Oversættelse af europæisk patentskrift

Int.Cl.: H 04 R 1/02 (2006.01) H 04 R 5/02 (2006.01)

Oversættelsen bekendtgjort den: 2015-08-31

Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: 2015-07-01

Europæisk ansøgning nr.: 05108549.6

Europæisk indleveringsdag: 2005-09-16

Den europæiske ansøgnings publiceringsdag: 2006-03-29

Prioritet: 2004-09-22 JP 2004275139

Designerede stater: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

Patenthaver: YAMAHA CORPORATION, 10-1 Nakazawa-cho, Naka-ku, Hamamatsu-shi, Shizuoka-ken, Japan

Opfinder: Tashiro, Takahiro, Yamaha Corporation, 10-1, Nakazawa-cho, Hamamatsu-shi, Shizuoka 430-8650, Japan

Fuldmægtig i Danmark: PATRADE A/S, Fredens Torv 3A, 8000 Århus C, Danmark

Benævnelse: Højttalerapparat med kombineret kredsløbsenhed

Fremdragne publikationer:
US-A- 3 023 274
US-A- 3 052 758
US-A- 3 183 305
DESCRIPTION

[0001] The present invention relates to a circuit-unit-combined speaker apparatus comprising a speaker box body having a speaker secured thereto, and a circuit unit, including a mixer device, amplifier device etc., for connection to the speaker.

[0002] Speaker apparatus including an amplifier provided within a speaker box have been conventionally known, for example, from Japanese Patent Application Laid-open Publication No. 2004-120424. However, the conventionally-known speaker apparatus are not equipped with a function for operating the amplifier. There have also been known speakers, such as guitar amplifiers, which have a function for setting parameters, such as sound volume and sound quality parameters.

[0003] Mixers are often used in cases where voices or tones of musical instruments in a performance are to be sounded from a speaker, regardless of whether the performance is a band performance or solo performance, but the mixer and speaker apparatus are generally provided separately from each other. So, it is conceivable to incorporate a mixer device, into a speaker apparatus like the one disclosed in the above-mentioned No. 2004-120424 publication. However, according to the conventional technical idea, even where the amplifier and mixer section can be incorporated into the speaker box, these devices are only secured to the speaker box in such a manner that they cannot be detached or removed from the speaker box.

[0004] However, the conventionally-known technique, in accordance with which the amplifier and mixer section are fixedly (i.e., unremovably) incorporated in the speaker box, has limited usability and poor user-friendliness because, in this case, the human player has to stay near the speaker apparatus, although the player himself (or herself) can advantageously set and change parameters for the amplifier and mixer.

[0005] Speaker apparatus, mixer, etc., which can be used personally by a human player so that no large-scale PA device has to be used, will be useful or convenient; in this case too, it is useful to construct the speaker apparatus, mixer, etc. in such a manner that they can be easily carried into and out of a stage, event site or the like.

[0006] US 3,183,305 discloses a rectangular aperture being formed in the upper surface of a speaker enclosure and an amplifier removably accommodated in the enclosure. Therein, the speaker could be damaged if any object falls through the aperture into the enclosure with the amplifier removed. US 2002/0085730 A1 discloses a structure wherein about one third of a briefcase is provided as a speaker box with the remainder of the briefcase provided as a storage compartment. US 3,023,274 describes a hinged cover provided on an upper portion of a speaker box, a goods storage space being provided inside the cover, and an amplifier attached to the upper surface of the box body. US 3,052,758 discloses a circuit box being incorporated beneath a speaker box having a vertical row of a plurality of speakers incorporated therein. The speaker box and circuit box are integrally interconnected and are freely disconnectable from each other. US 2003/174855 A1 discloses a speaker mounting system including a mounting member attachable to a structure, a connector attachable to the mounting member, a docking member attachable to the connector, and a speaker housing releasably attached to the docking member. The speaker housing has a side with a receiving portion removably receiving the docking member. US 2004/179241 A1 discloses a speaker system in which it is possible for power amplifier heat radiation and satisfactory audio characteristics to coexist. The power amplifier, and other components which are sources of heat, are arranged in an air flow convection path that is formed in a curved path from a lower bass reflex port toward an upper bass reflex port of a speaker box.

[0007] In view of the foregoing, it is an object of the present invention to provide an improved speaker apparatus which can be used and carried with ease.

