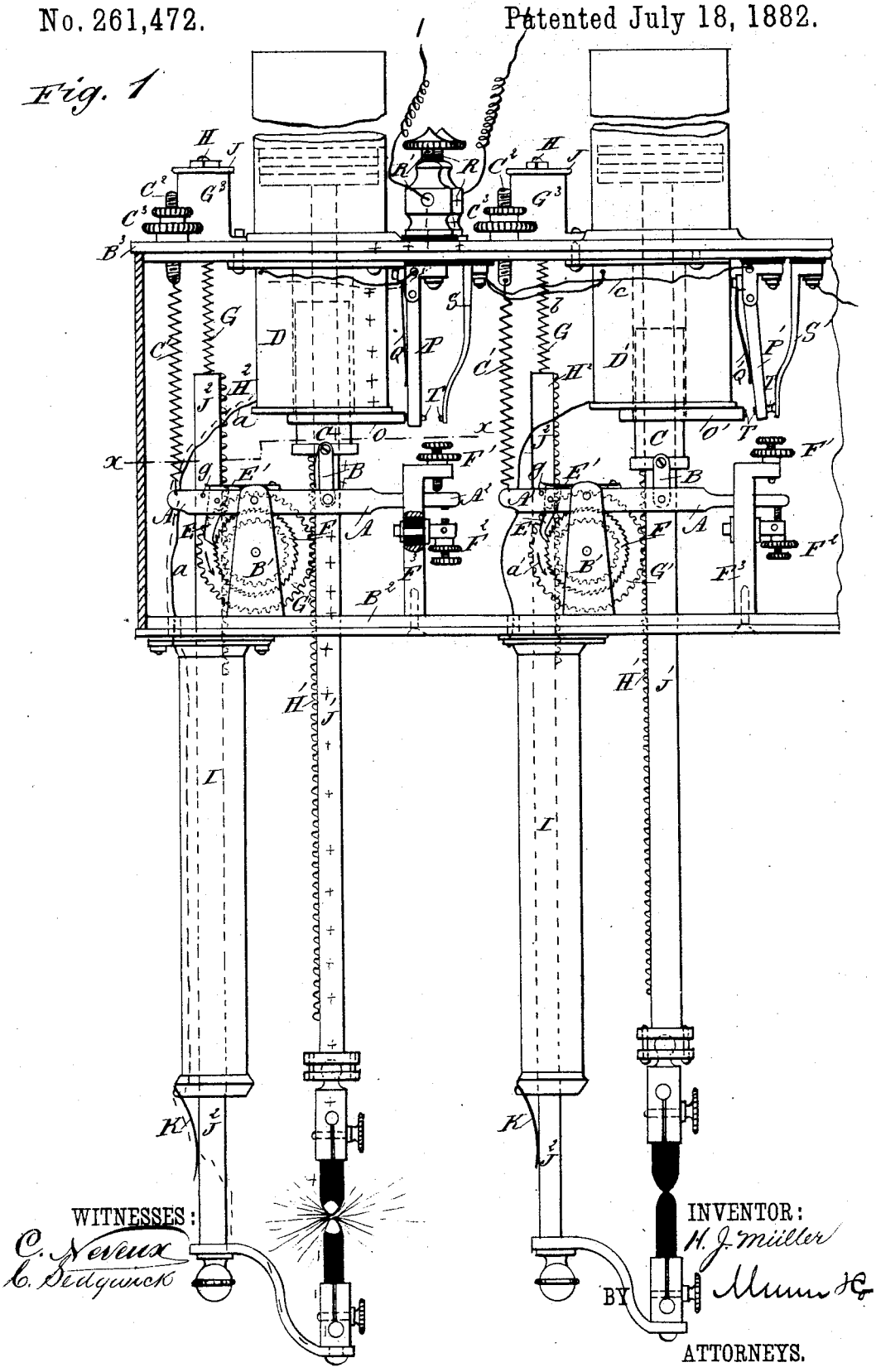
(No Model.) 2 Sheets—Sheet 1.

