

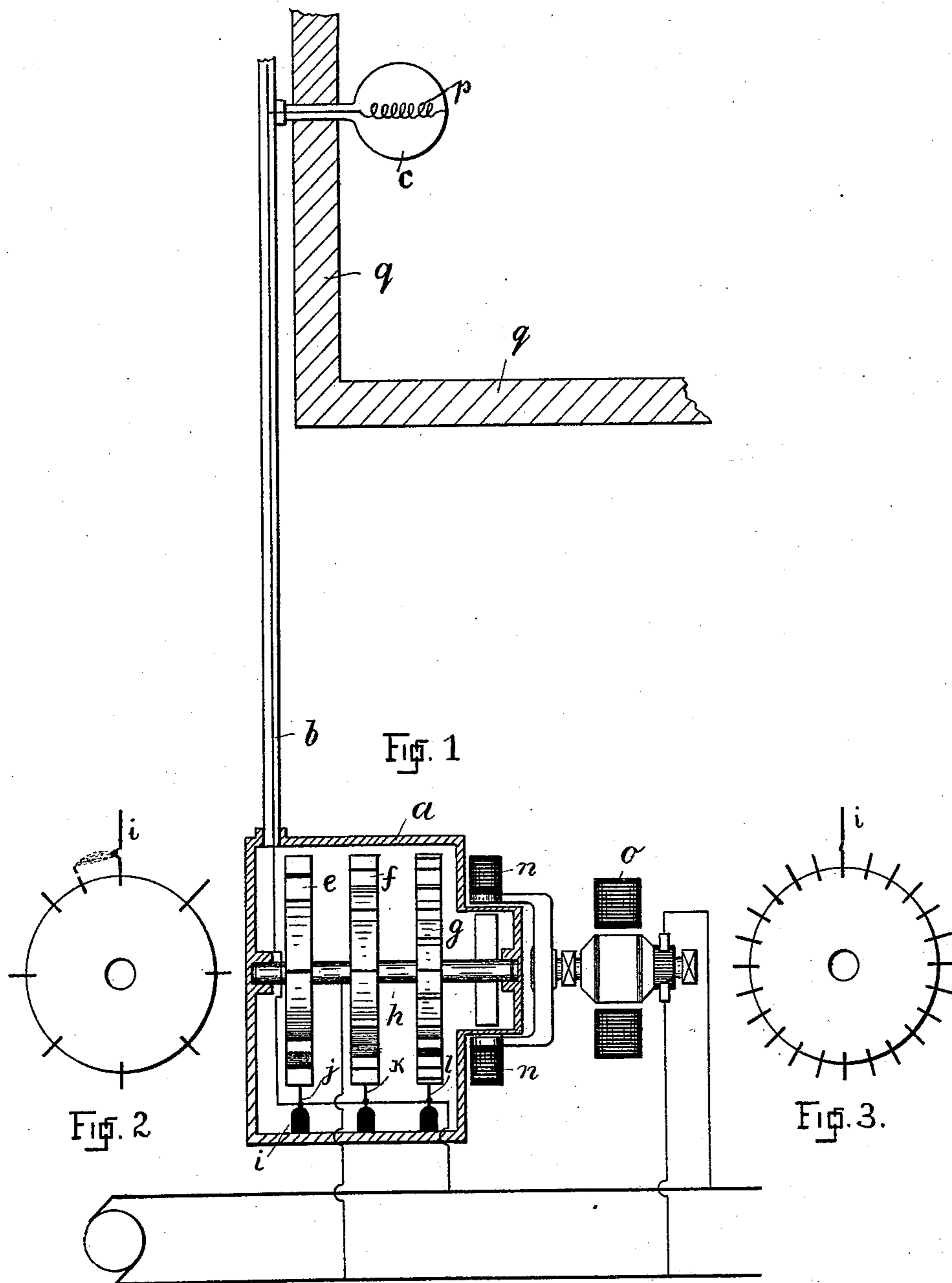
(No Model.)

D. McF. MOORE.

APPARATUS FOR GENERATING PHOSPHORESCENT ELECTRIC LIGHT.

No. 548,131.

Patented Oct. 15, 1895.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

DANIEL MCFARLAN MOORE, OF NEW YORK, N. Y.

APPARATUS FOR GENERATING PHOSPHORESCENT ELECTRIC LIGHT.

SPECIFICATION forming part of Letters Patent No. 548,131, dated October 15, 1895.

Application filed January 7, 1895. Serial No. 534,094. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, and a resident of New York, county and State of New York, have invented certain new and useful Improvements in Apparatus for Generating Phosphorescent Electric Light, (Case No. 10,) of which the following is a specification.

The object of this invention is to produce luminosity within an evacuated inclosure by a moderately-low electromotive force.

The object, further, of the invention is to produce light by drawing out sparks from a minimum to a maximum length consistent with the electromotive force within an evacuated space, and thereby to produce luminosity throughout the space and along a conductor extending therethrough.

The object, further, is to do away with glass at those portions of the system not needing it.

Figure 1 is a vertical section of the apparatus and includes also a lamp which may be illuminated thereby. Fig. 2 is a diagram to illustrate the manner in which the sparks are drawn out to a predetermined length. Fig. 3 shows a modification.

