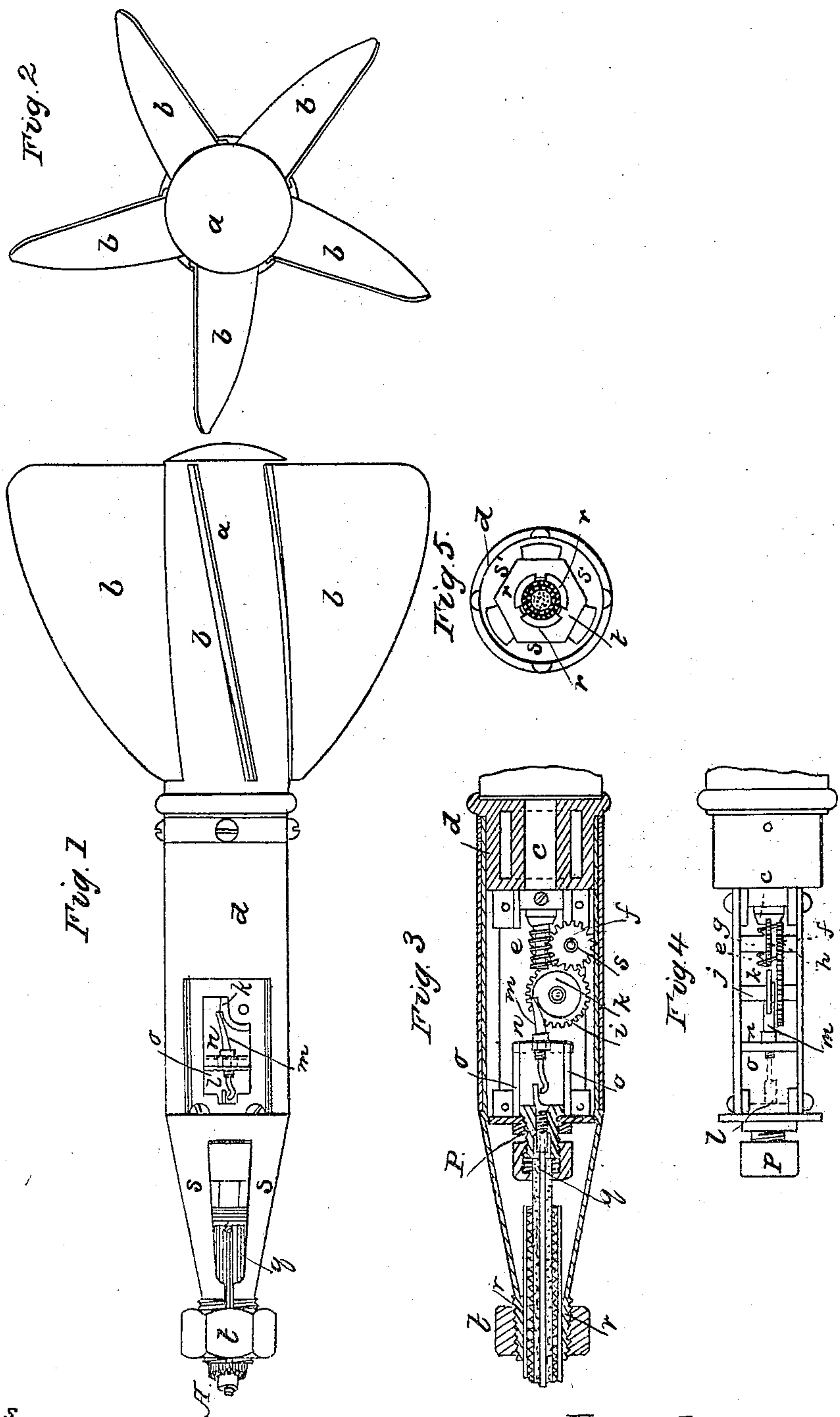


W. I. REID.  
Electro-Magnetic Log.

No. 76,521.

Patented April 7, 1868.



