(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
19 April 2018 (19.04.2018)

WIPO | PCT

(10) International Publication Number
WO 2018/068534 A1

(51) International Patent Classification:
H01R 13/52 (2006.01) *H04R 1/10* (2006.01)
H01R 43/18 (2006.01)

(21) International Application Number:
PCT/CN2017/090585

(22) International Filing Date:
28 June 2017 (28.06.2017)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201621119915.5 13 October 2016 (13.10.2016) CN
201610894343.6 13 October 2016 (13.10.2016) CN

(71) Applicant: **GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.** [CN/CN]; No. 18, Haibin Road, Wusha, Chang'an, Dongguan, Guangdong 523860 (CN).

(72) Inventors: **LI, Feifei**; No. 18, Haibin Road, Wusha, Chang'an, Dongguan, Guangdong 523860 (CN). **HUANG, Hanjie**; No. 18, Haibin Road, Wusha, Chang'an, Dongguan, Guangdong 523860 (CN).

(74) Agent: **TSINGYIHUA INTELLECTUAL PROPERTY LLC**; Room 301 Trade Building, Zhaolanyuan, Tsinghua University, Qinghuayuan, Haidian District, Beijing 100084 (CN).

(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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, 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, ST, 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:** MOBILE TERMINAL, EARPHONE SOCKET AND METHOD FOR MANUFACTURING EARPHONE SOCKET

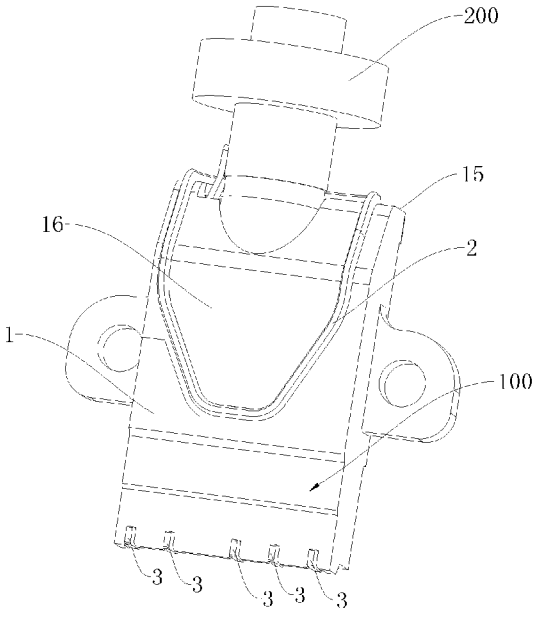


Fig. 2

(57) **Abstract:** The present disclosure provides a mobile terminal, an earphone socket and a method for manufacturing an earphone socket. The earphone socket includes a housing and a sealing member. The housing has an insertion hole surrounded by a peripheral side wall, the peripheral side wall has a first peripheral side wall located at an inner portion of the insertion hole and a second peripheral side wall located at an outer portion of the insertion hole, the first peripheral side wall has a thickness greater than that of the second peripheral side wall, and the second peripheral side wall has an opening port at an outer end of the insertion hole. The sealing member is embedded on an outer surface of the housing, and surrounds a periphery of the opening port, and at least a part of the sealing member extends to the first peripheral side wall.

WO 2018/068534 A1

DESCRIPTION

MOBILE TERMINAL, EARPHONE SOCKET AND METHOD FOR MANUFACTURING EARPHONE SOCKET

FIELD

The present disclosure relates to a technical field of mobile terminals, and particularly, to a mobile terminal, an earphone socket and a method for manufacturing an earphone socket.

BACKGROUND

In the related art, an earphone socket is used as a main adapter for electrical signal transmission in all types of electronic products, specially provided as an audio connector for audio signal output/input and more widely applied in various kinds of audiovisual products. In particular, with the rapid development of a variety of portable electronic products, such as mobile phones, personal digital assistants (PAD), MP3 players, recording pens, and notebook computers, earphones with various sizes have been extensively used in those products in recent years, and hence people are more demanding on waterproofness of the earphone socket. However, in the related art, a waterproof structure of the earphone socket is complex and occupies a large internal space, which is not conductive to a light and thin design of the electronic products.

SUMMARY

The present disclosure aims to solve at least one of the technical problems above in the related art. Accordingly, the present disclosure provides an earphone socket that has advantages of a simple waterproof structure and little space occupation.

The present disclosure further provides a mobile terminal that includes the above earphone socket.

The present disclosure further provides a method for manufacturing an earphone socket, which has advantages of simplifying a machining process and reducing cost.

The earphone socket according to embodiments of present disclosure includes: a housing including an insertion hole surrounded by a peripheral side wall, the peripheral side wall having a first peripheral side wall located at an inner portion of the insertion hole and a second peripheral side wall located at an outer portion of the insertion hole, the first peripheral side wall having a

thickness greater than that of the second peripheral side wall, and the second peripheral side wall having an opening port at an outer end of the insertion hole; and a sealing member embedded on an outer surface of the housing, and surrounding a periphery of the opening port, at least a part of the sealing member extending to the first peripheral side wall.

For the earphone socket according to embodiments of the present disclosure, by configuring the thickness of the first peripheral side wall of the housing to be greater than the thickness of the second peripheral side wall of the housing and configuring the sealing member to surround the periphery of the opening port with at least part of the sealing member extending to the first peripheral side wall, the fluid (e.g. water) outside the mobile terminal can be prevented from entering the mobile terminal along the outer surface of the housing, and hence the circuit board or the like inside the mobile terminal can be protected from damages, thereby improving the operational reliability of the mobile terminal. Furthermore, there is no need to increase the wall thickness of the second peripheral side wall and form the sealing groove in the second peripheral side wall, so as to reduce the overall thickness of the earphone socket and facilitate the light and thin design of the mobile terminal. Moreover, it is possible to enhance the structural strength of the housing, and improve the waterproof and dustproof reliability of the earphone socket.

In some embodiments of the present disclosure, the housing is provided with an embedding groove, and the sealing member includes: an embedded portion embedded in the embedding groove; and a protruding portion connected with the embedded portion and located outside the embedding groove.

In some embodiments of the present disclosure, an end face of a free end of the protruding portion is configured as an arc surface.

In some embodiments of the present disclosure, in a direction from a fixed end of the protruding portion to the free end of the protruding portion, a width of the protruding portion is gradually decreased.

In some embodiments of the present disclosure, the embedding groove is provided with at least one embedding recess therein in communication with the embedding groove, and the sealing member is provided with an embedded protrusion fitted with the at least one embedding recess.

In some embodiments of the present disclosure, the embedding groove is provided with at least one embedding recess therein in communication with the embedding groove, and the at least one embedding recess is provided with a glue portion for bonding the sealing member to the

housing.

In some embodiments of the present disclosure, the sealing member is injection-molded on the housing.

In some embodiments of the present disclosure, the housing includes a first surface constructed by a part of the second peripheral side wall, and a second surface constructed by another part of the second peripheral side wall and a part of the first peripheral side wall; the first surface is adjacent to the second surface; the opening port is located in the first surface; and the sealing member includes: a first segment embedded on the first surface and close to the opening port, a second segment embedded on the second surface, and two connecting segments connected between the first segment and the second segment to constitute a ring sealing member.

