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(54) **SOUND BOX STRUCTURE**

(75) Inventors: **HWANG-MIAW CHEN**, Tu-Cheng (TW); **HUI-CHENG CHEN**, Tu-Cheng (TW); **SHIH-CHIA CHIU**, Tu-Cheng (TW); **CHENG-CHIA PAN**, Tu-Cheng (TW)

Correspondence Address:
PCE INDUSTRY, INC.
ATT. Steven Reiss
288 SOUTH MAYO AVENUE
CITY OF INDUSTRY, CA 91789 (US)

(73) Assignee: **FOXCONN TECHNOLOGY CO., LTD.**, Tu-Cheng (TW)

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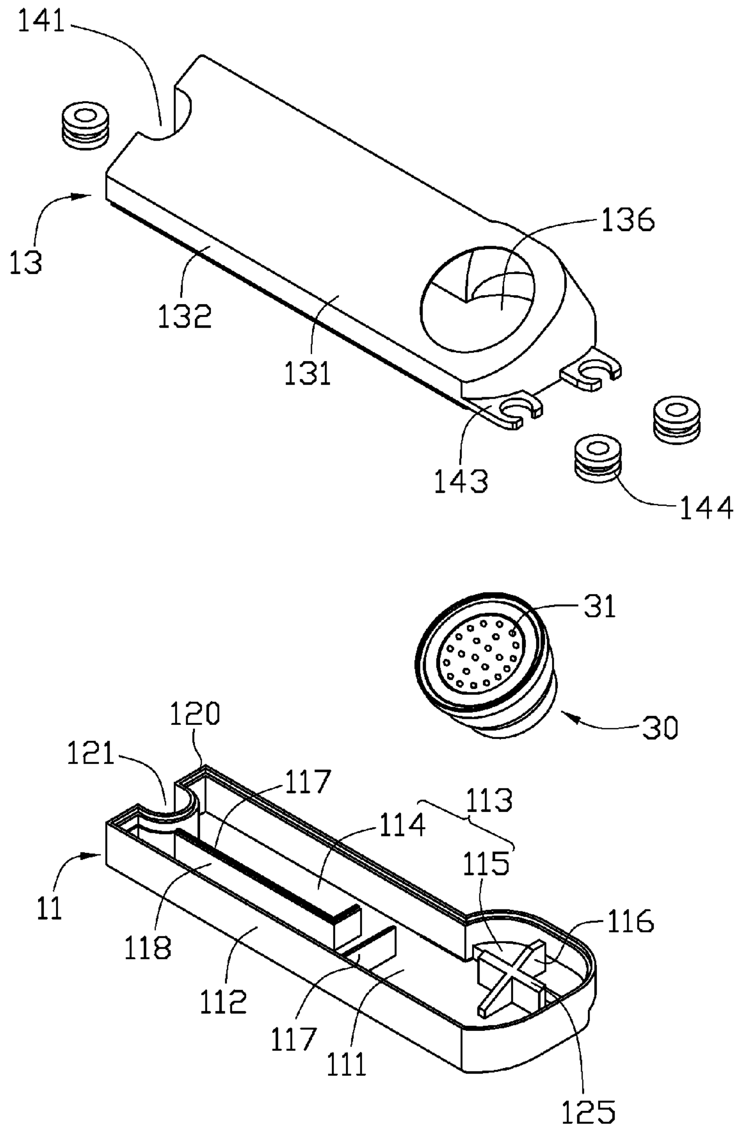
(57) **ABSTRACT**

A sound box structure includes a shell (**10**) and a speaker (**30**) received therein. The shell defines a resonance chamber (**114**) and a receiving chamber (**115**) communicating therewith. The speaker is received in the receiving chamber. The shell is Mg—Al alloy.



