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(54) **PERCUSSION INSTRUMENT**

(57) A percussion instrument is disclosed, preferably an instrument having tuned tone fields. The instrument has a hollow shell, the hollow shell comprising an upper shell segment having an upper shell segment rim and a lower shell segment having a lower shell segment rim, two spacers between the upper shell segment rim and the lower shell segment rim, and an acoustic pickup located between the upper shell segment rim and the lower shell segment rim and between the two spacers. The pickup may be an elongate pickup extending around the rim and may be piezoelectric. The pickup may be connected to an output jack installed in the hollow shell. Also disclosed is a method of making the percussion instrument.

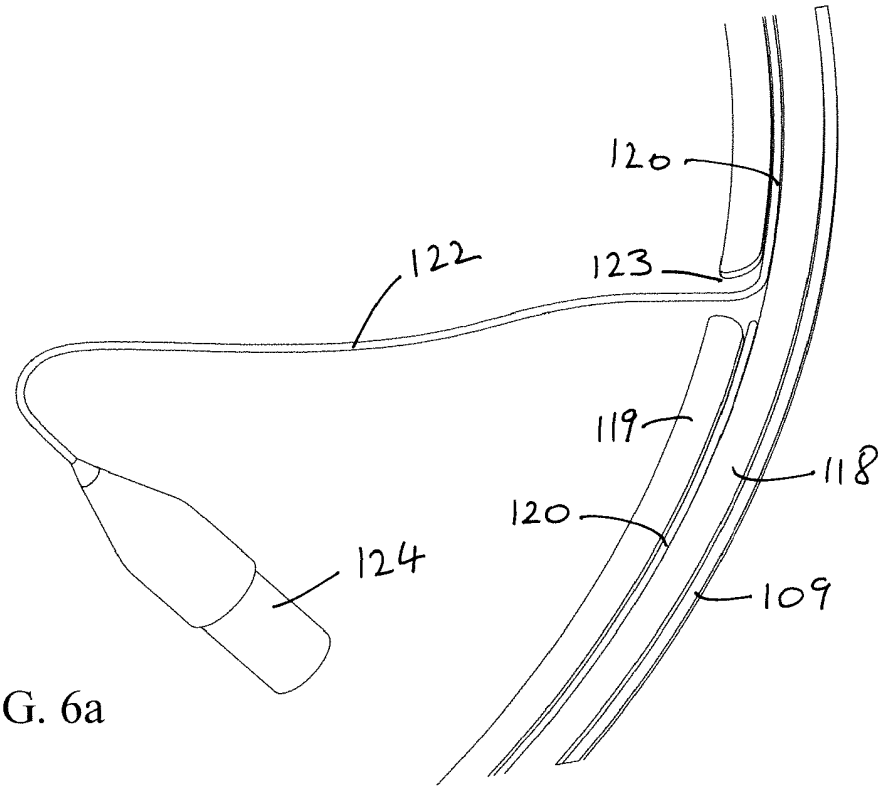

FIG. 6a

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Description

[0001] The present invention relates to percussion instruments, preferably tuned percussion instruments comprising an acoustic pickup. The present invention also relates to methods of making such percussion instruments.

[0002] Percussion musical instruments are known. JP-A-2009/186886 discloses an electronic percussion instrument in which strength of striking is accurately detected. EP-A-3 291 223 discloses an electronic percussion instrument capable of calculating a strike position quickly. US-A-2013/0192449 discloses a percussion instrument including an acoustic chamber housing having a zigzag shape.

[0003] Tuned percussion instruments include steelpans considered as a traditional art form in Trinidad and Tobago. The steelpan has playing areas of definite pitch, on one or more continuous metal note bearing surfaces. Steelpans are disclosed in US-A-2011/62510.

[0004] A development of the steelpan is the hang (also known as a handpan), originally conceived by PANArt Hangbau AG and since developed by a number of other makers.

[0005] Handpans in their basic form are a metal hollow shell of two shell segments fixed together with a tuned centre tone field of definite pitch surrounded by a number of other tone fields. A sound hole is present in the shell.

[0006] Handpans are disclosed in CH-A-693 319 and US design patents 794 115, 777 245, 766 356, 759 747, 737 370.

[0007] The sound of percussion instruments such as handpans is characteristic and becoming more popular. However, it has proven difficult to successfully amplify handpans, especially for performances outside of the studio. Attempts have been made to amplify by directing external microphones at the instrument and by attaching microphones (e.g. with tape) to the surface of the shell. Unfortunately, such attempts tend to introduce distortion and are prone to feedback, especially when there are ambient sounds or there is electromagnetic interference during a performance.

[0008] Significantly improved amplification has been disclosed in GB-A-2 580 887 but alternative arrangements are desirable.

[0009] There is, therefore, a need for improved amplification of percussion instruments, in particular improved amplification of handpans. There is also a need for designs which allow for improved manufacturing.

[0010] It is an aim of the present invention to address these needs.

[0011] The present invention accordingly provides, in a first aspect, a percussion instrument comprising, a hollow shell, the hollow shell comprising an upper shell segment having an upper shell segment rim and a lower shell segment having a lower shell segment rim, a first outer spacer located between the upper shell segment rim and the lower shell segment rim, a second inner spacer located between the upper shell segment rim and the lower shell segment rim and spaced from the first outer spacer between the first outer spacer and the interior of the hollow shell, an acoustic pickup located between the upper shell segment rim and the lower shell segment rim and between the first outer spacer and the second inner spacer.

[0012] The two-spacer arrangement (with the first outer spacer and second inner spacer) is greatly advantageous. The two spacers arrangement allows additional lateral pressure to be applied to secure the acoustic pickup in position and prevent it from dislodging or falling into the hollow shell during the installation process or subsequently. Thus providing a far more repeatable installation process and reducing the level of skill required. Surprisingly, the sound which the pickup produces once the instrument is assembled and in use is also refined, with a reduction in dead-spots and fewer areas with a volume/amplitude bias toward certain notes. Furthermore, and unexpectedly, the second inner spacer has an improved dampening effect on the sound which is picked up; allowing the important frequencies to reach the pickup whilst the higher, less desirable frequencies may be attenuated by the spacer.