H. J. MÜLLER.

MULTIPLEX ELECTRIC LAMP.

No. 261,472. Patented July 18, 1882.

Fig. 1



WITNESSES:
C. Neveux
C. Sedgwick

INVENTOR:
H. J. Müller
BY Munn & Co
ATTORNEYS.

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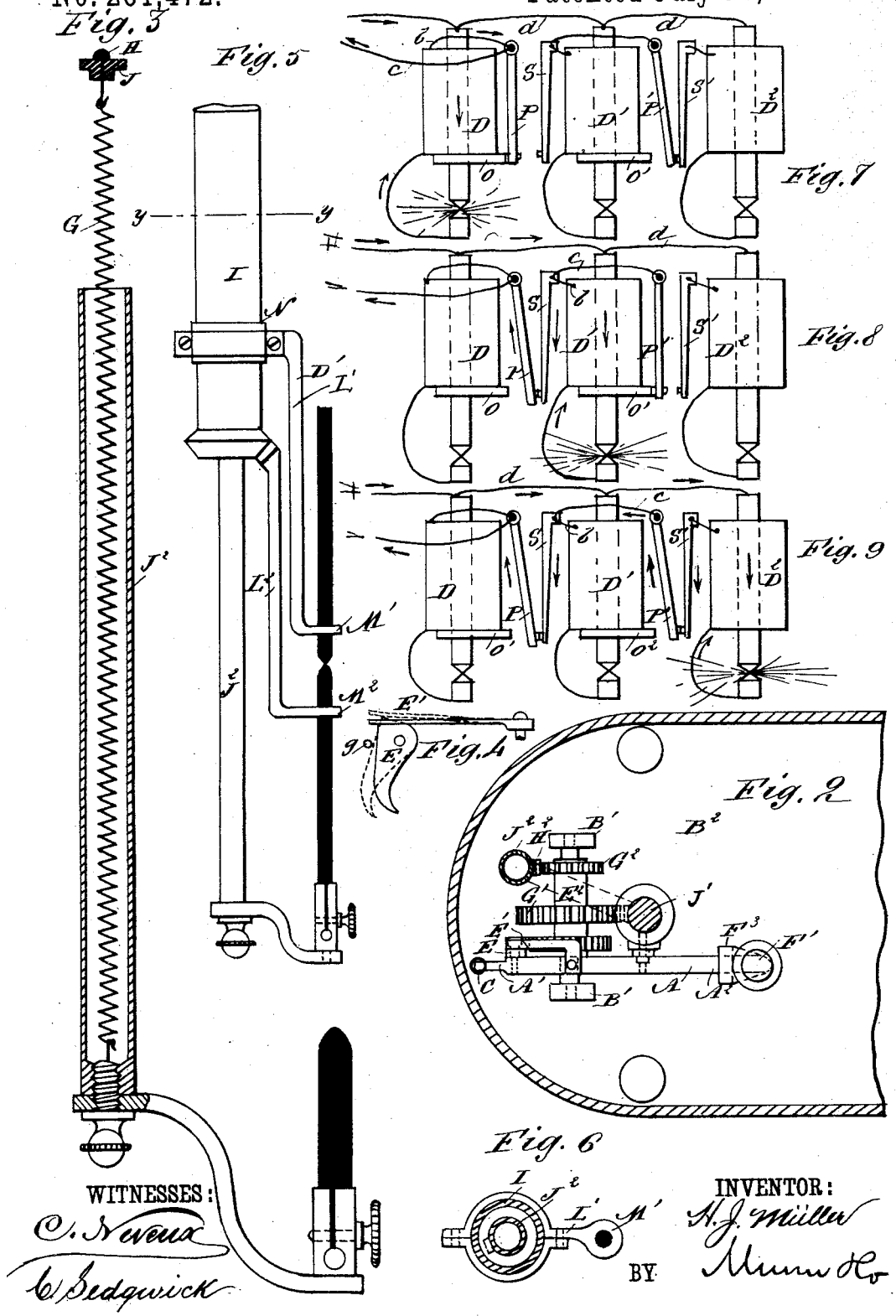

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INVENTOR:

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UNITED STATES PATENT OFFICE.

