No. 872,251. PATENTED NOV. 26, 1907.

J. L. POTTER.

ELECTROMAGNETIC POWER GENERATOR.

APPLICATION FILED JULY 16, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

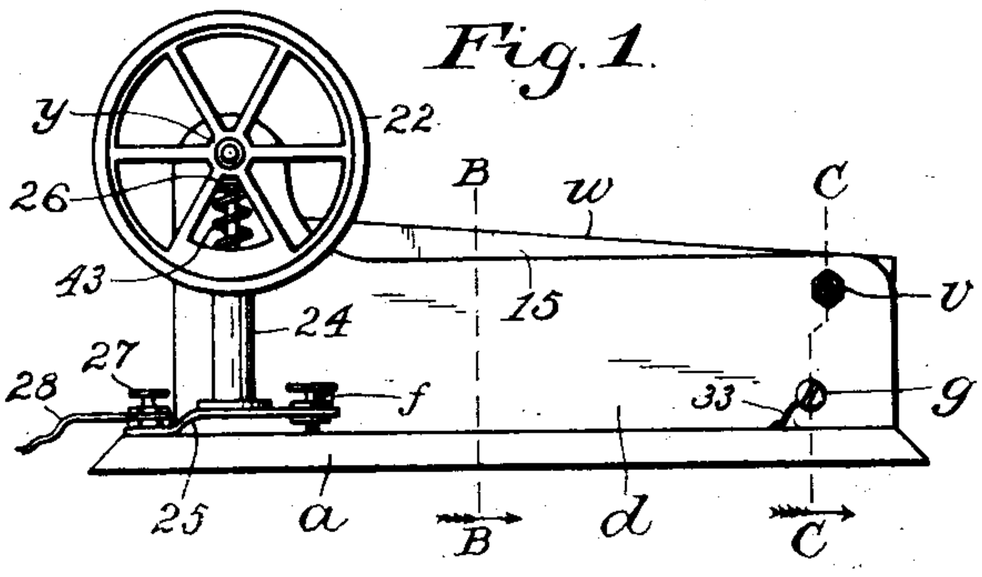

Fig. 2.

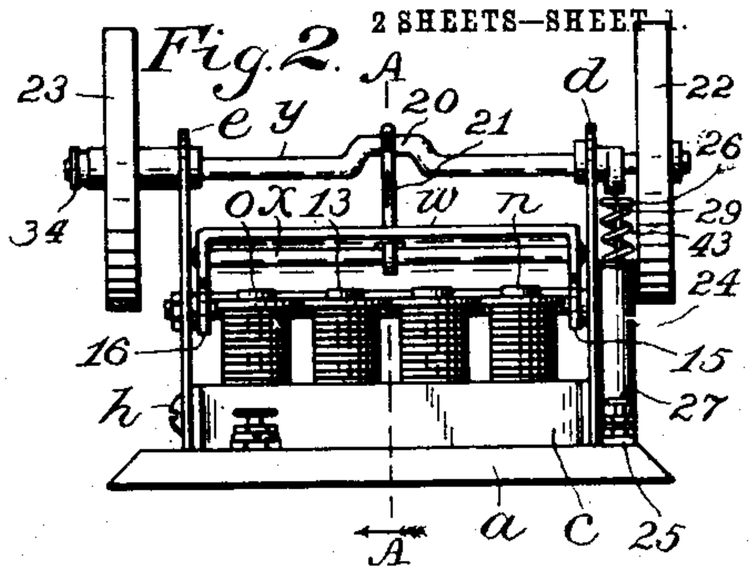

Fig. 3.

