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LOUDSPEAKER ARRANGEMENT

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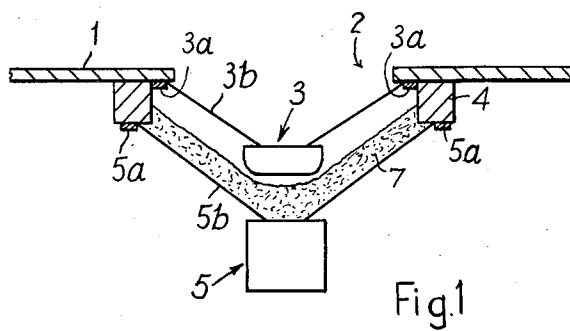


Fig. 1

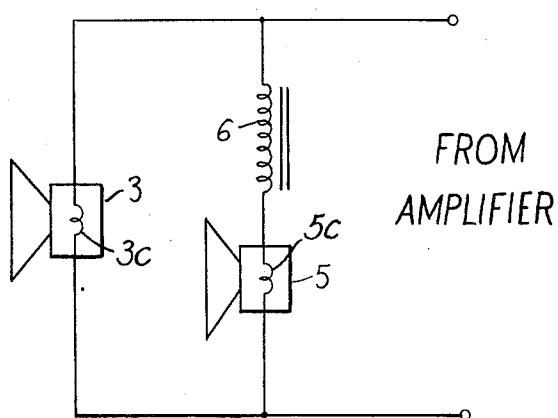


Fig. 2

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LOUDSPEAKER ARRANGEMENT

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1 Claim. (Cl. 179—1)

The present invention relates to a loudspeaker arrangement and has for an object to provide a loudspeaker arrangement which gives an improved response over the audio frequency range.

According to the present invention a loudspeaker arrangement comprises a plurality of loudspeakers mounted one behind the other, means being provided for enclosing a volume of air between successive loudspeakers to provide air coupling between the loudspeakers. The speech coils of the loudspeakers are electrically connected to the source of audio frequency with which they are to be energized so that the cones of the loudspeakers work in phase. The arrangement may consist of only two loudspeakers or alternatively more than two loudspeakers may be employed. The loudspeakers are preferably mounted one behind the other with their cones facing in the same direction.

From another aspect the invention provides a loudspeaker arrangement comprising two loudspeakers arranged one behind the other with their cones facing in the same direction and means for enclosing the space between the rear of the cone of the foremost loudspeaker and the front of the cone of the rearmost loudspeaker, whereby the volume of air between the loudspeakers is trapped in this space to provide air coupling between the loudspeakers. The enclosing means may also serve to maintain the two loudspeakers separated by the desired distance.

An embodiment of the invention will now be further described with reference to the accompanying drawings, in which:

FIGURE 1 is a diagrammatic section through one loudspeaker arrangement according to the invention, and FIGURE 2 is a circuit diagram showing the electrical connection of the loudspeakers.

Referring to FIGURE 1, there is shown a portion of a wall of a cabinet or baffle 1 having an aperture 2 behind which is mounted a loudspeaker 3, for example a 10" by 6" elliptical unit which operates over the full audio frequency range. The cone 3b of loudspeaker 3 is attached by its periphery 3a to the cabinet 1 and is also located in a hole cut in a block of wood 4 arranged behind the aperture 2, and surrounding the loudspeaker 3. The block 4 supports the periphery 5a of the cone 5b of a second loudspeaker 5, for example a 12" unit which only operates below 200 cycles per second. The periphery of both of the loudspeakers are sealed at their connection to the cabinet 1 and block 4 respectively, and therefore the volume of air between them is trapped between the cones of the two loudspeakers and provides additional coupling between them. The block 4 also acts as a spacer to maintain the desired distance between the two loudspeakers. The loudspeakers must of course be spaced by a minimum distance which ensures that they are not in mechanical contact and the maximum spacing between them is determined by the distance where the volume of air trapped between the loudspeakers becomes an inefficient coupling due to the elasticity of the air. This maximum distance will vary with the size of the loudspeakers and may also vary with their power.

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Advantageously an absorbent material 7 may be placed between the cones of the loudspeakers, this absorbent material being such that it will not substantially absorb frequencies below the upper frequency to be reproduced by the loudspeaker 5, e.g. below 200 cycles per second. The absorbent material may be attached to the cone of the rear loudspeaker 5, but must not touch the cone of the front loudspeaker 3. The absorbent material has the effect of preventing the reflection of frequencies of above 200 cycles per second produced by the front full range loudspeaker 3 by the cone of the rear bass loudspeaker 5. Such reflections, if present, would either add to or subtract from the output of the unit and would cause what is known as colouration. Suitable absorbent materials are cotton, wool, kapok or a foamed plastic.

The electrical connection of the loudspeakers is shown in FIGURE 2. A choke 6, which may have a value of between 15 and 20 mH in the present embodiment, is connected in series with the speech coil 5c of the bass loudspeaker 5 to filter out frequencies in excess of 200 c./s. This series combination of loudspeaker 5 and choke 6 is connected in parallel with the speech coil 3c of the full range loudspeaker 3, and the whole arrangement is in turn connected to the output terminals of an amplifier or other driving device.

In operation, the movement of the cone of the loudspeaker 3 is assisted by the cushion of air over all of its rear surface as well as being driven by its speech coil, whereby a reduction of cone break-up and/or flexing of the cone of the loudspeaker 3 is achieved.

The arrangement according to the present invention has the following advantages:

(1) A good bass response down to 30 c./s. can be achieved.

(2) A more linear impedance is presented to the amplifier than in multi-loudspeaker devices as at present constructed.

(3) A smoother response is obtained at the lower frequencies due to absence of cone "break-up."

I claim:

A loudspeaker arrangement comprising a first loudspeaker having a speech coil and a cone arranged to operate over the full range of audio signals to be reproduced, a second loudspeaker of larger size than the first loudspeaker, a speech coil and a cone included in said second loudspeaker, a choke connected in series with the speech coil of the second loudspeaker, means connecting the series combination of said speech coil and said choke in parallel with the speech coil of said first loudspeaker, so that the higher audio frequencies are filtered out by said choke and said second loudspeaker only reproduces the lower audio frequencies, means for supporting said first and second loudspeakers with their cones facing in the same direction and with the second loudspeaker behind the first loudspeaker, and means for enclosing the space between the rear of the cone of the first loudspeaker and the front of the cone of the second loudspeaker to trap the volume of air between the cones of the loudspeakers to provide air coupling between the loudspeakers.

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