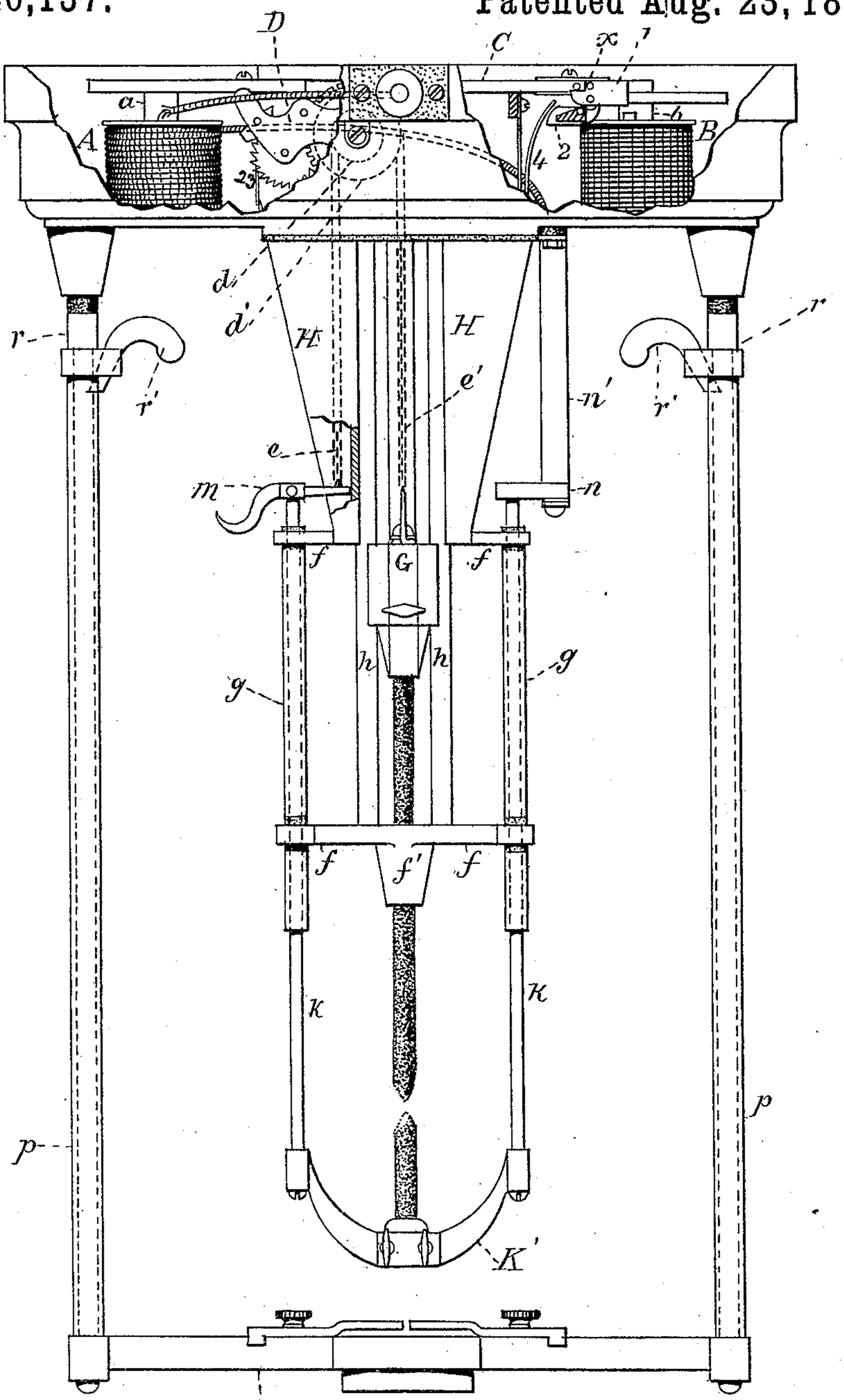
(No Model.) 3 Sheets—Sheet 1.