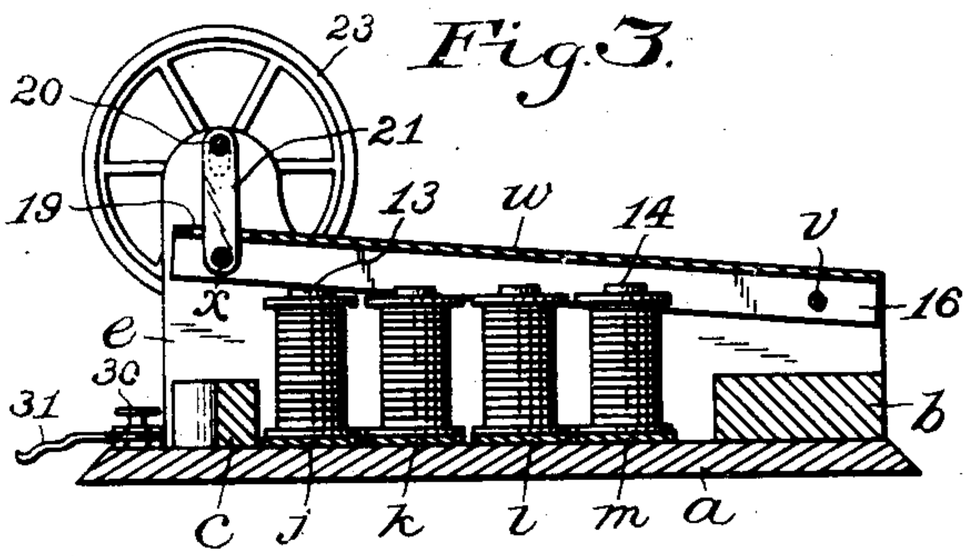

Fig. 4.

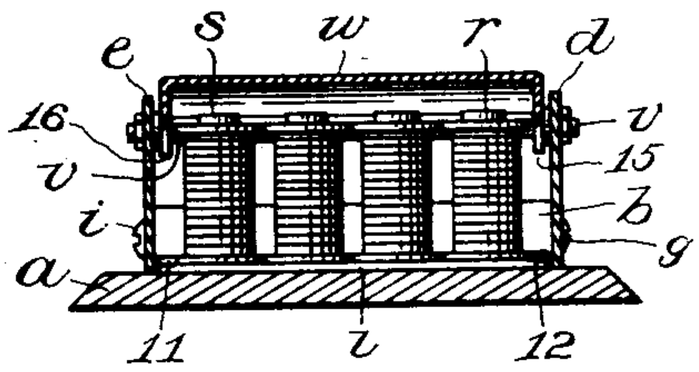

Fig. 5.

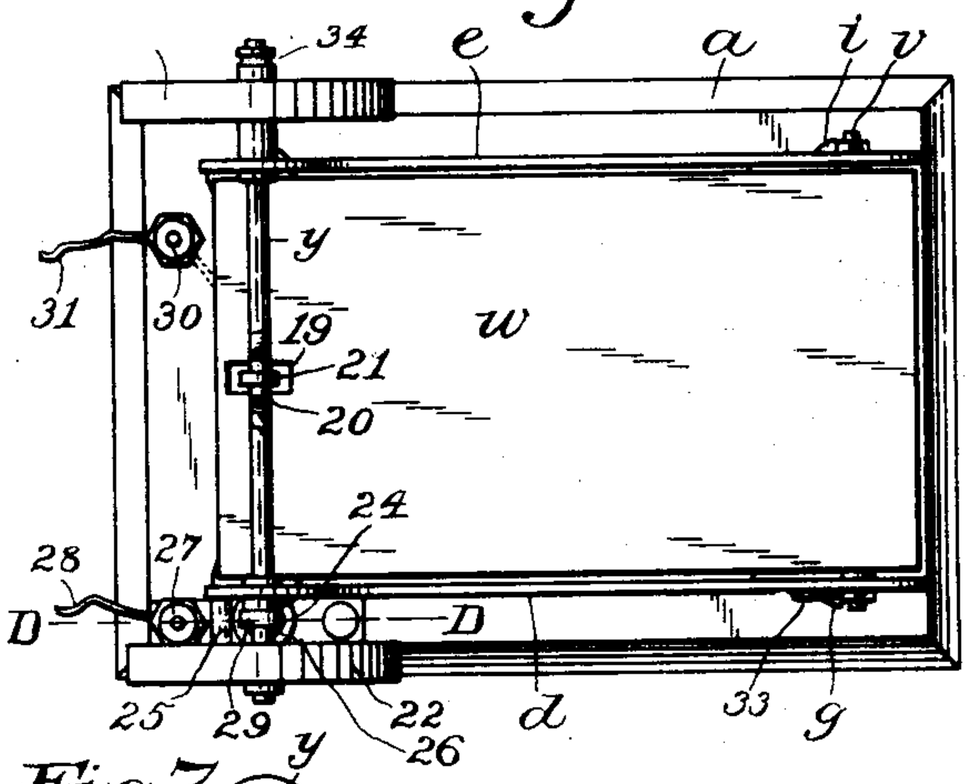

Fig. 6.

