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G. P. FINNIGAN & G. T. HANCHETT.

SYSTEM OF TRANSMITTING POWER.

APPLICATION FILED AUG. 30, 1905.

Fig. 1.

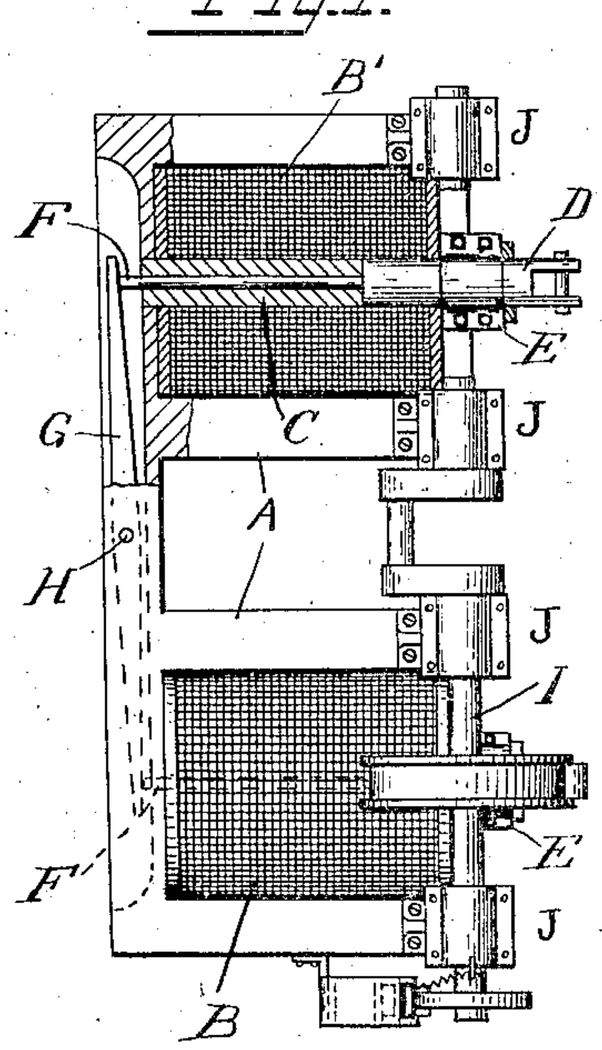


Fig. 2.

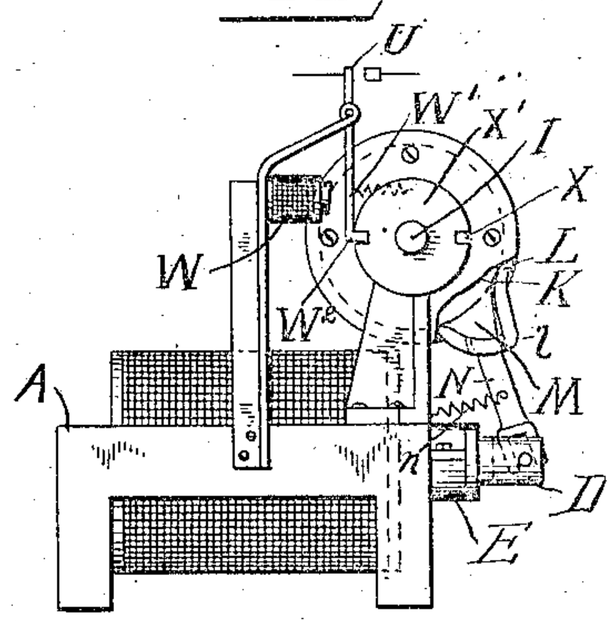


Fig. 3.