W. HOCHHAUSEN.

ELECTRIC LIGHT REGULATOR.

No. 246,137. Patented Aug. 23, 1881.

Fig. 1.



WITNESSES:

Julian A. Hurdle.
John Diffley

INVENTOR:

Wm Hochhausen
by H. B. Townsend
Atty.

(No Model.) 3 Sheets—Sheet 2.

W. HOCHHAUSEN.

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Fig. 2.

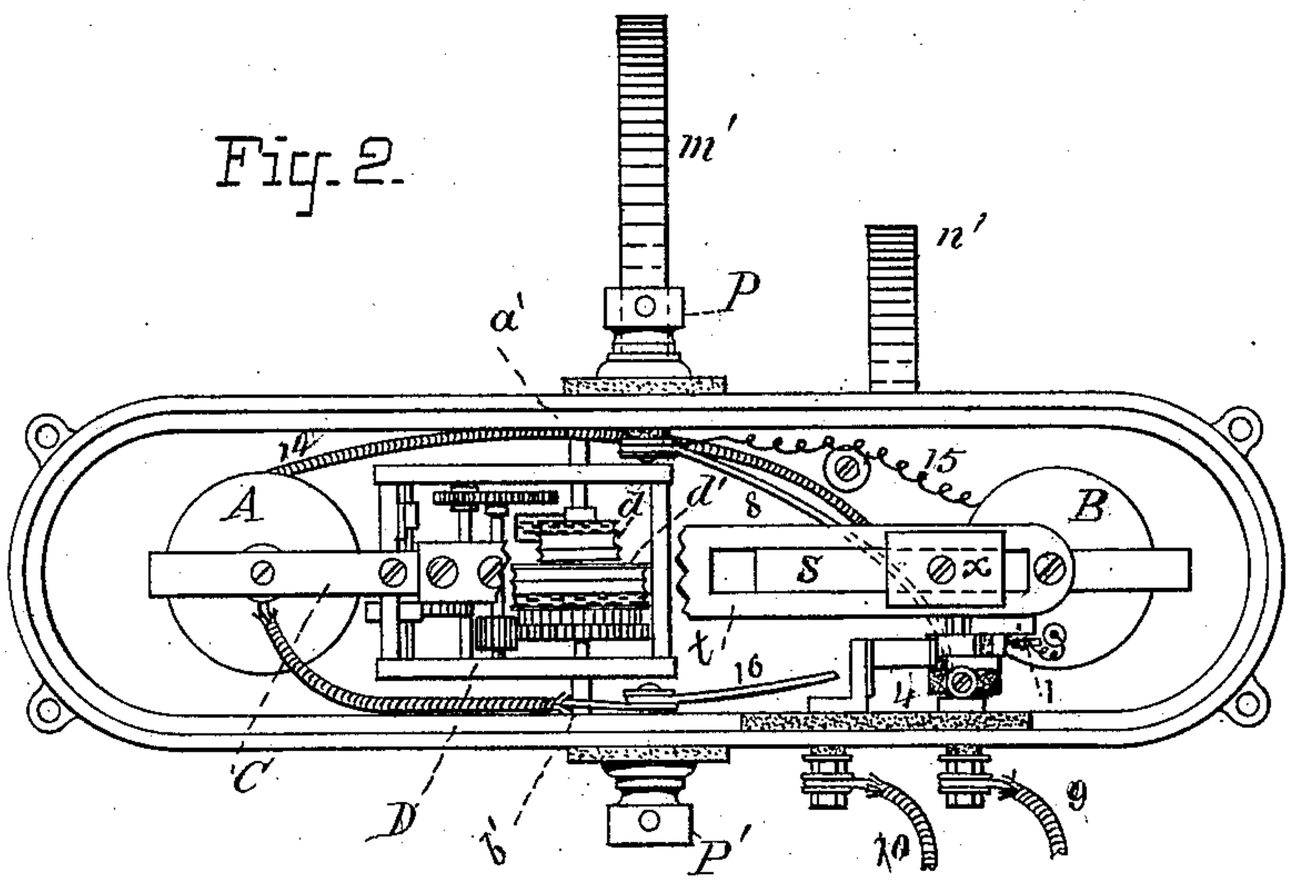
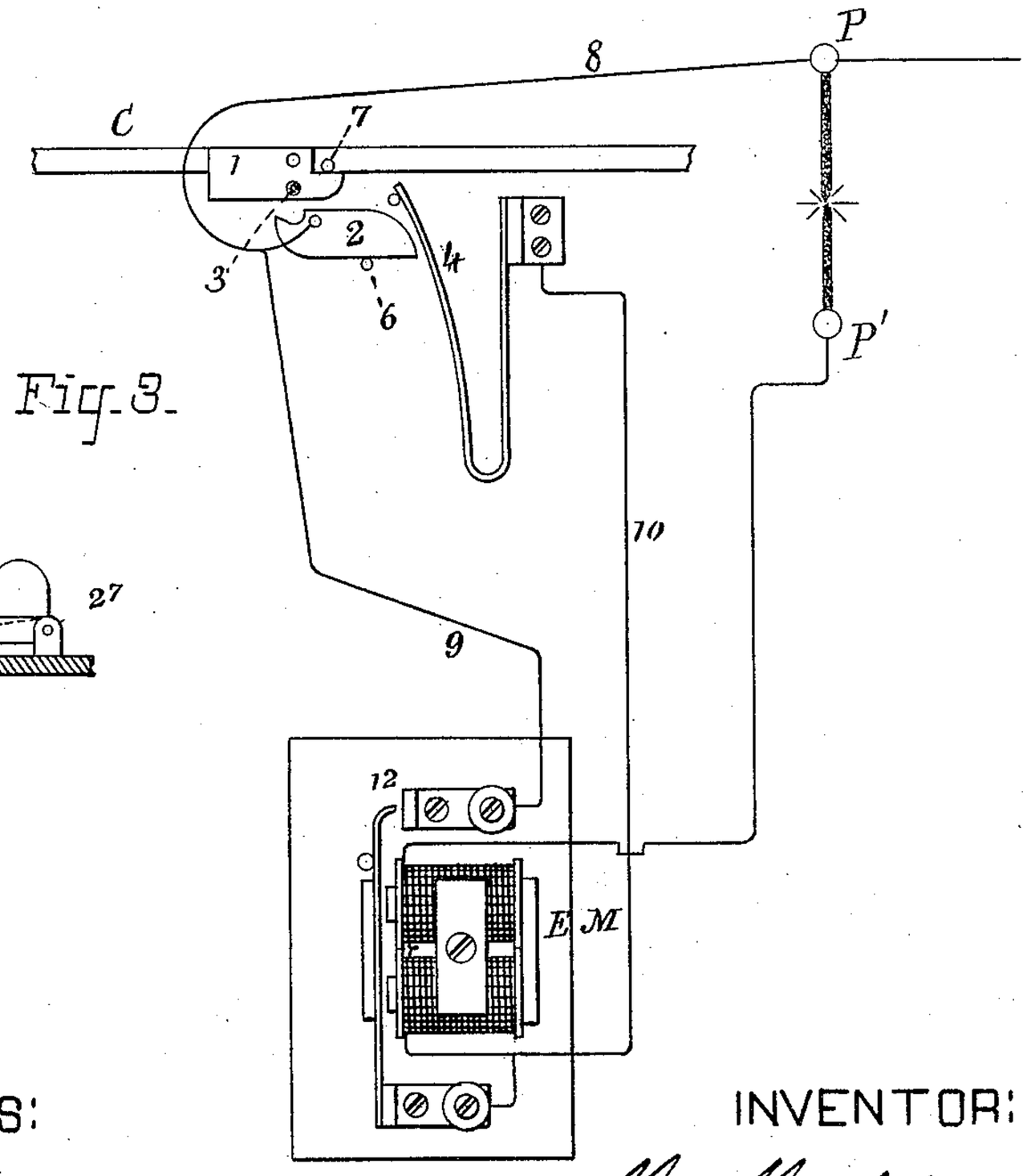


Fig. 3.