[0008] In order to accomplish the above-mentioned object, one aspect of the present invention provides an improved speaker apparatus according to claim 1.

[0009] According to the present invention, the mixer device is removably stored in the recessed section formed in the speaker box body. Thus, when the speaker apparatus is to be used, the mixer device, can be removed or detached from the speaker box body and placed, as a separate component, near a human player. As a consequence, the human player can use the mixer device with utmost ease when, for example, operating operators of the mixer device. Also, when the speaker apparatus is to be carried into or out of a given place, the mixer device can be snugly stored into the speaker box body so that the speaker box body and mixer device can be carried together as a single, integrated combination very easily, which significantly facilitates carrying-in/out of the speaker apparatus and mixer device. Further, with the retention structure for retaining the mixer device, removably accommodated in the recessed section, in the recessed section, the mixer device can be reliably retained in the recessed section during the carrying-in/out.
[0010] Advantageous embodiments can be configured according to any of claims 2-9 and 15-23.

[0011] According to another aspect of the present invention, there is provided a speaker system according to claim 10. Advantageous embodiments can be configured according to any of claims 11-14.

[0012] The following will describe embodiments of the present invention, but it should be appreciated that the present invention is not limited to the described embodiments and various modifications of the invention are possible without departing from the basic principles. The scope of the present invention is therefore to be determined solely by the appended claims.

[0013] For better understanding of the objects and other features of the present invention, its preferred embodiments will be described hereinbelow in greater detail with reference to the accompanying drawings, in which:

Fig. 1 is a view showing an example manner in which is used a circuit-unit-combined speaker apparatus according to an embodiment of the present invention;

Fig. 2 is a sectional view showing in enlarged scale relevant sections of the circuit-unit-combined speaker apparatus of the invention;

Fig. 3 is a rear view showing in enlarged scale relevant sections of the circuit-unit-combined speaker apparatus of the invention;

Figs. 4A - 4C are a rearview, sectional side view and bottom view, respectively, which show details of a speaker box body employed in the circuit-unit-combined speaker apparatus of the invention;

Fig. 5 is a sectional side view showing in enlarged scale principal or relevant sections of a second speaker apparatus employed in the circuit-unit-combined speaker apparatus of the invention;

Fig. 6 is an enlarged front view of a back lid employed in the circuit-unit-combined speaker apparatus of the invention;

Fig. 7 is an enlarged side view showing relevant portions of a locking member employed in the circuit-unit-combined speaker apparatus of the invention;

Fig. 8 is an enlarged perspective view showing a bracket section for speaker and mixer stands in the circuit-unit-combined speaker apparatus of the invention; and

Fig. 9 is an enlarged sectional side view of a retention structure according another embodiment of the present invention.

[0014] Fig. 1 is a view showing an example manner in which is used a circuit-unit-combined speaker apparatus according to an embodiment of the present invention. In the illustrated example, another type of speaker apparatus (i.e., second speaker apparatus) 10 with no circuit unit combined therewith is used in addition to the circuit-unit-combined speaker apparatus (i.e., first speaker apparatus) 10. The circuit-unit-combined speaker apparatus 10 comprises a speaker box body 1 and a mixer device 2 as the circuit unit mountable in a rear surface region of the speaker box body 1 via an appropriate retention structure, which are separable from each other; in the illustrated example of Fig. 1, the speaker box body 1 and the mixer device 2 are shown as used in a mutually-separated state. The second speaker apparatus 10 comprises a speaker box body 1 and a back lid 2 provided on a back surface of the box body 1 to function as a "dropout preventing member" or "retaining member" (see also Fig. 5), which are also separable from each other; in Fig. 1, the speaker box body 1 and the back lid 2 are shown as separated from each other. Within each of the speaker box bodies 1 and 1', a speaker 3 or 3' is secured to the front inner surface of the box body 1 or 1'. In the circuit-unit-combined (first) speaker apparatus 10 and the second speaker apparatus 10', the respective speaker box bodies 1 and 1' are generally identical to each other in construction, but the respective mixer device 2 and back lid 2' are different from each other in construction.