In some embodiments of the present disclosure, the first segment and the second segment extend in a common direction, and a length of the first segment is greater than a length of the second segment; the connecting segment includes: a straight segment having a first end connected with the first segment and extending in a direction perpendicular to an extension direction of the first segment; and a transition segment having a first end connected with a second end of the straight segment and a second end connected with the second segment, and gradually inclined towards the central axis in a direction towards an interior of the insertion hole.

In some embodiments of the present disclosure, a part of the second surface close to the first surface is configured as an inclined surface.

In some embodiments of the present disclosure, a part of the second surface close to the first surface is configured as an arc surface.

In some embodiments of the present disclosure, the sealing member is made of silica gel.

In some embodiments of the present disclosure, the housing is provided with a plurality of mounting holes through which pins pass, and the plurality of mounting holes are located in a same side wall of the housing.

The mobile terminal according to embodiments of the present disclosure incudes the above earphone socket.

For the mobile terminal according to embodiments of the present disclosure, by providing the above earphone socket, it is possible to prevent the fluid (e.g. water) outside the mobile terminal from entering the mobile terminal along the outer surface of the housing of the earphone socket, and hence avoid damaging the circuit board or the like inside the mobile terminal, thus enhancing the operational reliability of the mobile terminal. Furthermore, there is no need to increase the wall

thickness of the second peripheral side wall 11 and form the sealing groove in the second peripheral side wall 11, so as to reduce the overall thickness of the earphone socket and facilitate the light and thin design of the mobile terminal. Moreover, it is possible to enhance the structural strength of the housing, and improve the waterproof and dustproof reliability of the earphone socket.

In the method according to embodiments of the present disclosure, an earphone socket includes a housing and a sealing member embedded on an outer surface of the housing; the housing is provided with an insertion hole having an open end; and the sealing member surrounds a periphery of the insertion hole. The method includes actions of: machining an embedding groove in the housing and embedding the sealing member in the embedding groove; forming at least one embedding recess in communication with the embedding groove in the embedding groove; and filling glue in the embedding recess, and coagulating the glue to form a glue portion so as to fix the sealing member on the housing.

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

Fig. 1 is a schematic view of an earphone socket according to an embodiment of the present disclosure.

Fig. 2 is a schematic view of an earphone socket from another angle according to an embodiment of the present disclosure.

Fig. 3 is a schematic view of an earphone socket from still another angle according to an embodiment of the present disclosure.

Fig. 4 is a sectional view of an earphone socket according to an embodiment of the present disclosure.

Fig. 5 is a sectional view of an earphone socket according to an embodiment of the present disclosure.

Fig. 6 is a sectional view of an earphone socket from another angle according to an embodiment of the present disclosure.

Fig. 7 is a schematic view of a sealing member of an earphone socket according to an

embodiment of the present disclosure.

Fig. 8 is a schematic view of a mobile terminal according to an embodiment of the present disclosure.

Reference numerals:

mobile terminal 1000,

housing 1, second peripheral side wall 11, first peripheral side wall 12, insertion hole 13, opening port 131, embedding groove 14, first surface 15, second surface 16, mounting hole 17,

sealing member 2, embedded portion 21, embedded protrusion 211, protruding portion 22, first segment 23, second segment 24, connecting segment 25, straight segment 251, transition segment 252,

pin 3,

earphone plug 200.

DETAILED DESCRIPTION

Reference will be made in detail to embodiments of the present disclosure. Examples of the embodiments are illustrated in the drawings. The embodiments described herein with reference to drawings are explanatory, and used to interpret the present disclosure. The embodiments shall not be construed to limit the present disclosure.

In the specification, it is to be understood that terms such as "central," "length," "width," "thickness," "upper," "lower," "front," "rear," "left," "right," "inner," "outer" and "circumferential" should be construed to refer to the orientations or positions as described or as illustrated in the drawings under discussion. These relative terms are for convenience of description and do not indicate or imply that the device or element referred to must have a particular orientation or be constructed or operated in a particular orientation. Thus, the relative terms shall not be construed to limit the present disclosure.

In addition, terms such as "first" and "second" are used herein for purposes of description and are not intended to indicate or imply relative importance or significance or to imply the number of indicated technical features. Thus, the feature defined with "first" and "second" can comprise one or more of this feature. In the description of the present disclosure, "a plurality of" means two or more than two, unless specified otherwise.

In the present disclosure, unless specified or limited otherwise, the terms "mounted",

"connected", "coupled", "fixed" and the like are used broadly, and can be, for example, fixed connections, detachable connections, or integral connections; can also be mechanical or electrical connections; can also be direct connections or indirect connections via intervening structures; can also be inner communications of two elements, which can be understood by those skilled in the art according to specific situations.

In the following, an earphone socket 100 according to embodiments of the present disclosure will be described with reference to Figs. 1 to 8.

Figs. 1 to 8 illustrate the earphone socket 100 according to embodiments of the present disclosure. The earphone socket includes a housing 1 and a sealing member 2.

In an embodiment, the housing 1 has an insertion hole 13 surrounded by a peripheral side wall, the peripheral side wall has a first peripheral side wall 12 located at an inner portion of the insertion hole and a second peripheral side wall 13 located at an outer portion of the insertion hole. The first peripheral side wall 12 has a wall thickness greater than a wall thickness of the second peripheral side wall 11, and the first peripheral side wall 12 and the second peripheral side wall 11 together define the insertion hole 13, the second peripheral side wall 11 has an opening port 131 at an outer end of the insertion hole. An earphone plug 200 can be inserted into the insertion hole 13. The first peripheral side wall 12 and the second peripheral side wall 11 are arranged along a central axis of the insertion hole 13, and the opening port 131 is located in the second peripheral side wall 11. That is, the first peripheral side wall 12 and the second peripheral side wall 11 are arranged along the central axis of the insertion hole 13, and the opening port 131 is located in the second peripheral side wall 11.

The sealing member 2 is embedded on an outer surface of the housing 1. The sealing member 2 surrounds a periphery of the opening port 131, and at least part of the sealing member 2 extends to the first peripheral side wall 12. The sealing member 2 is embedded on the outer surface of the housing 1 and surrounds the periphery of the opening port 131, such that it is possible to prevent water outside a mobile terminal 1000 from flowing to an interior of the mobile terminal 1000 along the outer surface of the housing 1 of the earphone socket 100, and hence avoid damaging a circuit board or the like inside the mobile terminal 1000. In addition, at least part of the sealing member 2 extends to the first peripheral side wall 12, and since the sealing member 2 is embedded on the housing 1 through a sealing groove (as an embedding groove 14 described below), at least part of the sealing groove can be provided in the first peripheral side wall 12 when at least part of

the sealing member 2 extends to the first peripheral side wall 12; since the thickness of the first peripheral side wall 12 is greater than that of the second peripheral side wall 11, there is no need to increase the wall thickness of the second peripheral side wall 11 and form the sealing groove in the second peripheral side wall 11, so as to reduce an overall thickness of the earphone socket 100 and facilitate a light and thin design of the mobile terminal 1000. Meanwhile, at least part of the sealing groove can be provided in the first peripheral side wall 12, which can enhance a structural strength of the housing 1, improve operational reliability of the mobile terminal 1000, and improve waterproof and dustproof reliability of the earphone socket 100.

