

No. 619,679.

Patented Feb. 14, 1899.

A. A. DITTMAR.
GALVANOMETER.

(Application filed Aug. 27, 1898.)

(No Model.)

Fig. 1.

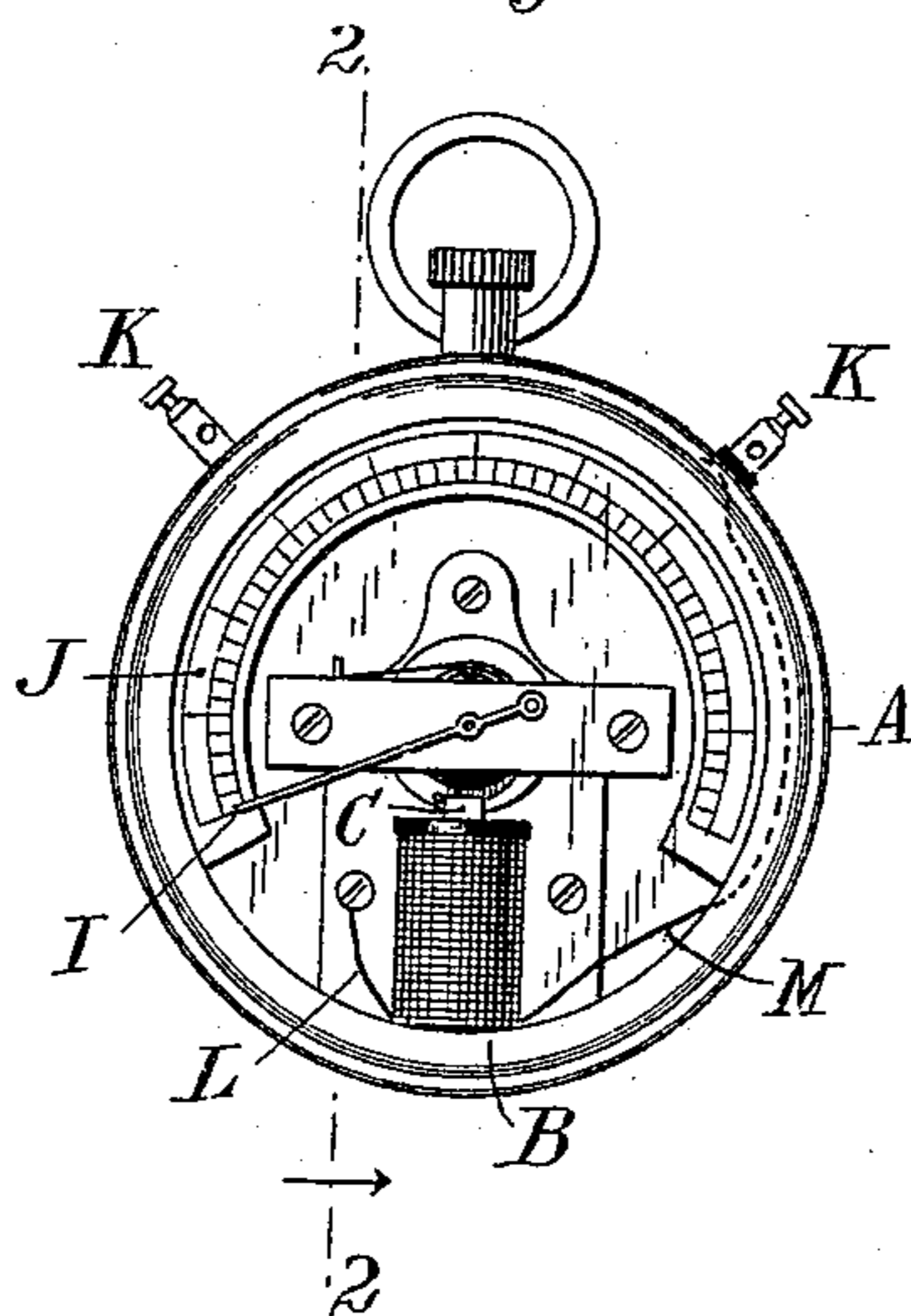


Fig. 2.