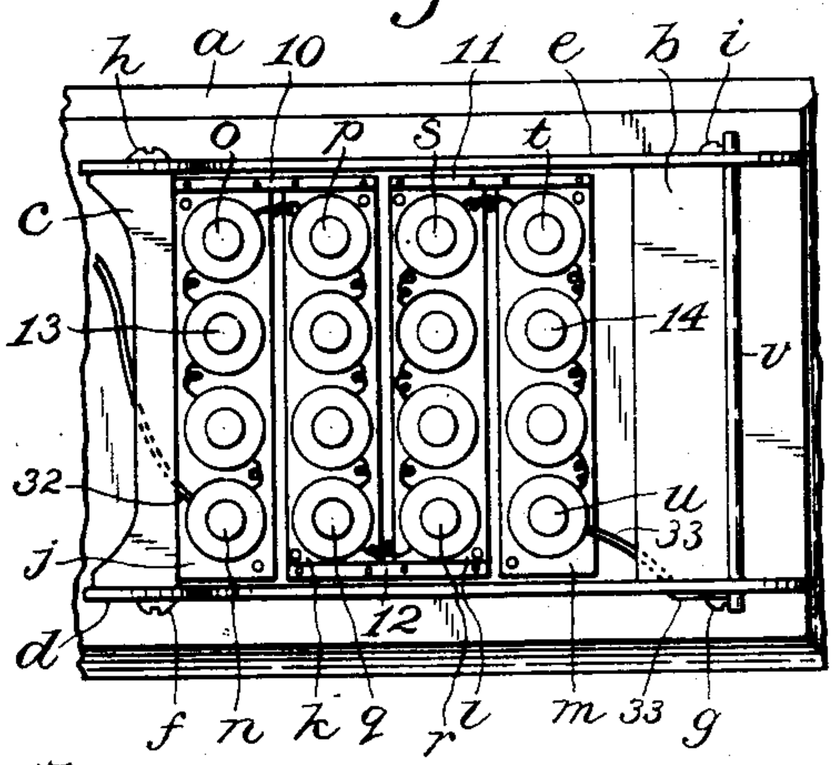

Fig. 7.

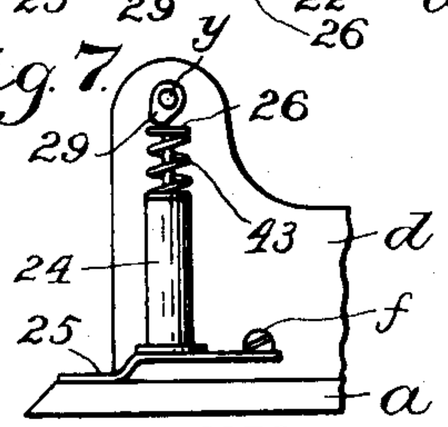

Fig. 8.

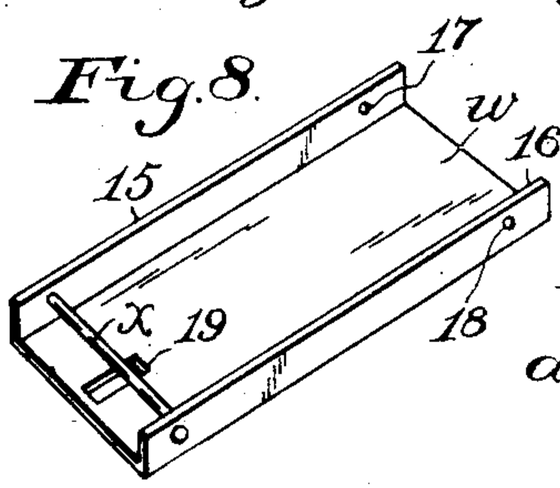

Fig. 9.

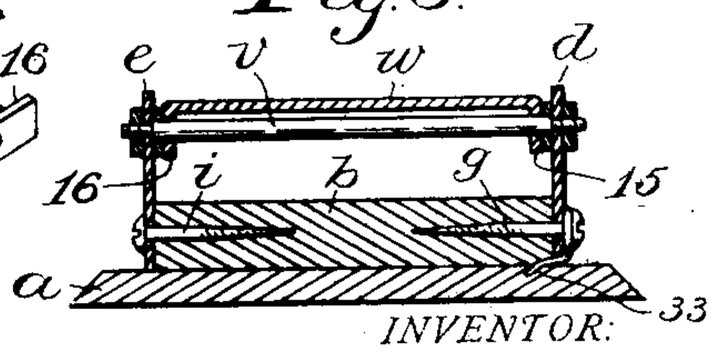

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Fig. 10.

