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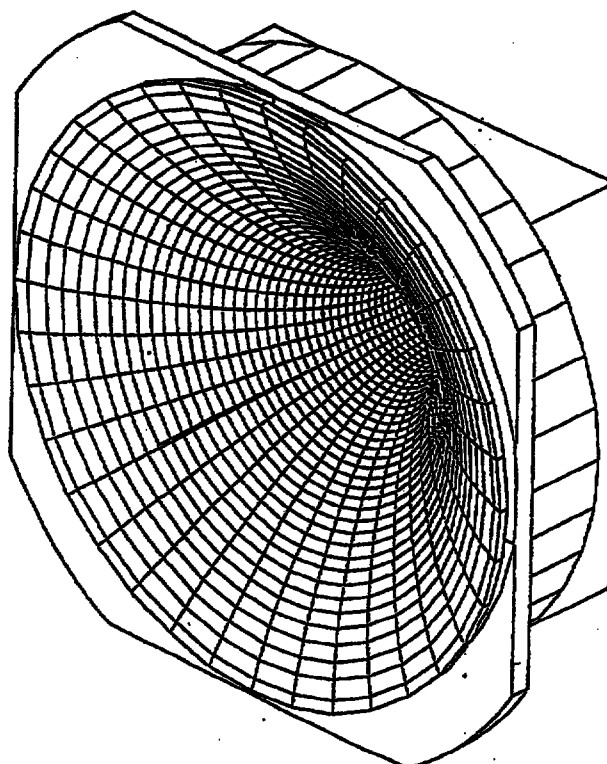
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(21) International Application Number: PCT/EP96/02301 (22) International Filing Date: 29 May 1996 (29.05.96) (30) Priority Data: TO95A000446 30 May 1995 (30.05.95) IT (71) Applicant (for all designated States except US): ZINGALI S.N.C. [IT/IT]; Via Goito, 20, I-04011 Aprilia (IT). (72) Inventor; and (75) Inventor/Applicant (for US only): ZINGALI, Giuseppe [IT/IT]; Via Goito, 20, I-04011 Aprilia (IT). (74) Agent: DINI, Roberto; Via Castagnole, 59, I-10060 None (IT).	(81) Designated States: AL, AU, BG, BR, CA, CN, CZ, FI, HU, JP, KP, KR, MX, NO, PL, RO, SG, SK, TR, US, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: **ACOUSTIC HORN TRANSDUCER WITH A CONIC TYPE DIFFUSER HAVING AN EXPONENTIAL PROFILE IN WOOD**

(57) Abstract

An acoustic horn transducer with a conic type diffuser is described, having as its main technical characteristic that the diffuser has an exponential type profile; a further characteristic resides in the fact that the realisation of the horn is obtained from wood.



"Acoustic horn transducer with a conic type diffuser having an exponential profile in wood"

5 **DESCRIPTION**

The present invention relates to an acoustic horn transducer.

It is known that in the greater part of acoustic reproduction systems for high fidelity and for professional use, it is convenient to divide the audio range that is comprised between 20 Hz and 20000 Hz in
10 numerous ways, using different types of acoustic transducers, applying the most suitable so as to reproduce the range of frequencies in the most correct way possible; for example a "woofer" loudspeaker is used for the lower frequencies, a "midrange" loudspeaker for the medium frequencies and a "tweeter" loudspeaker for the high
15 frequencies.

Conventional horn transducers offer, if compared to dome type transducers, the fundamental characteristic of projecting the sound with greater speed through the air, but with a punctiform image and often with a nasal timbre, making the entire system not very pleasant
20 to listen to; on the contrary dome transducers have a good sound

emission, but with lower sonorous impact, of "low efficiency", thus making rather approximate the sonority and the timbre dynamics of musical instruments.

The aim of the present invention is that of indicating how it is possible
5 to realise an acoustic horn transducer which represents an improvement of the known devices.

