

Aug. 4, 1925.

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J. J. GHEGAN

ADJUSTABLE MAGNETIC YOKE

Filed June 11, 1921

2 Sheets-Sheet 1

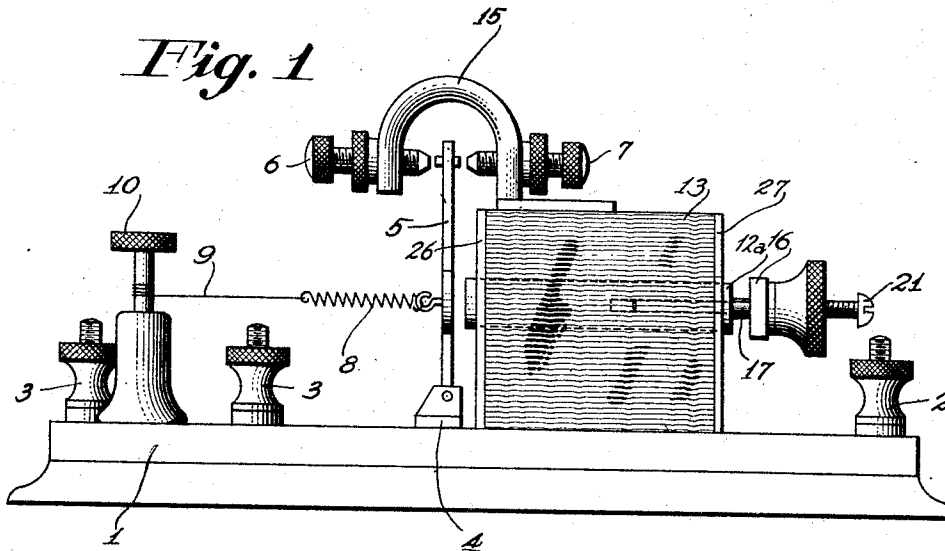
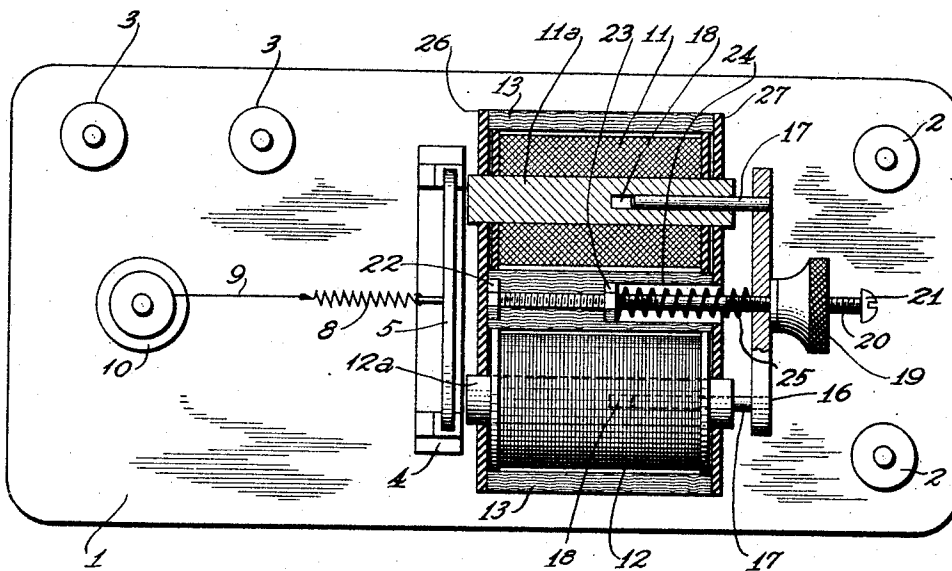


Fig. 2

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Fig. 3

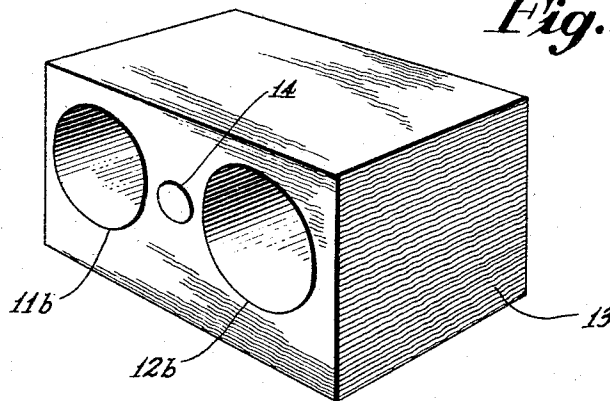
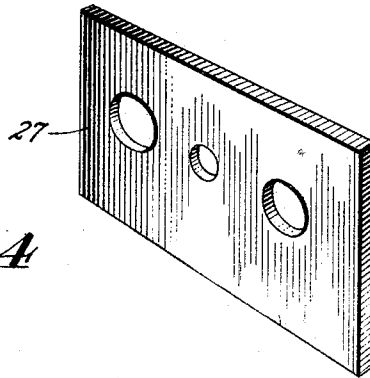


Fig. 4



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UNITED STATES PATENT OFFICE.