[0015] The speaker box bodies 1 and 1' and mixer device 2 are held by tripod stands 4A, 4B and 4C, respectively. In the illustrated example, a human player P can play a keyboard (electronic musical instrument) KB and sing a song with a microphone M. The keyboard KB and microphone M are connected to the mixer device 2 via cables C1 and C2, respectively. Further, the speaker box bodies 1 and 1' (i.e., their circuitries) are connected to the mixer device 2 via cables C3 and C4, respectively. Audio signal generated through the performance on the keyboard KB and audio signal (voice signal) generated by the microphone M are mixed by the mixer device 2, and the resultant mixed left and right signals of stereo two channels are supplied to and audibly produced (i.e., sounded) by the respective speakers 3 and 3' in the speaker box bodies 1 and 1'. In the illustrated example, where the mixer device 2 is separated from the speaker box body 1, the mixer device 2 can be placed next to the human player P, so that the player P can manipulate the mixer device 2 with ease. The mixer device 2 may be constructed in such a manner that a
plurality of input/output components (e.g., microphone, musical instrument, etc.) can be connected to the mixer device 2 so that a plurality of human players can use the mixer device 2.

[0016] Each of the speaker box bodies 1 and 1' has a recessed section 1A or 1A' in its rear surface. When the speaker apparatus 10 and 10' are to be carried out of or into a given place, the mixer device 2 is fitted and stored into the recessed section 1A of the speaker box body 1 and thereby closes or lid the recessed section 1A. The cables C1 - C4 and microphone M are stored into the recessed section 1A' of the other or second speaker box body 1', and then the recessed section 1A' is closed by the back lid 2'. Thus, as the two speaker apparatus 10 and 10' are carried, the mixer device 2, cables C1 - C4 and microphone M can be carried collectively together with the speaker apparatus 10 and 10'.

[0017] Figs. 4A - 4C are views showing details of the speaker box body 1 or 1'; Fig. 4A is a rear view, Fig. 4B is a sectional side view taken along the A-A line of Fig. 4A, and Fig. 4C is a bottom view. Because the two speaker box bodies 1 and 1' are constructed generally identically to each other as stated above, only the speaker box body 1 will be representatively described hereinbelow in relation to Figs. 4A - 4C. In Figs. 4A and 4B, the speaker box body 1 is shown as in a normal erected position where the top-to-bottom direction of the speaker box body 1 corresponds to the top-to-bottom direction of the figures. Left side of Fig. 4B will be referred to as "rear surface side" IR, while a right side of Fig. 4B will be referred to as "front surface side" IF.

[0018] The speaker box body 1 is formed by synthetic resin molding, and the recessed section 1A, having a rectangular opening that opens rearwardly, is formed in the rear surface side IR of the speaker box body 1. A plurality of bosses 1a1 - 1a9 are formed on the inner peripheral surface and corners of the recessed section 1A. Bottom plate portion 1Aa of the recessed section 1A is located substantially centrally within the speaker box body 1, and the bottom plate portion 1Aa has, in its lower end portion, a stepped portion 1Aa1 concaved toward the front surface side 1F. Space located forwardly of the bottom plate portion 1Aa (i.e., nearer to the front surface side 1F than the bottom plate portion 1Aa) is provided as a speaker chamber S for fixedly accommodating the speaker 3; the speaker 3 is installed in the speaker chamber S. Front case 20 (indicated by a dot-and-dash line in Fig. 4C), provided with a baffle plate and saran net, is secured to a front outer edge of the forwardly-open opening of the speaker chamber S.

[0019] As indicated by dot-and-dash lines in Figs. 4A and 4B, an engaging member 11, constituting an engaging section, is screwed to the bosses 1a1 - 1a3 on the inner surface of the recessed section 1A, and a locking member 12, constituting a locking means, is screwed to the bosses 1a6 - 1a8. The speaker box body 1 has four foot portions 1b slightly projecting downward from four positions of the underside of the body 1, and these four foot portions 1b are located near the corners of the underside. Further, two stand-engaging (or stand-mounting) sections 13 are provided at two positions of the underside which are located centrally in the front-and-rear direction of the underside of the box body 1. These stand-engaging sections 13 are similar in construction to stand-engaging sections 23 of the mixer device 2 which will be described later. Further, a handle section 1c is formed integrally on the speaker box body 1, by forming part of the body 1 into a through-hole.