For reaching such aim the present invention has as its subject an acoustic transducer according to that described in claim 1, and also in the successive claims.

10 Further characteristics and advantages of the acoustic transducer according to the invention will result in being clear from the description that follows and from the annexed drawings, supplied purely as an explanatory and non-limiting example, wherein:

Figure 1 represents the diffuser (horn) in a three dimensional view
15 according to the invention;

Figure 2 represents a sectioned view of the complete transducer with the wooden horn, indicated with number 1, and the "driver", indicated with number 2;

Figure 3 represents a plan view of the transducer seen from above.

20 After detailed studies and research the applicant has perfected a new transducer system for the sole reproduction of the medium high frequencies in order to realise two-way sonorous reproduction systems, that confer to the acoustic reproduction system the fundamental characteristic of remarkably reducing the cross
25 distortions between the "midrange" loudspeaker and the "tweeter" loudspeaker that, as is known, reproduce the medium high part in a reproduction system.

Furthermore such transducers for the sole reproduction of the medium high frequencies, replace the two usual transducers with one
30 only.

As a consequence of the drawbacks of the aforementioned transducers the applicant has perfected a new transducer with a wooden horn having the following characteristics:

- a) the constructive material used for the diffuser or horn is wood without knots, inasmuch it is the only material that is able to give the transducer the most correct timbre possible (nobody has ever seen a violin in a plastic or metallic material);
- 5 b) the conic profile of the exponential type being of 360° of the wooden diffuser 1 (note in particular the curve of the exponential type described in figure 2) confers to the transducer the characteristic of radiating sounds in an uniform and constant way;
- c) thanks to the constructive profile of the diffuser, and to the
- 10 material used, the typical resonance has been eliminated in the range of frequencies that go from 1000 Hz to 2000 Hz which confers to the conventional horn systems the typical nasal sound and punctiform. Together the constructive characteristics of the transducer according to the invention (diffuser with a conic profile of the exponential type
- 15 being of 360° realised in knotless wood) confer to the transducer, as resulting from exhaustive practical listening tests with all kinds of music and with sounds coming from live microphonic recordings, a reproduction of very high timbre quality and of dynamics being very near that offered by musical instruments listened to live.
- 20 The realisation of the wooden horn is carried out starting from a single wooden block, appropriately working it on a lathe, until its profile is that as shown in figure 2.
- It is clear in any case that numerous variations are possible by the skilled-man, to the acoustic horn transducer described as an example,
- 25 without departing from the novelty principles inherent in the invention. From the many, the possibility is mentioned of realising the diffuser rather than from wood, in plastic or in ferrous materials obtained by fusion, such as aluminium or other materials, of which the working techniques are different from those previously illustrated.
- 30 It is clear that other variations can be introduced to the transducer subject of the present invention, without departing from the novelty principles inherent in the innovative idea, as is also clear that in the practical realisation of the invention certain materials and the forms



of the illustrated details may be different, and the same may be replaced with technically equivalent elements.

CLAIMS

1. Acoustic horn transducer, with a conic type diffuser, characterised in that said transducer (1) has an exponential type profile.

5 2. Transducer according to claim 1, characterised in that said diffuser is realised in wood.

3. Transducer according to claim 1, characterised in that it is sized for the reproduction of both the range of the medium frequencies, and the range of the high frequencies.

10 4. Transducer according to one or more of the previous claims, characterised in that it comprises a "driver" (2) arranged to the rear of the diffuser (figure 2).

15 5. Transducer according to one or more of the previous claims, characterised in that the curve of the profile of the diffuser corresponds to that represented in Figure 2.