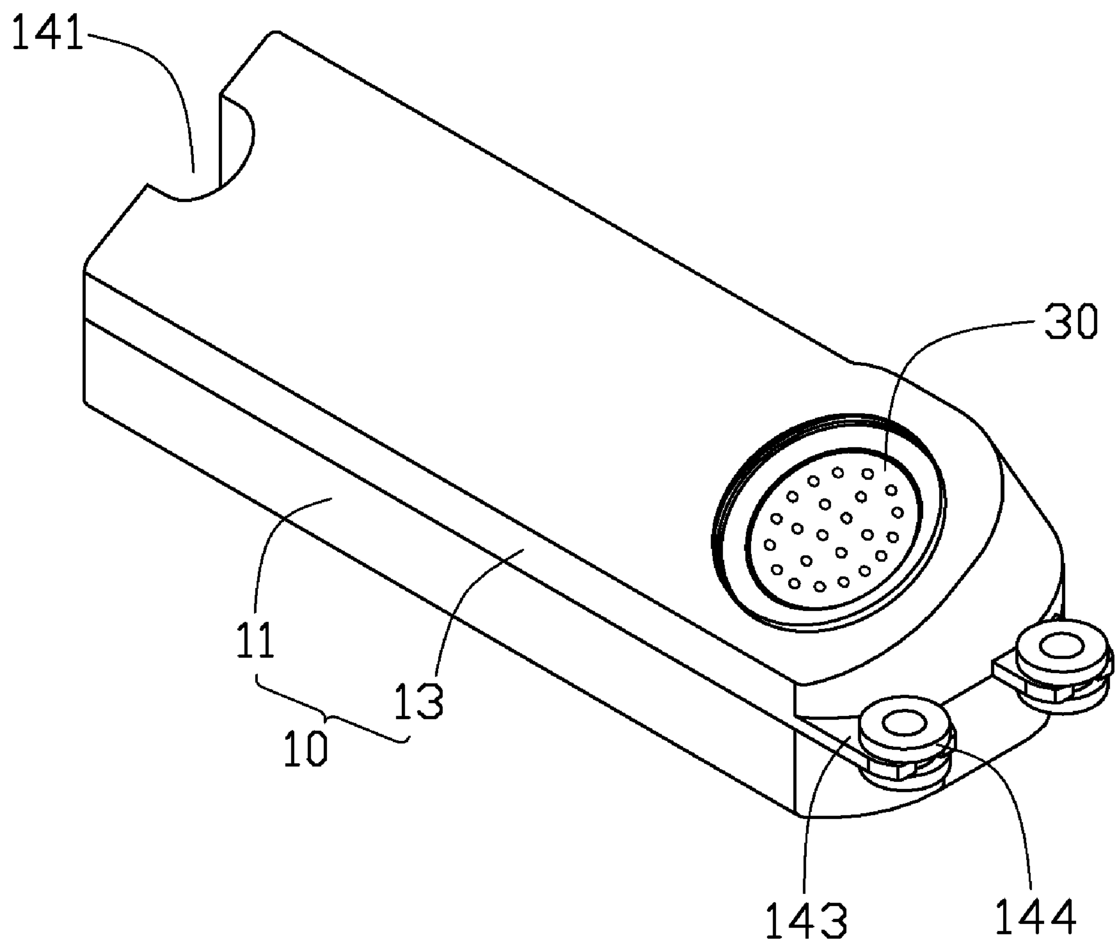