[0020] Fig. 2 is a sectional view showing in enlarged scale principal or relevant sections of the circuit-unit-combined speaker apparatus 10 and Fig. 3 is a rear view showing in enlarged scale relevant sections of the circuit-unit-combined speaker apparatus 10, which particularly show that the mixer device 2 is fitted and stored in the recessed section 1A of the speaker box 1. As seen in Fig. 2, an outer casing of the mixer device 2 is formed by securing a panel plate 22 to a body case 21, in the shape of a rectangular box, by means of screws N1. Within the body case 21, there is accommodated electronic circuitry for performing both a mixer function and an amplifier function, such as a main substrate 2a, circuit components 2b, subsidiary substrate 2c and operation section substrate 2d.

[0021] Now, with reference to Figs. 2 and 3, a description will be given about an example of the retention structure employable in the present invention.

[0022] The retention structure includes the engaging member 11 which is fastened to the bosses 1a1 - 1a3 by means of a screw N2. This engaging member 11, which is formed by bending a resilient plate of stainless steel or the like, has a bend portion 11a formed by bending a distal end portion of the resilient plate inwardly into the opening of the recessed section 1A, and leaf spring portions 11b bent deeper into the recessed section 1A than the bend portion 11a. Reference numeral 11c represents a flat wall portion of the engaging member 11.

[0023] The panel plate 22 of the mixer device 2 has a contour generally fittable in the opening of the recessed section 1A, and it has two claw portions 22a projecting accurately from two positions of the lower edge thereof. The mixer device 2 is inserted in the recessed section 1A with these two claw portions 22a sandwiched between the bend portion 11a and leaf spring portions 11b of the engaging member 11; thus, the leaf spring portions 11b are depressed, against its resiliency, by the rear surface of the claw portions 22a with the claw portions 22a of the panel plate 22 engaging with the bend portion 11a of the engaging member 11.
Then, by the later-described locking means fastening the mixer device 2 to the speaker box body 1, the mixer device 2 is secured to the speaker box body 1 via the bend portion 11a and leaf spring portions 11b of the engaging member 11. Namely, the claw portions 22a constitute an "engaging section", while the bend portion 11a and leaf spring portions 11b constitute the "engaging section". The bend portion 11a of the engaging member 11 has a thin resin sheet affixed thereto, so that only this resin sheet is visible from outside.

[0024] The locking member 12 is fastened to the bosses 1a6 - 1a8 by means of a screw N3. This locking member 12 is formed into a channel-shaped cross section by, for example, bending a steel plate, and it has a flat portion 12a (extending horizontally in Fig. 2 and thus will hereinafter be referred to as "horizontal portion") bent up to the end edge of the opening of the recessed section 1A. The horizontal portion 12a has two nut plates 12c secured to two positions thereof via respective springs 12b. Fig. 7 is an enlarged side view of the locking member 12 and nut plate 12c that constitute principal sections of the locking means. As shown, each of the nut plates 12c has a screw hole 12d formed therein, and the horizontal portion 12a has a through-hole 12al formed therein at a position opposed to the screw hole 12d.

[0025] Further, on the panel plate 22 of the mixer device 2, a fastening screw 24 is rotatably provided near the upper edge of the panel plate 22 at a position corresponding to the screw hole 12d of the corresponding nut plate 12c. Threaded portion 24a of the fastening screw 24 is screwed through the through-hole 12a1 into the screw hole 12d of the nut plate 12c with the mixer device 2 fixed via the above-mentioned engagement section and engaging section, so that the mixer device 2 is secured to the speaker box body 1. Namely, the locking member 12, springs 12b, nut plates 12c of the speaker box body 1 and the fastening screws 24 of the mixer device 2 constitute a group of the "locking members".

[0026] As illustrated in Fig. 2, the stand-engaging sections 23 are provided at two positions of a bottom plate section 21A of the speaker box body 1. As shown in Fig. 2, the stand-engaging sections 23 are each in the form of a threaded member having an inner threaded portion 23a, an outer threaded portion 23b and flange portion 23c. Each of the stand-engaging sections 23 is first passed through a corresponding hole 21a of the body case 21 until the flange portion 23c is brought into close contact with the rear surface of the body case 21 and then a nut 23d is screwed, from the interior of the case 21, onto the outer threaded portion 23b; in this way, the stand-engaging sections 23 are secured in place. Fig. 8 is an enlarged perspective view showing a bracket section (mounting support section) 41 that can be used for speaker and mixer stands. Two bracket screws 41b are rotatably provided on a base 41a, and a distance between the two bracket screws 41b is equal to a distance between the two stand-engaging sections 23 of the mixer device 2. The mixer device 2 is attached to the bracket section 41 by screwing a threaded portion 41c of the bracket screw 41b to the inner screw portion 23a of the stand-engaging section 23 (see Fig. 2).