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FIG. 1

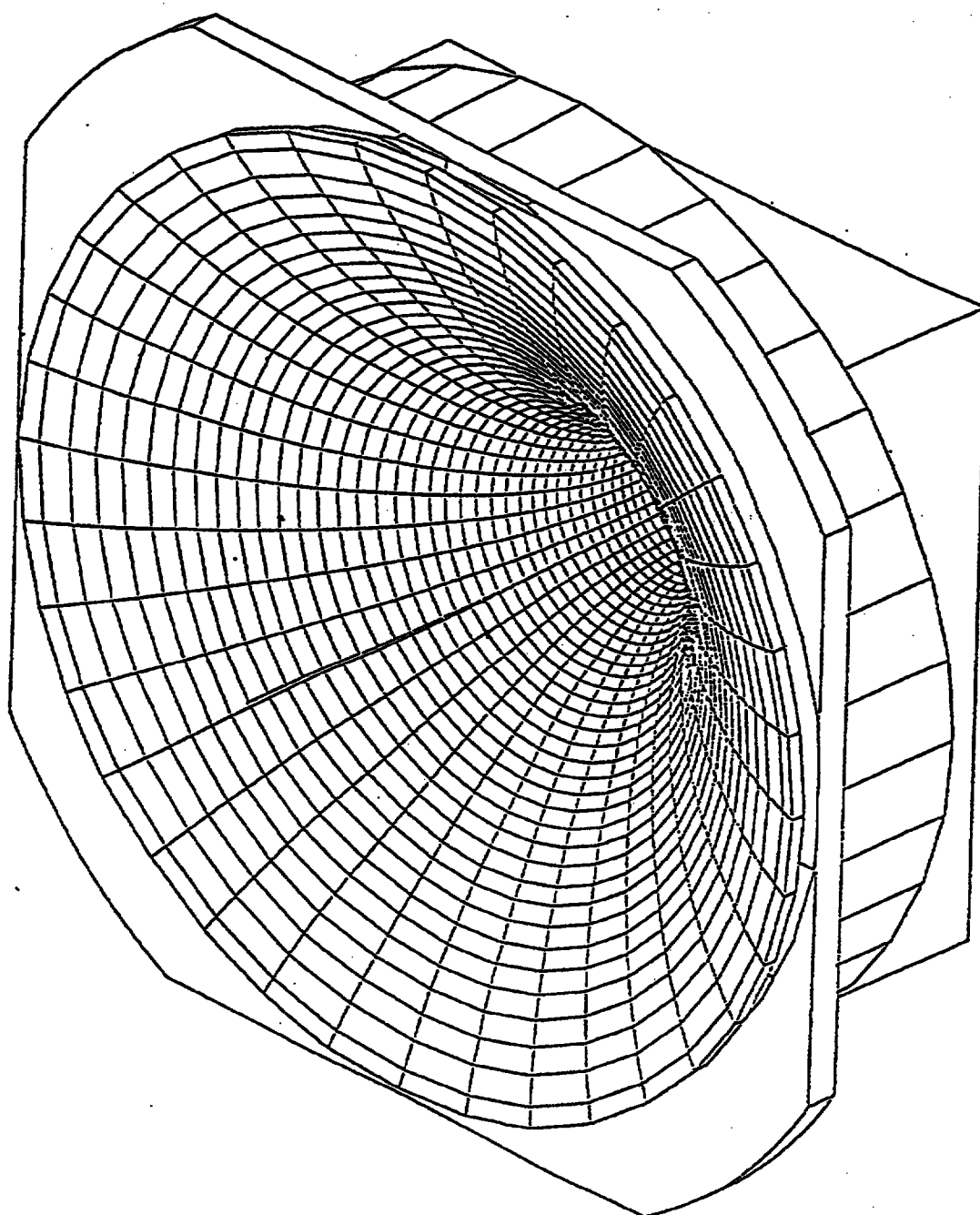


FIG. 2

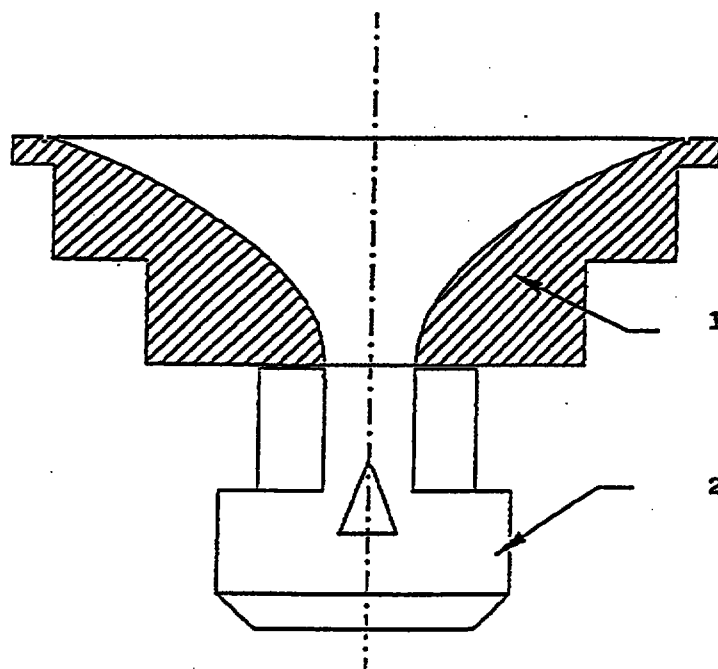
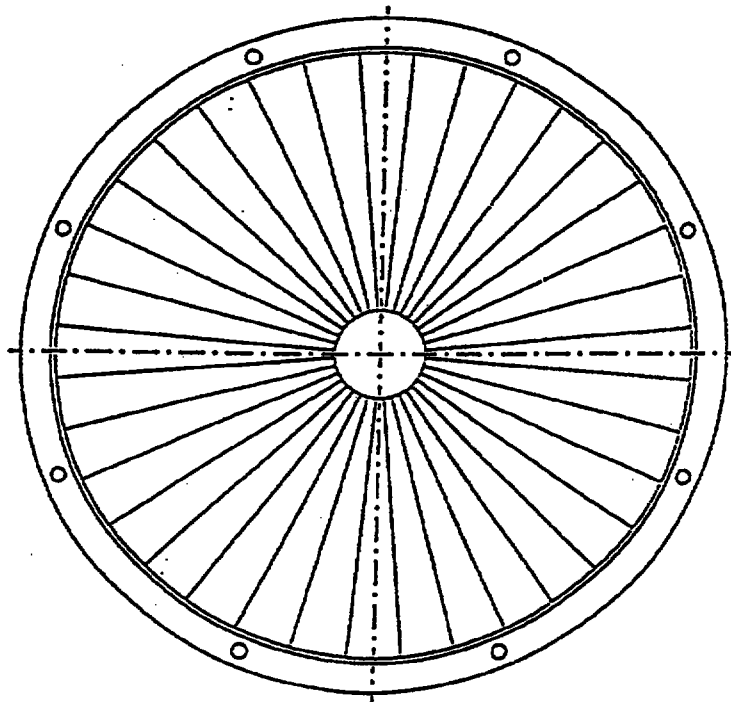


FIG. 3



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CLAIMS

1. Acoustic transducer sized for the reproduction of both the range of the medium frequencies and the range of the high frequencies, characterised by a single conic horn type diffuser having an exponential 360° type profile, whose length is shorter than the maximal diameter thereof.
2. Transducer according to claim 1, characterised in that said diffuser is realised in wood without knots.
3. Transducer according to claim 2, characterised in that the curve of the profile of said diffuser corresponds to that shown in figure 2, and that any resonance is eliminated in the range of the frequencies that go from 1000 Hz to 2000 Hz.
4. Transducer according to one or more of the previous claims, characterised in that it comprises a driver (2) arranged to the rear of the diffuser.

