



- (51) **International Patent Classification:**
H04R 1/28 (2006.01) *H04R 25/00* (2006.01)
- (21) **International Application Number:**
PCT/CN2013/082421
- (22) **International Filing Date:**
28 August 2013 (28.08.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
201220507722.2
27 September 2012 (27.09.2012) CN
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- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) **Title:** DOCK WITH SOUND BOX

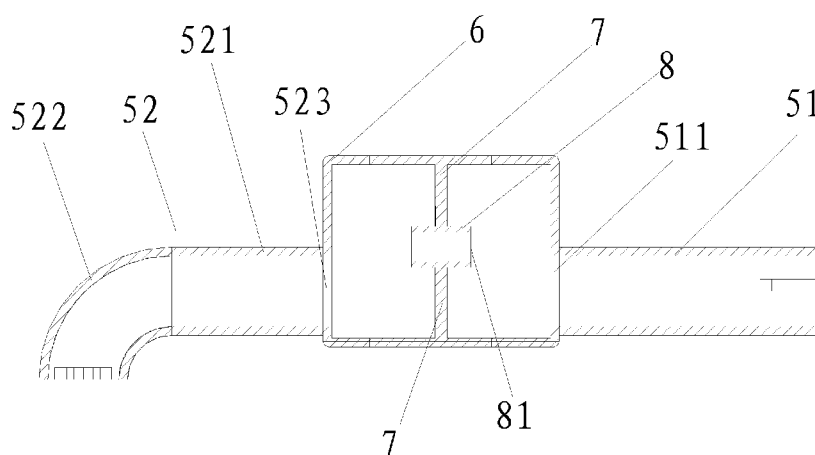


Fig. 5

(57) **Abstract:** A dock with a sound box, comprises: an upper shell (1) having a loudspeaker hole (41) and an inverter tube hole (53) formed thereon; a lower shell (2) engaged with the upper shell to define a sound cavity (9); a loudspeaker (4) disposed in the sound cavity and coupled to the loudspeaker hole; an inverter tube (5) configured to boost a sound; and a closed box (6) defining an interior cavity therein. The inverter tube comprises a first tube segment (51) and a second tube segment (52), wherein, the second tube segment is bent and extended to the upper shell to couple with the inverter tube hole. The interior cavity is divided into a first chamber (61) and a second chamber (62) by a baffle plate (7). The first chamber and the second chamber are communicated with each other via a communication pipe (8) penetrating through the baffle plate.



DOCK WITH SOUND BOX

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to and benefits of Chinese Patent Application Serial No.
5 CN201220507722.2, filed with the State Intellectual Property Office of P. R. China on September 27, 2012, the entire content of which is incorporated herein by reference.

FIELD

The present disclosure generally relates to a dock, particularly to a dock with sound box.
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BACKGROUND

With popularity of intelligent electronic terminals, such as smart phone, tablet computer, a dock with entertainment functions, for example, a dock with sound box, for those intelligent electronic terminals is developed quickly.

15 However, due to a dimension limitation of the dock, only the low powered loudspeaker can be equipped to the conventional dock, so that it is hard to improve sound quality.

In order to magnify the sound of the electronic terminals, such as cell phone, the conventional dock may comprise a long pipe to form a sound cavity so as to boost the sound coming from the low powered loudspeaker. However, even the sound has been boosted, a frequency response
20 thereof is not smooth, and transience thereof is poor. Moreover, a fidelity factor of the sound will be decreased gradually along with reduction of the frequency thereof, which may affect a sound clarity of the sound so that the sound is unclear and not pure.

SUMMARY

25 Embodiments of the present disclosure seek to solve at least one of the problems existing in the prior art to at least some extent, or to provide a consumer with a useful commercial choice.

According to embodiments of the present disclosure, there is provided a dock with sound box. The dock comprises: an upper shell having a loudspeaker hole and an inverter tube hole; a lower shell engaged with the upper shell to define a sound cavity; a connector disposed on the upper
30 shell; a loudspeaker disposed in the sound cavity and coupled with the loudspeaker hole; an inverter tube configured to boost a sound generated by the loudspeaker, disposed in the sound

cavity and comprising a first tube segment and a second tube segment, an end of the second tube segment being bent and extended to the upper shell to couple with the inverter tube hole; and a closed box defining an interior cavity therein, the interior cavity being divided into a first chamber and a second chamber by a baffle plate disposed in the interior cavity, and the first and second chambers being communicated with each other via a communication pipe disposed on and penetrating through the baffle plate, wherein the first tube segment is communicated with the first chamber, and the second tube segment is communicated with the second chamber, wherein a cross-sectional area of the interior cavity of the closed box being larger than a maximum cross-sectional area of the inverter tube.