The apparatus consists of an air-tight box *a*, of metal, and *b* is a similar kind of a tube passing from the box, while *c* is a glass bulb communicating with the tube and cemented in the socket *d*, so that there is a vacuum-space throughout the box, the tube, and the bulb. Within the box there are toothed wheels *e f g*, on which the teeth are respectively at different distances. These teeth form one of the terminals of an electric circuit—as, for example, through shaft *h*. The other terminal is lettered *i*, and has contacts *j k l* in contact with one of the teeth on the respective wheels. The remaining teeth on these wheels are that much shorter as not to touch the contacts *j k l*, but they all only just escape them. Mounted upon the shaft is an armature *m*. Without the box and within the inductive relation to the armature are electromagnets *n*, rotary about the center of the shaft *h*, and attached for this purpose to the shaft of an electric motor *o*.

I do not attach much importance to the means for rotating the shaft *h* and simply illustrate the rotary magnets *n* as one of the ways which may be employed, the idea being

that when the motor *o* is operated the magnets *n* rotate, and, by the attractive action upon the armature *m*, cause it also to rotate synchronously. If the motor should turn it faster and faster and before the wheels *e f g* had accumulated sufficient momentum to keep in unison with the magnets *n*, then every time that the magnets *n* come opposite the armature *m* another impulse will be given and the momentum thereby increased until both will rotate synchronously.

In every application which I have on file illustrating the production of luminosity within an evacuated inclosure by the rapid interruption of an electric circuit therein I have been able to use very low electromotive force, because I rapidly make and break the circuit in the vacuum at very short range, so that it becomes necessary to maintain a spark between the terminals substantially by producing a great many in a very short interval of time, which action amounts to almost a continuous sparking, at least from a practical point of view.

My object in this invention is to use an electromotive force sufficient to maintain a spark between two terminals which are not in contact, but are very close together, and then to move away the terminals and thereby draw out the spark longer without increasing the electromotive force, and then again to bring the terminals close enough together to form another spark, and then to draw this spark out also, preferably to its maximum length, and thus to keep up the repetition of obtaining short sparks and drawing them out longer.

In order to use even a lower electromotive force and at the same time to be without any risk of the spark failing to form at the beginning or now and then, I make one of the teeth in each wheel *e*, *f*, and *g* sufficiently long to come in contact with the terminals *i*, *k*, and *l*, so that every time this tooth comes around a spark will be produced. If this spark will not last until the next tooth comes in contact on wheel *e*, it will be supposed to act in regard to the teeth on the wheel *f*; but if these teeth are too far apart the sparks will form at each tooth on the wheel *g*, because they are placed sufficiently near together for the purpose. The conductor *i* is extended up through the metallic tube *d* and terminates

in the bulb. Everywhere the light is concentrated by means of convolutions *p*.

Many changes in the generation of the sparks for the purpose of obtaining an increased luminosity occur from the use of the construction herein set forth. For example, when the electromotive force is such that the terminals of the respective polarities do not actually touch each other the wheels *e*, *f*, and *g* rotate with no other resistance than the friction at their axles, whereas if it were necessary for the terminals *j k l* to touch every tooth the wheels would require several times more power to rotate them. Again, the combustion by the small amount of residual atmosphere would eat away the terminals, because of the actual contact of the same with each other; but with my present construction any transfer of metal from the terminals would be inappreciable and the device would be indefinitely durable. Again, the maximum length of the sparks in every case is obtained for an electromotive force that is not too great to form sparks longer than the distance between those teeth which are farthest apart from each other.

The partition *q* may represent the floor and walls of a room which is to be lighted in part by the lamp *c*, while the box *a* may be located, for example, in the cellar.

It should be borne in mind that, to begin with, the sparks in a vacuum are longer, other things being equal, than in the air, and therefore it may be apparent that the electromotive force for operating this device need not be higher than that often found in the ordinary lighting and railway systems.

I have found by experiment that the degree of luminosity in an evacuated space by apparatus tested by me depends, as to one element, upon the length of the sparks, and therefore, of course, upon the rapidity with which these sparks follow each other.

In Fig. 3 is shown a modification of one of the toothed wheels, in which the teeth are all of the same length and of such a length as to come in contact with the terminal *i* when the wheel is rotated.

I claim as my invention—

50 1. A phosphorescent illuminator, consisting

of the combination of an evacuated inclosure, electric terminals therein normally just escaping contact with each other, and means for moving them relatively without touching.

2. A phosphorescent illuminator, consisting of the combination of an evacuated inclosure, an electric terminal of one polarity, a number of terminals of the other polarity, adapted to move past the first terminal, and of such length that one of them touches the first terminal while the others just escape it.

3. The combination with an evacuated inclosure of a toothed wheel forming an electric terminal therein, an electric terminal of the opposite polarity located in the path of all the teeth, and means for rotating the wheel.

4. In a system of phosphorescent electric lighting the combination of an evacuated inclosure, rotary toothed wheels within the same, forming terminals of an electric circuit, terminals of the opposite polarity within sparking distance of the teeth, and means located outside of the inclosure for rotating the wheels.

5. In a system of phosphorescent electric lighting the combination with an evacuated inclosure, rotary toothed wheels within the same, forming terminals of an electric circuit, and terminals of the opposite polarity within sparking distance of the teeth, an armature, carried by the shaft of the wheels, rotary magnets outside of the inclosure and within inductive action of the armature, and means for rotating the magnets.

6. The combination with an evacuated inclosure of electric terminals of one polarity, wheels having teeth at different distances on the respective wheels and forming terminals of the opposite polarity which are within sparking distance of the first terminals and relatively movable thereto.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 21st day of December, 1894.

D. MCFARLAN MOORE. [L. s.]

Witnesses:

WM. R. WARREN,  
EDWARD P. THOMPSON.