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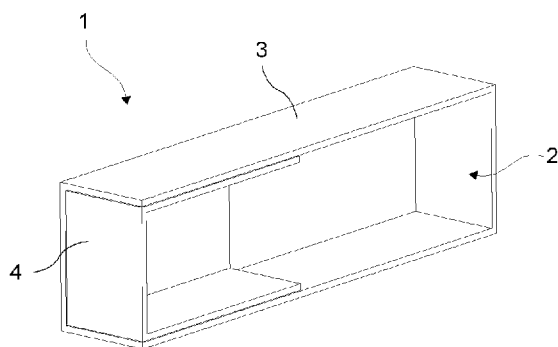
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(54) Title: SYSTEM FOR BASS AUDIO COMPENSATION USING MECHANICAL MEANS

Fig. 1



(57) Abstract: The present invention relates to a system for a bass audio compensation arrangement for image display devices. The present invention more specifically relates to an image display device having a rear cover covering an interior volume of said image display device, said rear cover of the image display device covering an interior volume thereof being provided with a volume adjustment means (1) such that interior volume is adjustable in a manually configurable manner.



Description**SYSTEM FOR BASS AUDIO COMPENSATION USING
MECHANICAL MEANS**

- [0001] The present invention relates to a system for a bass audio compensation arrangement for image display devices.
- [0002] It is well-known that the interior volumes of TVs do not provide the required volume for the speakers to effectively produce low frequency sounds. Additionally, the characteristics of low frequency sounds change depending on the geometry of the room and the position of the TV within said room which leads to an uncomfortable listening experience for the user.
- [0003] Among others, a prior art publication in the technical field of the invention may be referred to as CN204392545, which discloses a speaker module comprising an active sound source, a passive sound source, and a protection frame which contains and fixes the active sound source and the passive sound source. The active sound source comprises a vibration system and a magnetic circuit system. A front sound cavity is formed between the upper side of a diaphragm and the protection frame and a back sound cavity is formed between one side of the diaphragm close to the magnetic circuit system and the protection frame. The passive sound source is arranged in the back sound cavity and comprises two oppositely arranged passive radiators which are parallel structures to form a cavity. The structure of the speaker module improves the bass effect of the speaker module and the acoustic performance of the product. Other prior art publications may be referred to as CN105228055, CN203968356, EP2963944 and JP2007036921.
- [0004] The present invention, on the other hand, addresses the situation where the current trend of decreasing the thickness of TVs limits the interior volume of TVs and causes obstruction of production of low frequency sounds which is directly related to the interior volume.
- [0005] To this end, the present invention provides a system and method for improving the production of low frequency sounds and allowing the user to adjust the production of low frequency sounds based on the surroundings

of the TV.

- [0006] The present invention provides a system and method for a bass audio compensation arrangement for image display devices, as provided by the characterizing features defined in Claim 1.
- [0007] Primary object of the present invention is to provide an image display device having a rear cover with a manually configurable internal volume as covered by said rear cover.
- [0008] The present invention proposes an image display device having a rear cover covering an interior volume of the device with a volume adjustment means having at least one movably supported mechanical/passive component defining an increased volume compared to said interior volume.
- [0009] Said increased volume opens to a portion of said internal volume where at least one speaker of said image display device is placed. The volume adjustment means comprises a movable covering means displaceable into a fixed covering means to cover the rear cover plane opening.
- [0010] Accompanying drawings are given solely for the purpose of exemplifying an image display device having a rear cover defining a configurable internal volume, whose advantages over prior art were outlined above and will be explained in brief hereinafter.
- [0011] The drawings are not meant to delimit the scope of protection as identified in the Claims, nor should they be referred to alone in an effort to interpret the scope identified in said Claims without recourse to the technical disclosure in the description of the present invention.
- [0012] The drawings are only exemplary in the sense that they do not necessarily reflect the actual dimensions and relative proportions of the respective components of the system if not otherwise explicitly stated.
- [0013] Fig. 1 demonstrates a volume adjustment means having a fixed portion and a movable portion in the form of fixed covering means and movable covering means according to the present invention.
- [0014] Fig. 2 demonstrates the volume adjustment means with the movable portion being displaced relative to the fixed portion to increase the volume defined by the volume adjustment means according to the present

invention.