JOHN J. GHEGAN, OF EAST ORANGE, NEW JERSEY.

ADJUSTABLE MAGNETIC YOKE.

Application filed June 11, 1921. Serial No. 476,764.

To all whom it may concern:

Be it known that I, JOHN J. GHEGAN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Adjustable Magnetic Yoke, of which the following is a specification.

This invention is an adjustable magnetic yoke for use in conjunction with electromagnets and electrical instruments and appliances generally and more especially with telegraph instruments, such as relays and sounders.

The object of the invention is to provide a simple and efficient device for improving the magnetic adjustment of such instruments and appliances.

Devices for improving the magnetic adjustment of telegraph instruments have heretofore been suggested, but, in every instance, so far as I am aware, such adjustment has been accomplished by varying the air gap between the magnet armature and the cores of the magnets. This involved relative adjustment between the magnet and its armature and necessitated adjustable mountings for either or both of these parts. In either instance, such mountings are objectionable because of their expense, in the first instance, and their liability to damage in the second instance. A very common practice has been to mount the armature on a fixed pivot and to mount the associated magnet for bodily longitudinal adjustment toward and away from the armature. The objection to this arrangement is that the mounting of the magnet for adjustment necessitates the employment of relatively long unprotected leads of wire connecting the terminals with the magnets, which wires in practice are the source of considerable trouble because of their exposed position and their liability to break or be damaged.

In all of the prior devices, so far as I am aware, the adjustment has been accomplished through a variation of the air gap between the armature and magnet cores. With this arrangement, the well known laws of magnetic pull being in inverse ratio to the distance between the armature and the cores apply and the sensibility is therefore limited.

In accordance with the present invention, however, the magnet and its armature are in relatively fixed position and the armature being at all times in relatively close prox-

imity to the magnet cores, its responsiveness to variation in weaker currents is greatly increased.

Speaking generally, the present invention contemplates the pivoting of the armature on a fixed pivot and the mounting of the spools of the electromagnet in fixed positions, but instead of forming the yoke or back iron of the magnet rigid with the cores of the spools as heretofore, I mount the yoke for adjustment relative to at least one of the cores, so that the yoke may be manipulated to produce a gap between the yoke and at least one of the cores. Thorough experimentation and practical demonstration have proven that through the adjustment of this gap highly efficient results may be obtained particularly when dealing with weak currents. Moreover, through the mounting of the spools in a rigid and nonadjustable manner, the wiring connections to the coils may be entirely concealed and protected against breakage.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate different practical embodiments of the invention, but the constructions therein shown are to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a side elevation of a telegraph relay instrument embodying the present invention.

Figure 2 is a plan view of the instrument shown in Figure 1, illustrating certain parts in section.

Figure 3 is a perspective view of a block of insulating material in which the spools of the instrument are rigidly mounted.

Figure 4 is a like view of an end piece adapted to be positioned across the back ends of the spools.

Referring to the drawings, 1 designates any suitable form of base, preferably of insulating material and usually constructed from composition material. The base 1 carries the usual main terminals 2 and local terminals 3 and it has fixed thereon a bracket 4 to which is pivoted a conventional armature 5 operating between limiting stops 6 and 7. Associated with the armature 5 is a tension spring 8 of the well known form adapted to be placed under tension through

the medium of a cord 9 wound about an adjusting post 10. The parts thus far described are in common use in telegraph relays and form no part of the present invention except in conjunction with the elements next to be described.

11 and 12 designate two magnet spools, which are provided with iron cores 11^a and 12^a, respectively, and in accordance with the present invention, these spools are rigidly mounted in parallel relation in a supporting block 13, the preferred form of which is shown in Figure 3. This block of material is of some insulating substance and may be conveniently constructed of wood. It is provided with two parallel holes, 11^b and 12^b, which are bored completely through the block and with a central hole 14 positioned intermediate the holes 11^b and 12^b. The holes 11^b and 12^b are of a size to receive the magnet spools 11 and 12 with a fairly snug fit, and such magnet spools are maintained in position within the block by cover plates 26 and 27 secured to the opposite faces of the block in any suitable manner and provided with holes through which the cores 11^a and 12^a may extend. When the spools are positioned within the block, they will extend for substantially the entire distance therethrough with the opposite ends of their cores 11^a and 12^a extending beyond the opposite faces of the plug and through the cover plates 26 and 27, which are of suitable insulating material. The block 13 is mounted on the base 1 in any suitable manner, such for example as by screws, and the curved bracket 15, through which the limiting stops 6 and 7 are threaded may be conveniently mounted on the block 13 by means of screws or otherwise, so that when the parts are assembled, they will appear as shown in Figure 1.