[0013] The hollow shell will usually comprise ferrous metal, preferably steel. The metal may be treated or coated e.g. steel may be nitrided. The steel may be stainless steel.

[0014] Generally, the first outer spacer may comprise a first outer spacer ring extending around the rim.

[0015] The second inner spacer may comprise a second inner spacer ring extending around the rim. The second inner spacer may have a gap to allow connection to the acoustic pickup, optionally in the interior of the hollow shell.

[0016] The first outer spacer and/or second inner spacer advantageously comprise a nonferrous metal, preferably brass. Such metals are advantageous because they have surprisingly been found by the inventor to provide good properties and tone.

[0017] The first outer spacer and/or the second inner spacer may be formed as one piece (e.g. a ring, with or without a gap in the ring) or may be formed of two or more pieces. For example, if either the first outer spacer and/or the second inner spacer are in the form of rings, then one or both of the spacers may be formed as an entire loop (with or without a gap), or in two or more sections (for example, 2, 3, 4, 5 or more sections) which is advantageous because there is less waste of material in manufacturing. Preferably, the first outer spacer and/or the second inner spacer are each formed of 3 sections.

[0018] It is preferred that the acoustic pickup is an elongate pickup, extending at least partially around the rim. The elongate pickup may extend only partially around the rim, but usually will extend substantially wholly around the rim.

[0019] In preferred embodiments, the acoustic pickup comprises a piezoelectric pickup, and is preferably a pi-

ezoelectric cable pickup. Thus, in the preferred embodiments, the piezoelectric cable may extend at least partly (but preferably substantially wholly) around the rim.

[0020] The lower shell segment rim may comprise a lower flange preferably to support the first outer spacer, second inner spacer and the acoustic pickup. The first outer spacer may be located on the distal part of the flange. The second inner spacer may be located on the proximal part of the lower flange.

[0021] The acoustic pickup may therefore be located between the first outer spacer and second inner spacer on the lower flange.

[0022] Preferably, the upper shell segment rim comprises an upper flange to contact the first outer spacer, second inner spacer and the acoustic pickup when assembled.

[0023] Preferably, the first outer spacer is a first ring spacer with an outer diameter substantially the same as the outer diameter of the upper shell segment rim and flange and/or substantially the same as the outer diameter of the lower shell segment rim and flange. Furthermore, preferably, the first outer spacer is a first ring spacer with an inner diameter greater than the internal diameter of the upper shell segment rim and flange and/or greater than the internal diameter of the lower shell segment rim and flange.

[0024] Preferably, the second inner spacer is a second ring spacer with an outer diameter less than the inner diameter of the first ring spacer, with enough difference in diameter to allow the acoustic pickup (preferably an elongate acoustic pickup) to be placed between the first outer spacer ring and second inner spacer ring.

[0025] It is preferred that the acoustic pickup is held under pressure (i.e. vertical pressure) between the upper shell segment rim and lower shell segment rim. Optionally, the acoustic pickup is held under pressure (i.e. lateral pressure) between the first outer spacer and second inner spacer.

[0026] This is advantageous because pressure on, for example, a piezoelectric pickup has been surprisingly found to improve acoustic performance and especially amplification.

[0027] In some embodiments, the depth of the spacer is preferably less than the diameter of the acoustic pickup (i.e. there is a "pinch"). This enables the acoustic pickup to be held in place with pressure applied by the upper and lower shell segment rims (and/or flanges) when in position against the, shallower, spacer.

[0028] The depth of the spacer (i.e. thickness of the material of the spacer) may be in the range 1.0 to 2.0 mm, preferably 1.1 mm to 1.9 mm, more preferably 1.3 mm to 1.7 mm, most preferably around 1.5 mm.

[0029] The diameter of the acoustic pickup may be in the range 1.1 to 2.5 mm, preferably 1.2 mm to 2.0 mm, more preferably, 1.4 mm to 1.8 mm, most preferably around 1.6 mm.

[0030] The difference between the depth of the spacers (i.e. thickness of the material of the spacers) and the diameter of the acoustic pickup is preferably in the range - 0.5 mm to +0.5 mm. Preferably, the difference between the depth of the spacer and the diameter of the acoustic pickup is in the range - 0.2 mm to +0.4 mm, more preferably -0.1 mm to +0.3 mm, most preferably 0 mm to +0.2 mm.

[0031] The difference between the depth of the spacers and the diameter of the acoustic pickup affects the sound and amplification of the percussion instrument. Generally, where the difference is below -0.5 mm (i.e. the diameter of the acoustic pickup is 0.5 mm or greater than the depth of the spacer), the sound is good but amplification is generally less. Where the difference is above about 0.5 mm, the amplification is good but the quality of sound may suffer.

[0032] For convenient connection to an amplifier, the percussion instrument may further comprise an output jack installed in the hollow shell, optionally in the lower shell segment.

[0033] Usually, the output jack will be (electrically i.e. functionally) connected to the acoustic pickup by a connector (which may be a part of the acoustic pickup, e.g. part of a piezoelectric pickup cable). Optionally, the connector may pass through the gap in the second inner spacer.

[0034] The acoustic pickup may be fixed using adhesive, and the hollow shell may be formed by fixing the upper shell segment rim, the spacer and the lower shell segment rim with adhesive. Thus, the instrument may further comprise at least one adhesive bead between the upper shell segment rim and lower shell segment rim. The adhesive bead may comprise silyl modified polymer (SMP) adhesive.

[0035] Percussion instruments of the present invention may comprise a number of tone fields of definite pitch. Thus, it is preferred that the hollow shell comprises a plurality of tuned tone fields (which may also be known as playing areas).

[0036] To provide good acoustic properties, the instrument may further comprise a sound hole in the hollow shell. The sound hole may be in the upper shell segment but is preferably in the lower shell segment.

