(No Model.)

G. W. FOSTER.

ELECTRO MAGNETIC ENGINE.

No. 277,475. Patented May 15, 1883.

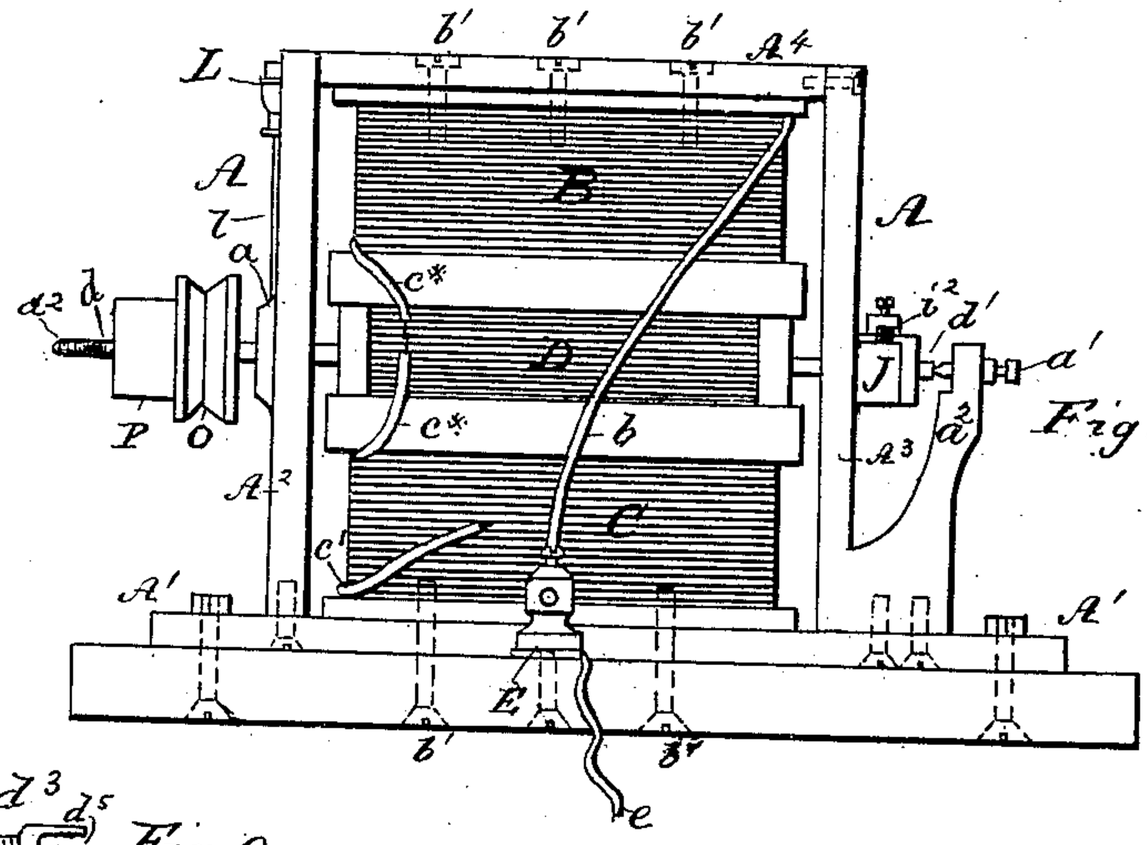

Fig. 2.

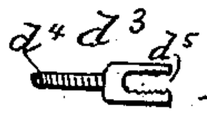

Fig. 9.

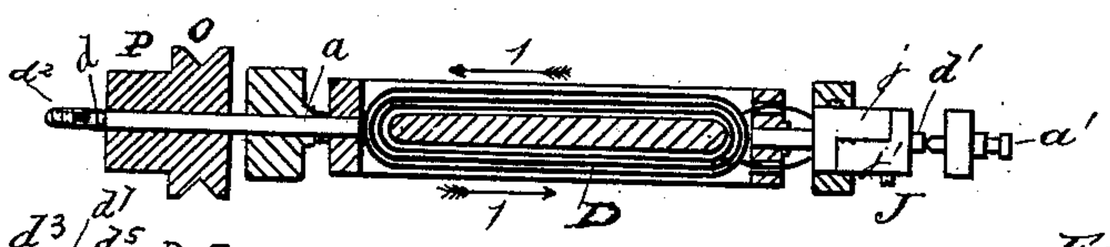

Fig. 8.

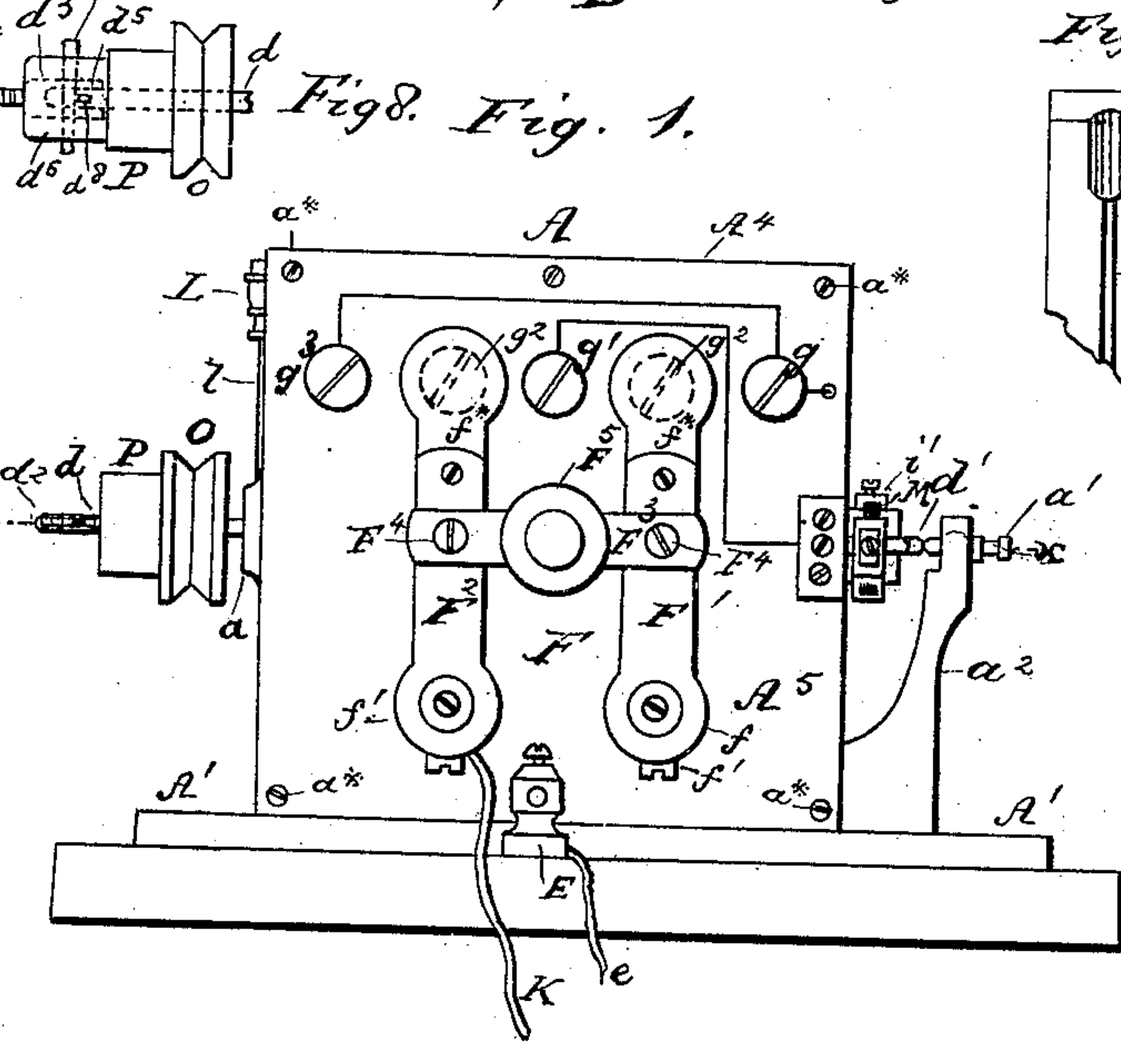

Fig. 1.

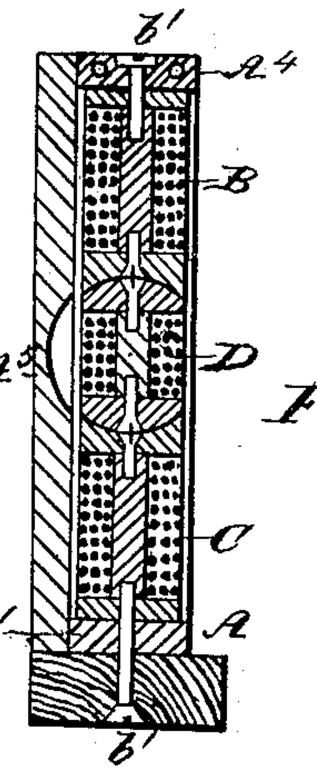

Fig. 4

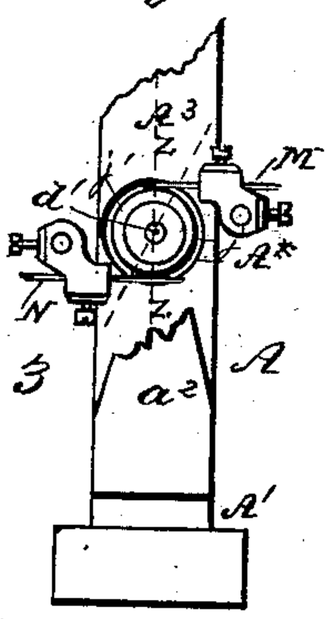

Fig. 3

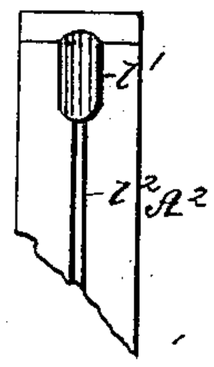

Fig. 7

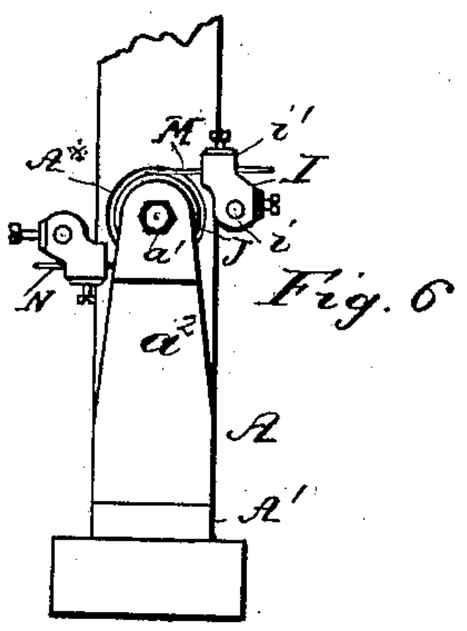

Fig. 6

WITNESSES:

D. F. Richards

T. G. Lowegren

INVENTOR

Gay. W. Foster

BY Richardson

ATTORNEYS

UNITED STATES PATENT OFFICE.

GAY W. FOSTER, OF NEW YORK, N. Y.

ELECTRO-MAGNETIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 277,475, dated May 15, 1883.

Application filed September 30, 1882. (No model.)

To all whom it may concern:

Be it known that I, GAY W. FOSTER, a citizen of the United States, residing at New York city, in the county and State of New York, have invented new and useful Improvements in Electro-Magnetic Engines, of which the following is a specification.

My invention relates to improvements in that class of devices which are employed to generate electro-magnetic power by "attraction" and "repulsion," the electric current being furnished to the engine from a battery of chemical jars, from accumulators previously charged with electricity, from dynamo-electric generators, or other suitable electric batteries.

The nature of my invention will be fully explained by reference to the following specification and the accompanying drawings, which form part thereof.

Referring to the drawings, Figure 1 is a front view of my improved electro-magnetic engine. Fig. 2 is a similar view with the non-conducting front plate removed, so as to expose the interior mechanism. Fig. 3 is an end view of the apparatus, partly in section. Fig. 4 is a vertical cross-section and Fig. 5 is a transverse section on the line *x x* of Fig. 1, (with parts in elevation,) showing the central revolving coil, D, and commutator J and parts immediately connected therewith. Fig. 6 is a partial end view. Fig. 7 is a perspective view of the upper part of the end piece. Figs. 8 and 9 are detail views.

In each of the views similar letters of reference are employed to indicate corresponding parts wherever they occur.

A represents the main framing of the engine, which is formed with a main or bed plate, A′, two vertical end pieces, A^2 A^3, a head-piece, A^4, and a front plate, A^5. The front plate, A^5, is formed of hard rubber or other suitable non-conducting material, and is fastened in place by means of screws *a**. The object of forming the plate A^5 of non-conducting material is to allow of the supporting thereon of all the wires and the various parts of the device, which require to be insulated from the remainder of the metallic parts of the machine. The end piece A^3 is formed with a large circular opening, A*, to allow of the free passage of the commutator J therethrough, and the adjustment of the position of the revolving armature and coil D and the commutator.

It will be seen that the frame A is provided with a recess in its end piece A^2, designed and shaped to receive an oiling apparatus, L, hereinafter described, in such manner that the said oiling apparatus shall not project above the top of the frame A. The frame A is formed square and plane, and is without any projecting parts extending above the top plate or head-piece, A^4.

Within the frame A, I arrange a pair of electro-magnets, B C, the electro-magnet B being attached, by preference, by screws *b′* to the head-piece A^4, while the electro-magnet C is similarly attached to the bed-plate A′.

Between the electro-magnets B and C, I arrange a powerful revolving armature and coil, D, of the character and construction commonly known as "Siemens." This revolving armature and coil D is supported on axles *d d′*, the axle *d* being supported in bearings *a*, formed in the end piece A^2, while the opposite axle, *d′*, is supported by means of an adjusting-screw, *a′*, carried by a shoulder or bracket, a^2, formed on or affixed to the end piece A^3. The shoulder or bracket a^2 is formed larger at its base than at its upper part, to allow of its being firmly fastened to the base or foundation A′.

E is a battery-connecting post, to which a wire, *e*, is attached, by means of which the electric current is conducted to the engine. The current passes from the connecting-post E by the wire *b*, (by preference arranged at the back of the front plate, A^5,) which is part of or is connected with the wire of the helix or coil of the electro-magnet B. After passing through the helix or coil of the electro-magnet B, the current is conducted by the wire *c**, which is composed of the end of the wire of the helix or coil of the electro-magnet B and the upper end of the wire forming the coil or helix of the electro-magnet C. The current then passes through the electro-magnet C, and is conducted away by the wire C′, which is formed of or is connected with the wire forming the helix or coil of the electro-magnet C. The wire *c′* is connected by means of the screw-cup connection *f′* to the standard *f* of the switch or current changer and breaker F, as shown in Fig. 1. The current then passes

from the standard *f* along the pivoted arm F′ of the double switch F, hereinafter more fully described, by which the current is conducted to a contact point or button, *g*, affixed or mounted on the front plate, A^5. From the button or point *g* the current is conducted to a bracket, I, insulated from the main framing, and provided with a shaft, *i*, upon which is mounted a binding-piece, *i′*, carrying a brush or series of connected metallic wires, M, by means of which the current is conducted to one side, *j*, of the commutator J, by means of which it is conducted to and through the coil D to the opposite side, *j′*, (see Figs. 3 and 5,) of the commutator J, by which it is conducted through the brush N to the standard *f′* of the second arm, F^2, of the double switch F, by means of which it is conducted by a contact point or button, *g′*, to a wire, K, connected with the said standard and leading back to the battery.

In describing the above action of the current I have supposed a positive current to be induced and to be passing through and operating the device.

The double switch F is composed of two arms, F′ F^2, mounted and pivoted on standards *f* and *f′*, and provided at their forward ends with springs *f* f**, adapted to form connection with one or other of the buttons *g*, *g′*, g^2 g^2, and g^3, the buttons *g*, *g′*, and g^3 being connected with the operating-wires, while the buttons g^2 g^2 are totally insulated. The arms F′ F^2 are connected together by means of a cross-bar, F^3, formed of non-conducting material. The cross-bar F^3 is provided with holes, through which are passed screws or studs F^4, affixed to the arms F′ F^2. The cross-bar F^3 is by preference operated by a handle or knob, F^5, affixed thereto, as shown, or in any other suitable manner.

The apparatus is shown and described heretofore as operating with a positive current, and with the arms F′ F^2 making connection with the buttons or metallic connections *g g′*. If it is desired to reverse the current, the arms F′ F^2 are shifted over onto the buttons or metallic connections *g′* g^3. If it is desired to shut off the current entirely, the arms are shifted onto the insulated buttons g^2 g^2. If it is desired to reverse the operation of the apparatus, the current is reversed, as above stated. If it is desired to stop the machine suddenly, the arms F′ F^2 are shifted from the buttons *g g′* to the buttons *g′* g^3, (so as to counteract the currents,) and then to the buttons g^2 g^2, and there allowed to remain until the machine is again to be started, as will be evident to all practical electricians.

My engine is composed, as before described, of two electro-magnets, B C, the poles of which are north and south, and placed opposite to one another, and between them is arranged the revolving armature and coil D and commutator J, connecting with the brushes M and N, the double switch F, and battery-connections. The currents passed through the apparatus cause the armature and coil D to revolve by attraction and repulsion produced by the change of polarity of the armature and coil D, effected by means of the commutator J.

To illustrate the operation of the invention, I will suppose the center of the armature and coil D to be on the line *z z*, as shown in Fig. 3, and that the said center-line *z z* has passed the electro-magnets B C, and the current to be traveling as indicated by the arrows 1 1 in Fig. 5, the said coil D having the same polarity as the electro-magnets B C, which face one another, and as it is well known that two poles of the same polarity repel, the armature and coil D must revolve, and as the magnets all retain the same polarity during a half-revolution, when the armature and coil D is repelled by the poles of the same polarity and approaches the poles of a different polarity it is again attracted to the line *z z*, and goes through the same operation of attraction and repulsion over and over again, and continues to revolve without any reaction, unless the switch F be changed from the buttons *g g′* to the buttons *g′* g^3, when the entire current is suddenly reversed and the armature and coil D is sent in the opposite direction. As before stated, I have supposed a positive current entering the apparatus through the battery-connecting post E, and passing out and returning through a wire connected with the pillar or support of the arm F^2 of the switch F, and the arms F′ F^2 of the switch F to be in connection with the buttons *g g′*. If the reverse action of the apparatus is desired, it is simply necessary to turn the switch F so that the arms shall come in contact with the buttons *g′* g^3, when a negative current will pass through the wire and through the respective parts of the apparatus and out through the post E and wire *e* to the battery or source of electric generation, thereby causing the armature and coil D to revolve in the opposite direction.

Power is communicated to any desired apparatus by means of the pulleys O P, affixed on the shaft or axle *d*, as shown in Figs. 1 and 2. The shaft or axle *d* is lubricated by means of an oil-cup, L, which is formed with a stem, *l*, and is received and held in a recess, *l′*, and channel l^2, formed in the end of the framing A. The end d^2 of the axle *d* is provided with a screw-thread cut in the circumference of its extremity, for the purpose of attaching thereto and firmly holding thereon an ordinary or other suitable lathe chuck or tool.

In Fig. 9 I have shown an additional piece, d^3, formed with a subsidiary shaft, d^4, adapted to be applied to the shaft *d* by screwing the projection d^5 formed on the shaft d^4 onto the end d^2 of the shaft *d*, as shown at Fig. 8, and there retaining it by means of a clamp, d^6, and keys d^7 d^8, or other suitable retaining means of connection. The object of the additional piece d^4 d^5 is to allow of the free application of various tools or devices to the shaft *d*. There may be any desired number of pieces, d^4 d^5, each provided with a shaft, d^4, of differ-

ent diameters, adapted for the application of various tools.

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

An electro-magnetic engine composed of the field-magnets B C and armature D, inclosed in a rectangular frame, and a non-conducting plate, A^5, secured to and inclosing one side of the frame and supporting the current-reversing switch, and an arm, a^2, carrying an adjusting-screw, a', substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand this 20th day of September, 1882.

GAY W. FOSTER.

Witnesses:
GEO. C. COFFIN,
FLOYD B. WILSON.