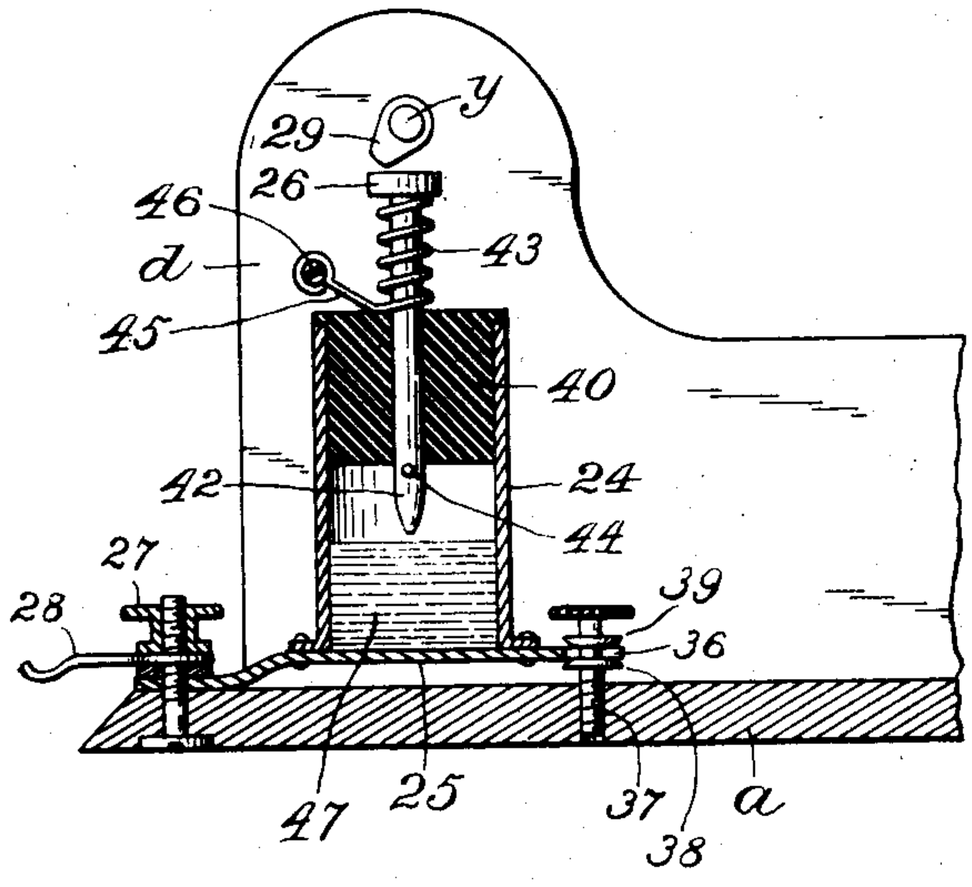


Fig. 11.

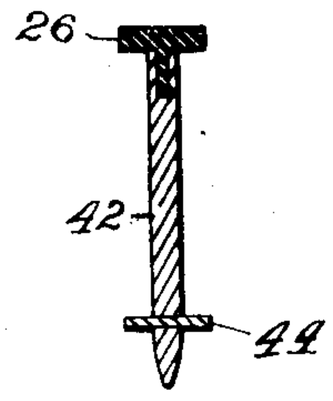


Fig. 12.

