

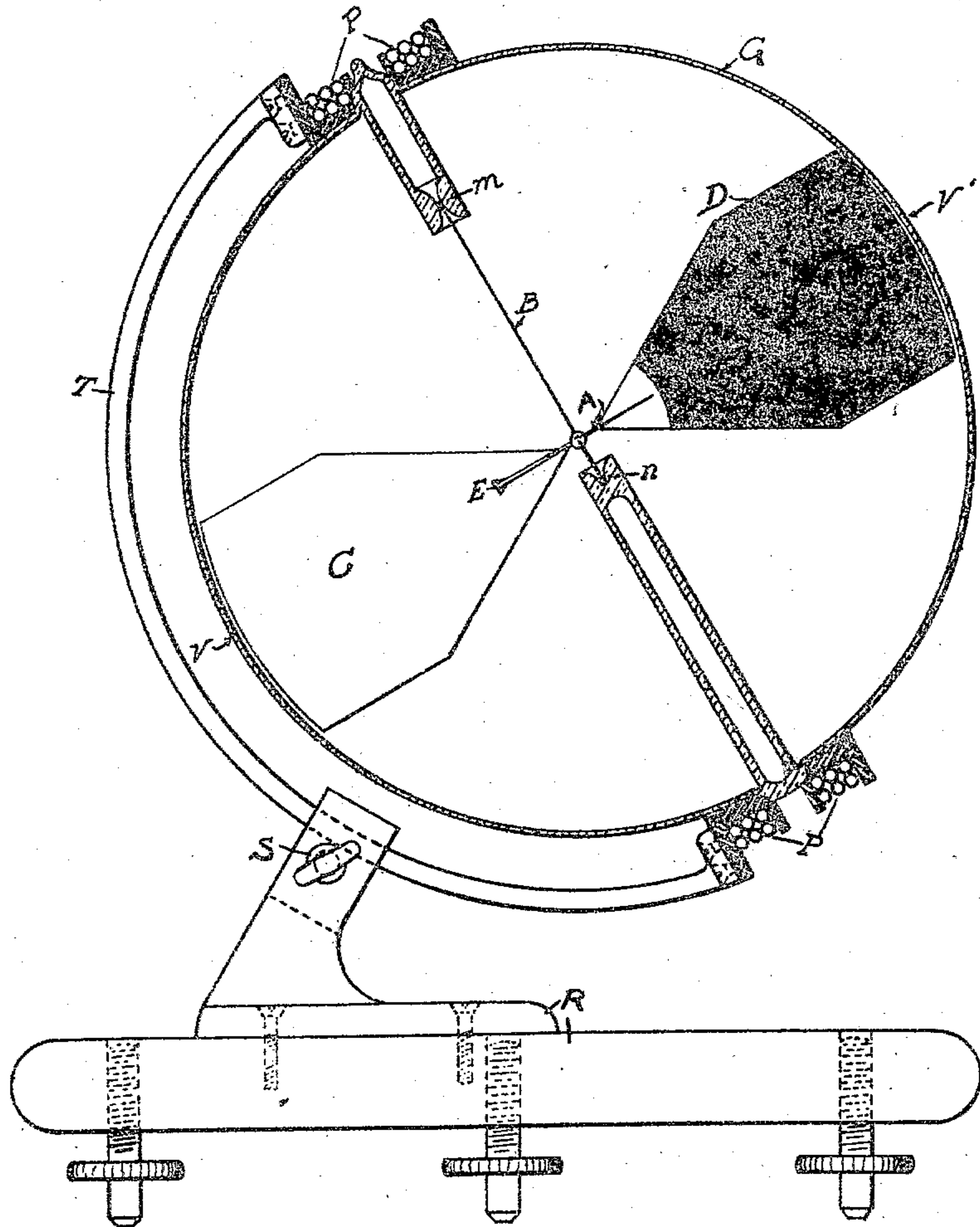
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PATENTED MAR. 1, 1904.

