

(No Model.)

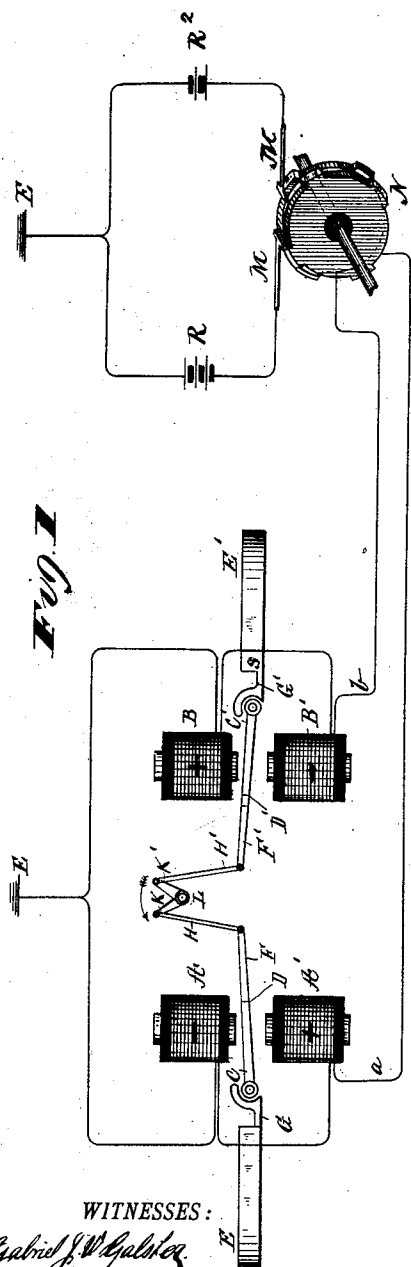
2 Sheets—Sheet 1.

H. VAN HOEVENBERGH.

## ELECTRO MECHANICAL MOVEMENT.

No. 374,883.

Patented Dec. 13, 1887.



**WITNESSES:**

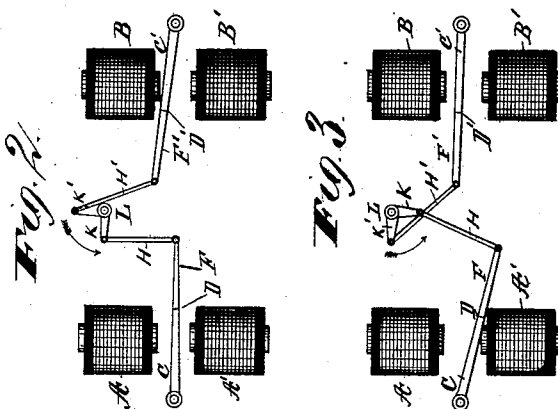
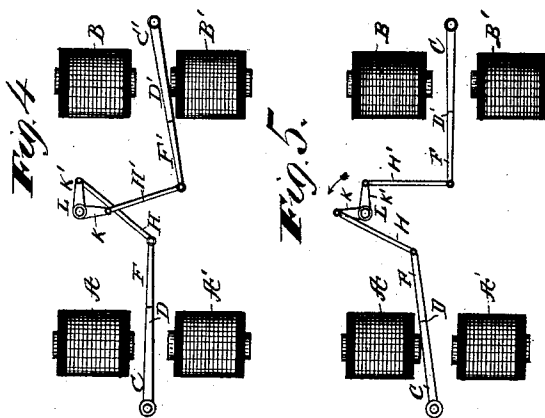
Gabriel J. Walster  
Wm. H. Capel

INVENTOR

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(No Model.)

