

(No Model.)

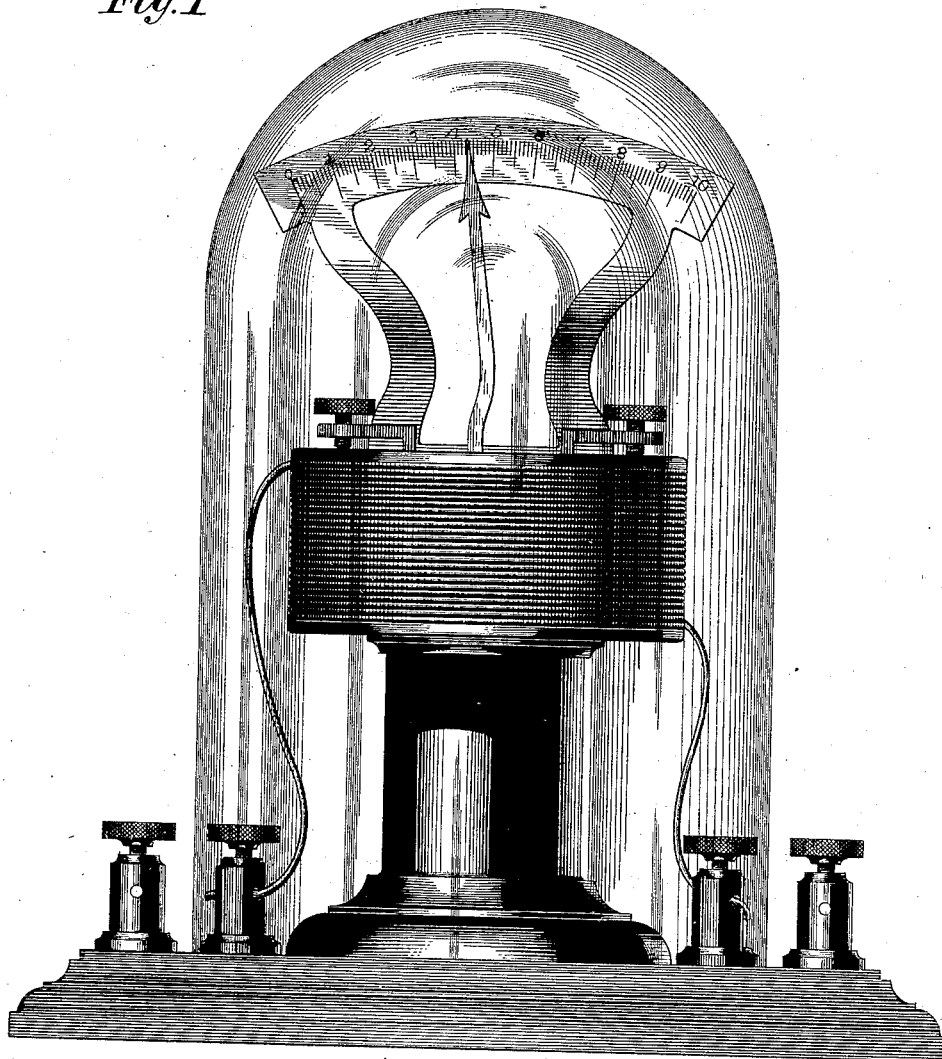
3 Sheets—Sheet 1

J. TREGONING.
ELECTRIC INDICATOR.

No. 382,914.

Patented May 15, 1888.

Fig. 1



Witnesses.

Frank H. Turpont.
H. R. Williams.

Inventor,

John Tregoning,
By his Attorney
Willard Eddy.

(No Model.)

