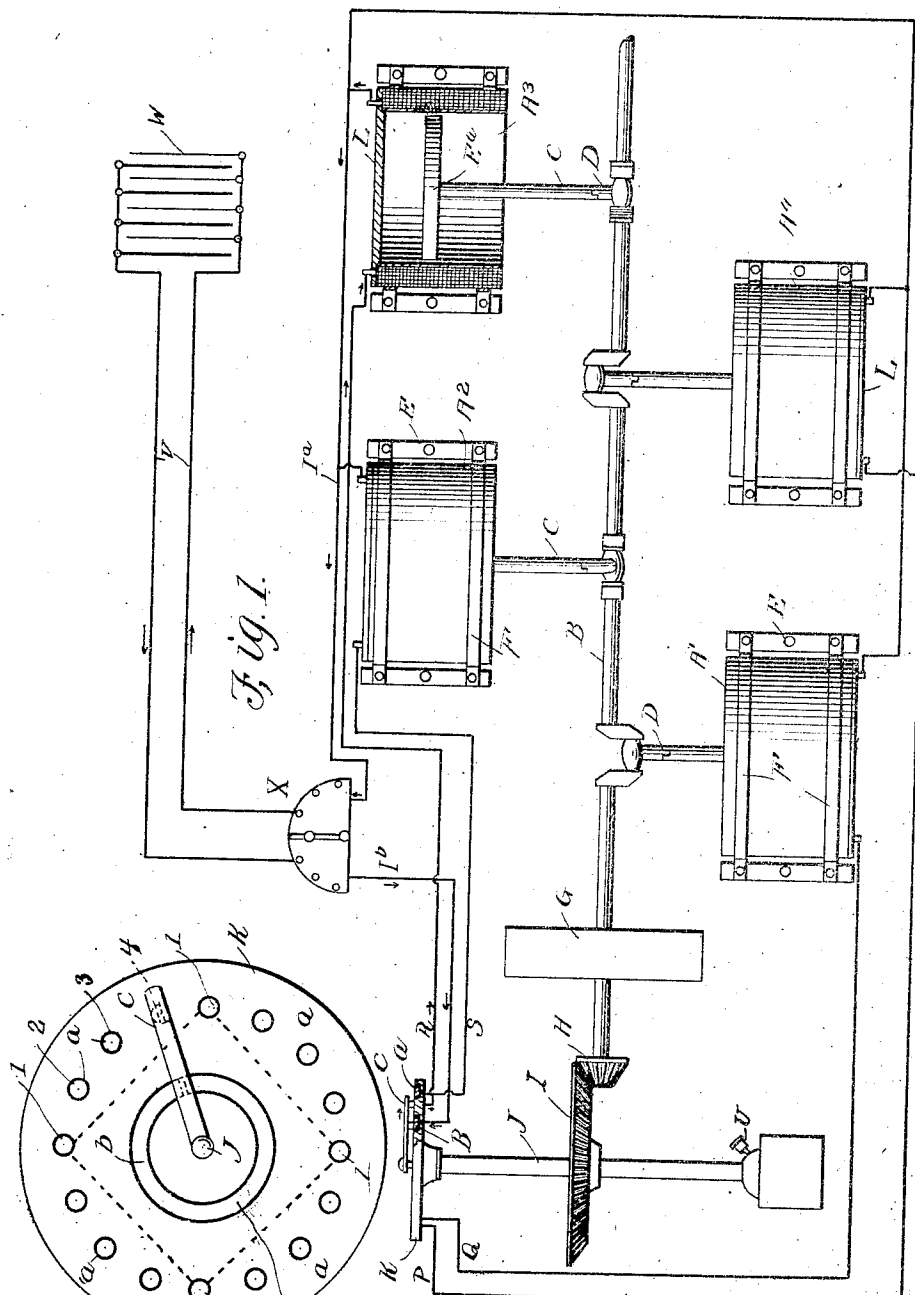


H. J. FORD.
ELECTROMAGNETIC ENGINE.
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1,018,309.

Patented Feb. 20, 1912.



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HARRY J. FORD, OF SAN QUENTIN, CALIFORNIA, ASSIGNOR OF ONE-HALF TO WILLIAM JOHN HILL.

ELECTROMAGNETIC ENGINE.

1,018,309.

