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N. BERCOVITZ, JR
INCREASE OF COUPLING TO MECHANICAL FILTER
END DISCS TO IMPROVE RESPONSE
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2,918,634

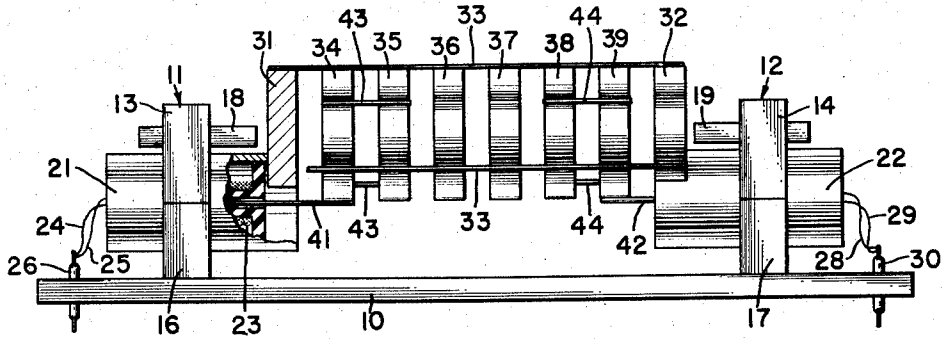


FIG 1

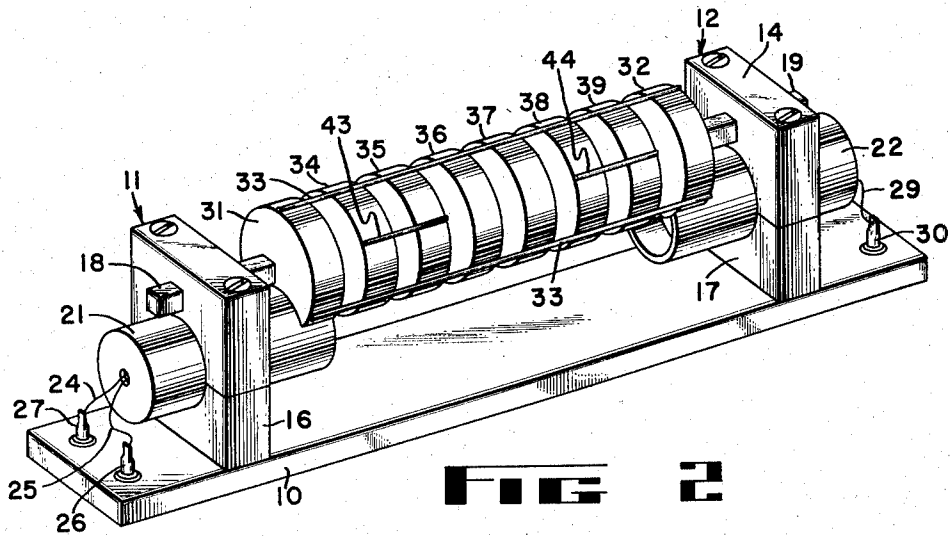


FIG 2

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INCREASE OF COUPLING TO MECHANICAL FILTER END DISCS TO IMPROVE RESPONSE

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3 Claims. (Cl. 333—71)

This invention relates in general to mechanical filters and in particular to means for maintaining equal ripple in a mechanical filter.

Electromechanical filters such as described in the patent to Melvin L. Doelz, Number 2,656,516, entitled "Filter Using Transverse Supporting Means," which issued on October 20, 1953, have very high Q's and may be used to obtain a sharp selectivity. Such filters have been used with great success, for example, in intermediate frequency stages of radio equipment. It has been discovered that in order to obtain uniform values for all peaks and valleys, or what is termed "equal ripple" in a filter, more coupling is required toward the ends of the filter than is used in the center sections.

It is an object of the present invention, therefore, to provide an electromechanical filter wherein the coupling is increased toward the ends of the filter assembly to improve the frequency response.

Further objects, features, and advantages will become obvious from the following description and claims when read in view of the accompanying drawings, in which:

Figure 1 is a side view of a mechanical filter utilizing the principles of my invention, and

Figure 2 is an isometric view illustrating the filter.