In one embodiment of the present disclosure, the first tube segment is straight, and the second tube segment comprises a straight segment communicated with the second chamber and a bent segment connected between the straight segment and the inverter tube hole, wherein the first tube segment and the straight segment are parallel to a surface of the upper shell and an end of the bent segment coupled with the inverter tube hole is perpendicular to the surface of the upper shell.

In one embodiment of the present disclosure, the communication pipe is straight.

In one embodiment of the present disclosure, an axis of the communication pipe is offset from axes of the first tube segment and the straight segment.

In one embodiment of the present disclosure, an inner diameter of the communication pipe is smaller than that of the first tube segment.

In one embodiment of the present disclosure, the baffle plate is disposed at a center of the closed box so that the first chamber and second chamber are symmetrical, and a length of the communication pipe extended in the first chamber is equal to that of the communication pipe extended in the second chamber.

In one embodiment of the present disclosure, two loudspeakers are disposed in the sound cavity.

In one embodiment of the present disclosure, the inverter tube hole is formed between the two loudspeaker holes.

In one embodiment of the present disclosure, the inverter tube is integral with the closed box.

In one embodiment of the present disclosure, the connector is an USB connector.

According to the present disclosure, the dock comprises an inverter tube disposed in the sound cavity and adjacent to the loudspeaker, the inverter tube boosts a sound emitted from the

loudspeaker. The dock also comprises a closed box disposed between the first tube segment and second tube segment of the inverter tube, the baffle plate is disposed into the closed box and configured to separate the interior cavity of the closed box into the first and second chambers, and a communication pipe passes through the baffle plate, the first tube segment is communicated with the first chamber, the second tube segment is communicated with the second chamber, the cross-sectional area of the closed box is larger than the maximum cross-sectional area of the inverter tube.

Therefore, an under damping state of a boosted sound wave transmitted into the closed box via the inverter tube may be converted into a damping state. Moreover, the sound in the closed box may be further boosted by the communication pipe, and a standing sound wave can be reduced in the first chamber and the second chamber. Thus, the sound wave may have a good transient state and a smooth frequency response.

In addition, after the rear sound wave in the sound cavity is transmitted out via the inverter tube hole, the rear sound wave may be overlay on a front sound wave transmitted out via the loudspeaker hole to further increase a sound pressure and power in low-frequency stage. Therefore, the sound emitted from the dock according to the present disclosure may have a better quality, loud and clear sound.

Additional aspects and advantages of embodiments of present disclosure will be given in part in the following descriptions, become apparent in part from the following descriptions, or be learned from the practice of the embodiments of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of embodiments of the present disclosure will become apparent and more readily appreciated from the following descriptions made with reference to the accompanying drawings, in which:

Fig.1 is a stereogram view of a dock with sound box according to an embodiment of the present disclosure;

Fig.2 is a schematic view of a dock with sound box according to an embodiment of the present disclosure, in which a bottom wall of the lower shell has been omitted;

Fig.3 is a cross-sectional view of a dock with sound box according to an embodiment of the present disclosure;

Fig.4 is a stereogram view of the inverter tube and the closed box of the dock with sound box according to an embodiment of the present disclosure;

Fig.5 is cross-sectional view of the inverter tube and the closed box of the dock with sound box according to an embodiment of the present disclosure;

5

DETAILED DESCRIPTION

Reference will be made in detail to embodiments of the present disclosure. The embodiments described herein with reference to drawings are explanatory, illustrative, and used to generally understand the present disclosure. The embodiments shall not be construed to limit the present disclosure. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the descriptions.

In the specification, Unless specified or limited otherwise, relative terms such as “central”, “longitudinal”, “lateral”, “front”, “rear”, “right”, “left”, “inner”, “outer”, “lower”, “upper”, “horizontal”, “vertical”, “above”, “below”, “up”, “top”, “bottom” as well as derivative thereof (e.g., “horizontally”, “downwardly”, “upwardly”, etc.) should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description and do not require that the present disclosure be constructed or operated in a particular orientation.

As shown in Figs.1-5, a dock with sound box according to embodiments of the present disclosure comprises: an upper shell 1, a lower shell 2, a connector 3, a loudspeaker 4 and an inverter tube 5.

