(No Model.)

C. D. RAAB.

MOTOR WATTMETER.

No. 604,501. Patented May 24, 1898.

Fig: 1.

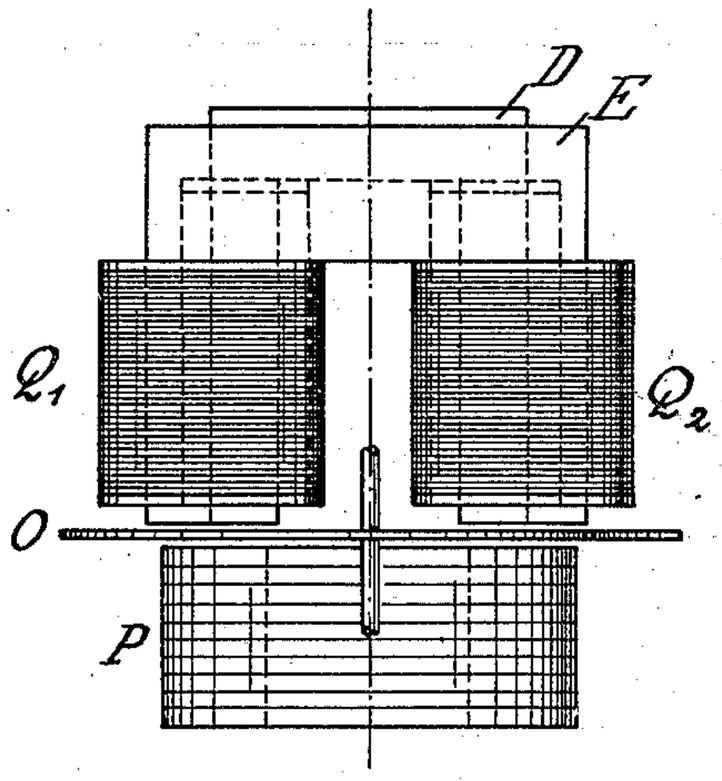


Fig: 3.

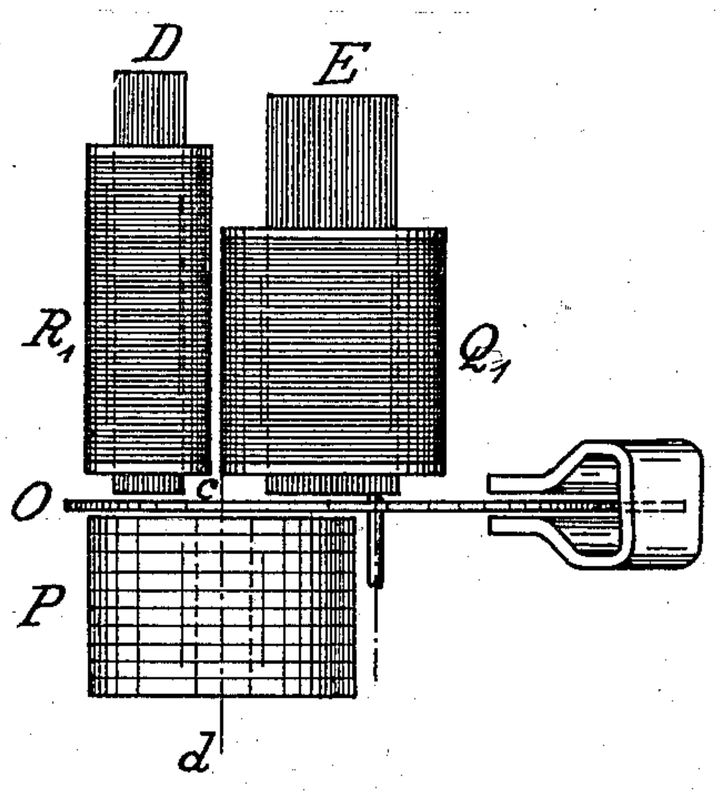


Fig: 2.

