E. A. BURLINGAME.

POLARIZED MAGNET.

APPLICATION FILED JULY 13, 1908.

921,794.

Patented May 18, 1909.

Fig. 1.

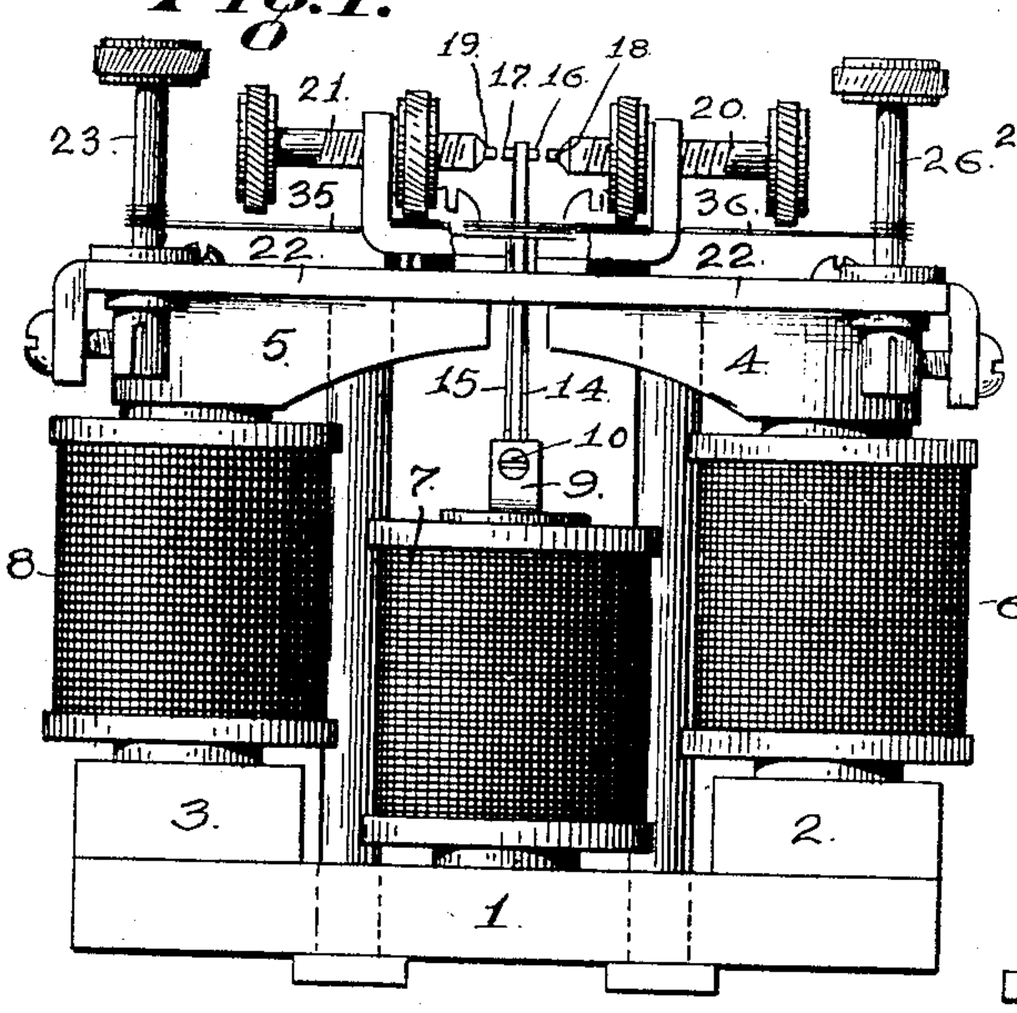


Fig. 2.

