Aug. 20, 1957 G. H. JONKER ET AL 2,803,803

ELECTRIC FILTER

Filed Nov. 26, 1952

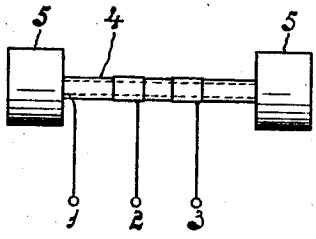


Fig. 1

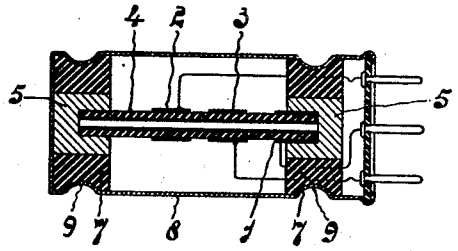


Fig. 2

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United States Patent Office

2,803,803

Patented Aug. 20, 1957

2,803,803

ELECTRIC FILTER

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Application November 26, 1952, Serial No. 322,614

Claims priority, application Netherlands January 17, 1952

2 Claims. (Cl. 333—72)

The invention relates to electric filters for electric oscillations corresponding with an audio frequency, particularly filters for rejecting the interference tone (for example 9 kcs./s.) generated in the output of a radio receiver by two transmitters adjacent in wavelength.

To reject such an interference tone use may be made of a resonant circuit tuned to the frequency to be rejected and made up of inductance and capacitance. However, in general the use of such a resonant circuit is a comparatively expensive solution.

The object of this invention is to provide a generally cheaper alternative solution. The invention is characterized by the use of an electrostrictive vibrator having a tubular or barshaped vibratory body which is weighted the ends. The use of an electrostrictive vibrator for filtering purposes is known per se for substantially higher frequencies. In accordance with this invention an electrostrictive vibrator is used for frequencies within the audio frequency range by loading a short, narrow tube consisting of electrostrictive material with weights at its ends.

The invention will be explained with reference to the accompanying drawing, in which:

Fig. 1 shows schematically one embodiment of this invention; and

Fig. 2 shows a longitudinal cross-sectional view of another embodiment of this invention.

Referring to Fig. 1, the tubular body 4 is made of electrostrictive material. Associated with this vibrator body 4 is an internal electrode 1 and two external electrodes 2 and 3, providing terminals to which an input potential may be applied between the internal electrode 1 and, for example, the external electrode 2, and from which an output potential may be abstracted between the internal electrode 1 and the second external electrode 3. The electrostrictive material is preferably an electret, as is the case, for example, with barium metatitanate. After a high voltage has been applied for a short period of time between the electrodes 1 and 2 and between the electrodes 1 and 3 it retains a given remanent polarization. This polarization considerably increases the electromechanical coupling.

If no further measures are taken and the input potential remains constant the potential produced across the output electrodes will be at maximum value in the proximity of the mechanical resonance frequency of the vibratory body 4. Consequently the required rejection is then obtainable by including the vibrator in a negative feedback circuit in the radio receiver. However, at a

rejection frequency of 9 kcs./s. the vibrator would thus be required to have a length of approximately 22 cm.

According to the invention a small construction of only a few centimeters is obtained because it proved possible to realize the vibratory body as a short narrow tube loaded with weights 5 at its ends. These weights, which together are usually considerably greater than the dead weight of the vibrator body 4, effect an imaginary elongation of the vibratory body 4 and consequently a reduction of its natural resonance. This results in a considerable saving of space and of electrostrictive material.

It has been found that the device shown makes possible a circuit quality Q of between 150 and 300. Such high circuit quality is generally excessive for the object aimed at by this invention. Therefore, according to a further feature of the invention, means have been provided to adjust the damping of the vibrator. To that end another set of weights (not shown) might, for example, be screwed against the weights 5 through damping material such as rubber discs with the thrust force being a measure of the damping effected by the rubber discs.

For this purpose, in the embodiment shown in Fig. 2 the reference numerals of which designate similar construction elements as in Fig. 1, rubber sockets 7 are arranged to surround the weights 5 so as to bring about the required damping. This damping is adapted to be adjusted by gripping the sockets with an adjustable pressure by means of grooves 9 recessed to the required depth in a metal screening can 8 and engaging a recess in the sockets 7.

Though, in principle, use may be made of a bar-shaped, for example, a strip-shaped, vibrator body in an exactly similar manner, the tubular vibrator body 4 has been found to be preferable owing to its greater mechanical strength.

While we have thus described our invention with specific examples and embodiments thereof, further modifications will be readily apparent to those skilled in the art without departing from the spirit and the scope of the invention as defined in the appended claims.

What we claim is:

1. An electric filter for electrical oscillations within the audio-frequency range, comprising a substantially cylindrical housing having a circumferential indentation formed substantially at each end in a side wall thereof, a pair of damping members mounted within the housing at opposite ends thereof, a vibratory member mounted at opposite ends within said damping members and having a resonance frequency within said audio-frequency range, said vibratory member comprising a tubular electrostrictive member having a given length and weight and a pair of weights mounted on and secured to opposite ends of said electrostrictive member, the combined weight of said pair of weights being greater than said given weight of said electrostrictive member and the combined length of said pair of weights being less than said given length of said electrostrictive member, whereby the overall length of said vibratory member is substantially less than the length of an electrostrictive member alone resonant within said audio-frequency range, said damping members surrounding and engaging said weights and being engaged by said circumferential indentations to provide a predetermined pressure on said weights, and a plurality of spaced electrodes coupled to said electro-

strictive member to provide input and output means therefor.

2. An electric filter as set forth in claim 1 wherein the electrostrictive member is constituted of barium metatitanate, and the damping members are constituted of rubber.

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