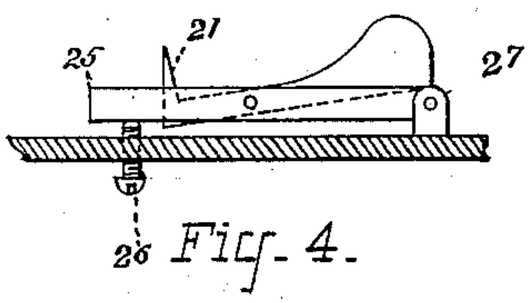


Fig. 4.

WITNESSES:

Julian A. Hurdle,
John J. Dyer

INVENTOR:

Wm. Hochhausen.
by R. S. Townsend
Atty.

(No Model.) 3 Sheets—Sheet 3.

W. HOCHHAUSEN.

ELECTRIC LIGHT REGULATOR.

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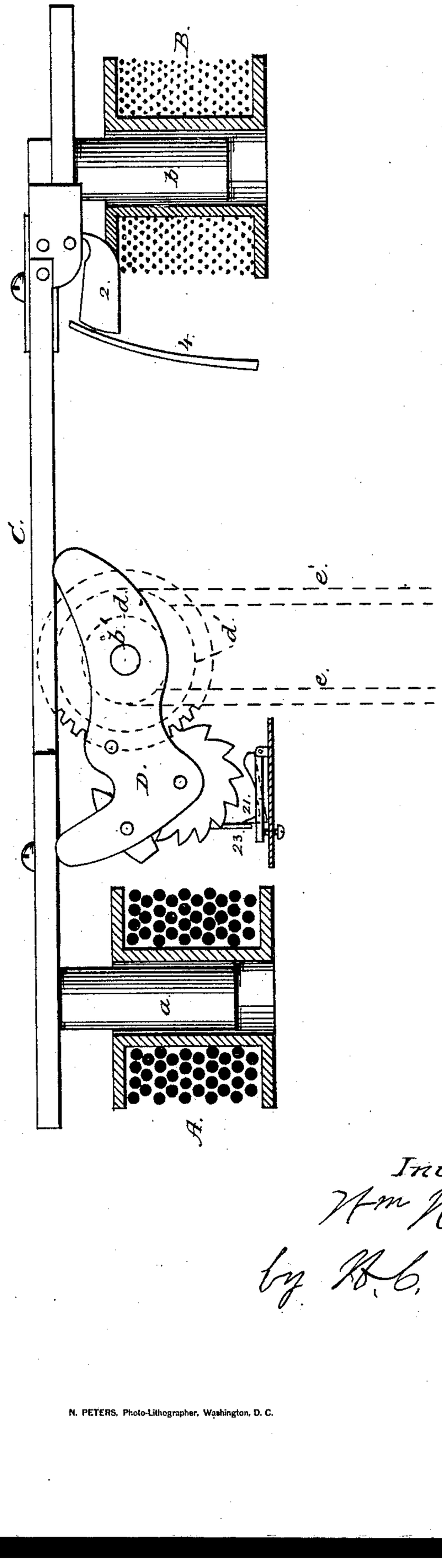
Fig. 5.



Attest;
H. W. Howard
J. E. Clark

Inventor;
Wm Hochhausen.
by R. G. Townsend
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM HOCHHAUSEN, OF NEW YORK, N. Y.

ELECTRIC-LIGHT REGULATOR.

SPECIFICATION forming part of Letters Patent No. 246,137, dated August 23, 1881.

Application filed May 23, 1881. (No model.)

To all whom it may concern:

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

The object of my invention is to provide a simple and efficient form of electric-light regulator that may be attached to the ceiling of low-studded apartments, where it is impracticable to use the common forms of regulator by reason of the extreme length of the lamp due to the employment of a rack-bar as the upper-carbon holder.

