The present invention relates to an electric pocket lamp with an electro-magnetic generator having a fixed secondary or armature and permanent rotating field magnets, in which centrifugal force is utilized to produce variation in the electrical output of the generator in proportion to the speed of the rotating magnet and thus effect regulation of the induced electro-motive force.

The principal object of the invention is to construct a centrifugal regulating apparatus in which the rotating field magnet is composed of two parts which are moved by centrifugal force in translation whereby to maintain the spark gap very nearly constant, over its entire length, and thereby eliminate magnetic loss and insure greater efficiency.

A further object of the invention is to guide the movement of the magnets in such manner that they move laterally with respect to each other and in a direction determined according to the number of the poles of the magnet.

A still further object resides in the provision of the field magnets along a diametrical line, so that when separated from each other, poles are created whose attraction is opposed to the centrifugal force.

In the accompanying drawing wherein an improved embodiment of the invention is illustrated:

Figure 1 is a side elevation of the electric pocket lamp, partly in section;

Figure 2 is an edge elevation thereof partly in section;

Figures 3 and 4 are, respectively, a front elevation and a cross section of a multiple pole magnet constituted by two fixed bipolar elements.

Fig. 5 shows in elevation a multiple magnet constituted by three fixed bipolar elements.

Figs. 6 and 7 are respectively a front elevation and a cross-section of a bipolar magnet built for the purpose of ensuring an automatic regulation of the current.

Fig. 8 shows in elevation a multiple magnet also arranged so as to ensure automatic regulation of the current.

The operating lever 14 pivoted at 15, has lugs 44 and 45 which guide its movement in suitable openings of the casing 1 of the lamp. One of the said lugs, for instance the lug 44, has cast with, or secured to, it a toothed quadrant 11* which meshes with a pinion 10 secured to a toothed wheel 9. The latter, by means of a pinion 8 and wheel 7 secured to each other, transmits the movement of the quadrant 11*, to a pinion 6 mounted on the spindle of the magnet. This arrangement has the advantage of making possible a direct driving of the accelerator gear by the lever itself, without interposition of connecting rods, as provided in the above noted application. The pinion 6 during its rotation drives the ratchet wheel 13 secured to it and transmitting its movement by means of a pawl 19, in one direction only, to the magnet 4 loosely mounted on the spindle 5.

Springs 20 resting on the wall of the casing 1 and secured to the trunnions of the lugs 44 and 45, have the tendency to keep the lever 14 raised, that is to say in its open position. But the latter is held back against the said movement by a lever 46 pivoted at 47 and held by a spring 48 in constant contact with the edge of the lug 45 in such a manner that the lip 49 of the lever 46 slides on the said edge during the movement of the lever and gets into a notch 50 as soon as it meets it, that is to say as soon as the lever 14 is in its closing position. In order to raise the lever 14 and enable it to be operated, it is necessary to swing back the lever 46 in order to disengage it from the notch, by pressing on a push button 51 which is connected to it by a pin 52 which can be 95 moved to and from a suitable slot provided in the wall of the casing 1.

It is advantageous to arrange round all the slots existing in the casing 1, packing joints which press against the movable parts 100 such as the lever 14 and the push button 51, and can be constituted for instance by leather packing 53 secured to the casing by means of metal plates 54 and pressed wherever it may be necessary by springs 55. In this way, all the joints of the casing are made so tight that the possibility of water entering it is minimized.

This improved device for driving the rotary magnet works as follows:

To make use of the lamp, holding it in the hand the push button 51 is slid back with
the thumb so as to move the lever 43 and to disengage its lip 47 from the notch in the lug 45. The lever 14 thus released, obeys the action of its springs 20 and rises by turning about its spindle 13. During the said movement, the toothed quadrant 14 turns the ratchet wheel 13 through the agency of the wheels and pinions 10, 9, 8, 7 and 6, without driving the magnet 4, the pawl 19 slipping on the ratchet wheel 13. A pressure is then exerted on the lever 14, and the accelerator gear is operated in the reverse direction by the quadrant 14, the ratchet wheel 13 driving in its movement the magnet 4 by means of the pawl 19. As soon as the action of the lever 14 ceases, it will be brought by its springs 20 back to its position and the ratchet wheel 13 will rotate in the opposite direction to the magnet which will alone continue its forward movement without producing by its rotation any driving force, and therefore without producing objectionable noise.

In order to simplify the manufacture of the said pocket lamp, it could be made of cast aluminum and provided in the interior of the casing—as shown in the drawing—with cast on perforated bosses intended to hold the spindle against the bottom of the wheels; this arrangement is very favorable for, as the majority of the said spindles can be mounted so as to overhang, it makes it possible for them a bearing surface sufficient to avoid any excessive play.

