

Description

[0001] The present invention is related to a cabinet for consumer electronic devices equipped with loudspeakers. Examples for such devices are audio equipment like CD players, tape recorders, radios, and television receivers. In particular, the invention is related to devices where the loudspeakers form an integral part of it.

[0002] In known electronic devices of this type, the cabinet is formed as an integral part for housing electronic and mechanical components as it is shown in Figs. 1a and 1b. The electrical components comprise among others the power supply and signal processing circuits. The mechanical components may be a tape recorder and/or a CD player. The housing acts as a structuring element apt for arranging all required components for the device. Furthermore, the housing protects the user from hazardous electrical shocks and the components from damages due to external influences like dirt or moisture. Finally, the cabinet allows designing the device, i.e. the shape, size and looking. For all this reasons the cabinet is a very important part of the device, sometimes decisive for its commercial success.

[0003] In general, the cabinet is made out of plastic by injection moulding. Known cabinets enclose all components especially the loudspeakers. For marketing purposes it is frequently required to have different models of different design and size for different markets. It is therefore necessary to manufacture different types of cabinets for devices having different types of loudspeakers or different design of the loudspeaker boxes. Even though the mechanical and electrical components can be identical. This type of differentiation causes significant costs due to different moulds required for manufacturing cabinets for different models.

[0004] Using this as a starting point the present invention suggests a cabinet for an electronic device equipped with a loudspeaker for audio reproduction. Today audio devices have usually two loudspeakers for stereo reproduction of sound. However, the number of loudspeakers is not important for the present invention. The cabinet comprises a main cabinet for housing electrical and mechanical components of the electronic device and further comprises a cabinet for a loudspeaker being separate from the main cabinet and connected to the outside of the main cabinet in a non-detachable manner.

[0005] In this way the present invention allows to design audio devices with different look without requiring completely individual cabinets. Rather the invention suggests to use a standardized main cabinet to take advantage of a more cost efficient manufacturing.

[0006] In an embodiment of the invention a vibration damping means is arranged between the main cabinet and the loudspeaker cabinet. The vibration damping means improve the sound quality but also prevent dust or moisture from penetrating into the loudspeaker cabinet.

[0007] It is also possible to arrange electronic circuitry inside the loudspeaker cabinet, if certain loudspeakers need different circuits than others. This allows an even higher degree of standardization, encompassing not only the cabinet itself but also the electrical components, in particular those related to the sound reproduction.

[0008] In yet another embodiment of the invention the main cabinet is provided with urging means pressing the loudspeaker cabinet against the main cabinet to secure a tight seat of the loudspeaker cabinet on the main cabinet.

[0009] This advantage can also be achieved if the urging means press the loudspeaker cabinet primarily against the vibration damping means.

[0010] It is understood that even though the present invention is exemplified as a portable audio device the scope of the invention is not limited to this kind of devices. The invention can be applied to any consumer electronics products equipped with loudspeakers, e.g. TV receivers.

[0011] In the drawing an embodiment of the present invention is illustrated wherein equal or corresponding elements are denoted with the same reference number. The figures are showing:

Figs. 1a and 1b a portable audio device according to the prior art;

Fig. 2a a first audio device according to the present invention in front view;

Fig. 2b the audio device of Fig. 2a in a sectional view;

Fig. 2c details of the device shown in Fig. 2a;

Fig. 3a a second audio device according to the invention and

Fig. 3b the audio device of Fig. 3a in a sectional view.

[0012] Fig. 1a shows a portable audio device 1 of a conventional type having for example a radio receiver, a tape recorder and a CD player. The components are contained in a cabinet 2 made out of injection moulded plastic. The device 1 is equipped with two sets of loudspeakers 3a, 3b on the left and on the right side of the cabinet 2 for stereo representation of the sound. By comparison of Fig. 1a and 1b it can be seen that the device shown in Fig. 1b the loudspeaker cabinets are larger compared to the device shown in Fig. 1a. The design shown in Fig. 1b gives the user the impression that this device is more powerful than the one shown in Fig. 1a even if the two devices are technically identical apart from the loudspeakers and/or the loudspeaker cabinet. This kind of differentiation is frequently required for marketing purposes to enable a manufacturer to satisfy different segments of the market. However, this kind of differentiation gives rise to increased manufacturing costs for the different types of cabinets.

