

J. S. CAMACHO.

Improvement in Electric Magnetic Motors.

No. 129,000.

Patented July 16, 1872.

Fig. 2.

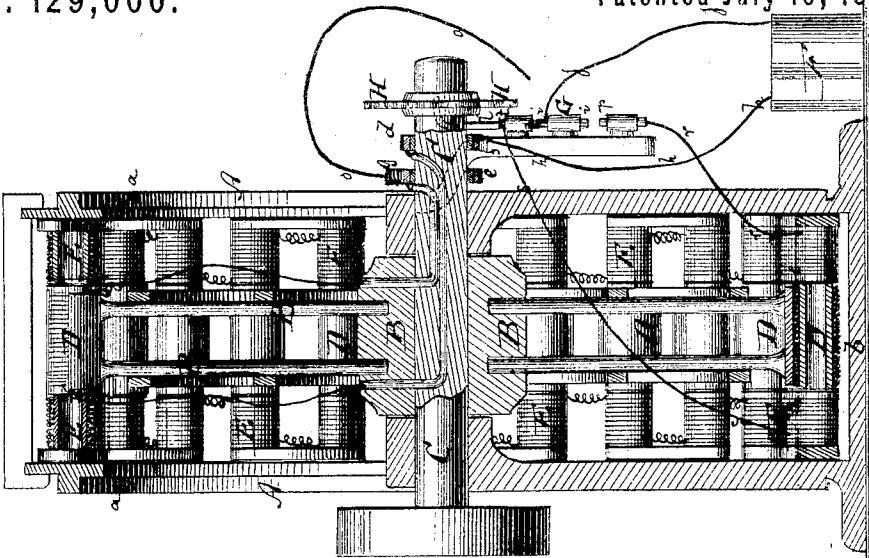
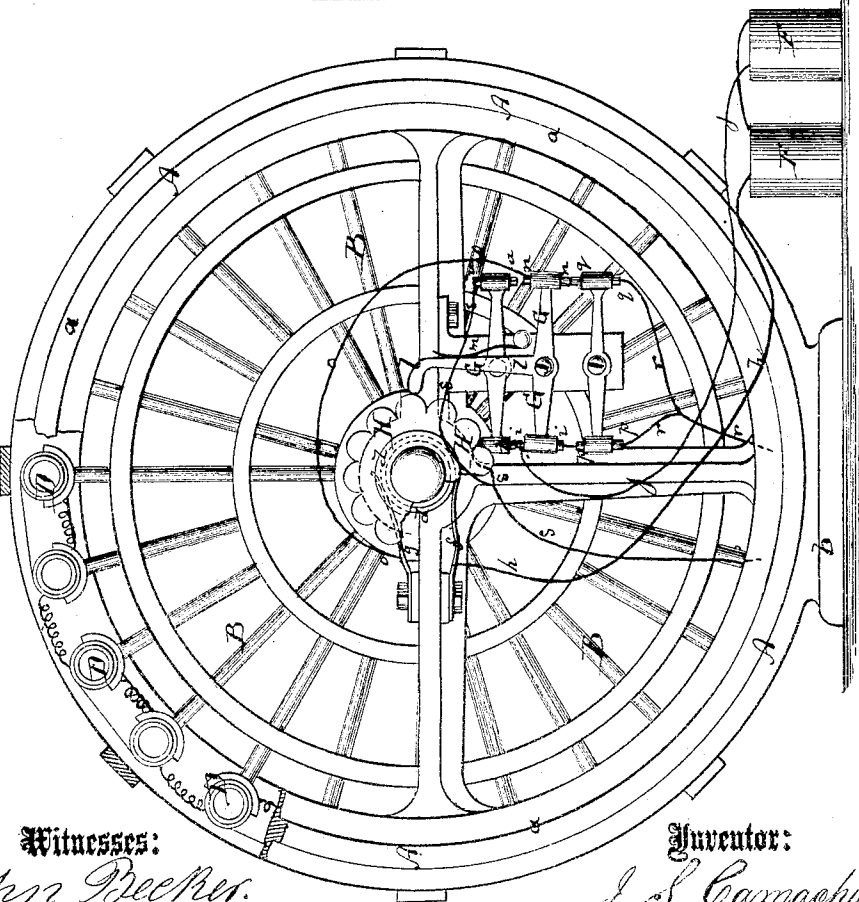


Fig. 1.