Witnesses  
Wm H. Burroughs  
Andrew Gedney

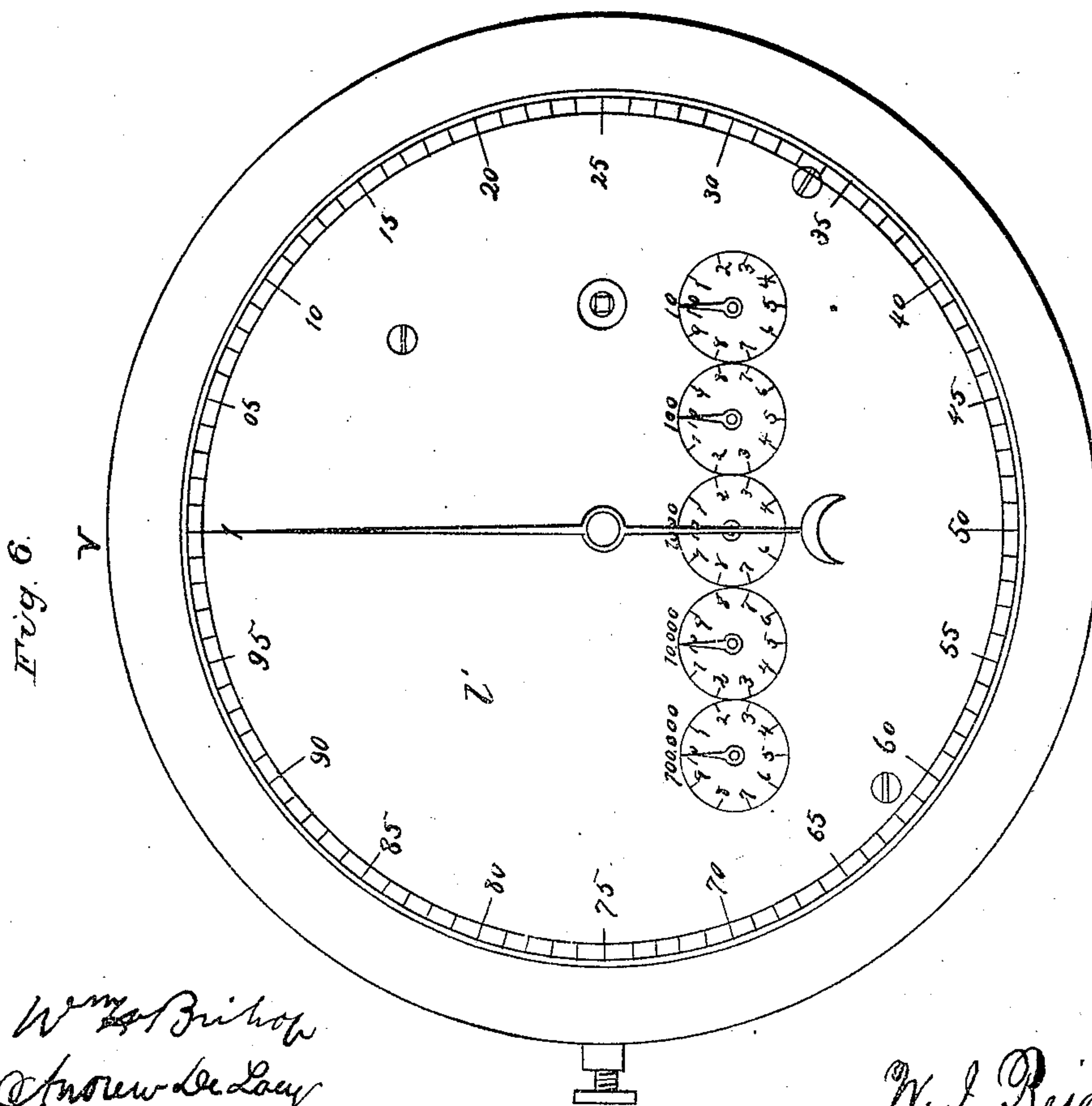