2 Sheets—Sheet 2.

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*Fig. 6*

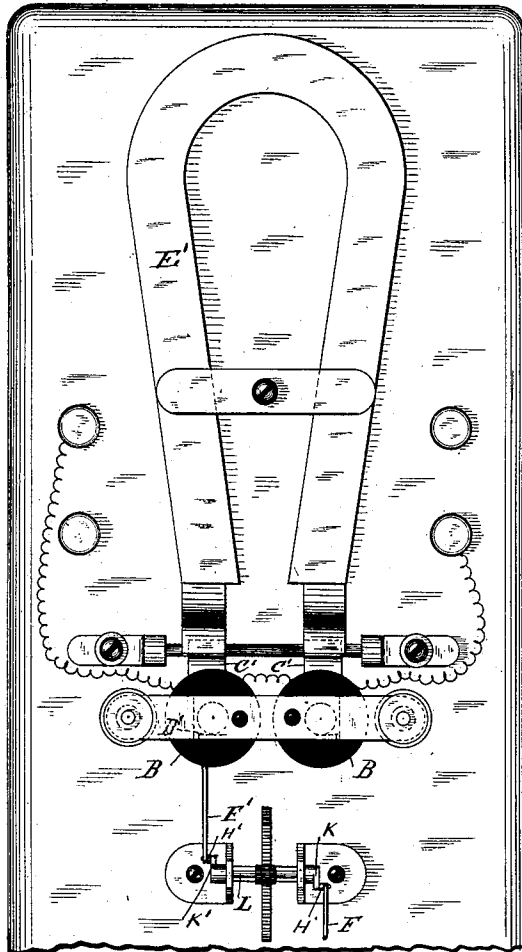
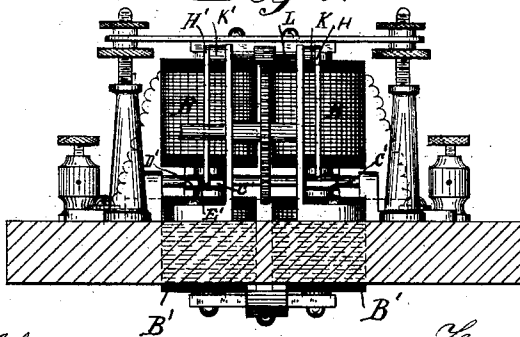


*Fig. 7*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

HENRY VAN HOEVENBERGH, OF NEW YORK, ASSIGNOR OF ONE-HALF TO  
JESSE H. BUNNELL, OF BROOKLYN, NEW YORK.

## ELECTRO-MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 374,883, dated December 13, 1887.

Application filed December 15, 1886. Serial No. 221,585. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY VAN HOEVENBERGH, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Electro-Mechanical Movements, of which the following is a specification.

The object of my invention is to provide a simple and effective organization making up an electro-mechanical movement adapted to produce revolution of a shaft in either direction at will without the intervention of other parts than those used in securing revolution in one direction only, the organization being such that the shaft may be revolved at any desired speed and may be stopped, started, and reversed by a controlling agency located at any desired distance from the shaft.

The electro-mechanical movement comprises two general parts—to wit, first, the electro-magnets and mechanism actuated thereby and mechanically connected with the shaft in such way that when they are energized in proper order they may impart rotation thereto, and, second, the means for generating or producing electric currents in said magnets in the proper order or succession. In my invention the latter devices are mechanically entirely independent of the shaft to be moved, and in this respect my invention is a radical departure from an ordinary electro-magnetic motor.

The device for producing the proper order or succession of currents is ordinarily a commutator connected to the source of electricity, such as a galvanic battery or an armature of a magneto-electric generator; but I do not limit myself to a commutator in the circuit of a generator, as any means for setting up the desired order or succession of currents will answer the purposes of my invention. In my claims, therefore, the term "commutator" is to be understood as embracing any means which will produce the desired order of currents produced by the commutator and generator whose circuit is controlled by the commutator.

The two parts making up the organization of the electro-mechanical movement will be described in the order in which they have been mentioned.

Figure 1 of the accompanying drawings shows diagrammatically an organization of devices embodying my invention. Figs. 2, 3, 4, and 5 illustrate the four positions of the shaft and its actuating mechanism. Fig. 6 is a plan of a portion of the apparatus. Fig. 7 is an end view of the same.

A A' and B B' indicate ordinary electro-magnets of suitable resistance arranged with their poles or faces opposite.

C C' and D D' are short iron tongues fastened to non-magnetic pivot-shafts and arranged to vibrate between the pole-faces.

E E' indicate permanent magnets arranged to magnetize the iron tongues by induced magnetism through their soft-iron extensions G.

The magnets B B' are in a circuit, *b*, and magnets A A' are on a circuit or wire, *a*. The connections being made as is well understood by electricians, a current in one direction on a wire—as, for instance, *a*—will cause the tongue between magnets A A' to move in one direction under the attraction of the magnets at one side and the simultaneous repulsion of the magnets at the opposite side, while a current in the opposite direction will cause said tongues to move in the reverse direction.