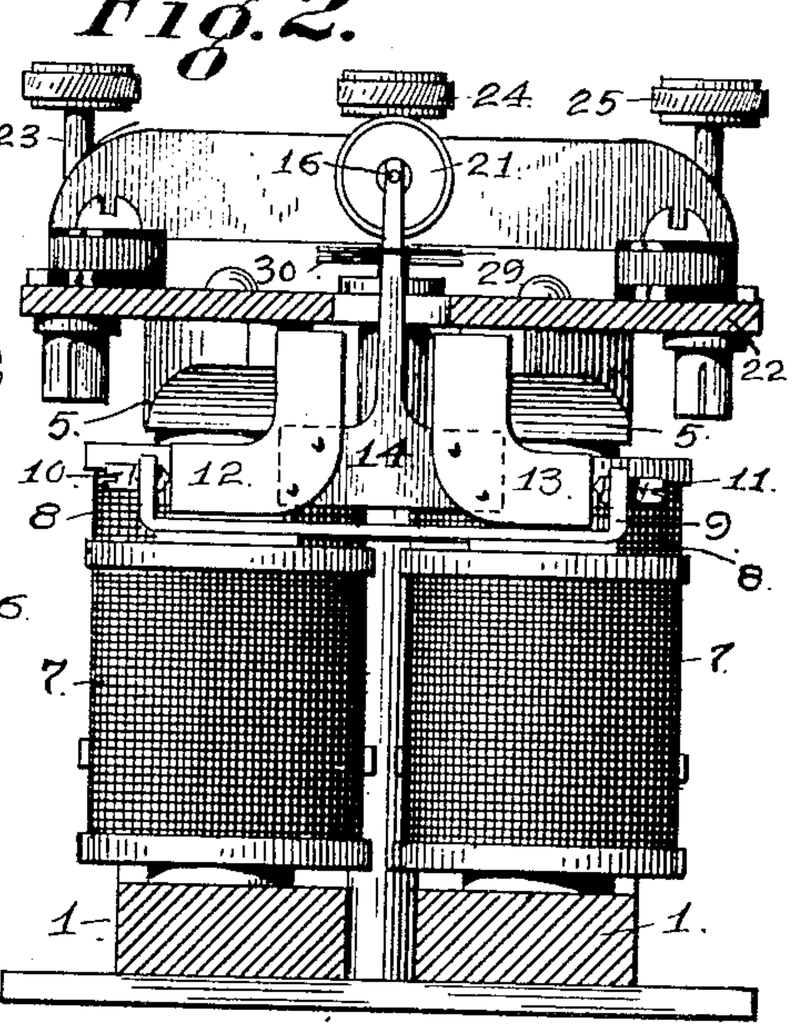


Fig. 3.

