R. N. HILL.

ELECTROMAGNETIC DEVICE.

APPLICATION FILED DEC. 12, 1913.

1,167,067.

Patented Jan. 4, 1916.

Fig. 1.

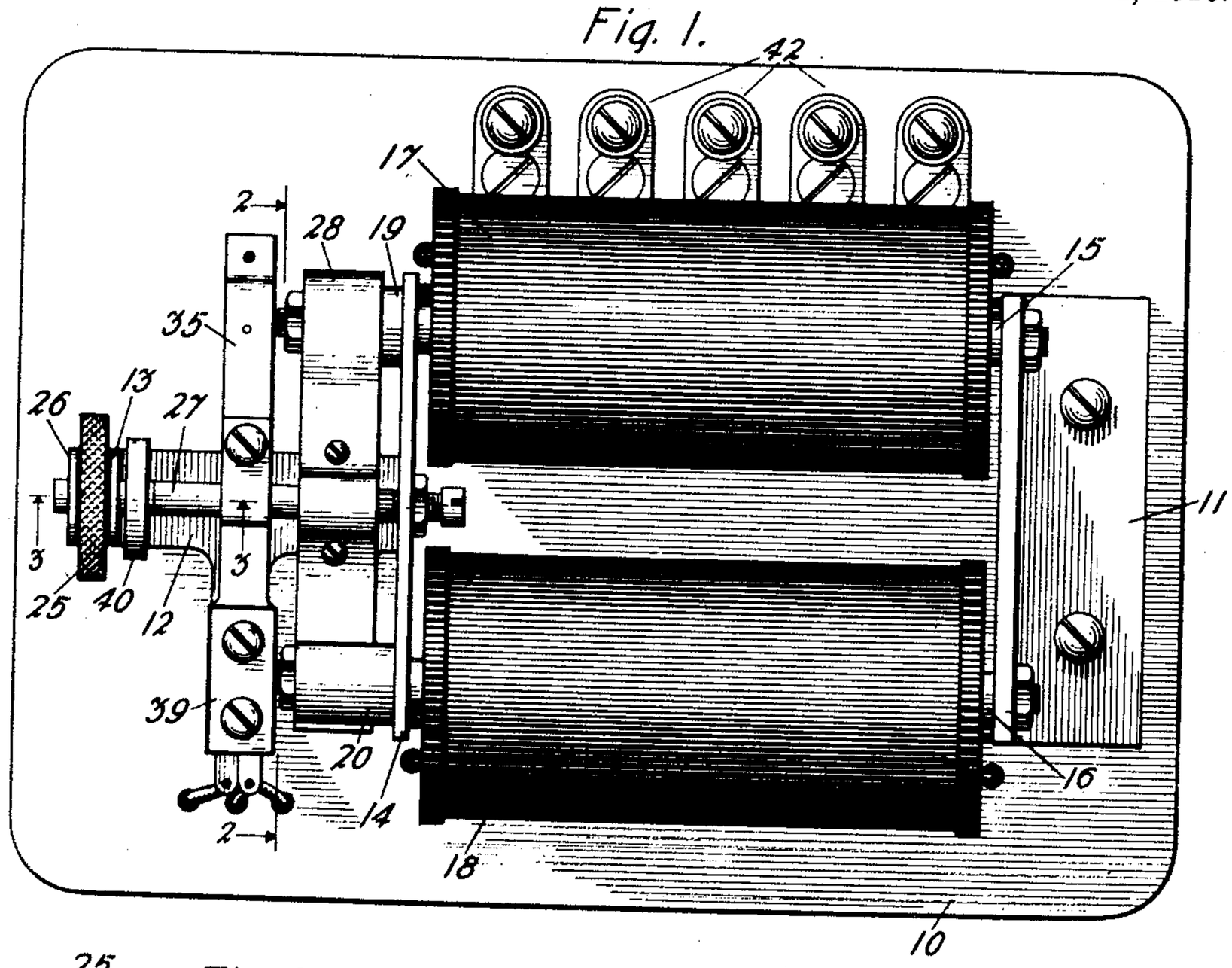


Fig. 3.

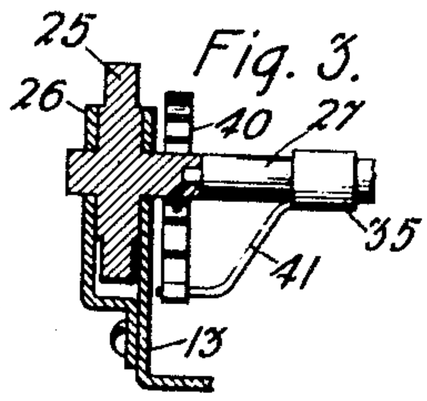


Fig. 4.