As already stated, the improvements according to the present invention, relate also to the means for supporting the rotating magnet. In the constructions shown in Figs. 3-5, the magnets are rigidly held on their support, whilst they can of course rotate about their spindle.

On the spindle 5 provided with a long bearing 5a, are mounted two magnetic elements 4 and 4a, the branches of which form an angle of 90° (see Figs. 3 and 4). The bearing 5a has spaced extensions 5b, which are bent angularly into the recesses formed between the angularly disposed branches of the magnetic elements whereby the latter are held against radial displacement when they are pressed against the disc 5a by a nut 56 which is screwed on a screw-threaded portion of the spindle.

In the construction shown in Fig. 5, three magnetic elements 4, 4a and 4b, the branches of which form an angle of 60°, are mounted on the spindle 5 and rest against the bearing 5a to which they are secured by means of screws or in some way. The methods of fixing the magnetic elements to the bearing of the spindle are, besides, given merely by way of example and can be carried out in any suitable manner without altering the principle of the system. Each of the magnetic elements is joined to the adjacent element or elements along radial junction lines, and whatever be their number, the poles are always alternately north and south when they are erected on the driving bearing.

These same elements are arranged in Figs. 6-8 so as to obtain by an automatic regulation of the current an absolutely constant luminous intensity of the lamp. On the spindle 5 carrying the disc 5a, are mounted the two bipolar elements 4 and 4a (Figs. 6 and 7) the inner lateral faces of which are pressed against each other by the springs 57 which have the tendency to bring them closer to the spindle 5. The disc 5a has guides 58 engaging with oblique mortises 59 provided in the elements parallel to their line of junction.

When the magnet is rotating at its normal working speed, no movement of the elements 4 and 4a takes place; but if the speed of rotation should become too great, the said elements, under the pressure of the force, move away from the centre to a distance which is a function of the said speed. The gap existing between the polar bore and the armature increases, which results in the intensity of the magnetic field being reduced and in the electromotive force being maintained within its utmost limits. In this way automatic regulation is obtained of the electromotive force which to a certain extent is independent of the speed of rotation of the magnet.

The magnet shown in Fig. 8 is a multiple one, and its elements 4 and 4a are mounted on the bearing 5a of the spindle 5 in a manner similar to that just described, in order that they should be able to move away from the spindle under the action of centrifugal force. To that end, they are provided with radial mortises 59 normal to the line of junction of the elements, with which engage guides 58 screwed into the bearing 5a. They are moreover connected by springs 57 which constantly tend to bring them nearer to the spindle, and it is only when the speed of rotation becomes too great, and the centrifugal force overcomes the tension of the springs that the magnetic elements move away from each other.

The automatic regulation of the electromotive force in the electricity generator results in ensuring constant intensity of lighting of the lamp, as soon as a certain speed of rotation is reached by the magnet, and in preventing, in case of an excessive speed, the filament of the lamp bulb from being destroyed.

It is obvious that the various arrangements described by way of example could be modified within certain limits without altering the principle of the system. Thus the shape or the arrangement of the various parts of the lamp could be varied, and any suitable method of erecting, guiding and
returning the elements of the magnet, could be employed for obtaining regulation of the gap by the action of centrifugal force.

These magnet constructions designed for obtaining automatic regulation of the induced electromotive force, are more particularly applicable to electro-mechanical lamps for bicycles, driven by one of the wheels of the vehicle, the speed of which constantly varies within wide limits.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. In an electric pocket lamp, an electromagnetic generator including an armature and a two-part permanent field magnet composed of two parts having the parts contacting along a plane surface, and means to normally and resiliently retain the parts of the field magnet in engagement, and guiding means for the field magnet parts, whereby movement thereof in translation by a centrifugal force is effected.

2. In an electric pocket lamp, an electromagnetic generator including an armature, a two-part permanent field magnet having the parts thereof contacting along a diametrical plane of the axis of rotation thereof, means tending to draw the parts of the field magnet together, a support for the field magnet, a plate attached to said support, and guide means carried by said plate and engaging the parts of said field magnet.

3. In an electric pocket lamp, an electromagnetic generator including an armature, a permanent two-part cruciform field magnet having the parts thereof normally contacting of a plane diametrical along the axis of rotation thereof, means supporting the field magnet, coiled springs connecting the parts of the magnet and normally tending to draw the latter together, said magnet parts having guide grooves disposed perpendicular to the line of contact between the parts thereof, a plate carried by the supporting means, and guide lugs carried by the plate engaging in said grooves.

In testimony whereof I have signed my name to this specification.

ANTOINE LUZY.