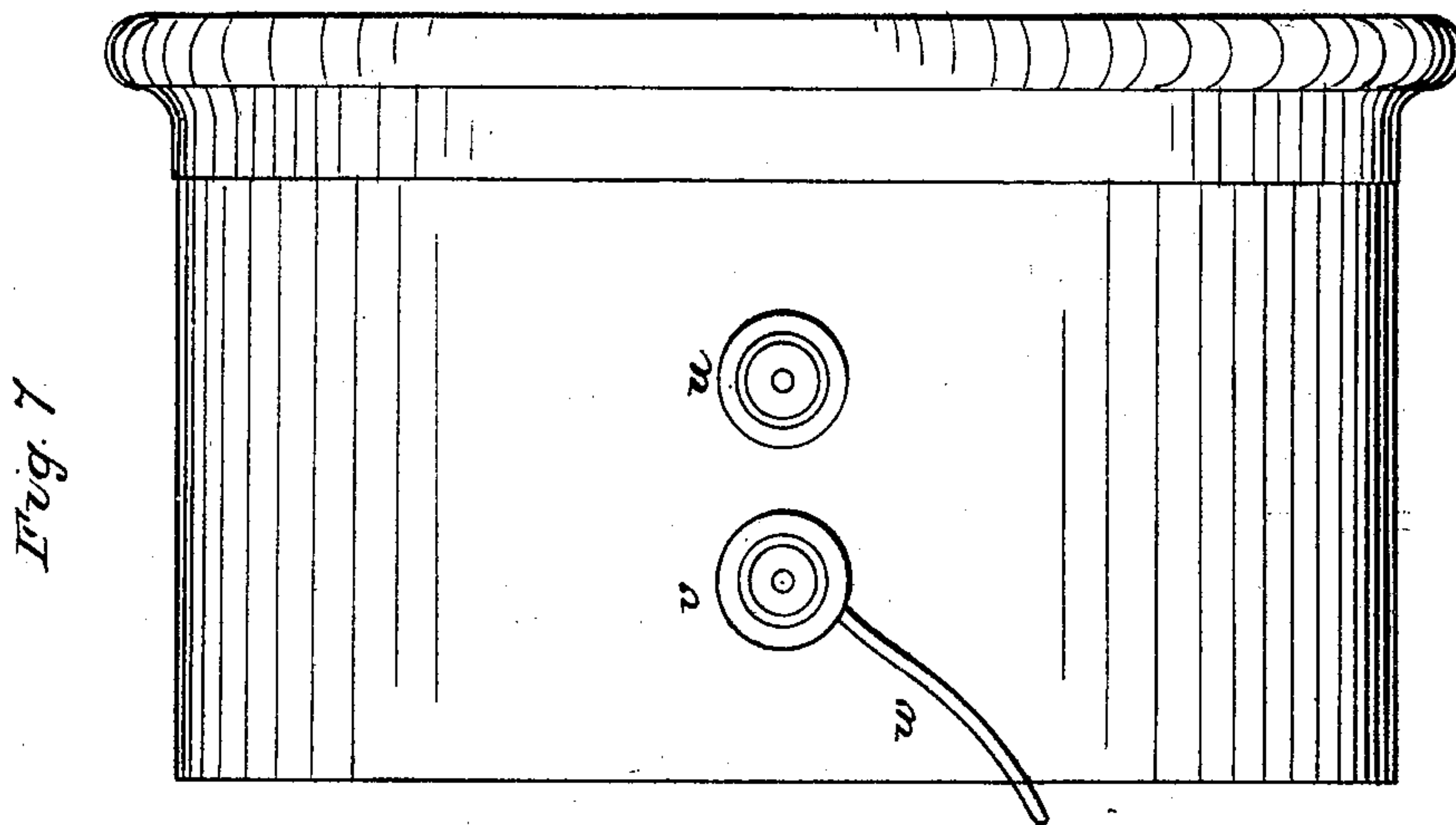
Inventor  
W. I. Reid

