No. 897,824. PATENTED SEPT. 1, 1908.

W. R. EVERETT & E. J. NEWTON.

POLE SHOE.

APPLICATION FILED AUG. 17, 1904.

Fig. 1

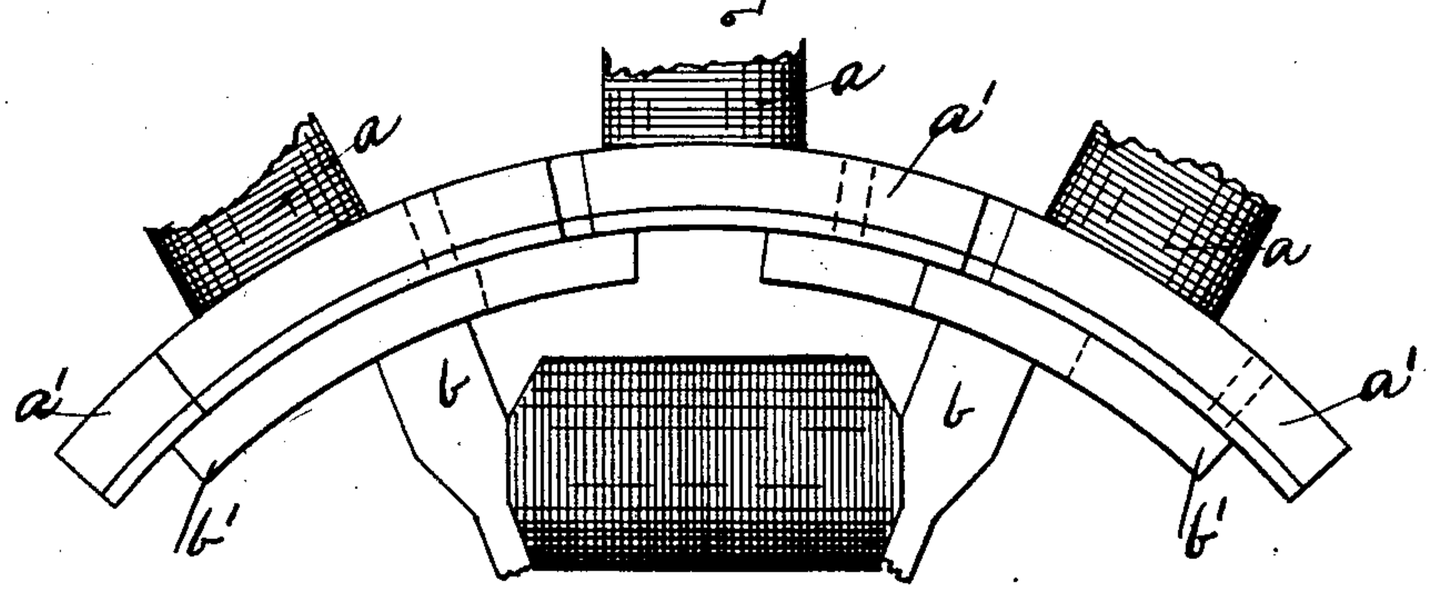



Fig. 2.

