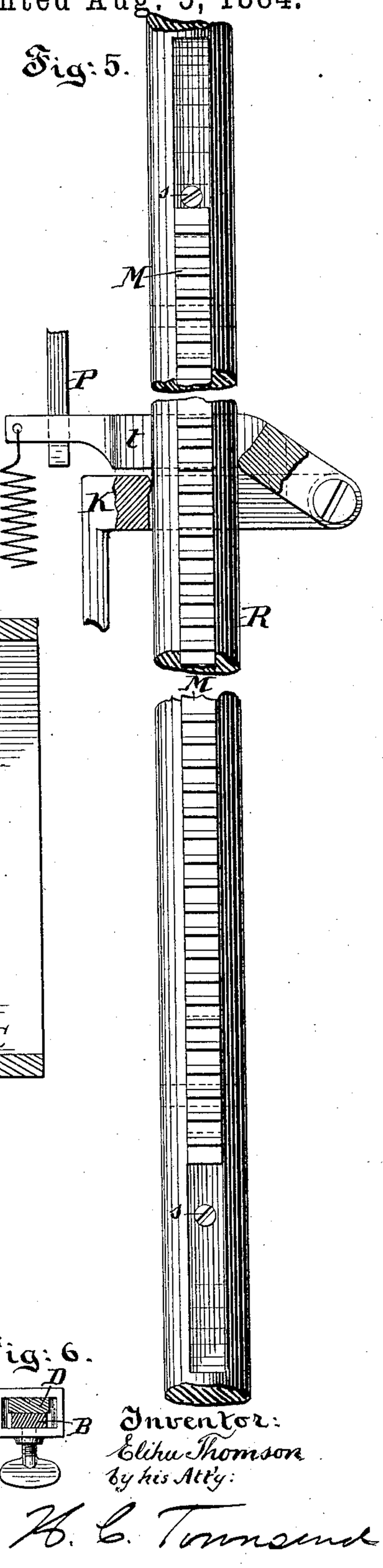

Fig: 6.

Witnesses:
A. H. Gartner
Thos. Toomey

Inventor:
Elihu Thomson
by his Att'y:
H. L. Townsend

UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

FOCUSING ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 302,961, dated August 5, 1884.

Application filed October 8, 1883. (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 Focusing Electric-Arc Lamps, of which the following is a specification.

The general object of my invention is to simplify the construction and improve the operation of electric-arc lamps of the class known as "focusing-lamps," or those in which the carbons are fed simultaneously at the proper relative rates to keep the arc always at the same point.

My invention is designed more especially to provide a simple and effective means, in small compass, whereby the desired focusing movement may be imparted to the carbons; to provide a means whereby the carbon-carriers of such lamps may be suitably guided and prevented from binding when the lamp is subjected to jarring; to so construct the carbon carriers or supports of a focusing-lamp that they may be adjusted in any desired direction for the purpose of bringing the carbons into line or for insuring the formation of the arc at the desired point; in a focusing-lamp whose carriers are mechanically connected so as to move together in feeding to secure, as far as possible, a movement of the upper carbon only when the carbons are to be separated to form the arc, to thereby increase the sensitiveness of the mechanism in case of overfeed of the carbons, and to secure the shortest possible lamp capable of giving the proper action.

My invention consists, principally, in making one of the carriers compound, or in two parts capable of slight movement upon one another. One of said parts is mechanically connected with the other carbon-carrier, so that the two, whenever they move, will move together at the proper relative rates. The other part is under the control of the mechanism by which the separation of the carbon is effected and the feed controlled. The latter part carries the carbon, and when it is actuated to form the arc is permitted to move without imparting movement to the other portion and the mechanically-connected opposite carbon. When the carbons are so far consumed as to necessitate a feed, the two portions of the compound carrier are engaged with one another, and the feed movement permitted in that portion which carries the carbon will be imparted through the other portion to the opposite carbon.

My invention consists, also, in certain details of construction of parts, hereinafter described and claimed, whereby the general objects of the invention are effected.