The upper shell 1 has a loudspeaker hole 41 and a inverter tube hole 53 formed thereon, and the upper shell 1 and the lower shell 2 are engaged to define a sound cavity 9. The connector 3 is disposed on the upper shell 1 and configured to connect with an electrical device, such as a smart phone or a pad. The loudspeaker 4 and the inverter tube 5 are disposed in the sound cavity 9 and may be fixed in the sound cavity 9 via the upper shell 1 or the lower shell 2. The loudspeaker 4 is coupled with the loudspeaker 41.

The inverter tube 5 may be disposed adjacent to the loudspeaker 4 so as to boost a sound generated by the loudspeaker 4. The inverter tube 5 comprises a first tube segment 51 and a second tube segment 52, an end of the second tube segment 52 is bent and extended to the upper shell to couple with the inverter tube hole 53.

A closed box 6 defines an interior cavity therein, the interior cavity is divided into a first chamber 61 and a second chamber 62 by a baffle plate 7 disposed in the interior cavity, and the first chamber 61 and a second chamber 62 are communicated with each other via a communication pipe 8 disposed on and penetrating through the baffle plate 7. The first chamber 61 is communicated with the first tube segment 51, the second chamber 62 is communicated with the second tube segment 52.

A cross-sectional area of the interior cavity of the closed box 6 is larger than the maximum cross-sectional area of the inverter tube, so that a standing sound wave of the sound wave from the inverter tube 5 may be reduced. The sound wave transmitted from the first tube segment 51 is transmitted into the communication pipe 8 via the first chamber 61, and then is transmitted out of the inverter tube hole 53 via the second tube segment 52 to outside of the dock.

The inverter tube 5 and the closed box 6 are configured to transmit and lead a rear sound wave in the sound cavity 9 to the outside of the dock, so that the rear sound wave is overlay on a front sound wave transmitted from the loudspeaker hole 41 (i.e. a front sound cavity), in the meantime, the rear sound wave is boosted, filtered and optimized in the sound cavity 9 by the inverter tube 5 and the closed box 6.

More specifically, as shown in Fig.2, Fig.4 and Fig.5, in an preferred embodiment of the present disclosure, the first tube segment 51 of the inverter tube 5 is straight so as to boost the rear sound wave in the sound cavity and avoid the rear sound wave being transmitted along a bending path, the standing sound wave is not taken place in the straight first tube segment 51, thus, the frequency responses of the sound is more smooth.

The second tube segment 52 of the inverter tube 5 comprises a straight segment 521 and a bent segment 522 between the straight segment 521 and the inverter tube hole 53 to communicate with the straight segment 521 and the inverter tube hole 53. The first tube segment 51 and the straight segment 521 are parallel to a surface of the upper shell 1, an end of the bent segment 522 is coupled with the inverter tube hole 53 and is perpendicular to the surface of the upper shell 1, so that the standing sound wave is reduced when the rear sound wave passes through the inverter tube 5 and the closed box 6.

In one embodiment of the present disclosure, the closed box 6 may be disposed between the first tube segment 51 and the straight segment 521 of the second tube segment 52, and an outlet 511 of the first tube segment 51 is communicated with the first chamber 61, an inlet 523 of the

straight segment 521 is communicated with the second chamber 62. The communication pipe 8 is straight. Therefore the standing sound wave of the rear sound wave from the first tube segment 51 is reduced when the rear sound wave passes through the first chamber 61 and the second chamber 62, and the rear sound wave is easily to convert into a damping state from an under damping state .

5 In some embodiments of the present disclosure, the communication pipe 8 may be arranged in a staggered pattern with the first tube segment 51 and the straight segment 521, in other words, an axis of the communication pipe 8 is offset from axes of the first tube segment 51 and the straight segment 521. Thus, the rear sound wave from the first tube segment 51 may be filtered and optimized in a larger space of the first chamber 61, so as to further reduce the standing sound
10 wave.

In one preferred embodiment of the present disclosure, the closed box 6 has a shape of rectangular parallelepiped, and the communication pipe 8 is parallel to upper and lower walls of the closed box 6.

In one embodiment of the present disclosure, an inner diameter of the communication pipe 8
15 is smaller than that of the first tube segment 51, more specifically, the inner diameter of the communication pipe 8 is smaller than that of the outlet 511, so that the rear sound wave from the first tube segment 51 may be further boosted, and a sound pressure thereof may be increased.

