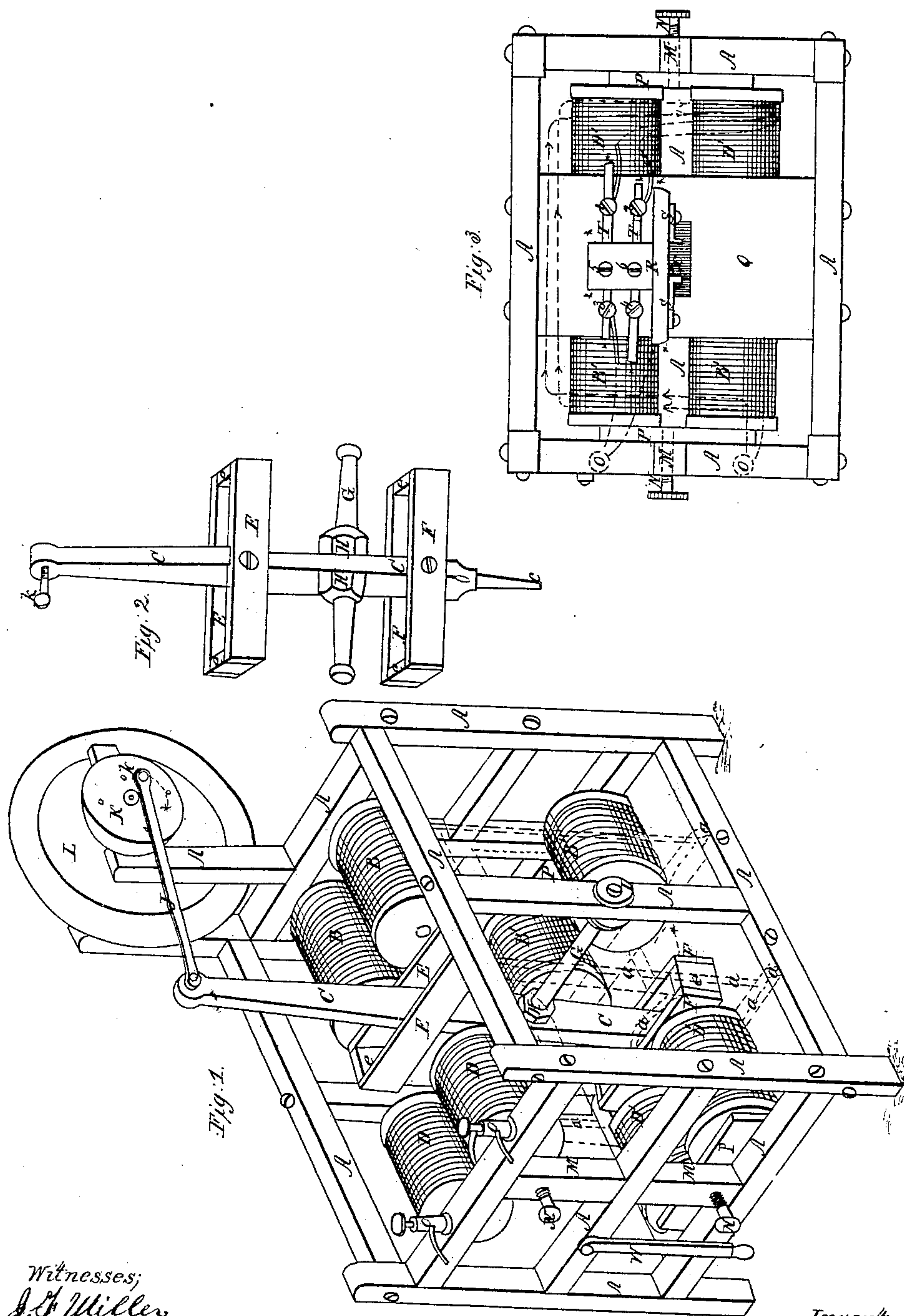


L. H. McCULLOUGH.
CUT-OFF FOR ELECTROMAGNETIC ENGINES.

No. 62,352.

Patented Feb. 26, 1867.



Witnesses;
J. B. Miller
J. F. Dennis

Inventor;
L. H. McCullough

United States Patent Office.

LEWIS H. McCULLOUGH, OF RICHMOND, INDIANA.

Letters Patent No. 62,352, dated February 26, 1867.

IMPROVEMENT IN THE CUT-OFF OF ELECTRO-MAGNETIC ENGINES.

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

TO WHOM IT MAY CONCERN:

Be it known that I, LEWIS H. McCULLOUGH, of Richmond, Indiana, have invented certain new and useful Improvements in Electro-Magnetic Engines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the drawings which accompany this specification, and form a part of the same, and to the letters of reference marked thereon. In the drawings—

Figure 1 is a perspective view of my improvement.

Figure 2 is a perspective view of the armatures and vibrating shaft.

Figure 3 is a bottom view of my improved engine, showing the reciprocating arrangement for changing the current of electricity and the conducting wires.

