(No Model.)

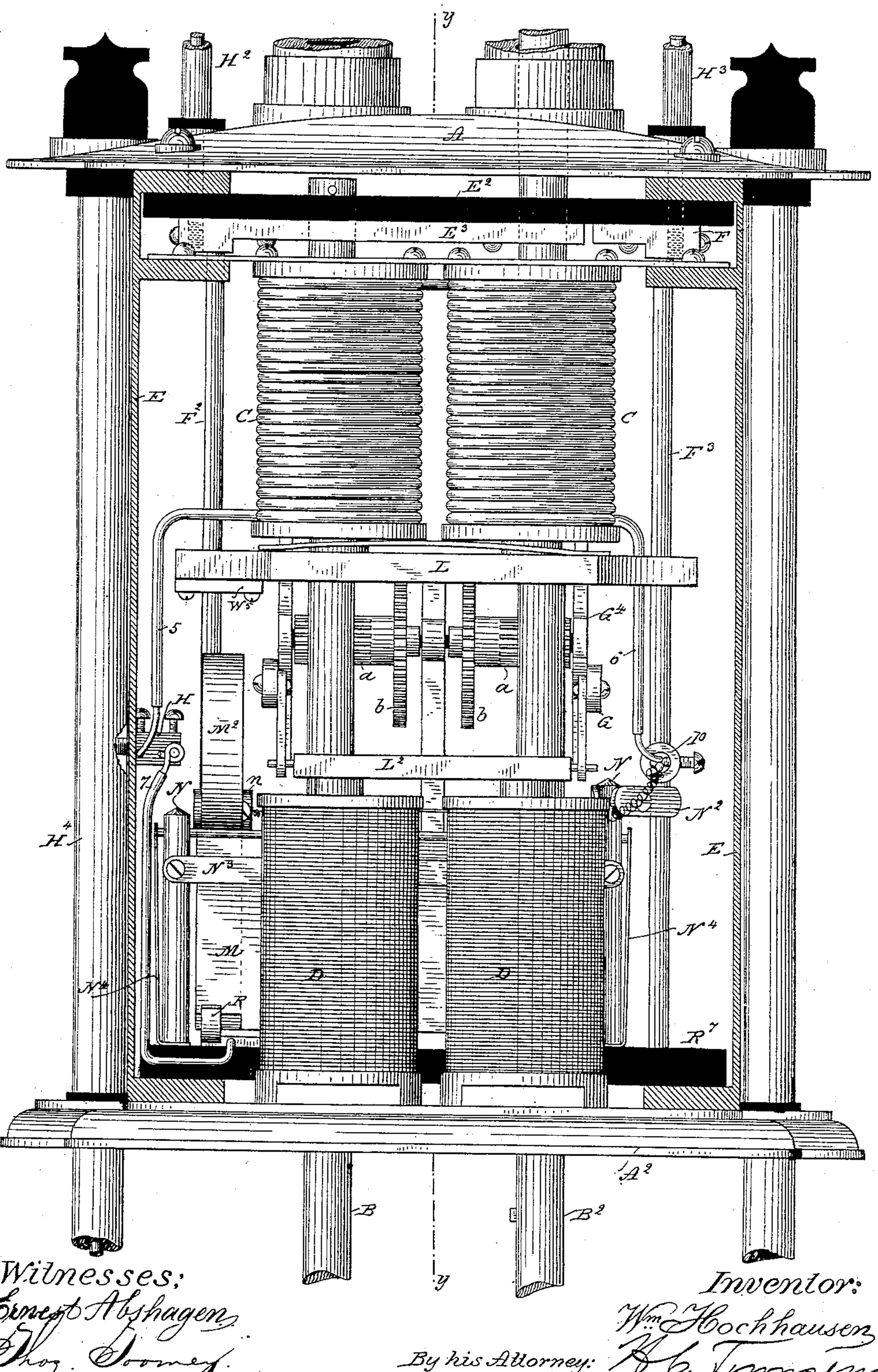
4 Sheets—Sheet 1.

W. HOCHHAUSEN.

DOUBLE ELECTRIC ARC LAMP.

No. 294,042. Patented Feb. 26, 1884.

Fig. 1.



Witnesses:
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Thos. Toomey.

Inventor:
Wm. Hochhausen
By his Attorney: H. C. Townsend

(No Model.)

4 Sheets—Sheet 2.

W. HOCHHAUSEN.

DOUBLE ELECTRIC ARC LAMP.