In the accompanying drawings I have shown only the parts directly concerned in effecting the results, the magnet system and the circuits and connections being omitted, as any of the well-known arrangements are suitable, and they are not especially related to the mechanical constructions forming the subject of this patent.

In the drawings, Figure 1 is a front elevation of the mechanical portions of a lamp embodying my invention. Fig. 2 is a plan of the same on a cross-section line *x x* of Fig. 1. Fig. 3 is a side elevation of the lamp. Fig. 4 is a top view of the lamp. Fig. 5 is a side view, partly in section, of the compound carrier and the carbon-separating and feed-controlling device, here shown as a clutch or clamp, of a construction embodied in some of my prior patents. Fig. 6 is cross-section of the arm D, Fig. 2, on the line *y y*.

In Fig. 1, C is the case containing the mechanism of the lamp. It supports the bushings or guides b b^2, through which the upper and lower carbon-carriers, R R^2, respectively, slide, those of the latter being insulated, as shown in black, from the case C C. The carriers R R^2 form or are provided with rack-rods, and gear with the wheels G H, respectively, which latter are also insulated from each other by means of a suitable bushing or bushings, to prevent electrical connection between the carriers R R^2. The wheels G H are upon a shaft, *c*, mounted in standards *d d*. (See Fig. 3.)

E E^2 are the carbon-holders, respectively, supported from arms or brackets F D, attached to the carriers. The ratio of the gears is such as to give a rate of motion to the carrier R in descending of about twice that of R^2 in simultaneously ascending, although this proportion is subject to change, according to relative softness and size of carbons used. A ver-

tical guide-rod extending through the casing or attached to it is shown at T. Arms or guide-pieces V W, attached, respectively, to the arms F D and bearing on said rod, serve to steady the carriers and prevent them from binding in their bushings *b* b^2. The lower holder, E^2, has an independent upward and downward adjustment in sleeve or bushing B on the end of arm D, and may be set therein at any desired height by the set-screw *e* or other suitable means. By this adjustment the carbons may be set so as to be in contact at the focus of the reflector Y. The bushing B is itself carried by a plate or arm, *f*, (see Figs. 3 and 6,) which is capable of horizontal adjustment longitudinally or laterally upon the arm D, and may be clamped or secured to said arm in any desired position by means of a clamp, *g*, or other device. The lower carbon-holder, E^2, is thus given a vertical adjustment and a horizontal adjustment in all directions. The upper carbon-holder, E, borne in like manner by the arm F, may or may not have similar adjustments.

The carbon-separating and feed-controlling device or mechanism may be of any desired kind. I prefer, however, to employ a clutch of any suitable character—such, for instance, as that shown—consisting of the body K, partly encircling the carrier R, Figs. 1, 2, and 5, and having a hinged cam-lever or toe, *t*, adapted to bear on the carrier, a fixed releasing-stop, P, therefor, and a clamping or clutching spring, S, acting to fasten the cam or toe upon the carrier when the cam-lever *t* is lifted out of engagement with the stop P. This construction of clutch is described and shown in other prior patents granted to me. The clutch is lifted and lowered vertically by the agency of any known and suitable magnet system, (not shown and not forming any part of my present invention,) the only requisite being that it shall lift the carbons apart by raising the clutch when the arc is too short, and lower the clutch to the stop P, or beyond, when the arc is too long, and perform this action in a gradual manner without quick pulsation or jerks. The carrier R, with which said clutch, clamp, or other lifting and feed-controlling mechanism engages, is the compound carrier, and is not connected with the other carrier by a rigid or constant mechanical connection, but is so made as to be capable of moving a slight distance upward without necessarily imparting movement through the intermediate mechanism to the other carrier, R^2. This may be accomplished by the construction shown in Figs. 1 and 5, where M indicates the rack for the carrier R. This rack is not fixedly attached to the carrier, but is freely movable in or upon the carrier between stops *s s*, as indicated, so that the carrier R itself may have a slight independent vertical play, determined by the distance between the stops *s s*, and may therefore be lifted, by the action of the clutch or other device, when the arc is to be formed, without imparting movement to the rack M and the lower carrier and carbon. The rack M is made of sufficient weight to balance the rack-rod and carrier R^2, Fig. 1, and its accompanying parts, so that no tendency to movement exists unless the carrier R and its parts add their weight to that of the rack M, when the clutch K is released. The parts thus constituted act as follows: In Fig. 3 the carbons are shown in place in the reflector Y, ready for use. When the clutch is lifted by the assumed magnet system, the slight play of the carrier R outside the rack M allows formation of the arc without any movement of the gearing, which remains at rest. The lowering of the clutch to feed the carbons adds the weight of R, F, and E, &c., to that of M, causing feeding of both carbons at their proper rates by the rotation of the gear-wheels or other intermediate mechanism. Should, however, an overfeeding take place and the carbons run too near together, as may sometimes happen, there is at once a renewed lift by the clutch, as at first, without disturbing or requiring the gearing to take part therein.