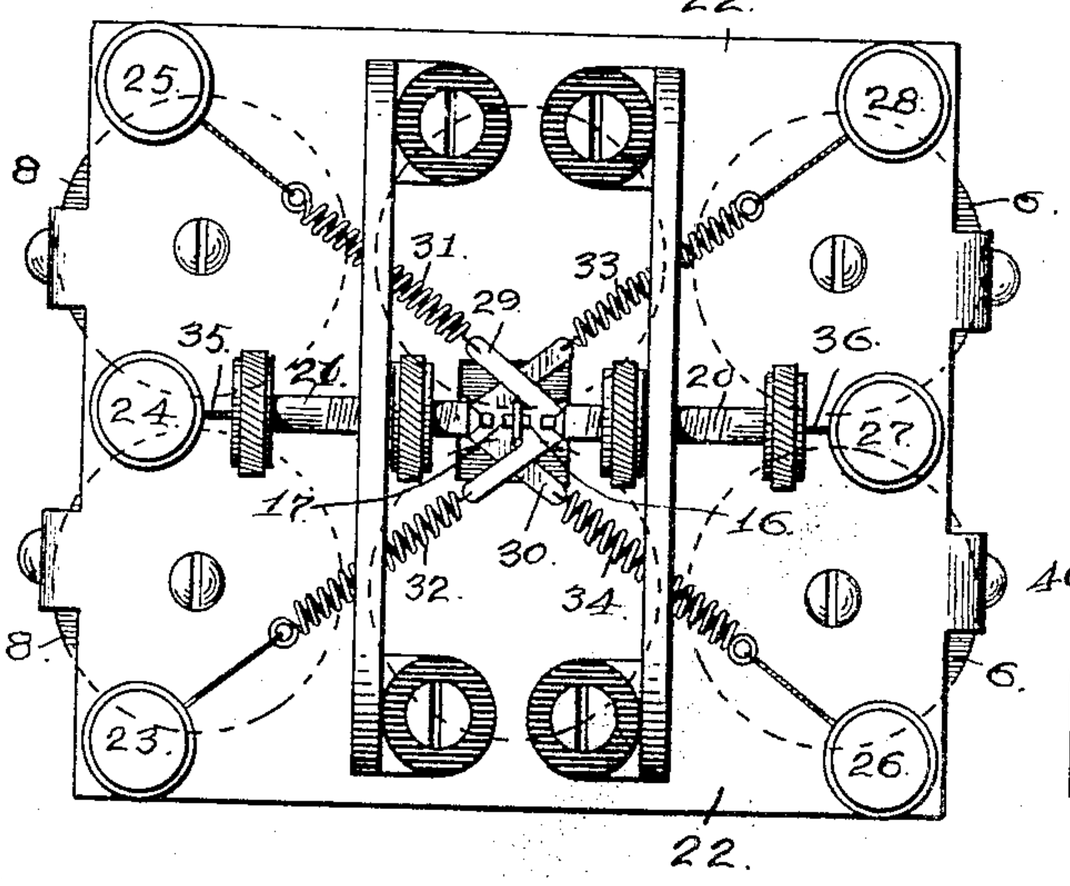
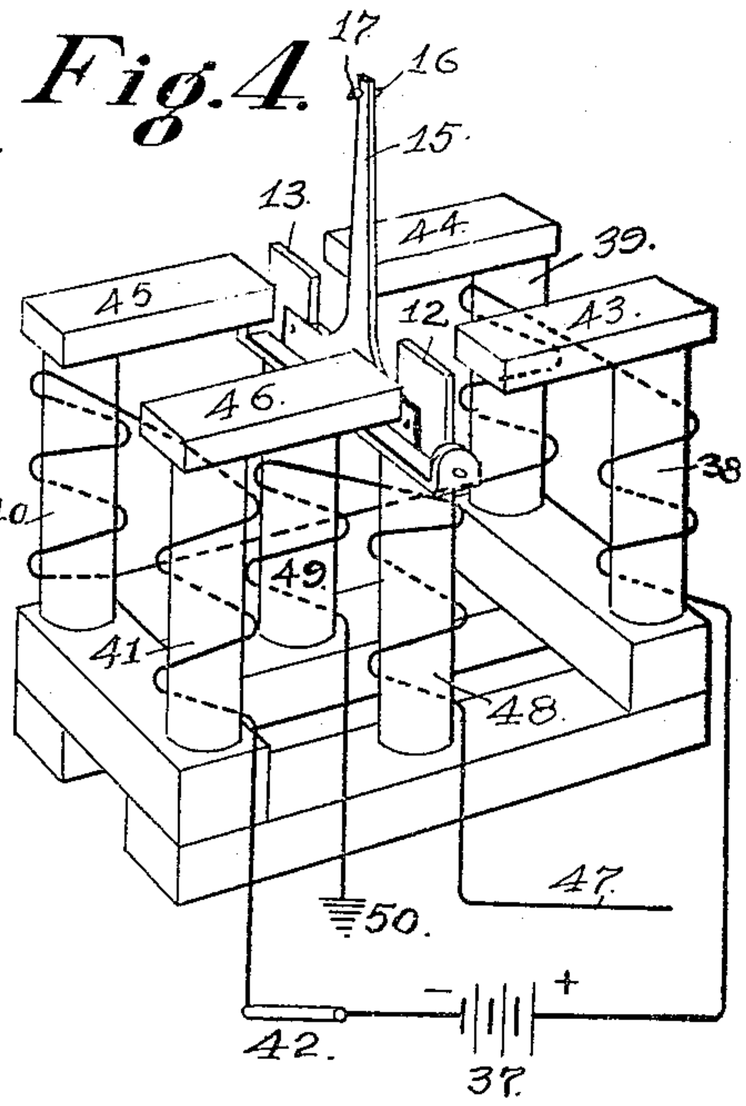


Fig. 4.