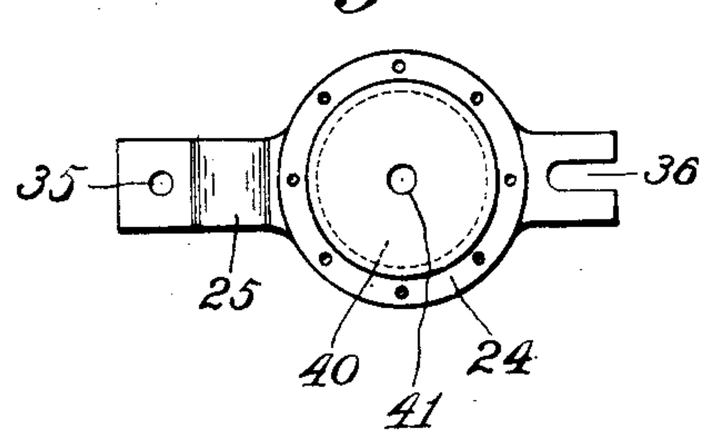
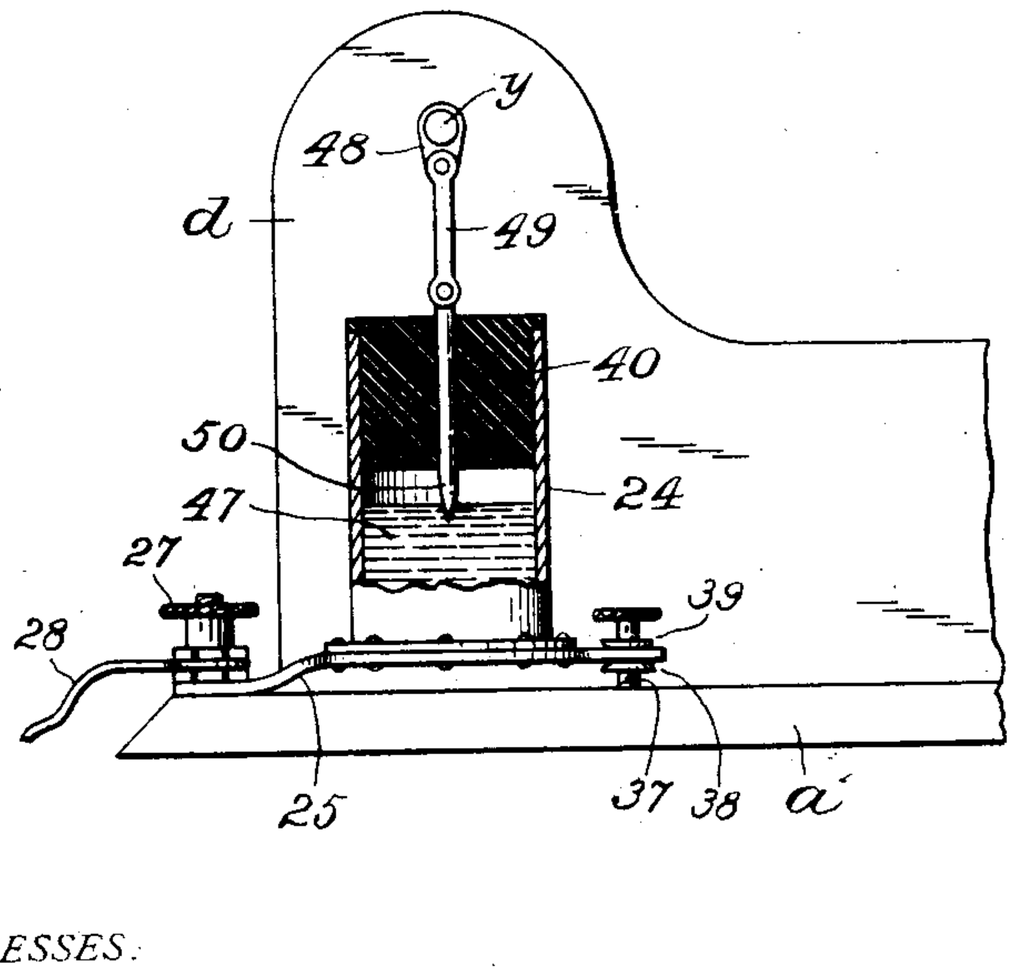


Fig. 13.



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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC POWER-GENERATOR.

No. 872,251. Specification of Letters Patent. Patented Nov. 26, 1907.

Application filed July 16, 1906. Serial No. 326,305.

To all whom it may concern:

Be it known that I, JOSEPH L. POTTER, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented new and useful Improvements in Electromagnetic Power-Generators; and I do declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to power-generators of the type in which a single armature is employed to operate opposite to a plurality of electro-magnets, to be influenced first by one or more of the electro-magnets and then in succession by the others, the armature transmitting motion to a crank-shaft, the invention having reference. particularly to improvements in the class of electro-magnetic power generators for which Letters Patent No. 798,975 were granted to me on September 5, 1905, disclosing a power generator having a plurality of pivoted bar armatures movable opposite to a plurality of magnet cores and provided with devices operatively connecting the several armatures with a crank-shaft, one of the cores being nearer than the other to the pivot of the armatures, so that in operation each armature moves toward the plurality of cores with part of the armature approaching one of the cores in advance of another part thereof that approaches another one of the plurality of cores of the magnet. Also the several armatures are successively attracted by the cores, each armature in turn transmitting power to the crank-shaft through the connector, the latter, however, by reason of its step-by-step pick-up and let-go type of construction, causing considerable noisy clatter, the construction entailing also considerable friction, the clatter and friction being objectionable in some cases.