A further object of my invention is to provide a means for cutting out the light from circuit when the arc becomes too long or is extinguished from any reason—as by failure of the mechanism to feed properly or from breakage of the carbons—in such a way that when the circuit through the carbons is re-established the lamp will automatically resume its action without requiring the attendance of an operator to remove or break the cut-out circuit.

A further object of my invention is to improve the adjusting devices of the regulator.

To these ends my invention consists in certain peculiarities of construction which will be described, and specified in the claims.

In the accompanying drawings, Figure 1 is a side view of my hanging lamp, a portion of the casing containing the feeding mechanism being broken away to better show the parts. Fig. 2 is a top view of the regulator mechanism. Fig. 3 is a diagram of the circuits employed in conjunction with the automatic cut-out devices. Fig. 4 is a detail view of a yielding adjustable locking-stop for the vibrating fly of the escapement; and Fig. 5 is a side view of the lever supporting the regulating mechanism and carrying the movable cores of the main and derived circuit electro-magnets detached from the casing.

A and B are the main and derived circuit electro-magnets, respectively, A being of coarse wire and in the direct circuit with the carbons, while B is of finer wire and higher resistance and is placed in a derived circuit around the carbons. These electro-magnets are provided with movable cores *a* and *b*, attached to opposite ends of a lever, C, which is pivoted at the points *a'* and *b'*, (see Fig. 2,) and upon which is mounted a gear-train of substantially the same construction as that ordinarily employed, with the exception that the cog-wheel gearing with a rack-bar is replaced by a double winding-drum, *d d'*, the portion *d'* of which is of twice the circumference of *d*. This drum is spirally grooved for the purpose of guiding the bands or chains *e* and *e'*, which pass down upon opposite sides thereof, and are attached, the one, *e*, to the lower-carbon holder, and the other, *e'*, to the upper. The upper-carbon holder is made considerably heavier than the lower, and, as will be readily seen, if allowed to descend by gravity will turn the drum so as to wind up the chain or band *e* and lift the lower-carbon holder. By this construction or arrangement the light is constantly focused.

The regulator-train is locked in any of the well-known ways—as, for instance, by a yielding locking stop or detent, 21—upon the floor of the casing containing the train, which engages with a vibrating escapement-fly, 23, of the train when the left hand side of the lever is depressed sufficiently by the electro-magnet A.

The yielding locking stop or detent is shown in detail in Fig. 4 as weighted at one end and pivoted in a frame, 25, which is itself pivoted at 27, and may be adjusted vertically by a screw, 26, passing through the floor of the regulator-casing. This screw serves to adjust the locking-detent 21, and determines the point in the descent of the vibrating escapement at which it will engage with the detent, and thus stop the feed of the carbons. The pivoted detent 21, should the vibrating fly catch upon its end, instead of passing down upon one side or the other of the toe, will yield so as not to interfere with the free movement of the armature-lever and its train.

The operation of the main and derived circuit magnets A and B in controlling the movements of the lever and locking and releasing the train so as to allow the carbons to feed together is well understood in the art, and need not be described in detail.

For the purpose of guiding and supporting the upper and lower carbon holders in their

simultaneous movements, I use a depending frame, H, in which are guideways *h h* for the upper-carbon carrier G, the latter consisting of a perforated block of metal provided with suitable clamping devices for the carbon pencil. The depending frame is further provided with cross-arms *f f f f*, the lower two of which meet at the center in an enlargement, *f'*, placed at a short distance above the point where the arc is formed, and vertically perforated to guide the carbon pencil. To the cross-arms *f*, but insulated therefrom, are secured two vertical tubes, *g*, in which slide the rods K, which support the lower-carbon holder. At the upper end of one of these rods is an extension, *m*, to which is attached the chain passing over the smaller portion of the winding-drum, while to the other rod K is attached an arm, *n'*, to which is secured a flexible metallic conductor, *n'*, through which the current is conveyed from or to the lower holder.