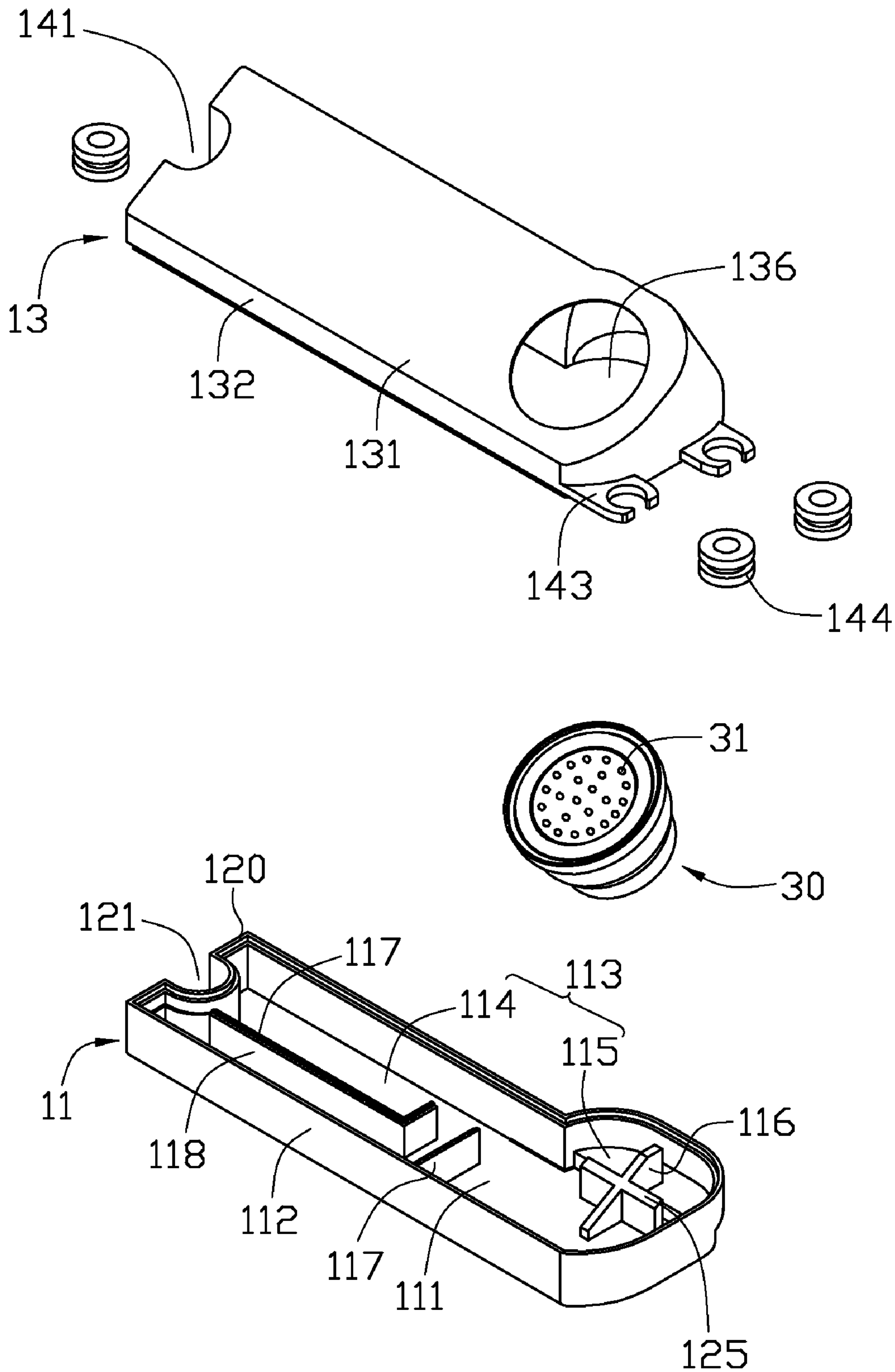


