J. DOYLE.

2 Sheets—Sheet 1.

Electro-Magnetic Motor.

No. 217,731. Patented July 22, 1879.

Fig. 1.

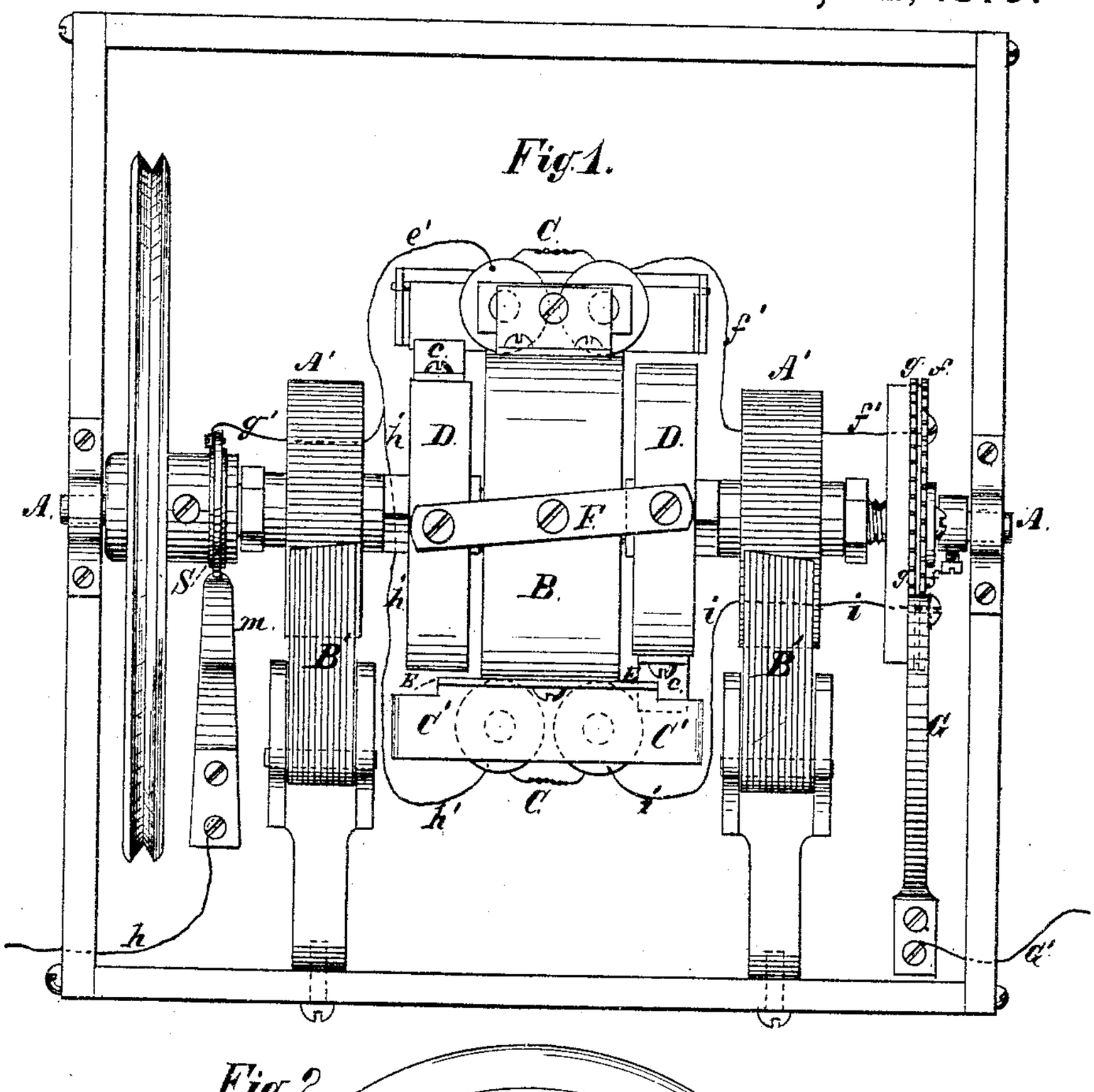
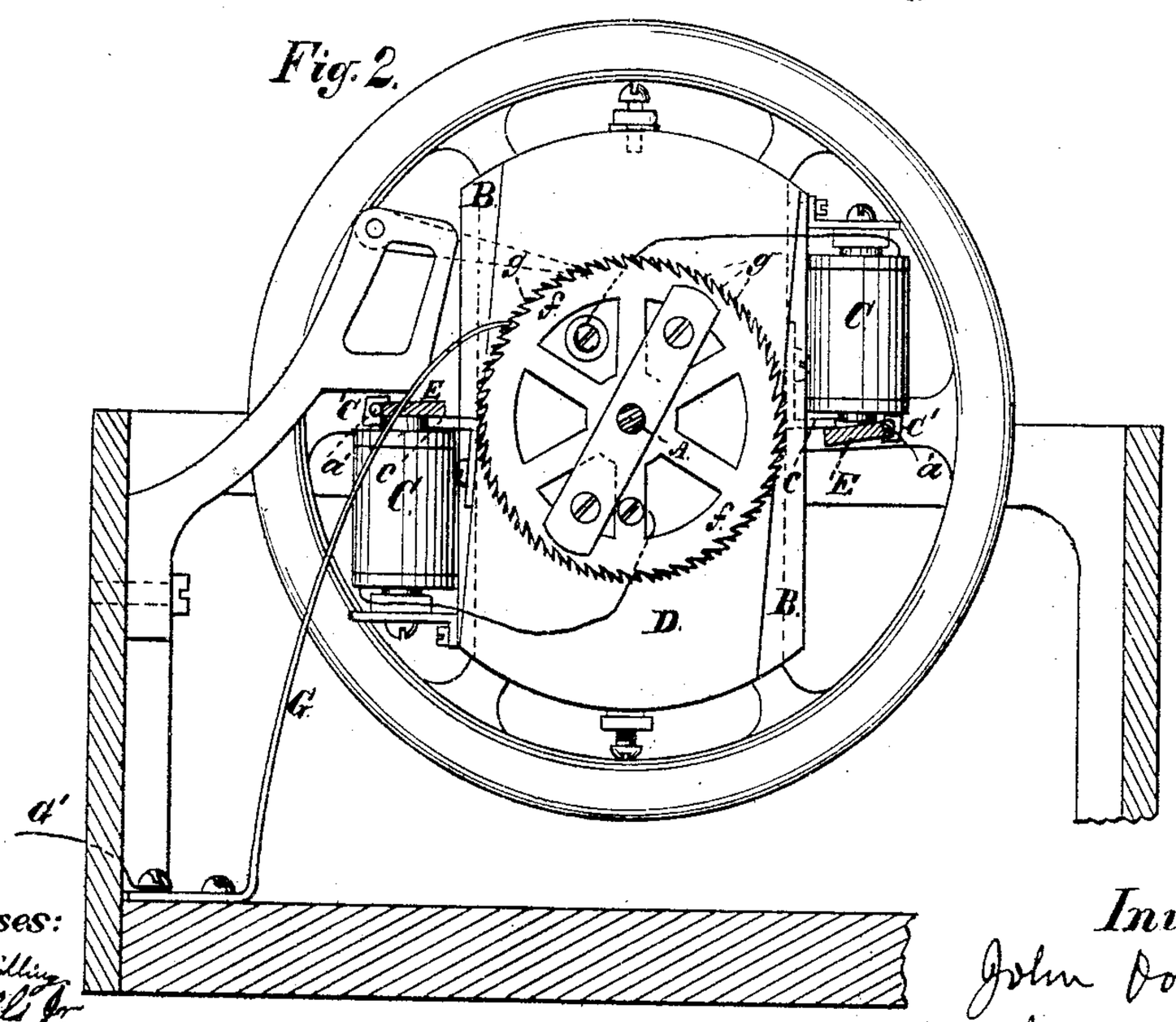