[0037] The hollow shell may be of diameter in the range 16 inch (40 cm) to 24 inch (61 cm). Usually, the hollow shell may be of a diameter of 18 inch (45 to 46 cm) or 21 inch (53 to 54 cm).

[0038] The preferred acoustic range of the percussion instrument is in the range E2 to C7, preferably B2 to G5.

[0039] The percussion instrument may be tuned to play a notes in a musical scale selected from C# minor, D minor, E minor, E major, F minor, G major, G# minor, A and B minor.

[0040] Thus, the percussion instrument may be tuned to one of the following scales: C# Annaziska (with tone fields tuned to the notes G# A B C# D# E F# G#), C# Mystic 7 (with tone fields tuned to the notes G# A C# D# E G# B), C# Raga Desh (with tone fields tuned to the notes G# B C# F F# G# B C#), C# Ysha Savita (with tone

fields tuned to the notes G# C C# D# F F# G# C#), D Integral (with tone fields tuned to the notes A Bb C D E F A), D Kurd 8 (with tone fields tuned to the notes A Bb C D E F G A), D Kurd 9 (with tone fields tuned to the notes A Bb C D E F G A (C5 Bottom Note)), D Celtic Minor (with tone fields tuned to the notes A C D E F G A), D Celtic 8 (with tone fields, for example being tuned to the notes A C D E F G A C), E Kurd 8 (with tone fields tuned to the notes B C D E F# G A B), E Kurd 9 (with tone fields tuned to the notes B C D E F# G A B D), E SaBye (with tone fields tuned to the notes A B C# D# E F# G# B), F Integral (with tone fields tuned to the notes C Db Eb F G Ab C), F Integral 8 (with tone fields tuned to the notes C Db Eb F G Ab C Eb), F Low Pygmy (with tone fields tuned to the notes G Ab C D# F G Ab C), or G Oxalista (with tone fields tuned to the notes B C D E G A B C D).

[0041] Other scales to which the percussion instruments may be tuned are, for example: G GiZa (with tone fields tuned to the notes Bb D Eb F# G A Bb D), G# Kurd 9 (with tone fields tuned to the notes D# E F# G# A# B C# D# F#), A Oxalis (with tone fields tuned to the notes C# D E F# A C# D E), or B Minor (with tone fields tuned to the notes D E F# G A B C# D).

[0042] The percussion instrument generally has a round cross section, optionally a substantially circular cross section. Usually, the hollow shell is therefore curved.

[0043] Generally, the hollow shell may be substantially spheroidal, optionally substantially oblate spheroidal. Thus, generally, each shell segment is substantially hemi-spheroidal. The tone fields may be somewhat flattened areas of the upper shell segment or lower shell segment of the hollow shell so the geometry of each shell segment may not be precisely hemi-spheroidal.

[0044] As discussed above, piezoelectric pickups are advantageous and produce excellent quality sound.

[0045] Thus, in a second aspect, the present invention provides a percussion instrument comprising a hollow shell having an upper shell segment and a lower shell segment, and an elongate piezoelectric acoustic pickup installed inside the hollow shell between a first outer spacer ring and a second inner spacer ring.

[0046] An output jack installed in the hollow shell is greatly advantageous.

[0047] Accordingly, in a third aspect, the present invention provides a percussion instrument comprising a hollow shell having an upper shell segment and a lower shell segment, an elongate acoustic pickup installed inside the hollow shell between a first outer spacer ring and a second inner spacer ring, and an output jack (optionally a gold plated output jack) fixed in the hollow shell and connected to the acoustic pickup. The output jack may be ¼ inch (6.4 mm).

[0048] The invention provides a percussion instrument with an acoustic pickup that may be manufactured in an efficient manner.

[0049] In a fourth aspect, the present invention accordingly provides a method of making a percussion instrument comprising a hollow shell, the method comprising: providing an upper shell segment having an upper shell segment rim, providing a lower shell segment having a lower shell segment rim, providing a first outer spacer and placing the spacer between the upper shell segment rim and the lower shell segment rim, providing a second inner spacer and placing the second inner spacer between the upper shell segment rim and the lower shell segment rim and spaced from the first outer spacer, between the first outer spacer and the interior of the hollow shell, installing an acoustic pickup between the upper shell segment rim and the lower shell segment rim and between the first outer spacer and the second inner spacer, and joining the upper shell segment and lower shell segment thereby forming a hollow shell.

[0050] The percussion instrument of all aspects of the present invention is most preferably a handpan.

[0051] Preferred and optional aspects of the second, third and fourth aspect of the invention are as set out above in relation to the first aspect.

[0052] Embodiments of the present invention will now be described with reference to the following figures, in which:

Figure 1 shows a schematic, partially exploded side view of an embodiment of a percussion instrument of the present disclosure.

Figure 2 shows the inner surface of the lower shell segment of the shell of the percussion instrument of Figure 1.

Figure 3 is a schematic section through part of the rim of the percussion instrument of Figure 1.

Figure 4 shows a top plan view of a lower shell segment of another embodiment of a percussion instrument of the present disclosure.

Figure 5 shows a schematic section on A - A of Figure 4.

Figure 6 shows in (b) a top perspective view of the lower shell segment of the percussion instrument of Figure 4 and in (a) a detail of part of the rim.

Figure 7 shows a side sectional view of the lower shell segment of the percussion instrument of Figure 4.

[0053] Figure 1 shows a schematic, partially exploded view of percussion instrument of the invention in the form of a handpan 2. The handpan 2 is formed of a steel hollow shell with an upper shell segment 4 and a lower shell segment 6 and a brass first outer spacer ring 18 and brass second inner spacer ring 19 (not visible in Figure 1) between the steel upper shell segment 4 and steel

lower shell segment 6. At the crown of the upper shell segment 4 is the crown tone field 3 tuned to a definite pitch. Around the upper shell segment 4 are upper tone fields 12 each also tuned to a definite pitch. On the lower shell segment 6 there are lower tone fields 14 each also tuned to a definite pitch. The tone fields 3, 12, 14 together are tuned to the notes in a musical scale enabling the performance of melodies. A sound hole 16 is formed at the base of the lower shell segment 6.