It is to be understood that the mechanism described is adapted to use with differential magnet systems or shunt-feeding magnet systems to work upon a circuit with other lamps, or with a current strength of uniform amount; or it may be used with varying currents to work alone with either a differential or other magnet system, with or without derived-circuit magnets. It is to be understood, also, that in the practice of my invention the disconnection of the movements of the two rods R R^2 during lift of the carbon is claimed, broadly, whether effected by the agency of gearing-connections or their mechanical equivalents.

The position of the arc during burning and the relation of the parts render possible a very compact lamp, such as is readily adapted to use with the ordinary standard locomotive head-light box and reflector, the case G, containing the mechanism, being supported so as to occupy a position immediately back of the reflector.

What I claim as my invention is—

1. In an electric-arc lamp whose carriers are mechanically connected so that the feed movement of one imparts or is accompanied by a corresponding feed movement of the other, a compound carrier made in two parts, one of which supports the carbon and is capable of a slight independent movement upon the other, while the latter is mechanically connected with the other carbon-carrier, so as to impart movement to it, as and for the purpose described.

2. In a focusing electric-arc lamp having suitable connecting mechanism to impart a proper relative feed to the two carbons, the combination of a carbon-carrier having a separate or independent lifting movement independent of

the aforesaid connecting mechanism, and carbon-adjusting mechanism engaging with said carrier.

3. The combination, substantially as described, of a carbon-carrier constructed in two parts, one of which supports the carbon, while the other is movable between two stops upon the first part, a carbon-separating and feed-controlling device engaging with the first part, and intermediate connecting mechanism between the second part and the carrier for the opposite carbon, as and for the purpose described.

4. The combination, substantially as described, of the carrier, the carbon lifting and feeding clutch engaging therewith, the rack M, supported upon and movable between stops on said carrier, and intermediate toothed wheels between said rack and the rack for the other carrier, as and for the purpose described.

5. The combination of the rack M, the lower carrier and its parts, and the intermediate wheels, balanced as described, and the independently-movable carrier arranged to add its weight to the rack, and thus cause a feed when released by the feed-controlling devices, as and for the purpose set forth.

6. The combination, in a focusing electric lamp, of a case containing the mechanism back of the arc, carbon-feeding rods projecting therefrom upward and downward, respectively, and arms extending at right angles therefrom, bearing the carbon-holding clamps, the upper carbon being borne by the part attached to the upper end of the upper feed-rod, and the other or lower carbon being borne by the part attached to the lower feeding-rod, substantially as set forth.

7. The combination, in an electric lamp, of a feed-rod, R or R^2, engaging with the feed-controlling mechanism, an arm or bracket extending transversely from the same, and carrying at or near its extremity a carbon clamp or holder, and a guide bar or rod, T, against which the arm or bracket bears, as and for the purpose described.

8. The combination, in an electric lamp, of the feed rods or carriers R R^2, gearing with a common feed-controlling mechanism, the arms or brackets F and D, the guide-rod T, with which the arms engage, and the positive and negative carbon-holders E E^2, supported, respectively, from the arms F and D.

Signed at Boston, in the county of Suffolk and State of Massachusetts, this 5th day of October, A. D. 1883.

ELIHU THOMSON.

Witnesses:
JOSEPH J. SKINNER,
JAMES F. MEENCH.