Fig. 2.



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2 Sheets—Sheet 2.

J. DOYLE.

Electro-Magnetic Motor.

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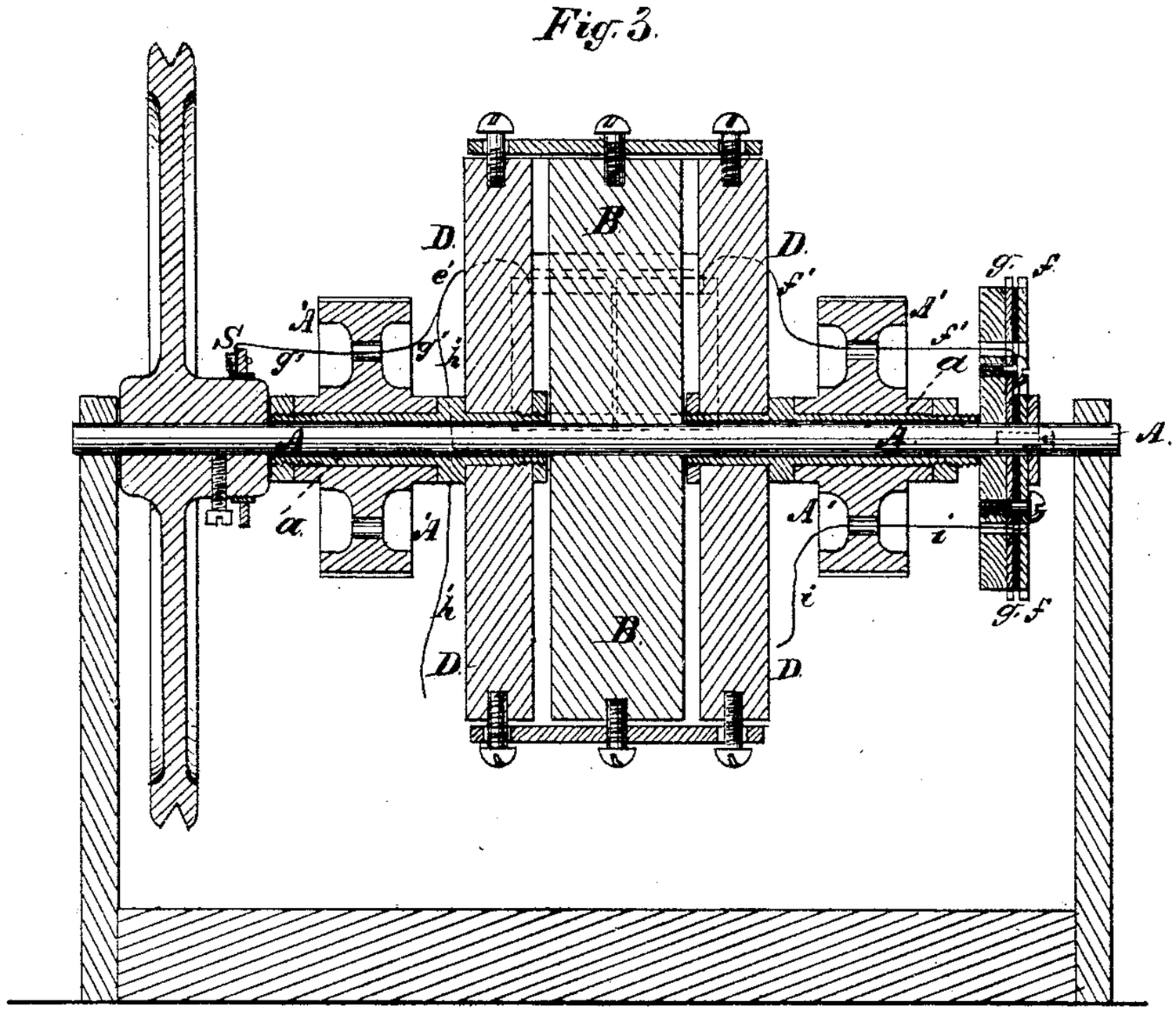
Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN DOYLE, OF HOBOKEN, NEW JERSEY, ASSIGNOR OF ONE-HALF HIS RIGHT TO C. COLES DUSENBURY, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRO-MAGNETIC MOTORS.

Specification forming part of Letters Patent No. **217,731**, dated July 22, 1879; application filed November 27, 1878.

To all whom it may concern:

Be it known that I, JOHN DOYLE, of Hoboken, in the county of Hudson and State of New Jersey, have invented certain Improvements in Electro-Magnetic Motors, of which the following is a specification.

It is well known that the attractive power of a magnet diminishes with very great rapidity in proportion as the distance at which it is desired to act increases, and that this is the real reason of the comparative failure of many otherwise promising apparatus for obtaining power from electro-magnetism.

This invention is designed to remedy this drawback by providing an electro-magnetic motor in which the magnets shall at no time be at more than a trifling distance from the armatures with which they co-operate in giving motion to the mechanism.

The invention comprises certain novel combinations of parts, whereby the aforesaid object and result are effectually secured.

Figure 1 is a plan view of an electro-motor embracing my said invention. Fig. 2 is an end view, and Fig. 3 a vertical transverse sectional view, of the same.

A is the axial shaft of the apparatus, which shaft has affixed to it a central revolving block, B. This block has at its circumference two electro-magnets, C, placed at opposite points of said circumference.

At each side of the block B is a plate, D, corresponding more or less in peripherical contour with the block B. Each plate D is attached to the inner end of a sleeve, *a*, which sleeves are loose upon the shaft A, and each of which has at its outer end a ratchet-wheel, A′. Behind each ratchet-wheel A′ is a system of pawls, B′, arranged to hold said ratchet-wheels against any backward or reverse motion.

