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DAMPING MEANS FOR MAGNETIC TRANSLATING DEVICE

Filed July 17, 1962

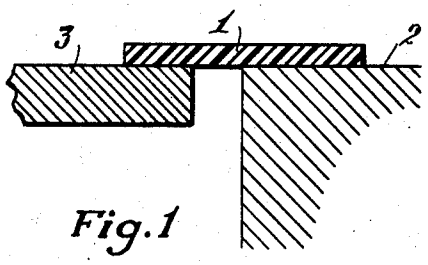

Fig. 1

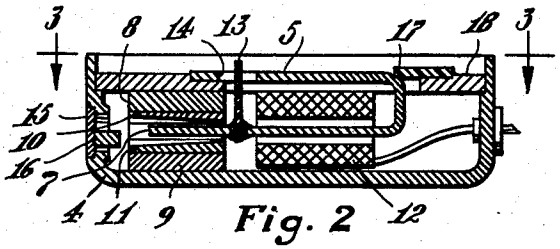

Fig. 2

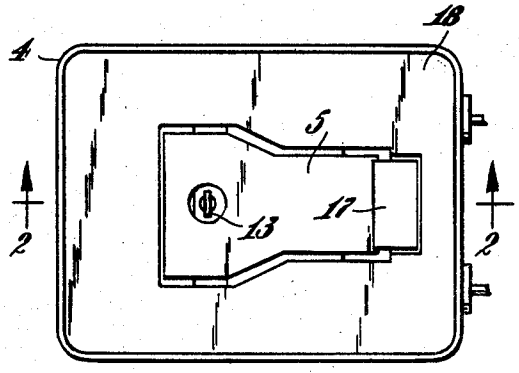

Fig. 3

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DAMPING MEANS FOR MAGNETIC TRANSLATING DEVICE

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This invention concerns damping means utilized to reduce undesirable resonances in magnetic translating devices having vibratory armatures.

Accordingly, it is an object of this invention to provide a damping means attached to a substantially non-vibratory portion of a magnetic translating device and leading therefrom into fixed relation with a vibratory portion of the armature of the translating device. The undesirable resonance to be damped is generally the second normal mode of vibration in flexure. In ordinary magnetic translating devices having straight armatures, the frequency of the second normal mode is roughly six times the frequency of the fundamental or first normal mode, and thus the former is usually above the upper cutoff frequency of the translating device and thus of no detrimental effect. The problem arises in the magnetic translating device of copending application Serial No. 168,183, filed January 23, 1962. In that device the armature is folded rather than straight, and is free to vibrate throughout its length, including the folded region. In such case, the frequency of the second normal mode may be less than twice the fundamental frequency, and thereby may introduce a severe dip in the response of the translating device below its upper cutoff frequency, thus necessitating correction by some means. That means is provided by the damping means of the present invention.

The above and further objects will be more readily apparent by reference to the following specification and drawings in which

FIG 1. is a sectional schematic view of the invention;

FIG. 2 is a sectional view of the invention applied to a magnetic translating device along line 2—2 of FIG. 3; and

FIG. 3 is a plan view of the invention in a magnetic translating device along line 3—3 of FIG. 2.

Referring to FIG. 1, the invention is shown schematically in a preferred embodiment as a member 1 of damping material suitable for such purpose, preferably a highly plasticized vinyl; however any plasticized thermoplastic, silicone gel, elastomer or other flexible material having a lossy elastic modulus may be employed. The member has one end secured to a substantially fixed portion 2 of a magnetic translating device generally of the form disclosed in the aforesaid copending application, and the other end secured to the armature 3 of such translating device in the vicinity of the folded region of the armature. The member may be secured by suitable attaching means such as a solvent type adhesive.

FIGS. 2 and 3 show the invention applied in the particular embodiment of the magnetic translating device disclosed in the aforesaid application. This device comprises a casing 4, a folded armature 5 having one end fixed in a recess in plate 18 as by spot welding, the end 7 of the armature being free to vibrate between the upper and lower magnets 8 and 9 with pole pieces 10 and 11 having tapered faces. When utilized as a transducer the device may include a coil 12 through which the armature passes. A drive pin 13 has a lower tongue extending through a circular hole in the free end of the armature and passes through armature hole 14 to a further driven or driving element such as the diaphragm of a microphone or

receiver. Vernier or fine magnetic adjustment disk 15 with slug 16 thereon is adjusted and then fixed in position to the case as by epoxy bonding.

The magnets 8 and 9 extend laterally of the plane of the free end of the armature on opposite sides thereof and are magnetized approximately perpendicular to the plane of said free end of the armature and have opposite poles facing each other across the gap in which the free end of the armature vibrates. According to this embodiment of the invention a damping member 17 has one end mounted in a recess in the substantially fixed plate 18 and the other end secured to the armature 5 in the vicinity of the folded portion. The attachment of the damping member to the other parts of the device is preferably by an adhesive which does not appreciably swell the damping material, so as to avoid distortion of the damping member during bonding. The armature remains substantially free to vibrate throughout its full folded extent but is prevented from unduly building up undesirable amplitude of vibration in the second normal mode. Similar damping means may be provided at somewhat different locations along the armature, but in the vicinity of the folded portion of the armature, either instead of or in addition to that shown.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. A damping member for a magnetic translating device which has a folded armature having a fixed end and an end free to vibrate, comprising an element of vibration damping material having one portion attached to a substantially fixed portion of a magnetic translating device and having another portion attached to the armature between the fixed and free ends thereof in the vicinity of the folded region.

2. In combination with a magnetic translating device having a folded armature with a fixed end and an end free to vibrate, the improvement comprising a member of damping material having one part secured to a substantially fixed portion of the translating device and having another part secured to the armature of said device between the ends thereof in the vicinity of the folded region.

3. The improvement recited in claim 2 wherein the damping member is secured to the portions of the translating device by adhesive.

4. The improvement recited in claim 2 wherein the material is plasticized thermoplastic.

5. In a magnetic translating device having an armature extending along the device from a fixed end of the armature, turning around, and then extending back along the device to an end of the armature free to vibrate, the improvement comprising a damping means secured to the armature in the vicinity of the turn-around portion and extending to a substantially fixed portion of the device.

6. In a magnetic translating device having a folded armature, the improvement comprising damping means secured to the armature in the vicinity of the folded portion and extending to a substantially fixed portion of the device, wherein the damping means is a member of plasticized thermoplastic.

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ROBERT H. ROSE, *Primary Examiner.*