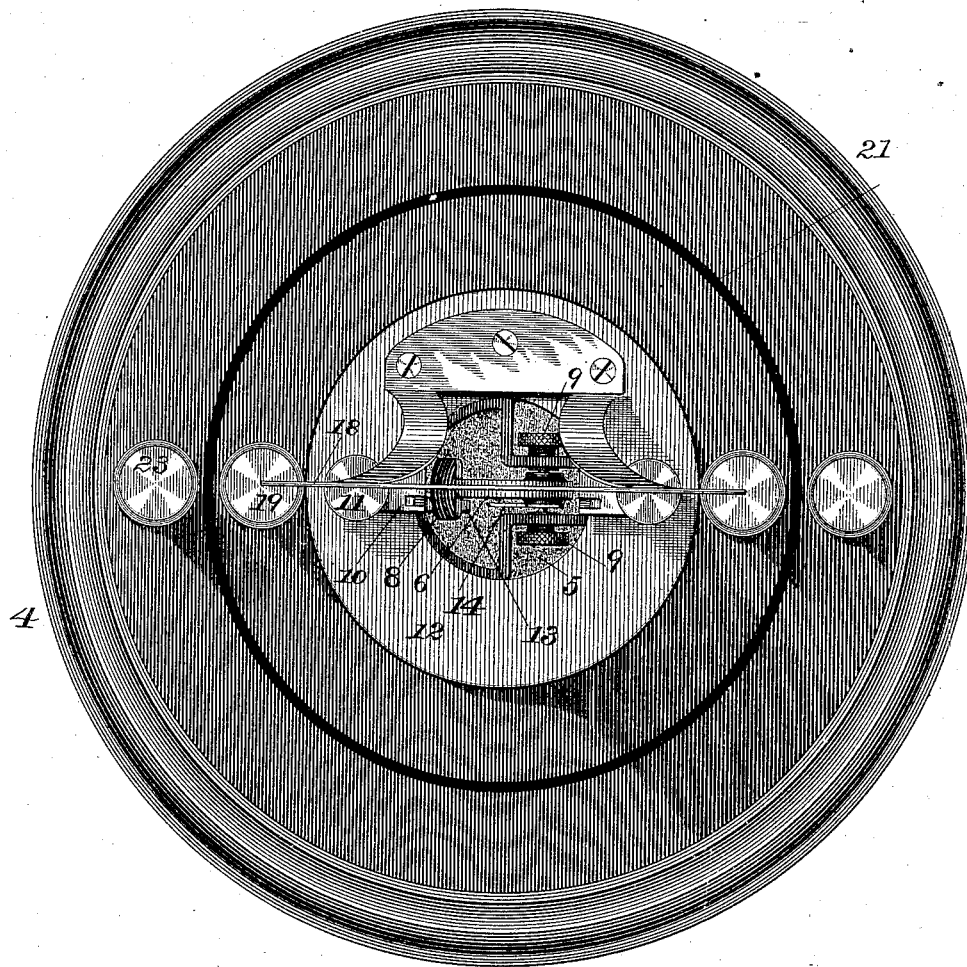
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Fig. 2



Witnesses,

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(No Model.)

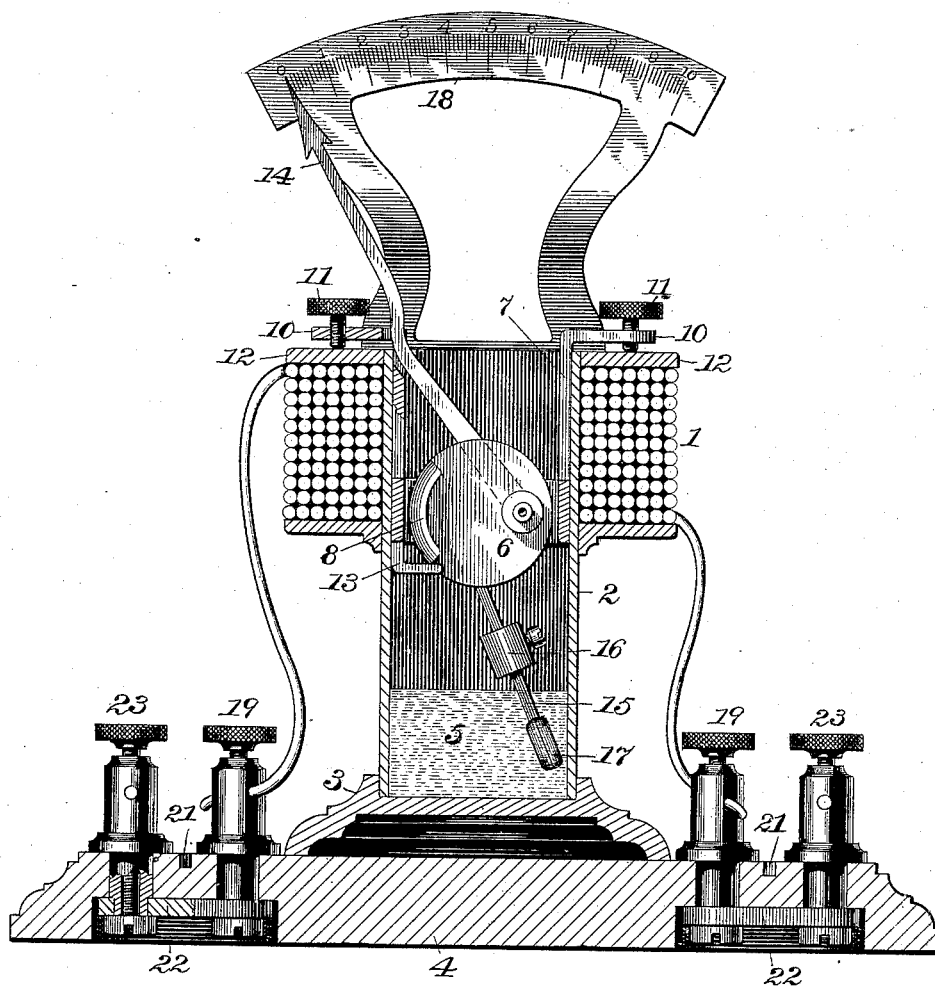
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Fig. 3



Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN TREGONING, OF HARTFORD, CONNECTICUT.

