No. 695,253. Patented Mar. 11, 1902.

P. B. WATSON.

ELECTROMAGNETIC ENGINE.

(Application filed May 28, 1901.)

(No Model.) 2 Sheets—Sheet 1.

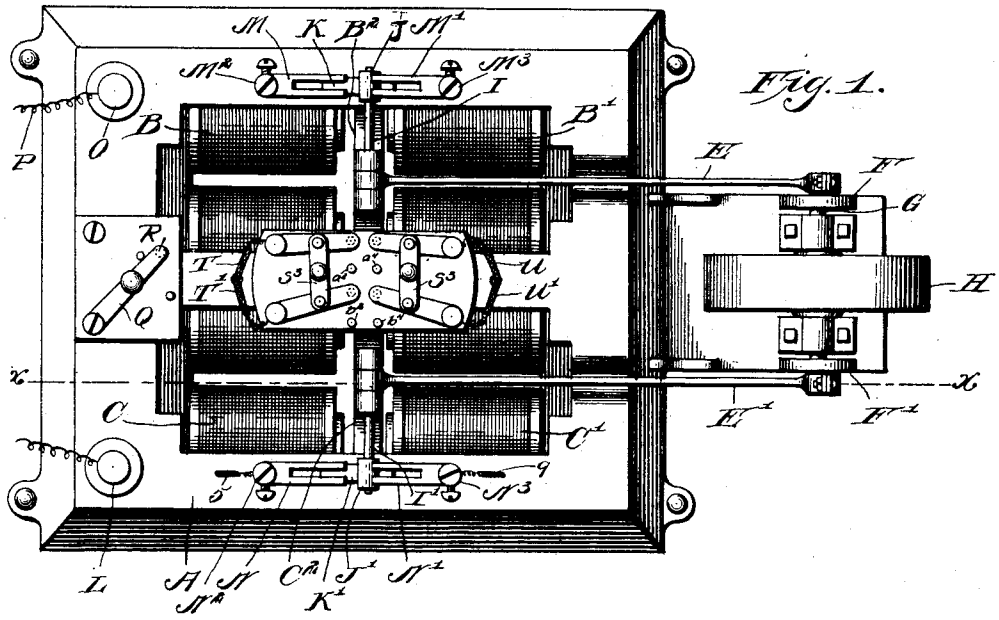

Fig. 1.

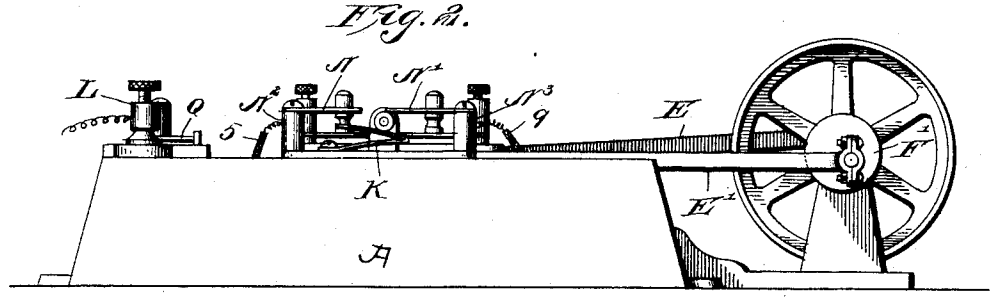

Fig. 2.

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Fig. 3.

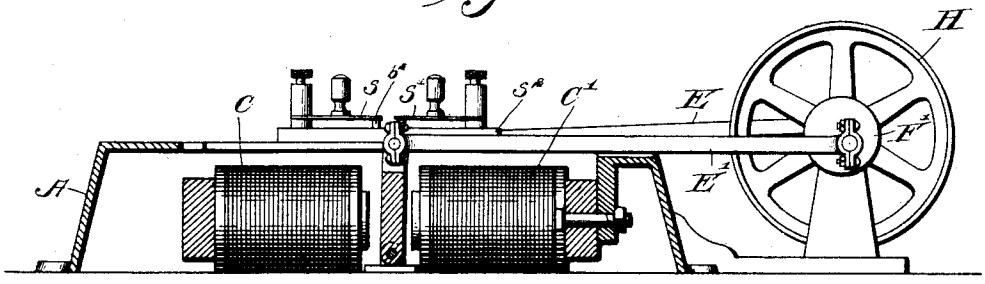
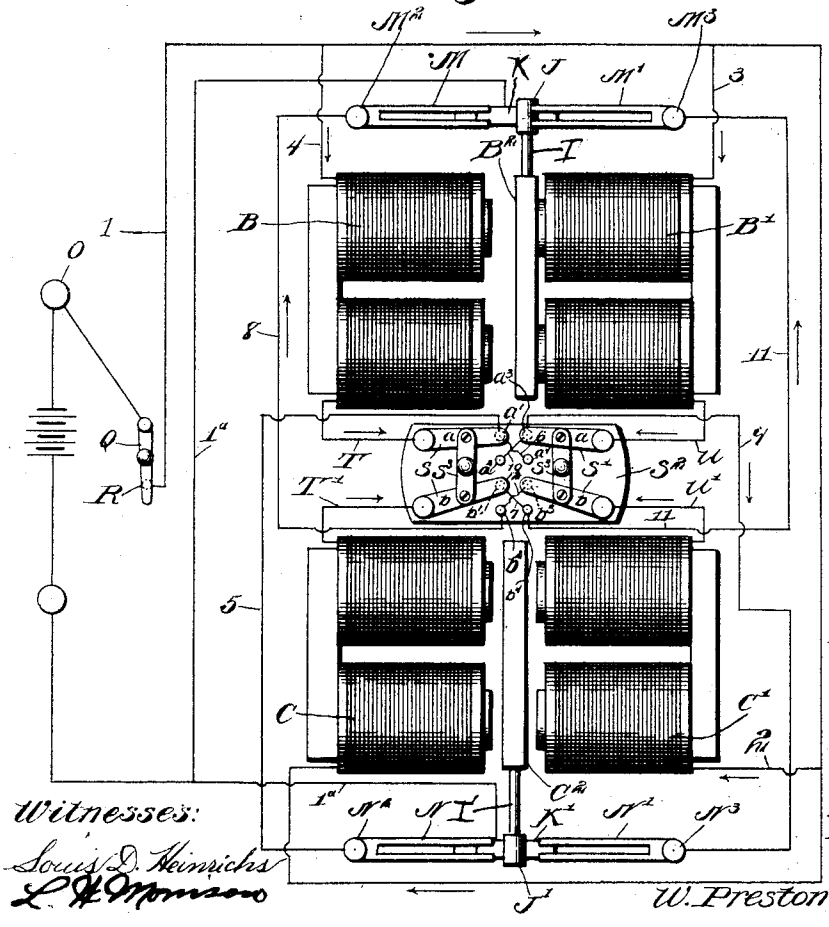


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC ENGINE.

SPECIFICATION forming part of Letters Patent No. 695,253, dated March 11, 1902.

Application filed May 23, 1901. Serial No. 62,215. (No model.)

To all whom it may concern:

Be it known that I, PETER B. WATSON, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Electromagnetic Engines, of which the following is a specification.

My present invention relates to a new and useful improvement in electromagnetic engines, and primarily has for its object to improve upon Letters Patent No. 647,210, granted to me by the United States Patent Office April 10, 1900, and to so construct such an engine as to utilize four pairs of magnets operating with one current and so time the vitalizing and devitalizing of these magnets as to operate two armatures connected by pitmen with cranks upon the fly-wheel shaft set at forty-five degrees to each other, thus avoiding dead-centers; so arranging a contact-controller carried by each armature as to make and break the circuit of the magnets in whose field that particular armature is, so as to bring about a rotary movement of the fly-wheel in a given direction; providing switch mechanism for so controlling the current as to reverse the engine, and otherwise to so construct the engine as to render it simple and efficient for the utilization of an electric current for the generation of rotary motion.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of an engine made in accordance with my improvement; Fig. 2, a side elevation thereof; Fig. 3, a section at the line $x\,x$ of Fig. 1, and Fig. 4 a diagrammatical view showing the circuits.

In carrying out my invention as here embodied, A represents the base or framework of the engine, being of such shape as to conveniently support the magnets and operating parts, and within this frame are secured the magnets B, B′, C, and C′, the poles of each pair of the magnets facing each other and having the armatures B^2 and C^2 located between these poles, said armatures being independent of each other and pivoted at D so as to swing to and fro between the poles of their respective magnets when the latter are properly energized and deënergized, as will be hereinafter set forth.

Each of the armatures B^2 and C^2 have lugs projecting upward therefrom, in which are pivoted the pitmen E and E′, respectively, and these pitmen in turn are coupled at their outer ends to the cranks F and F′. The cranks F and F′ are secured upon the shaft G and are set at forty-five degrees to each other, so as to avoid being stopped on dead-centers, as will be readily understood.

H represents the fly-wheel, which is secured upon the shaft G and serves to transmit the power generated by the engine by belt or otherwise. The armatures B^2 and C^2 have also secured thereto the controlling-rods I and I′, respectively, said rods extending outward and having journaled thereon the contact-rolls J and J′, insulated from said rods.

A conductor-spring K is secured beneath the contact-roll J, and a corresponding spring K′ is secured beneath the contact-roll J′, these springs being so formed as to remain in constant contact with the rolls in their to-and-fro movement during the operations of the engine, and thus provide for the flow of any current transmitted to the rolls through these springs to the frame of the engine, and thus to the negative binding-post L.

Two contact-springs M and M′ are supported upon the posts M^2 and M^3 and project toward each other and in the path of travel of the contact-roll J, so that when said roll is oscillated back and forth by this armature it will alternately come in contact with these springs, the latter riding up upon the roll, and thus transmitting the current to said roll during a certain portion of its movement, first from one contact-spring and then from the other. A duplicate arrangement is provided in connection with the contact-roll J′ in the

contact-springs N and N', which are supported upon the posts N^2 and N^3. These posts M^2, M^3, N^2, and N^3 are insulated from the frame of the engine, and the main positive binding-post O is also insulated from the frame and has leading thereto the wire P, connected with the positive element of the source of the electric current. From this binding-post O a wire leads to the switch Q, and when the latter is in contact with its plug R the current will pass through said switch to the wire 1, which leads to the positive end of the magnet C, and by the branch wire 2 to the positive end of the magnet C', by the branch wire 3 to the positive end of the magnet B', and by the branch wire 4 to the positive end of the magnet B, as is clearly indicated by the arrows adjacent to said wires, so that when the switch Q is closed the source of the current is in constant connection with the positive end of all of the magnets.

Two compound switches S and S' are pivoted upon an insulated switchboard S^2, each switch being composed of the elements *a* and *b*, which are yoked together by the links S^3. The members *a* and *b* of the switch S have connected therewith the wires T and T', respectively, which wires lead from the negative ends of the magnets B and C, respectively, so that the current passing from the magnets through these wires will reach the members *a* and *b* of the switch S and from thence through one set or the other of the contact-plugs a' b' or a^2 b^2. Likewise the members *a* and *b* of the switch S' are connected by the wires U and U' with the negative ends of the magnets B' and C', respectively, so that the current flowing from these magnets to the members of this switch will pass either to one set or the other of the contact-plugs a^3 b^3 or a^4 b^4, according as the members of these switches are in contact with one or the other sets of these plugs.

The plug a' is connected by the wire 5 with the post N^2, and thus with the contact-spring N, and this plug a' is also connected by a short wire 6 with the plug a^4, and the plug b' is connected by a short wire 7 with the plug b^4, and the last-named plug is connected by the wire 11 with the post M^3, and thus with the contact-spring M'. Likewise the plug a^3 is connected by the wire 9 with the post N^3, and consequently with the contact-spring N', and also this plug a^3 is connected by a short wire 10 with the plug a^2. The plug b^2 is connected by the wire 6 with the post M^2, and consequently with the contact-spring M. This last-named plug is also connected by the short wire 12 with the plug b^3.

The operation of the machine would be as follows when the different mechanism is in the position shown in Fig. 4—that is, with the contact-roller J', carried by the armature C^2, in a position intermediate between the two contact-springs N and N' and the contact-roller J, carried by the armature B^2, in contact with the contact-spring M'. The current will then flow from the positive binding-post along the wire through the electromagnets C, to the member *b* of the switch S, to the plug b', and then along the short wire 7 to the plug b^4, and from there along the wire 11 to the binding-post M^3, to the contact-spring M', and through the roller J to the spring K, which spring is connected by the wire 1^a with the negative binding-post. Thus a circuit is formed which will energize the magnets C. This energizing of the magnets C will attract the armature C^2 and cause the same to travel toward such magnets. This will carry the roller J' into contact with the contact-spring N, and when this has occurred the current will then flow as follows: from the positive binding-post, through the wire 1 and branch wire 4, through the magnets B and wire T to the member A of the switch S, to the plug a', and through the wire 5 to the binding-post N^2, through the contact-spring N, through the roller J' to the spring K', which is connected by the wire 1^a with the negative binding-post. Again, the circuit will be formed, energizing this time the magnets B, which will attract the armature B^2 toward them. This will bring the roller J into contact with the spring M, which will then cause the magnets C' to be energized, which will attract the armature C^2 toward them and carry the roller J' into contact with the springs N', which will then cause the current to so run as to energize the magnets B', which will bring the armature B^2 in the original position from which it starts. It will thus be noticed that when the reversing-switch is in the position shown in Fig. 4 the contacts made by the roller J will energize the magnets diagonally opposite from the side from which the contact is made—as, for instance, a contact with M will energize the magnets C' and contact with M' will energize the magnets C; but the contacts made by the roller J' will energize the electromagnets working in connection with the opposite armatures, but upon the same side as the contact is made. Thus one of the armatures is always under the influence of either one of the magnets at all times. When the reversing-switch is moved so that the members of the switch S will rest upon the plugs b' and b^2 and the members of the switch S' will rest upon the plugs a^4 and b^4, the action will then be just reversed. The contacts made by the roller J' will then energize the set of magnets working in connection with the opposite armature diagonally opposite from the side upon which the contact is made, and the contacts made by the roller J will energize the set of magnets working in connection with the opposite armature upon the same side as the contact is made. This will cause the mechanism to work in the opposite direction and reverse the revolution of the fly-wheel H.

The advantages of my invention are that

by a very simple arrangement I provide an electromagnet-engine which has all the requirements of a motor, but will run smoothly and can be reversed at will, and by utilizing two sets of magnets and two armatures and connecting them with the crank-shaft upon the quarter said crank-shaft cannot become set upon a dead-center.

Of course I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is—

1. In an electromagnetic engine, a framework, two sets of magnets, each set having oppositely-disposed poles set to provide an intervening space, an armature pivoted between each set of magnets, pitmen reciprocated by the armatures, controlling-rods carried by the armatures, rolls on the rods, contact-springs engaged by the rolls, and suitable connections whereby the action of the rolls on the springs cuts off and shifts the current to the sets of magnets as and for the purpose described.

2. In an electromagnetic engine, a framework, two sets of electromagnets supported by said framework, the poles of each set of magnets being arranged opposite to one another, a space between the poles of each set of magnets, two armatures, one pivoted within the space between each set of magnets, a crank-shaft, two pitmen, one end of each of the pitmen being connected to each of the armatures, the other end of the pitmen being connected to the crank-shaft, the cranks of the crank-shaft being set upon a quarter, a pulley secured to the crank-shaft for the purpose of transmitting motion, a contact carried by each of the armatures and insulated therefrom, each of these contacts being connected with the negative pole of the source of electricity, two pairs of contact-springs, each pair located upon opposite sides of the machine and adapted to be alternately contacted by the contact carried by the armature, each of the contact-springs upon one side of the machine connected with the positive pole of the source of electricity through that half of the set of magnets upon the opposite side of the machine diagonally opposite from the end of the machine upon which the contact is located, the spring-contacts upon the opposite side of the machine adapted to be alternately contacted by the contact carried by the opposite armature, each of the last-named spring-contacts connected with the opposite pole of the source of electricity through half of the set of magnets upon the opposite side of the machine working in conjunction with the opposite armature, the said half set of magnets being located upon the same end of the machine as the spring-contact to which they are connected, substantially as and for the purpose specified.

3. In an electromagnetic engine, a framework, two sets of electromagnets supported by said framework, the poles of each set of magnets being arranged opposite to one another, a space between the poles of each set of magnets, two armatures, one pivoted within the space between each set of magnets, a crank-shaft, two pitmen, one end of each of the pitmen being connected to each of the armatures, the other end of the pitmen being connected to the crank-shaft, the cranks of the crank-shaft being set upon a quarter, a pulley secured to the crank-shaft for the purpose of transmitting motion, a contact carried by each of the armatures and insulated therefrom, each of these contacts being connected with the negative pole of the source of electricity, two pairs of contact-springs, each pair located upon opposite sides of the machine and adapted to be alternately contacted by the contact carried by the armature, each of the contact-springs upon one side of the machine connected with the positive pole of the source of electricity through that half of the set of magnets upon the opposite side of the machine diagonally opposite from the end of the machine upon which the contact is located, the spring-contacts upon the opposite side of the machine adapted to be alternately contacted by the contact carried by the opposite armature, each of the last-named spring-contacts connected with the opposite pole of the source of electricity through half of the set of magnets upon the opposite side of the machine working in conjunction with the opposite armature, the said half set of magnets being located upon the same end of the machine as the spring-contact to which they are connected, a reversing-switch interposed between the spring-contacts and the magnets so as to change the connection of the spring-contacts to the opposite half of the set of magnets to which they were formerly connected for the purpose of reversing the last-named position and thus reverse the revolution of the crank-shaft, as and for the purpose specified.

4. In an electromagnetic engine, two sets of electric magnets, the poles of each set arranged opposite to one another, a space between the poles of each set of magnets, a movable armature arranged in these sets between the magnets, a crank-shaft, two pitmen, one end of each pitman being connected to each of the armatures, the other end of the pitmen being connected to the crank-shaft, two traveling contacts, one carried by each of the armatures, said contacts always in connection with the negative pole of the source of power, two pairs of spring-contacts arranged upon opposite sides of the machine, the members of each pair of spring-contacts adapted to be alternately contacted by one of the contacts carried by the armature, each member of each pair of contacts being connected to the positive pole of the source of

electricity, the other half of the magnets composing the set of magnets upon the opposite side of the machine from the contacts, to which is connected a reversing-switch, interposed between the spring-contacts and the magnets for the purpose of changing the connection of each of the spring-contacts from half of the opposite set of magnets to which they are connected to the other half, and vice versa, for the purpose of changing the direction of rotation of the crank-shaft, substantially as and for the purpose specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

PETER B. WATSON.

Witnesses:
MARY E. HAMER,
L. W. MORRISON.