Figs. 4 and 5 illustrate the housing 1 including the first peripheral side wall 12 and the second peripheral side wall 11; the first peripheral side wall 12 is connected with the second peripheral side wall 11; the thickness of the first peripheral side wall 12 is greater than that of the second peripheral side wall 11; the first peripheral side wall 12 and the second peripheral side wall 11 together define the insertion hole 13 with the opening port 131 at one end; and the opening port 131 is located in the second peripheral side wall 11. The sealing member 2 is embedded on the outer surface of the housing 1 and surrounds the periphery of the opening port 131, so as to prevent a fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 along the outer surface of the housing 1, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000. In addition, at least part of the sealing member 2 extends to the first peripheral side wall 12, and correspondingly, at least part of the sealing groove extends to the first peripheral side wall 12; since the thickness of the first peripheral side wall 12 is greater than that of the second peripheral side wall 11, there is no need to increase the wall thickness of the second peripheral side wall 11 and form the sealing groove in the second peripheral side wall 11, so as to reduce the overall thickness of the earphone socket 100 and facilitate the light and thin design of the mobile terminal 1000. Meanwhile, it is possible to enhance the structural strength of the housing 1, and improve the waterproof and dustproof reliability of the earphone socket 100.

For the earphone socket 100 according to embodiments of the present disclosure, by configuring the thickness of the first peripheral side wall 12 of the housing 1 to be greater than the thickness of the second peripheral side wall 11 of the housing 1 and configuring the sealing member 2 to extend along the periphery of the opening port 131 with at least part of the sealing member 2 extending to the first peripheral side wall 12, the fluid (e.g. water) outside the mobile terminal 1000 can be prevented from entering the mobile terminal 1000 along the outer surface of

the housing 1, and hence the circuit board or the like inside the mobile terminal 1000 can be protected from damages, thereby improving the operational reliability of the mobile terminal 1000. Furthermore, there is no need to increase the wall thickness of the second peripheral side wall 11 and form the sealing groove in the second peripheral side wall 11, so as to reduce the overall thickness of the earphone socket 100 and facilitate the light and thin design of the mobile terminal 1000. Moreover, it is possible to enhance the structural strength of the housing 1, and improve the waterproof and dustproof reliability of the earphone socket 100.

In some embodiments of the present disclosure, as illustrated in Figs. 4, 5 and 7, the housing 1 is provided with the embedding groove 14, and the sealing member 2 includes an embedded portion 21 and a protruding portion 22. The embedded portion 21 is embedded in the embedding groove 14, so as to realize fixation of the sealing member 2. The protruding portion 22 is connected with the embedded portion 21 and located outside the embedding groove 14. When the sealing member 2 is embedded into the embedding groove 14 and after that the earphone socket 100 is assembled into the mobile terminal 1000, a free end of the protruding portion 22 can be in contact with an outer wall of a component inside the mobile terminal 1000, so as to separate the interior of the mobile terminal 1000 from the exterior thereof. Therefore, it is possible to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 along the outer surface of the housing 1, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000; it is possible to prevent dust from entering the mobile terminal 1000 along the outer surface of the housing 1, and hence improve the waterproof and dustproof reliability of the earphone socket 100, thereby enhancing the operational reliability of the mobile terminal 1000.

In some embodiments, as illustrated in Figs. 4 and 5, an end face of the free end of the protruding portion 22 has an arc surface. As illustrated in Figs. 4 and 5, the arc surface of the end face of the free end of the protruding portion 22 protrudes in a direction away from the embedded portion 21, such that when the end face of the free end of the protruding portion 22 is in contact with the outer surface of the component inside the mobile terminal 1000 to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000, the reliability of contact fitting between the protruding portion 22 and the outer surface of the component inside the mobile terminal 1000 can be improved, and hence prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 through a gap between the protruding

portion 22 and the outer surface of the component inside the mobile terminal 1000, thereby avoiding damaging the circuit board or the like inside the mobile terminal 1000, so as to improve the operational reliability of the mobile terminal 1000.

In at least one embodiment, as illustrated in Figs. 4 and 5, in a direction from a fixed end of the protruding portion 22 to the free end of the protruding portion 22, a width of the protruding portion 22 is gradually decreased. When the end face of the free end of the protruding portion 22 is in contact with the outer surface of the component inside the mobile terminal 1000 to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000, it is possible to improve the reliability of contact fitting between the protruding portion 22 and the outer surface of the component inside the mobile terminal 1000, and hence prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 through the gap between the protruding portion 22 and the outer surface of the component inside the mobile terminal 1000, thereby avoiding damaging the circuit board or the like inside the mobile terminal 1000, so as to improve the operational reliability of the mobile terminal 1000.

As illustrated in Fig. 7, the embedding groove 14 is provided with at least one embedding recess therein in communication with the embedding groove 14, and the sealing member 2 is provided with an embedded protrusion 211 fitted with the embedding recess. Therefore, it is possible to increase a mating area between the sealing member 2 and the outer surface of the housing 1, enhance reliability of fixing the sealing member 2 on the outer surface of the housing 1, and hence improve the waterproof and dustproof reliability of the earphone socket 100. For instance, in an example illustrated in Fig. 7, the embedded portion 21 is provided with a plurality of embedded protrusions 211; the plurality of embedded protrusions 211 are spaced apart in a circumferential direction of the sealing member 2, connected with the embedded portion 21, and located at a side of the embedded portion 21 away from the opening port 131. Therefore, the plurality of embedded protrusions 211 can be embedded on the outer surface of the housing 1, thus enhancing the reliability of fitting between the embedded portion 21 and the outer surface of the housing 1 and hence enhancing the reliability of fixing the sealing member 2 on the outer surface of the housing 1, so as to improve the waterproof and dustproof reliability of the earphone socket 100. When the earphone socket 100 is machined, the sealing member 2 can be injection-molded into the embedding groove 14 together with the embedded protrusion 211.

In some embodiments of the present invention, the embedding groove 14 is provided with at

least one embedding recess therein in communication with the embedding groove 14, and the embedding recess is provided with a glue portion therein for bonding the sealing member 2 to the housing 1. The sealing member 2 and the housing 1 can be two individually fabricated structures; after they are fabricated individually, the sealing member 2 can be placed into the embedding groove 14 in the housing 1; then the embedding groove is filled with glue, and the glue is coagulated in the embedding groove to form the glue portion. The glue portion can fix the sealing member 2 in the embedding groove 14, which enhances the reliability of fixing the sealing member 2 on the outer surface of the housing 1, and improves the waterproof and dustproof reliability of the earphone socket 100. In addition, it is possible to simplify a machining process and reduce cost by fabricating the sealing member 2 and the housing 1 individually and assembling them together.

In some embodiments of the present disclosure, the sealing member 2 is injection-molded on the housing 1. Thus, the sealing member 2 can be directly injection-molded on the housing 1, and a process assembling the sealing member 2 and the housing 1 can be simplified.

In some embodiments of the present disclosure, as illustrated in Figs. 2 and 5, the housing 1 has a first surface 15 including a surface of a part of the second peripheral side wall 11, and a second surface 16 including a surface of another part of the second peripheral side wall 11 and a surface of a part of the first peripheral side wall 12. The first surface 15 is adjacent to the second surface 16, and the opening port 131 is located in the first surface 15 to facilitate insertion of the earphone plug 200 into the insertion hole 13. The sealing member 2 includes a first segment 23, a second segment 24 and two connecting segments 25. The first segment 23 is embedded on the first surface 15 and is close to the opening port 131; the second segment 24 is embedded on the second surface 16; the two connecting segments 25 are connected between the first segment 23 and the second segment 24 to constitute a ring sealing member 2. The structure of the sealing member 2 becomes more flexible by designing the sealing member 2 in a form of multi-segment connection, and the sealing member 2 can be designed reasonably according to the shape of the outer surface of the housing 1, thus achieving a better waterproof and dustproof effect.