[0027] The stand-engaging sections 13 on the underside of the speaker box body 1 are similar in construction to the stand-engaging sections 23 of the mixer device 2, and the distance between the stand-engaging sections 13 is equal to the distance between the stand-engaging sections 23 of the speaker box body 1. The speaker box body 1 can also be attached to the bracket section 41 in a similar manner to the above-described.

[0028] As shown in Fig. 3, the panel plate 22 of the mixer device 2 has a pair of upper and lower handles 25a and 25b provided thereon, so that the mixer device 2 can be attached to or detached from the recessed section 1A by a human operator holding the handles 25a and 25b; note that either or both of the handles 25a and 25b may be dispensed with. On the panel plate 22, there are provided speaker output terminals aL and aR for left and right speakers of stereo two channels, recorder output terminals bL and bR, and expanded power speaker output terminals cL and cR. On the panel plate 22, there are also provided a microphone input terminal d, line input terminal e, microphone/line selecting switch f, reverb adjusting knob g, channel level knobs i2 - i7, master level knob J, a.C. power connector j, power switch k, etc. Further, a jack (terminal) 14 for connection thereto the cable C3 (or C4) from the mixer device 2 is provided on the speaker box body 1 near the recessed section 1A.

[0029] Fig. 5 is a sectional view showing in enlarged scale principal sections of the second speaker apparatus 10', and Fig. 6 is a front view of the back lid 2'. In Fig. 5, elements similar to those in the speaker apparatus 10 of Fig. 2 are indicated by the same reference numerals with marks "'" added thereto, and these similar elements will not be described in detail to avoid unnecessary duplication. For example, the speaker box body 1', recessed section 1A', engaging member (engaging section) 11', bend portion (engaging section) 11a', leaf spring portions (engaging section) 11b', locking member 12', springs (locking members) 12b' and nut plates (locking members) 12c' are similar in construction to the above-described speaker box body 1, recessed section 1A, engaging member (engaging section) 11, bend portion (engaging section) 11a, leaf spring portions (engaging portion) 11b, locking member 12, springs (locking members) 12b and nut plates (locking members) 12c.

[0030] The microphone M and its cable C2, the power supply cable C5 and the cables C3 and C4 interconnecting the mixer device 2 and the speaker box bodies 1 and 1' are together stored in the recessed section 1A' of the speaker box body 1'. The
back lid 2' has a contour generally fittable in the opening of the recessed section 1A and is fittingly attached to the opening of the recessed section 1A. Therefore, during carrying of the second speaker apparatus 10' too, the microphone M and cables C2 - C4 can be effectively prevented from dropping out of the recessed section 1A', by the back lid 2' functioning as a "dropout preventing member" or "retaining member".

[0031] As shown in Fig. 6, the back lid 2' has two claw portions 22a' projecting accurately from two positions of the lower edge thereof. These claw portions 22a' and bend portions 11a' and leaf spring portions 11b' of the engaging member 11' perform engagement functions in a similar manner to the above-described claw portions 22a, bend portion 11a and leaf spring portions 11b of the speaker device 10 shown in Fig. 2. Namely, in this case too, the claw portions 22a' constitute an "engagement section", and the bend portions 11a' and leaf spring portions 11b' constitute an "engaging section". Further, on the back lid 2', fastening screws 24' are rotatably provided, near the upper edge of the lid 2', at positions corresponding to the fastening screws 24 of the mixer device 2. The back lid 2' is secured to the speaker box body 1' by screwing the fastening screws 24' to the nut plates 12c', in generally the same manner as shown in Fig. 2, with the back lid 2' engaged via the engaging and engagement sections. Namely, in this case too, the locking member 12', springs 12b', nut plates 12c' of the speaker box body 1' and the fastening screws 24' of the back lid 2' constitute a group of "locking members".

[0032] Namely, in each of Figs. 2 and 5, the mixer device 2 or back lid 2' is secured to the speaker box body 1 or 1' by the resilient force of the leaf spring portion (resilient member) 11d or 11d' and frictional force between the claw portions 22a or 22a' and the bend portion 11a or 11a'. Thus, the mixer device 2 or back lid 2' can be detachably attached with an extremely small number of screws (two screws in the illustrated example) in the group of locking members.