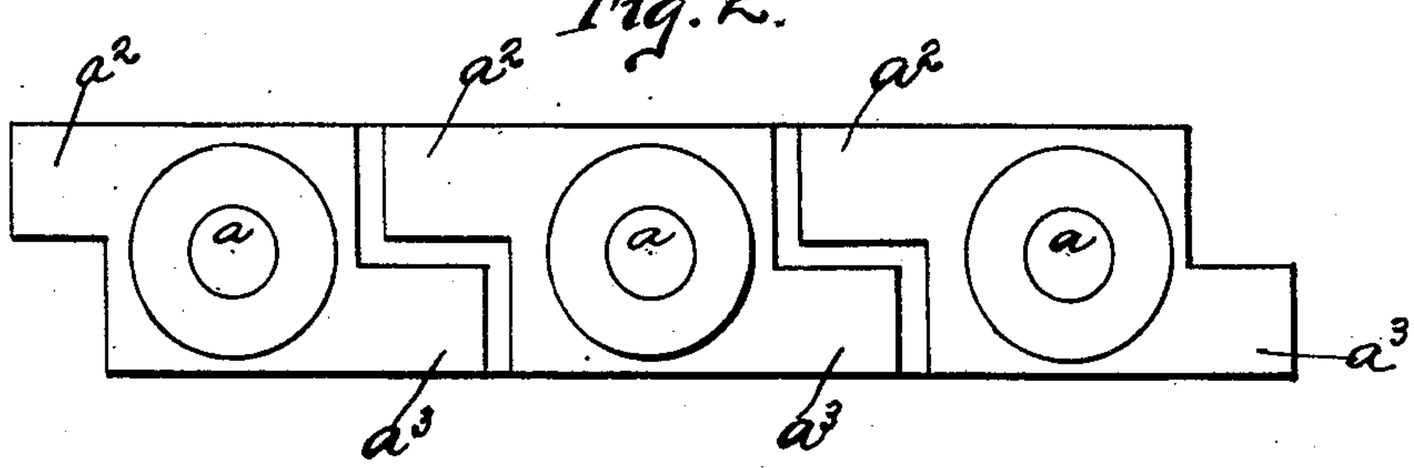



Fig. 3

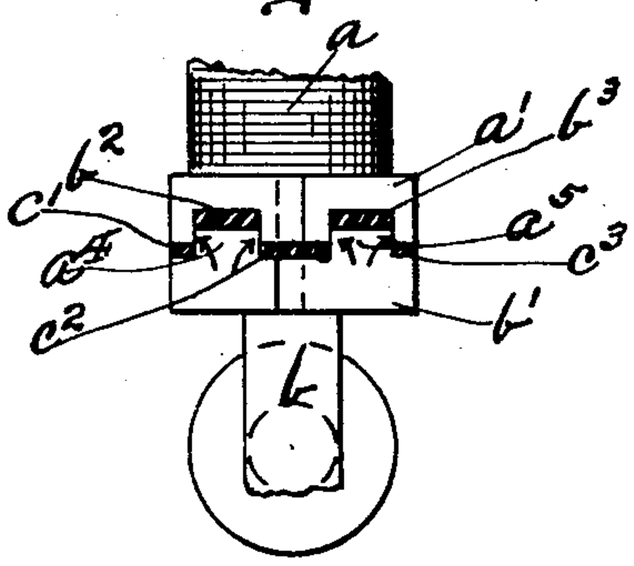
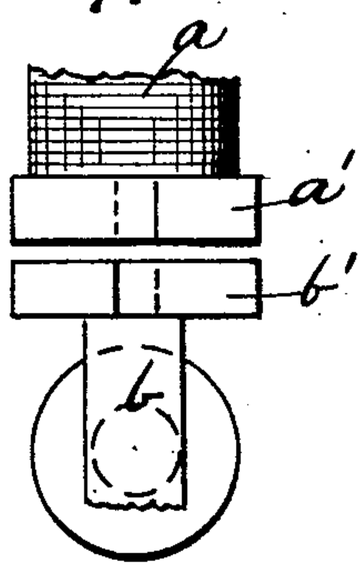



Fig. 4

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# UNITED STATES PATENT OFFICE.

WILLIAM R. EVERETT AND EDWIN J. NEWTON, OF CHICAGO, ILLINOIS.

## POLE-SHOE.

No. 897,824. Specification of Letters Patent. Patented Sept. 1, 1908.

Application filed August 17, 1904. Serial No. 221,021.

*To all whom it may concern:*

Be it known that we, WILLIAM R. EVERETT and EDWIN J. NEWTON, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Pole-Shoes for the Transmission of Magnetic Lines of Force Through Economical Paths, of which the following is a specification.

Our invention is utilized on that class of machinery called magnetic engines or motors. The construction of magnetic engines was practically abandoned at about the time of the inception of the present type of electric motor. This abandonment was due largely to the inability to construct a magnetic engine with a commercial degree of efficiency owing to the loss occasioned by the separation of the poles as well as the necessity of leaving a large air gap and to prevent the electro-magnets drawing together, which air gap offering as it does a high reluctance to the transmission of the lines of magnetic force, destroyed the efficiency of the engines as well as the fact that when the air gap was materially reduced the tension put upon the machine due to the tendency of the magnetic circuits to shorten themselves, caused a constant strain upon the machine and a tendency to distort it.