[0054] At the widest, lower part of the upper shell segment 4 is the upper shell segment rim 11 with an upper shell segment flange 10 extending outwardly. Similarly, at the widest, upper part of the lower shell segment 6 is the lower shell segment rim 9 with a lower shell segment flange 8 extending outwardly.

[0055] When assembled, the first outer spacer ring 18 is located between the upper shell segment 4 and lower shell segment 6 extending around the upper shell segment flange 10 and lower shell segment flange 8. The first outer spacer ring 18 has an outer diameter substantially the same as that of the upper shell segment flange 10 and lower shell segment flange 8 so that the outer surface of the hollow shell is substantially flush around the equator. The first outer spacer ring 18 is much less wide than the upper shell segment flange 10 and lower shell segment flange 8. A second inner spacer ring 19 with an outer diameter smaller than that of the first spacer ring is also located between the upper shell segment flange 10 and lower shell segment flange 8, between the first outer spacer ring 18 and the interior of the hollow shell. An elongate piezoelectric cable pickup 20 extends around the lower shell segment 4 located on the interior part of the flanges 8, 10 between the first outer spacer ring 18 and the second inner spacer ring 19. The spacer rings 18, 19 are shallower in depth (at about 1.5 mm) than the diameter of the piezoelectric cable pickup 20 so that, when the handpan 2 is assembled by fixing the lower shell segment flange 8 and upper shell segment flange 10 to the spacer rings 18, 19 with adhesive, the piezoelectric cable pickup 20 is held in place under vertical pressure. Such pressure significantly improves the acoustic performance of the piezoelectric cable pickup 20 and reduces the adverse effect of external sound and interference. An output jack 24 (a 1/4 inch gold plated output jack) is installed in a 0.5 inch (1.27 cm) aperture drilled through the lower shell segment 6 and, in the interior of the lower shell segment, is soldered to connector 22 in electrical connection with the piezoelectric cable pickup 20.

[0056] Figure 2 shows the interior surface of the lower shell segment 6 before assembly. The lower shell segment 6 comprises lower tone fields 14, sound hole 16 and output jack 24 soldered to connector 22, itself in connection with the piezoelectric cable pickup 20. The piezoelectric cable pickup 20 extends around the lower shell segment flange 8. During assembly, the first outer spacer ring 18 and second inner spacer ring (not shown in Figure 2), are adhered to the lower shell segment flange 8. The piezoelectric cable pickup 20 is positioned between the spacer rings 18, 19 on the flange 8 and held in place with adhesive and extends around the interior side of the flange 8 between the spacer rings 18, 19.

[0057] Figure 3 shows a schematic section, partially exploded for clarity, through part of the rim of the handpan 2. The upper shell segment flange 10 of the upper shell segment 4 and lower shell segment flange 8 of the lower shell segment 6 each have an SMP adhesive bead 26 fixing the first outer spacer ring 18, the second inner spacer ring 19 and the piezoelectric cable pickup 20 in place. During assembly, the upper shell segment flange 10 and lower shell segment flange 8 are clamped while the adhesive cures (which may take several days). As discussed above, since the spacer rings 18, 19 are shallower in depth (at about 1.5 mm) than the diameter of the piezoelectric cable pickup 20 (at about 1.6 mm), the piezoelectric cable pickup 20 is pinched (the pinch being about 0.1 mm) and so held in place under consistent pressure. Such pressure significantly improves the acoustic performance of the piezoelectric cable pickup 20 and reduces the adverse effect of external sound and interference.

[0058] The two spacers arrangement allows additional lateral pressure to be applied to secure the acoustic pickup in position and prevent it from dislodging or falling into the hollow shell during the installation process or subsequently. Thus providing a far more repeatable installation process and reducing the level of skill required. Surprisingly, the sound which the pickup produces once the instrument is assembled and in use is also refined, with a reduction in dead-spots and fewer areas with a volume/amplitude bias toward certain notes. Furthermore, and unexpectedly, the second inner spacer (i.e. the inner spacer) has an improved dampening effect on the sound which is picked up; allowing the important frequencies to reach the pickup whilst the higher, less desirable frequencies may be attenuated by the spacer.

[0059] One or both of the spacer rings 18, 19 may be formed as an entire loop (with or without a gap), or in two or more sections (for example, 2, 3, 4, 5 or more sections) which is advantageous because there is less waste of material in manufacturing. Preferably, the first outer spacer 18 and/or the second inner spacer 19 are each formed of 3 sections.

[0060] Figures 4 to 7 show an alternative embodiment of a handpan of the present disclosure.

[0061] Figure 4 shows the interior surface of the lower shell segment 106 before assembly. The lower shell segment 106 comprises sound hole 116 and output jack 124 soldered to connector 122, itself in connection with the piezoelectric cable pickup 120. The piezoelectric cable pickup 120 extends around the lower shell segment flange 108 at lower shell segment rim 109. During assembly, the first outer spacer ring 118 (about 1.5 mm thickness, about 6mm width) and second inner spacer ring 119 (about 1.5 mm thickness, about 6mm width), are adhered to the lower shell segment flange 108. The pi-

ezoelectric cable pickup 120 is positioned between the spacer rings 118, 119 on the flange 108 and held in place with adhesive and extends around the interior side of the flange 108 between the spacer rings 118, 119.

[0062] Figure 5 shows a schematic section on A - A of Figure 4 through part of the rim of the lower shell segment 106 of the handpan. The lower shell segment flange 108 of the lower shell segment 106 has the first outer spacer ring 118, and the second inner spacer ring 119 and the piezoelectric cable pickup 120 fixed in place.

[0063] Figure 6 (a) and (b) and Figure 7 shows the lower shell segment 106 of the handpan and the features are the same as for Figures 4 and 5 except as mentioned below. Figure 6 (a) shows a detail of a part of the rim 109 of the lower shell segment 106 with the first outer spacer ring 118, second inner spacer ring 119 and piezoelectric cable pickup 120 between the spacers 118,119. There is a gap 123 in the second inner spacer ring 119 to allow a connector 122 to connect the piezoelectric cable pickup 120 and output jack 124. Figure 7 shows a side view of the lower shell segment 106 with the output jack 124 fixed to the lower shell segment in a hole drilled in the shell segment to allow for connecting an amplifier.