Further, as illustrated in Fig. 2, the first segment 23 and the second segment 24 extend in the same direction, so as to facilitate the machining of the embedding process 14, simplify the structure and machining process of the housing 1, shorten a production cycle and reduce a production cost. A length of the first segment 23 is greater than a length of the second segment 24.

The first segment 23 is embedded on the first surface 15 and located at one side of the opening port 131, and the second segment 24 is embedded on the second surface 16 and located at the other side of the opening port 131. The length of the first segment 23 is greater than that of the second segment 24, and correspondingly, a first part of the embedding groove 14 for containing the first segment 23 has a length greater than a length of a second part of the embedding groove 14 for containing the second segment 24, such that the opening port 131 is surrounded by the sealing member 2 to achieve waterproof and dustproof characteristics of the earphone socket 100, and the length of the second part of the embedding groove 14 for containing the second segment 24 can be reduced to enhance the structural strength of the housing 1, thereby improving the waterproof and dustproof reliability of the earphone socket 100.

As illustrated in Figs. 2 and 7, each connecting segment 25 includes a straight segment 251 and a transition segment 252. A first end of the straight segment 251 is connected with the first segment 23, and an extension direction of the straight segment 251 is perpendicular to an extension direction of the first segment 23. Since the straight segment 251 is close to the opening port 131, when the extension direction of the straight segment 251 is configured to be perpendicular to that of the first segment 23, a structure of a third part of the embedding groove 14 for containing the straight segment 251 can be simplified, thus simplifying the structure and machining process of the housing 1, shortening the production cycle and reducing the production cost. Moreover, the first segment 23 and the straight segment 251 can define enough space to surround the opening port 131, so as to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000.

A first end of the transition segment 252 is connected with a second end of the straight segment 251, and a second end of the transition segment 252 is connected with the second segment 24. In a direction towards an interior of the insertion hole 13, the transition segment 252 is gradually inclined towards the central axis of the insertion hole 13. Thus, it is convenient to connect the transition segment 252 with the second segment 24 to shape the sealing member 2 into a ring, thereby realizing a waterproof and dustproof function of the sealing member 2. When the earphone socket 100 is mounted to the mobile terminal 1000, the sealing member 2 can prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000, so as to

improve the operational reliability of the mobile terminal 1000.

In some embodiments of the present disclosure, as illustrated in Fig. 2, a part of the second surface 16 close to the first surface 15 is formed as an inclined surface, so as to adapt to an arc design of a housing of the mobile terminal 1000 and the like to make the appearance of the mobile terminal 1000 and the like more beautiful. Certainly, the part of the second surface 16 close to the first surface 15 can also be formed as an arc surface, so as to adapt to an arc design of the housing of the mobile terminal 1000 and the like to make the appearance of the mobile terminal 1000 and the like more beautiful.

In some embodiments of the present disclosure, the sealing member 2 is made of silica gel. Silica gel is a high-active adsorbent material and an amorphous substance. Silica gel does not react with any other substance except strong alkali and hydrofluoric acid, and dissolve in water and any solvents. Silica gel is non-toxic, odorless and chemically stable. Silica gel has the advantages of high adsorption performance, good thermal stability, stable chemical properties, high mechanical strength and so on. Thus, the reliability of the sealing member 2 can be enhanced, and the waterproof and dustproof effect of the sealing member can be improved.

In some embodiments of the present disclosure, as illustrated in Figs. 3 and 6, the housing 1 is provided with a plurality of mounting holes 17 through which pins 3 pass. The plurality of mounting holes 17 are located in a common side wall of the housing 1. A first end of each pin 3 located in the insertion hole 13 can be connected with the earphone plug 200, and a second end of each pin 3 extending out of the mounting hole 17 can be electrically connected with the circuit board, so as to realize an electrical connection between the earphone plug 200 and the circuit board. In addition, the plurality of mounting holes 17 are located in the same side wall of the housing 1, such that the pins 3 can extend out from the same side wall of the housing 1. Thus, it is convenient to save an internal space of the mobile terminal 1000, optimize a layout of components inside the mobile terminal 1000, and facilitate the electrical connection between the pins 3 and the circuit board.

An earphone socket 100 according to a specific embodiment of the present disclosure will be described with reference to Figs. 1 to 8. The following description is only illustrative and intended to interpret the present disclosure but shall not be construed to limit the present disclosure.

As illustrated in Figs. 1 to 8, the earphone socket 100 according to the embodiment of the present disclosure includes the housing 1 and the sealing member 2.

In an embodiment, the housing 1 includes the second peripheral side wall 11 and the first peripheral side wall 12. The wall thickness of the first peripheral side wall 12 is greater than that of the second peripheral side wall 11, and the first peripheral side wall 12 and the second peripheral side wall 11 together define the insertion hole 13 with the opening port 131 at one end. The first peripheral side wall 12 and the second peripheral side wall 11 are arranged along the central axis of the insertion hole 13, and the opening port 131 is located in the second peripheral side wall 11. The sealing member 2 is embedded on the outer surface of the housing 1. The sealing member 2 surrounds the periphery of the opening port 131, and at least part of the sealing member 2 extends to the first peripheral side wall 12. Therefore, when the earphone socket 100 is assembled to the mobile terminal 1000, it is possible to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 along the outer surface of the housing 1, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000, thereby improving the operational reliability of the mobile terminal 1000. Furthermore, there is no need to increase the wall thickness of the second peripheral side wall 11 and form the sealing groove in the second peripheral side wall 11, so as to reduce the overall thickness of the earphone socket 100 and facilitate the light and thin design of the mobile terminal 1000. Moreover, it is possible enhance the structural strength of the housing 1, and improve the waterproof and dustproof reliability of the earphone socket 100.

As illustrated in Figs. 4 and 5, the housing 1 is provided with the embedding groove 14. The sealing member 2 is made of silica gel and includes the embedded portion 21 and the protruding portion 22. The embedded portion 21 is embedded into the embedding groove 14 to fix the sealing member 2. The protruding portion 22 is connected with the embedded portion 21 and located outside the embedding groove 14. When the earphone socket 100 is assembled to the mobile terminal 1000, the embedded protrusion 211 can separate the interior of the mobile terminal 1000 from the exterior thereof, so as to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 along the outer surface of the housing 1 of the earphone socket 100, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000. In addition, the embedding groove 14 is provided with at least one embedding recess therein in communication with the embedding groove 14, and the embedded portion 21 is provided with at least one embedded protrusion 211 fitted with the at least one embedding recess, so as to increase the mating area between the sealing member 2 and the outer surface of the housing 1, thereby

improving an effect of fixing the sealing member 2. The embedded protrusion 211 is provided at the side of the embedded portion 21 away from the opening port 131, and the shape of the embedded protrusion 211 is not limited herein. In an embodiment the embedded protrusion 211 is injection-molded on the housing.

As illustrated in Figs. 4 and 5, in the direction from the fixed end of the protruding portion 22 to the free end thereof, the width of the protruding portion 22 is gradually decreased. The end face of the free end of the protruding portion 22 is formed as an arc surface. Therefore, it is possible to increase a fitting degree between the protruding portion 22 and the outer surface of the component inside the mobile terminal 1000, thereby improving the waterproof and dustproof effect of the sealing member 2.