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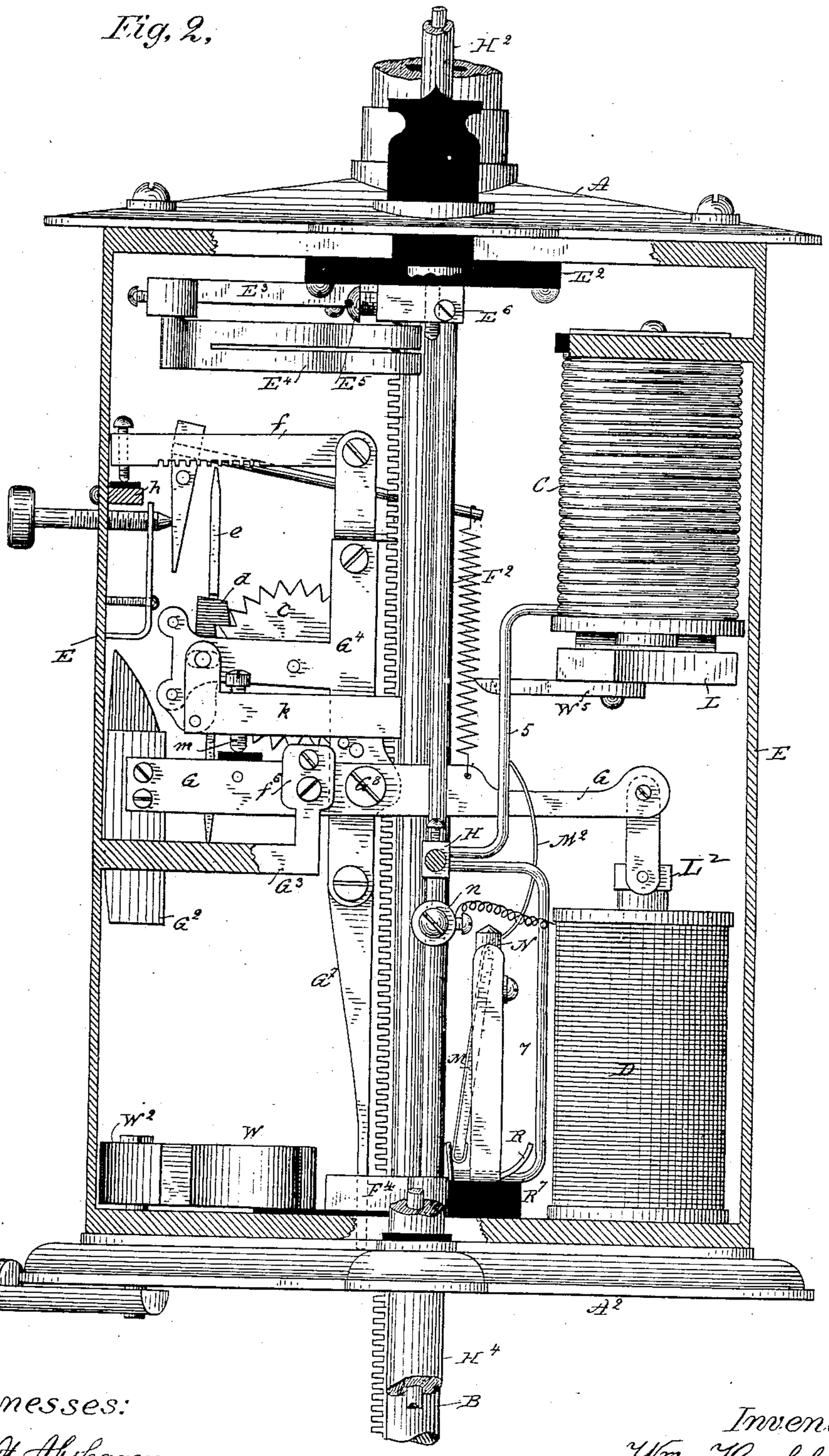
Fig. 2.



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H. C. Townsend

(No Model.)

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W. HOCHHAUSEN.

DOUBLE ELECTRIC ARC LAMP.

