

No. 840,987.

PATENTED JAN. 8, 1907.

W. E. ATHEARN.
TELEGRAPH RELAY.
APPLICATION FILED NOV. 28, 1906.

Fig. 1.

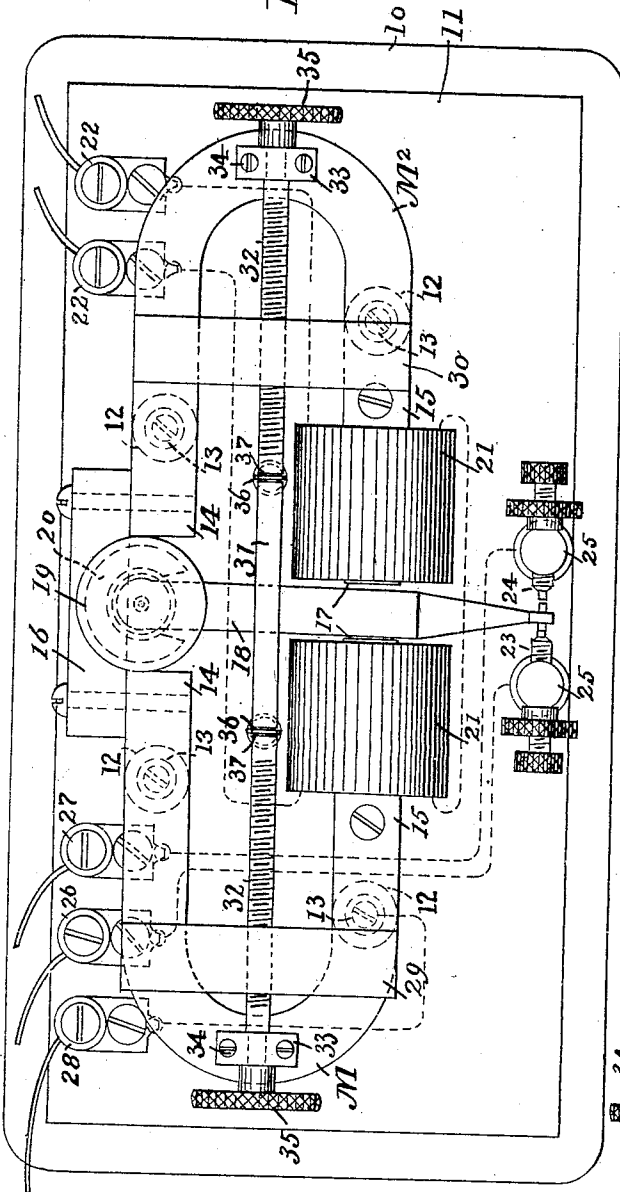
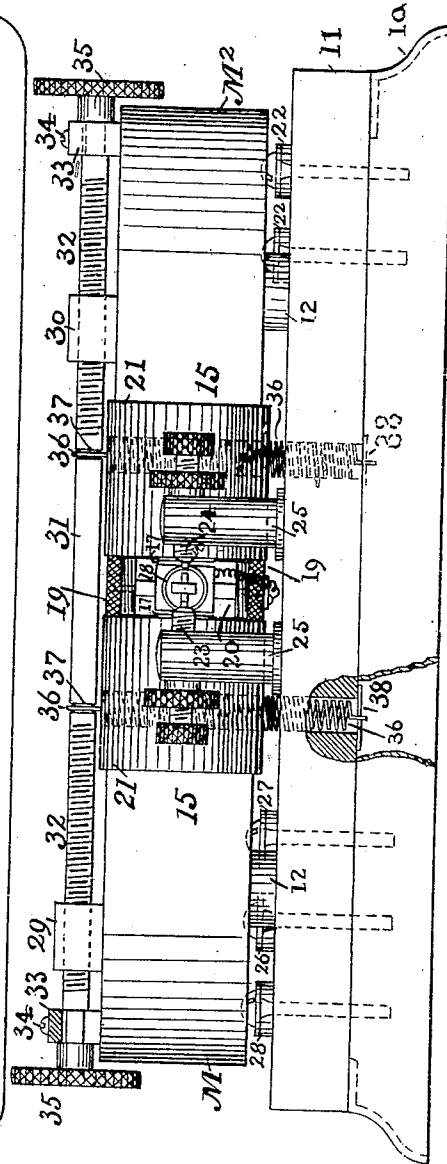


Fig. 2.