[0015] Fig. 3 demonstrates the volume adjustment means with the movable portion being displaced relative to the fixed portion to decrease the volume defined by the volume adjustment means according to the present invention.

[0016] Fig. 4 demonstrates the volume adjustment means with a covering means adaptor portion adapted to form an intermediate portion between a rear cover plane and said volume adjustment means according to the present invention.

[0017] Fig. 5 demonstrates the covering means adaptor portion with the adaptor movable portion being displaced relative to the adaptor fixed portion to decrease the volume defined by the volume adjustment means according to the present invention.

[0018] The following numerals are assigned to different part number used in the detailed description:

1. Volume adjustment means
2. Increased volume
3. Fixed covering means
4. Movable covering means
5. Covering means adaptor portion
6. Adaptor fixed portion
7. Adaptor movable portion

[0019] The present invention proposes a system for a bass audio compensation arrangement for image display devices. The present invention more particularly proposes an image display device having a rear cover with a manually configurable internal volume as covered by said rear cover.

[0020] The internal volume as covered and defined by the rear cover of the image display device, i.e. the interior volume of the TV set does not provide the required volume for the TV speakers to effectively produce low frequency sounds, which usually leads to performance problems and an uncomfortable listening experience on the part of the users.

[0021] According to the present invention, preferably telescopically interengageable parts that can be mechanically pulled out to expand and

pushed in to diminish the back cover volume are added to the back cover of the TV in substantially close vicinity of the speakers.

- [0022] A series of measurements being taken in order to provide manual configuration instructions to the users serves to the purpose of allowing users to fine tune audio response of the image display device, as will be delineated hereinafter.
- [0023] According to the present invention, measurement of low frequency sound level response of the system is taken when the interengageable parts are positioned so as to provide the smallest possible volume, i.e. in the closed position of a movable covering means (4) pushed all the way in relative to a fixed covering means (3), the two forming a volume adjustment means (1) providing an increased volume (2).
- [0024] More precisely, the rear cover of the image display device is provided with a volume adjustment means (1) such that the user can manually increase the internal volume covered by the rear cover starting from a minimum increased volume (2) being set as the smallest volume formed by said volume adjustment means (1). More particularly, the volume adjustment means (1) is configured to define an additional volume directly in communication with the internal volume covered by the rear cover of the image display device at two sides of the rear cover plane.
- [0025] In accordance with the present invention, the first measurement of low frequency sound level response is used as a reference value. Repeated measurements are taken with the altered positions of the interengageable parts at different stages of pulling out, i.e. at different positions of the movable covering means (4) relative to the fixed covering means (3) starting from the minimum increased volume (2).
- [0026] Results obtained are compared with the reference measurement to determine the positional points of the interengageable parts, i.e. the movable covering means (4) and the fixed covering means (3) at different stages where sound response during pulling out of interengageable parts is increased/decreased by multiples of 1 dB. For points corresponding to an increase/decrease by multiples of 1 dB as determined, a visual indication at respective sections on said movable covering means (4)

and/or fixed covering means (3) is added to the interengageable parts to make adjustments possible with 1 dB precision. In this regard, it will be possible to adjust the sound level of the TV at bass frequencies using this mechanical structure.

- [0027] Additionally, a covering means adaptor (5) having an adaptor fixed portion (6) and adaptor movable portion (7) serves to the purpose of forming an intermediate body in between the rear cover plane and said volume adjustment means (1), therefore even further increasing the minimum increased volume (2) as set by said volume adjustment means (1). The adaptor movable portion (7) and the movable covering means (4) are configured to lean on one another in an integral manner to move together when adjusting the additional volume to be defined by said volume adjustment means (1).
- [0028] In a nutshell, the present invention proposes an image display device having a rear cover covering an interior volume of said image display device.
- [0029] In one embodiment of the present invention, said rear cover of the image display device covering an interior volume thereof is provided with a volume adjustment means (1) such that interior volume is adjustable in a manually configurable manner.
- [0030] In a further embodiment of the present invention, said volume adjustment means (1) comprises at least one movably supported component defining an increased volume (2) compared to said interior volume,
- [0031] In a further embodiment of the present invention, said increased volume (2) is directly in communication with said internal volume at two sides of the rear cover plane.
- [0032] In a further embodiment of the present invention, said increased volume (2) is directly in communication with a portion of said internal volume in substantially close vicinity of at least one speaker of said image display device.
- [0033] In a further embodiment of the present invention, said volume adjustment means (1) comprises a movable covering means (4) displaceable relative to a fixed covering means (3) to cover a rear cover plane opening on

which said volume adjustment means (1) is disposed.