[0064] One or both of the spacer rings 118, 119 may be formed as an entire loop (with gap 123 in the case of the second inner spacer ring 119), or in two or more sections (for example, 2, 3, 4, 5 or more sections) which is advantageous because there is less waste of material in manufacturing. Preferably, the first outer spacer 118 and/or the second inner spacer 119 are each formed of 3 sections.

[0065] All publications mentioned in the above specification are herein incorporated by reference. Although illustrative embodiments of the invention have been disclosed in detail herein, with reference to the accompanying drawings, it is understood that the invention is not limited to the precise embodiment and that various changes and modifications can be performed therein by one skilled in the art without departing from the scope of the invention as defined by the appended claims and their equivalents.

Reference Numerals

[0066]

2	handpan
3	crown tone field
4	upper shell segment
6	lower shell segment
8	lower shell segment flange
9	lower shell segment rim
10	upper shell segment flange
11	upper shell segment rim
12	upper tone field
14	lower tone field
16	lower shell segment sound hole
18	spacer ring
20	piezoelectric cable pickup
22	connector
24	output jack
26	adhesive bead
102	handpan
106	lower shell segment
108	lower shell segment flange
109	lower shell segment rim
116	lower shell segment sound hole
118	first outer spacer ring
119	second inner spacer ring
120	piezoelectric cable pickup
122	connector
123	gap in second inner spacer ring
124	output jack

Claims

1. A percussion instrument comprising,

a hollow shell, the hollow shell comprising an upper shell segment having an upper shell segment rim and a lower shell segment having a lower shell segment rim,
a first outer spacer located between the upper shell segment rim and the lower shell segment rim,
a second inner spacer located between the upper shell segment rim and the lower shell segment rim and spaced from the first outer spacer between the first outer spacer and the interior of the hollow shell,
an acoustic pickup located between the upper shell segment rim and the lower shell segment rim and between the first outer spacer and the second inner spacer.

2. A percussion instrument as claimed in claim 1, wherein the first outer spacer comprises a first outer spacer ring extending around the rim.

3. A percussion instrument as claimed in either claim 1 or claim 2, wherein the second inner spacer comprises a second inner spacer ring extending around the rim.

4. A percussion instrument as claimed in any one of the preceding claims, wherein the second inner spacer has a gap to allow connection to the acoustic pickup.

5. A percussion instrument as claimed in any one of the preceding claims, wherein the acoustic pickup is an elongate pickup, extending around the rim.

6. A percussion instrument as claimed in any one of the preceding claims, wherein the acoustic pickup is

a piezoelectric pickup, optionally a piezoelectric cable pickup.

7. A percussion instrument as claimed in any one of the preceding claims, wherein the lower shell segment rim comprises a lower flange to support the first outer spacer, second inner spacer and the acoustic pickup.

8. A percussion instrument as claimed in claim 7, wherein the acoustic pickup is located between the first and second inner spacers on the lower flange.

9. A percussion instrument as claimed in any one of the preceding claims, wherein the acoustic pickup is held under pressure between the upper shell segment rim and lower shell segment rim, and optionally the acoustic pickup is held under pressure between the first outer spacer and second inner spacer

10. A percussion instrument as claimed in any one of the preceding claims, further comprising an output jack installed in the hollow shell, optionally in the lower shell segment.

11. A percussion instrument as claimed in claim 10, wherein the output jack is connected to the acoustic pickup by a connector, optionally wherein the connector passes through the gap in the second inner spacer.

12. A percussion instrument as claimed in any one of the preceding claims, wherein the hollow shell comprises a plurality of tuned tone fields.

13. A percussion instrument as claimed in any one of the preceding claims, wherein the percussion instrument is tuned to play notes in a musical scale selected from C# minor, D minor, E minor, E major, F minor, G major, G# minor, A and B minor.

14. A handpan comprising a percussion instrument as claimed in any one of claims 1 to 13.

15. A method of making a percussion instrument comprising a hollow shell, the method comprising:

providing an upper shell segment having an upper shell segment rim,
providing a lower shell segment having a lower shell segment rim,
providing a first outer spacer,
placing the spacer between the upper shell segment rim and the lower shell segment rim,
providing a second inner spacer,
placing the second inner spacer between the upper shell segment rim and the lower shell segment rim and spaced from the first outer spacer,
between the first outer spacer and the interior of the hollow shell,
installing an acoustic pickup between the upper shell segment rim and the lower shell segment rim and between the first outer spacer and the second inner spacer, and
joining the upper shell segment and lower shell segment thereby forming a hollow shell.