From this showing, and from the foregoing description, it will be apparent that the mounting of the armature and the spools are fixed with respect to one another and that neither is adjustable. The gap between the magnet and its armature is, in effect, fixed, aside, of course, from the slight adjustment permitted by the stop 6. The main magnetic adjustment in an instrument or appliance embodying this invention is attained through the adjustment of the magnet yoke associated with the cores of the two magnet spools and in the preferred form of the invention, this yoke is mounted for bodily movement toward and away from the rear ends of the spools, so as to produce gaps at the rear end of each core. Thus, in Figures 1 and 2, the yoke 16 of soft iron carries two parallel pins 17, which are spaced apart a distance equal to the distance between the centers of the cores 11^a and 12^a and are adapted to project into sockets 18 formed in the rear ends of the cores. These

pins, which may be termed the guide pins, are preferably of brass, or some other suitable material other than soft iron.

By mounting the yoke in the manner described, it may be slid toward and away from the cores while guided by the pins 17 within the sockets 18, and, in practice, this adjustment of the gaps between the ends of the cores and the yoke 16 is preferably controlled by a manually adjustable nut 19 operating on a screw threaded shank 20. The shank 20 may be conveniently in the form of a bolt which extends through the block 13 and through the yoke 16 and nut 19 and is provided at its outer end with a head 21. The bolt is precluded from longitudinal movement by two jamb nuts 22 and 23, one of which threads on to the bolt 20 from the forward end of the block 13 and the other of which threads on to the bolt from the after end of the block and is received within a pocket 24 in the after end of the block. A coil spring 25 encircles the bolt 20 between the jamb nut 23 and the yoke 16 and serves to impel the yoke in a direction away from the cores. The position of the yoke may, however, be accurately regulated by manipulating the adjusting nut 19 to control the gaps between the ends of the cores and the yoke. The nut 19 is, however, precluded from being screwed off of the bolt and becoming lost by the head 21 of the bolt which serves as a limiting stop.

It will thus be apparent that although the armature mounting and the mounting for the spools are in fixed relation to one another, the magnetic adjustment may be accomplished by simply manipulating the screw 19. This makes it possible to carry the wiring from the terminals 2 and 3 along the under side of the base and carry them up through the base directly to the spools in a permanent manner and in a way in which they will be protected at all times against damage or breakage.

In the foregoing description and in the accompanying drawings, I have illustrated the present invention as associated with a telegraph relay instrument, but I am aware that the same is applicable to other instruments and appliances employing electromagnets and vibrating armatures, and, accordingly, I do not wish to be understood as limiting the invention to the specific environment in which it is shown, but consider the same as broadly novel as is commensurate with the appended claims.

The manner of obtaining magnetic adjustment, as hereinbefore described, constitutes a novel method, the claims for which are appended hereto.

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

1. An electromagnet provided with a yoke having guide pins of non-magnetic material mounted thereon and extending into pockets in the ends of the cores of the magnet
5 for the purpose of guiding the yoke toward and away from the ends of the cores, whereby said yoke may be withdrawn from contact with the cores to provide gaps between the cores and the yoke while the yoke re-
10 mains supported upon the cores.

2. An electromagnet embodying a pair of spaced cores each of which is provided at its rear end with a pocket extending longitudinally into the core, windings associated
15 with each core, and a yoke mounted for movement toward and away from the rear ends of the cores and provided with guiding means projecting into the pockets of the cores to guide the yoke for movement to-
20 ward and away from the core, said guiding means being of non-magnetic material, whereby gaps in the flux circuit of the mag-

net may be produced by moving the yoke away from the core ends.

3. In a device of the class described, an
25 electromagnet embodying a pair of cores, coils associated with each core, means for mounting the cores and coils in fixed position relative to one another, an armature associated with the cores and mounted for
30 pivotal movement on an axis fixed with respect to the position of the cores and coils, and a yoke associated with both cores and mounted for sliding movement toward and
35 away from the ends of the cores to provide gaps in the magnetic circuit between the ends of the cores and the yoke, and unitary manually operable means for effecting
40 adjustment of the yoke to give the desired gaps.

In testimony whereof I have signed the foregoing specification.

JOHN J. GHEGAN.