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MAGNETIC ADJUSTING MEANS FOR MAGNETIC TRANSLATING DEVICE

Filed Jan. 23, 1962

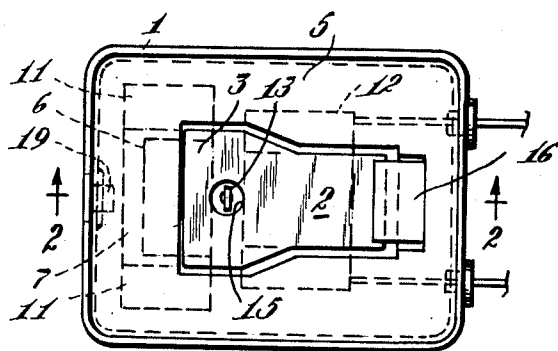


Fig. 1

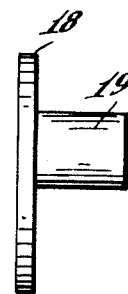


Fig. 3

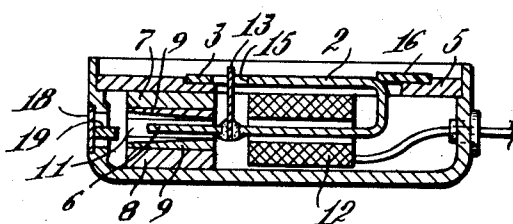


Fig. 2

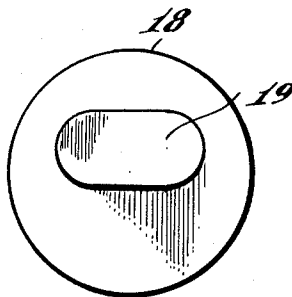


Fig. 4

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3,185,779 MAGNETIC ADJUSTING MEANS FOR MAGNETIC TRANSLATING DEVICE

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15 Claims. (Cl. 179—114)

This invention is related to magnetic translating devices, and is especially concerned with means to provide a vernier adjustment of the magnetic characteristics of such translating device.

It is an object of this invention to provide a means enabling fine adjustment of the magnetic characteristics of a magnetic translating device after previous coarse adjustments and assembly in a substantially complete casing making further coarse adjustments difficult if not impossible.

Another object of the invention is to provide a magnetic adjustment which can be adjusted from the exterior of the case after the components of a magnetic translating device are assembled within the case of the device.

A further object of the invention is to provide a simple, rugged, easily adjusted means to vary the magnetic characteristics of a magnetic translating device from the exterior of a casing especially an adjustment means which can then be fixed in final position.

For the purpose of illustration a typical embodiment of the invention is shown in the accompanying drawings in which—

FIG. 1 is a plan view of a translating device embodying the invention;

FIG. 2 is a section on line 2—2 of FIG. 1;

FIG. 3 is a side view of the magnetic adjusting means; and

FIG. 4 is an end view of the adjusting means.

The particular translating device chosen for the purpose of illustration is described and claimed in copending application Ser. No. 168,183 filed January 23, 1962. It comprises a casing 1 of magnetic material, a folded armature 2 having one end 3 fixed in a recess in plate 5 as by spot welding, the other end 6 being free to vibrate between the upper and lower magnets 7 and 8 provided with pole pieces 9 having tapered pole faces, the pole pieces being spaced apart by shim spacers 11. When utilized as a transducer the translating device may include a coil 12 through which the armature passes. A drive pin 13 has its lower end fastened to the free end of the armature and passes through a hole 15 in the armature to a driven or driving element such as the diaphragm of a microphone or receiver. Damping means 16 is seated in a recess in plate 5 and attached to the plate and armature as by epoxy adhesive. The magnets 7 and 8, extending laterally of the plane of the armature's free end on opposite sides thereof, may comprise any suitable permanent magnetic material having sufficiently high coercive field and available magnetic energy. The magnets are magnetized approximately perpendicular to the plane of the free end of the armature, and have opposite poles facing each other across the gap in which the free armature end vibrates.