FIG. 1


141
136
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132
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144
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121
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114
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125

FIG. 2

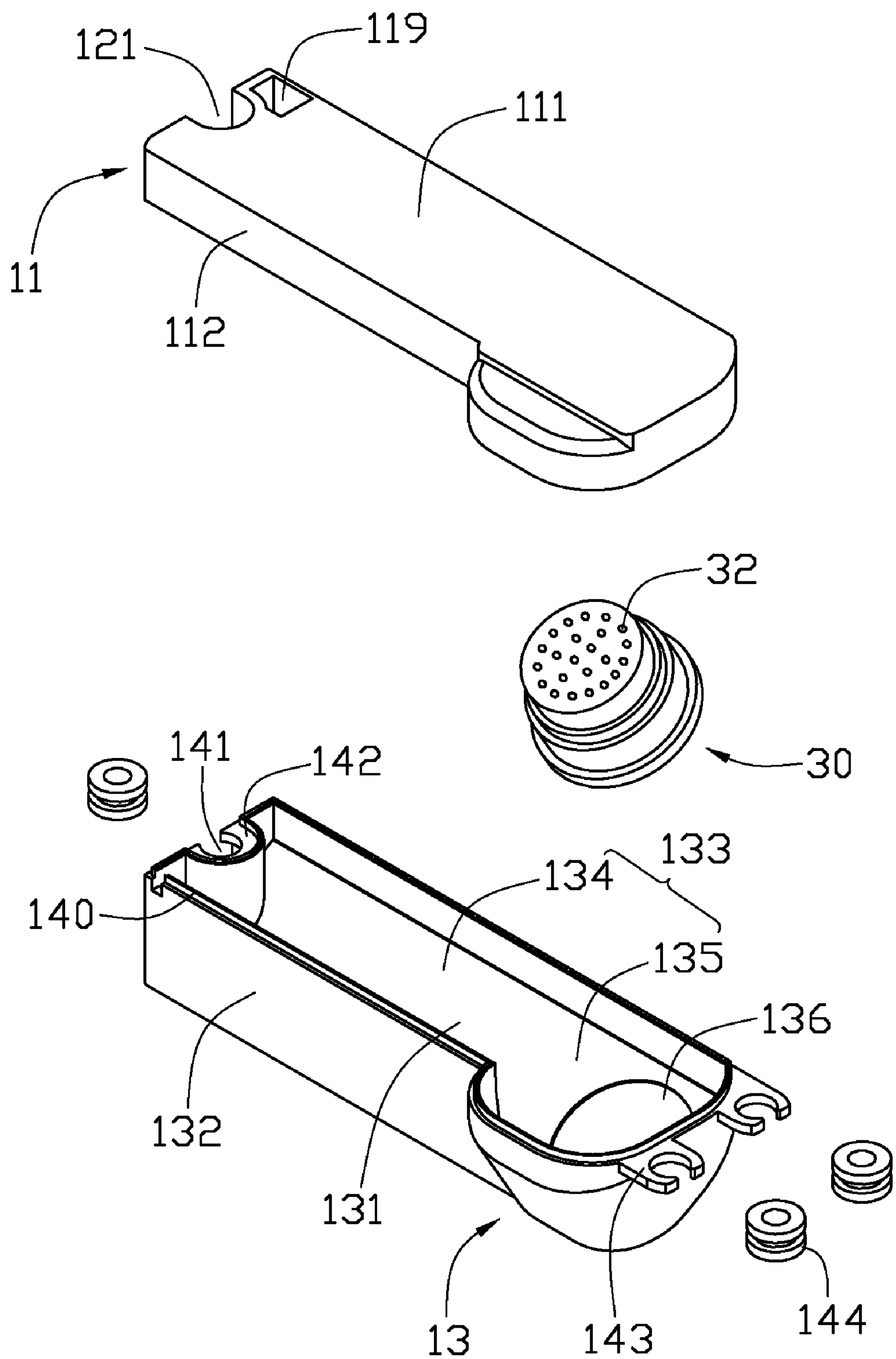
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FIG. 3

SOUND BOX STRUCTURE

BACKGROUND

[0001] 1. Technical Field

[0002] The present invention generally relates to sound box structure, and particularly to a sound box structure used in an electronic device.

[0003] 2. Description of Related Art

[0004] With the continuing development of technology, sound box structures have been widely used in electronic devices such as mobile phones, computers and other devices providing audio capabilities.

[0005] A typical sound box structure generally includes a shell and a speaker located therein. The speaker converts electric energy to vibration for producing sound. In addition to housing the speaker, the shell plays an important role in the quality of the sound transmitted. Resonance chamber size promotes corresponding mass of air driven, with commensurate quality of low frequencies transmitted. Larger resonance chambers reduce resistance of the air therein, with low frequency effect improving accordingly.

[0006] Currently, sound box shell structures are generally plastic. Due to low rigidity thereof, deformation is generated during operation, which decreases the quality of the low frequency sound. Accordingly, reinforcing ribs supporting the sound box structure are normally required. However, such reinforcing ribs not only complicate the sound box structure, but also reduce the resonance chamber in the shell, affecting low frequency reproduction.

[0007] In addition, the plastic shell is easily desiccated, shrunk and deformed during the injection molding fabrication process, which makes the plastic shell have an unappealing appearance and an inaccurate dimension. Moreover, the plastic shell has low thermal conductivity. As a result, heat generated from the speaker and other electronic components in the shell is slow to dissipate. Furthermore, the plastic shell easily enables sound from the speaker to generate standing waves. Upon termination of audio output, sound is delayed, which interferes with actual output. Moreover, the plastic shell adversely affects magnetic leakage prevention.

[0008] What is needed, therefore, is a sound box structure which overcomes the described limitations.

SUMMARY

[0009] A sound box structure includes a shell and a speaker received therein. The shell defines a resonance chamber and a receiving chamber communicating therewith. The speaker is received in the receiving chamber. The shell is Mg—Al alloy.