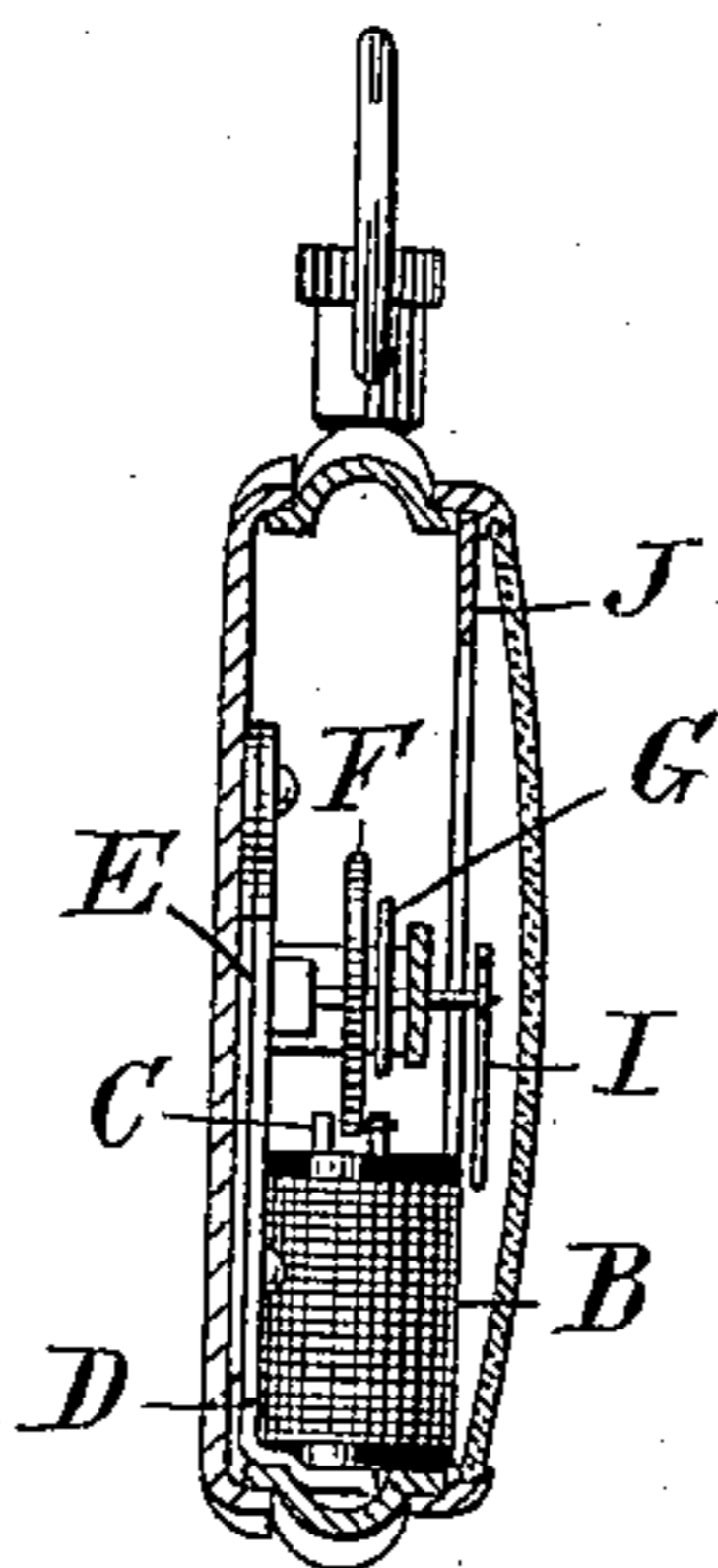
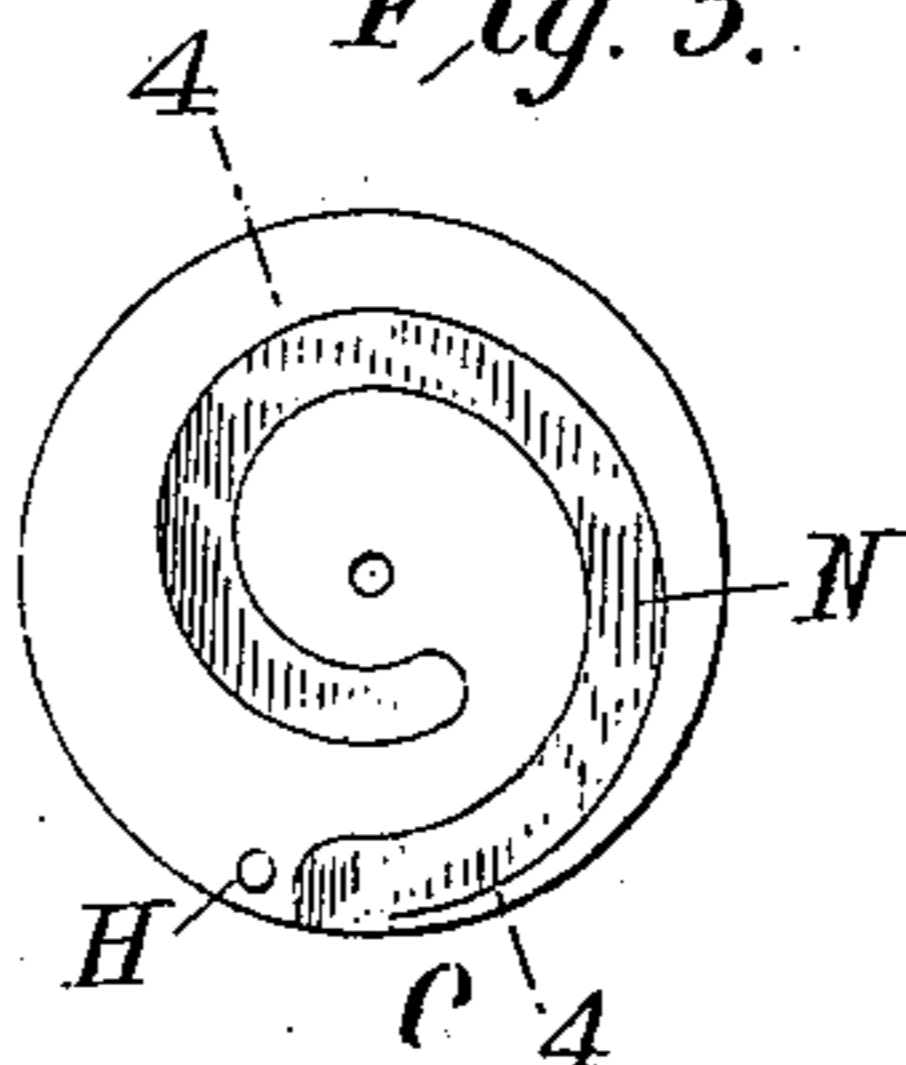