The globe-holder G' is suspended from a pair of tubes, *p p*, which slide upon rods *r r* depending from the bottom plate of the regulator. Pivoted catches *r' r'*, attached to the tubes, engage with notches in the upper portion of the rods *r* and hold the globe at the proper elevation, but may be disengaged to allow the holder to be lowered for the purpose of cleaning, &c.

The cut-out devices are shown in Fig. 1 and in reversed position, together with the circuits in Fig. 3. The pivoted latch or toe 1 is carried by the lever C at a point in proximity to the derived-circuit magnet B, and is so arranged with reference to a second latch or toe, 2, pivoted to an insulated plate secured in the side of the case, that when the lever is abnormally depressed at the end which is acted upon by the derived-circuit magnet B (which action will occur, as is readily understood, when the resistance in the carbon-circuit becomes abnormal) a pin, 3, of insulating material, upon the side of latch 1, will engage with the end of the latch 2 and throw its opposite end into contact with a spring, 4. The movement of the lever, if continued, will carry the pin 3 past the end of the lever 2. Upon its return it does not disturb the latch 2, which is in this case held from movement by a pin, 6, secured to the side of the case, while the latch 1 is free to tilt, and thus allow the pin 3 to slip by. A stop, 7, upon the lever C prevents the latch 1 from turning when it is carried downward into engagement with the latch 2.

The connections of the shunting devices are as follows: From the positive binding-post P through a wire, 8, to the latch 2, and thence through 9 to the contact-stop of the armature of an electro-magnet, E M, which is connected upon one side to the negative binding-post P' and upon the other to the spring 4 through wire 10, and also to its armature lever or support. The operation of these devices is as follows: Normally the cut-out circuits are broken at 4 and at 12. When the arc is extinguished or abnormally lengthened from any cause the magnet B is energized sufficiently, or the balance between B and A is sufficiently disturbed, to depress the end of the lever C, which carries the latch downward to a sufficient extent to cause 2 to make contact with spring 4, thus momentarily closing a circuit through 4 10, electro-magnet E M, and to negative binding-post P'. The armature of the electro-magnet is by this means drawn forward against its stop, thus closing a new circuit for the electro-magnet through 9 12 and to P'. This circuit is held closed by the electro-magnet so long as sufficient current flows to energize it, and forms a derived or cut-out safety-circuit for the lamp. In the meantime the lever C and latch 1 are free to return to their normal position. When the carbons have been restored to contact, either by the resumption or continuance of the feeding operation or by the replacement of the carbon, a circuit is formed through them directly, which is of sufficiently low resistance to divert the current from the electro-magnet E M to such an extent that it cannot retain its armature against the stop. The armature thereupon flies back, breaking the cut-out circuit at 12, and the circuits and apparatus are thus automatically restored to their normal condition, and the normal operation of the lamp is immediately resumed.

The general circuits through the lamp are as follows: From positive binding-post P the main or light circuit passes through a flexible conducting-band, *m'*, Fig. 2, attached at one end to the post and at the other to the carbon block G, through G to the upper carbons, to the lower carbons, to K' *n'*, Fig. 1, wire 14, Fig. 2, electro-magnet A, and to the negative binding-post P'. The derived circuit through electro-magnet B leaves positive binding-post by wire 15, and reaches the negative binding-post P' through wire 16. The cut-out, when formed, is from post P, through wire 8, to latch 2, and thence through the circuits described in connection with Fig. 3.