Specification of Letters Patent.

Patented Feb. 20, 1912.

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To all whom it may concern:

Be it known that I, HARRY J. FORD, a citizen of the United States, residing at San Quentin, in the county of Marin and State of California, have invented new and useful Improvements in Electromagnetic Engines, of which the following is a specification.

The present invention provides a motor utilizing electricity as the motive force, the purpose being to devise an engine which may be used for a variety of purposes where small and effective engines are required both for the sake of lightness and to economize space.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated in the accompanying drawing, and pointed out in the appended claims.

Referring to the drawing, forming a part of the specification, Figure 1 is a plan view of an electric engine embodying the invention, one of the solenoids being in section. Fig. 2 is a front view of the commutator.

The engine comprises a crank shaft B having its crank portion set quartering, said crank shaft being mounted in any suitable manner and provided with a fly wheel G and a bevel pinion H. A plurality of solenoids A', A², A³ and A⁴ are arranged in series and are coupled to the crank portions of the crank shaft and are adapted to be energized in successive order to apply the force to the best possible advantage for driving the crank shaft. The solenoids are suitably mounted and are fixed. Blocks E receive straps F which are passed about the solenoids and serve to secure them to the said blocks. A steel plate L is located at one end of each solenoid and when charged acts in the capacity of a magnet to assist materially in actuating the core of the solenoid. Each solenoid has a core E^a, which is in the nature of a plunger and has a rod C attached thereto, said rod being connected by means of a pitman D with a crank of the shaft B. A shaft J is arranged at a right angle to the shaft B and is provided with a gear wheel I, which is in mesh with the pinion H. The gear wheel I is about four times the diameter of the pinion H so that when the shaft B makes four revolutions the shaft J makes

only one revolution. The movable part of the commutator is attached to the shaft J and consists of an arm c, which is arranged to travel over a disk K upon which is provided a ring b and a plurality of contacts a. The parts b and a constitute terminals of the several circuits including the solenoids, whereby they are successively energized upon closing of the respective circuits. The electric contacts a are provided in groups, each group including a contact for each solenoid and four groups being provided upon the disk or plate K so that during one revolution of the shaft J the solenoids are energized four times. The control is indicated at X and may be of any construction or make. Wires V connect the control with the source of electric supply which in the present instance is indicated at W and constitutes a storage battery. A wire I^a connects the control with one terminal of each of the helices or windings of the solenoids. Wires P, Q, R and S connect the other terminal of the helices or windings of the respective solenoids with the contacts 1, 2, 3 and 4 of the respective groups of contacts a arranged upon the plate or disk K. A wire I^b connects the other terminal of the control with the annular contact b of the commutator. In the operation of the engine the shaft J has a rotary movement imparted thereto which causes the outer end of the arm c to sweep over the contacts b and a so as to successively close the circuits including the solenoids, whereby the latter are energized in rotation, thereby attracting the cores E^a and imparting rotary movement to the shaft B. The shaft J may be mounted in any manner and is shown stepped in a bearing to which is fitted an oil cup U.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the device which I now consider to be the embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention what is claimed as new, is—

1. An electric engine comprising a shaft having angularly disposed crank portions, solenoids, cores arranged to operate within the solenoids, rods pivotally connecting the stems of the cores with the crank portions of the crank shaft, a second shaft geared to the crank shaft and adapted to rotate at a slower speed, and a commutator comprising an arm connected to the second shaft to rotate therewith, two sets of contacts, the one being annular and the other comprising isolated elements, each of said elements having electric connection with one terminal of the helices of the several solenoids, and the annular contact having electric connection with the other terminals of said helices.

2. In an electric engine, the combination of a crank shaft having its crank portions arranged at different relative angles, solenoids, cores arranged to operate in the sole-

noids and having connection with the crank portions of the crank shaft, a second shaft driven from the crank shaft at a slower speed, an annular contact in electrical connection with one terminal of the helix or winding of each of the solenoids, groups of isolated contacts arranged in a circle about the annular contact, each contact of the several groups of contacts having electric connection with the other terminal of the helix or winding of the respective solenoids, and an arm connected with said second shaft to rotate therewith and in electric connection with the annular contact and adapted to make electric connection with the contacts of the several groups in successive order.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY J. FORD.

Witnesses:

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