Fig. 4.



Fig. 3.



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GALVANOMETER.

SPECIFICATION forming part of Letters Patent No. 619,679, dated February 14, 1899.

Application filed August 27, 1898. Serial No. 689,633. (No model.)

To all whom it may concern:

Be it known that I, ALLEN A. DITTMAR, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a certain new and useful Galvanometer, of which the following is a specification.

This invention relates to an improvement in rotary-disk armatures especially designed for use in electromagnetic instruments—such, for instance, as galvanometers.

The main object of the invention is to construct an armature for a galvanometer or other indicator which shall be accurately balanced and which shall have an extended degree of rotation, so as to provide for constructing an indicating instrument on a small scale and still enable the graduations of its scale to be made legible.

With this object in view the invention consists in the construction, arrangement, and combination of parts hereinafter fully described, and set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 represents a pocket-galvanometer embodying the invention. Fig. 2 represents a vertical transverse section through the same, taken on the line 2 2 of Fig. 1. Fig. 3 is a face view of the rotary armature drawn on an enlarged scale. Fig. 4 is a diametrical section thereof, taken on line 4 4, Fig. 3.

In describing this invention reference will be had to its embodiment in a pocket-galvanometer.

The case of the galvanometer represented at A may be and preferably is a watchcase. This may have an open face, as shown, or may be of the "hunting-case" pattern, if desired.

The electromagnet of the galvanometer is indicated at B and has its upper pole-piece divided, as indicated at C. The recurved pole-piece D is attached to the lower end of the magnet's core and serves as the second pole-piece of the magnet. This pole-piece also serves to support the magnet and other mechanism of the galvanometer and is magnetically insulated from the case by the interposition of the copper plate E.