[0013] In Figs. 2a and 2b a portable audio device 1 according to the present invention is shown in a front

view. The cabinet of this device comprises a main cabinet 4 which is manufactured in a conventional way, e. g. by injection moulding of plastic material. The main cabinet 4 incorporates a front wall 6 and a back wall 7 (Fig. 2b). The front and the back walls are connected by sidewalls 8 (Fig. 2b). Attached to the main cabinet 4 there are two loudspeaker cabinets 9 on each side of the main cabinet 4. It is important to note that the loudspeaker cabinets 9 are separate parts from the main cabinet and are attached to the latter by clipping means, screws or any other technique that is known in the prior art for connecting plastic form parts. Each loudspeaker cabinet 9 houses a loudspeaker 11 for the reproduction of audio signals reproduced by a CD player, tape recorder or radio receiver incorporated in the main cabinet 4. For the sake of simplicity only the CD door 12 is shown in Fig. 2a. The electrical connection between the loudspeakers 11 and the signal processing and amplifying circuits are made by conventional plug connections or simply by wires penetrating the sidewalls 8 of the main cabinet 4.

[0014] Fig. 2c shows an enlarged detail of Fig. 2b and in particular, the contact area between the loudspeaker cabinet 9 and the main cabinet 4. Between the plastic parts of the two cabinets 4, 9 there is interposed a vibration damping material 13, e.g. a rubber gasket. The damping material 13 prevents the transmission of vibrations from the loudspeakers to the main cabinet.

[0015] The rubber gasket 13 has a circular section and is accommodated in a half circular groove 14 in the main cabinet 4. The front end 16 of the loudspeaker cabinet 9 is also provided with another half circular groove 17 so that the rubber gasket 13 is securely held in the grooves 14 and 17. Protrusions 18 prolong the front wall 6 and the back wall 7 of the main cabinet 4. The loudspeaker cabinet closely fits between one protrusion 18 of the front wall 6 and back wall 7 as can be seen in Fig. 2b. Therefore, there is no visible gap between the main cabinet 4 and the loudspeaker cabinet 9. The securing means connecting the main cabinet 4 and the loudspeaker cabinet 9 are not shown in the drawing and are of conventional type like screws, clips, glue, etc. The securing means are arranged such that it is not possible for the user to detach the loudspeaker cabinet 9 from the main cabinet 4.

[0016] The cross section of the rubber gasket can have a different shape as shown in Fig. 2c. Depending on the need to avoid sound leakage and/or need to reduce cabinet vibrations the rubber gasket 13 can be mounted or not in a particular type of cabinet.

[0017] If the reproduced sound has a high volume and contains low frequencies excessive vibrations could disturb the normal operation of a CD player that is built into the main cabinet. The vibration damping rubber gasket 13 reduces the transfer of vibrations generated by the loudspeakers to the main cabinet. Simultaneous the rubber gasket 13 improves the sound quality as such due to its capability to dampen parasitic vibrations.

[0018] Figs. 3a and Fig. 3b display in a different scale another type of a portable audio device according to the present invention. The main cabinet 4 of the first and second embodiment of the invention should have the same size and shape whereas the loudspeaker cabinets are quite different. Compared to the first embodiment shown in Figs. 2a and Fig. 2b each loudspeaker cabinet 9 houses one additional loudspeaker 19. Therefore, the second embodiment shown in Fig. 3a and 3b exhibits a completely different outlook apart from the different sound characteristics.

[0019] It is evident that the outlook or design of an audio device can be changed or adapted to different market requirements without changing the number or type of loudspeakers.

Claims

1. Cabinet for an electronic device equipped with a loudspeaker for audio reproduction **characterized in that** said cabinet comprises a main cabinet for housing electrical and mechanical components of the electronic device and further comprises a cabinet for a said loudspeaker being separate from main cabinet and connected to the outside of the main cabinet in a non-detachable manner.
2. According to claim 1 **characterized in that** a vibration damping means (13) is arranged between the main cabinet (4) and the loudspeaker cabinet (9).
3. Cabinets according to claim 1 **characterized in that** inside the loudspeaker cabinet (9) electronic circuitry is arranged.
4. Cabinet according to claim 1 **characterized in that** the main cabinet is provided with urging means (13) pressing the loudspeaker cabinet (9) against the main cabinet (4).
5. Cabinet according to claim 4 **characterized in that** said urging means are arranged such that the loudspeaker cabinet (9) is pressed against the vibration damping means (13).