WITNESSES.

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UNITED STATES PATENT OFFICE.

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POLARIZED MAGNET.

No. 921,794. Specification of Letters Patent. Patented May 18, 1909.

Application filed July 13, 1908. Serial No. 443,273.

To all whom it may concern:

Be it known that I, ELMER A. BURLINGAME, a citizen of the United States, residing at San Francisco, in the county of San Francisco, State of California, have invented new and useful Improvements in Polarized Magnets, of which the following is a specification.

My present invention relates to improvements in polarized relay magnets, and the object of the invention is to provide an electro-magnetic device by which a part to be operated may be moved in either direction from a neutral position, according to the direction of the current traversing the magnet coils.

By my invention I provide a simple form of relay magnet which will operate efficiently and reliably, and which can be manufactured at low cost.

The invention includes the features of construction and arrangement and combination of parts hereinafter described, and particularly set forth in the appended claims.

Reference is made to the accompanying drawings, which illustrate a relay magnet constructed in accordance with my invention, and which form a part of this specification.

In the said drawings: Figure 1, is a side elevation; Fig. 2, is a vertical section on a line near the center of that shown in Fig. 1, showing an elevation of the armature pivotally mounted on the central magnets; Fig. 3, is a plan view showing the tension arrangement for controlling the contact piece, and Fig. 4, is a diagram of the arrangement of the circuits.

Referring to the drawings, I have shown, at numerals 1, 2, and 3, pieces which form a base for the form of magnet of my invention. The pieces 4 and 5 are soft iron pole pieces and at 6, 7, and 8, are shown electro-magnets with soft iron cores. Each magnet comprises two coils of opposite windings which are hereinafter more particularly described. On the cores of magnet 7 is a non-magnetic yoke 9 in which are pivotally mounted by the pivot pieces 10 and 11, the armature pieces of soft iron 12, and 13, as shown in Fig. 2. Attached to these armature pieces, 12 and 13, are the aluminum pieces 14 and 15, at the upper and outer ends of which are the platinum contact points 16 and 17. These platinum points, 16 and 17, are provided to engage with the platinum points 18 and 19 of the adjustable screws 20 and 21, which are provided with suitable supports on the plate 22, the said plate being held suitably in place by supports from the base. Also on the plate 22 are suitably mounted the adjusting screws 23, 24, 25, 26, 27, and 28. Around the armature, as shown, are two triangular shaped pieces of aluminum 29 and 30. The piece 29 is supported by the adjusting springs 31 and 32, attached to the adjusting screws 23 and 25, and by the thread 36 attached to the adjusting screw 27. The aluminum piece 30 is supported by the adjusting springs 33 and 34 attached to the adjusting screws 26 and 28, and by the thread 35 attached to the adjusting screw 24.

The magnets 6 and 8 are composed of two coils each, and the two coils of each magnet have windings opposite to each other. The wires of these coils, as shown in Fig. 4, pass from the positive pole of the battery 37 to the coil 38, which has a negative winding; then to coil 39 with a positive winding; then to the coil 40 with a negative winding; then to coil 41 with a positive winding, and then on through switch 42 back to the negative pole of battery 37. This current renders the poles of the two magnets 6 and 8 permanently magnetic, and makes the pole piece 43, in coil 38 negative; the pole piece 44, in coil 39 positive; the pole piece 45, in coil 40 negative, and the pole piece 46, in coil 41 positive. The coils connected with the wire 47, from the main line circuit, are wound opposite to each other and this circuit passes, as shown, through the wire 47, the coils 48 and 49 of the magnet 7 and on to the ground at 50.

