

WILLIAM WICKERSHAM.

Improvement in Electro-Magnetic Engines.

No. 124,868.

Patented March 19, 1872.

Fig. 1.

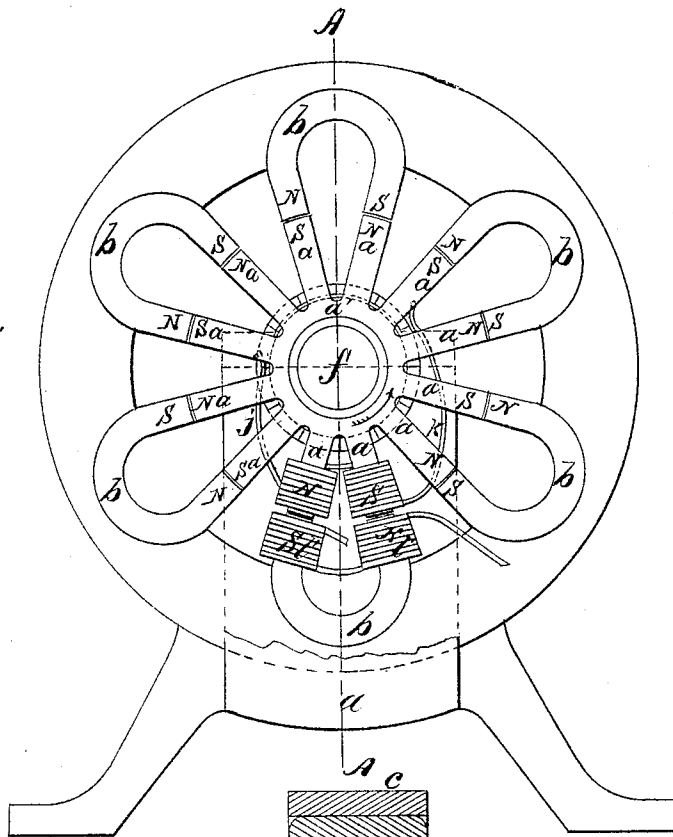


Fig. 2.

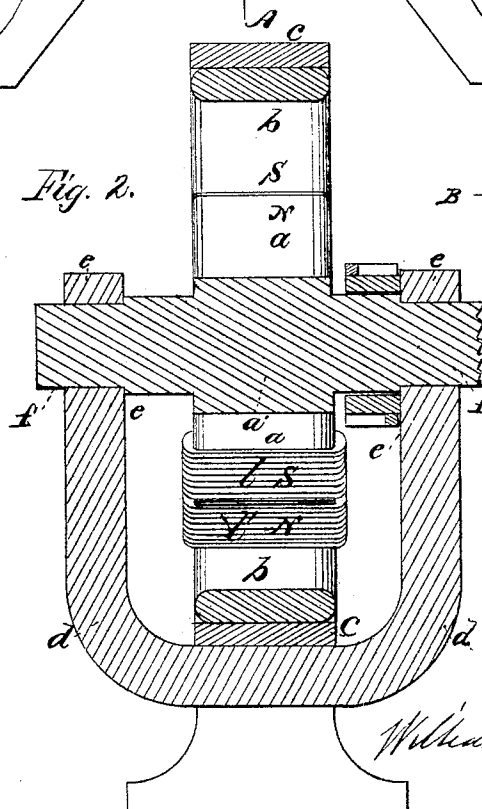
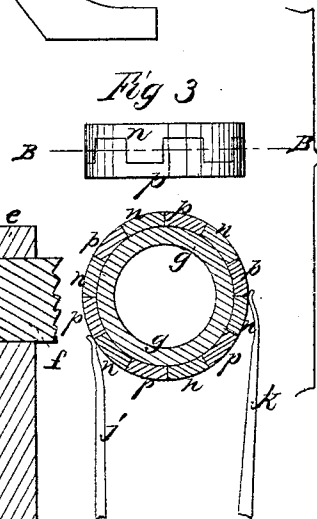


Fig 3



Witnesses.

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IMPROVEMENT IN ELECTRO-MAGNETIC ENGINES.

Specification forming part of Letters Patent No. 124,868, dated March 19, 1872.

Be it known that I, WILLIAM WICKERSHAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in the Electro-Magnetic Engine; and I hereby declare that the following is a full and exact description of the same, reference being had to the annexed drawing and the letters of reference marked thereon making a part of this specification.

The first feature of my invention relates to construction; and consists in a series of electro-magnets, constructed of one piece of iron, having their poles outward and equidistant from their axis of rotation, and their middles about the axis joined in one solid piece of iron.

The second feature of my invention relates also to construction; and consists in elongated poles of electro-magnets in a parallel direction to their axis of rotation, or in extending a horseshoe electro-magnet at right angles to the plane of its bend, thereby increasing their power proportionate to the extension of the pole.

The third feature of my invention relates to the form of the helix; and consists in an elongated helix suited to the elongated pole, as described, made of a ribbon-shaped strip of metal, so formed that one edge of the strip shall be next to the magnet, while the other edge is from it.