- [0034] In a further embodiment of the present invention, said movable covering means (4) and said fixed covering means (3) are telescopically interengageable.
- [0035] In a further embodiment of the present invention, said covering means (4) and/or fixed covering means (3) comprises visual indications at respective sections to make adjustments possible with a predetermined sound level precision.
- [0036] In a further embodiment of the present invention, said image display device further comprises a covering means adaptor (5) having an adaptor fixed portion (6) and adaptor movable portion (7) forming an intermediate body in between the rear cover plane and said volume adjustment means (1).
- [0037] In a further embodiment of the present invention, said adaptor movable portion (7) and the movable covering means (4) are configured to lean on one another to move together when adjusting the additional volume to be defined by said volume adjustment means (1) together with said covering means adaptor (5).
- [0038] In a further embodiment of the present invention, said adaptor movable portion (7) and the movable covering means (4) are integrally formed.
- [0039] As the characteristics of low frequency sounds change depending on the geometry of the room and the position of the TV within said room which leads to an uncomfortable listening experience for the user, the mechanical structure of the invention may allow prevention of quietness/loudness of low frequency sounds based on the geometry of the room and the position of the TV within said room. The present invention is therefore presented as a mechanical equalizer whereby the user can adjust the sound of the TV.

Claims

1. An image display device having a rear cover covering an interior volume of said image display device, **characterized in that**;
said rear cover of the image display device covering an interior volume thereof is provided with a volume adjustment means (1) such that interior volume is adjustable in a manually configurable manner,
said volume adjustment means (1) comprises at least one movably supported passive element defining an increased volume (2) compared to said interior volume,
said increased volume (2) is directly in communication with said interior volume at two sides of the rear cover plane and,
said increased volume (2) is directly in communication with a portion of said interior volume in substantially close vicinity of at least one speaker of said image display device.
2. An image display device as in Claim 1, **characterized in that** said volume adjustment means (1) comprises a movable covering means (4) displaceable relative to a fixed covering means (3) to cover a rear cover plane opening on which said volume adjustment means (1) is disposed.
3. An image display device as in Claim 1 or 2, **characterized in that** said movable covering means (4) and said fixed covering means (3) are telescopically interengageable.
4. An image display device as in Claim 3, **characterized in that** said covering means (4) and/or fixed covering means (3) comprises visual indications at respective sections to make adjustments possible with a predetermined sound level precision.
5. An image display device as in Claim 1, **characterized in that** said image display device further comprises a covering means adaptor (5) having an adaptor fixed portion (6) and adaptor movable portion (7) forming an intermediate body in between the rear cover plane and said volume adjustment means (1).
6. An image display device as in Claim 5, **characterized in that** said adaptor movable portion (7) and the movable covering means (4) are configured to lean on one another to move together when adjusting the additional volume to be defined by said volume adjustment means (1) together with said covering

means adaptor (5).

7. An image display device as in Claim 6, **characterized in that** said adaptor movable portion (7) and the movable covering means (4) are integrally formed.