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Fig. 3,

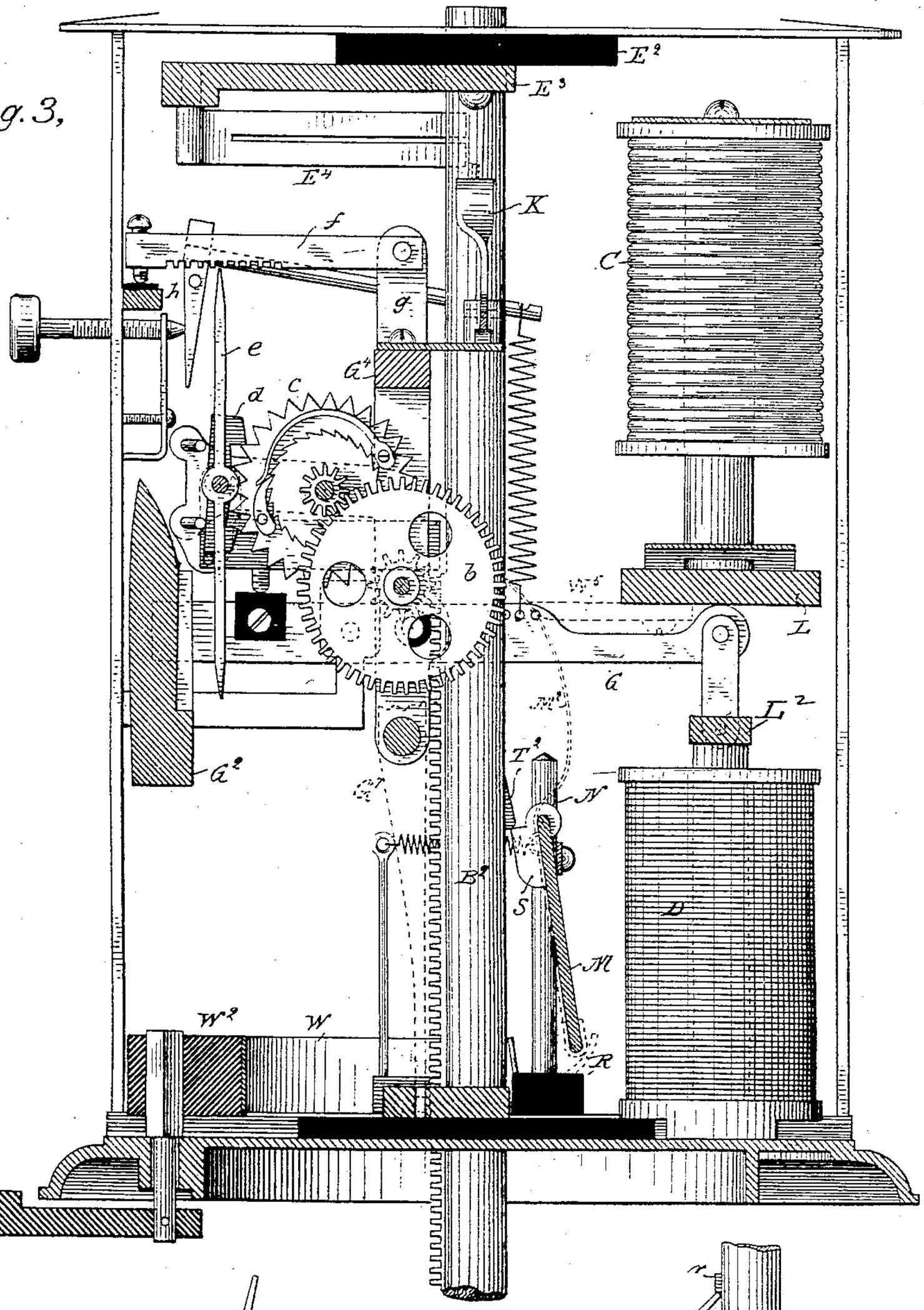


Fig: 7.

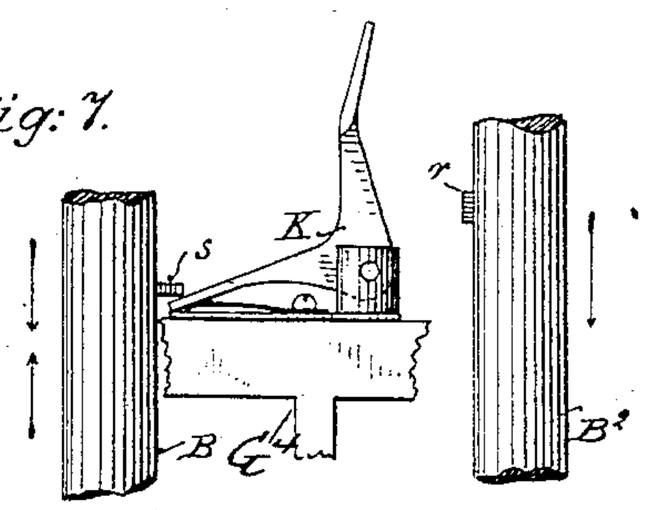
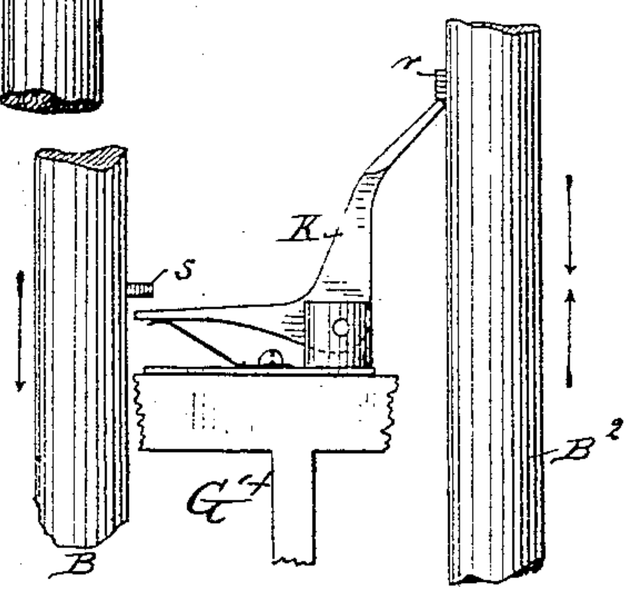


Fig: 8.



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(No Model.)