The fourth feature of my invention relates to the arrangement of the poles; and consists in making the revolving poles of alternate north and south polarity, and of having a corresponding series of fixed horseshoe electro-magnets, with poles of alternate north and south polarity, near to which the revolving poles pass, so that always when a north pole of one of the revolving magnets approaches the south pole of one of the fixed magnets a south-pole revolving magnet will approach the north pole of the same fixed magnet.

The fifth feature of my invention relates to the manner of changing the poles, and consists in reversing the polarity of each magnet of one series (the revolving or the fixed series) at the line of the nearest approach to one of the opposite series, thereby securing the condition that each revolving pole shall always repel a fixed pole while receding from it, yet always attract it while moving toward it.

Referring to my drawing, Figure 1 is an end

elevation of my engine with the box of the shaft taken off so as to exhibit the end of the frame and the fixed as well as the revolving magnets. Fig. 2 is a section through the center from one end to the other of my machine in the dotted line A. Fig. 3 shows an edge view and a section through the middle of the pole-changer.

a a a are the revolving magnets. *a'* is the central portion of iron, in which they are all united. *b b b* are the fixed horseshoe electro-magnets. *c* is the frame or ring to which the fixed magnets are attached. *d* is the support of the revolving magnets, having boxes *e e*, into which the shafts *f f* of the revolving magnets are fitted. *g* is an ivory ring, onto which the two pole-changing rings *p* and *n* are fitted. *j* and *k* are wires connected with the two ends of the helices. *l l* are the helices of the revolving magnets; *v v*, the stationary ones.

In describing the operation of my engine, I will assume that the ring *p* is connected with the positive pole of the battery, and the ring *n* is connected with the negative pole of the same, and that the terminating wires *j k* of the helices *l l* press upon the rings *n* and *p* in the dotted line B, as shown in the sectional view, Fig. 3, and that all the revolving and fixed magnets are provided with helices, as the two lower ones are; then assuming that all parts of the machine have the positions as shown in the drawing, and that the ring *g* and the two rings *n* and *p* around it are fixed, and attached to the box *e e*, so as to insulate the rings *n* and *p*. Now, suppose that the revolving magnets begin to move in the direction indicated by the arrow *i*; immediately the wire *j* disconnects with the positive pole and closes with the negative, while at the same time the wire *k* disconnects with the negative and closes with the positive pole by passing around the pole-changer. The effect of this is to change the polarity of all the revolving magnets *a a a*, while the stationary magnets remain unchanged, making each revolving pole of the same polarity of the fixed pole adjacent to it, thereby causing a mutual repulsion between them and a mutual attraction between each revolving pole and the next fixed pole in advance in the direction in which it is moving; and when each moving pole reaches next fixed pole, another change of polarity is made in the

moving poles, causing them to repel the adjacent fixed poles and attract the next in advance, and so on continuously all the way round, which is done automatically by the pole-changer *n p* by reversing the direction of the current in all the helices *l l* of the revolving magnets *a a* each time they approach to their nearest position to the poles of the fixed magnets *b b b*. Meanwhile the opposite ends of the strip of metal forming the helices of the fixed magnets *l' l'* are connected to the two poles of the battery in such manner as to give one end of each constantly a north polarity and the other a south polarity; and the whole series is arranged to give every alternate pole the same polarity and the intermediate ones the opposite polarity; but by attaching the ring *g* to the shaft *f*, (instead of fixing it to the box *e e*.) and having it revolve with the shaft, and then having the wires *j* and *k* connect with the opposite ends of the helices *l' l'*, so as to reverse their currents, while the currents of the helices *l l* are constant in the same direction, the same result may be attained.

The revolving magnets *a a a* are attached to and may be the same piece of iron with the shafts *f f* fitted in the boxes *e e*, and all revolve around a common axis, so that their poles pass close by the poles of the fixed magnets *b b b*.

Having thus described my invention, I claim as follows:

1. I claim, in electro-magnetic engines, three or more electro-magnetic poles of one piece of metal revolving around a common axis, substantially as described, and for the purpose set forth.

2. I claim the revolving or fixed magnets, or both, elongated in direction parallel to the axis of their rotation, as and for the purpose set forth.

3. An elongated helix suited to the elongated poles of the magnets, as described, made of thin ribbon-shaped strips of metal, substantially as and for the purpose described.

4. Two series of electro-magnets of alternate north and south polarity, so arranged that when one of the revolving magnets of north polarity approaches the pole of the fixed horseshoe magnet of south polarity one of the revolving south poles shall approach the other (north) pole of the horseshoe fixed magnet, as and for the purpose set forth.

5. The device and arrangement by which the polarity of each pole of one series (the revolving or fixed series) is reversed at the time of the nearest approach to one of the opposite series, the whole of the series in like manner being reversed at the same time, substantially as described, and for the purpose set forth.

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Witnesses:

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