The baffle plate 7 is disposed at a center of the closed box 6, so that the first chamber 61 and second chamber 62 are symmetrical, and lengths of the communication pipe 8 extended in the first
20 chamber 61 is equal to that of the communication pipe 8 extended in the second chamber 62, therefore the rear sound wave may be filtered and optimized evenly in the first chamber 61 and the second chamber 62.

Referring to Fig.2 and Fig.3, a working principle of the dock with sound box according to the present disclosure will be described in detail below.

25 In one embodiment of the present disclosure, the dock comprises two loudspeakers 4. It can be understood that the dock may comprise one or more loudspeakers according to types of the product or actual demand. The rectangular parallelepiped closed box 6 is disposed between the first tube segment 51 and the straight segment 521. The baffle plate 7 is disposed at the center of the closed box 6, and the lowest portion of an inlet 81 of the communication pipe 8 is substantially
30 lined to the highest portion of the outlet 511. Therefore, with the arrangements of the baffle plate 7 and the communication pipe 8, the closed box 6 becomes a variable damping type box.

The working processes of the dock according to the present disclosure are: firstly, the front sound wave generated by a vibrating diaphragm of the loudspeaker 4 is transmitted to the outside of the dock via the loudspeaker hole 41. Synchronously, the rear sound wave generated by the vibrating diaphragm of the loudspeaker 4 in the sound cavity 9 passes through the first tube segment 51 of the inverter tube 5 firstly (as shown by arrows in Fig.3), so that the rear sound wave is boosted and the sound pressure and power of the rear sound wave are increased in low-frequency stage.

Secondly, the rear sound wave is transmitted into the first chamber 61, so that the rear sound wave may be filtered in a larger space of the first chamber 61 and the standing sound wave of the rear sound wave is reduced. At the same time, a part of the rear sound wave is transmitted into the second chamber 62 via the communication pipe 8, and the other part of the rear sound wave is stayed in the first chamber 61 casually due to the smaller inner diameter of the communication pipe 8.

A trailing aftershock of the vibrating diaphragm may be restrained effectively, and the rear sound wave is transmitted into the second chamber 62 after the rear sound wave has been further boosted in the communication pipe 8, the rear sound wave is converted into the damping state from the under damping state. Thus, the rear sound wave can have a better transience and the rear sound in the low frequency stage is pure and powerful.

Finally, the rear sound wave came out of the second chamber 62 passes through the second tube segment 52, and then the rear sound wave is transmitted to the outside of the dock via the inverter tube hole 53.

After the rear sound wave is resonated and turned 180 degrees within the inverter tube 5, the rear sound wave is overlay on the front sound wave from the loudspeaker hole 41.

Thus, with the dock according to embodiments of the present disclosure, the front sound wave and the rear sound wave are utilized fully so as to increase the sound pressure and power in low-frequency stage and reduce standing wave in the sound cavity 9. The unclear and worse transience sound wave caused by the standing sound wave in the sound cavity and a large air flow may be overcome.

In some embodiments of the present disclosure, the inverter tube hole 53 is formed between two loudspeaker holes 41, therefore the sound pressure of the overlay sound wave from the loudspeaker holes 41 and inverter tube hole 53 may be higher. The closed box 6 is integral with the

inverter tube 5, thus a manufacturing process of the dock may be simplified and a sealing property of the dock may be improved to increase the sound pressure.

The connector 3 is a USB connector 3, so that the dock may be suitable for different kinds of electronic product.

5 In conclusion, the dock with sound box according to the present disclosure, with the inverter tube and the closed box, the sound wave from the dock may have a smooth frequency response and pure and powerful low frequency of the sound wave, and the quality of the sound of the dock may be improved.

Reference throughout this specification to “an embodiment,” “some embodiments,” or “one
10 embodiment,” means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. Thus, the appearances of the phrases such as “in some embodiments,” “in one embodiment,” or “in an embodiment,” in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore,
15 the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

Although explanatory embodiments have been shown and described, it would be appreciated by those skilled in the art that the above embodiments cannot be construed to limit the present disclosure, and changes, alternatives, and modifications can be made in the embodiments without
20 departing from spirit, principles and scope of the present disclosure.