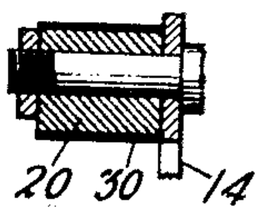


Fig. 2.

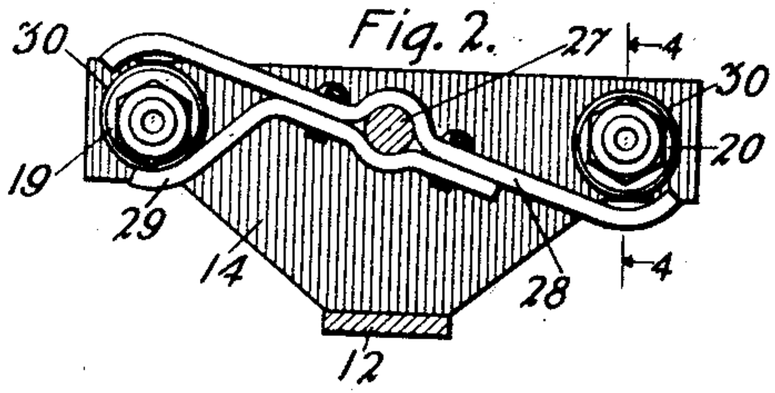
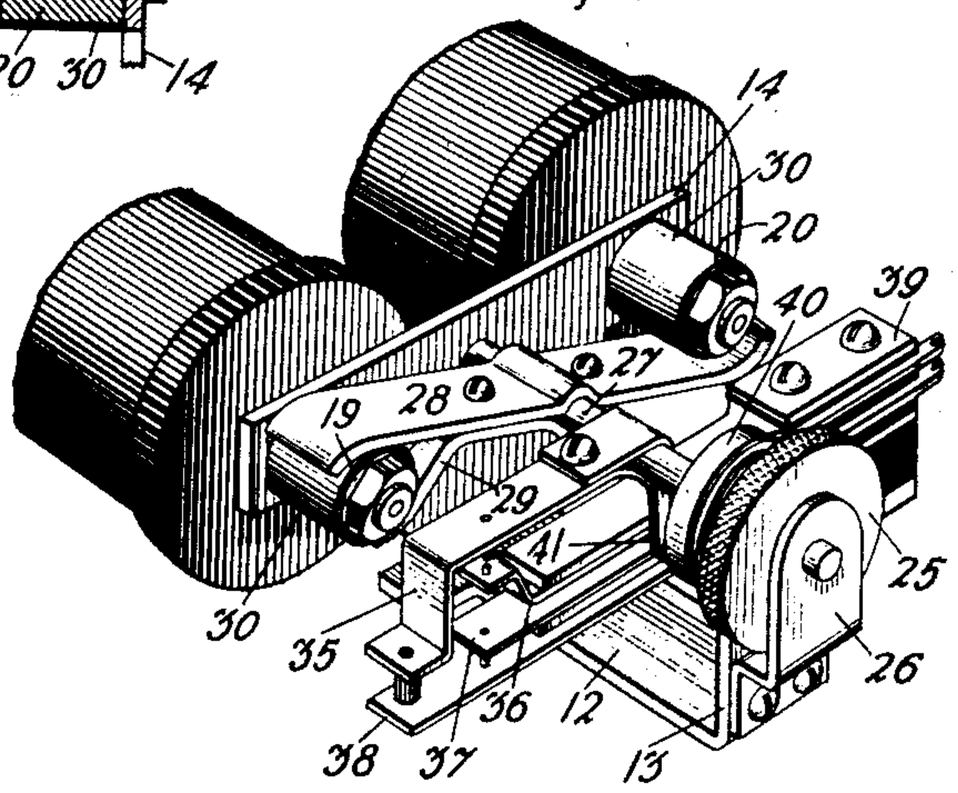


Fig. 5.



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UNITED STATES PATENT OFFICE.

RALPH NADING HILL, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO WESTERN ELECTRIC COMPANY, INCORPORATED, A CORPORATION OF NEW YORK.

ELECTROMAGNETIC DEVICE.

1,167,067. Specification of Letters Patent. **Patented Jan. 4, 1916.**

Application filed December 12, 1913. Serial No. 806,250.

To all whom it may concern:

Be it known that I, RALPH NADING HILL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Electromagnetic Devices, of which the following is a full, clear, concise, and exact description.

This invention relates to electromagnetic devices and has for its object the production of an electromagnetic device of few and simple parts, easily made and readily assembled, and reliable in operation.

One feature of this invention is the means provided for regulating and maintaining an air gap between the pole pieces and the armature which will not change even after long service and cannot be readily changed while in service.

Another feature of this invention is the means provided for readily and easily adjusting the tension on an armature associated with the electromagnetic device.

In accordance with these features, generally speaking, there is provided a relay having a pair of energizing coils, a substantially S-shaped armature and adjustable eccentric extensions for the pole pieces of the coils, by means of which the air gap may be changed.