T. Z. MILLARD & P. H. PALMER.  
LIGHT MEASURING INSTRUMENT.

APPLICATION FILED MAR. 23, 1903.

NO MODEL.



Witnesses

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# UNITED STATES PATENT OFFICE.

THOMAS Z. MILLARD, OF OTTUMWA, AND PHIL HAROLD PALMER, OF  
BLOOMFIELD, IOWA; SAID MILLARD ASSIGNOR TO SAID PALMER.

## LIGHT-MEASURING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 753,508, dated March 1, 1904.

Application filed March 23, 1903. Serial No. 149,218. (No model.)

*To all whom it may concern:*

Be it known that we, THOMAS Z. MILLARD, residing at Ottumwa, in the county of Wapello, and PHIL HAROLD PALMER, residing at Bloomfield, in the county of Davis, State of Iowa, citizens of the United States, have invented a new and useful Light-Measuring Instrument, of which the following is a specification.

The object of our invention is to obtain a photometer that will directly indicate the intensity of light transmitted to it and also to directly indicate the relation of the intensity of light emitted from an electric lamp to the current consumed by said lamp. We attain this by applying a retarding force or retarding forces to the rotation of the vane in an ordinary radiometer in such a manner that the vane instead of revolving completely around its axis will move through an angle the greatness of which depends upon the intensity of light striking the vane. Thus the intensity of said light is directly indicated upon a scale calibrated along said angle.

The accompanying drawing shows a vertical section of the instrument by which we attain the foregoing objects.

The instrument consists of an air-tight bulb G, around which is fastened a coil of insulated wire P P, and on the inside of the bulb G is a very light vane consisting of an absorbent of light D and a reflector of light C, attached one to each end of a magnetic needle A, which is attached perpendicularly to a spindle B, which rests in sockets *m* and *n*. The air is exhausted from the bulb to a degree at which the vane will most readily move under the force of light. Also included with the instrument is the adjustable support consisting of a base R, on which there is an adjustable clamp S, which clamps to a semicircular rod T, which supports the bulb G and coil P P.

The end E of the magnetic needle A is made heavier than the other end, so that the vane

will seek a certain position of equilibrium when the instrument is supported in an inclined position and the vane is acted upon by the force of gravity alone.

The position of the coil of wire P P is such that the position which the vane will seek when the needle A is acted upon by the force of magnetism set up by current in the coil will coincide with the position it will seek when influenced by gravity alone. Thus the force of gravity alone or the combined forces of gravity and of magnetism may be used to retard the motion of the vane set up by the force of light, and by adjusting the instrument by means of clamp S, so that the spindle B is vertical, the force of gravity will not retard the rotation of the vane, and the force of magnetism from the current in the coil will act alone as a retarding force against the force of light on the vane. Then by passing the current of an electric lamp whose light shines against the vane of the instrument through the coil the relation of the intensity of light emitted by the lamp to its current consumption will be indicated by the position of the vane. Scales may be calibrated upon the bulb at V and V'.

Between the source of light to be measured and the instrument is interposed an alum-cell which hinders the obscure heat-rays which may radiate from the source of light from reaching the instrument. As heat has a tendency to rotate the vane, temperature corrections may be made by the adjustment of inclination of instrument by means of clamp S.

We are aware that the intensity of light has been measured by the speed of rotation of the vanes in radiometers; but to the best of our knowledge we are the first to apply the principle of repulsion and attraction of light on reflectors and absorbents of light in such a manner that the intensity of light will be indicated directly with success, making a direct reading photometer and efficiency-indicator.

What we claim as our invention, and desire to secure by Letters Patent, is—

The combination in a radiometer of a vane of which a magnetic needle made with one end  
5 heavier than the other is a part, a coil of insulated wire the plane of which coincides with the axis of the vane and an adjustable support, all substantially as shown.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS Z. MILLARD.

PHIL HAROLD PALMER.

Witnesses:

W. S. CHESINAN,

B. W. SCOTT.