W. I. REID.

# Electro-Magnetic Log.

**No. 76,521.**

Patented April 7, 1868.



Wm. A. Bishop  
Andrew Lee Lacy

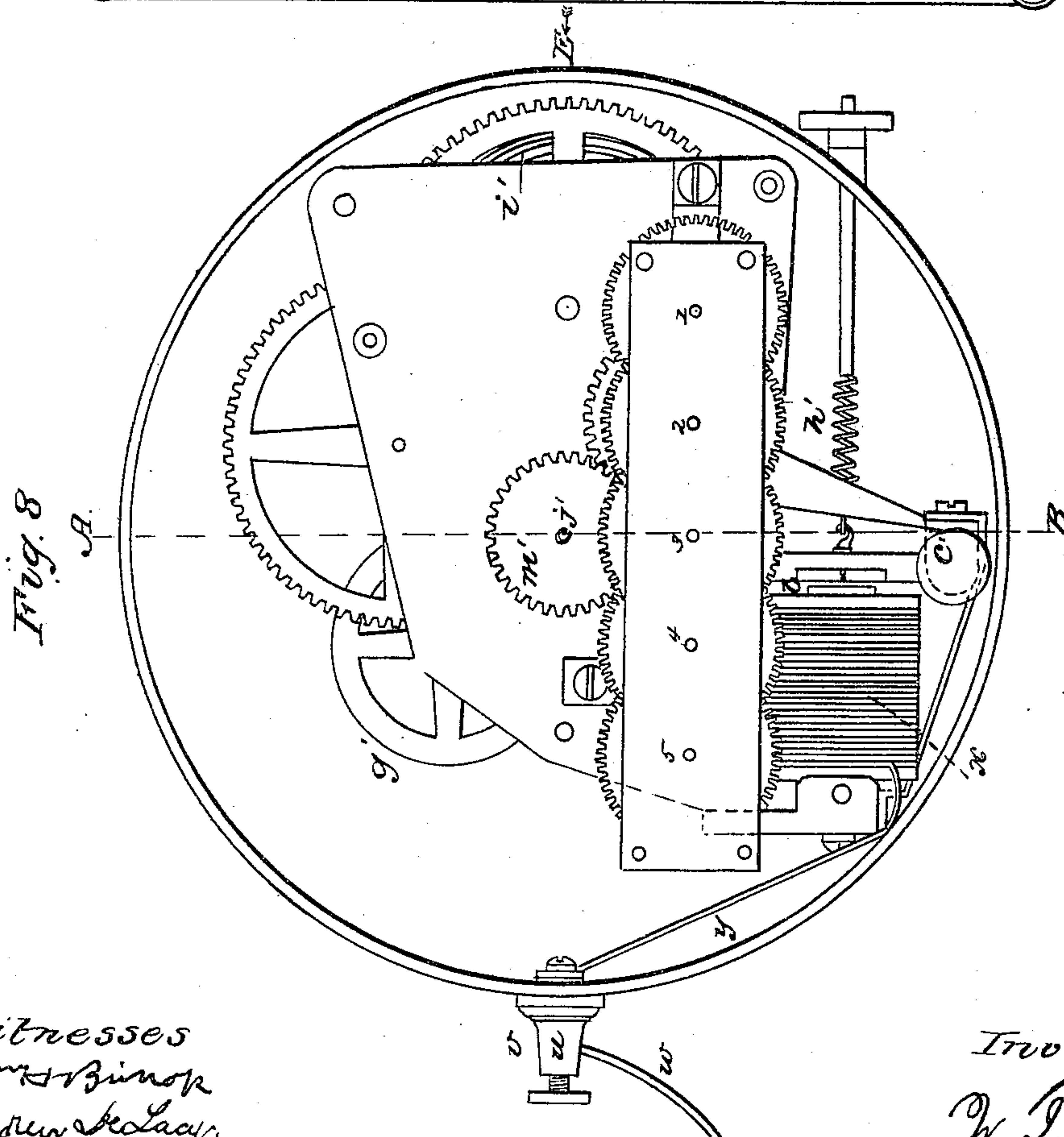