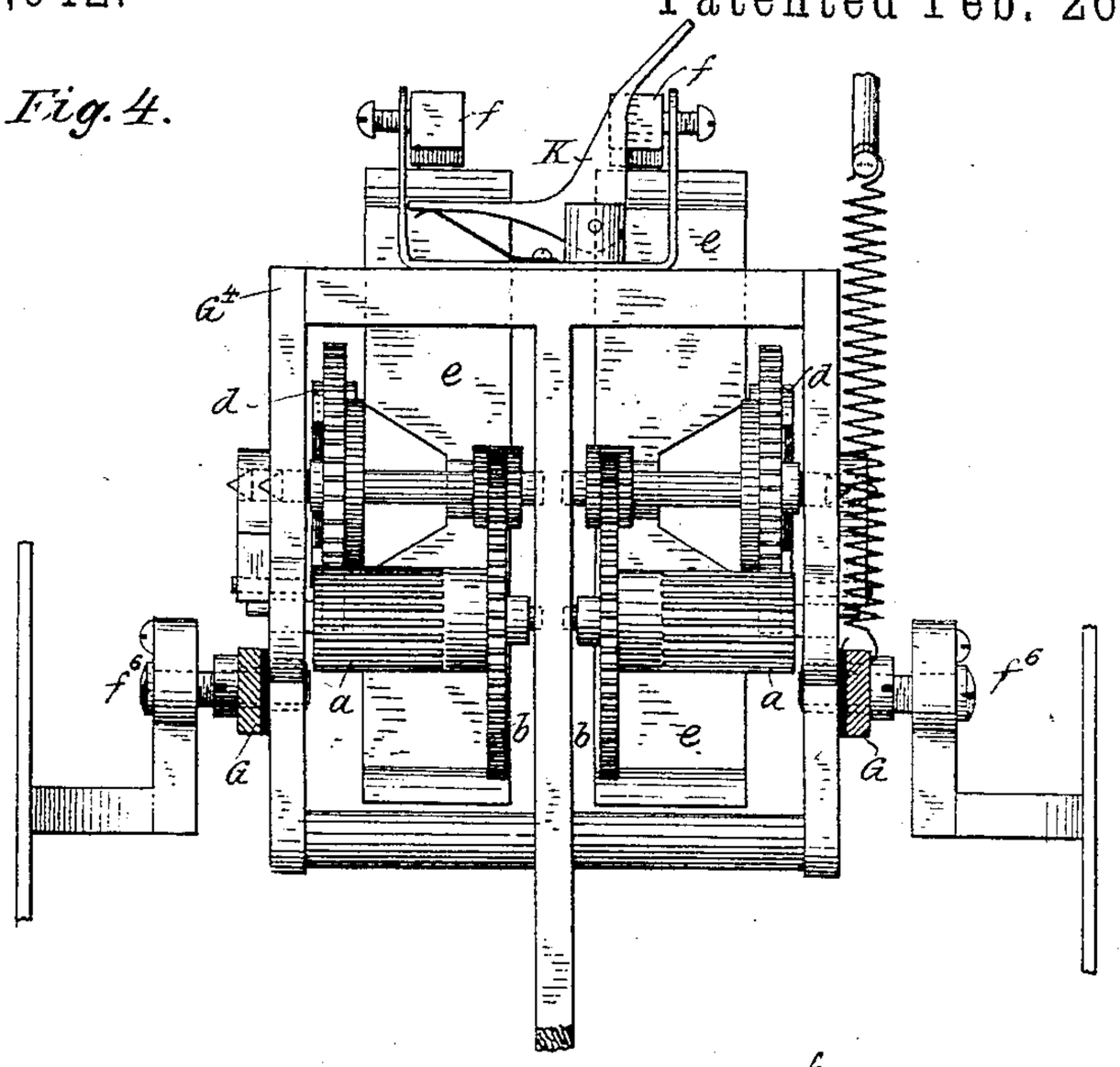
4 Sheets—Sheet 4.

W. HOCHHAUSEN.

DOUBLE ELECTRIC ARC LAMP.

No. 294,042. Patented Feb. 26, 1884.

Fig. 4.



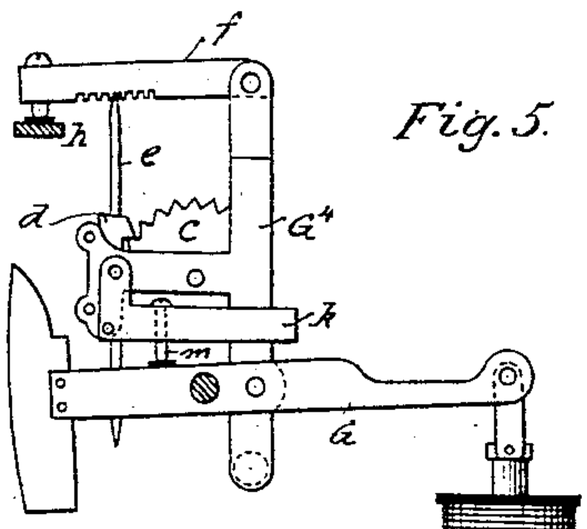


Fig. 5.

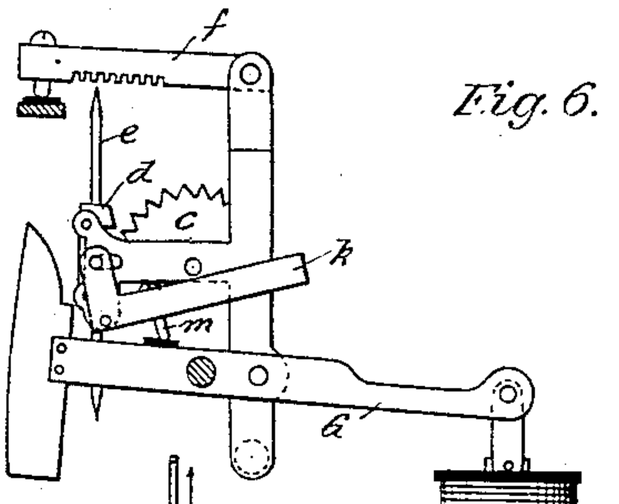


Fig. 6.