Fig. 1

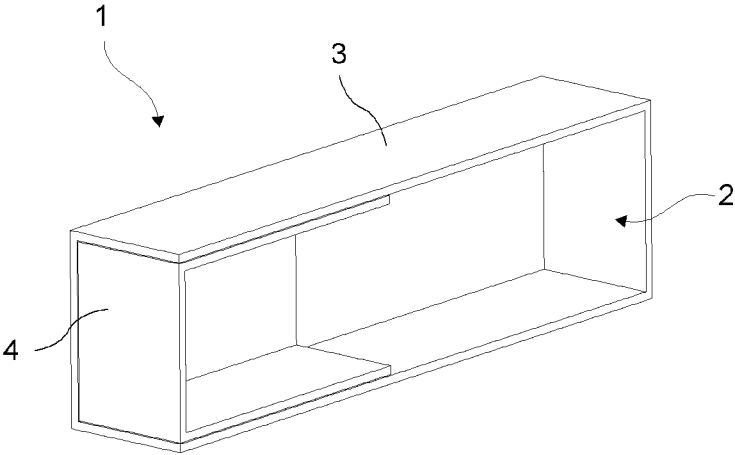


Fig. 2

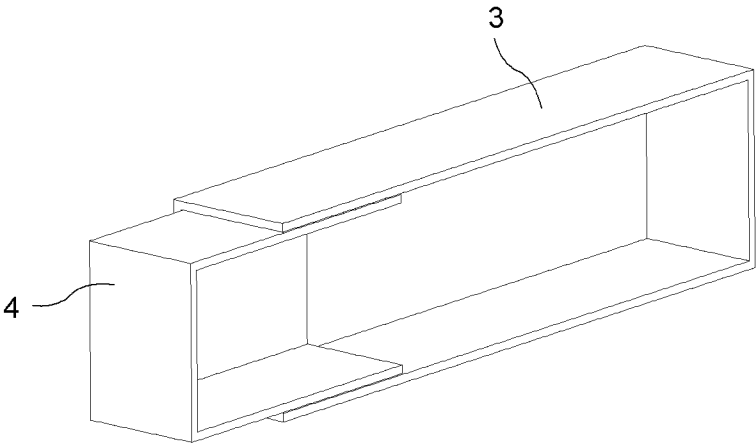


Fig. 3

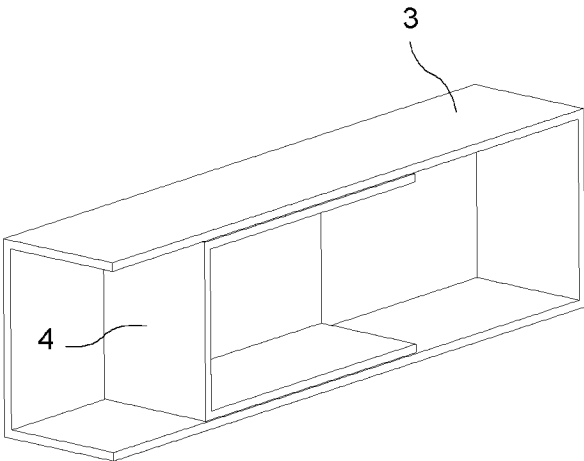


Fig. 4

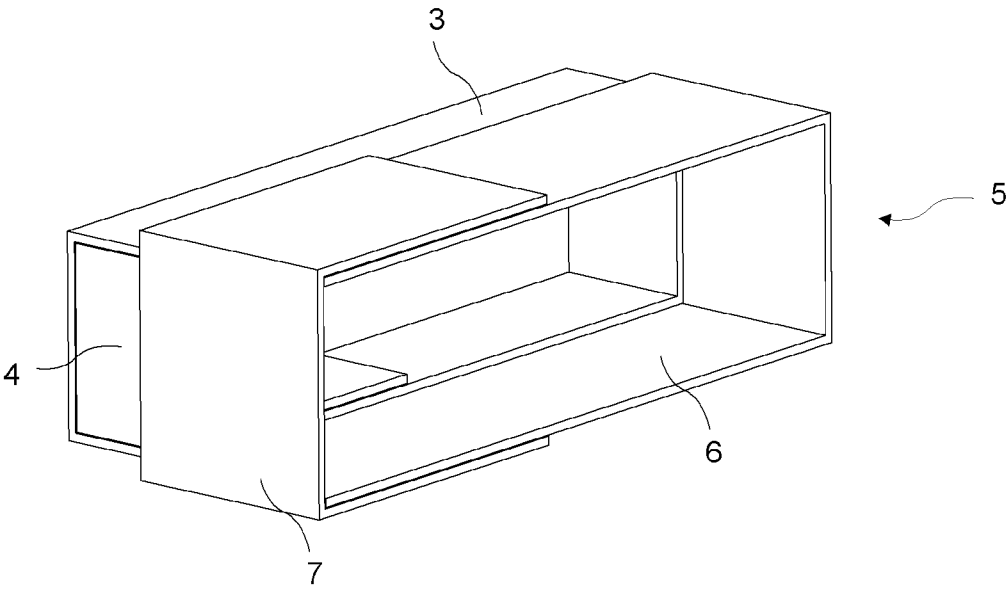
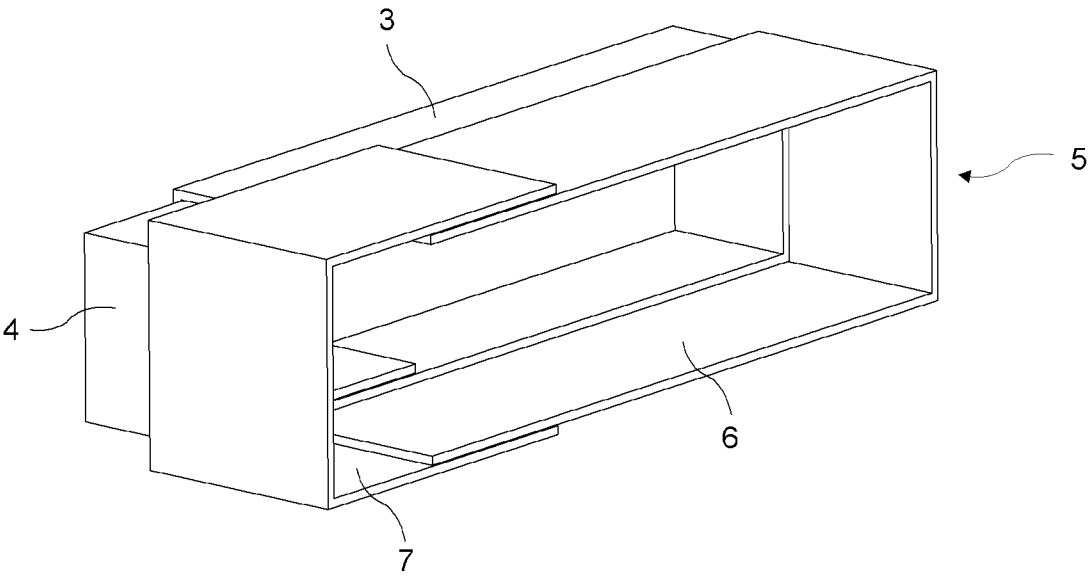


Fig. 5



INTERNATIONAL SEARCH REPORT

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B. FIELDS SEARCHED

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2009/196455 A1 (LEE YEON-HO [KR]) 6 August 2009 (2009-08-06) paragraph [0003] - paragraph [0039] paragraph [0071] - paragraph [0101] paragraphs [0110], [0123] figures 2,3A,3B	1-7
Y	----- WO 2007/123292 A1 (JANG SEUNG-CHUL [KR]) 1 November 2007 (2007-11-01) page 4, line 13 - line 25 page 9, line 13 - line 25 figures 1,6	1-7
A	----- US 2005/072624 A1 (HWAN RYU JAE [KR] ET AL) 7 April 2005 (2005-04-07) paragraphs [0010], [0012], [0025], [0082]; figure 5 ----- -/--	1-7



Further documents are listed in the continuation of Box C.



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INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2011/280428 A1 (TSENG CHEN [TW] ET AL) 17 November 2011 (2011-11-17) paragraph [0015] - paragraph [0017]; figures 1A-1C	1-7
A	----- US 2013/003984 A1 (BELAFONTE STEPHEN [US] ET AL) 3 January 2013 (2013-01-03) abstract; figures 4,6	1-7
A	----- US 2005/248911 A1 (SUPRAPMO SUSIMIN [SG] ET AL) 10 November 2005 (2005-11-10) paragraph [0026]; figures 1-3 -----	1-7

INTERNATIONAL SEARCH REPORT

Information on patent family members

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