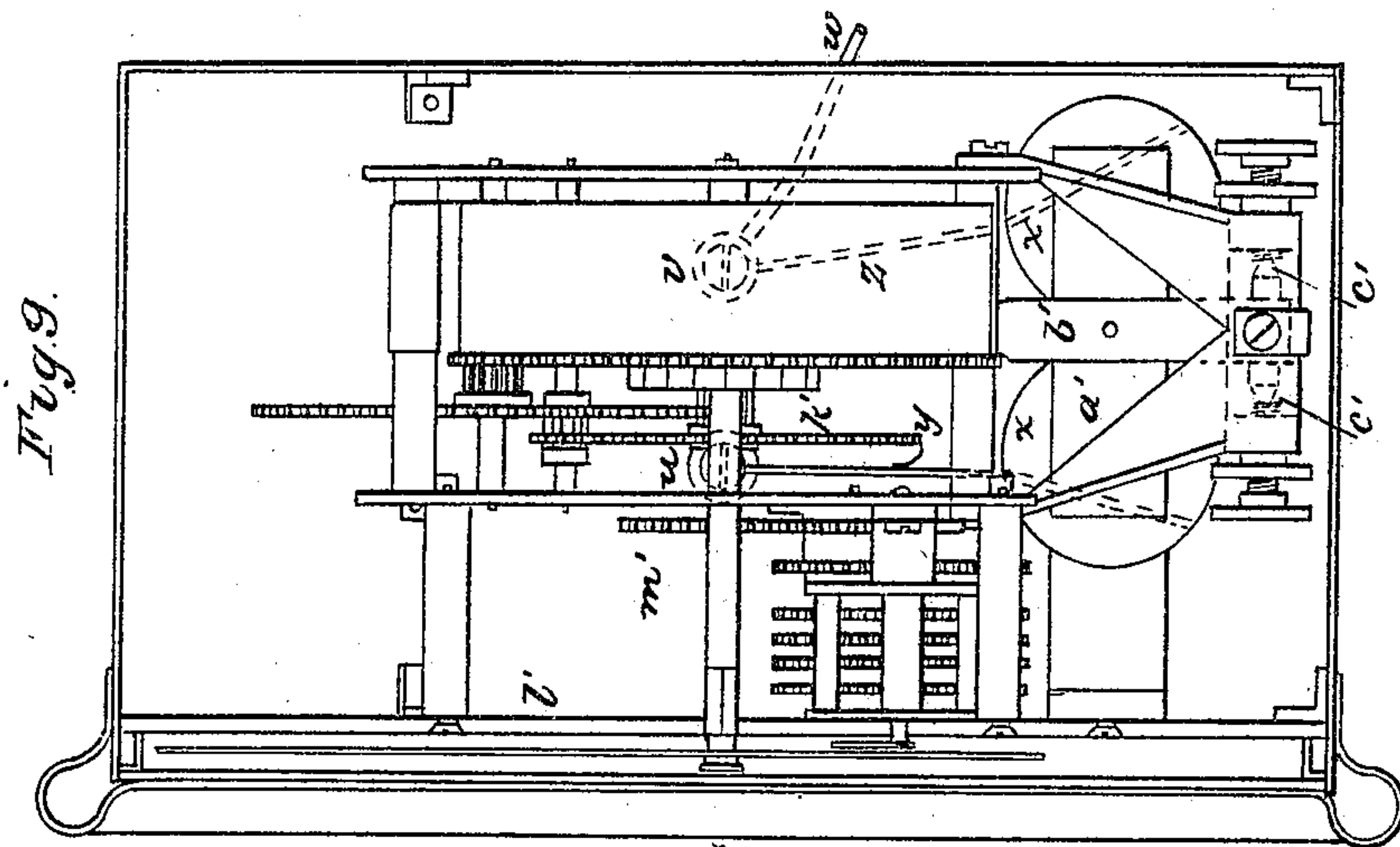
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Electro-Magnetic Log.

