

(No Model.)

E. P. WARNER.

ELECTROMAGNETIC DAMPER FOR MEASURING INSTRUMENTS.

No. 544,332.

Patented Aug. 13, 1895.

Fig. 1

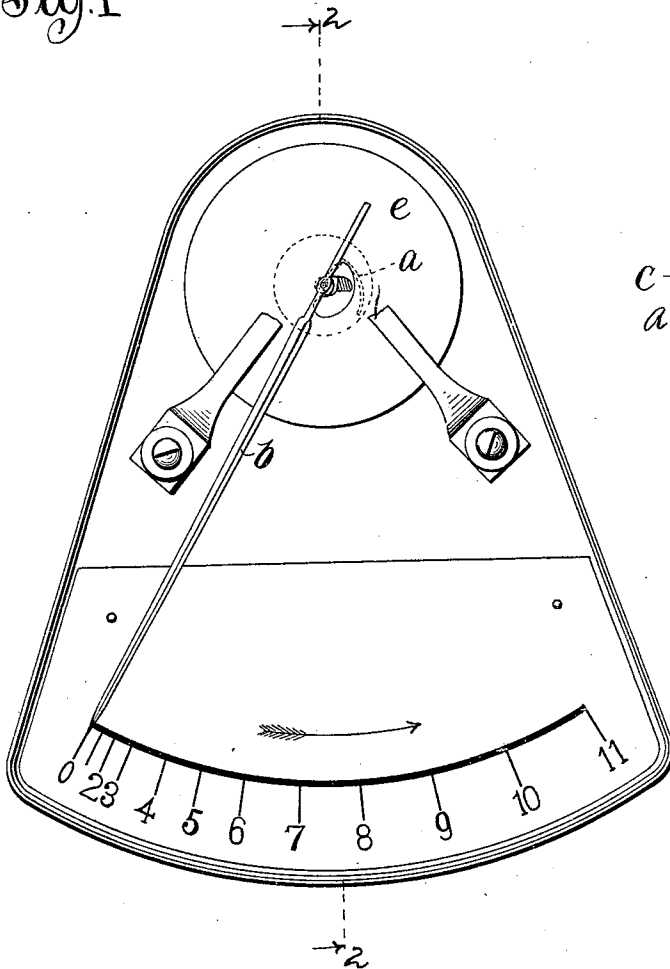


Fig. 2.

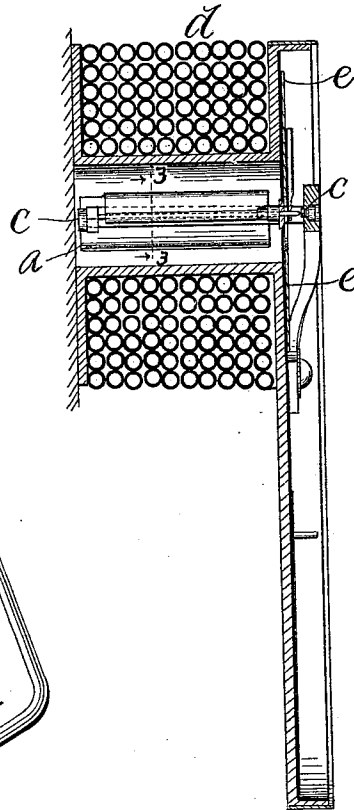
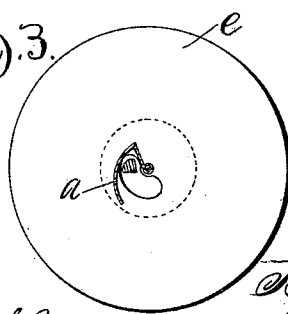


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

ERNEST P. WARNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

ELECTROMAGNETIC DAMPER FOR MEASURING-INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 544,332, dated August 13, 1895.

Application filed September 18, 1894. Serial No. 523,333. (No model.)

To all whom it may concern:

Be it known that I, ERNEST P. WARNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electromagnetic Dampers for Measuring-Instruments, (Case No. 57,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to that class of electrical measuring-instruments in which a magnetic vane or armature is subjected to the action of a solenoid surrounding the same and included in a circuit, a pointer or indicator being ordinarily attached to the armature to move over a graduated scale when the armature is actuated. In such instruments the needle or pointer is usually adapted to take the zero position under the influence of gravity when no current is passing through the coil. When current is established the armature is moved in opposition to the action of gravity, the amount of said motion depending on the ampère turns set up in the coil. In such instruments the needle has been liable to oscillate more than is desirable under changes in the ampère turns of the coil, rendering it difficult to make a true reading, especially when the changes are sudden and extreme. By the use of my invention these objectionable oscillations are prevented and the instrument is rendered practically dead-beat.

My invention, speaking generally, consists of a metallic disk, preferably of light metal, as aluminum, rigidly mounted upon the rotating-shaft, so that any motion of the armature will be accompanied by corresponding motion of the disk. This disk is located within the magnetic field of the coil, so that when rotated it will cut the lines of force and set up eddy-currents within itself. The result of these eddy-currents is to effect a retardation of the rotary movements of the disk, and consequently of the armature and needle, the amount of such retardation depending upon the rapidity of the movement and the number of lines of force cut.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of an ammeter provided with my electromagnetic damper. Fig. 2 is a sectional view thereof on line 2 2, Fig. 1. Fig. 3 is a sectional view on line 3 3, Fig. 2.

Like parts are indicated by similar letters of reference throughout the different figures.

As is usual in this class of instruments the armature *a* and the needle *b* are pivoted upon an arbor *c* and counterbalanced, so that when no current is passing through the coil *d* the pointer or needle will indicate zero, as shown in Fig. 1. When current is sent through the coil *d* the armature, and consequently the needle, will be rotated, as indicated by the arrow. The scale is graduated to indicate, in this instance, ampères. In case the coil is made up of fine wire and the instrument is used as a voltmeter, the scale will be graduated accordingly to indicate volts. As measuring-instruments of this general construction are well known in the art, no further general description thereof is deemed necessary.

My invention consists in the metallic disk *e*, connected with the armature so as to move within the field of force when the armature is moved in response to changes in current passing through the coil *d*. This metal disk being rotated in the field will cut lines of force, and thus eddy-currents will be set up in the disk, causing the disk to offer more or less mechanical resistance to the oscillations of the needle, according to the number of lines of force that may be cut by the disk. I have found that a metal plate which is of light metal, as aluminum, and which is disk-shaped and centrally pivoted upon the arbor carrying the armature, is the most satisfactory. I do not, however, limit myself in all of my claims to any particular kind of metal or to the precise form of the disk shown and described, since it is evident that other metals—as, for example, copper, or even iron—might be successfully employed, and that the shape of the rotary damping plate or piece might be varied without injuriously affecting the utility thereof.

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

In an electrical measuring instrument, the
; combination with a coil or helix through
which the current to be measured is passed,
of an armature mounted within said coil and
adapted to rotate about an axis parallel to or
coincident with the axis of the coil, an index
10 finger carried upon said armature and adapted
to move over a scale, and a metallic disk

mounted to rotate with said armature, the
disk being adapted to rotate in its own plane
and in front of the end of the coil to act as a
damper, substantially as described. 15

In witness whereof I hereunto subscribe my
name this 2d day of August, A. D. 1894.

ERNEST P. WARNER.

Witnesses:

GEORGE L. CRAGG,

HARRIET G. TEMPLETON.