In fig. 1, A A A A represent the framing, which is of a rectangular form, and may be made of any convenient size. B B and B' B' represent a pair of magnets, situated one below the other; and D D and D' D', a similar pair of magnets placed one below the other, and occupying the same relative positions in the frame, being placed opposite each other and held in the required position by the set-screw N, which operates the magnet through the plate P which is the cross-head of said magnet. The vibrating shaft C is provided with an axle, G, upon which it rests, and which is hung on the centres I I, and is secured upon said axle by the nuts H H. Equidistant from said axle, and attached to said vibrating shaft C, and upon each side of the same, are armature plates, E E, above the axle, and F F below the same, at distances to correspond with the cores of the upper and lower magnets heretofore described. These armature plates are attached firmly to each other respectively by the end pieces e e e e, secured in any suitable manner to secure the requisite strength. The lower end of said vibrating shaft terminates in a rounded form, the uses of which will be hereinafter described. Attached to the upper end of the vibrating shaft C, by means of a wrist-pin, is a pitman, J, the opposite end of which is connected suitably to a plate-wheel, K, by a crank-pin, k, revolving upon a suitable shaft which carries the balance-wheel L. The metallic posts M M support the outer ends of the magnets and are sustained by the cross-pieces of the framing, each one of said parts being provided with set-screws N N, by which the magnets are propelled forward or back in the frame as may be required for the purpose of increasing or diminishing the force of the magnets upon the armatures. The dotted lines a a a a represent a suitable metallic framing, placed at the inner ends of the magnets, firmly attached to the framing and properly arranged for the support of the inner ends of the said magnets. The posts O O are fitted to receive the battery wires, and are suitably secured to the upper end piece of the framing A A. W is a switch-lever, pivoted upon the framing, and used to connect and disconnect the electric current with the magnets by which the engine is put in motion or stopped at pleasure. Q, fig. 3, is a cross-framing occupying the centre section of the bottom of the machine, and to which are attached the devices for changing the electric current to each pair of magnets alternately through the operation of the lower portion of the vibrating shaft C. To effect this a frame, R, is provided in the form of a cross-head sustaining the rods T T, and provided upon the side opposite from the rods T T with adjustable stops S S'. These stops are made adjustable for the purpose of allowing more or less throw of the rods T T, as may be required. The rods T T are held in position by set-screws 5 and 6, fig. 3. The rods T T are composed of brass or other metallic conducting material, with a core terminating in a protruding point of glass or other non-conducting material. At the termination of each throw of the rods T T, the conducting portion of the rod continues the electrical current to one set of magnets, during which time the glass or non-conducting point being brought in contact with the opposite post diverts the current from the other set or pair of magnets. Each vibration of the vibrating shaft C reproduces this effect, and a continuous vibration of the shaft C produces a revolution of the wheel K, by the action of the pitman J. The posts 1, 2, 3, and 4, are secured to the cross-framing Q, and are provided with openings in which the rods T T are actuated, said openings serving both as a guide and a support for said rods. The posts 1 and 3 are in connection with the magnets B and D', and the posts 2 and 4 are in connection with the magnets D and B', so that when the magnets B and D' are charged or excited by the electric current, the armatures E E, carrying the upper portion of the vibrating shaft, are impelled towards the magnet B, while the armatures F F carrying the lower portion of the vibrating shaft are impelled towards the magnet D', and simultaneously operate the cross-head R, which carries the rods T T by which the electric current is changed to the magnets D and B', by which the opposite vibration of the vibrating shaft C is pro-

duced which in turn changes the cross-head R and rods T T, restoring the electric current, and thus continuing, producing a succession of revolutions as may be desired of the plate-wheel K. By the use of the switch W the electric current is let on or taken off at will, and the engine is under perfect control. The nuts H H upon the axle G serve to hold the vibrating shaft C firmly in its proper position. The vibrations of the rods T T are so arranged in connection with their construction that they divert the current automatically from the upper and lower opposite magnets alternately during the vibration of the shaft C, and consequent revolution of the plate-wheel K. The plate-wheel K is provided with additional holes at different distances from the centre in order to compensate for the longer or shorter vibrations of the vibrating shaft C, when changed by altering the positions of the stops S S. It will readily be seen that no positive breaking of the current takes place at any point in the vibrations of the arm C, and as a consequence there is no loss of the electrical or exciting force upon the magnets, which may be enlarged or increased indefinitely, and any given number of engines may be operated by a battery having electric current sufficient to charge the magnets of each, the only appreciable loss being the current diminution of the vital energies of the batteries.

Among the many advantages which are developed by my improved electro-magnetic engine, the following may be referred to:

1. The direct action of the upper and lower pairs of magnets, upon opposite sides of the armatures and vibrating shaft, above and below the central axis simultaneously, the opposite magnets being for the time dead or unexcited.

2. The arrangement by which the electric current is automatically diverted, and suffers no break in its transition from one pair of magnets to the other pair of magnets, and "*vice versa*."

3. In so arranging the changing devices by which the current is diverted, as that the length of traverse or vibration of the vibrating shaft may be increased or diminished as may be desired.

4. In the manner of making the magnets adjustable in relation to the vibrating shaft by which the power of the engine is regulated in proportion to the relative distance between said magnets and the armatures upon the shaft C.

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

The compound rods T T, cross-head R, and posts 1, 2, 3, 4, constructed and operated substantially as herein set forth and described.

L. H. McCULLOUGH.

Witnesses:

J. F. MILLER,

WM. F. DENNIS.