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Witnesses  
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Inventor  
W. I. Reid.



W. I. REID.

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Fig. 11

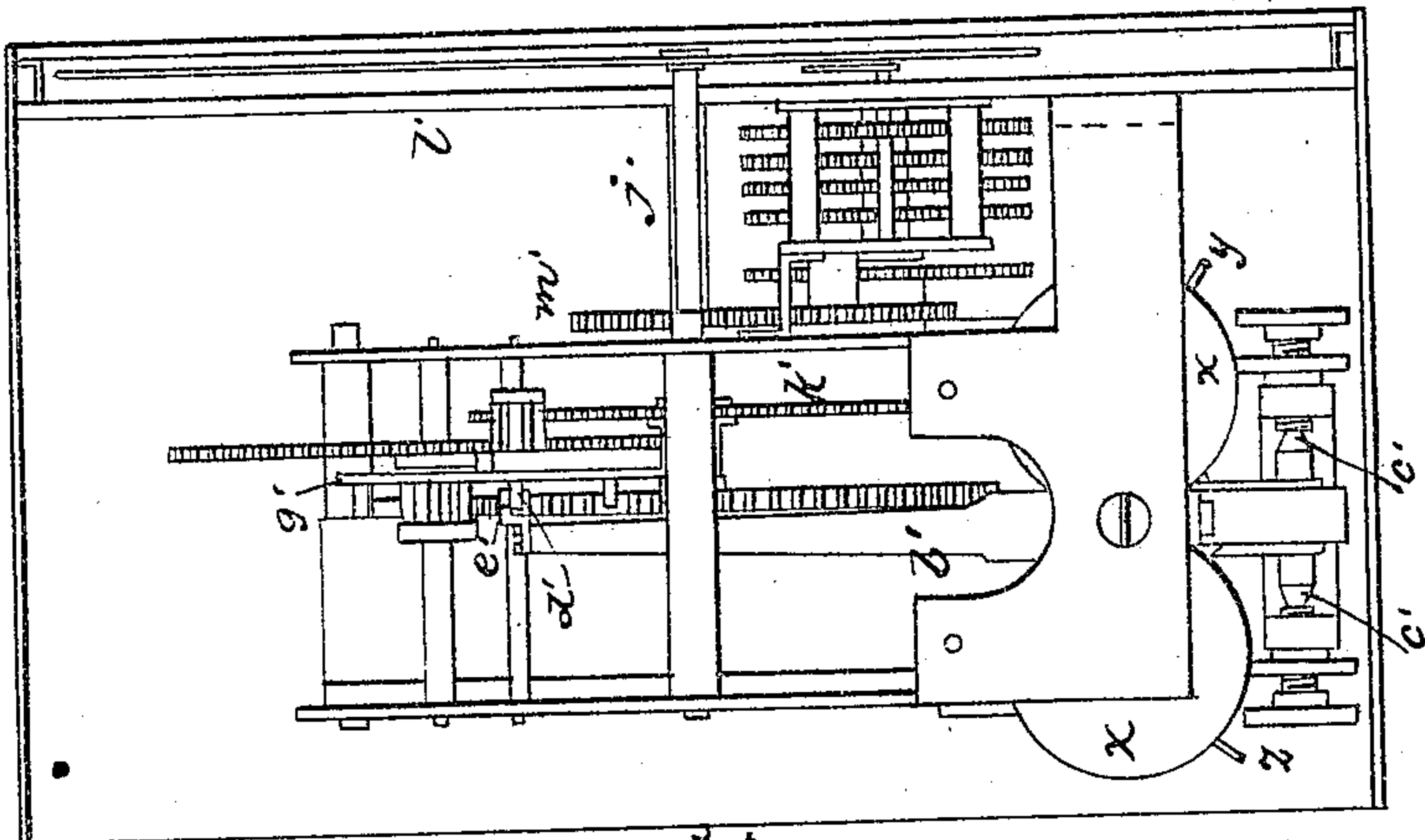
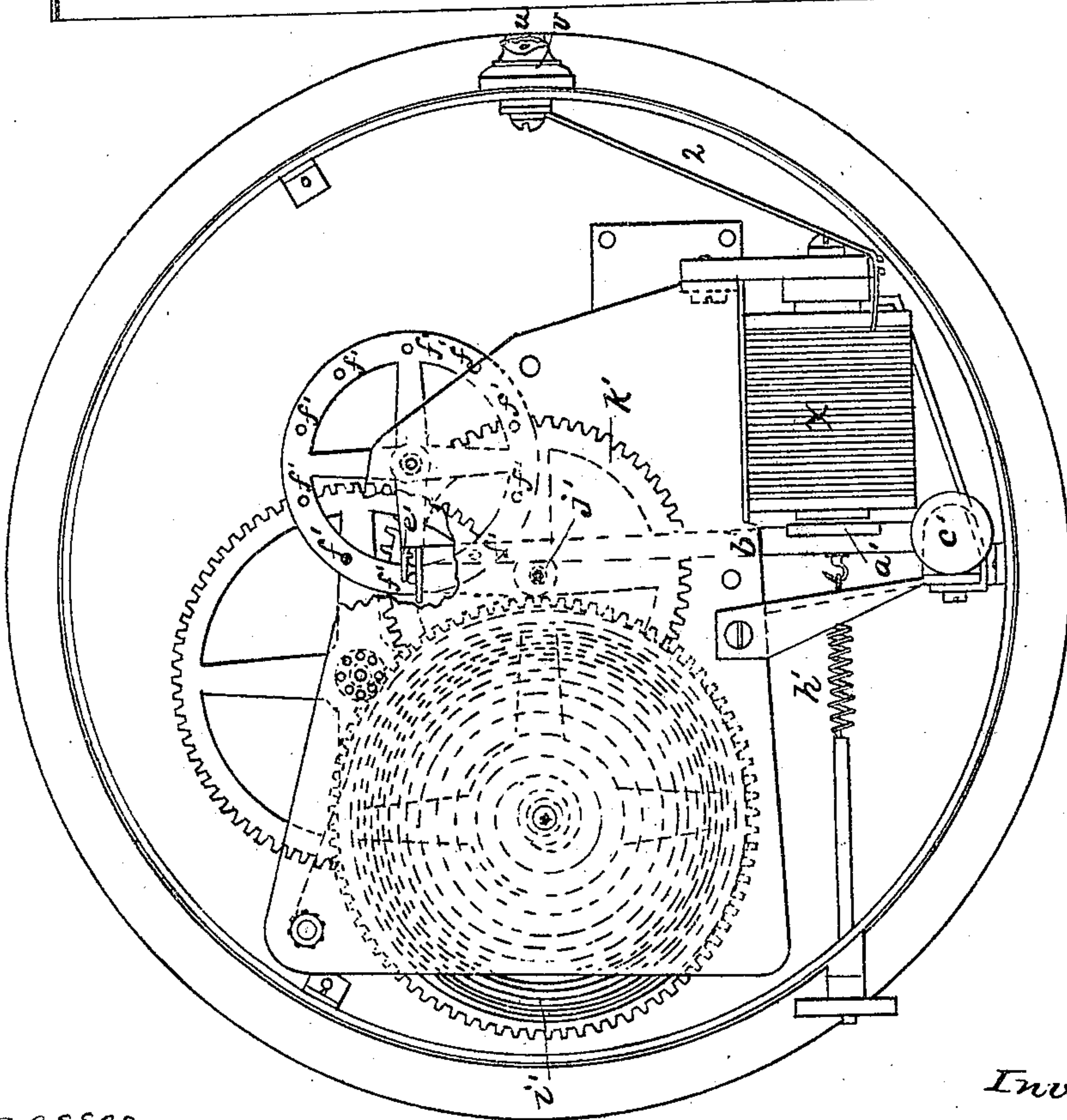


Fig. 10



Witnesses  
Wm. H. Bishop  
Andrew DeLong

Inventor

W. I. Reid.

# United States Patent Office.

W. I. REID, OF BROOKLYN, NEW YORK.

*Letters Patent No. 76,521, dated April 7, 1868.*

## IMPROVEMENT IN ELECTRO-MAGNETIC LOGS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, W. I. REID, of Brooklyn, in the county of Kings, and State of New York, have invented a new and useful Electro-Magnetic Log for measuring and recording the travel of vessels through the water, and which may also be used for sounding the depths in water; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a side view of the log.

Figure 2, an end view.

Figure 3, a longitudinal section.

Figure 4, a side view, with the casing removed.

Figure 5, an end view, looking from the end, A, fig. 1, showing section of the cable.

Figure 6 is a front, and

Figure 7 a side elevation of the registering-instrument.

Figure 8, an elevation of the same, with the dial removed.

Figure 9, a vertical section, taken in the plane of the line A B of fig. 8.

Figure 10, a view of the back of the said instrument, with the back of the case removed; and

Figure 11, a cross-section, taken in the same plane as fig. 9, but looking from the opposite direction.

The same letters indicate like parts in all the figures.

The object of my said invention is to register, on board ship, the travel of vessels, by means of a log, drawn through the water, which apparatus I denominate "the electro-magnetic log;" and my said invention consists in combining with the spindle, which is rotated by passing through the water, a mechanism to close and break an electric circuit at every given number of revolutions, when combined, by means of an electric conductor, with an instrument connected with a galvanic battery or equivalent means for generating a current of electricity, and which said instrument is provided with an electro-magnet and armature to operate the detent of an escapement, and with a registering-mechanism to indicate the number of beats of the escapement.

My said invention may be used, also, for sounding depths in water, as it will be obvious that whether the log be dragged horizontally through the water by a vessel, or vertically by a weight, the distance of its travel will be equally well registered; the only change necessary for sounding, being either to reverse the inclination of the vanes of the log, or the application of a sufficient weight to the forward end where the cable-conductor is attached.

In the accompanying drawings, *a* represents a hub, with oblique vanes, *b*, such as are usually employed on logs for measuring the travel of vessels through the water. The spindle *c* of the hub extends into a case, *d*, and is journaled thereto, so as to turn freely, and its inner end is formed with what is termed a worm-gear or endless screw, *e*, the threads of which engage the cogs of a wheel, *f*, on an arbor, *g*, which drives, by two cog-wheels, *h i*, another parallel arbor, *j*, that carries a cam or tappet-wheel, *k*. At the forward end of the case *d* there is an insulated electric conductor, *l*, and between the inner end of this conductor and the cam or tappet-wheel *k*, a metallic lever, *m*, is mounted in an India-rubber diaphragm, *n*, properly sealed water-tight to a case, *o*, by preference made of glass, which encloses the inner end of the lever and the conductor. The elasticity of the diaphragm will be sufficient to bear the lever *m* against the periphery of the cam or tappet-wheel, and its other end away from the conductor *l*; but any equivalent device may be substituted for the India-rubber diaphragm, as the sole purpose is, once in every revolution of the cam or tappet-wheel, to put the lever *m* in contact with the electric metal of the case, which is to be in the water, and then to break that connection, for a purpose to be presently described. The insulator, *p*, of the conductor *l*, is to be suitably formed, in any well-known mode, so that the conducting wire of the cable *q*, a part only being represented, can be secured in contact with the conductor *l*, and the cable itself is to be firmly secured to the instrument by passing through the inside of a conical screw, *r*, split in three parts, more or less, and connected with the case *d* by spring-arms *s*, so that by means of a conical nut, *t*, the cable can be firmly grasped or liberated to be disconnected. The other end of the cable *q* is to be secured on shipboard, and there connected with the registering-instrument V. This registering-instrument is provided with two hitches, *u* and *v*, to one of which the conducting-wire



of the cable *q* is to be hitched, and to the other, in like manner, a conducting-wire, *w*, from one of the poles of any suitable galvanic battery.

Within the registering-instrument there is an electro-magnet, *x*, the two wires, *y* and *z*, of its coil being connected with the cores of the two hitches, *u v*, in any well-known manner. And in front of the electro-magnet there is an armature, *a'*, attached to a lever, *b'*, that vibrates on an axis at *c'*. The upper end of this lever, (see fig. 10,) is provided with two pallets, *d'* and *e'*, which alternately liberate and stop pins *f'*, projecting from the face of an escapement-wheel, *g'*. When the electric circuit is broken, and the armature *a'* is drawn away from the electro-magnet, by the tension of a spring, *h'*, one tooth of the escapement-wheel *g'* is permitted to escape from the lower pallet, *d'*, and stopped by the upper pallet *e'*, and there held so long as the electric circuit continues to be broken; but so soon as the lever *m*, of the log, is brought into contact with the conductor *l*, the electric circuit is closed, and the electro-magnet *x* is thereby rendered magnetic, and the armature *a'* is attracted, which vibrates the lever *b'* in the opposite direction, so that the upper pallet, *e'*, liberates the pin of the escapement-wheel *g'*, which, by the motive force to be presently described, is turned until the next pin on its face is arrested by the lower pallet *d'*.

The escapement-wheel is driven by a main-spring, *i'*, and train of wheels and pinions, just as in a clock, suitable means being provided, as in a clock, for winding up the main-spring. A pointer or hand is placed on the outer end of the arbor *j'* of a cog-wheel, *k'*, which engages the pinion on the arbor of the escapement-wheel, the wheel *k'* being one of the train of wheels from the main-spring wheel to the escapement-wheel, and this pointer, at each complete escapement, indicates, by the divisions on a dial, *l'*, the number of escapements, and hence the number of revolutions which have been made by the vane-wheel of the log.

The wheel *m'* on the arbor of the main index-hand communicates motion by any of the well-known means to a series of spindles, 1, 2, 3, 4, 5, or any other number, each of the said spindles carrying a pointer, to indicate, each on a separate circle of divisions on the dial, the number of revolutions; and each division on No. 1 indicating one complete revolution of the main index-hand; each division of No. 2 one complete revolution of No. 1, and so on to any extent.

It is to be understood that the galvanic battery is to have one of its poles connected with the coil of the electro-magnet, and the other with some metallic substance in the water, which completes the electric circuit.

I do not wish, however, to limit my claim of invention to the use of the specific arrangement of dials, or the specific mechanism by which the number of revolutions are registered, as other and equivalent devices may be substituted, but the means represented will answer a good purpose. Nor do I wish to be understood as limiting my claim of invention to the specific mode of closing and breaking the electric circuit, as any equivalent break may be substituted.

What I claim as my invention, is—

The log, provided with a break for closing and breaking the electric circuit, substantially as described, in combination with the registering-instrument connected therewith by an electric conductor, the said registering-instrument being provided with an escapement operated by an electro-magnet, and with the means described, or equivalent means, for registering, all substantially as specified and for the purpose set forth.

W. I. REID.

Witnesses:

ANDREW DE LACY,  
WM. H. BISHOP.