HANS J. MÜLLER, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND ALEXANDER LEVETT, OF SAME PLACE.

MULTIPLEX ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 261,472, dated July 18, 1882.

Application filed August 20, 1881. (No model.)

To all whom it may concern:

Be it known that I, HANS J. MÜLLER, of the city, county, and State of New York, have invented a new and Improved Multiplex Electric Lamp, of which the following is a specification.

The object of my invention is to provide an improvement in the class of multiplex electric lamps which are so constructed that when one set of carbons is completely consumed another set of carbons will be switched into the circuit automatically; and a further object of my invention is to facilitate the automatic regulation of the carbons. The lamp is provided with two or more sets of carbons and corresponding helices furnished with a pivoted armature and a contact-strip between each two helices, so that the armature will be in contact either with the helix or with the contact-strip, accordingly as the current is to pass through one helix or the other.

The invention consists in a device for regulating the carbons automatically, which device consists of a pivoted lever connected with the helix-core and provided with a spring-pawl engaging with a ratchet-wheel rigidly mounted on a shaft, on which a cog-wheel is also mounted engaging with a rack on the carbon-holder.

The invention further consists in the combination, with the lower-carbon holder for a focus-lamp, of a spring for drawing this carbon-holder upward.

The invention further consists of arms attached to the lower-carbon holder or to the frame of the lamp, and serving to guide slender carbons and prevent them from slipping past each other.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a longitudinal elevation of my improved multiplex lamp, parts being shown in section. Fig. 2 is a sectional plan view of one-half of the lamp on the line *x x*, Fig. 1. Fig. 3 is a longitudinal sectional elevation of the lower-carbon holder. Fig. 4 is a detail longitudinal elevation of the spring-pawl of the carbon-regulator. Fig. 5 is a longitudinal elevation of the lower-carbon holder and its tubular casing. Fig. 6 is a cross-sectional view of the same on the line *y y*, Fig. 5. Fig. 7 is a diagram of the lamp, showing the first set of carbons in the circuit. Fig. 8 is a like diagram showing the second set of carbons in the circuit. Fig. 9 is a like diagram showing the third set of carbons in the circuit.

A lever, A, is pivoted at or near its middle to connecting rods or links B, pivoted to the bottom of the core C of a helix, D, and between the links B and one end of the lever. This lever is pivoted to uprights B′, resting on a plate, B^2, of the frame of the lamp. The short end, A′, of the lever A is drawn upward by a spiral spring, C′, attached to a screw, C^2, passing through the top plate, B^3, of the frame of the lamp, and provided with adjusting-nuts C^3. The longer end, A^2, of the lever A is located between two adjusting-screws, F′ F^2, on a standard, F^3, on the plate B^2 of the lamp-frame. A pawl, E, is pivoted to the lever A near the short end, and a flat spring, E′, attached to the lever A and resting on the upper end of the pawl E, as shown in Fig. 4, keeps this pawl in the proper position, as will be more fully set forth hereinafter. The pawl E engages with a ratchet-wheel, F, rigidly mounted on a shaft, E^2, journaled in the standards B′ below the lever A. Two cog-wheels, G′ and G^2, of which the former has about double the diameter of the latter, are rigidly mounted on the shaft E^2. The smaller cog-wheel, G^2, is insulated from the shaft E^2, and engages with a rack, H^2, on the negative or lower carbon holder, J^2, and the cog-wheel G′ engages with a rack, H′, on the upper or positive carbon holder, J′. The positive-carbon holder J′ passes through the core and the helix, and has a piston at its upper end fitting in a suitable cylinder, and the negative-carbon holder J^2 is contained in a tubular casing, I, projecting downward from the bottom plate, B^2. This carbon-holder J^2 is hollow, and contains a spring, G, attached to the bottom of the carbon-holder and to an insulated button, H, resting on a plate, J, on a projection, G^3, of the top plate, B^3. This is the construction for a focus-lamp; but in an ordinary lamp the cog-wheel G^2, the rack H^2, and the spring G can be dispensed