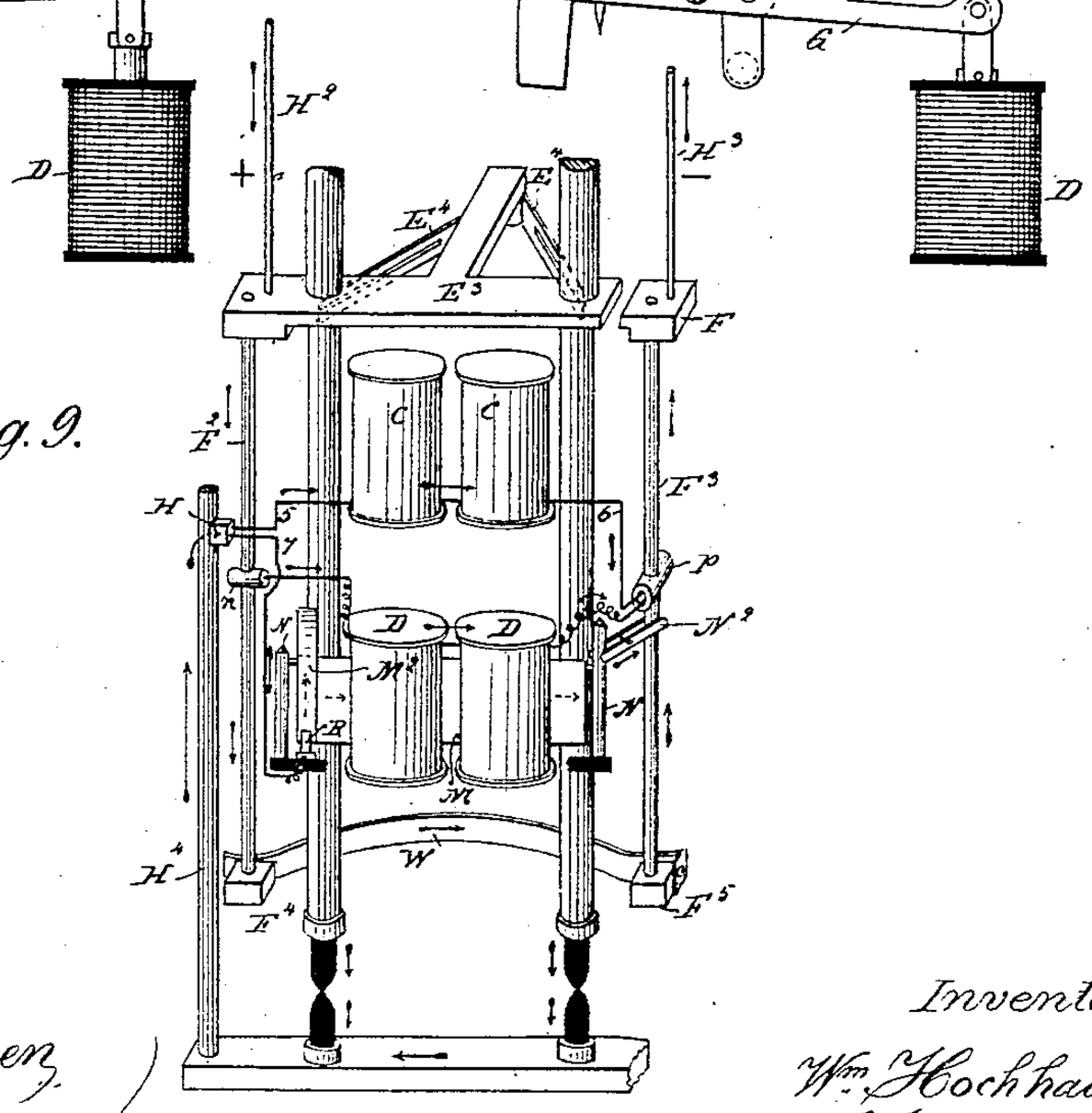


Fig. 9.

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By his Attorney: K. C. Timmerman

UNITED STATES PATENT OFFICE.

WILLIAM HOCHHAUSEN, OF NEW YORK, N. Y.

DOUBLE ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 294,042, dated February 26, 1884.

Application filed April 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, WM. HOCHHAUSEN, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Double Electric-Arc Lamps, of which the following is a specification.

My invention relates to electric-arc lamps of the class in which two sets of carbons are combined in such a way that the carbons of one set may be held out of action until the carbons of the first set are consumed, at which time the set held out of action is automatically released, so that it may be regulated or fed in the same way as the first-acting set.

My invention consists of certain combinations of regulating and feeding mechanism, carbon-carriers, and locking and releasing devices making up a double-carbon lamp of novel construction and action, the peculiarities of which will be hereinafter more particularly set forth.

In carrying out my invention, I duplicate the ordinary feed-regulating mechanism of an electric lamp, but support the same in a common lever or support, which is actuated in the usual way by a magnet or magnet system of ordinary construction. With the two carbon-carriers are combined suitable intermediate locking and unlocking devices, whereby one carbon-carrier may be held from feeding, and may be released by the descent of the other carbon-carrier.

My invention further consists of certain hereinafter-specified improvements in the automatic cut-out for the lamp.