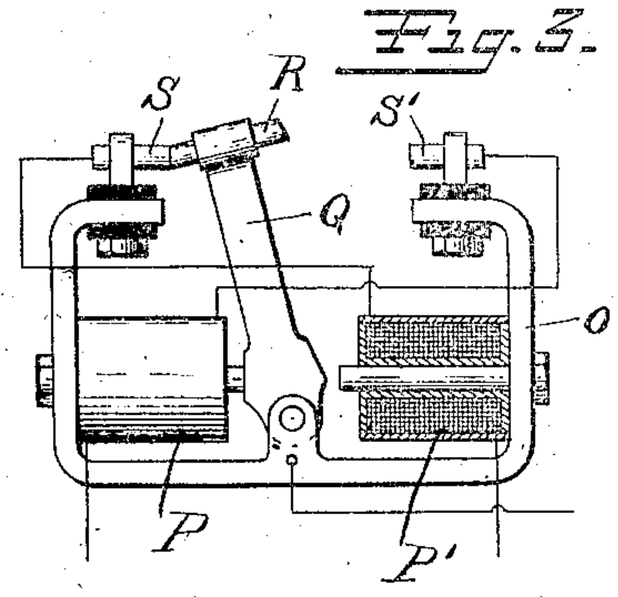
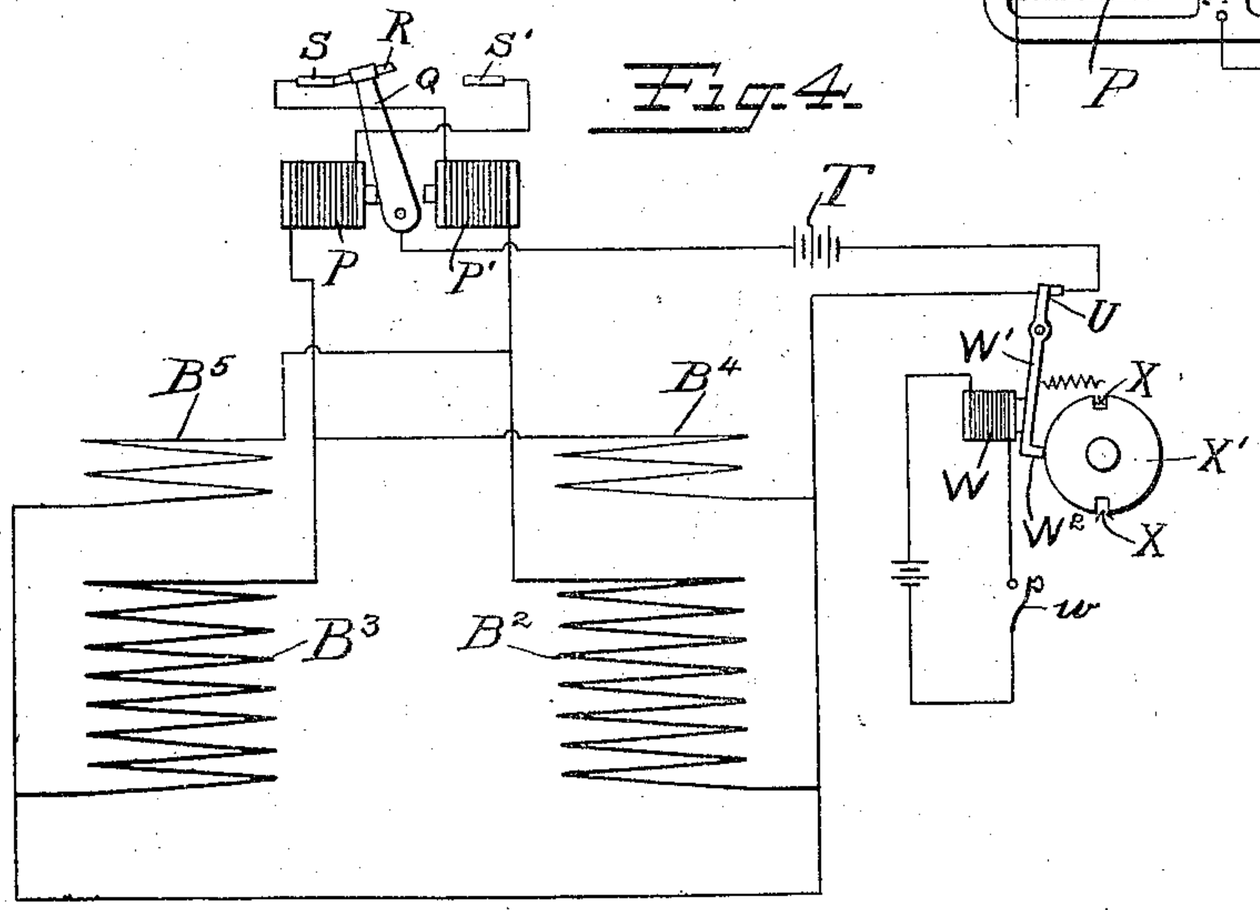


Fig. 4.



Witnesses
Chas. A. Peard
S. Isabel Classon.

Inventors
George P. Finnigan
George T. Hanchett
By their Attorneys
Bartlett Brownell & Mitchell

UNITED STATES PATENT OFFICE.

GEORGE P. FINNIGAN, OF GREENE, NEW YORK, AND GEORGE T. HANCHETT, OF HACKENSACK, NEW JERSEY; SAID HANCHETT ASSIGNOR TO SAID FINNIGAN.

SYSTEM OF TRANSMITTING POWER.

No. 834,570. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed August 30, 1905. Serial No. 276,451.

To all whom it may concern:

Be it known that we, GEORGE P. FINNIGAN, residing at Greene, Chenango county, State of New York, and GEORGE T. HANCHETT, residing at Hackensack, Bergen county, State of New Jersey, citizens of the United States, have invented certain new and useful Improvements in Systems for Transmitting Power, of which the following is a full, clear, and exact description.

Our invention relates to improvements in systems for transmitting power, and has for its object to provide means whereby powerful pulls of definite length can be produced by simple durable electric mechanism, and, further, to provide a system in which the parts most liable to get out of order may be located at the point where the operator is, as distinguished from a remote point at which the power of the motive device may be applied.

Apparatus embodying our invention is particularly useful for duty in any case where short, precise, and powerful movements are desired—such, for instance, as in turning railroad-switches, operating signals, changing end-cell contacts of large storage batteries, and the like. The use of electric motors to provide such powerful pulls or thrusts has heretofore always been attended with much complication and uncertainty. In order to get the necessary power in the push or pull with an ordinary motor, a long train of reduction gears or worms has heretofore been employed, and to cause the motor to stop absolutely at any given point has been a very difficult matter on account of the inertia of the parts, tending to cause it to overtravel an indefinite amount, depending upon the weight and speed of the parts and the friction obtaining in the apparatus at the time. Moreover, when ordinary direct-current motors are used the brushes and other parts essential to the operation of the motor are necessarily located at the motor and are therefore in most cases remote from the operator. Moreover, under any conditions such parts require much care and attention and cannot withstand long periods of severe abuse and neglect.

In our invention the foregoing troubles are eliminated.

The following is a description of an embodiment of our invention, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a motor embodying the features of our invention, part being shown in section. Fig. 2 is an end elevation of the same. Fig. 3 is a circuit-changer or commutator designed to operate said motor and to be located at any desired distance therefrom. Fig. 4 is a diagram of circuits.

Referring more particularly to the drawings, A is a magnetic framework on which two similar solenoids B B′ are mounted. Each solenoid has a stationary core C and a movable core D sliding in a sleeve E, supported by the framework A. The movable cores D have extensions E F, which engage a rocking lever G, pivoted at the point H, so that when one core D is in the other is forced out. I is a shaft journaled in supports J, carried by the framework and carrying a friction-clutch for each of the solenoids B B′. These friction-clutches each consist of a disk K, fixed to the shaft I, a strap L, surrounding the same, having an offset *l*, a dog M within said offset, adapted to engage the disk, and a lever N, connected to the dog and connected to the core D. A spring *n* may be used to keep the cores retracted, so as always to engage the lever G and prevent hammering. If the solenoids B B′ are alternately energized, the cores D D are alternately retracted and the shaft I revolved by the motion communicated thereto through the clutches.

In order to alternately energize the solenoids B B′, a commutator or circuit-changer (illustrated in Fig. 3) is provided. This consists of an iron framework O, carrying two magnets P P′, and a pivoted armature Q. This armature carries a contract R, which as the armature is moved from side to side engages contacts S S′. These contacts are insulated from the frame O and are connected electrically to the windings of the magnets P P′, respectively, and the windings of the magnets P P′ are connected with the windings of the solenoids B B′ and thence to one terminal of a battery or other source of electricity T. The other terminal of the source T is connected to the contact R through the armature Q. The solenoids B

B′ have main energizing-coils B^2 B^3 and high-resistance deënergizing-coils B^4 B^5, the main energizing-coil of one solenioid and the de-energizing-coil of the other solenoid being in multiple with one another and in series with one of the magnets P P′. The object of the demagnetizing-coils is to eliminate residual magnetism, which would tend to retard the motion of the core when it should be free to move.

When the armature Q is in the position shown in Fig. 4, the circuit through the battery T being closed, the current flows from source T through coil B^2, magnet P′, contacts S R, armature Q to the other terminal of the battery. This pulls in the core of the solenoid B, and at the same time the magnet P′ attracts the armature Q, so as to cause the contact R to engage the contact S′. A circuit is thus closed through the coil B^3 of the solenoid B′ and the magnet P, the current flowing from the battery T through coil B^3, magnet P, contacts S and R, armature Q to the battery. The armature Q is thus kept moving and contact made by R with S and S′ alternately. This movement is by reason of the copper shields on the magnets P P′ slow enough to permit the solenoids B B′ to alternately act upon their cores. The demagnetizing-coils B^4 and B^5 are also alternately magnetized, each eliminating the residual magnetism of the solenoid whose main coil-circuit has just been broken. The coil B^4 being in multiple with B^3 receives its discharge electromotive force and thus reduces the sparking at the contact S′, while the coil B^5, being in multiple with the coil B^2, reduces the sparking at contact S. The currents of self-induction in coils B^4 and B^5 also help to build up the magnetism of their magnets.

The circuit through the battery T is controlled by a switch U, which is operated by a relay-magnet W from any push-button in convenient location. The armature W′ of the relay-magnet is provided with a projection W^2, which is adapted to enter the recesses X in a disk X′ when the magnet W is deënergized. The disk X′ is mounted on the shaft I, so that when the relay-magnet W has once been energized the switch U is held closed until the disk X′ has been revolved enough to permit the projection W^2 to enter the next succeeding recess X. When this occurs, the circuit is broken at the switch U and the motor is deënergized. The projection W^2 entering the slot X locks the motor whenever it is deënergized. The motion is a very powerful one and is so slow that the parts have practically no inertia, so that the motor will stop immediately whenever both of the solenoids are deënergized.

Our invention permits of various modifications of both construction and of circuits, such as will suggest themselves to those skilled in the art. Thus our invention is not limited to the use of main and deënergizing circuits in multiple or to friction-clutches, as distinguished from pawl-and-ratchet clutches or other equivalent devices,

What we claim is—

1. In a power system, the combination of a step-by-step electric motor, a circuit therefor, a motive device operating independently of the movement of said motor and controlling said circuit, a mechanical locking device for said motor, and a switch for opening said circuit when said motor is locked, said locking device and said switch being mechanically connected.

2. In a power system, the combination of a step-by-step electric motor, a circuit for the same, a motive device operating independently of the movement of said motor and controlling said circuit, a switch for closing said circuit, means for opening said circuit at said switch when the motor has moved a predetermined amount, and causing the arm of said switch to lock said motor.

3. In a power system, the combination of a plurality of solenoids, movable cores within said solenoids, means for energizing said solenoids alternately, a shaft, and clutches upon said shaft connected to said cores and actuated by said solenoids.

4. In a power system, the combination of a motor having two solenoids adapted to be alternately energized, a separate motor device operating independently of said first motor, and terminals controlled thereby for closing the circuits through said solenoids alternately.

5. In a power-transmission system, the combination of a motor having a plurality of solenoids adapted to be energized at separate times, a separate motor device, a vibrating contact actuated thereby, two stationary contacts alternately engaged by said vibrating contacts, conductors leading from said stationary contacts through said solenoids respectively to one terminal of a source of energy and a conductor leading from said vibrating contact to the other terminal of said source of energy.

6. In a magnetic motor, the combination of a shaft, a plurality of magnets, means actuated by said magnets for intermittently engaging said shaft, and means actuated by said magnets whereby each restores the other to an operative position.

7. In combination, two solenoids, cores therefor, power-transmitting devices connected to said cores, a source of current for energizing said solenoids, means for placing said solenoids in circuit with said source alternately, and connections such that the core of the energized solenoid moves the core of the deënergized solenoid into operative position.

8. In combination, two solenoids, cores

therefor, power-transmitting devices connected to said cores, an independent motor device having magnets provided with closed circuits and an armature actuated thereby and a circuit for said solenoids controlled by said armature.

9. In a motor device, the combination of a plurality of solenoids, each having a main energizing-winding and a deënergizing-winding, the main winding of a solenoid about to be deënergized being in multiple with the deënergizing-winding of a solenoid about to be energized.

10. In a motor device, the combination of two solenoids, provided with pairs of windings, said pairs consisting of the main winding of one magnet and the deënergizing winding of the other, a source of current, and means for connecting said pairs to said source alternately.

GEORGE P. FINNIGAN.
GEORGE T. HANCHETT.

Witnesses:
ALEXANDER D. CHEW,
JOHN ANDERSEN.