Upon the pole-piece D is journaled the armature F, which is in disk form and extends between the portions of the divided pole-piece C, as indicated. This is preferably made very thin and light, so much so that an ordinary hair-spring, as indicated at G, is sufficient to return it to the initial or zero point, where it is stopped by engagement with the pole-piece C of a suitable pin or projection H, carried by the disk. Upon the arbor carrying the armature there is mounted the hand or pointer I, which travels over a scale J.

The binding-posts of the instrument are indicated at K, from one of which current is led to the magnet through the case and the conductor L, while the other is insulated from the case and connected to the magnet by the conductor M.

To construct a successfully-operating galvanometer on so small a scale, it is necessary that the armature or movable part thereof be as light in construction as possible and that its moments of inertia shall be as nearly as possible equalized. To this end the armature F is made in the form of a circular disk and composed of a spiral or snail, of magnetic material, as iron, extending about the periphery thereof and terminating at the center, the convolutions being separated by non-magnetic material, such as brass, which is indicated at N. As will be noted, the spiral or snail, of magnetic material, begins, as at O, in a narrow point and gradually widens until it reaches the stop H, which is but a short distance from the point O. The non-magnetic material N breaks through to the periphery between the points H and O. The normal position of the disk brings the point O just within the gap between the divisions of the pole-piece. The disk is preferably made by stamping out the iron snail and the brass snail and then inserting one within the other and brazing them together, thereby making a disk of uniform surface and extent and of equal moments. Brass is chosen as the non-magnetic material N, because it is of the same specific gravity as wrought-iron, from which the snail or main portion of the armature is made. This insures a perfectly-balanced disk.

Other non-magnetic material may be used in the place of brass, if desired, provided the resultant disk will be balanced.

In the operation of the instrument as soon as the current is permitted to pass through the magnet B the disk begins to rotate, because of the attraction of the pole-piece C for the greater mass of the snail, and this continues until that tension is placed upon the spring G proportionate to the amount of current to be measured, which amount will be indicated by the pointer. Then upon cutting off the current from the galvanometer the spring will turn the disk to its normal position, with the stop H resting against the pole of the magnet, at which time the current will be at zero.

The galvanometer constructed on this plan may be easily calibrated and absolute accuracy secured in its operation.

While the armature, as shown, is polarized by direct connection with the pole-piece D, and thereby of opposite polarity to the divided pole of the magnet, it is obvious that said armature may be given the desired polarity by other means.

The invention claimed is—

1. In an electromagnetic device, a compound disk of magnetic and non-magnetic balancing metal, the magnetic portion of the disk being in the spiral or snail form while the non-magnetic material fills the remainder of the area comprised within the periphery of the disk so as to produce a disk which is balanced in all positions.

2. In an electromagnetic indicating device, the combination with an electromagnet having a divided pole-piece, of a convolute or snail-shaped armature magnetically connected to the opposite pole of the magnet and movable between the divisions of the divided pole-piece by which it is attracted continu-

ously in the same direction, or in opposition to the retractor, through its whole range of movement, substantially as set forth.

3. The combination with the casing, of the recurved pole-piece mounted therein, the compound balanced disk armature constructed substantially as described journaled in the upper portion of said pole-piece and magnetically connected therewith, the electromagnet mounted on the lower end of the recurved pole-piece and having its other pole-piece divided and the divisions thereof placed on either side of said armature, a spring opposing the attractive action of the divided pole-piece in all positions of the armature, and a pointer carried by the armature, substantially as and for the purpose set forth.

4. A disk armature consisting of an iron spiral or snail forming the periphery of the disk and terminating at the center thereof, and a spiral of non-magnetic material as N, interposed between the convolutions of the iron spiral, the two spirals being brazed together to form a complete and rigid disk, substantially as shown and described.

5. The combination with the balanced convolute or snail-shaped armature-disk of one polarity and its retractor, of a magnet having a divided pole-piece of opposite polarity so placed that the disk shall revolve between the divisions by the attraction thereof exerted upon convolutions of the disk at all positions thereof in a direction to oppose the influence of the retractor.

Signed at New York, in the county of New York and State of New York, this 26th day of August, A. D. 1898.

ALLEN A. DITTMAR.

Witnesses:

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