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- a) the constructive material used for the diffuser or horn is wood without knots, inasmuch it is the only material that is able to give the transducer the most correct timbre possible (nobody has ever seen a violin in a plastic or metallic material);
- 5 b) the conic profile of the exponential type being of 360° of the wooden diffuser 1 (note in particular the curve of the exponential type described in figure 2) confers to the transducer the characteristic of radiating sounds in an uniform and constant way;
- 10 c) thanks to the constructive profile of the diffuser, and to the material used, the typical reasonance has been eliminated in the range of frequencies that go from 1000 Hz to 2000 Hz which confers to the conventional horn systems the typical nasal sound and punctiform. Together the constructive characteristics of the
- 15 transducer according to the invention (diffuser with a conic profile of the exponential type being of 360° realised in knotless wood) confer to the transducer, as resulting from exhaustive practical listening tests with all kinds of music and with sounds coming from live microphonic recordings, a reproduction of very high timbre quality and of dynamics being very near that offered
- 20 by musical instruments listened to live.

The realisation of the wooden horn is carried out starting from a single wooden block, appropriately working it on a lathe, until its profile is that as shown in figure 2.

25 In figure 2 the number 1 indicates the wooden horn diffuser and the number 2 indicates the driver. In figure 2 it is evident that the curve of the profile of the diffuser is of the exponential type; it is also evident that, due to the particular curve chosen, the length (L) of the horn diffuser is considerably shorter than the diameter (D) thereof.

30 It is clear in any case that numerous variations are possible by the skilled-man, to the acoustic horn transducer described as an example, without departing from the novelty principles inherent in the invention. From the many, the possibility is mentioned of realising the diffuser rather than from wood, in plastic or in

35 ferrous materials obtained by fusion, such as aluminium or other materials, of which the working techniques are different from those previously illustrated.

40 It is clear that other variations can be introduced to the transducer subject of the present invention, without departing from the novelty principles inherent in the innovative idea, as it is also clear that in the practical realisation of the invention certain materials and the forms

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FIG. 2

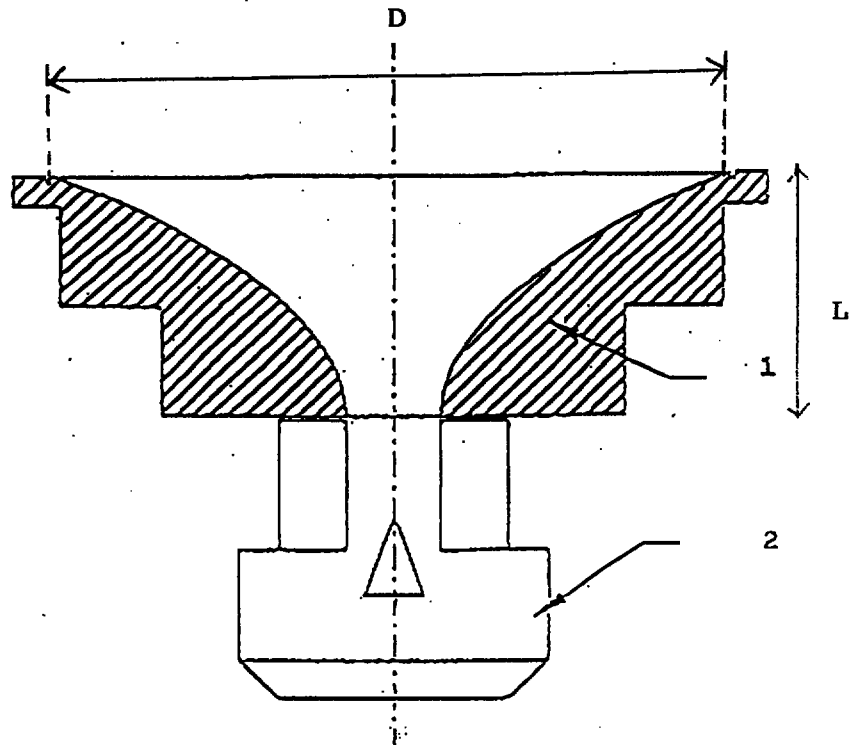


FIG. 3