[0010] Other advantages and novel features of the present invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Many aspects of the present sound box structure can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the disclosed sound box structure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0012] FIG. **1** is an assembled, isometric view of a sound box structure in accordance with an embodiment of the present invention.

[0013] FIG. **2** is an exploded, isometric view of the sound box structure of FIG. **1**.

[0014] FIG. **3** is similar to FIG. **2**, but viewed from another aspect.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0015] Referring to FIGS. **1** and **2**, a sound box structure includes a shell **10** and a speaker **30** located therein.

[0016] The shell **10** is Mg—Al alloy, and includes a bottom cover **11** and a top cover **13** engaging the bottom cover **11**. Both of the top and bottom covers **13**, **11** are semi-enclosed.

[0017] The bottom cover **13** includes a bottom wall **111** and a sidewall **112** vertically and upwardly extending from an outer periphery of the bottom wall **111**. The bottom wall **111** and sidewall **112** cooperatively form a chamber **113** therebetween. The chamber **113** includes a resonance chamber **114** and a receiving chamber **115** communicating with the resonance chamber **114**. The receiving chamber **115** is substantially circular, and receives the speaker **30** therein. An X-shaped supporting portion **116** extends upwardly from the bottom wall **111** and within the receiving chamber **115**. The supporting portion **116** has an inclined top surface **125**, and an acute angle is defined between the top surface **125** and the bottom wall **111**. Two clapboards **117** vertically and upwardly extend from the bottom wall **111** and within the resonance chamber **114**. One of the clapboards **117** is L-shaped, and the other is linear. The clapboards **117**, the bottom wall **111**, and the sidewall **112** cooperatively form an L-shaped inverted tube **118**. The bottom wall **111** defines an inverted hole **119** (shown in FIG. **3**) at a corner thereof. The inverted hole **119** extends through the bottom wall **111** and communicates with the inverted tube **118**.

[0018] The sidewall **112** has a step **120** at a top thereof. Height of an inner side of the step **120** is less than that of an outer side of the step **120**, so as to engage the top cover **13** conveniently. One portion of the sidewall **112** is sunken into the resonance chamber **114**, defining a fixing groove **121** at a lateral side thereof.

[0019] Referring to FIG. **3**, the top cover **13** is similar to the bottom cover **11**, and also includes a bottom wall **131** and a sidewall **132**. The bottom wall **131** and sidewall **132** cooperatively form a chamber **133** therebetween. The chamber **133** includes a resonance chamber **134** and a receiving chamber **135** communicating with the resonance chamber **134**. The receiving chamber **135** is substantially circular, and receives the speaker **30** therein. The bottom wall **131** defines a circular through hole **136** aligning with the receiving chamber **135**.

[0020] The sidewall **132** has different heights, with a lateral side higher than an opposite lateral side, which forms an actual angle between the bottom walls **131**, **111**. The sidewall **132** has a step **140** at a top end thereof. Height of an inner side of the step **140** exceeds that of an outer side of the step **140**, so as to match the step **120** of the bottom cover **11**. One portion of the sidewall **132** is sunken into the resonance chamber **134**, defining a fixing groove **141** at a lateral side thereof. The fixing groove **141** matches the fixing groove **121** of the bottom cover **11**. A first tab **142** outwardly extends from the sidewall **132** and within the fixing groove **141**, and two second tabs **143** outwardly extend from the sidewall **132** adjacent to the receiving chamber **135**. The first and second tabs **142**,

143 fix the sound box structure onto an electronic device (not shown), such as mobile phone, computer or other device. In addition, three rubber washers **144** respectively enclose and cooperate with the first and second tabs **142**, **143**, reducing vibration between the sound box structure and the electronic device.

[0021] The speaker **30** converts electric energy into vibration to produce sound. The speaker **30** defines a plurality of front tone holes **31** (shown in FIG. **2**) and a plurality of rear tone holes **32** opposite the front tone holes **31**.