In the accompanying drawings, Figure 1 is an end view of a double electric lamp embodying my invention. Fig. 2 is a side view of the same. Fig. 3 is a vertical central section on the line *y y* of Fig. 1. Fig. 4 is a detail view of the feed-regulating train of wheels. Figs. 5 and 6 show in detail a quick-release device for said train. Figs. 7 and 8 show in detail the intermediate locking and releasing catch between the two carbon-carriers. Fig. 9 illustrates the circuits of the lamp.

A A^2 indicate, respectively, the top and bottom plates of the lamp, between which is placed a frame or casing, E, from which latter the magnets and other working parts of the lamp are supported.

C C indicate the main-circuit magnet, and D D the derived-circuit magnet, the former having movable cores connected by a cross-piece, L, which latter rests upon the end of lever G, carrying the feed-regulating trains of wheels for the two carbon-carriers B B^2 when there is no current passing through the carbons. The cores of the derived-circuit magnet D are connected by a cross-piece, L^2, hung by links from the end of lever G. A counter-weight, G^2, attached to the lever, acts in opposition to the attraction of magnets D D. The weight of the main-magnet cores and cross-piece L is, however, sufficient to overcome weight G^2 and to hold the end of lever G down when no current is passing, so that the carbons may come freely together. When the current passes, the cores and cross-bar L are raised by magnet C C, and are held up out of connection with lever G, so that the latter is operated to produce the proper movements of the feed-regulating mechanism by the derived-circuit magnet only. This arrangement is substantially the same as that patented to me by Letters Patent of the United States No. 271,456, and the main-magnet cores and cross-piece herein described constitute the overbalancing-weight of that patent. The lever G is pivoted at f^6, Figs. 2 and 4, in suitable brackets supported in frame or case E, and carries a frame, G^4, that supports two feed-regulating trains of wheels, with their ordinary escapements and detents, one train being connected to carbon-carrier B and the other to carrier B^2. The frame G^4 is pivoted in lever G at G^8, and is provided with a depending piece, G^7, which works in a slot in the lower plate, A^2. By this means a straight up-and-down movement of frame G^4 is secured. Each train consists of the usual pinion, *a*, gearing with a carbon-carrier, and wheel *b*, connected with escapement-wheel *c*. The escapement-pallets *d* of the two trains are provided with the usual vibrating fly, *e*, and are mounted on a rock-shaft rocking at each end in a pivoted lever supported by frame G^4, which lever is weighted at its end *k*, so as to normally hold

the pallets in engagement with the escapement-wheels. A pin, *m*, in the lever is arranged to come into contact with lever G and throw the pallets out of engagement with the escapement-wheel whenever the attraction of magnet D becomes sufficiently strong to pull down the end of lever G into the position shown in Fig. 6. When this occurs, either carbon-carrier can drop freely. The detents for the retarding mechanism are indicated at *f*, and each consists of a toothed lever supported at one end from the top of frame G^4, and resting at the other by an adjustable screw on a support, *h*. When the counterbalance G^2 raises frame G^4, the fly *e* comes into engagement with the detent *f*, and prevents the descent of the carbon-carrier. When, however, the attraction of the derived-circuit magnet D prevails, the detent disengages from the fly, and the carbon-carrier is permitted to feed. Each carbon-carrier is provided with its own train of wheels, terminating in the fly *e* and a detent, *f*, and the feed of either carbon-carrier is produced by the action of its own feed-regulating train and detent working in conjunction with the magnet system in the ordinary way.

In order to hold one carbon-carrier out of action while the other is feeding, I provide a detent or catch, K, consisting of an elbow-shaped lever pivoted on a projection secured to the upper end of frame G^4. The vertical end of the lever K is arranged to catch under a pin, *r*, projecting from carbon-carrier B^2, so as to prevent said carrier from feeding downward while carrier B is in action. The horizontal end of lever K is arranged in the path of a pin, *s*, projecting from carbon-carrier B, as shown in Figs. 7 and 8. Pin *r* is so placed on the carrier B^2 as to hold the carbons out of contact after a new carbon has been inserted. Pin *s* is arranged on carbon-carrier B so as to strike the horizontal end of lever K when the carbon of carrier B is wholly or nearly consumed. A spring or weight tends to hold the lever K in engagement with pin *r*.

When the transfer or locking lever K is supported, as above described, from the frame carried or actuated by the lamp-magnet, no change in the weight to be supported by said magnets is produced when the first-acting carrier engages with and is held up by lever K, as would be the case if the lever K were hung from a fixed support independent of the movable support by which the carriers are sustained.