with, and the negative-carbon holder J^2 is made stationary. The spring K serves to insure electrical connection between the casing I and the carbon-holder J^2. If very slender carbons are used, it frequently happens that the points of the carbons slip by each other, and thus fail to form a light-arc. To avoid this slipping of the carbons, I provide the casing I with two downward-projecting arms, L′ and L^2, having loops or eyes M′ M^2 at the ends, through which eyes the carbons pass, and are thus guided. The upper arm, M′, is insulated from the tubular casing I by means of a ring, N, of insulating material.

The above-described mechanism is applicable to a single lamp, and in a multiplex lamp each set of carbons must be provided with the above mechanism.

In Fig. 1 I have shown a duplex lamp, and in Figs. 7, 8, and 9 I have shown triplex lamps.

Each helix D D′, &c., is provided with a pole-piece, O O′, &c. An armature, P P′, &c., is pivoted to the top plate, B^3, adjoining to each helix D D′, &c., (except the last,) and is pressed from the helix by a spring, Q Q′, &c. The negative-wire binding-screw R′ is connected with the first armature, P, the screw R and the hinge-piece of the armature being insulated from the plate B^3. A contact spring or strip, S S′, &c., is attached to the top plate, B^3, adjoining each armature, and is properly insulated from the plate B^3. The pole-pieces O O′, &c., the armatures P P′, and the contact-strips S S′ are provided with contact-buttons T, made of gas-retort carbon in its natural state—that is to say, the carbon is used as it comes from the retorts and without being mixed with other ingredients. The current passes from the generator through a wire held by the positive-wire binding-screw R, passes through the positive-carbon holder J′, the carbons, the negative-carbon holder J^2, the casing I, the wire *a*, to the helix D, from there to the joint-piece of the armature P, and from there to the negative binding-screw R′. The contact-strip S is connected with the helix D′ by the wire *b*, and with the joint-piece of the armature P′ by the wire *c*, and so on for any number of helices. The positive carbons are connected electrically by wires *d d* or by the lamp-frame. The last magnet, D^2, need not have a pole-piece. The holder for the screw F^2 is insulated in the standard F^3, and a wire leads from this screw-holder to the negative binding-screw R′, for the purpose of cutting out any lamp without extinguishing the others, so that when the lever A drops the current will pass through said lever to the screw F^2, and thence to the negative line. This is in a single lamp. In a multiplex lamp a relay will be required. I do not claim this cut-out in the present case, since it will be the subject-matter of a later application.