The signs + — on the magnets, Fig. 1, indicate the directions of the current necessary in order that said magnets may attract the tongues.

Each pair of magnets, A A' or B B', with their tongues, constitute, in effect, a polarized electro-magnet so adapted to produce movement in a direction depending upon the direction of the exciting-current. Many devices are known adapted to produce such action, and I do not limit myself to the particular form of polar electro-magnet shown.

F F' indicate extensions from the tongues or their shafts, which arms are preferably made of steel and very thin and light. H H' indicate links cementing said arms with the cranks K K' in the shaft L to be revolved. These cranks are placed quartering, as shown, so that there may be no dead-center.

Shaft L may be used to communicate movement to shafts, wheels, or devices by any desired mechanical means.

With the mechanism arranged as shown, and with the armatures in the position shown in Fig. 2, it is evident that if an impulse of the proper polarity, say +, be sent through circuit *a* the crank-shaft will be moved into the position shown in Fig. 3, making one quarter of the entire revolution of the shaft in the direction shown by the arrow. Now, if a minus impulse be sent through circuit *b* the crank-shaft will assume the position shown in Fig. 4, having made another quarter of a revolution. A minus impulse sent through circuit *a* will move the shaft into position, Fig. 5, and a plus impulse sent through circuit *b* will move the shaft into position, Fig. 2, it having then made a complete revolution, and the succession of impulses having been  $\begin{matrix} + & - & + & - \\ + & - & + & - \end{matrix}$ , the upper line representing circuit *a* and the lower line circuit *b*.

It is also evident that the direction of revolution of the crank-shaft may be reversed when it is in any of the positions shown by altering the sequence of the impulses. For instance, when the shaft is in the position, Fig. 4, if a + impulse be sent through circuit *a* the shaft will make a quarter of a revolution in a direction opposite to that of the arrow. A + impulse sent through circuit *b* will continue the revolution in the same direction.

A means which under the control of any desired agency can effect the proper action of the magnets for the shaft in either direction continuously, reversing the movement or bringing the same to rest, is indicated at *M* and *R R*<sup>2</sup>. The means herein shown consist, essentially, of the commutator *N*, two batteries *R R*<sup>2</sup>, having opposite poles connected to the commutator, which latter is placed in the circuit of wires *a b*.

The commutator consists of two wheels having conducting and non-conducting spaces arranged as shown and mounted on a shaft in proper manner to be insulated from one another. The wires *a b* connect with the wheels by springs bearing against the wheels, and the commutator-springs *M M*<sup>2</sup> bear against the edge of the wheels and are adapted to come into contact with the conducting-spaces of both.

The wheels may be rotated by hand or by any other desired agency. With the arrange-

ment shown currents may be produced in the wires *a b* in the order  $a + b + a - b$ ; or the order may be reversed at any desired point, so that the succession shall be, for instance,  $a + - + + - +$  or  $a + - + - - + - +$   $b + - + - +$  or  $b + - + - + - +$

I do not claim any particular device, however, for this purpose, but propose to use the device best adapted to the end. While it is manifest that this mechanism may be used for a great variety of purposes—such as printing-telegraphs, indicators for showing force and directions of winds, and positions of steam-gages and water-gages—I do not herein make claims for such applications, designing to have them protected by Letters Patent hereafter.

What I claim as my invention is—

1. As an electro-mechanical movement, an electromotor operated by two lines through electric impulses whose order may be reversed at will independently of the motor, the main shaft of which motor is in constant mechanical connection with the operating armature or armatures and is susceptible of revolution in either direction.

2. As an electro-mechanical movement, a reversible electromotor operated by electro-magnets energized by electric impulses of alternately-reversed polarity produced independently of the action of the motor itself, and means for altering the sequence of impulses at will, as described.

3. As an electro-mechanical movement, an electromotor operated by electro-magnets, pitman-bars, and two or more cranks or eccentrics, applied as described, so as to produce no dead point, in combination with a commutator or its equivalent, as described, mechanically independent of the motor itself.

4. In an electro-mechanical movement, an electromotor operated by electro-magnets energized by electric impulses of alternately-reversed polarity independently controlled, the main shaft of which motor is susceptible of revolution in either direction.

Signed at New York, in the county of New York and State of New York, this 10th day of December, A. D. 1886.

HENRY VAN HOEVENBERGH.

Witnesses:

WM. H. CAPEL,  
H. C. TOWNSEND.