ELECTRIC INDICATOR.

SPECIFICATION forming part of Letters Patent No. 382,914, dated May 15, 1888.

Application filed May 23, 1887. Serial No. 239,072. (No model.)

To all whom it may concern:

Be it known that I, JOHN TREGONING, of the city and county of Hartford, Connecticut, have invented certain new and useful Improvements in Electric Indicators, which improvements are described in the following specification and illustrated by the accompanying drawings.

My invention relates to instruments for electrical measurement, both voltmeters and ammeters, and is designed to promote simplicity of construction and uniformity of operation in such instruments.

The invention involves the use of a solenoid and a pivoted armature.

The best mode in which I have contemplated the application of my invention is shown in the drawings, in which—

Figures 1 and 2 are a front view and a top view of my improved indicator, respectively; and Fig. 3 is a central vertical section of the same.

With special reference to Fig. 3, the numeral 1 denotes a solenoid-helix wound, in the ordinary manner, upon a hollow brass spool or bobbin, 2, which is considerably longer than the width of said helix, and is closed at the lower end by a metallic base-socket, 3. By means of this socket the bobbin is mounted in a vertical position upon an insulating-base, 4. The lower part of bobbin 2 contains oil, glycerine, or other fluid, 5, and serves as a dash-pot, while the upper part contains the armature 6. The latter consists of a piece of soft iron, which is pivoted in a sliding frame, 7, let down into bobbin 2 from above. Armature 6, which is pivoted eccentrically as regards both its own mass and the axial center of bobbin 2, may conveniently consist of a circular disk which is pivoted at or near one edge of the same in a vertical position, and is loaded with a flange, 8, at the opposite edge of said disk, as seen in Fig. 3. This is magnetically equivalent to a straight bar of iron pivoted at one end. Frame 7 is a brass shell which is of general cylindrical form, and is adapted to fit closely within spool 2, but has two re-entrant angles, as seen in Fig. 2, for the accommodation of the pivotal thumb-nuts 9. Frame 7 has two arms, 10 and 10, which extend radially outward from the top of said

frame and are provided with adjusting-screws 11 and 11, bearing upon the upper annular cheek, 12, of bobbin 2. Frame 7 is armed at the bottom with a finger or detent, 13, which is adapted to stop armature 6 in such a position that an imaginary line passing through the pivotal point of said armature and also through the center of mass of the same lies across or partly across the hollow interior of bobbin 2, as seen in Fig. 3. Armature 6 is provided with a counterbalance-lever, 15, and with an index-finger, 14, whose point may traverse index-plate 18. Lever 15 is provided with an adjustable counterpoise, 16, and with a terminal expansion or fan, 17. In order that the maximum deflection of index-finger 14 may be made to correspond with the length of index-plate 18, the instrument is adjusted for calibration by manipulation of set-screws 11. By means of those screws frame 7, carrying armature 6, is raised or lowered in bobbin 2 until precisely the requisite maximum deflection of that finger is obtained from the maximum current with which the indicator is designed to be used. The indicator is then calibrated in the usual manner. In the construction of this instrument as an ammeter helix 1 is formed of coarse wire, as indicated in Fig. 3; but that helix may be formed of fine wire and wound to a high resistance, and in that case the instrument becomes a voltmeter and is calibrated as such in the usual manner. The ends of helix 1 are connected with binding-posts 19 within a glass bell, which is seen in Fig. 1, and is fitted to base 4 by a circular groove, 21, which is seen in Fig. 2. The internal binding-posts, 19, are connected by conductors 22 (seen in Fig. 3) with the external binding-posts, 23.

Such being the construction of my improved indicator, the mode of its operation is as follows: Index-finger 14 is adjusted by means of counterpoise 16 so as to stand at zero of scale 18 when no current passes through helix 1, and by means of binding-posts 23 and 23 the instrument is inserted in the circuit in which the desired electrical measurement is to be made. When current passes through the instrument, finger 14 is deflected proportionately, and the deflection is read directly from plate 18 in volts or amperes, as the case may

be, according as the instrument has been constructed, in the described manner, as a volt-meter or ammeter. The dash-pot, in combination with the fan 17, prevents undue oscillation of the armature and brings finger 14 promptly to rest.

I claim as my invention and desire to secure by Letters Patent—

1. A solenoid, in combination with an armature which is eccentrically pivoted therein, and is provided with a lever carrying an adjustable counterpoise and a fan, substantially as and for the purpose specified.

2. In an electric indicator, a hollow spool and a helix which is located on said spool, in combination with an armature pivoted in a

frame which is adjustable in said spool, substantially as and for the purpose specified.

3. A hollow spool, a helix which is wound thereon, a dash-pot which is formed therein, and an armature which is provided with an index-finger, fan, and counterbalancing-lever, in combination with an adjustable frame in which said armature is eccentrically pivoted within said spool, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my name in the presence of two witnesses.

JOHN TREGONING.

Witnesses:

W. M. BYORKMAN,
WILLARD EDDY.