As illustrated in Figs. 2 and 5, the housing 1 has the first surface 15 including a surface of a part of the second peripheral side wall 11, and the second surface 16 including a surface of another part of the second peripheral side wall 11 and a part of the first peripheral side wall 12. The first surface 15 is adjacent to the second surface 16, and the opening port 131 is located in the first surface 15. The part of the second surface 16 close to the first surface 15 is formed as an inclined surface. The sealing member 2 includes the first segment 23, the second segment 24 and two connecting segments 25. The first segment 23 is embedded on the first surface 15 and is close to the opening port 131; the second segment 24 is embedded on the second surface 16; the two connecting segments 25 are connected between the first segment 23 and the second segment 24 to constitute the ring sealing member 2.

The first segment 23 and the second segment 24 extend in the same direction. The length of the first segment 23 is greater than that of the second segment 24, and correspondingly, the length of the first part of the embedding groove 14 for containing the first segment 23 is greater than that of the second part of the embedding groove 14 for containing the second segment 24. Thus, it is possible to not only simplify the structure of the housing 1, but also reduce the length of the second part of the embedding groove 14 for containing the second segment 24, thereby further improving the structural strength of the housing 1. Each connecting segment 25 includes the straight segment 251 and the transition segment 252. The first end of the straight segment 251 is connected with the first segment 23, and the extension direction of the straight segment 251 is perpendicular to the extension direction of the first segment 23. The first end of the transition segment 252 is connected with the second end of the straight segment 251, and the second end of

the transition segment 252 is connected with the second segment 24. In the direction towards the interior of the insertion hole 13, the transition segment 252 is gradually inclined towards the central axis of the insertion hole 12.

As illustrated in Figs. 3 and 6, the housing 1 is provided with a plurality of mounting holes 17 through which the pins 3 pass. The plurality of mounting holes 17 are located in the common side wall of the housing 1. The first end of each pin 3 located in the insertion hole 13 can be connected with the earphone plug 200, and the second end thereof extending out of the mounting hole 17 can be electrically connected with the circuit board, so as to realize the electrical connection between the earphone plug 200 and the circuit board. In addition, the plurality of mounting holes 17 are located in the same side wall of the housing 1, such that the pins 3 can extend out from the same side wall of the housing 1. Thus, it is convenient to save the internal space of the mobile terminal 1000, optimize the layout of components inside the mobile terminal 1000, and facilitate the electrical connection between the pins 3 and the circuit board.

In the following, a method for manufacturing an earphone socket 100 according to embodiments of the present disclosure will be described with reference to Figs. 1 to 8.

The earphone socket 100 includes a housing 1 and a sealing member 2 embedded on the outer surface of the housing 1. The housing 1 is provided with an insertion hole 13 having an open end. The sealing member 2 surrounds a periphery of the insertion hole 13. The method includes the following actions. In S10, an embedding groove 14 is machined in the housing and the sealing member 2 is embedded on the embedding groove 14; in S20, at least one embedding recess is made in the embedding groove 14, and the at least one embedding recess is in communication with the embedding groove 14; and in S30, the glue is filled in the embedding recess, and the glue is coagulated to form a glue portion, so as to fix the sealing member 2 on the housing 1.

With the method for manufacturing the earphone socket 100 according to embodiments of the present disclosure, the housing 1 and the sealing member 2 can be machined individually, and then the sealing member 2 is embedded in the embedding groove 14. The embedding recess in the housing 1 is filled with the glue to form the glue portion. The sealing member 2 is fixed on the outer surface of the housing 1 through the glue portion. This method can simplify the machining process of the housing 1 and the sealing member 2, thus reducing the cost.

A method for manufacturing the earphone socket 100 according to a specific embodiment of the present disclosure will be described with reference to Figs. 1 to 8. It should be understood that

the following description is only illustrative and intended to interpret the present disclosure but shall not be construed to limit the present disclosure.

The earphone socket 100 includes the housing 1 and the sealing member 2. The housing 1 includes a second peripheral side wall 11 and a first peripheral side wall 12. The wall thickness of the first peripheral side wall 12 is greater than that of the second peripheral side wall 11, and the first peripheral side wall 12 and the second peripheral side wall 11 together define an insertion hole 13 with an opening port 131 at one end. The first peripheral side wall 12 and the second peripheral side wall 11 are arranged along a central axis of the insertion hole 13, and the opening port 131 is located in the second peripheral side wall 11. The sealing member 2 is embedded on an outer surface of the housing 1. The sealing member 2 surrounds the periphery of the opening port 131, and at least part of the sealing member 2 extends to the first peripheral side wall 12.

As illustrated in Figs. 4 and 5, the housing 1 is provided with the embedding groove 14. The sealing member 2 includes an embedded portion 21 and a protruding portion 22. The embedded portion 21 is embedded into the embedding groove 14. The protruding portion 22 is connected with the embedded portion 21 and located outside the embedding groove 14. The embedding groove 14 is provided with at least one embedding recess therein in communication with the embedding groove 14.

When the sealing member 2 and the housing 1 are manufactured, the embedded portion 21 of the sealing member 2 is first embedded in the embedding groove 14; then the glue is filled in the embedding recess; the glue is coagulated to form the glue portion; the glue portion can fix the sealing member 2 on the housing 1. This method can simplify the machining process of the housing 1 and the sealing member 2, thus reducing the cost.

A mobile terminal 1000 according to embodiments of the present disclosure will be described with reference to Figs. 1 to 8.

The mobile terminal 1000 according to embodiments of the present disclosure includes the earphone socket 100. By providing the earphone socket 100, it is possible to prevent the fluid (e.g. water) outside the mobile terminal 1000 from entering the mobile terminal 1000 along the outer surface of the housing 1 of the earphone socket 100, and hence avoid damaging the circuit board or the like inside the mobile terminal 1000, thus enhancing the operational reliability of the mobile terminal 1000. Furthermore, there is no need to increase the wall thickness of the second peripheral side wall 11 and form the sealing groove in the second peripheral side wall 11, so as to

reduce the overall thickness of the earphone socket 100 and facilitate the light and thin design of the mobile terminal 1000. Moreover, it is possible enhance the structural strength of the housing 1, and improve the waterproof and dustproof reliability of the earphone socket 100.

In some embodiments of the present disclosure, the mobile terminal 1000 can be a mobile phone, a tablet computer, a notebook computer and so on.

Reference throughout this specification to "an embodiment", "some embodiments", "an example", "a specific example" or "some examples" 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 above phrases throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics can be combined in any suitable manner in one or more embodiments or examples. Moreover, different embodiments or examples as well as the features in the different embodiments or examples described in the specification can be combined or united by those skilled in the related art in the absence of contradictory circumstances.

Although embodiments of the present disclosure have been shown and illustrated, it shall be understood by those skilled in the art that the above embodiments are explanatory and cannot be construed to limit the present disclosure, and changes, modifications, alternatives and variants can be made in the embodiments without departing from the scope of the present disclosure.

CLAIMS

What is claimed is:

1. An earphone socket (100), comprising:

a housing (1) having an insertion hole (13) surrounded by a peripheral side wall, the peripheral side wall having a first peripheral side wall (11) located at an inner portion of the insertion hole and a second peripheral side wall (12) located at an outer portion of the insertion hole (13),

the first peripheral side wall (11) having a thickness greater than that of the second peripheral side wall (12), and the second peripheral side wall (12) having an opening port (131) at an outer end of the insertion hole (131); and

a sealing member (2) embedded on an outer surface of the housing (1), and surrounding a periphery of the opening port (131), and at least a part of the sealing member (2) extending to the first peripheral side wall (11).