[0022] During assembly, the step **120** of the sidewall **112** of the bottom cover **11** engages the step **140** of the sidewall **132** of the top cover **13**. The bottom and top covers **11**, **13** are welded together. The resonance chamber **114** of the bottom cover **11** and the resonance chamber **134** of the top cover **13** further cooperatively form a resonance chamber. The receiving chamber **115** of the bottom cover **11** and the receiving chamber **135** of the top cover **13** further cooperatively form a receiving chamber. The speaker **30** is received in the receiving chamber. One end of the speaker **30**, with rear tone holes **132**, abuts the supporting portion **116** of the bottom cover **11**, with the rear tone holes **132** communicating with the chamber of the sound box structure. The other end of the speaker **30**, with front tone holes **131**, abuts an outer edge of the through hole **136** of the bottom cover **11**, with the front tone holes **131** aligning with the through hole **136** and facing out.

[0023] During operation, the speaker **30** generates sound through the front and rear tone holes **131**, **132**. The sound through the front tone holes **131** is directly transmitted out via the through hole **136**. The sound through the rear tone holes **132** enters and resonates in the resonance chamber of the sound box structure, and is then transmitted out via the inverted tube **118** and inverted hole **119**. The sound transmitted from the inverted hole **119** and the sound transmitted from the through hole **136** are superposed, widening the frequency bandwidth of the sound from the speaker **30**.

[0024] In the sound box structure, the shell **10** is Mg—Al alloy, providing improved rigidity over plastic. Thus, there is no need to provide reinforcing ribs in the shell **10** or increase a thickness of the shell **10** to diminish deformation of the sound box structure. Accordingly, size of the resonance chamber in the shell **10** is increased, which lowers the low frequency effect of the sound of the sound box structure. Meanwhile, the overall structure of the sound box structure is simplified. In addition, the shell **10** does not desiccated, shrunk and deform during the producing process. Furthermore, the shell **10** has good thermal conductivity, such that heat generated from the speaker **30** and other electronic components in the shell **10** is dissipated promptly. Moreover, the shell **10** prevents generation of standing waves, shortening the lag time of sound after the speaker **30** stops transmitting.

[0025] Table 1 below shows experimental data of the sound box structure of FIGS. **1** to **3** via a Gauss Meter. A distance between the Gauss Meter and sound box structure is 1 cm. As compared to the typical sound box structure with a plastic shell, the shell **10** improves prevention of magnetic leakage.

TABLE 1

	Magnetic leakage quantity (Gauss)
Sound box structure of FIGS. 1 to 3	0.25
Typical sound box structure	0.4

[0026] It is believed that the present invention and its advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the examples hereinbefore described merely being preferred or exemplary embodiments of the invention.

What is claimed is:

1. A sound box structure, comprising:

a shell of Mg—Al alloy comprising a resonance chamber and a receiving chamber communicating therewith; and

a speaker received in the receiving chamber.

2. The sound box structure of claim **1**, wherein the shell comprises a top cover and a bottom cover engaged therewith, wherein both the top and bottom covers are semi-enclosed.

3. The sound box structure of claim **2**, wherein each of the top and bottom covers comprises a bottom wall and a sidewall extending from an outer periphery thereof, and the resonance chamber and receiving chamber are enclosed by the bottom walls and the sidewalls of the top and bottom covers.

4. The sound box structure of claim **3**, wherein each of the top and bottom covers comprises a step at a top end thereof, and the step of the top cover engages with the step of the bottom cover.

5. The sound box structure of claim **3**, wherein a tab extends from at least one of the top and bottom covers, and is enclosed by a rubber washer.

6. The sound box structure of claim **3**, wherein a supporting portion extends from the bottom cover and within the receiving chamber, and an acute angle is defined between the bottom wall of the bottom cover and a top surface of the supporting portion.

7. The sound box structure of claim **6**, wherein the sidewall of the top cover has different heights, and an actual angle is defined between the bottom walls of the top and bottom covers.

8. The sound box structure of claim **6**, wherein the bottom wall of the top cover defines a through hole aligning with the speaker and receiving chamber.

9. The sound box structure of claim **8**, wherein the speaker comprises a plurality of front tone holes and a plurality of rear tone holes opposite to the front tone holes, and wherein the end of the speaker comprising the rear tone holes abuts the supporting portion, and the end of the speaker comprising the front tone holes abuts an outer edge of the through hole.

10. The sound box structure of claim **2**, wherein at least one clapboard extends from the bottom cover and within the resonance chamber, the clapboard, the bottom wall of the bottom cover and the side wall of the bottom cover cooperatively forming an inverted tube, and the bottom cover defining an inverted hole communicating with the inverted tube.

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