For the purpose of adjusting the balance between the electro-magnets A and B' and the tendency to keep the train in engagement with its locking-detent, I employ, instead of an adjustable retracting-spring, a sliding bar, *s*, of magnetic material, which is adjustable toward and from the core *b* of electro-magnet B. This bar *s* slides in ways in the lever C, which at that portion of its length, as at *t*, is of some non-magnetic material—as, for instance, brass. A friction-spring, *x*, secured to the bar *s* and bearing upon *t*, serves to hold the bar *s* at the point to which it is adjusted. When the bar *s* is in close proximity to the core the attraction is stronger than when it is at a distance, this action being in accordance with the well-known law that within certain limits the attraction upon an axial magnetic core is greater the larger the portion of the core which for the time being projects beyond the coils. The slide *s* acts in an analogous man-

ner by varying the mass of the axial core or of magnetic material in inductive proximity thereto which lies outside of the coils.

This device constitutes a simple and effective substitute for the retractile spring ordinarily employed.

I am aware that it is not new in electric-light regulators to employ chains or cords passing over pulleys for the purpose of supporting and controlling the movements of the carbon-carriers; but in no instance of which I am aware has a double winding-drum been employed in the manner described and shown.

What I claim as my invention is—

1. The combination, substantially as described, of a double winding-drum, depending chains or cords supporting the upper and lower carbon-carriers directly, a pivoted lever, a gear-train mounted on said lever and connected to the double winding-drum, a stop or detent stationary with relation to the train, and main and derived circuit electro-magnets for controlling the movements of the lever, in the manner set forth.

2. In an electric-light regulator, a depending frame supported from the regulator-casing, in combination with a weighted block to which the upper carbon is secured, and guideways upon the depending frame, which embrace and guide the weighted block or carrier, which latter is supported by a chain or cord and provided with a clamp for the upper carbon, substantially as described.

3. In an electric-light regulator, a depending frame supported from the regulator-casing, and provided with cross-arms, substantially as described, in combination with tubular guides attached to the cross-arms, the lower-carbon holder and its supporting-rods, the latter being adapted to slide in said guides, and supporting-rods of the lower-carbon holder, adapted to slide in said guides.

4. The combination, substantially as described, of a weighted block or carrier for the upper carbon, a guide-frame for said block, bracket or cross arms attached to said frame and provided with guiding devices, and a lower-carbon holder adapted to be guided by said devices, as set forth.

5. The combination of guide-frame H *h*, cross-arms *f*, and tubular guides *g*, substantially as described.

6. The combination of guide-frame H *h*, cross-arms *f*, tubes *g*, and tubular guide *f'* for the carbon pencil, substantially as described.

7. The combination of the weighted block to which is clamped the upper carbon, the guideways therefor, the lower-carbon holder and its supporting-rods, and the tubular guides attached to the frame-work which guides the upper-carbon carrier, substantially as described.

8. In an electric lamp, a safety cut-out apparatus comprising a circuit-closer upon the lever of the regulator, adapted to make and break a safety or branch circuit, an electro-magnet in the safety or branch circuit, and a second circuit-closer controlled by said electro-magnet, and adapted to make contact and preserve the continuity of the safety-circuit when the circuit-closer upon the regulator-lever has broken contact, all substantially as described.

9. The combination, with the armature-lever of the regulator, of a cut-out circuit-closer composed of two pivoted latches, one upon the lever and the other attached to the frame of the lamp, and adapted to be thrown into contact with a circuit-closing spring and stops for said latches, arranged as described, to prevent the swinging of the latches in one direction, but to allow them to swing freely in the other.

10. The combination of the pivoted latches, the circuit-closing spring, the electro-magnet, and its circuit-closer and circuits, arranged substantially as described.

11. The combination of a pivoted yielding locking-detent for the regulator and a stationary adjustable support for said detent, substantially as described.

12. The combination of a pivoted locking-detent, consisting of a weighted lever provided with a locking-projection, a frame or carrier for said detent, pivoted on a stationary support, and means of adjusting said frame or support, substantially as described.

13. In an electric-light regulator, the combination, with the axial core of the regulating electro-magnet, of a block or bar of magnetic material adjustable with relation to said core, substantially as and for the purpose described.

WILLIAM HOCHHAUSEN.

Witnesses:
THOS. O'NEIL,
JNO. J. DIFFLEY.