Figure 1 illustrates a base plate 10 on which are mounted a pair of stand-offs 11 and 12 that have upper sections 13 and 14, respectively, and lower sections 16 and 17. The lower sections 16 and 17 are attached to the base plate 10. The upper sections 13 and 14 support biasing magnets 18 and 19. Mounted between the upper and lower portions of the stand-offs are hollow cylinders 21 and 22 which support therein driving and output coils.

The driving coil 23 is shown in the cutaway portion of the cylinder 21. Leads 24 and 25 are connected to the coil 23 and are attached to terminals 26 and 27, respectively, which extend through the base plate 10. The output coil mounted in the cylinder 22 is connected to leads 28 and 29 which are connected respectively to terminals that extend through the plate 10. One of these terminals is seen and is designated by the numeral 30.

A pair of supporting discs 31 and 32 are recessed into and attached to the cylinders 21 and 22. Extending between the supporting discs 31 and 32 are a plurality of coupling wires 33. There might be, for example, three coupling wires 33 equally spaced about the peripheries of the supporting discs.

A number of active discs 34-39 are mounted between the supporting discs 31 and 32 and their peripheries are attached to the coupling wires 33, for example as by welding. These discs are tuned to the resonant frequency of the filter as pointed out in the above referenced Patent Number 2,656,516 and are the active resonating members of the filter.

The first active disc 34 has a driving wire 41 attached to its periphery which extends within the confines of the cylinder 21 and through the driving coil 23. It is to be noted that the lower portion of the supporting

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disc 31 has been removed so that the driving wire 41 extends freely through the coil. The last active disc 39 has an output magnetostrictive wire 42 which extends within the confines of cylinder 22 and through the pick-up coil mounted therein.

A plurality of additional coupling wires 43 are connected between the peripheries of the first two active discs 34 and 35. There might be, for example, two or more of these. In a similar manner, additional short coupling wires 44 are attached between the peripheries of the last active discs 38 and 39.

It should be particularly noted that the coupling wires 43 and 44 do not extend the length of the filter but only couple a portion of the active discs together.

In operation, an input signal is supplied to the terminals 26 and 27 and coupled to the magnetostrictive driving wire 41 by the driving coil 23. This causes the first active disc 34 to oscillate if the input signal has any frequency components which cause the resonant frequency disc to oscillate and this motion is converted to the rest of the filter. The frequency components within the pass band of the filter will be passed by the last disc of the filter 39 through the output wire 42. Any output induced in the output coil is furnished to leads 28 and 29.

The addition of the extra coupling wires 43 and 44 results in an improved frequency response so that the peaks and valleys occurring over the pass band will be substantially equal. This results in equal ripple.

It is seen that this invention has been described with a particular embodiment and relates to adjusting the coupling between the active discs of an electromechanical filter so as to improve the frequency response.

Although this invention has been described with respect to a particular embodiment thereof, it is not to be so limited as changes and modifications may be made therein which are within the full intended scope of the invention as defined by the appended claims.

I claim:

1. A resonating assembly in an electromechanical filter comprising a plurality of resonating discs, a plurality of long coupling wires attached to the peripheries of all of said discs, said discs being mounted by said plurality of long wires in a parallel spaced relationship, and a plurality of short coupling wires attached to the peripheries of a portion of said discs which are adjacent the end of the resonating assembly.

2. A resonating assembly in an electromechanical filter comprising a plurality of resonating discs, a plurality of long coupling wires attached to the peripheries of all of said discs, said discs being mounted by said plurality of long wires in a parallel spaced relationship, and a plurality of short coupling wires attached to the peripheries of a portion of at least two of said resonating discs which are adjacent the ends of the resonant assembly.

3. A resonating assembly in an electromechanical filter comprising a plurality of resonating discs, a plurality of long coupling wires attached to the peripheries of all of said discs, said discs being mounted by said plurality of long wires in a parallel spaced relationship, and a plurality of short coupling wires attached to the peripheries of a portion of the two resonant discs which are adjacent the ends of the resonant assembly.

References Cited in the file of this patent

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2,656,516	Doelz	Oct. 20, 1953
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