Witnesses

Frank E. Lockwood.
Joseph A. Gately

Inventor
William E. Athearn.
by Thomas D. Lockwood
his Attorney

UNITED STATES PATENT OFFICE.

WILLIAM E. ATHEARN, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

TELEGRAPH-RELAY.

No. 840,987.

Specification of Letters Patent.

Patented Jan. 8, 1907.

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To all whom it may concern:

Be it known that I, WILLIAM E. ATHEARN, residing at New York, borough of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Telegraph-Relays, of which the following is a specification.

In electromagnetic apparatus it may become desirable to vary the strength or disposition of the magnetic field independently of the position of the poles and of the current flowing in an energizing-circuit. This is the case, for example, in the polarized relays employed in telegraphy, in which, after the magnet-poles have been arranged to exert their attractive force upon the armature in the most effective manner, the operator may wish to "bias" said armature or to impart to it a greater tendency to be normally drawn toward one pole rather than toward the other or to otherwise adjust the field due to the permanent magnets to compensate for varying line conditions. In relays provided with permanent magnets of U or horseshoe form such control may be conveniently secured by bridging across its legs a movable magnetic keeper, which as it is approached to the poles gradually reduces the magnetic flux therefrom, and consequently the force with which the armature is attracted.

The present invention relates more especially to instruments in which there are at least two keepers associated with a magnet or magnets, and has for its principal objects the provision of means for coordinating the movements of the keepers and of a generally improved adjusting mechanism therefor.

In the drawings forming a part of this specification is illustrated a polarized relay embodying the invention, Figure 1 being a top plan view thereof, and Fig. 2 a front elevation, parts being broken away.

The same characters of reference designate like parts in both figures.

The form of polarized relay here shown is not essential to this invention, but is a convenient one merely and will be briefly described. Upon a base 10, which may be of cast metal, is secured a support 11 of insulating material, preferably of wood. Spaced from this supporting-board by washers 12, it being secured thereon by screws 13 passing through the board and washers, is a relay-magnet, which in the present instance con-

sists of two generally U-shaped permanent magnets M M². These magnets have longer leg portions 14 14 and shorter parallel portions 15 15, joined at their outer extremities by curved integral yoke portions. The longer legs are of the same polarity and are magnetically united to one another by a block 16, the shorter legs both being of opposite polarity to their companions and having projecting from them soft-iron pole-pieces 17 17, which confront and are in alignment with one another. Between said pole-pieces moves an armature 18, pivoted upon opposite cap-screws 19 19, threaded into a supporting member 20, which is of magnetic material and is shown as fixed to the block 16. The pole-pieces carry coils 21 21, connected in series and ending in a pair of terminal plates 22 22, provided with the usual screws for the attachment of the incoming and outgoing line conductors. The free extremity of the armature plays between the opposed ends of contact-screws 23 and 24, threaded through posts 25, rising from the base-board and being insulated thereby from one another. The posts of the contact-screws 23 and 24 are respectively connected to terminals or binding-screws 26 and 27, similar to the terminals 22, previously mentioned, while still another terminal 28 is joined to one of the screws 13, and thus to the armature through the magnet. One or more local circuits may be connected to this terminal 28 and to either or both terminals 26 and 27, depending upon the use to which the instrument is to be put. So far as the structure has been described it operates in the manner usual in polarized relays, which need not here be discussed.

Mounted to slide upon the upper surface of the permanent magnets M M² and extending between the leg portions 14 and 15 are magnetic keepers or bridges 29 and 30, respectively, preferably of soft iron. Near the center of each of these bridges is shown a transverse opening tapped to receive an operating rod or member 31, provided with threads at 32 32, these threads being of the same pitch and extending about the rod in the same direction—that is, both being either right or left handed. The rod passes through retaining-blocks 33 33, fixed to the outer ends of the magnets by screws 34, the openings in these blocks being of such vertical extent

that the rod is permitted some movement of self-adjustment in this direction. Heads or enlargements 35 35, situated outside the blocks and contacting therewith, maintain the rod against longitudinal displacement and are knurled to enable them to be readily rotated, they thus serving as finger-pieces. The keepers are held yieldably in contact with the magnets by springs 36 36, each having a loop at one extremity which engages a groove 37 in the rod situated near the inner end of the screw 31, thus preventing displacement along the same, while the opposite end of each spring extends through the base-board and is there held under some tension by a pin 38. This arrangement of springs and the capability of movement of the rod in its retaining-blocks allows the keepers to pass freely over the magnets and to adjust themselves at both extremities to the contacting surface of the legs.