[0033] Further, in the described embodiment, the stopped portions 1Aa1 and 1Aa1' are formed in the recessed sections 1A and 1A', to provide considerable spatial room. Thus, when the mixer device 2 is to be installed in the recessed section 1A, it can be readily inserted into the recessed section 1A without a corner portion 2A (see Fig. 2) of the mixer device 2 interfering with the bottom plate portion 1Aa of the recessed section 1A. Further, in the recessed section 1A', members of relatively great sizes, such as the microphone M, can be accommodated in a considerably great or deep space defined by the stopped portion 1Aa1' while deformable members, such as a bunch of the flexible cables C3 - C5, can be accommodated in a shallower space defined by the other portions of the bottom plate portion 1Aa than the stopped portion 1Aa1', as illustrated in Fig. 5. In such a case, the cables C3 - C5 etc. may be sandwiched between the back lid 2' and the bottom plate portion 1Aa1' in such a manner that the cables C3 - C5 etc. can be stored and effectively prevented, by frictional force, from being displaced within the recessed section 1A'.

[0034] The bottom plate portion 1Aa (1Aa') of the recessed section 1A (1A') and bottom and side surfaces, continuing from the bottom plate portion 1Aa (1Aa'), form generally flat surfaces. Thus, although the bottom and side surfaces of the recessed section 1A (1A') are exposed to the outside, as seen in Fig. 6, when the circuit unit (mixer device 2) or lid 2' is removed, there will be encountered no substantial inconvenience in terms of the functions and appearance.

[0035] As seen in Fig. 6, typical examples of connections using the mixer device 2 or use of the mixer device 2) are indicated, on the surface of the back lid 2', via three drawings F1 - F3. The first drawing F1 illustrates use of the mixer device 2 in a band performance, the second drawing F2 illustrates use of the mixer device 2 in a solo performance, and the third drawing Fig. 3 illustrates use of the mixer device 2 in a party. Each of the drawings F1 - F3 comprises schematic illustrations of one or more human players, audience, MC, participants, speaker box body, one or more musical instruments, other equipment, such as a recorder, panel plate 22 of the mixer device 2 and cables connecting the mixer device 2 and the equipment. Because there are displayed, on the surface of the back lid 2', examples of use of the circuit-unit-combined speaker apparatus of the invention in the above-described manner, it is possible to readily know how to use (or how to connect) the mixer device 2; thus, the mixer device 2 is very user-friendly even for a beginner user.

[0036] In the described embodiment, the mixer device 2 employed as the "circuit unit" has the mixer function and amplifier function. Alternatively, the circuit unit mounted in the speaker box body may comprise other than the mixer device, such as an amplifier device, effect impartment device or other device that is constructed to perform other appropriate signal processing on sound signals to be supplied to the speaker.

[0037] Further, the "engaging section", "engagement section" and "locking members" are not limited to those in the above-described preferred embodiment and may be constructed in any other suitable manner as long as they can secure one side of the mixer device and back lid near the edge of the opening of the recessed section in the speaker box body and also secure other portions (preferably opposite from the engaging section) of the mixer device and back lid near the edge of the opening of the recessed section.

[0038] Now, with reference to Fig. 9, a description will be given about another example of the retention structure employable in...
the present invention. Fig. 9 is a side sectional view similar to Fig. 2, which extractively illustrates a retention structure for retaining the circuit unit (mixer device etc.) 200 in and to the speaker box body 1. Body case 210 of the circuit unit 200 has an outer peripheral edge portion extending so as to overlap a peripheral edge portion 1Ab of the recessed section 1A of the speaker box body 1, in correspondence with which the outer peripheral edge portion of the panel plate 220 is expanded as compared to the counterpart of Fig. 2. The panel plate 220 has downward hook claws 201 formed at an appropriate plurality of positions (e.g., four positions) of the underside thereof. The body case 210 has a plurality of engaging holes formed in the outer peripheral edge portion at positions corresponding to the hook claws 201. The panel plate 220 is fixed to the body case 210 by the hook claws 201 being engaged in the corresponding engaging holes. As shown, overlapped layers of the outer peripheral edge portions of the body case 210 and panel plate 220 of the circuit unit 200 are received on the peripheral edge portion 1Ab of the recessed section 1A of the speaker box body 1 and fastened at an appropriate plurality of positions (e.g., four positions) to the peripheral edge portion 1Ab by means of screws N10. In this way, the circuit unit (mixer device etc.) 200 is held in the recessed section 1A and retained to (i.e., secured to) the speaker box body 1.