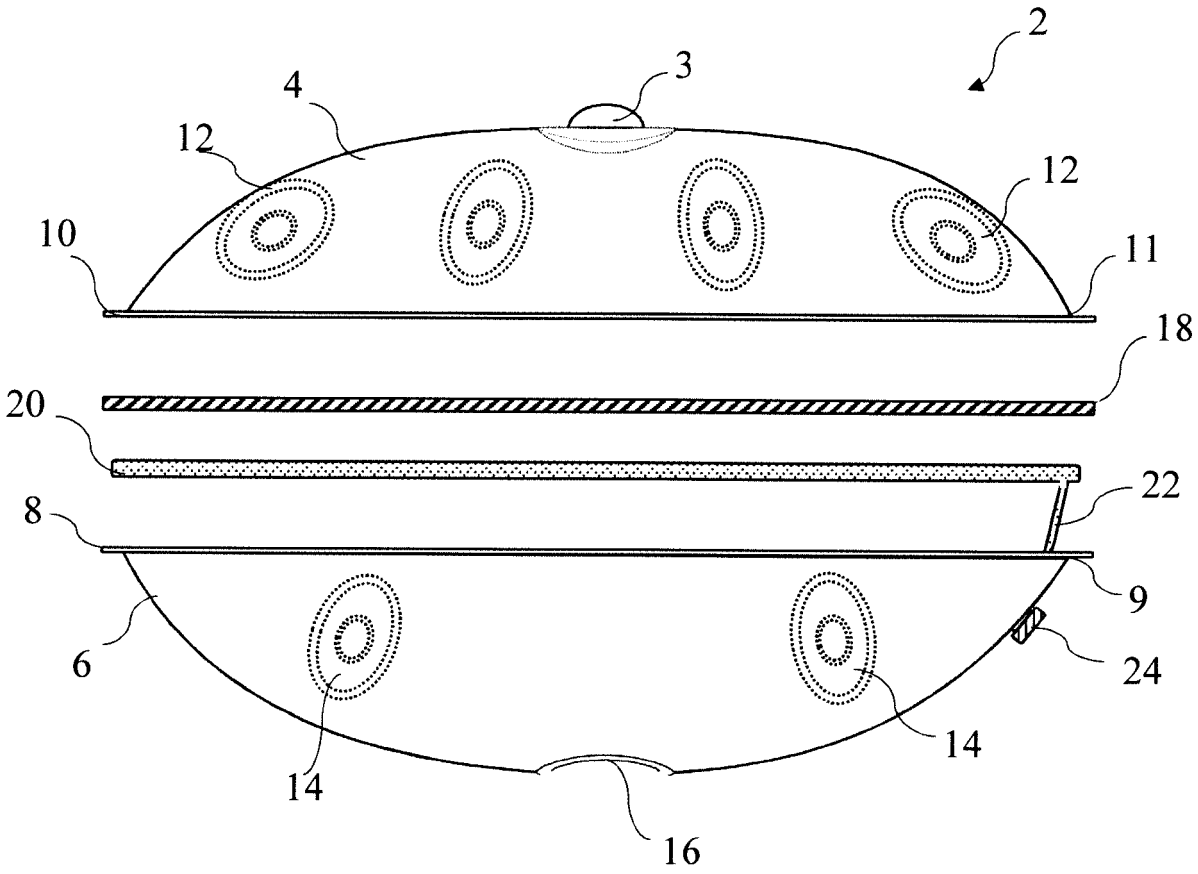

FIG. 1

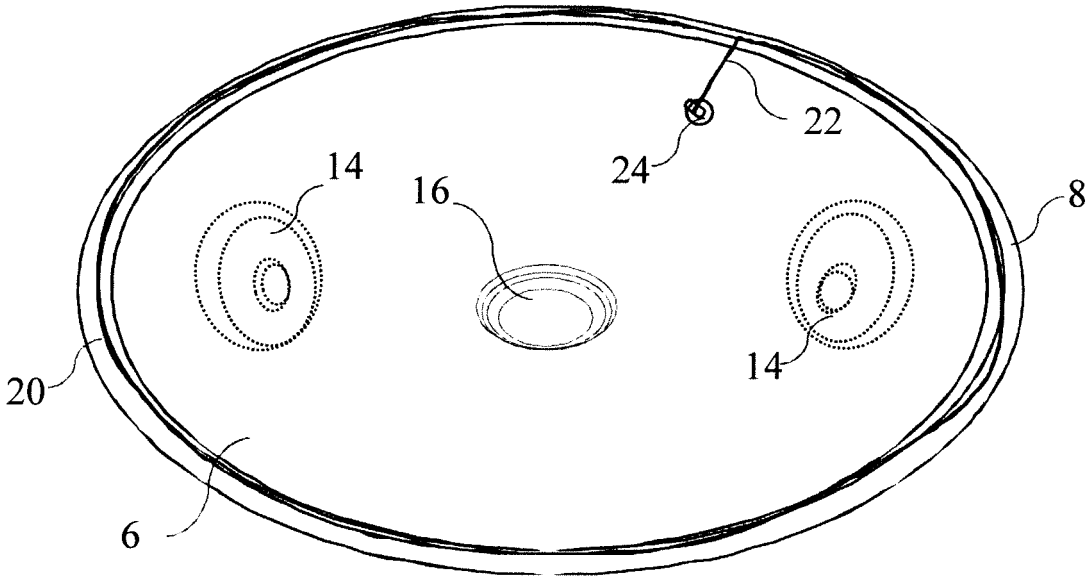

FIG. 2

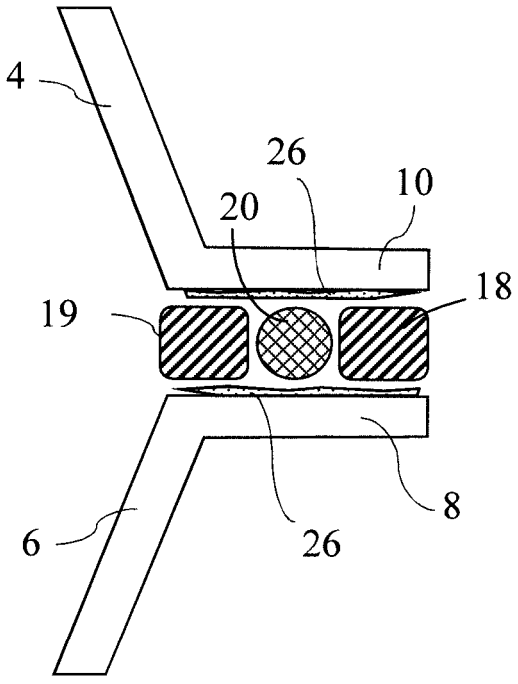

FIG. 3

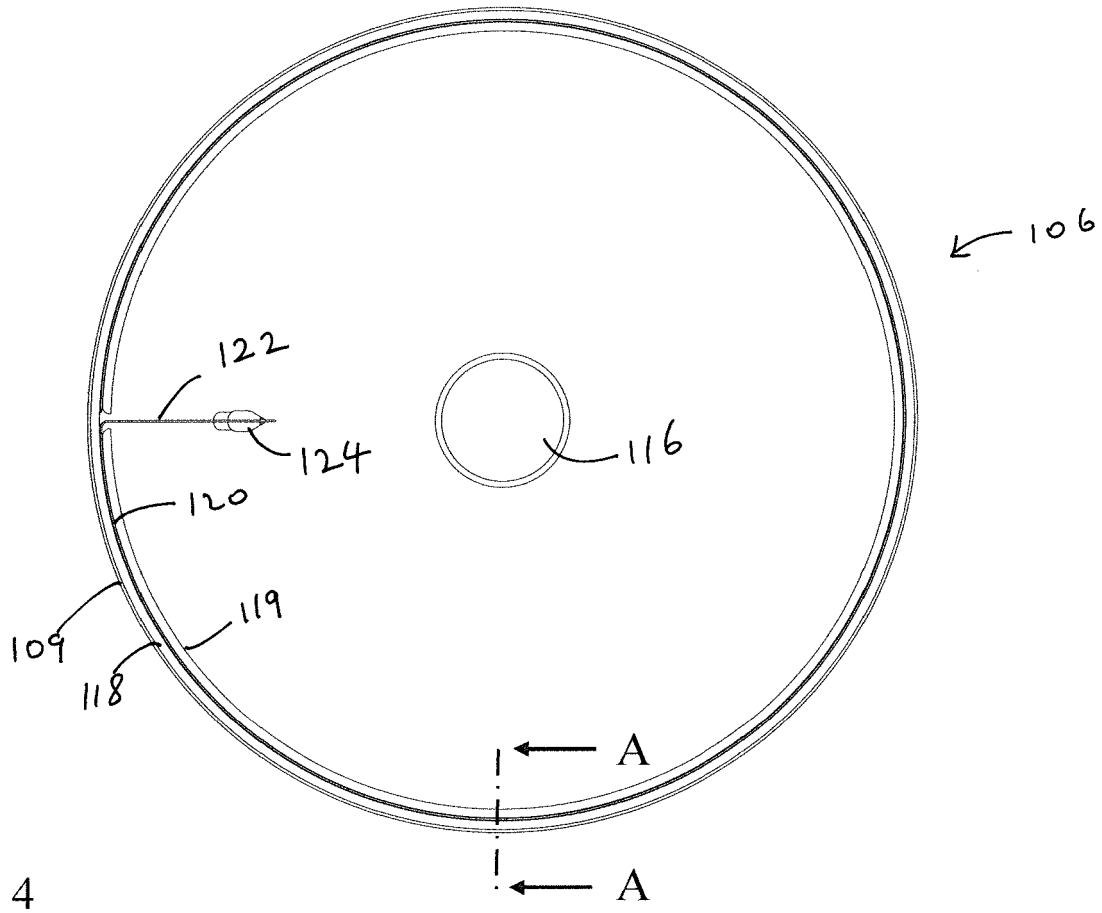

FIG. 4