WHAT IS CLAIMED IS:

1. A dock with sound box, comprising:

an upper shell having a loudspeaker hole and an inverter tube hole;

5 a lower shell engaged with the upper shell to define a sound cavity;

a connector disposed on the upper shell;

a loudspeaker disposed in the sound cavity and coupled with the loudspeaker hole;

10 an inverter tube configured to boost a sound generated by the loudspeaker, disposed in the sound cavity and comprising a first tube segment and a second tube segment, an end of the second tube segment being bent and extended to the upper shell to couple with the inverter tube hole; and

a closed box defining an interior cavity therein, the interior cavity being divided into a first chamber and a second chamber by a baffle plate disposed in the interior cavity, and the first and second chambers being communicated with each other via a communication pipe disposed on and penetrating through the baffle plate,

15 wherein the first tube segment is communicated with the first chamber, and the second tube segment is communicated with the second chamber,

wherein a cross-sectional area of the interior cavity of the closed box being larger than a maximum cross-sectional area of the inverter tube.

20 2. The dock according to claim 1, wherein the first tube segment is straight, and the second tube segment comprises a straight segment communicated with the second chamber and a bent segment connected between the straight segment and the inverter tube hole,

25 wherein the first tube segment and the straight segment are parallel to a surface of the upper shell and an end of the bent segment coupled with the inverter tube hole is perpendicular to the surface of the upper shell.

3. The dock according to claim 2, wherein the communication pipe is straight.

30 4. The dock according to claim 3, wherein an axis of the communication pipe is offset from axes of the first tube segment and the straight segment.

5. The dock according to claim 4, wherein an inner diameter of the communication pipe is smaller than that of the first tube segment.

6. The dock according to any one of claim 1-5, wherein the baffle plate is disposed at a center of the closed box so that the first chamber and second chamber are symmetrical, and a length of the communication pipe extended in the first chamber is equal to that of the communication pipe extended in the second chamber.