The general circuits and connections of the lamp are as follows: E^3 indicates a plate of metal supported from an insulating-plate, E^2. The positive conducting-wire H^2 passes through the top of the lamp and into said plate, being secured therein by a set-screw, E^5, Fig. 2. The plate E^3 carries conducting-springs E^4, bearing upon the sides of the carbon-carriers, so as to make good connection between the positive wire, the two carbon-carriers, and the upper carbons. A conducting-rod, F^2, is clamped at its upper end in the plate E^3, and is secured therein by a clamp-screw, E^6. Its lower end rests in an insulated conducting plate or block, F^4. A similar conducting-rod, F^3, (see Figs. 1 and 9,) is seated at its upper end in a plate, F, also secured to insulating-plate E^2, and disconnected from plate E^3. The negative conducting-wire H^3 is inserted into plate F, or secured therein in any suitable manner. The lower end of rod F^3 rests in a conducting-block, F^5, Fig. 9, to which is secured a spring, W, whose free end can be forced into contact with block F^4 by a cam-piece, W^2, so as to switch the lamp out of circuit. The derived-circuit magnet D is placed in circuit between rods F^2 and F^3, one terminal of said magnet being connected to a binding-post, *n*, clamped to rod F^2, its other terminal being connected to a binding-post, *p*, clamped to rod F^3. The circuit from the lower carbons is through a side rod, H^4, of the lamp, as usual. Into the rod H^4 is screwed a binding-post, H, from which a wire, 5, leads to magnet C. The other terminal of said magnet is connected to rod F^3 and the negative wire H^3 through binding-post *p*. By this arrangement the magnet D is placed in a derived circuit around the carbons, and the magnet C is in the main circuit with the set of carbons that is for the time being in action.

A preferred form of cut-out for this lamp is constructed as follows: M indicates a plate of iron pivoted in posts N, facing the side of magnet D. Projecting from the upper end of the plate is a copper strip or spring, M^2, arranged in the path of a projection, W^5, secured to the cross-piece L, so that when the plate M is attracted by magnet D, thus swinging the spring M^2 to the left, Fig. 2, the projection W^5 will, if allowed to drop, strike said spring and force it into contact with rod F^2, or with some other portion of the frame of the lamp. The lower end of the copper strip M^2 is bent around the lower edge of plate M, and, when said plate is drawn forward by magnet D, makes contact with a projection, R, from a block which is mounted on an insulating-plate, R^7, and is connected by wire 7 with binding-post H. The plate M is connected through one of its posts N with rod F^3 by a clamp, N^2, which clamps post N and rod F^3.

To assist in making good connection, copper plates N^4 are clamped beneath the posts N, and bear against the end of the spindle or rock-shaft by which M is carried, and by which it is supported from post N. A cross-strip, N^3, connects, electrically, the posts N, so that if the connection should fail at one end it may be still had through the other.

The operation of the cut-out device is as follows: If, during the operation of either carbon-carrier, the arc becomes abnormally long, the magnet D will draw the plate M forward against the influence of its retractor, consisting of the usual retracting-spring, as shown,

which is properly adjusted for the purpose, and will cause the plate M or the lower end of the strip M^2 to make contact with the stop R, thus completing a short circuit around the magnets C, which circuit, starting with the binding-post H, is through wire 7, stop R, plate M, post N, clamp N^2, to rod F^3 and strip M^2 toward rod F^2. The cores of magnet C and cross-piece L, being then unsupported, will fall, and the projection W^5 will force M^2 into contact with rod F^2, thus completing a short circuit around the carbons and both magnets C, the path of such short-circuit current being from H^2 through F^2 M^2 M, the supports therefor, clamp N^2, rod F^3, and to negative wire H^3. If, while the carbon is burning properly, the current be shut off, the cores of magnet C will drop, as before, but spring M^2, being at such time in the position shown in Fig. 2, will not be forced against rod F^2, the projection W^5 being suitably perforated, as indicated by dotted lines in Fig. 2, to pass down over said spring. The lamp may therefore at any time be brought into operation again.

In order to automatically short-circuit the lamp when the second B^2 of the carbon-carriers has fed down, I provide a projection, T^2, which is arranged to come into contact with an insulating-piece, S, Fig. 3, upon the end of plate M, and to cause the plate to swing and make contact at R.

The general operation of the lamps is as follows: Both carbons having been inserted and raised to their highest points, the pin *r* on carbon-carrier B^2 will catch upon the end of lever K, so that said carbon will be prevented from feeding, although its fly *e* may be carried out of engagement with its detent *f* by the movements of the lever G. The end of the carbon in carrier B^2 is out of contact with its lower carbon when the lamp starts into action; but the carrier B being free, the carbon of the latter will come into contact with its lower carbon, so that when the weight of the cores for magnet C is removed from the lever G, the weight G^2 will raise the frame G^4, thus forming the arc in the usual way. The carbon-carrier B then feeds in the ordinary way, the action of the mechanism being as described in my prior patent before referred to. During this operation both carbons are supported by the magnet system, since the lever K is supported by the frame G^4 and lever G. The position of the carbon-carriers with relation to the lever K is indicated in Fig. 8. When the carbon in B has fed out, the pin *s* comes into contact with the end of K, and said carrier is prevented from moving downward farther. At the same time the carrier B^2 is released, and its carbon feeds down into contact with the lower carbon, the operation of lifting and feeding carrier B^2 then taking place in the same manner as the lift and feed of carrier B. During this operation both carriers are supported, as before, by the lever G. During the ordinary operation of feeding, the lever which supports the pallets *d* occupies the position which is substantially shown in Fig. 5. If, however, the arc becomes abnormally long, lever G is thrown into the position shown in Fig. 6, thus removing the pallets from the escapement, and allowing the carbons to run together, and to preserve the circuit.

This device is supplementary to the electrical cut-out, and may take its place.

I do not limit myself to any special form or construction of feed-regulating devices, since my invention may be applied to other devices designed for producing the proper separation and feed of the carbons.

The lever K may be varied in form without departing from the invention; but it should, by preference, be supported on the lever G or the frame G^4, carried thereby, so that the weight of both carriers shall always be upon the armature-lever or other support actuated by the magnet system of the lamp.