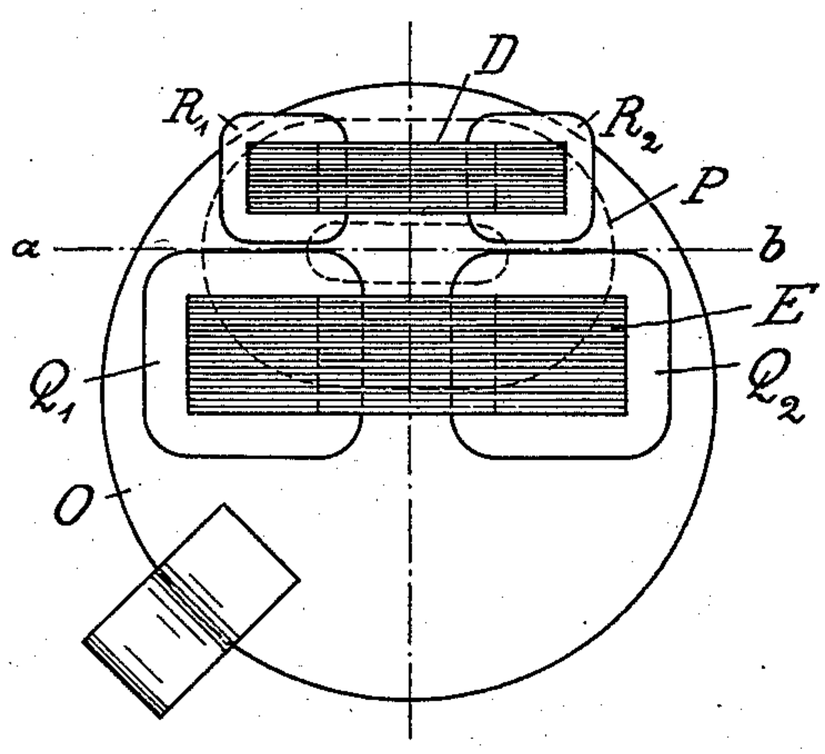
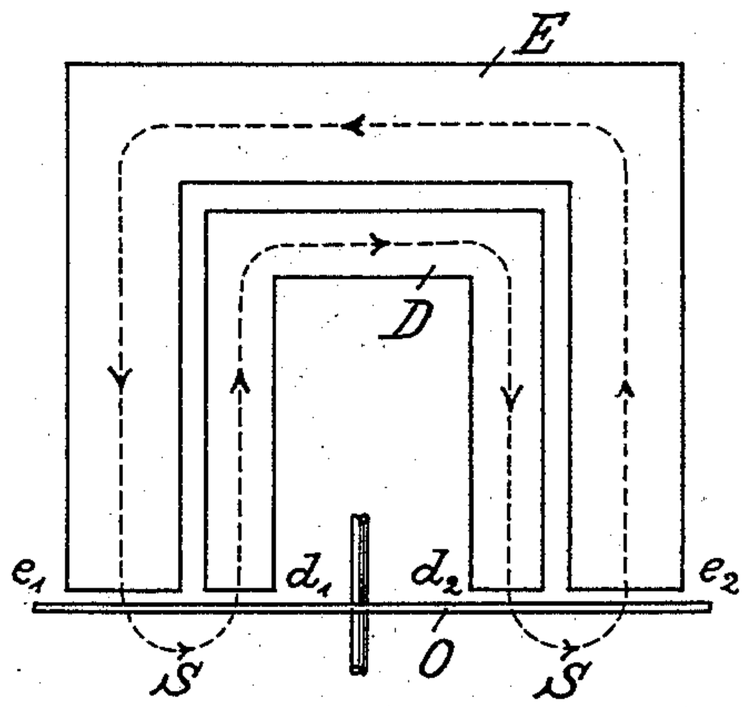


Fig: 4.



Witnesses
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UNITED STATES PATENT OFFICE.

CARL DANIEL RAAB, OF KAISERSLAUTERN, GERMANY.

MOTOR-WATTMETER.

SPECIFICATION forming part of Letters Patent No. 604,501, dated May 24, 1898.

Application filed December 27, 1897. Serial No. 663,792. (No model.) Patented in Belgium June 30, 1897, No. 128,865, and in Spain July 10, 1897, No. 21,022.

To all whom it may concern:

Be it known that I, CARL DANIEL RAAB, a subject of the King of Bavaria, residing at Kaiserslautern, in the Kingdom of Bavaria, German Empire, have invented a new and useful Improvement in Motor-Wattmeters, (for which I have obtained a patent in Belgium, No. 128,865, bearing date June 30, 1897, and in Spain, No. 21,022, bearing date July 10, 1897,) of which the following is a specification.