The object of the present invention is to improve the construction generally of electro-magnetic power generators, and particularly to improve the generator shown in said Letters Patent, to the end that a single armature may be made to perform as much or more work as a plurality of armatures but through means of a relatively greater number of electro-magnets successively influencing the armature, the aim being to provide a single positive and constant connection between the armature and the crank-shaft, and at the same time attain the desired result in securing relatively long stroke of the crank of the shaft so that great power may be obtained from the electro-magnets whose magnetic field is limited in extent. And a further object particularly is to eliminate the plural-contact connector and as much as possible the friction and noise inherent in reciprocating or vibrating mechanism.

A still further object is to provide improved make-and-break devices for electric circuits.

With the above-mentioned and minor objects in view, the invention consists in an electro-magnetic generator having a plurality of fixed magnet cores arranged in a novel manner, an armature of novel construction having part thereof constantly within the field of influence of one or more of the cores, other parts of the armature being movable into or out of the field of influence of others of the cores, said armature being designed to be variously constructed specifically and having operative connection with the crank of the crank-shaft. And, the invention consists further in the novel parts and the combinations and arrangements of parts, as hereinafter particularly described and pointed out in the appended claims.

Referring to the drawings, Figure 1 is a side elevation of an electro-magnetic power generator constructed in the most simple form in accordance with the invention; Fig. 2, an end elevation thereof; Fig. 3, a longitudinal vertical sectional view on the line A A in Fig. 2; Fig. 4, a transverse vertical sectional view on the line B B in Fig. 1; Fig. 5, a top plan view of the complete power generator; Fig. 6, a fragmentary plan view without the armature, showing the plan arrangement of the electro-magnet cores; Fig. 7, a fragmentary side elevation showing the make-and-break devices by which the cores may be magnetized or de-magnetized; Fig. 8, a perspective view of the armature inverted with respect to its operative arrangement; Fig. 9, a transverse vertical sectional view on the line C C in Fig. 1; Fig. 10, a vertical sectional view on the line D D in Fig. 5 showing the make-and-break device in modified form; Fig. 11, a sectional view of the modified electrode of the device; Fig. 12, a top

plan of the electrode holder; and, Fig. 13, a fragmentary side elevation of the machine showing modifications in the make-and-break device.

In construction a suitable frame base is provided, preferably of wood for the smaller sizes of machines, the base comprising a main part *a* and two anchor-pieces *b* and *c*, the two latter parts being suitably secured to the main part or formed integrally therewith. Two frame parts *d* and *e* rest on the base part *a* and are secured to the anchor-pieces by screws *f g h i*.

A suitable number of yokes *j k l m* are secured upon the base part *a* between the frame parts *d* and *e*, and suitable magnet cores *n o p q r s t u* are attached to the yokes, standing upright thereon, all being uniform in height, and there being four cores on each yoke. The yokes *j* and *k* are connected by a bridge 10, the yokes *l* and *m* by a bridge 11, and the yokes *k* and *l* by a bridge 12. Also cores 13 and 14 and other cores, usually a large number, are attached to the yokes, and any suitable number of yokes and cores may be employed to suit requirements. The cores have suitable windings, the windings of the different cores being suitably connected together, as will be understood.

The armature pivot *v* is mounted on the frame parts *d* and *e*, and the armature *w* is mounted on the pivot so that the major portion of the armature may swing up or down opposite to the tops of the cores. The armature is of broad flat bar-shape and has side bars 15 and 16 in which are pivot holes 17 and 18 near the ends thereof to receive the pivot *v*, the opposite ends of the side bars having a pivot rod *x* connected thereto, there being a slot 19 in the armature opposite the middle portion of the rod. In the smaller or toy sizes of machines the armature may be cheaply stamped out of sheet metal, the side bars being integral with the body of the armature. The armature with its side bars serves as a cover for the electromagnet so as to be ornamental as well as useful. In its proper relation to the magnet cores the armature is pivoted so that the body of the armature may have its under surface nearly in contact with all of the cores at one time and be separated an equal distance from all of the cores, it being desirable to prevent actual contact of the armature with the cores in order to provide a noiseless machine.