Adjacent to each of the magnets C, and, like them, attached to the block B, is a bracket, C′, formed with bearings *a′* for the pivots or points of support of an armature, E, the said pivots of each armature being at the upper or outer part thereof, so that the armature as thus suspended may have its central or lower portion free to swing.

In front of each armature, adjacent to one end thereof, but attached to one of the plates D, is a stop or spur, *c*, the spur on one of the plates D being in front of one end of one of the armatures, and the spur on the other of said plates being in front of the opposite end of the other armature.

A bar, F, pivoted at its center to the circumference of the block B, has its ends pivoted to the adjacent circumferences of the two plates, thus connecting the block B and the two plates D with a lever-like connection. A counterpoise is provided at an opposite point on the circumference of the block B, in order to balance the weight of the bar F.

Inasmuch as each of the hereinbefore-mentioned spurs affords a fixed fulcrum or point of resistance, the plates D, with which said spurs are provided, being kept from any retrograde movement by reason of the action of the pawls B′ on the ratchet-wheels A′, connected with the said plates, as hereinbefore explained, the block B is itself forced forward to a distance equal to the swing of the armature, and is thus, with its shaft A, made to perform a fraction of a revolution. When the block B is thus advanced by the resistance afforded by the spur on one of the plates D, the said movement of the block, acting through the lever-like bar F, carries forward the opposite plate D, so as to bring the spur of said opposite plate forward to the other armature while the latter is away from the face of the other magnet. When the said other magnet is put in operation (the two magnets working alternately) it is this other armature that, having the face of its adjacent magnet brought up to it, moves the block B by reason of the resistance offered by the spur of said other plate D, simultaneously with which the first-mentioned plate D is again advanced by means of the lever-like bar F. It will be seen, therefore, that the armatures themselves being prevented by the spurs on the plates D from moving back to meet the faces of the magnets, the latter must, when in operation, advance to meet the armatures with the results already described. It is, therefore, only necessary that the circuit through the two magnets should be

made to alternate by suitably breaking and closing the circuit through them to magnetize the two alternately. This is accomplished by means as follows:

On the shaft A, but insulated therefrom and from each other, are two peripherically-toothed disks, *g f*, the teeth of one of said disks being coincident with the spaces between the teeth of the other, the two disks being side by side, but, as aforesaid, insulated from each other.

G is a metallic spring, the free end of which bears upon the circumference of the two disks, but in such manner as to be in contact with only one tooth of one or the other of the disks at the same time. From this spring G extends the wire G′ of, say, the negative pole of the battery. The opposite pole of the battery connects by a wire, *h*, with a metallic spring, *m*, the extremity of which lies in contact with the surface of a metallic boss, S, on the shaft A.

The coils of one of the magnets B are connected with the boss S and toothed disk *f* by wires *g′*, *e′*, and *f′*. The coils of the other magnet are connected with said boss S and with the toothed disk *g* by the wires *g′* and wires *h′ i*.

When the spring G is in contact with a tooth of the toothed disk *g* the electric current is formed through the aforesaid spring G, the wires *i h′ g′*, boss S, and spring *m* to put in operation one of the magnets.

When the spring G rests upon a tooth of the disk *f* the circuit is changed to pass through wires *f′*, *e′*, and *g′* to the boss S, &c., to put in operation the other magnet, and so on alternately, the rotation of the shaft A causing the teeth of the two disks to be alternately brought in contact with the spring G, and thus automatically changing the circuit from one magnet to the other and back again. The power of the motor may be transmitted therefrom by means of a suitable band-wheel, H, on the shaft A.

When desired, the working devices may be duplicated or multiplied on the same shaft—that is to say, four, six, or other desired and suitable number of magnets—and their adjuncts may be employed instead of two.

What I claim as my invention is—

1. The combination of the ratchet-wheels and pawls, or their equivalents, with the block B, carrying the magnets and armatures, and the plates D, having stops or spurs *c*, all substantially as and for the purpose herein set forth.

2. The combination of the bar F with the block B, magnets C, armatures E, and plates D, having stops or spurs *c*, all substantially as and for the purpose herein set forth.

3. The block B, having the magnets and armatures, the plates D, having the stops or spurs, the pivoted bar F, connecting the block B with the plates D, and the insulated toothed disks *g f* for changing the circuit, the whole combined for use and operation substantially as and for the purpose set forth.

JOHN DOYLE.

Witnesses:
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