In the illustration a preferred embodiment of the aforesaid adjusting means comprises a circular disk 18 mounted in an opening in the end of the casing 1, the disk having a protuberance 19 projecting into the vicinity of means 7-9 creating a magnetic field in the translating device. Both the disk 18 and the protuberance 19 are made of magnetic material such as a nickel-iron alloy. The protuberance 19 may be integral with the disk or it may be attached to the disk in any suitable way. As

shown in FIG. 4 the protuberance is offset from the axis of the disk. Thus, by rotating the disk in the casing opening by appropriate means exterior of the casing, the protuberance may be moved relatively to the pole pieces to be more or less opposite a pole piece, thus shorting some of the field collected by that pole piece to the casing. When the protuberance is parallel to the plane of the armature it affects only the adjacent pole piece to any substantial extent. When it is perpendicular to the plane of the armature it shorts both pole pieces the same amount. At any intermediate position it shorts flux between the casing and one pole piece more than it shorts flux between the casing and the other pole piece. After the shorting means is adjusted to the desired position, as indicated by appropriate testing equipment, the disk 18 may be affixed to the casing by any suitable means, as for example by an adhesive such as epoxy or the like.

The invention is useful in other forms of translating devices, utilizing one or more magnets transverse or lengthwise of the armature. It may readily take other forms such as a rectilinearly sliding or screw adjusted mass movable nearer one or the other of the pole pieces, and may occupy positions other than shown such as adjacent the shims, as will be obvious to the artisan. However, the invention is to be limited only by the scope of the appended claims.

I claim:

1. A magnetic translating device comprising a casing of magnetic material, means within the casing defining opposed surfaces with a gap therebetween, means for creating magnetic flux between the two surfaces, and means mounted on said casing adjacent said gap to short a part of said flux from either surface to said casing.

2. A device according to claim 1 wherein said last means is adjustable from outside the casing.

3. A device according to claim 1 wherein said last means comprises a support engaging the casing and a protuberance projecting toward said gap.

4. A device according to claim 3 wherein the support is a disk and the protuberance projects from one side of the disk off center.

5. A magnetic translating device comprising a casing of magnetic material, within the casing opposed surfaces with a gap therebetween, means for creating magnetic flux between the two surfaces, and means mounted on said casing adjacent said gap to short a part of said flux to said casing, said means including a mass of soft magnetic material movable transversely of said gap.

6. A magnetic translating device according to claim 5 wherein said mass comprises a rotor and said mass comprises a protuberance eccentrically disposed on the rotor.

7. A magnetic translating device according to claim 5 further characterized by means outside the casing for moving said mass as aforesaid.

8. A magnetic translating device comprising a casing of magnetic material, within the casing opposed poles with a gap therebetween, means for creating magnetic flux between the two poles, an armature having a portion vibratable lengthwise of said gap, and means mounted on said casing adjacent said gap to short a part of said flux from either of said poles, said means including a mass of soft magnetic material movable lengthwise of said gap.

9. A magnetic translating device according to claim 8 wherein said mass comprises a rotor and said mass comprises a protuberance eccentrically disposed on the rotor.

10. A magnetic translating device according to claim 8 further characterized by means outside the casing for moving said mass as aforesaid.

11. In a magnetic translating device of the balanced

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armature type in which one end of an armature is vibratable in a gap between spaced pole faces which are of opposite magnetic polarities relative to the other end of the armature which is at a neutral magnetic potential, and having a permeable casing which is also magnetically neutral, the improvement comprising a protuberance of magnetic material mounted on said casing and adjustably positionable adjacent said gap for differentially shunting flux from said pole faces to said casing and out of the gap so as to provide a control over the residual flux passing through the armature.

12. In a magnetic translating device of the balanced armature type in which one end of an armature is vibratable in a gap between spaced pole faces which are of opposite magnetic polarities relative to the other end of the armature which is at a neutral magnetic potential, and having a permeable casing which is also magnetically neutral, the improvement comprising a disk of permeable material rotatably mounted on said casing adjacent the gap and a permeable protuberance eccentrically mounted on said disk and projecting toward the gap for differentially shunting flux from said pole faces to the casing and out of the gap to an extent dependent upon the angular position of said disk thereby to provide a control over the residual flux passing through the armature.

13. Apparatus according to claim 12 in which said disk is rotatable from outside of said casing.

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14. A magnetic translating device comprising a casing of magnetic material; a pair of magnet means for providing a pair of spaced pole faces of opposite magnetic polarities within said casing, said casing being at a neutral magnetic polarity; an armature one end of which is attached to said casing and the other end of which is vibratable in the gap between the pole faces; a coil around said armature for sensing changes in the magnetic flux passing through said armature; and a protuberance of magnetic material mounted on said casing adjacent said gap and extending adjustably toward said gap for differentially shunting flux from said pole faces to said casing and out of said gap thereby to provide a control over the residual flux passing through said armature.

15. A magnetic translating device according to claim 14 further comprising a disk of magnetic material rotatably mounted in an aperture in said casing, said protuberance being eccentrically mounted on said disk.

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