Means are carried by the armature shaft for adjusting the tension on the armature.

This invention will be more fully understood by reference to the accompanying drawings, wherein—

Figure 1 is a plan view of an electromagnetic device embodying this invention; Fig. 2 is a view on line 2—2 of Fig. 1; Fig. 3 is a view on line 3—3 of Fig. 1; Fig. 4 is a view on line 4—4 of Fig. 2; and Fig. 5 is a view in perspective of the armature end of the electromagnetic device shown in Fig. 1.

As shown in the drawings, the electromagnetic device or relay comprises a base 10 having secured thereto an angle bracket 11 of magnetic material and a frame 12 of non-magnetic material. The frame 12 is substantially U-shaped, having upward extensions 13 and 14. The relay has two cores 15 and 16 supported by the angle bracket 11 and the extension 14 of the frame 12. Energizing windings 17 and 18 are carried by the cores 15 and 16 respectively. The cores 15 and 16 are provided on one end with eccentric extensions or collars 19 and 20, the purpose of which will be explained hereinafter.

A knurled thumb nut 25 is journaled in the extension 13 of the frame 12 and in an auxiliary bracket 26 mounted on said extension. A shaft 27 carrying an S-shaped armature 28 of magnetic material is journaled in the extension 14 of the frame 12 and in the hub of the thumb nut 25. A stop bar 29, preferably of non-magnetic material, is attached to the armature 28 and is formed to engage one side of the pole piece extension 19 to limit the movement of the armature from the pole piece extensions 19 and 20. The ends of the armature are curved oppositely to approximate the curvature of the pole piece extensions or collars 19 and 20. Since the pole piece extensions or collars 19 and 20 are eccentric, one or both of them may be revolved to adjust the air gap between the armature 28 and said extensions. The periphery of each of the pole piece extensions or collars 19 and 20 may be enveloped with a sleeve 30 of brass or other suitable non-magnetic material, to prevent the sticking of the armature 28 and said pole piece extensions.

The shaft 27 has secured thereto a contact arm 35 which controls contact springs 36, 37 and 38 of a spring pile up 39 mounted on the frame 12. In order that the armature 28 may be normally held away from the pole piece extensions 19 and 20, and in order that the tension on the armature may be readily adjusted, a spiral spring 40 encircles the hub of the thumb nut 25, the inner end of the spring engaging said nut and the outer end engaging an extension 41 of the contact arm 35.

A series of terminals 42 are mounted on the base 10. Leads (not shown) from the terminals 42 connect to the windings 17 and 18 and to the spring contacts 35, 36, 37 and 38.

It will be seen that this invention makes it possible to adjust the air gap between the pole pieces and the armature to compensate for any variations in the magnetic circuit or any manufacturing variations. After obtaining the proper air gap, the position of the eccentric pole piece extensions may be definitely set so that the air gap cannot then be readily changed and will not change of itself, due to long use of the relay. By

means of the armature tensioning scheme provided, it is possible to readily adjust the tension thereof to care for any leakage conditions of the line to which the relay is connected.

What I claim is:

1. In an electromagnetic device, the combination of an electromagnet having a polar extension on the core thereof, a pivoted armature mounted adjacent one side of said polar extension, a non-magnetic stop bar mounted on said armature and extending along the other side of said polar extension. and a spring normally holding said armature away from and said stop bar against said polar extension.

2. In an electromagnetic device. the combination of an electromagnet having a polar extension on the core thereof, an armature pivotally mounted in operative relation to said polar extension, a spring normally holding said armature away from said polar extension whereby an air-gap is formed therebetween, and an adjustable eccentric collar encircling said polar extension for varying the air-gap between said extension and said armature including means for holding said collar in adjusted position.

3. In an electromagnetic device, the combination of a pair of energizing windings, cores therefor each having a polar extension, an S-shaped armature pivotally mounted between said polar extensions, a spring normally holding said armature away from said polar extensions whereby air gaps are formed between said armature and said polar extensions, an adjustable eccentric collar encircling each of said polar extensions for varying the air gaps between said extensions and said armature, and means for holding said collars in adjusted position.

4. In an electromagnetic device, the combination of a pair of energizing windings, cores therefor each having a polar extension, an S-shaped armature pivotally mounted between said polar extensions, a spring normally holding said armature away from said polar extensions whereby air gaps are formed between said armature and said polar extensions, an adjustable eccentric collar encircling each of said polar extensions for varying the air gaps between said extensions and said armature, means for holding said collars in adjusted position, and a stop bar mounted on said armature and normally held against one of said collars to control the distance at which said armature is normally held from said polar extensions.

In witness whereof, I hereunto subscribe my name this 10th day of December A. D., 1913.

RALPH NADING HILL.

Witnesses:
NANON E. TUTHILL,
MURRAY V. CONATY.