Magnetic engines or motors are extremely desirable forms for producing motion from an electric current, owing to the fact that it becomes possible with their use to obtain a high initial torque without any possibility of burning out the engine or motor with the intensity of the current.

The object of our invention is to produce a shoe the use of which will avoid the above difficulties, and not only provide a method of eliminating the air gap due to the separation of the poles, to practically nothing, but to provide means whereby the current is deflected and caused to pass laterally through opposite sides and complete the circuit through a medium of low reluctance.

Our method of attaining this object may be more readily understood by having reference to the accompanying drawings, which are a part of this specification and are hereunto annexed, in which

Figure 1 is a side elevation showing our improved form of pole shoe, Fig. 2 is a top or plan view of the same, Fig. 3 is a detail view showing the manner of directing the line of force, Fig. 4 is a similar view of a modified form of construction.

Similar letters refer to similar parts throughout the entire description.

In the drawings, the shoes are shown mounted upon the cores $a$ and $b$ of two opposing electro-magnets. The shoes $a'$ are formed with two projecting arms $a^2$ and $a^3$ which are offset on opposite sides. Shoulders $a^4$ and $a^5$ are formed on these arms. The shoes are held in place by means of screws $a^6$ or any other convenient method of fastening. A shoulder $a^7$ is formed on the lower side of the shoe and recessed into the core $a$, thus eliminating the shearing strain from the screw $a^6$. The opposite shoe $b^1$ corresponds in construction to the shoe $a^1$ with the exception that it is provided with recesses $b^2$ and $b^3$. They are secured in place by means of screws $b^4$ or any other convenient method; the shoulder $b^5$ being recessed in corresponding manner into the core $b$. Strips of non-magnetic material $c^1$, $c^2$ and $c^3$ are placed upon the faces of the shoe $b^1$. Similar non-magnetic strips are placed at the top of the recesses $b^2$ and $b^3$. The result of this construction is at once apparent. The non-magnetic strips serve to retard and deflect the lines of magnetic force and since they seek the paths of least resistance it follows that they pass through the sides $a^8$ and $a^9$ of the shoulders and recesses as indicated by the arrows in the drawings, and since the tendency is no greater for them to flow through the sides $a^8$ than the sides $a^9$, it will be seen that the shoes are balanced and it becomes possible to reduce the air gap between the sides to the smallest fraction of an inch consistent with motion without any danger of them drawing together and by this pressure increasing the friction to such an extent as to practically make movement impossible. This in connection with the doing away of the loss due to the separation of the poles which we accomplish by means of the overlapping of the extended arms $a^2$ and $a^3$ raises the efficiency to a maximum.

Many modifications one of which is shown in Fig. 4 in the construction of these shoes, will suggest themselves to persons skilled in the art, which will not deviate from the spirit of our invention, which is to provide means

to deflect the lines of magnetic force causing them to pass laterally in relation to the shoes in opposite directions, and to provide means, *i. e.*, overlapping shoes, for reducing the loss occasioned by the separation of the poles, and we do not wish to be limited to the precise construction shown in the drawings.

Having described our invention, what we regard as new and desire to secure by Letters Patent is

1. Pole shoes for magnetic engines or motors, said shoes being formed with extended arms, said arms being offset on opposite sides and overlapping the arms of the next shoe, said shoes having circumferential grooves formed therein, corresponding pole shoes having shoulders thereon, said shoulders fitting to and coinciding with the said circumferential grooves, for the purpose set forth substantially as described.

2. Pole shoes for magnetic engines or motors, said shoes being formed with extended arms, said arms being offset on opposite sides and overlapping the arms of the next shoe, said shoes having circumferential grooves formed therein, corresponding pole shoes having shoulders thereon, said shoulders fitting to and coinciding with the said circumferential grooves, strips of non-magnetic material mounted in said grooves, for the purpose set forth substantially as described.

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