[0039] Still another example of the retention structure (i.e., structure of the engaging and engaged sections) employable in the present invention may be constructed as follows. For example, an engaging hole may be formed in one of the speaker box and mixer device (or back lid), and a claw insertable in the engaging hole may be formed on the other of the speaker box and mixer device (or back lid); in this case, the speaker box and the mixer device (or back lid) is fixed to each other on a side opposite from the position where the claw is engaged in the engaging hole. The fixing structure may comprise a claw that is provided on the mixer device (or back lid) and resiliently deformable by a finger, and a hole that is formed in the speaker box and engageable with the claw. In another alternative, the engaging and engaged sections may be constructed to secure together the speaker box and mixer device (or back lid) by screws or otherwise.

[0040] Further, in a speaker system comprising left and speakers or a plurality of speakers, there may be provided a plurality of the circuit-unit-combined speaker apparatus 10, rather than just one such circuit-unit-combined speaker apparatus 10.

[0041] Further, since the speaker box body 1 of the first (circuit-unit-combined) speaker apparatus 10 is constructed similarly to the speaker box body 1' of the second speaker apparatus 10', the accessories, such as the microphone and/or connecting cord, may be stored in the recessed section 1A of the speaker box body 1 of the first speaker apparatus 10 and covered with the lid 2'. Similarly, the circuit unit (mixer device 2) may be accommodated in the speaker box body 1' of the second speaker apparatus 10'. In other words, the circuit unit (mixer device 2) or lid 2' may be mounted to the recessed section 1A or 1A' of any desired one of the speaker apparatus 10 and 10' of the present invention; that is, each the speaker apparatus 10 and 10' of the present invention can be selectively used for any one of the functions.

[0042] Further, the recessed section 1A in the rear surface side of the speaker box body 1 may be divided into two or more areas, in which case the circuited unit may be detachably attached to one of the divided areas and another of the divided areas may be provided with the back lid (dropout preventing member) to provide a storage space for the cables and microphone.

[0043] The recessed section 1A or 1A' for storing the circuit unit, parts, accessories, etc. may be provided in another surface than the rear surface side. Further, the speaker may be provided in a left or right side or topside rather than the front surface side.

[0044] Furthermore, the circuit unit may be retained in the recessed section 1A (against dropout from the recessed section 1A) by the back lid 2' closing the recessed section 1A, with no particular fixing, engaging or locking structure provided in the circuit unit.

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

Patentkrav

1. Højttalerapparat omfattende en højttalerkasselegeme (1) med en højttaler (3) monteret på en forsideflade (1F) deraf, og hvor en bagsideflade (1R) af højttalerkassen (1) er lukket for at tilvejebringe et lukket rum (S) i højttalerkassen (3), kendetegnet ved, at
   - højttalerkasselegemets (1) bagsideflade (1R) har en væg (1Aa, 1Aa1), som er konkav indad over et forudbestemt område for at tilvejebringe et forsønket afsnit (1A) i bagsidefladen (1R), hvor det forsønkedde afsnit (1A) er placeret udenfor det lukkede rum (S) i højttalerkasselegemet (1), og at højttalerapparatet yderligere omfatter:
     - en mikserindretning (2), som er aftageligt optaget i højttalerkasselegemets (1) forsønkedde afsnit og omfatter et betjeningselement (i1 – i7), som kan betjenes af en menneskelig operatør, til at styre eller justere et lydsignal, der skal tilføres højttaleren, og
     - en holdekonstruktion (11, 11a, 11b, 22a, 12, 12a, 12b, 12c, 24) til at holde mikserindretningen (2), som er aftageligt optaget i det forsønkedde afsnit (1A), i det forsønkedde afsnit (1A).

2. Højttalerapparat ifølge krav 1, hvori holdekonstruktionen omfatter:
   - en indgrebssektion (11, 11a, 11b, 12, 12a, 12b, 12c) tilvejebragt på et perifert kantparti af det forsønkedde afsnit (1a) af højttalerkasselegemet (1), og
   - en indgrebssektion (22a, 24) tilvejebragt på mikserindretningen ved en position svarende til indgrebssektionen,

   hvor indgrebssektionen (22a, 24) af mikserindretningen (2) er i indgreb med højttalerkasselegemets indgrebssektion med mikserindretningen optaget i det forsønkedde afsnit (1A), sådan at mikserindretningen (2) holdes i og til højttalerkasselegemet (1).