The operation is as follows: If the light-arc is very small, there is very little resistance in the circuit, and the helix D draws its core C inward, thereby raising the end A^2 of the lever A as far as the screw F′ will permit, thereby lowering the end A′. This causes the pawl E to engage with the ratchet-wheel F, which is rotated a short distance in the direction of the arrow *a′*. The pawl E will assume the position shown in dotted lines in Fig. 4, thereby raising the spring E′ slightly. The stud *g* forms a check for this movement of the pawl. If the ratchet-wheel F is rotated in the direction of the arrow *a′*, the cog-wheels G′ G^2 will be rotated in the same direction, as all these wheels are mounted on the same shaft E^2. By rotating in the manner described the cog-wheels G′ G^2 will raise the positive-carbon holder J′ and lower the negative-carbon holder J^2, thus separating the carbon points. This causes a greater tension in the circuit, the spring C′ can overcome the power of the helix, the end A^2 of the lever A is lowered, and the end A′ raised, the pawl E sliding over the teeth of the ratchet-wheel F. The above operation is repeated every time the carbons approach each other too much. The rapid descent of the carbons is prevented by the piston attached to the positive-carbon holder J′, as I have described in another patent. The weight of the upper carbon and its holder, acting on the ratchet-wheel G′ and the shaft E^2, raises the carbon-holder J^2, and to accelerate this movement I have provided the spring G—that is to say, the spring G tends to counterbalance the weight of the carbon-holder J^2, and to that extent reduces the force required to raise it. Hence said carbon-holder is raised quickly and easily when the opposite one, J′, moves downward, and thereby operates the cog-wheels G′ G^2 and shaft E^2. As the positive carbon is consumed twice as rapidly as the negative carbon, the wheel G′ must have twice the diameter of the wheel G^2. As long as there are any carbons in the first lamp, the current passes from the binding-post R, through the frame of the lamp, into the positive-carbon holder, the positive and negative carbons, the helix, the joint-piece of the armature P, and the binding-post R′, and from there to the generator. This course is indicated by the signs + and —. During this time the armature P is attracted by the pole-piece O, as shown in Figs. 1 and 7. As soon as the first set of carbons is consumed to such an extent that the circuit will be interrupted the armature P is released from the pole-piece O, and is pressed against the contact-strip S by the spring Q. The current will now pass through the second set of carbons, and through the helix D′, causing the pole-pieces of the same to attract the armature P′, thereby interrupting the circuit or connection with the helix D^2. As soon as the second set of carbons is consumed the armature is released from the pole-piece O′, and pressed against the contact-strip S′ by the corresponding spring, as shown in Fig. 9. The current will now pass through the third set of carbons and the corresponding helix. In the

manner described a series of sets of carbons can be united.

The contact-buttons made of entirely pure gas-retort carbon as it comes from the retort are much more durable and conductive than the buttons made of prepared carbon, and are not destroyed as rapidly by the sparks.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electric lamp, the combination, with the helix-core, of a lever pivoted thereto and to suitable standards, a pawl pivoted to this lever, a ratchet-wheel acted upon by the pawl, a cog-wheel which is fast on the same shaft with the ratchet-wheel, and a rack on the carbon-holder, substantially as herein shown and described, and for the purpose set forth.

2. In an electric lamp, the combination, with the helix D, of the core C, the lever A, pivoted to standards B′, the pawl E, the ratchet-wheel F, the cog-wheels G′ and G², all of said wheels being fast on the same shaft, and the racks H′ H² on the carbon-holders J′ J², substantially as herein shown and described, and for the purpose set forth.

3. In an electric lamp, the combination, with the helix D, of the core C, the lever A, pivoted to standards B′, the spring C′, the pawl E, the ratchet-wheel F, the cog-wheels G′ G², all of said wheels being fast, and the racks H′ H² on the carbon-holders J′ J², substantially as herein shown and described, and for the purpose set forth.

4. In an electric lamp, the combination, with the carbon-holder J², of the spring G, the insulating-cap H, and the cap or plate J, substantially as herein shown and described, and for the purpose set forth.

5. In an electric lamp, the combination, with the lever A, of the pawl E, the spring E′, and check-stud *g*, substantially as herein shown and described, and for the purpose set forth.

6. In an electric lamp, the combination, with two or more helices having pole-pieces and two or more sets of carbons which are regulated in position by means of said helices, of as many pivoted armatures and corresponding contact-strips, minus one, as there are helices, substantially as shown and described, and for the purpose set forth.

7. In an electric lamp, the combination, with two or more helices having pole-pieces and two or more sets of carbons which are regulated in position by means of said helices, of as many pivoted armatures P, pressure springs Q, and contact strips S, save one, substantially as herein shown and described, for the purpose set forth.

8. In an electric lamp, the combination, with the tubular casing I, of the arms L′ L², both attached to said casing, provided with eyes M′ M², substantially as herein shown and described, and for the purpose set forth.

HANS J. MÜLLER.

Witnesses:
OSCAR F. GUNZ,
C. SEDGWICK.