Witnesses:

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PER

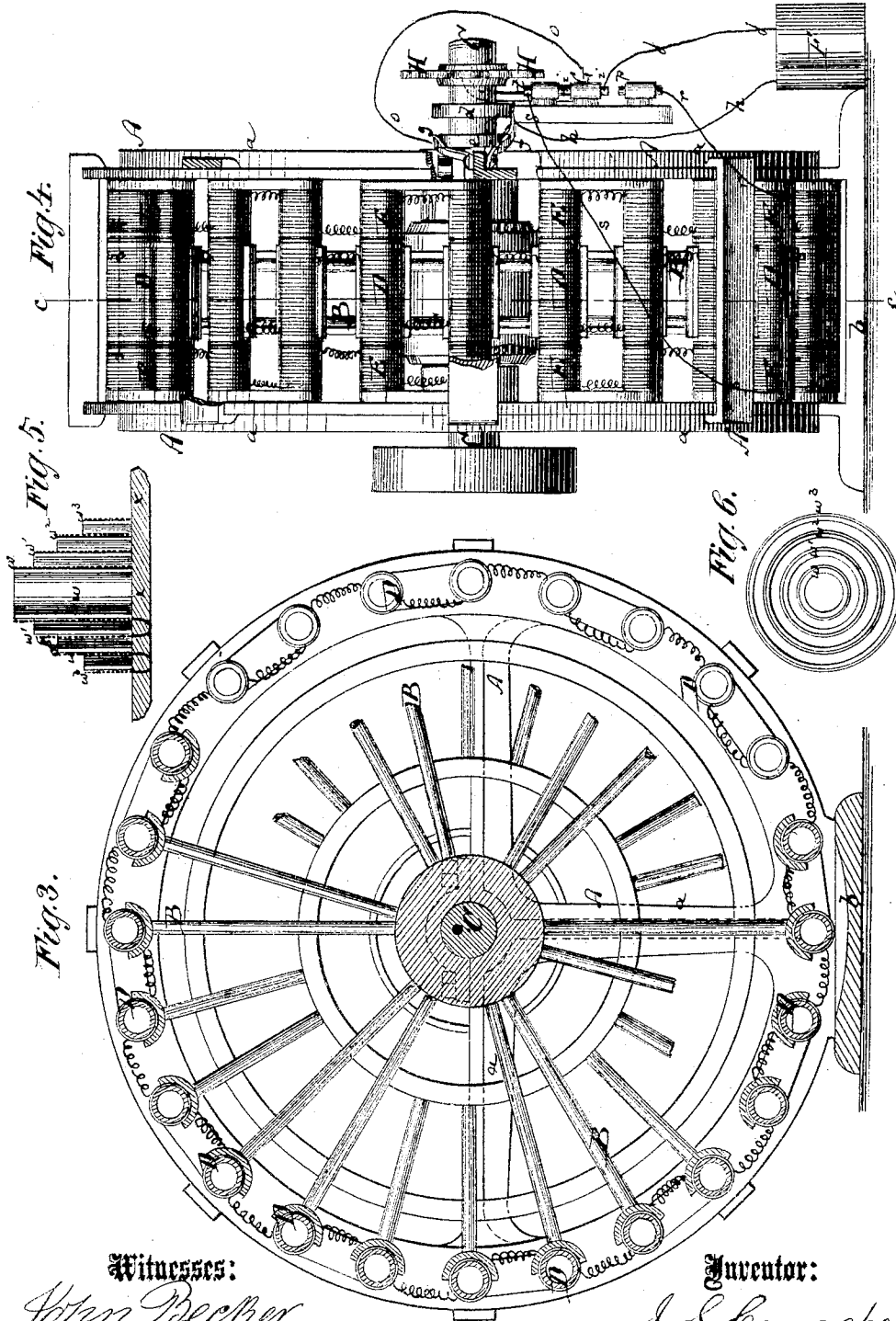
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UNITED STATES PATENT OFFICE.

JOSÉ S. CAMACHO, OF HABANA, ISLAND OF CUBA.

IMPROVEMENT IN ELECTRO-MAGNETIC MOTORS.

Specification forming part of Letters Patent No. 129,000, dated July 16, 1872.

Specification describing a new and Improved Electric-Motor, invented by JOSÉ S. CAMACHO, of Habana, in the Island of Cuba.

This invention relates to a new electro-motor to be applied to the propulsion of vehicles, such as railroad-cars, small or large vessels, to the operation of machinery, and other useful purposes. The invention consists principally in such a combination of a wheel containing a series of electro-magnets that have an unvarying direction of electric current with a series of stationary electro-magnets, in which the direction of the current is reversed at regular intervals, that by the changed polarity of the stationary electro-magnets their respective power of attraction will be so changed or rather transmitted from one to the other that the wheel-magnets will be caused to follow such transmission, whereby the wheel is turned. This principle of operation is based upon the well-known property of magnets to have their opposite poles attract, but their like poles repel each other. The invention also consists in a new current-regulating mechanism; and also in a novel construction of electro-magnets for the purpose of obtaining a larger ratio of power from a given length of coil than could be derived by the plain cores of ordinary electro-magnets, all as hereinafter more fully described.

In the accompanying drawing, Figure 1 represents a side elevation, partly in section, of my improved electric-motor. Fig. 2 is a vertical central section of the same. Fig. 3 is a vertical section of the same on the plane of the line *c c*, Fig. 4. Fig. 4 is an end view, partly in section, of the same. Fig. 5 is a longitudinal central section; and Fig. 6, an end view of the new form of electro-magnet.

Similar letters of reference indicate corresponding parts.