In normal position the armature pieces 12 and 13, to which are attached the aluminum pieces 14 and 15 with their platinum contact points 16 and 17, is held midway between the faces of the pole pieces 43, 44, 45, and 46, by the aluminum pieces 29 and 30 by means of the springs 31, 32, 33, and 34, and the threads 35 and 36. This armature is neutral magnetically when no current is passing through the magnet 7. Now, in operation, if a positive impulse comes from the main line 47 it will magnetize the magnet 7 in such a manner that the iron piece 12 of the armature will be negative, and the iron piece 13 will be positive. This will cause magnetic attraction between the iron piece 12 and the pole piece 46, and also attraction between

the iron piece 13 and the pole piece 45, because of their opposite polarity. There will also be magnetic repulsion of the iron piece 12 by the pole piece 43, and also repulsion of the iron piece 13 and the pole piece 44, because of their like polarity. The four poles 43, 44, 45, and 46, each with a force exerted in one direction will move the armature pieces 12 and 13 and their attached aluminum pieces 14 and 15 in the direction of the screw contact 19 on the screw 21. The armature, moving thus in the direction described, will bear with it the aluminum piece 30. This will stretch tension springs 33 and 34 and slack the thread 35. On the cessation of the current from the main line the magnet 7 will be demagnetized and the springs 33 and 34 will draw back the armature with its pieces 12 and 13 and the attached aluminum pieces 14 and 15 until it is stopped in normal position by the thread 35. Should the impulse over the main line be a negative one the magnet 7 will be magnetized in such a way that the iron piece 12 of the armature will be positive and the iron piece 13 will be negative. This will cause magnetic repulsion between iron piece 12 and the pole piece 46, and also repulsion between the iron piece 13 and the pole piece 45, because of their like polarity. There will also be magnetic attraction of the iron piece 12 and the pole piece 43, and also attraction of the iron piece 13 and the pole piece 44, because of their opposite polarity. Again the four poles 43, 44, 45 and 46, each with a force exerted in one direction on the armature pieces 12 and 13, will force the pieces and their attached aluminum pieces 14 and 15 in the direction opposite to that on the former movement and in the direction of the contact 18, on the contact screw 20. The armature moving thus, in the direction described, will bear with it the aluminum piece 29. This will stretch the tension springs 31 and 32 and slack the thread 36. On the cessation of the current from the main line, the magnet 7 will be demagnetized and the springs 31 and 32 will draw back the armature pieces 12 and 13 and their attached aluminum pieces 14 and 15 until it is stopped in normal position by the thread 36. The device is again ready for another impulse from the main line.

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

1. In an apparatus of the class described, magnets with coils of opposite windings, each provided with a suitably shaped pole, said magnets arranged in sets, magnet coils of opposite windings located between said sets and having suitable soft iron cores, armature pieces pivotally supported thereon and between said sets of poles.

2. In an apparatus of the class described, magnets with coils of opposite windings, each provided with a suitably shaped pole, said magnets arranged in sets so that magnets of negative polarity and of positive polarity will be in each set, magnet coils of opposite windings located between said sets having suitable soft iron cores, armature pieces pivotally supported on said soft iron cores, said armature pieces so arranged that each is between said pole pieces of opposite polarity.

3. In an apparatus of the class described, magnets with coils of opposite windings, each provided with a suitably shaped pole, said magnets arranged in sets so that magnets of negative polarity and of positive polarity will be in each set, magnet coils of opposite windings located between said sets having suitable soft iron cores, armature pieces pivotally supported on said soft iron cores, said armature pieces so arranged that each is between said pole pieces of opposite polarity, extensions on said armature pieces contact points on said extensions, said contact points designed to engage other contact points, and means for returning the armature pieces to normal position.

In testimony whereof I have affixed my signature in the presence of two witnesses this 29th day of June 1908.

ELMER A. BURLINGAME.

Witnesses:

FRANK L. OWEN,

A. DIXON.