3. Højttalerapparat ifølge krav 1, hvori holdekonstruktionen omfatter:
   - et låseelement (12, 12a, 12b, 12c, 24) til fastgørelse af mikserindretningen (2) på højttalerkasselegemet,
   - en indgrebssektion (11, 11a, 11b) tilvejebragt på et perifert kantparti af højttalerkasselegemets forsønkedde afsnit, og
   - en indgrebssektion (22a) tilvejebragt på mikserindretningen (2) ved en position svarende til indgrebssektionen,

   hvori, når mikserindretningen (2) skal optages i det forsønkedde afsnit, kommer mikserindretningens (2) indgrebssektion i indgreb med højttalerkasselegemets
indgrebssektion, og mikserindretningen (2) fastgøres til højtalerkasselegemet via låseelementet.

4. Højtaleral apparatus ifølge ethvert af krav 1 – 3, hvori mikserindretningen (2) er tilsluttet højtaleren monteret i højtalerkasselegemet (1), og selv når mikserindretningen (2) er i en tilstand, hvor den er fjernet fra højtalerkasselegemets for- sønkede afsnit, kan mikserindretningen (2) forbindes med ledning til højtaleren (3) i højtalerkasselegemet (1).

5. Højtaleral apparatus ifølge krav 4, hvori, når mikserindretningen (2) er i en position adskilt fra højtalerkasselegemet (1), kan lydsignalet, der skal tilføres højtale- ren (3), styres eller justeres ved betjening af betjeningselementet (i1 – i7).

6. Højtaleral apparatus ifølge ethvert af krav 1 – 5, hvori det forsinkede afsnit (1A) er udført over et område, som er større end halvdelen af hele arealet af bagsidefladen (1R).

7. Højtaleral apparatus ifølge ethvert af krav 1 – 6, hvori mikserindretningen (2) har et standemonteringsafsnit (23), og når mikserindretningen (2) er i en tilstand fjernet fra det forsinkede afsnit (1A) af højtalerkasselegemet (1), kan mikser- indretningen (2) monteres via standemonteringsafsnittet (23) til en given stand- der (4C).

8. Højtaleral apparatus ifølge krav 7, hvori standemonteringsafsnittet (23) er tilveje- bragt på et sted, som er usynligt udefra, når mikserindretningen (2) er optaget i højtalerkasselegemets (1) forsinkede afsnit (1A).

9. Højtaleral apparatus ifølge krav 7, hvori højtalerkasselegemet (1) har et standemon- monteringsafsnit (13) tilvejebragt på en overflade deraf, som er forskellig fra en overflade af højtalerkasselegemet (1), mod hvilken en forreste overflade af højt- taleren vender, og hvor mikserindretningens (2) standemonteringsafsnit (23) er konstrueret tilsvarende højtalerkasselegemets (1) standemonteringsafsnit (13).

10. Højtaleral system omfattende:
- et første højtaleral apparatus omfattende højtaleral apparatuset ifølge ethvert af krav 1 – 9, og
- et andet højtaleral apparatus omfattende:
- et andet højtalerkasselegeme (1') med en anden højttaler (3') monteret deri, og med et andet forsønket afsnit (1A') dannet i en overflade deraf, hvor en eller flere ønskede emner (M, C2-C5) kan opbevares udtageligt i det andet forsønkedede afsnit (1A'), så vidt en lagerstørrelse af det andet forsønkedede afsnit (1A') tillader, og
- et holdeelement (2') til i det andet forsønkedede afsnit (1A') at holde emnerne (M, C2-C5), som opbevares udtageligt i det andet forsønkedede afsnit (1A') af højtalerkasselegemet (1').

11. Højtalersystem ifølge krav 10, hvori det andet højtalerapparat yderligere omfatter en anden holdekonstruktion (11', 11a', 11b', 22a', 12', 12a', 12b', 12c', 24') til afgørende at holde holdeelementet (2') på det andet højtalerkasselegeme (1').

12. Højtalersystem ifølge krav 10 eller 11, hvori holdeelementet (2') er et bagpanel (2'), som dækker det andet forsønkedede afsnit (1A') af det andet højtalerapparat.

13. