No. 837,701. PATENTED DEC. 4, 1906.

D. MENDELSON.

ELECTRIC MOTOR.

APPLICATION FILED MAR. 24, 1906.

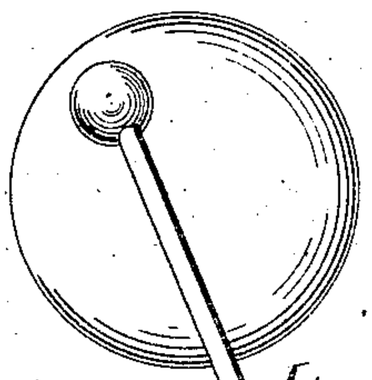


Fig. 1

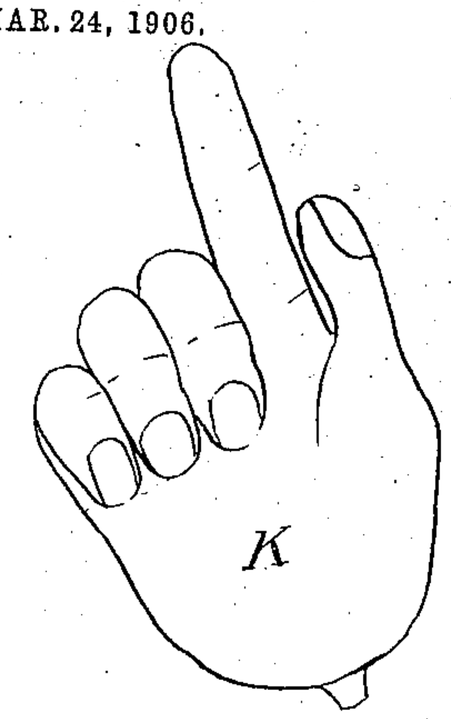


Fig. 2

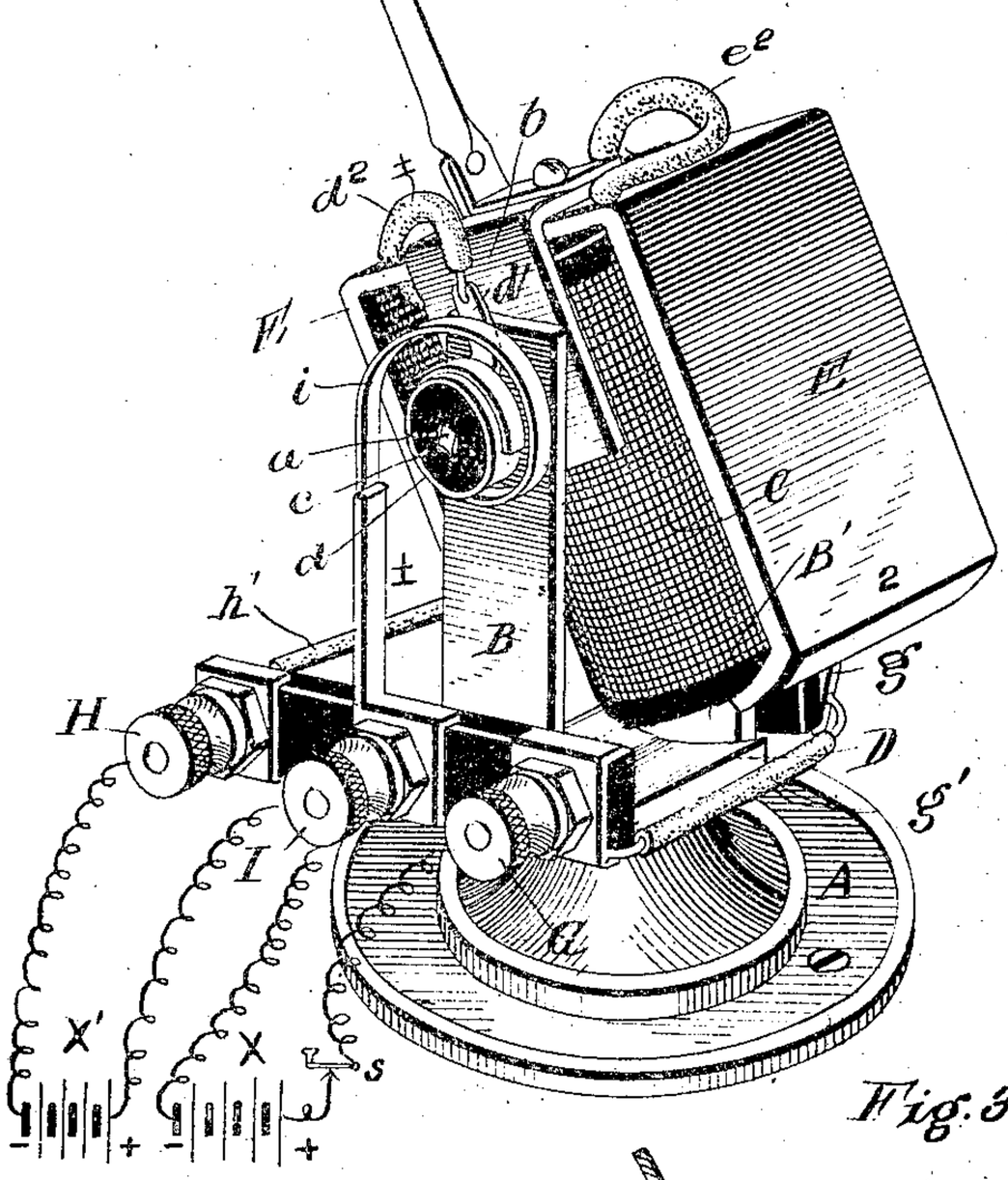


Fig. 3

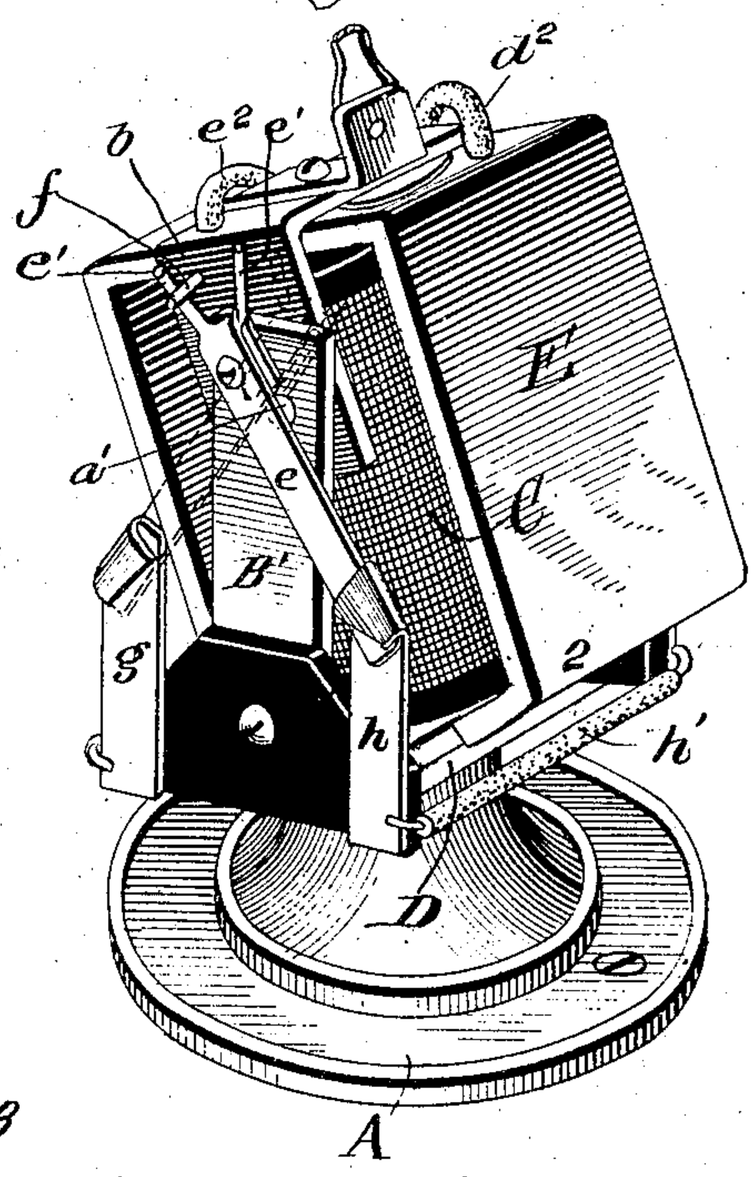
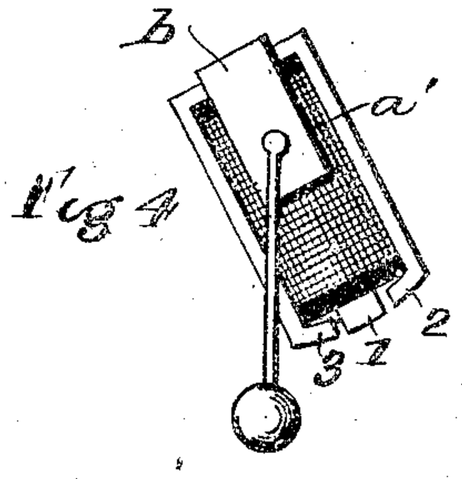


Fig. 4



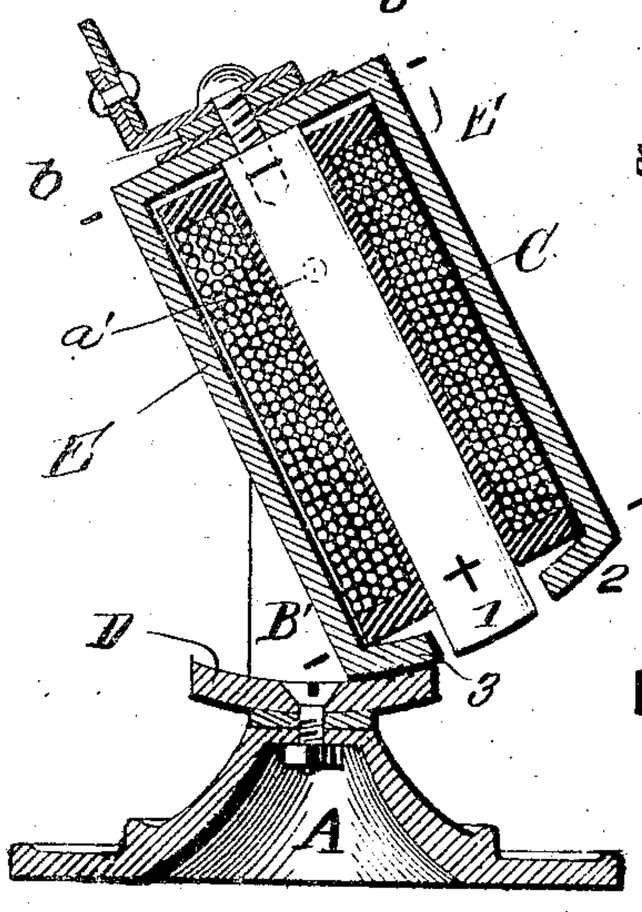
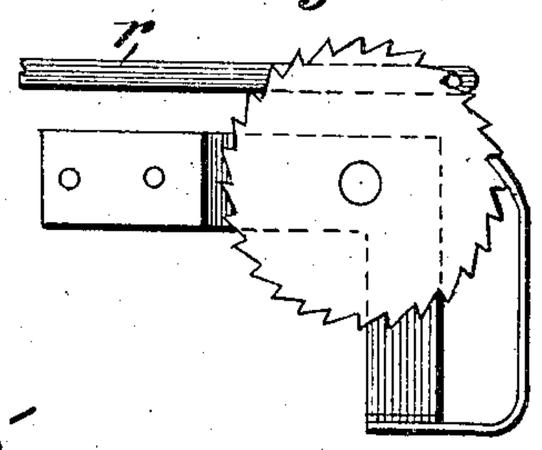


Fig. 5



WITNESSES

C. E. Shuffey

Edw. W. Byrn

INVENTOR

DAVID MENDELSON

BY Munn & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

DAVID MENDELSON, OF BROOKLYN, NEW YORK.

ELECTRIC MOTOR.

No. 837,701. Specification of Letters Patent. Patented Dec. 4, 1906.

Application filed March 24, 1906. Serial No. 307,941.

To all whom it may concern:

Be it known that I, DAVID MENDELSON, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have made certain new and useful Improvements in Electric Motors, of which the following is a specification.

My invention is in the nature of an electric motor of the vibrating type, designed chiefly to be used in small installations for advertising purposes, but applicable also to other uses; and it consists in the novel construction and arrangement of the motor parts, with special reference to securing a large effective power and freedom from polarization and residual magnetism, as hereinafter fully described with reference to the drawings, in which—

Figure 1 is a perspective view from one side, showing one application of the same for ringing a bell. Fig. 2 is a similar view from the opposite side, showing another application of the same for advertising purposes. Fig. 3 is a vertical central section through the same, and Figs. 4 and 5 are details showing modifications.

In the drawings, A represents any suitable base-stand, on which is mounted two parallel brass standards B B′, between which is hung to vibrate an electromagnet C. The axial center of vibration is located near the upper end of the electromagnet and consists of pivots or trunnions *a a′*, which connect the brass supporting frame B of the electromagnet with supporting-frame *b* of the electromagnet with the upper ends of the parallel standards B B′, the greater part of the weight of the electromagnet being below the axial center, so as to cause it to swing as a pendulum.

Between the frame-standards at the bottom there is fixedly mounted an iron armature D, whose face next to the electromagnet approaches its end very closely and is fashioned on its upper side with a concave curve conforming to the radius of the swing of the electromagnet.

The electromagnet has at its lower end three poles. The center pole is formed by the lower end 1 of the iron core of the magnet and the two side poles 2 and 3 flanking the same, one being on each side of the center pole and both being of the same polarity with each other, but opposite polarity to that of the lower end of the core 1. This result is obtained by making the two poles 2 and 3 on the lower ends of an inverted-U-shaped iron bar E, which embraces the electromagnet and has its upper or middle portion directly attached to and in magnetic connection with the upper end of the core of the electromagnet. As the upper end of the core is of opposite polarity from the lower end, the polarity of the upper end will manifest itself in the two pendent sides branches or legs of the iron bar E to the extreme lower end, so that if the lower end of the core be positive then the adjacent ends 2 and 3 of the bar E will be negative, and the attractive influence of the armature on the three poles of the electromagnet will be increased and extended through a long range or amplitude of stroke of the electromagnet, that gives it a much greater movement and available power.

I will now describe how the electric current is introduced into the motor and the circuit broken to secure the return motion.

On one side of the motor (see Fig. 1) the trunnion *a* is rigidly attached to the vibrating frame-plate *b* of the electromagnet and passes through the standard B and has rigidly attached to it a non-conducting hub *c*, bearing on its periphery a metal band *d*. This band by an insulated metal arm *d′* connects with one terminal d^2 of the helix of the electromagnet. The other terminal e^2 of this helix is in electrical connection with the frame-plate *b*, standard B′, and a swinging metal switch-arm *e*, pivoted on a stationary axis to the standard and having above its pivot two tappet-prongs *e′ e′*. Between these prongs *e′ e′* plays a pin *f*, carried by the vibrating electromagnet-frame, and which pin *f* by alternately striking the prongs *e′* and *e′* throws the switch-arm *e* from one side to the other into contact alternately with the stationary circuit-terminals *g* and *h*. One of these terminal plates *g* is connected by an insulated wire *g′* to an insulated binding-post G, and the other terminal plate *h* is through an insulated wire *h′* connected to an insulated binding-post H. Between these two binding-posts G and H is a third insulated binding-post I, to which is attached one end of a volute spiral spring *i*, which is electrically and mechanically connected to the metal face of the non-conducting hub *c*, which oscillates with the electromagnet. This spring forms a conductor to one terminal of the electromagnet, and it also acts mechanically, like an escapement-spring, to start back the elec-

tromagnet after it has swung to the end of its stroke and also holds the circuit closed when the motor is at rest, as hereinafter described.

The operation of my motor is as follows: The binding-posts G H I are connected to the batteries X X′, as seen in Fig. 1, the positive pole of the battery X being connected to the binding-post G, the negative pole of battery X′ to H, and the binding-post I being connected to the negative pole of battery X and also the positive pole of battery X′. Now if the electromagnet be thrown over so that the switch-arm *e* is in contact with circuit-terminal plate *g*, as in dotted lines, Fig. 2, a circuit from battery X will flow through the electromagnet over the following path: from positive pole of battery X to binding-post G, wire *g′*, plate *g*, switch-arm *e*, the metal frame *b* of the electromagnet, the helix-terminal e^2, the helix, the other helix-terminal d^2, arm *d′*, the coil-spring *i*, to binding-post I, and the negative side of the battery X. The magnet will therefore be energized, and the attraction which it exerts on its stationary armature will throw the magnet over on its pivots. As it passes over, the pin *f*, striking one of the prongs *e′*, shifts the switch-arm *e* out of contact with plate *g* and into contact with plate *h*, as shown in Fig. 2. The first-named circuit will be broken, and a circuit of opposite polarity will be established through the helix from the other battery X′ over the following path: from the negative side of the battery X′ to binding-post H, wire *h′*, contact-plate *h*, switch-arm *e*, the frame *b* of the magnet, helix-terminal e^2, the helix, the other helix-terminal d^2, arm *d′*, coil-spring *i*, binding-post I, and the positive side of battery X′. The magnet will therefore be again charged and will be thrown back again over its armature and in doing so will again bring switch-arm *e* into contact with circuit-terminal plate *g* to again restore the first-named circuit for a continuance of the vibration.

It will be perceived that the helix-terminal d^2, which connects with binding-post I, is alternately positive and negative, which causes the current charging the electromagnet to be alternately reversed. This prevents polarization and residual magnetism and causes the magnet to instantly let go its hold when the circuit is broken.

In making use of my motor it is specially well adapted for a vibrating motion taken directly from the swing of the electromagnet, as it is of a specially long and strong pull. In Fig. 2 I show extended above the frame of the electromagnet and rigidly attached to it a dummy representation of a hand K, which when so mounted is made to move with a continual beckoning motion to invite entrance to a store or call attention to some special object, or this hand may be concealed behind a mask and be suddenly extended into range of vision to point to an advertisement. In Fig. 1 I show in the place of the hand a bell-hammer L for ringing a bell with a strong and rhythmic stroke. Such bell-hammer should have in its shank a flexible spring-joint, as shown at *l*, to permit rebound. This flexible joint also serves by the recoil to start back the electromagnet, and the extended arm L serves to balance the electromagnet.

If it be desired to have a rotary motion, a pitman or connecting rod *r* is jointed to the oscillating frame and is made to operate as a drag-pawl on a ratchet-wheel, as seen in Fig. 5, or this rod may be connected to the crank of a continuously-rotating shaft.

When the circuit from either battery is made through the electromagnet, it is not immediately broken when the magnet starts back, but the circuit is kept closed until the magnet has progressed across the armature and made its strongest pull. This is secured by having the switch-arm *e* to be caught and held by a frictional contact on the ends of the plates *g* and *h* and by causing the pin *f* to strike the prongs *e′ e′* to shift the switch-arm *e* only after the electromagnet has moved over the armature, which gives a much stronger motive effect.

Instead of having the tappet-pin *f* on the electromagnet and the prongs *e′ e′* on the switch-arm it is obvious that the positions of these parts may be reversed.

By means of the coil-spring *i* I get a double result of causing it to act as a conductor for the electric circuits and also of returning the electromagnet from the forward throw. By reason of this spring one of the batteries and the circuit may be dispensed with, as one battery only may be made to give the forcible pull, and the return stroke may be effected by the coil-spring. This permits of the variation of the speed and power of the motor to suit its special applications. This spring also serves to hold the switch-arm *e* in contact with one of the plates *g h* when the motor is at rest, with the contacts in position for a closed circuit through the magnet, so that the motor is self-starting whenever the main or starting switch *s* throws on the current from the battery.

My invention may be used for bells, dummy hands, clocks, and for many other useful purposes for advertising or for instruction or practical use. Among its advantages I would especially point out its simple construction, its cheapness, its long pull and broad motion, the absence of polarization and absence of residual magnetism in both the magnet and the armature, and the fact that the motor is self-starting. For this self-starting action I have shown the coil-spring *i* as a preferred means for holding the switch-arm *e* onto the contact-plate *g*; but I do not confine myself to the same, as the

electromagnet may be normally held when at rest in this position by a pendulum, as shown in Fig. 4, or by other means.

I claim—

1. An electric motor, comprising a base-stand with two upright standards having between them at the bottom a stationary armature, an electromagnet pivoted between the standards, and a circuit-closing switch operated by the swing of the electromagnet.

2. An electric motor, comprising a base-stand with two upright standards having between them at the bottom a stationary armature formed as a broad curved iron plate, an electromagnet pivoted in the upper ends of the standards and constructed at its lower end with a center pole and two flanking poles, one on each side and extending from the opposite end of the magnet-core and of the same polarity therewith and a circuit-closing switch.

3. An electric motor, comprising a base-stand with two upright standards having between them at the bottom a stationary armature, an electromagnet pivoted between the standards at the upper end, two separate circuits and two circuit-closing devices operated by the swing of the electromagnet and arranged to throw an alternately-reversed current through the electromagnet.

4. An electric motor, comprising a base-stand with two upright standards having between them at the bottom a stationary armature, an electromagnet pivoted between the standards at the upper end, two separate circuits, three binding-posts, one of which is in common to both circuits, and a separate circuit-breaker for each circuit, one being closed by the swing of the magnet in one direction and the other being closed by the swing of the magnet in the other direction and vice versa.

5. An electric motor, comprising a stationary supporting-frame, a vibrating electromagnet hung in said frame and bearing a tappet projection, a pivoted switch-arm acted upon by said tappet projection, and a friction contact-plate arranged to seize and hold the switch-arm to hold the circuit closed during a part of the stroke.

6. An electric motor, comprising a stationary supporting-frame, a vibrating electromagnet hung in said frame and bearing a tappet projection, a switch-arm pivoted on a stationary axis and having a two-pronged end inclosing the tappet projection, two friction contact-plates for separate circuits arranged to seize and hold the switch-arm until released by the tappet and two reversely-arranged circuits having their opposite poles connected to the two contact-plates.

7. An electric motor, comprising a base-stand with two upright standards having between them at the bottom a stationary armature, an electromagnet pivoted between the standards near the upper end of the electromagnet, a circuit-closing device operated by the swing of the electromagnet and a weighted spring-arm attached to the electromagnet and extending above the same to balance the magnet and start it back by the recoil of the arm.

8. An electric motor comprising a fixed armature of soft iron, a three-pole electromagnet vibrating across the armature and an automatic circuit-closing switch.

9. An electric motor comprising a fixed armature, an oscillating electromagnet, a circuit-closing switch operated by the oscillations of the electromagnet, and means for holding the circuit-closing switch closed when the motor is at rest to enable it to be self-starting.

DAVID MENDELSON.

Witnesses:
EDW. W. BYRN,
SOLON C. KEMON.