7. The dock according to any one of claim 1-6, wherein two loudspeakers are disposed in the sound cavity.

8. The dock according to claim 7, wherein the inverter tube hole is formed between the two loudspeaker holes.

9. The dock according to any one of claims 1-8, wherein the inverter tube is integral with the closed box.

10. The dock according to any one of claims 1-9, wherein the connector is an USB connector.

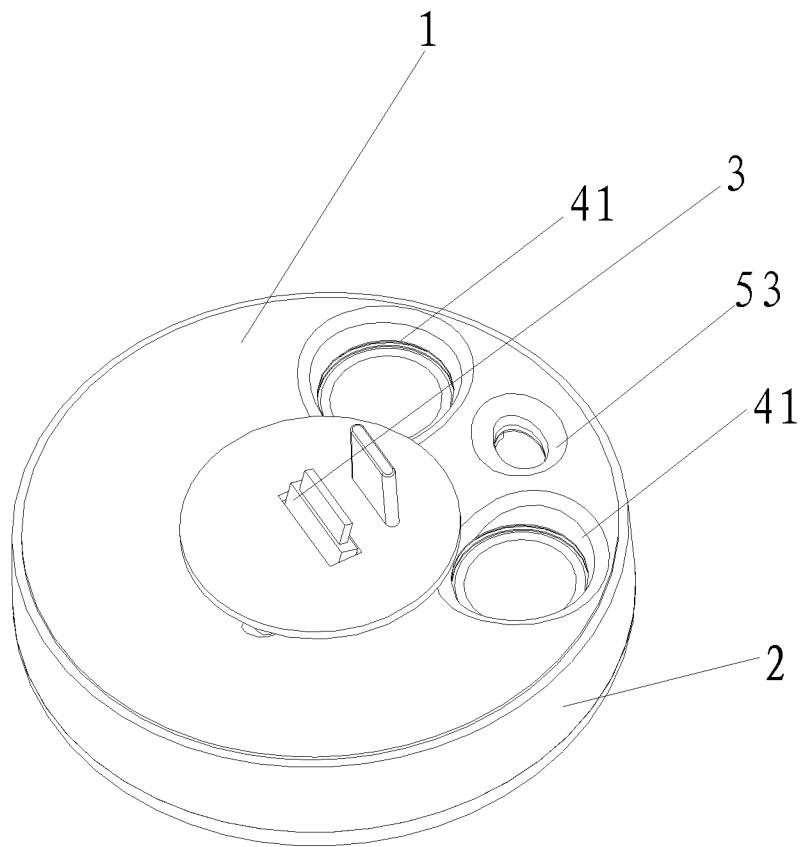


Fig.1

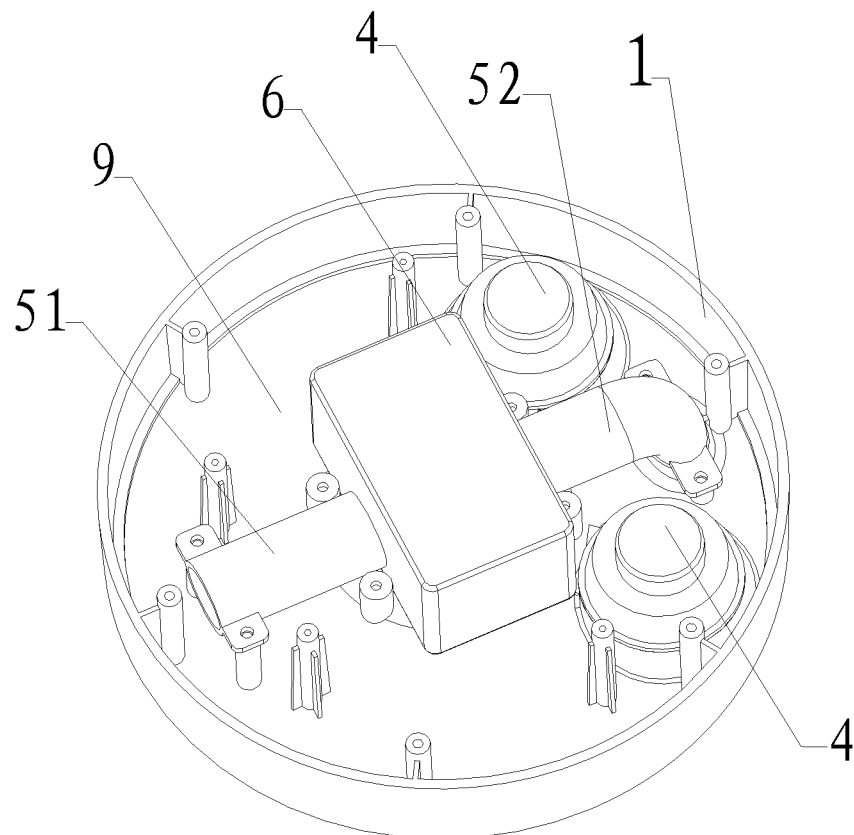


Fig. 2

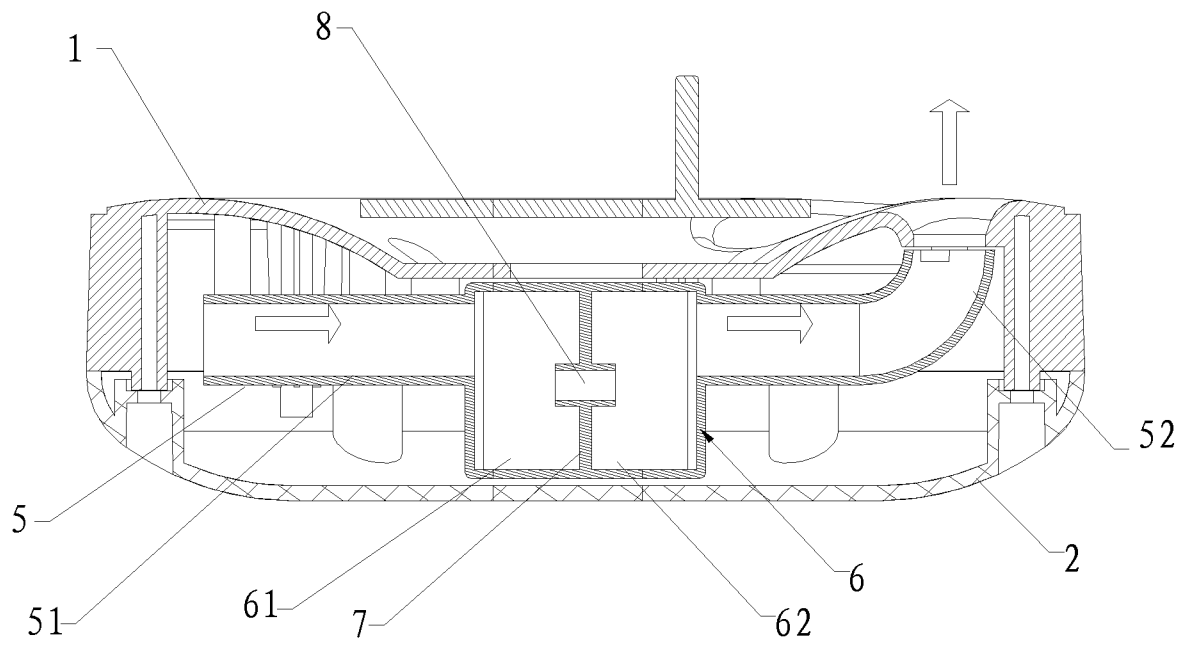


Fig. 3

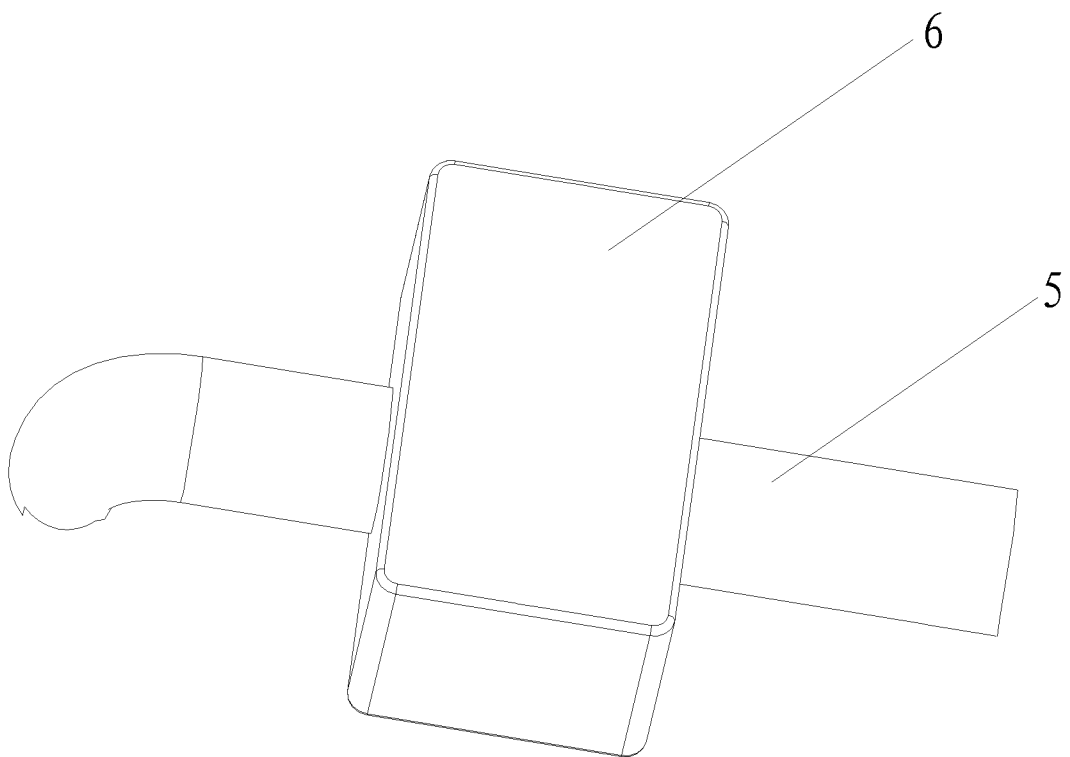


Fig. 4

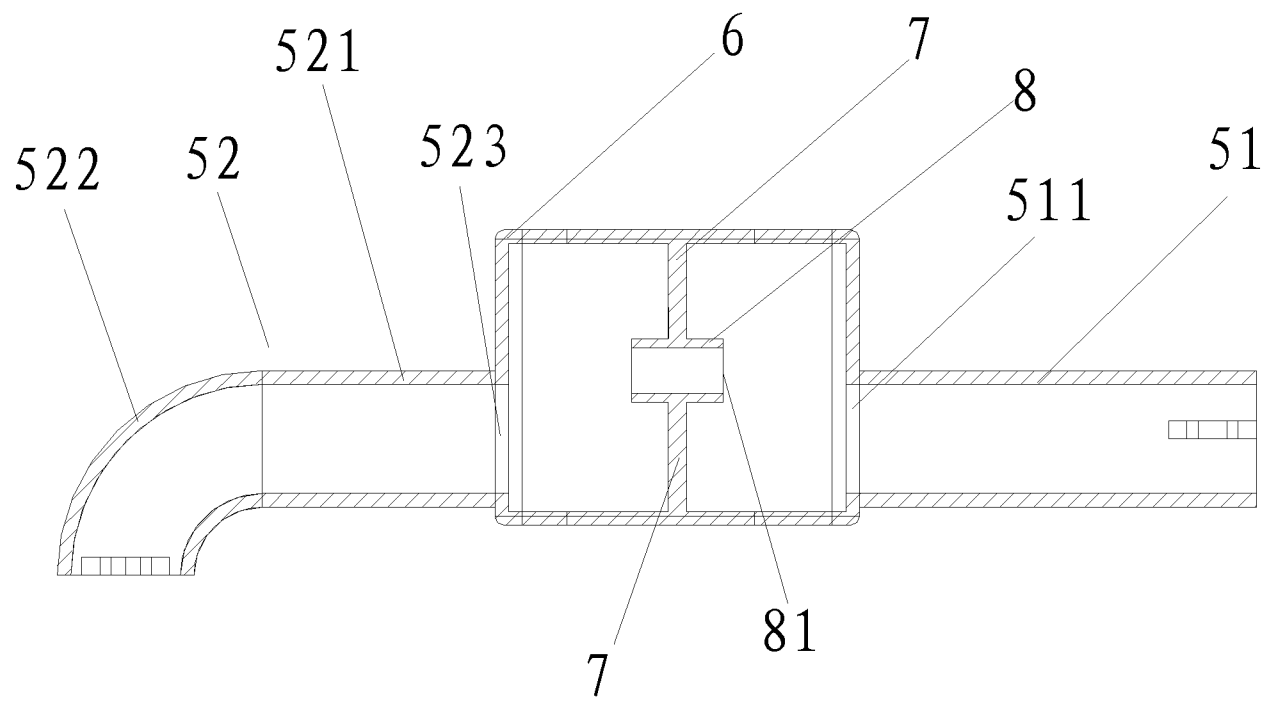


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2013/082421

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H04R 1/-, H04R 25/-

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)

WPI, EPODOC, CNPAT, CNKI: INVERT+, REVERSE, FREQUENCY, PHASE, TUBE, PIPE, CROSS SECTION, SOUND BOX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 202931512 U (BYD CO., LTD.) 08 May 2013 (08.05.2013) pages 2-4 of description, figures 1-5	1-10
