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3,242,445

SUPPORTING DEVICE FOR MECHANICAL FILTER

Filed March 31, 1964

FIG. 1

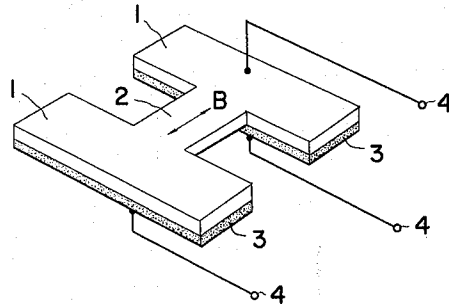


FIG. 2

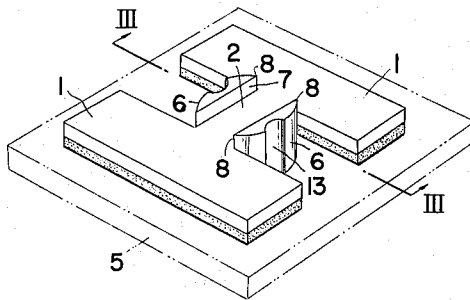
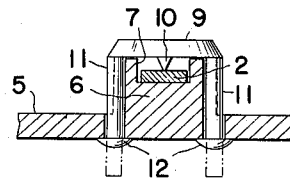


FIG. 3



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3 Claims. (Cl. 333—72)

This invention relates to a supporting device for a plate form mechanical filter wherein resonant elements and a coupling element consist of a single plate and has as its object the provision of an improved supporting device which does not interfere with the filtering characteristics of the mechanical filter.

While the invention concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed that the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIG. 1 shows a perspective view of a mechanical filter embodying this invention;

FIG. 2 shows a perspective view of the mechanical filter shown in FIG. 1 illustrating a support assembled therewith, with a holding clamp removed; and

FIG. 3 shows a sectional view taken along a line III—III in FIG. 2.

Referring now to the accompanying drawing, there is shown in FIG. 1 a typical mechanical filter in the form of a flat plate wherein more than two resonant elements 1 and a coupling element 2 interconnecting them are formed of a single metal plate, and piezoelectric elements or magnetostrictive elements 3 are bonded to the resonant elements situated at the opposite ends of the assembly. Suitable voltage is impressed across the piezoelectric element of one end to drive them electrostatically. Numerals 4 indicate lead wires to electrodes, it being understood that the resonant elements 1 can be used additionally as the pickup electrodes situated on the opposite end.

It is a feature of this invention to anchor the coupling member 2 by means of a suitable supporting device in order to support a mechanical filter of such configuration by utilizing the fact that the vibration mode of the coupling element 2 essentially comprises a longitudinal vibration as shown by an arrow B.

For example, as shown in FIG. 2, a support 6 is mounted on a base plate 5. The support 6 is formed with a slot 7 having a width slightly larger than that of the coupling element 2, and, after inserting the coupling element in the slot, a clamp 9 is secured upon the support 6 to anchor the coupling element 2 by means of a projection 10 directed downwardly from the clamp 9, as shown in FIG. 3.

In order to fix the filter plate, it is advantageous to shape the support 6 to extend along the whole length of the coupling element and also to have sharp edges 8 at its opposite ends in order to contact with the resonant elements 1 in areas as small as possible so as not to disturb the vibration of the resonant elements. As shown in the drawing FIG. 3, the clamp 9 is provided with legs 11 adapted to extend through holes in the base plate 5 and welded thereto at 12. Guide grooves 13 are pro-

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vided for the opposite side surfaces of the support 6 to accommodate the legs 11.

It is to be understood that the clamp 9 may be made of a synthetic resin, or in some cases such a clamp may be dispensed with provided that an anchoring projection 10 is secured to a cover for the filter.

The support 6 may be shaped to have any configuration to accommodate or clamp the coupling element 2.

With the support according to this invention adapted to support the coupling element in the manner described above the resonant elements 1 can freely vibrate without any appreciable energy loss caused by the support, thus greatly improving the filter characteristics.

Even when the longitudinally vibrating portion of the filter is supported by considerably strong force, the vibrating element is not materially affected by the stiffness or mass of the support, and the filtering characteristics are not deteriorated to any appreciable extent. Thus, the invention provides an improved supporting device which can positively support a vibrating element and can stabilize the operation thereof.

While the invention has been explained by describing particular embodiments thereof, it will be apparent that improvements and modifications may be made without departing from the scope of the invention as defined in the appended claims.

What is claimed is:

1. A supporting device for a mechanical filter in the form of a flat plate and including a plurality of resonant elements and coupling elements interconnecting said resonant elements, said coupling and resonant elements being formed of a single plate, said supporting device being provided with a slot adapted to accommodate said coupling element together with sharp edges at the opposite side thereof adapted to contact said resonance elements in areas as small as possible; said device also being provided with means to clamp said coupling element from the opposite side thereof.

2. A supporting device for a mechanical filter in the form of a flat plate and including a plurality of resonant elements and coupling elements interconnecting said resonant elements, said coupling and resonant elements being formed of a single plate; and a clamp secured over said supporting device provided with a projection which serves to anchor said coupling elements.

3. A supporting device for a mechanical filter in the form of a flat plate and including a plurality of resonant elements and coupling elements interconnecting said resonant elements; said coupling elements and resonant elements being formed of a single plate; said supporting device being provided with a slot adapted to accommodate said coupling elements together with sharp edges at the opposite side thereof adapted to contact said resonance elements in areas as small as possible; and a clamp secured over said supporting device provided with a projection which serves to anchor said coupling elements.

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L. ALLAHUT, *Assistant Examiner*.