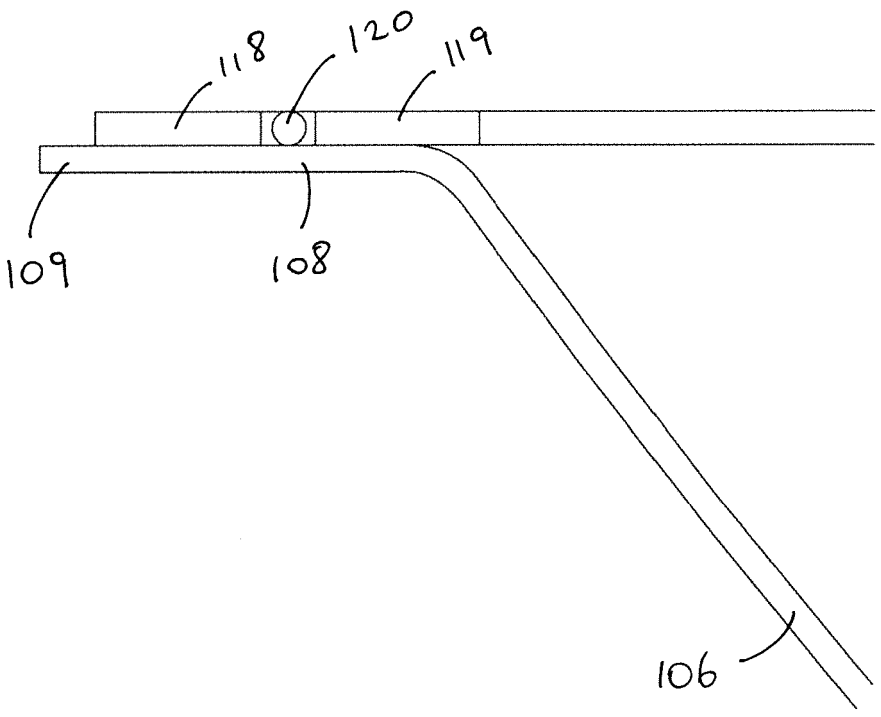

FIG. 5

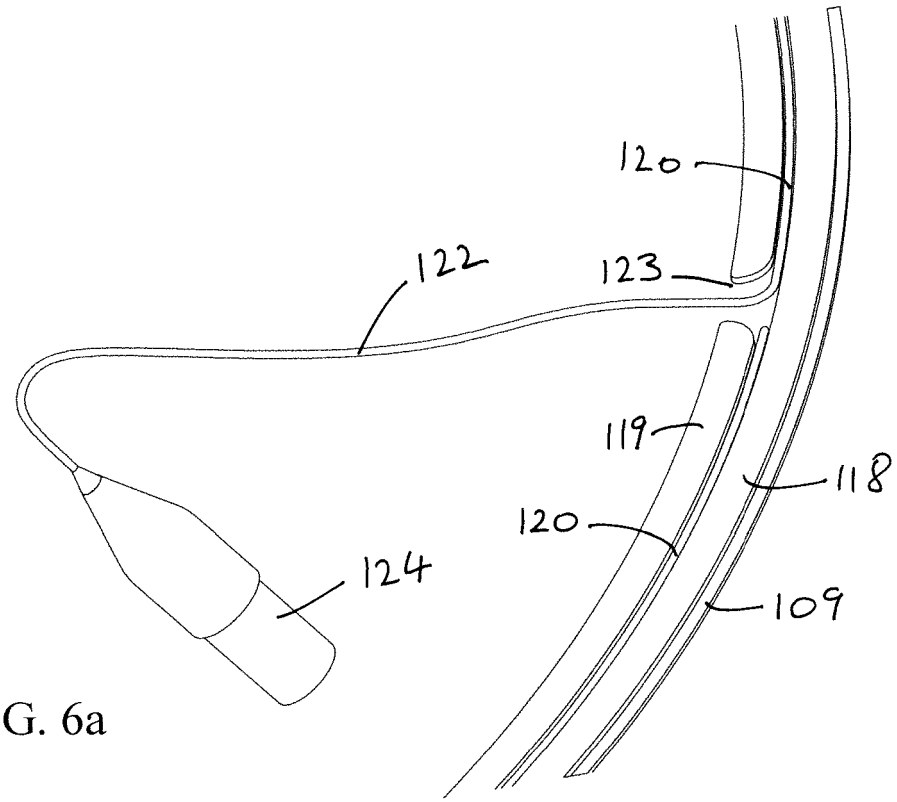

FIG. 6a

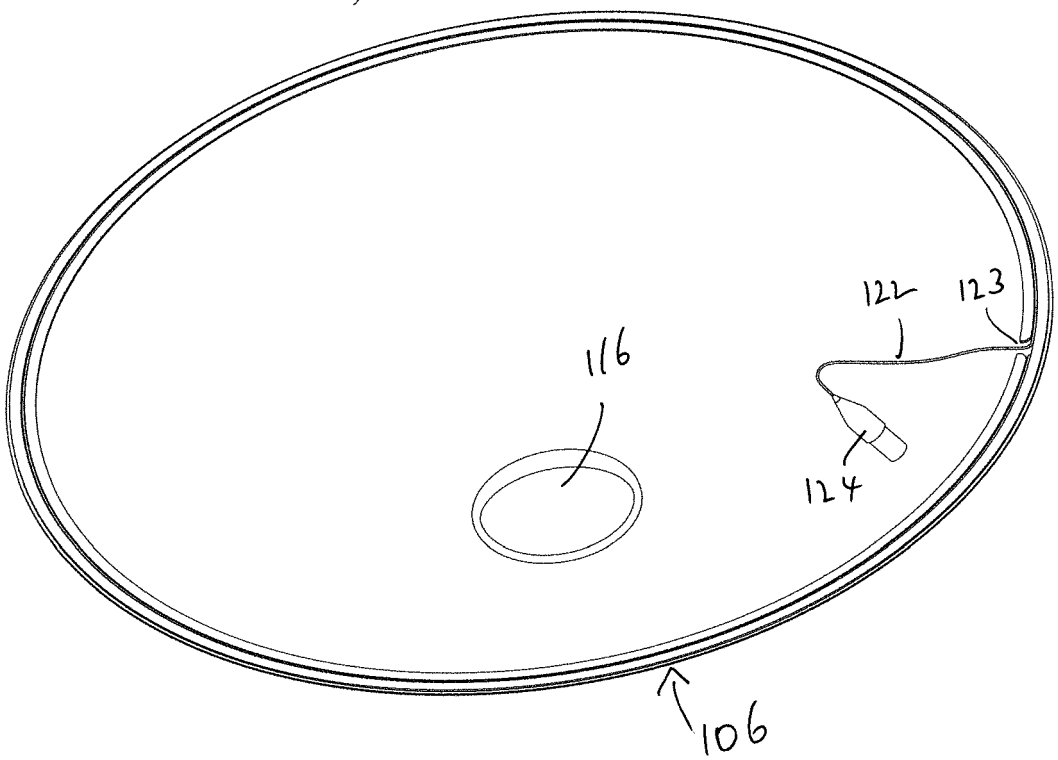

FIG. 6b

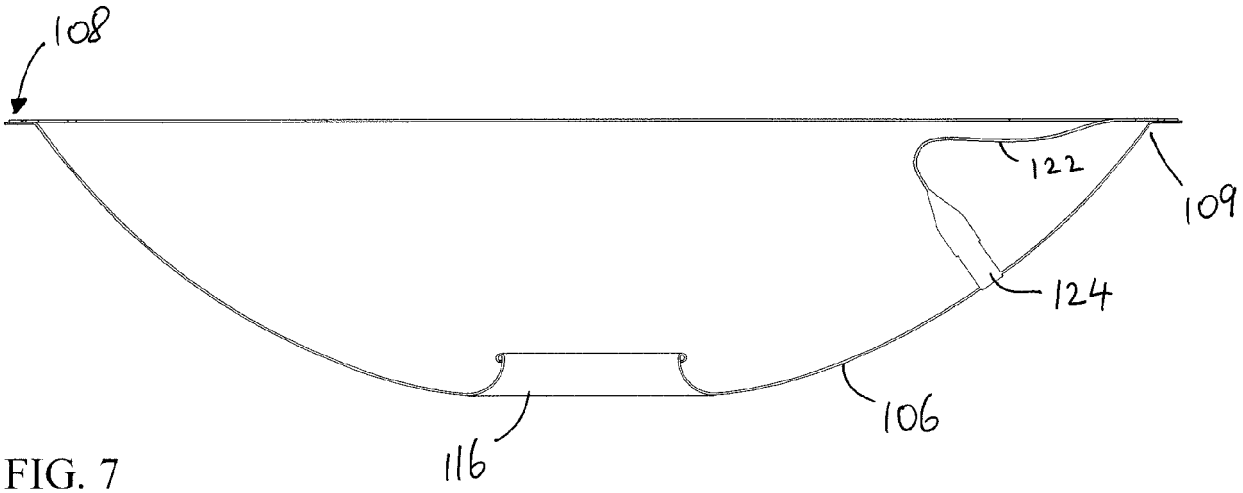

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 22 19 9426

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Place of search	Date of completion of the search	Examiner
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