In this relay, as described, the pole-pieces of the magnets are arranged during its construction in their most effective relation to the armature as regards total width of air-gap, though the limit of movement of the armature with respect to the poles may be varied by the contact-screws. These having been satisfactorily fixed in position, the normal tendency of the armature to remain against one or the other may be adjusted by the keepers. When one of these members approaches the yoke portion of its magnet at the outer limit of its travel, as the keeper 29 is shown in the drawings, its companion is so situated upon its screw 34 that it is similarly related to the coil 21, which determines its inner limit. The keeper 29 is therefore close to the point at which it does not sensibly affect magnetic field, while the keeper 30 is near the point at which it will divert the maximum number of lines of force from the armature. Thus the influence of the magnet M upon the armature is approximately the same as though it had no keeper; but the field of the magnet M² is considerably weakened and the armature will normally rest against the screw 23. If the rod 31 be turned so that the keeper 29 travels inwardly, or toward the right, the keeper 30 also moves to the right, since both sections of the screw-thread encircle the rod in the same direction, and because of this and of the similar pitch the space between them will remain constant. It will be obvious that in their advance both keepers will reach points at the same distance from their respective pole-pieces. This causes the field of the permanent magnetic system to become practically uniform, so that from a central position the armature will be equally attracted and will remain against whichever contact-screw it may happen to be until such a current flows through the coils 21 as to strengthen the opposite pole. Finally as this mean adjustment is passed

an opposite bias to that first described is given to the armature, this, as would be the case in the previous instance, growing stronger as the keepers approach their respective inner and outer limits. The ease and precision of control attained by this simultaneous operation will be readily appreciated. The placing of one keeper at its intermediate or neutral point necessarily thus positions the other without consideration or added effort upon the part of the operator, and their traversing to either side of this mean adds to the strength of one portion of the field what it subtracts from the other, insuring harmony of action and the most effective adjustment.

I claim as my invention—

1. A relay comprising a magnet having oppositely-situated poles, an armature movable between the poles, means for controlling the attractive force of each of the poles, and operating mechanism common to the controlling means of both poles for oppositely varying the attraction of said poles.

2. In a magnetic mechanism, the combination with an armature, of permanent magnets associated with said armature and having separated leg portions, a keeper extending between the leg portions of each of two of the magnets, and means for simultaneously moving the keepers in the same direction.

3. A relay comprising a magnet having confronting poles, an armature mounted to oscillate between said poles, means for regulating the attractive power of both of said poles, and actuating mechanism adapted to operate the said regulating means for both poles and thereupon to adjust the attraction of both poles simultaneously and inversely, substantially as set forth.

4. The combination with a magnet having oppositely-situated poles and a plurality of adjacent leg portions associated with each pole, of an armature movable between the poles, independent magnetic members bridging the leg portions, and a rotatable operating member having threaded engagement with both bridge members, the thread coöperating with said bridge members encircling the operating member in the same direction.

5. In a polarized relay, the combination with two generally U-shaped permanent magnets having one pair of like poles joined magnetically and the other pair of like poles provided with adjacent pole-pieces, of an armature pivoted at the juncture of the first-named poles and extending between the pole-pieces, a magnetic keeper coöperating with the legs of each magnet, and an operating member mounted upon the magnets and engaging both keepers, substantially as described.

6. A relay comprising a magnet having adjacent leg portions, an armature coöperating with the extremity of one leg portion,

a keeper extending across the legs of the magnet and being movable thereover, an operating member for the keeper, and yieldable means for maintaining the engagement
5 of the keeper and magnet.

7. A relay comprising a magnet having adjacent leg portions, an armature cooperating with the extremity of one leg portion, a keeper extending across the legs of the
10 magnet and being movable thereover, an operating member for the keeper, and a

spring engaging the operating member and serving to draw the keeper against the magnet, as and for the purpose set forth.

In testimony whereof I have signed my
15 name to this specification, in the presence of two subscribing witnesses, this 23d day of November, 1906.

WILLIAM E. ATHEARN.

Witnesses:

EDWARD BLAKENEY,
CHARLES S. SCALES.