I am aware that it is not new to interpose between two carriers of a double-carbon lamp a locking-lever for holding one carrier up until the other has fed to a predetermined point, and do not wish to be understood as claiming such device, broadly, irrespective of its location or mounting.

What I claim as my invention is—

1. The combination, with two carbon-carriers, of two independent sets of feed-regulating mechanisms—one for each carrier—constantly in normal or feed-regulating connection with said carrier, so that when the magnet system acts it will act alike and in the ordinary manner upon both mechanisms and their carriers, a catch for engaging with and preventing the movement of one carrier when the feed-regulating mechanism is released by the movement of the lever, while the other is left free to move, and means for automatically releasing the first-named carrier when the latter has fed to a predetermined point.

2. The combination, in a double-carbon lamp, of a single pivoted frame, a single magnet system actuating said frame, two independent trains of wheels mounted on said frame, independent retarding devices for each train, detents arranged to release both trains when the frame is moved, carbon-carriers—one for each train—and means for holding one train from movement when both are released, while the other is left free to rotate.

3. The combination, with two carriers supported from a common armature lever or support, of an intermediate locking-lever carried by said support and engaging positively with one carrier, and a releasing projection upon the other carrier, for actuating and disengaging said locking-lever when the latter carrier has moved downward to a predetermined extent.

4. The combination, with the two carbon-carriers, of the intermediate elbow-lever pivoted on the armature-lever of the lamp, and locking and releasing projections on the car-

riers, as described, whereby the one carrier may be held while the other is feeding, and when the latter has fed to a predetermined point it may itself be held by the lever, and at the same time may release the first carrier.

5. The combination, with two carbon-carriers, of a locking mechanism for holding one of said carriers from movement while the other is feeding, said mechanism being mounted on the support that carries and actuates the feed-regulating devices for said carriers, and a suitable projection upon the first-acting of the two carriers, suitably arranged to bring said carrier to rest, so that its weight will bear upon the common support after said carrier has fed to a predetermined extent.

6. The combination of the lever, the two independent feed-regulating mechanisms, with their independent escapements and detents, the two carbon-carriers, the overbalancing-weight resting on the lever when there is no current passing, the main-circuit magnet for holding said weight out of action, and the derived-circuit magnet connected to the lever.

7. The combination of the derived-circuit regulating-magnet, the armature presented to the side thereof, a stop for said armature, through which the main-circuit magnet is short-circuited, and a spring connected to the armature and arranged to be forced against the frame of the lamp by the weight released by the main-circuit magnet.

8. The combination of the pivoted armature, the contact-stop for the lower end thereof, and the spring connected to the other end and arranged in the path of the weight normally supported by the main-circuit magnet.

9. The combination of the insulated plate to which the positive conductor is connected, the two carbon-carriers, and the contact-springs supported by said plate.

10. The combination of the insulating-plate E^2, plates E^3 and F, conducting-rods F^2 F^3, and suitable binding posts or clamps, whereby the derived-circuit magnet may be connected in circuit between said rods.

11. The combination, in a double-carbon lamp, with the second-acting of the two carbon-carriers, of a lug or projection, T^2, arranged in the manner described, to engage with the automatic cut-out mechanism of the lamp when the carrier has completed its speed.

12. The combination of plate M, conducting-strip M^2, bent around the lower edge of plate M, stop R, and means for forcing the upper end of the strip into contact with the rod F^2, or other portion of the lamp-frame, upon an abnormal increase in the length of arc.

13. The combination of the lever G, supporting the two feed-regulating trains and the two carbon-carriers, the counterbalance-weight G^2, or its equivalent, the derived-circuit magnet D, connected to said lever, and the main-circuit magnet C, whose cores are supported by said lever when the lamp is out of action, but may be raised out of connection therewith when the magnet is energized.

14. The combination, in a double-carbon lamp, of the feed-regulating lever G, the derived-circuit magnet D D, whose cores are hung from cross-bar L^2, and the main-circuit magnets C C, whose cores are connected by cross-bar L, arranged to rest loosely on the end of the lever G.

Signed at New York, in the county of New York and State of New York, this 14th day of April, A. D. 1883.

WILLIAM HOCHHAUSEN.

Witnesses:

THOS. TOOMEY,

GEO. C. COFFIN.

Correction in Letters Patent No. 294,042.

It is hereby certified that Letters Patent No. 294.042, granted February 26, 1884, upon the application of William Hochhausen, of New York, New York, for an improvement in "Double Electric-Arc Lamps," should have contained the following clause, setting forth certain foreign patents which had been obtained by the said William Hochhausen, viz: "Subject to the limitation prescribed by section 4887 of the Revised Statutes, by reason of English patent No. 2,057, dated April 23, 1883; French patent No. 155,914, dated June 7, 1883; and Canadian patent No. 17,395, dated July 26, 1883."

It is further certified that the United States Letters Patent No. 294,042 should be read with this clause inserted in the grant thereof, thereby limiting its term, and to make it conform to the files and records pertaining to the case in the Patent Office.

Signed, countersigned, and sealed this 25th day of March, A. D. 1884.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior

Countersigned:

BENJ. BUTTERWORTH,
Commissioner of Patents.