2. The earphone socket (100) according to claim 1, wherein the housing (1) is provided with an embedding groove (14), and the sealing member (2) comprises:

an embedded portion (21) embedded in the embedding groove (14); and

a protruding portion (22) connected with the embedded portion (21) and located outside the embedding groove (14).

3. The earphone socket (100) according to claim 2, wherein an end face of a free end of the protruding portion (22) is configured as an arc surface.

4. The earphone socket (100) according to claim 2, wherein in a direction from a fixed end of the protruding portion (22) to the free end of the protruding portion (22), a width of the protruding portion (22) is gradually decreased.

5. The earphone socket (100) according to claim 2, wherein the embedding groove (14) is provided with at least one embedding recess therein in communication with the embedding groove (14), and the sealing member (2) is provided with an embedded protrusion (21) fitted with the at least one embedding recess.

6. The earphone socket (100) according to claim 2, wherein the embedding groove (14) is provided with at least one embedding recess therein in communication with the embedding groove (14), and the at least one embedding recess is provided with a glue portion for bonding the sealing

member (2) to the housing (1).

7. The earphone socket (100) according to claim 1, wherein the sealing member (2) is injection-molded on the housing (1).

8. The earphone socket (100) according to claim 1, wherein the housing (1) comprises a first surface constructed by a part of the second peripheral side wall (12), and a second surface constructed by another part of the second peripheral side wall (12) and a part of the first peripheral side wall (11); the first surface is adjacent to the second surface; the opening port (131) is located in the first surface; and the sealing member (2) comprises:

a first segment (23) embedded on the first surface and close to the opening port (131);

a second segment (24) embedded on the second surface; and

two connecting segments (25) connected between the first segment (23) and the second segment (24) to constitute a ring sealing member (2).

9. The earphone socket (100) according to claim 8, wherein the first segment (23) and the second segment (24) extend in a common direction, the first segment (23) has a length greater than a length of the second segment (24); and

the connecting segment (25) comprises:

a straight segment (251) having a first end connected with the first segment (23) and extending in a direction perpendicular to an extension direction of the first segment (23); and

a transition segment (252) having a first end connected with a second end of the straight segment (251) and a second end connected with the second segment (24), and gradually inclined towards the central axis in a direction towards an interior of the insertion hole (13).

10. The earphone socket (100) according to claim 8, wherein a part of the second surface close to the first surface is configured as an inclined surface.

11. The earphone socket (100) according to claim 8, wherein a part of the second surface close to the first surface is configured as an arc surface.

12. The earphone socket (100) according to claim 1, wherein the sealing member (2) is made of silica gel.

13. The earphone socket (100) according to any one of claims 1 to 12, wherein the housing (1) is provided with a plurality of mounting holes (17) through which pins (3) pass, and the plurality of mounting holes (17) are located in a same side wall of the housing (1).

14. A mobile terminal (1000), comprising an earphone socket (100) according to any one of claims 1 to 13.

15. A method for manufacturing an earphone socket (100), wherein the earphone socket (100) comprises a housing (1) and a sealing member (2) embedded on an outer surface of the housing (1); the housing (1) is provided with an insertion hole (13) having an open end; the sealing member (2) surrounds a periphery of the insertion hole (13); and the method comprises actions of:

machining an embedding groove (14) in the housing (1) and embedding the sealing member (2) in the embedding groove;

forming at least one embedding recess in communication with the embedding groove (14) in the embedding groove (14); and

filling glue in the embedding recess, and coagulating the glue to form a glue portion so as to fix the sealing member (2) on the housing (1).