A in the drawing is the frame of the apparatus. It is made of suitable size, according to the power to be obtained or imparted; and is composed of two circular cheeks or sides, *a a*, projecting from a base, *b*. B is a wheel, mounted upon a shaft, C, whose bearings are in the cheeks of the frame A. The wheel B carries at or near its circumference a series of electro-magnets, D D, whose axes are parallel to the axle C, while their poles are in line with

the faces of the wheel, respectively. The electro-magnets D are supported on spokes or disks, or otherwise on part of the wheel. The wires wound about the electro-magnets D are all connected with each other, so that said electro-magnets are all affected by the same current, but being wound in opposite directions around the magnets, alternately, the poles of the latter will also be alternately of opposite names on the same side of the wheel. Each cheek of the frame A supports as many electro-magnets E E as the wheel B, and they are set on a circle of equal diameter, so that each of the several magnets D can be placed between two of the electro-magnets E E, as shown, the latter being preferably but half as long as the former. The several electro-magnets E E on both sides of the wheel are all connected by the same wire, so that the current, when passing through such wire, will magnetize all the coils E with equal intensity. The electro-magnets E E are connected metallically into pairs, the wire being wound in reverse direction around the cones of every pair, so that their contiguous poles in the same plane will be of opposite polarity. The wire which passes around the magnets D connects at its ends, respectively, with two insulated rings, *d* and *e*, which are mounted upon the axle C, and in metallic connection with two springs, *f* and *g*, that are fastened to the frame A. The spring *f* is by a wire, *h*, connected with one pole of the battery F, from which power is derived for operating the machine. The other pole of the same battery connects by a wire, *j*, with a pin, *i*, that is fastened to one end of a pivoted T-shaped lever, G. The pin *i* is insulated from the lever G, whose vertical arm *l* is by a spring, *m*, held against a notched wheel, H, that is mounted upon the shaft C. The other or third arm of the lever G carries in its extremity an insulated metal pin, *n*, which is by a wire, *o*, connected with the spring *g*, as shown in Fig. 1. Under the pins *i* and *n* are two pins, *p* and *q*, respectively, held insulated in a fixed frame, and connected by conductors *r r*, with one end of the wire that is wound about the electro-magnets E. The other end of the same wire is by conductors *s s* connected with pins *t* and *u*, which are held insulated in a fixed frame, respectively, above

pins *i* and *n*. When the end of the arm *l* is in contact with a prominence of the wheel *H* the pin *j* will be in contact with *t*, and the pin *n* in contact with *q*, as shown in Fig. 1. The current will then form the battery, pass along the conductor *h*, spring *f*, and ring *d*, over the wires of the magnets *D* of the wheel, leaving the same through the ring *e*, spring *g*, and wire *o*, whence it passes on the pins *n* *q* and wire *r* to the electro-magnets *E*, leaving the same over the wire *s*, pin *t*, pin *i*, and wire *j*, which carries it back to the battery. All the electro-magnets *D* and *E* are then magnetized in such manner that the fixed magnets *E* will attract the magnets *D*, so as to turn the wheel in part. Such turning, will, however, cause the arm *l* to enter a notch of the wheel *H*, and, bringing the pin *i* in contact with *p* and *n* with *u*, the current from the wheel will then enter the fixed magnets by the conductor *S*, and leave them through *r*. Thus the current is reversed throughout all the magnets *E*, but remains unchanged in *D*. The magnets *D* *E* in contact, will thereby have their contiguous poles equalized to repel each other, while the magnets *E*, next to those in contact with *D*, having the poles reversed, will attract *D*, and cause a further turning of the wheel. In this manner the wheel is turned continuously as long as the current is sustained. It may, by means of a belt, by gearing or otherwise, transmit its power to the propelling mechanism of a car or to other machinery. Each electro-magnet employed in the above apparatus I prefer to construct in the manner shown in Figs. 5 and 6—that is to say, make with a series of concentric cups, *w*, *w*¹, *w*², *w*³, &c., instead of using the single central core now in use.

I find that much of the power of the outer coils of wire is lost in ordinary electro-magnets in proportion to their distance from the core,

and that much power is gained when each coil is, or, at least, as few coils as possible, are brought in contact with the core. This latter object is attained by subdividing the core into as many cylinders, one within the other, as there are coils or subdivisions of coils, the interior cylinders being longer than those surrounding them, in such ratio that the lengths of wire of the several coils may be equal. The several gradated cylinders *w*, *w*¹, *w*², *w*³, &c., are attached to one plate, *x*, by which the magnetism is utilized either by attraction or repulsion.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The magnets *D*, arranged upon a rotary wheel or ring, *B*, and wound with conducting-wires in reverse directions, alternately, so that the poles of each magnet will be of opposite polarity, alternately, and the magnets *E*, arranged upon the stationary rings *A*, so as to be in the same horizontal plane with the magnets *D*, and connected into pairs, around which the conducting-wires are wound in reverse direction, alternately, all arranged to operate as herein shown and described.

2. The vibrating lever *G*, carrying the pins *i* *n* and the arm *l*, and arranged in combination with the pins *p* *q*, conductors *r*, pins *t* *u*, conductors *s*, and with the notched wheel *H*, to operate substantially as herein shown and described.

3. The electro-magnets, composed of the concentric gradated cylinders *w*, *w*¹, *w*², &c., with a coil around each, as set forth.

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Witnesses:

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