My invention is directed to a novel motor-wattmeter in which a rotary armature moves in a magnetic field between the poles of two horseshoe electromagnets on one side, located in shunt-circuits, and a main-current solenoid on the other side, which electromagnets and solenoid produce turning moments on said armature, the resultant effect being a rotary motion thereof, the rate of which is proportional to the amount of electrical energy consumed in any given circuit.

The objects of my invention are, first, to increase the total moment of rotation by so arranging the horseshoe electromagnets that the armature is crossed at four points by the flux of the magnetic lines of the shunt-current; second, to provide means whereby a rotary motion is entirely avoided when the circuit is without load, and to so arrange the main-current field in relation to the armature and the horseshoe electromagnets that a large space for the main-current solenoid is obtained, whereby the meter is adapted for working with currents of very great intensities.

In order to enable others skilled in the art to construct and use my present invention, reference is had to the accompanying drawings, in which—

Figure 1 is an elevation, Fig. 2 a plan, and Fig. 3 a side view, of a meter constructed in accordance with my invention. Fig. 4 illustrates diagrammatically the common flux of the magnetic lines of both shunts.

Referring to the drawings, O is a rotatably-pivoted disk armature faced at one side by the main-current solenoid P and at the other side by the two horseshoe electromagnets D and E. The horseshoe electromagnets D and E have each two coils Q' Q^2 and R' R^2, the coils Q' Q^2 forming an inductive shunt, while the coils R' R^2 constitute a second or auxiliary shunt.

At each side of the axes a b and c d of the solenoid P there are two free poles of the horseshoe electromagnets D and E. Within the magnetic field produced by these poles the armature is crossed by the magnetic lines of both shunts Q' Q^2 and R' R^2, as will be seen from Fig. 4.

In order to illustrate the flux S of the magnetic lines of both shunts, in Fig. 4 the horseshoe electromagnet D is shown as smaller than and as being placed within the horseshoe electromagnet E. As shown by Fig. 2, the main-current solenoid P is in cross-section of oval shape and so arranged in relation to the poles e' e^2 and d' d^2 that its hole is in the center of said poles. It will be readily understood that in view of this arrangement at each side of the axis a b two magnetic turning moments acting from the same direction are produced. The flux of the magnetic lines passes the poles e' e^2 in opposite direction than the poles d' d^2, the pair of poles e' e^2 being at one side and the pair of poles d' d^2 at the other side of the axis a b. Hence it follows that the turning moments of the poles e' d' will act with a left lever-arm and that of the poles e^2 d^2 with a right lever-arm on the armature-shaft.

In the construction hereinbefore described the magnetic lines are compelled to cross a very great air-gap, the consequence being that the meter cannot start without a main current. This gives my invention a superiority over arrangements in which the free poles are placed opposite each other, thus causing turning moments acting from opposite directions. These moments, although compensable, are sometimes subjected to alterations in the course of time. It is further obvious that in view of the arrangement of the horseshoe electromagnets at one side of the armature-disk the other side of the latter is left free for the main solenoid P, which may be varied in size or windings so as to be adapted for all currents without altering the standard type of the meter.

Having thus described my invention, what

I claim, and desire to secure by Letters Patent of the United States, is—

1. A motor-wattmeter having a disk armature, two horseshoe electromagnets placed near each other at one side of the disk armature and a main-current solenoid at the other side thereof, substantially as described.

2. A motor-wattmeter having a disk armature, two horseshoe electromagnets placed near each other at one side of the disk armature and provided with shunt-coils, and a main-current solenoid at the other side of the disk armature, substantially as described.

3. A motor-wattmeter having a rotary armature and two shunt horseshoe electromagnets with their poles closely adjacent thereto and on one side thereof, in combination with a main-current solenoid located on the other side thereof, substantially as described.

4. A motor-wattmeter having a disk armature, two shunt horseshoe electromagnets of different size placed near each other at one side of the armature, in combination with a main-current solenoid located on the other side of said armature, substantially as described.

In testimony whereof I have hereunto subscribed my name this 29th day of November, 1897.

CARL DANIEL RAAB.

Witnesses:
ALOIS GOBANZ,
OSCAR BOCK.