A shaft *y* having a crank 20 is mounted rotatively in the frame parts *d* and *e*, and a pitman 21 of suitable length is connected to the crank and also to the rod *x* with which the free end of the armature is provided, the pitman extending through the slot 19. Balance wheels 22 and 23 are attached to the shaft.

The make-and-break devices may be variously constructed to suit requirements and voltage employed for energizing the cores, the elements of the devices comprising preferably an electrode holder 24 that serves as an electrical conductor and which is attached to a conducting plate 25 formed as a part of the holder, there being a contact piece 26 suitably supported by the holder, the plate 25 being connected to a binding-post 27 that is mounted on the base part *a* and connected by a circuit-wire 28 which may be connected to any suitable source of electricity as a battery or a dynamo. The devices include preferably a cam 29 that is secured to the shaft *y* so that when the shaft rotates the full part of the cam may be brought into contact with the contact-piece 26 to periodically form a circuit through the shaft and the frame of the machine. A binding post 30 is mounted on the base part *a* and has a circuit-wire 31 connected thereto which may be connected to a battery, the binding post being connected with the winding of the magnet cores, as by the wire 32 of the core *n*, the wire 33 of the core *u* being connected to the frame part *d* by means of the screw *g*, so that the current may pass by way of the frame and the main shaft *y*. Any suitable electrical connection may be made between the holder 24 and the contact-piece 26, the latter being supported yieldingly by a spring. The contact-piece may be a conductor and have considerable thickness so as to not wear out rapidly by frictional contact, nor readily burn out by the sparks. Modifications in the make-and-break devices will be described hereinafter in detail. In order to transmit power from the generator a pulley 34 is attached to the main shaft *y*.

When the machines are built in the smaller or toy sizes, they may be operated by means of common portable batteries, but in some cases it is desirable to connect the machines to the wires of electric lighting systems, in which case the core windings will be designed for the higher voltage, and in such cases it is desirable to modify the make-and-break devices and provide against rapid burning out of the electrodes or the points at which the circuits are to be broken for de-magnetizing the cores. For this purpose it is preferable that the holder 24 be formed as a hollow cylinder, the plate 25 comprising a bottom therefor and composed of spring-metal, one end of the plate having a hole 35 therein to receive the binding post 27 by which the plate is secured to the base part *a*, the other end of the plate being movable slightly so that the holder may be adjusted in height, the movable end having a slot 36 therein to receive an adjusting screw 37 which is screwed into the base part *a*, there being collars 38 and 39 on the screw at opposite sides of the plate. A guide 40 is fixed in the holder 24 and has a guide opening 41 therein

in which is a movable electrode 42 formed as a rod or vertical plunger, the contact-piece 26 being attached to the top thereof. The guide preferably is formed as an insulator as shown in Figs. 10 and 13, and as indicated in Fig. 11, the contact-piece 26 may be composed of insulating or non-conducting material. A spring 42 normally forces the electrode toward the cam 29 against a stop pin 44 with which the electrode is provided, the spring encircling the electrode between the guide 40 and the contact-piece 26. If the contact-piece 26 be composed of non-conducting material so that no sparks can be thrown off between it and the cam, a circuit-wire 45 is attached to the spring 43 and to the frame part *d* by a screw 46, so that a circuit may be had direct between the frame part and the electrode by means of the spring which incidentally has contact with the electrode and must be made of conducting material. If the contact-piece 26 be a conductor the wire 45 will not be required, the circuit being made by way of the cam and shaft. In the holder 24 is a suitable quantity of mercury or other suitable conducting liquid or substance 47 with which the electrode 42 may have contact only when depressed by the cam or moved by other means to be hereinafter described. In some cases a crank 48 may be attached to the shaft *y* as in Fig. 13 in lieu of the cam 29, a rod 49 being connected to the crank and to an electrode 50 which is guided in the guide 40 in lieu of the electrode 42 and contact-piece 26, this modification requiring that the guide 40 be composed of non-conducting material, and that the substance 47 be liquid so that the electrode may dip into it, or that the substance 47 if a solid shall be yieldingly supported in the holder, or if it be preferred, the holder itself be yielding.