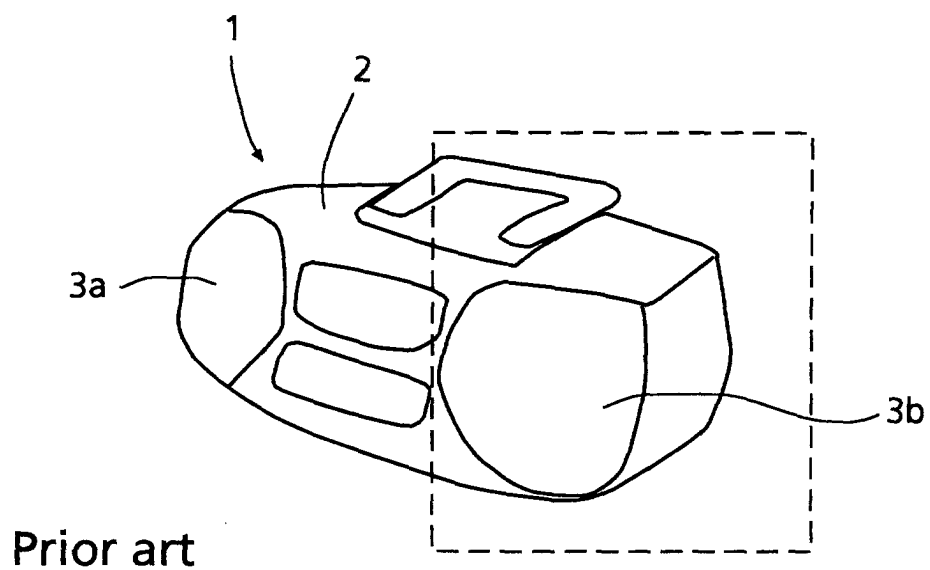


Fig.1a

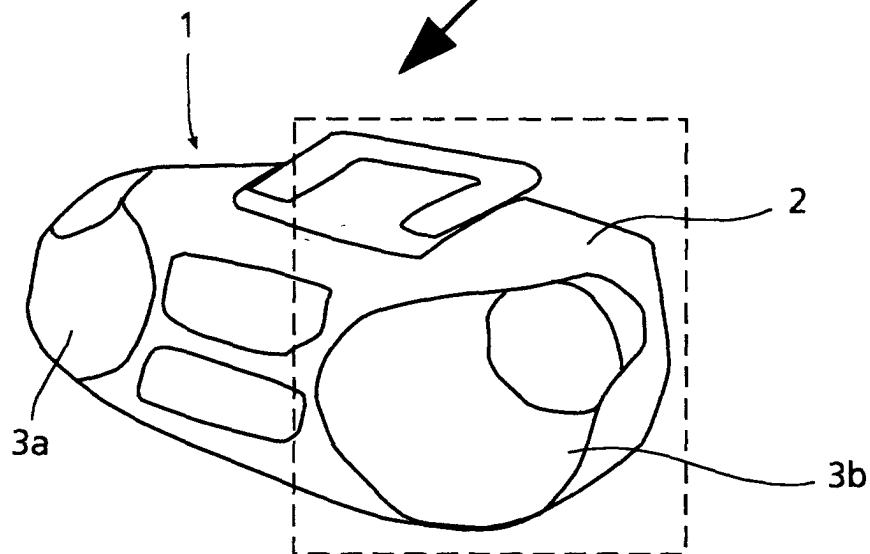


Fig.1b

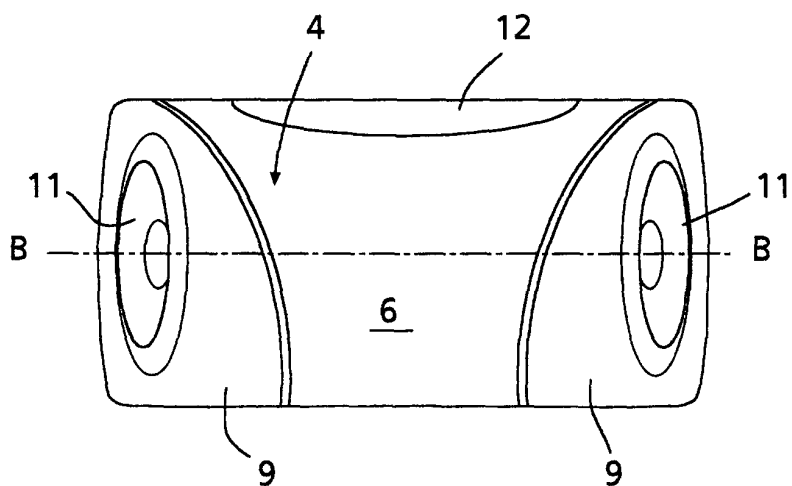


Fig. 2a

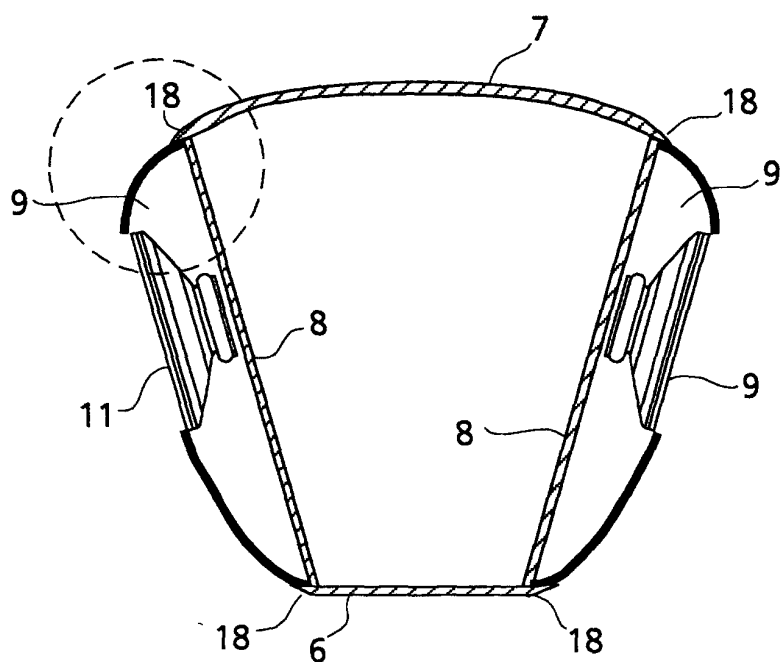


Fig. 2b

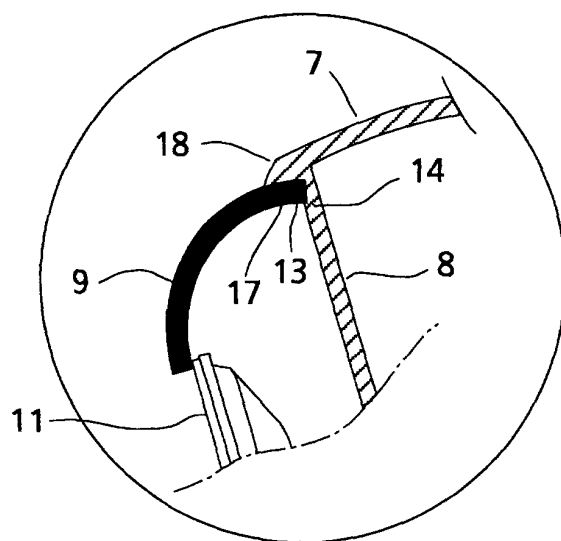


Fig. 2c

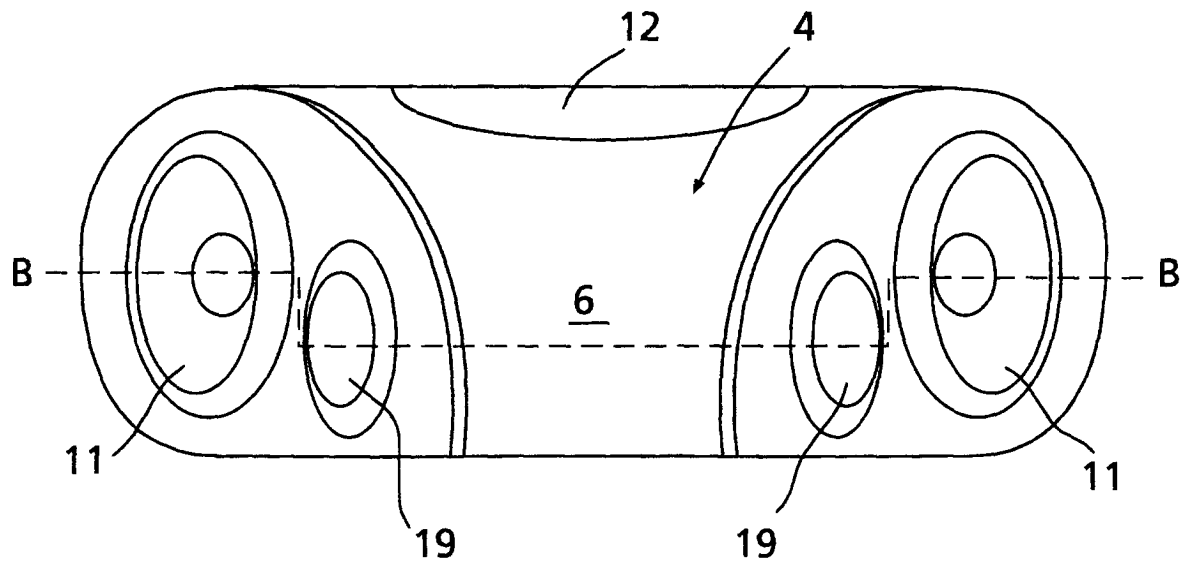


Fig.3a

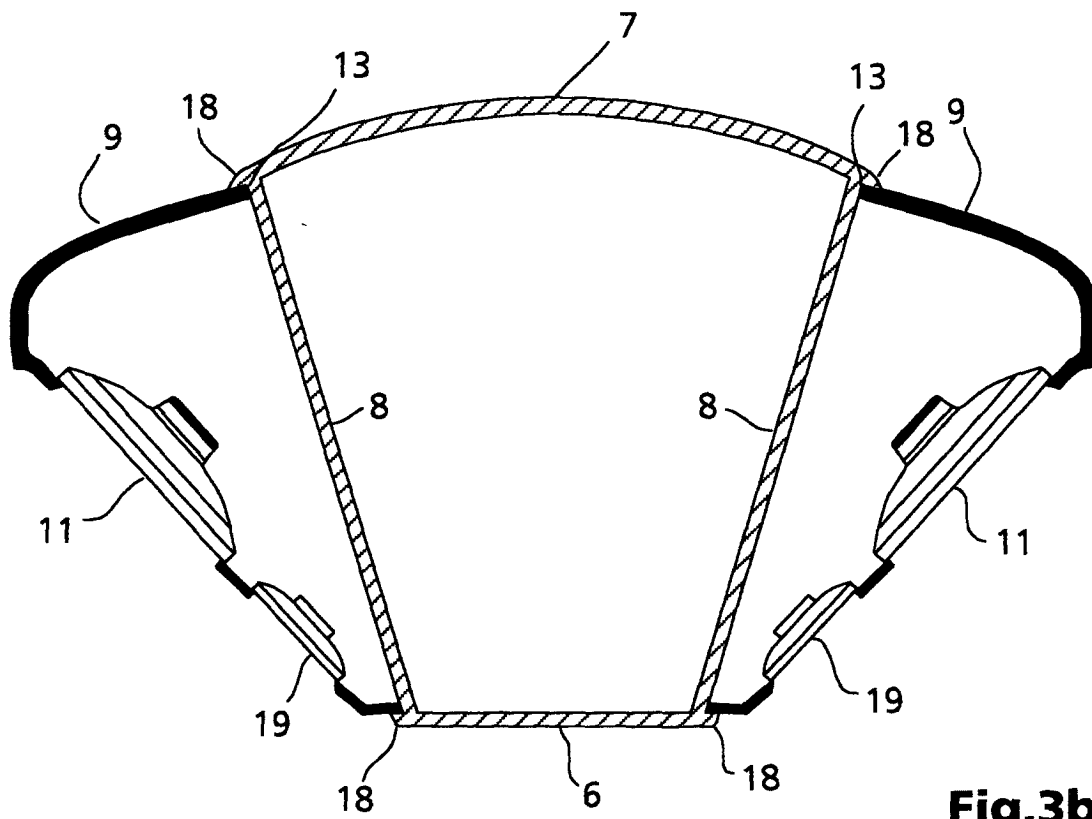


Fig.3b



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 8553

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Y	GB 2 303 485 A (YOUNGER PETER STEWART) 19 February 1997 (1997-02-19) * page 1, line 3-14 *	1	H04R5/02