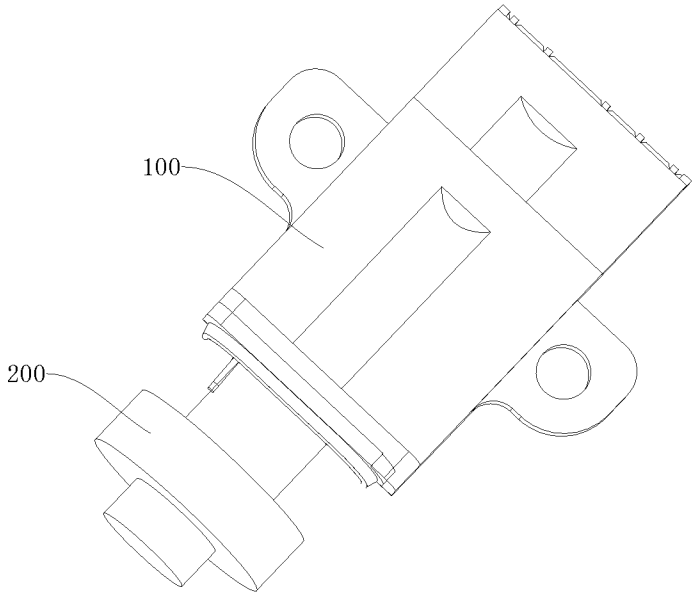


Fig. 1

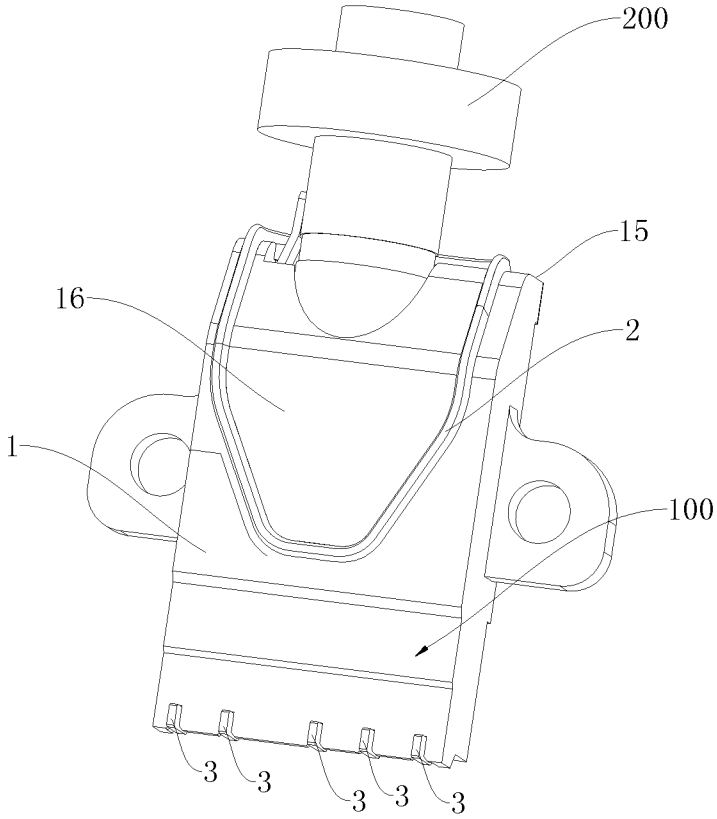


Fig. 2

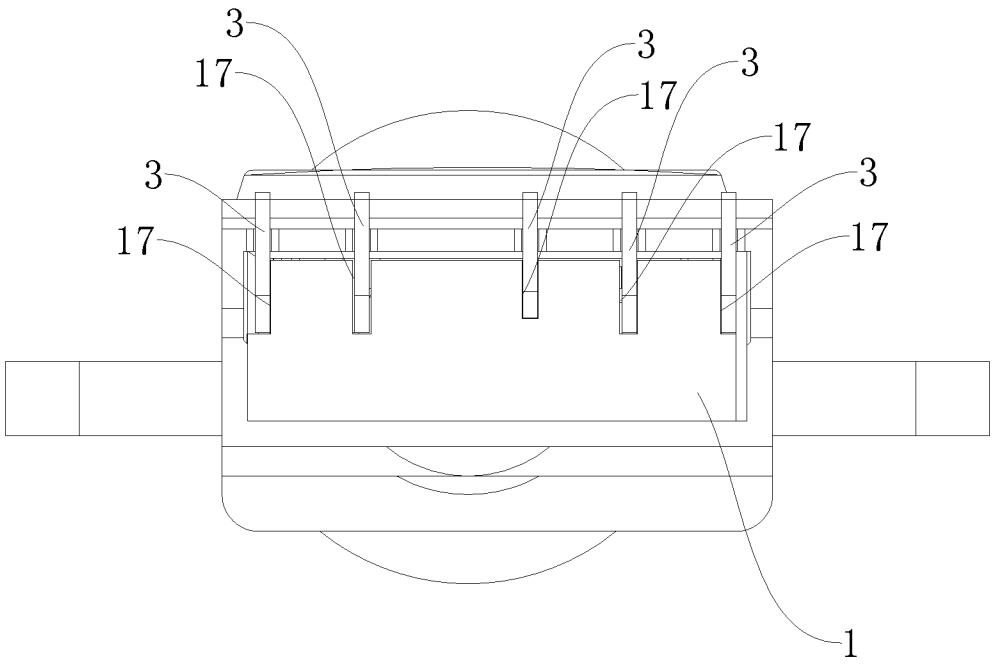


Fig. 3

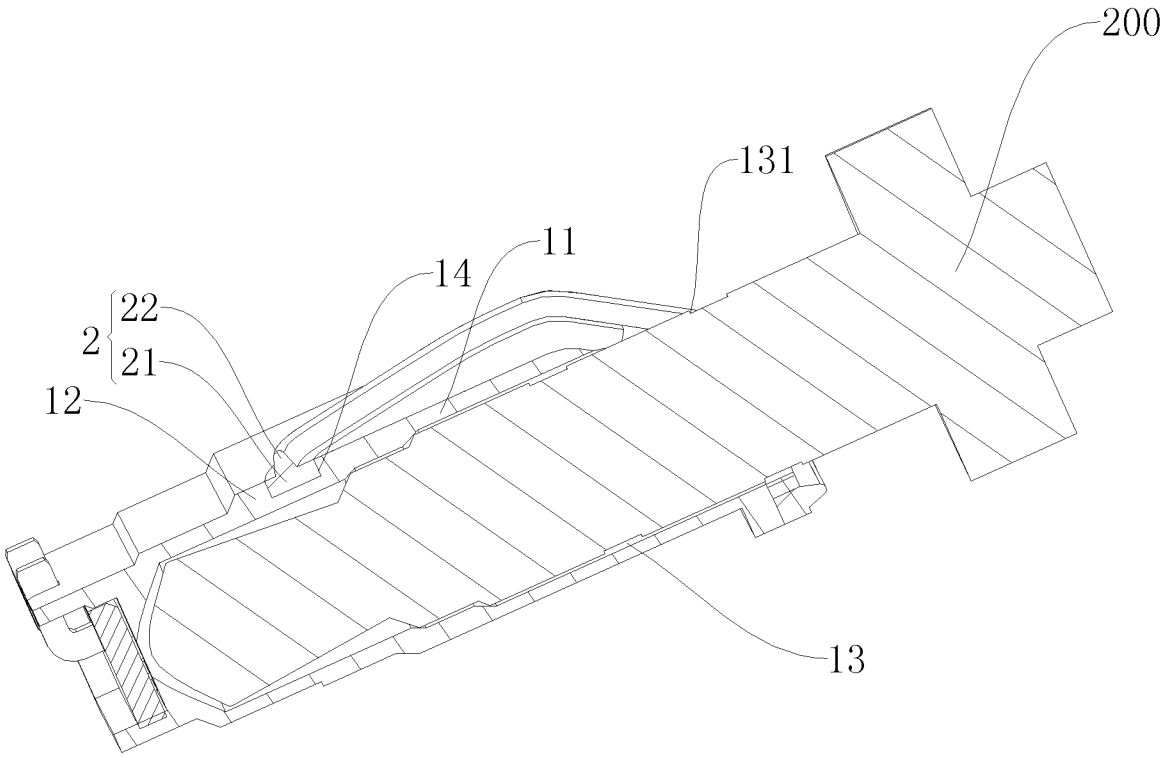


Fig. 4

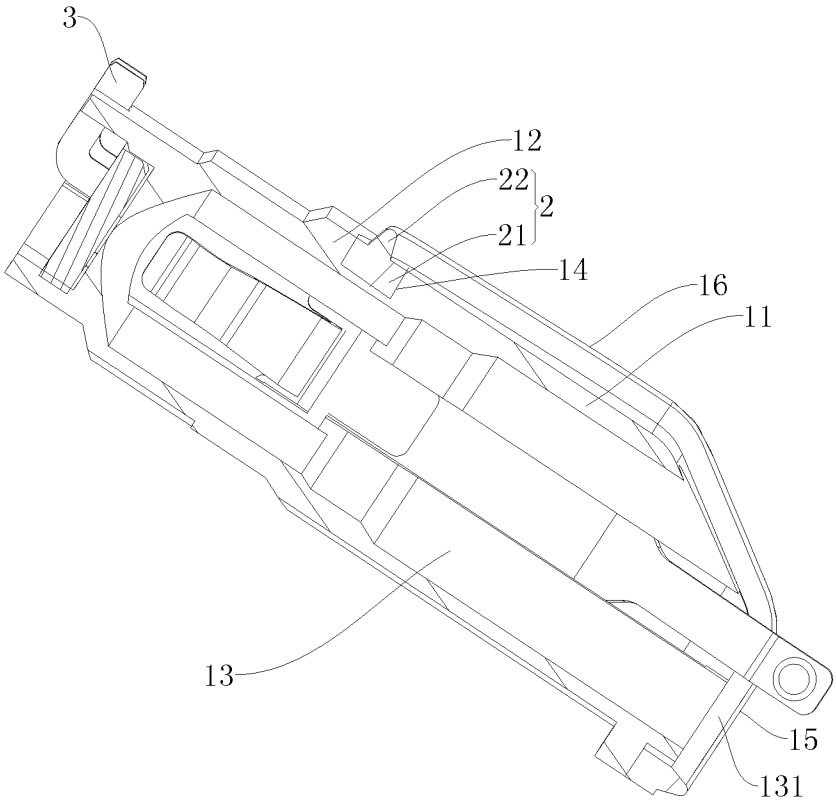


Fig. 5

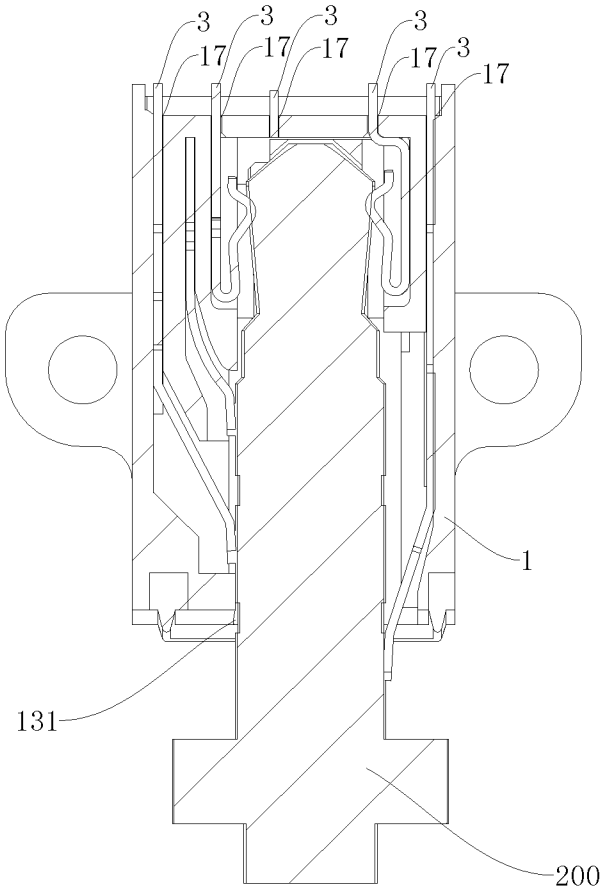


Fig. 6

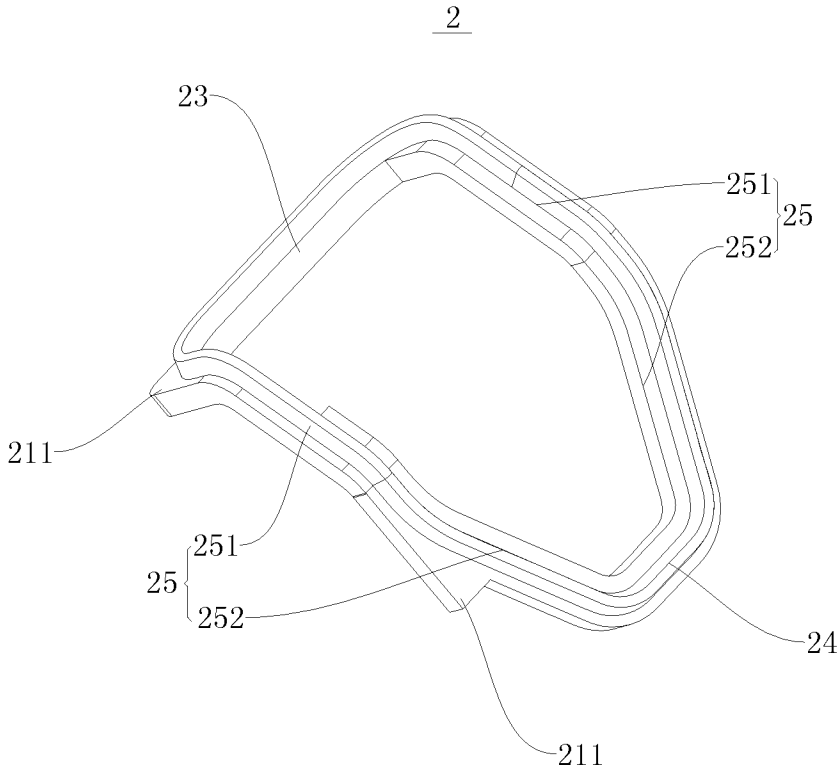


Fig. 7

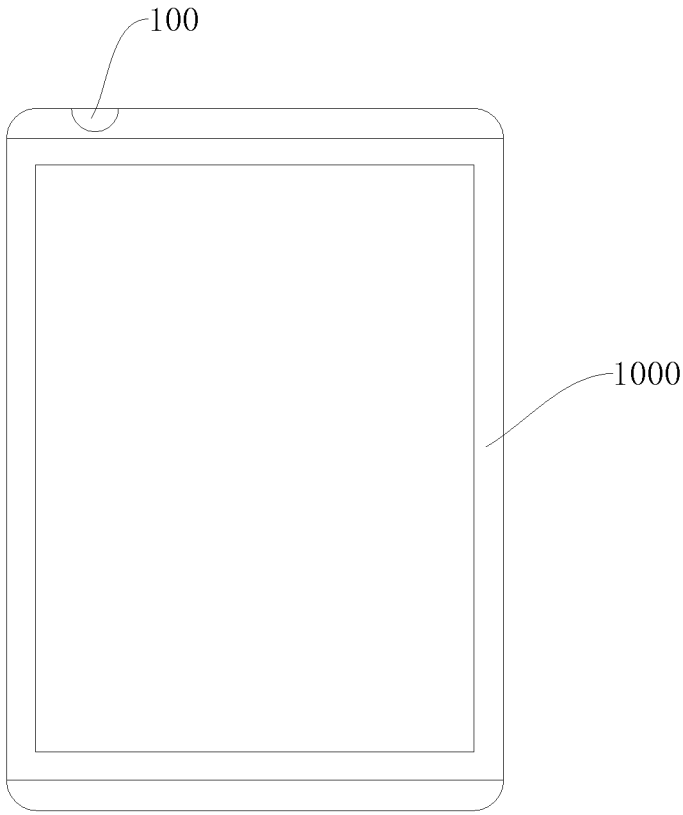


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/090585

A. CLASSIFICATION OF SUBJECT MATTER

H01R 13/52(2006.01)i; H01R 43/18(2006.01)i; H04R 1/10(2006.01)i

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)

H01R; H04R

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)

EPODOC,WPI,CNPAT,CNKI,GOOGLE:earphone, headset, ear jack, insertion hole, waterproof, dustproof, mobile, terminal, shell

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 106329212 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 11 January 2017 (2017-01-11) claims 1-15	1-15
PX	CN 206117959 U (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 19 April 2017 (2017-04-19) claims 1-14, description paragraphs [0077]-[0078]	1-15
PX	CN 106505358 A (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 15 March 2017 (2017-03-15) description paragraphs [0077]-[0078], figures 1-11	1-15
PX	CN 206117958 U (GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD.) 19 April 2017 (2017-04-19) description paragraphs [0062]-[0063], [0081]-[0082], figures 1-11	1-15
X	US 2014273617 A1 (SAMSUNG ELECTRONICS CO., LTD.) 18 September 2014 (2014-09-18) abstract, description paragraphs [0056]-[0071], figures 5-10	1-15

☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"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)

"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

"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

"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

"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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 August 2017	**28 September 2017**
Name and mailing address of the ISA/CN **STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA** **6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer **MEN,Le** Telephone No. **(86-10)62413334**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2017/090585

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 104882718 A (DONGGUAN GUANGYE ELECTRONICS CO., LTD.) 02 September 2015 (2015-09-02) the whole document	1-15
A	CN 205004521 U (SHENZHEN JINSER ELECTRONICS CO., LTD.) 27 January 2016 (2016-01-27) the whole document	1-15

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2017/090585

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	106329212	A	11 January 2017	None			
CN	206117959	U	19 April 2017	None			
CN	106505358	A	15 March 2017	None			
CN	206117958	U	19 April 2017	None			
US	2014273617	A1	18 September 2014	AU	2014201514	A1	02 October 2014
				EP	2779319	A1	17 September 2014
				CN	104051897	A	17 September 2014
				KR	20140113789	A	25 September 2014
				US	2014267025	A1	18 September 2014
CN	104882718	A	02 September 2015	None			
CN	205004521	U	27 January 2016	None			