Y	US 6002781 A (TAKAYAMA, Satoshi et al.) 14 December 1999 (14.12.1999) column 3 line 47 - column 5 line 55 of description, figures 1-4	1-10
Y	EP 0456416 B1 (MATSUSHITA ELEC. IND. CO., LTD.) 02 August 1995 (02.08.1995) column 1 of description, figure 6	1-10
A	CN 1531835 A (MORKERKEN J. P. et al.) 22 September 2004 (22.09.2004) the whole document	1-10
A	JP 2007-201600 A (MATSUSHITA ELECTRIC WORKS LTD.) 09 August 2007 (09.08.2007) the whole document	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:	“T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
“A” document defining the general state of the art which is not considered to be of particular relevance	“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
“E” earlier application or patent but published on or after the international filing date	“Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
“L” document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)	“&” document member of the same patent family
“O” document referring to an oral disclosure, use, exhibition or other means	
“P” document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 08 October 2013(08.10.2013)	Date of mailing of the international search report 07 Nov. 2013 (07.11.2013)
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer GAO, Yang Telephone No. (86-10) 61648153

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/082421

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 202931512 U	08.05.2013	None	
US 6002781 A	14.12.1999	EP 0613317 A1	31.08.1994
		CA 2116178 A	25.08.1994
		JP H06253383 A	09.09.1994
		DE 69412152 T2	10.12.1998
EP 0456416 B1	02.08.1995	JP H0417497 A	22.01.1992
		DE 69111683 T	04.04.1996
CN 1531835 A	22.09.2004	WO 02093978 A	21.11.2002
		CA 2446972 C	24. 07.2007
		FR 2824990 A	22.11.2002
		EP 1405545 A	07.04.2004
		US 2004173402 A	09.09.2004
		JP 2004529580 A	24.09.2004
		AU 2002302724 A1	25.11.2002
JP 2007-201600 A	09.08.2007	None	

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2013/082421

Continuation: A. CLASSIFICATION OF SUBJECT MATTER

H04R 1/28 (2006.01) i

H04R 25/00 (2006.01) i