

A. R. HARRIS.

## Improvement in Electro-Magnetic Indicators for Steam Engines.

No. 115,847.

Patented June 13, 1871.

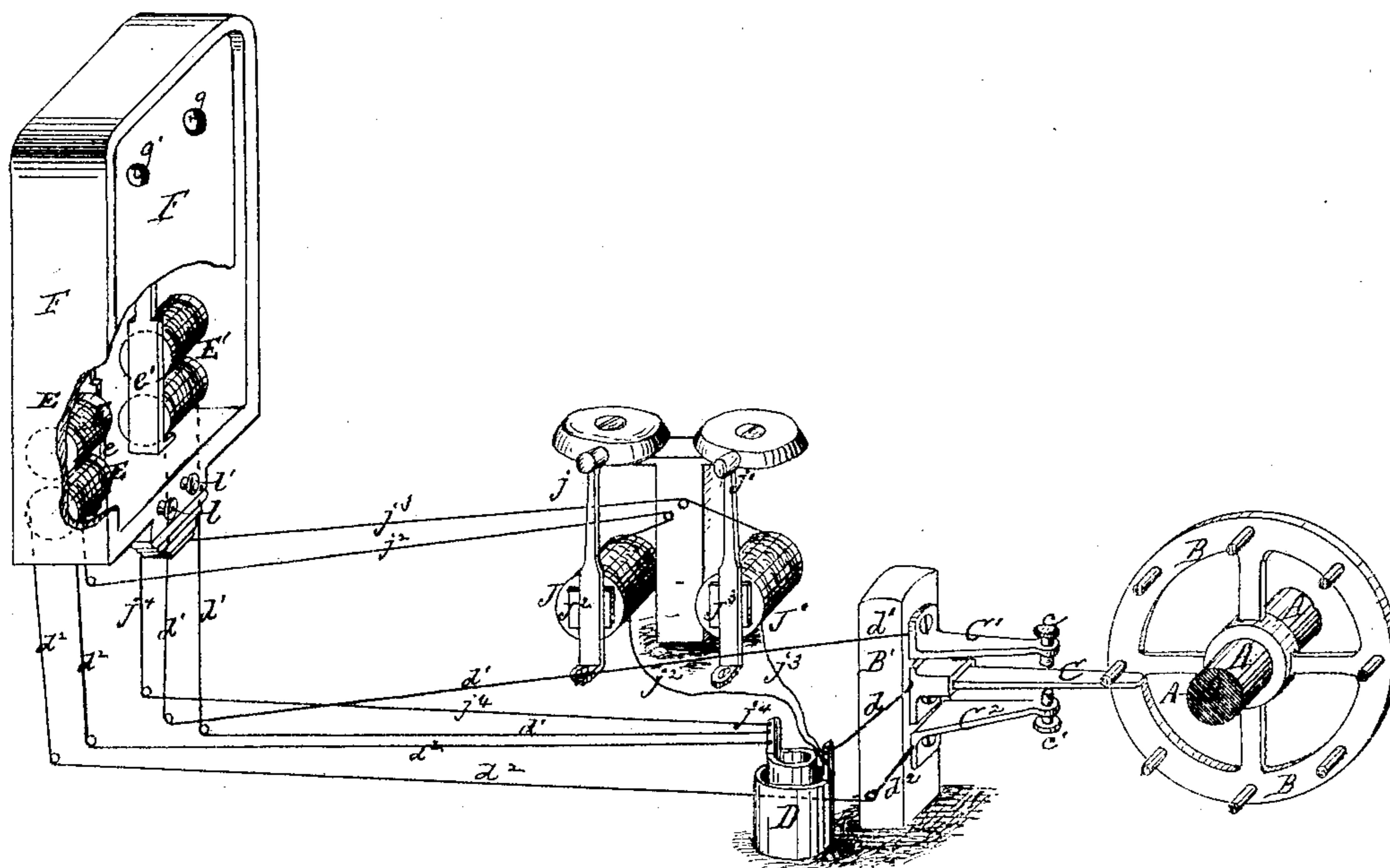


Figure 1.

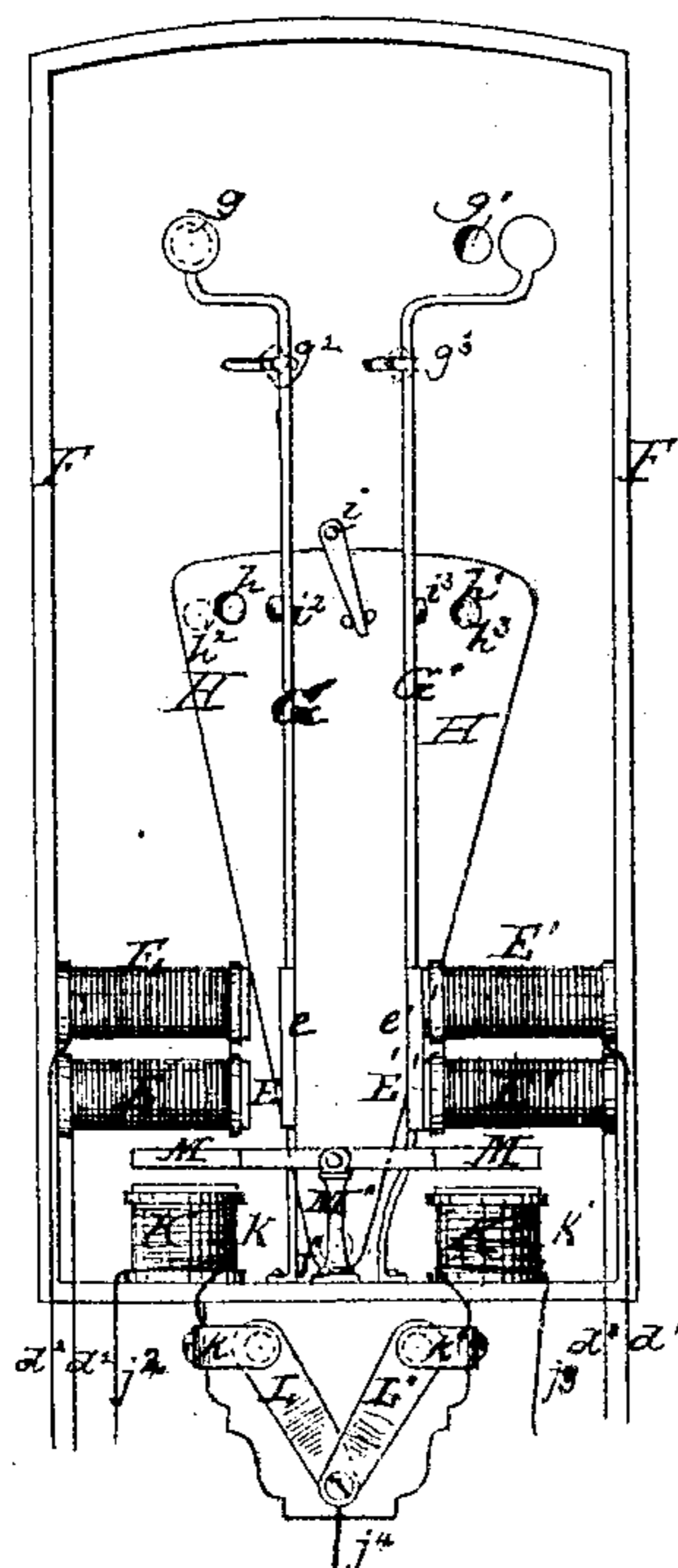


Figure. 2.

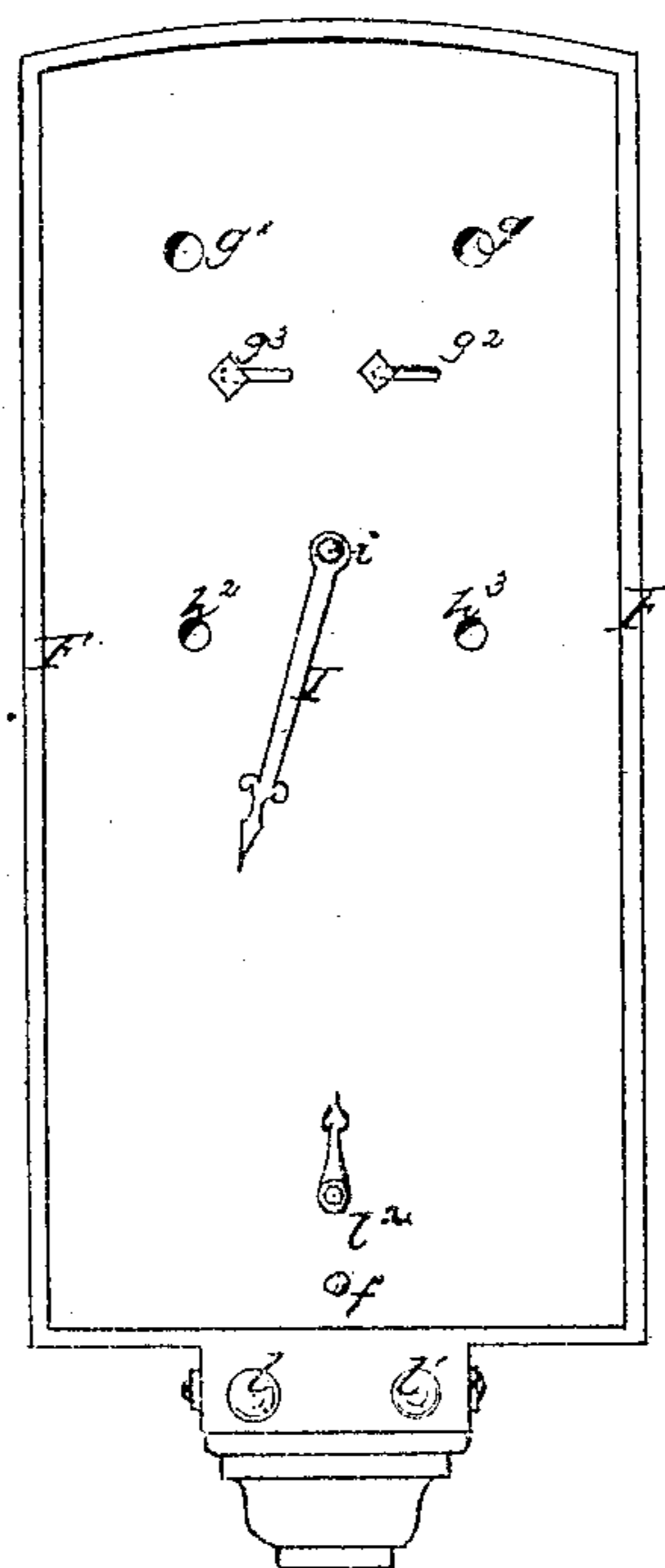


Figure 3.

Witnesses:

Robert Burns.  
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## UNITED STATES PATENT OFFICE.

ANDREW R. HARRIS, OF ST. LOUIS, MISSOURI.

## IMPROVEMENT IN ELECTRO-MAGNETIC INDICATORS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 115,847, dated June 13, 1871.

*To all whom it may concern:*

Be it known that I, ANDREW R. HARRIS, of St. Louis, in the county of St. Louis and State of Missouri, have made certain new and useful Improvements in Motion-Indicators for Marine-Engines; and I do hereby declare that the following is a full and true description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

In this invention the power of electro-magnetism is used to communicate motions of marine-engines to indicating and registering devices displayed in a tablet-frame in the pilot-house; also, to signal and indicate the bells in the engine-room, thus enabling the pilot, captain, or other officer of the vessel to know at all times the exact motion of said engine, (usually termed "running ahead" and "backing" motions,) and guarding against any misunderstanding as regards said motions or the signaling of the bells.

The nature of said invention relates, firstly, in the construction and arrangement of indicating devices adapted to be operated by electro-magnets, and connecting the wires of said electro-magnets to a circuit-breaker arranged in connection with the shaft of the engine. Secondly, said invention relates to the devices used in combination with electro-magnets for signaling and indicating the bells, all of which will now more fully be described.

To enable those skilled in the art to make and use my said invention, I will now more fully describe the same, referring to the accompanying—

Figure 1 as a perspective view, showing battery-connections; Fig. 2 as a rear elevation, showing devices in tablet-frame; and to Fig. 3 as a front elevation of tablet and its devices.

Same letters of reference indicate same parts in the different figures of the drawing.

On the driving-shaft A of the engine I secure the lantern-wheel B. Relatively situated, so as to be operated by said sprocket-wheel, on a post, B', I secure the spring-switch C, operating between metal brackets C<sup>1</sup> C<sup>2</sup>, having adjustable keys *e e'*, as clearly shown in Fig. 1. The battery D, which furnishes the current, is placed in any suitable part of the engine-room or pilot-house. The positive wire

*d* of said battery I connect in any well-known manner to the spring-switch C. The duplicate negative wires *d<sup>1</sup> d<sup>2</sup>* I connect from battery with electro-magnets E E', arranged within the tablet-frame F, Fig. 1. Said wires *d<sup>1</sup> d<sup>2</sup>* coil around said electro-magnets to return and make connection with the respective brackets C<sup>1</sup> C<sup>2</sup>, in manner shown in Figs. 1 and 2. The armatures *e e'* of the electro-magnets E E' carry target-levers G G', so arranged as to vibrate over openings *g g<sup>1</sup>* in the tablet F, Fig. 2. I also provide said target-levers with hands *g<sup>2</sup> g<sup>3</sup>*, vibrating in suitable slots of the tablet F, and displayed in front of the same, Fig. 3. The hands *g<sup>2</sup> g<sup>3</sup>* serve to indicate the continuous motion of the engine in day-time. In the night-time a suitable light is placed within the tablet-frame to indicate said motions of the engine-shaft. This is accomplished by the vibrating action of the target-levers G G' displaying the light through the openings *g g<sup>1</sup>*, in manner indicated in Fig. 2.

I have also arranged further mechanical devices to more perfectly indicate the motions of the engine thus designated by pivoting within the frame F, to its tablet *f*, a plate, H, having openings *h h<sup>1</sup>*, Fig. 2, operating over corresponding openings *h<sup>2</sup> h<sup>3</sup>* in the tablet, Figs. 2 and 3. Said openings are so arranged that, in accordance with the motions of the engine, the light shall be admitted through said openings, thus forming light-signals to record said motion in the night. To record or register said motions in the day, I have provided the tablet F with a pointer, I, Fig. 3, its shaft *i* operated by lugs of the plate H, Fig. 2. The plate H is manipulated by the target-levers G G' acting against small lugs or projections *i<sup>2</sup> i<sup>3</sup>* on said plate.

The operation of these parts is, therefore, as follows: In the forward motion of the engine the spring-switch C is manipulated by the sprocket-wheel B, and contact is established with the bracket C<sup>2</sup>, and a current passes into wire *d<sup>2</sup>* leading to electro-magnets E; said magnet attracts the armature *e*, and by means of the target-lever G indicates said motion by vibrating hand *g<sup>2</sup>*, (at night by light-signal *g*;) at the same time, by means of the recording-plate H being actuated to one side, said motion is recorded by light-signal *h<sup>2</sup>* in the night-time,

and by the pointer I moving to the left in the day-time. Similarly are the operation of parts to indicate and register the backward motion of the engine.

Furthermore, within the tablet-frame F I have arranged the manipulating devices to signal and record the bells in the engine-room. I provide the bells with electro-magnets J J<sup>1</sup>, the armatures J<sup>2</sup> J<sup>3</sup> of which carry hammers j j<sup>1</sup> arranged to strike bells. (See Fig. 1.) The battery D (or a separate battery, if preferable,) I connect to said electro-magnets J J<sup>1</sup> by duplicate positive wires j<sup>2</sup> j<sup>3</sup> passing around said magnets to lead to and pass also around electro-magnets K K', arranged within frame F to connect with metal brackets k k' secured to the sides of said frame, and forming part of the manipulator, Figs. 1 and 2. The negative wire j<sup>4</sup> of the battery connects with springs L L' secured to the rear part of the frame F, and arranged as shown in Fig. 2. To operate said springs I provide the tablet with the respective keys l l'. When said keys are depressed, the circuit is completed, and the current, passing through wires j<sup>2</sup> j<sup>3</sup> to electro-magnets J J<sup>1</sup>, causes the same to attract its armatures J<sup>2</sup> J<sup>3</sup> and strike the bells.

In order to indicate the bell-ring, I furthermore provide the tablet with a pointer, l<sup>2</sup>, having its shaft secured centrally to armature M, arranged to vibrate freely on a standard, M', in manner shown in Fig. 2. As soon, therefore, as said armature is attracted by either electro-magnets, the pointer l<sup>2</sup> is actuated to

move in the direction of the key or knob operated upon, and to remain in position as a record until the motion is changed. The frame F, containing the operating devices, is securely inclosed to prevent any unauthorized handling of parts; also, tablet may be suitably lettered, to more clearly understand the operation as desired.

Having thus fully described my said invention, what I claim, and desire to secure by Letters Patent, is—

1. The arrangement of wheel B on shaft A, spring C, metal brackets C<sup>1</sup> C<sup>2</sup> having keys c c', post B', in combination with electro-magnets E E', armatures e e', target-levers G G<sup>1</sup>, hands g<sup>2</sup> g<sup>3</sup>, to indicate the motions of engine-shaft A, substantially as set forth.

2. The plate H, light-signals h<sup>2</sup> h<sup>3</sup>, pointer I, arranged in tablet F, in combination with target-levers G G<sup>1</sup>, armatures e e', and electro-magnets E E', to register the motions indicated, substantially as described.

3. The arrangement of keys l l', springs L L', brackets k k', electro-magnets K K', vibrating armature M carrying pointer l<sup>2</sup>, in combination with electro-magnets J J<sup>1</sup>, armatures J<sup>2</sup> J<sup>3</sup> carrying hammers j j<sup>1</sup>, for signaling and registering the bells, substantially as set forth.

In testimony of said invention I have hereunto set my hand.

A. R. HARRIS.

Witnesses:

J. W. HERTHEL,  
ROBERT BURNS.