A	* page 2, line 1-6 * -----	2-5	
Y	EP 0 492 919 A (SONY CORP) 1 July 1992 (1992-07-01) * figure 5 *	1	
A	-----	2-5	
Y	EP 0 114 951 A (SCHUPBACH WALTER) 8 August 1984 (1984-08-08) * page 2, line 26 - page 3, line 7 *	1	

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) H04R H04B H04N H05K G11B
Place of search THE HAGUE		Date of completion of the search 27 July 2001	Examiner Zanti, P
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 10 8553

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-07-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2303485 A	19-02-1997	NONE	
EP 0492919 A	01-07-1992	JP 3104073 B	30-10-2000
		JP 4222180 A	12-08-1992
		DE 69117033 D	21-03-1996
		DE 69117033 T	04-07-1996
		KR 202210 B	15-06-1999
		US 5274709 A	28-12-1993
EP 0114951 A	08-08-1984	CH 663872 A	15-01-1988
		AT 24813 T	15-01-1987
		CA 1201659 A	11-03-1986
		DE 3369052 D	12-02-1987
		DE 114951 T	06-12-1984
		DK 591183 A,B,	24-06-1984
		JP 59122199 A	14-07-1984
		KR 9106301 B	19-08-1991
		NO 834701 A,B,	25-06-1984
		US 4572325 A	25-02-1986

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82