In practical use the crank 20 on its lower center will permit the armature *w* to approach nearly into contact with all of the magnet cores, and at the upper center of the crank, the armature will be inclined to the plane of the tops of the cores, as in the drawings, particularly as seen in Fig. 3, so that the cores nearer the pivot *v* will first attractively influence the armature which is too far removed from the farther cores as at 13 to be influenced thereby. During the movement of the crank-shaft the armature will be brought successively within the field of the cores on the yokes *l* and *k* and those farther removed from the pivot of the armature.

It will be clear from the foregoing that the machine will operate smoothly and noiselessly, and the number of frictional connections is reduced to the minimum, thus eliminating to the maximum extent what might operate to retard motion or detract from the effective power of the machine.

Having thus described the invention, what I claim as new is—

1. An electro-magnetic power generator including a plurality of pairs of magnet cores, an armature covering all of the plurality of pairs of cores, a pivot supporting one end part of the armature, and a crank-shaft having constant operative connection with the other end part of the armature.

2. An electro-magnetic power generator including a frame, a rotative crank-shaft and also a pivot mounted on the frame, a make-and-break device mounted on the frame, a make-and-break device mounted on the crank-shaft, a plurality of magnet cores arranged as a group thereof, a circuit-wire between one of the group of cores and the frame, a pitman connected to the crank of the crank-shaft, and an armature mounted on the pivot and pivotally connected to the pitman and guided thereby.

3. An electro-magnetic power generator including a plurality of pairs of fixed magnet cores, a pivot, a rotative crank-shaft, and an armature mounted on the pivot and extending over the ends of the plurality of pairs of cores, the armature being operatively connected with and guided by the crank of the crank-shaft and periodically moving toward the cores with part of the armature approaching one pair of cores in advance of another part thereof that approaches another pair of the magnet cores.

4. An electro-magnetic power generator including a plurality of stationary magnet cores grouped together, a pivot, a rotative crank-shaft, and an armature comprising a broad flat bar-shape main member having side-bars and covering the ends of the group of cores, the armature being guided movably by the pivot and the crank-shaft.

5. An electro-magnetic power generator including a plurality of stationary magnet cores, a rotative crank-shaft, a pivot, a pitman connected to the crank of the crank-shaft, and an armature comprising a broad flat bar-shape main member having side-bars formed integral therewith and connected pivotally to the pivot, the armature being pivotally connected to the pitman.

6. In an electro-magnetic power generator, the combination of a base having a plurality of yokes mounted thereon, each yoke having a plurality of magnet cores attached thereto, a frame, a rotative crank-shaft mounted on the frame, a pivot mounted on the frame, and an armature having a pair of side-bars and covering the ends of the plurality of magnet cores, the armature being supported and guided movably by the pivot and having operative connection with the crank-shaft.

7. In an electro-magnetic power generator, the combination of a fixed electro-mag-

net, a rotative crank-shaft, an armature operatively connected with the crank-shaft and movable opposite to the electro-magnet, an electrode holder having a guide therein and provided with a contact-element, an electrode mounted in the guide and movable into contact with the contact-element, and means between the crank-shaft and the electrode for moving the electrode.

8. In an electro-magnetic power generator, the combination of a fixed electro-magnet, a rotative crank-shaft, an armature operatively connected with the crank-shaft and movable opposite to the electro-magnet, an electrode holder having a non-conducting guide therein and provided with a liquid conducting contact-element, an electrode mounted in the guide and movable into the contact-element, and means between the crank-shaft and the electrode for moving the electrode.

9. In an electro-magnetic power generator, the combination of a fixed electro-magnet, a rotative crank-shaft, an armature operatively connected with the crank-shaft and movable opposite to the electro-magnet, an electrode holder adjustably supported and having a non-conducting guide therein and provided with a liquid conducting contact-element, an electrode mounted in the guide and movable into the contact-element, and means between the crank-shaft and the electrode for moving the electrode.

10. In an electro-magnetic power generator, the combination of a fixed electro-magnet, a rotative crank-shaft, an armature operatively connected with the crank-shaft and movable opposite to the electro-magnet, a cam secured to the crank-shaft, an electrode holder having a guide therein, means for adjusting the holder, a conducting contact-element in the holder, an electrode mounted in the guide, and a spring normally pressing the electrode towards the cam.

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

JOSEPH L. POTTER.

Witnesses:

E. T. SILVIUS,

S. SNIDER.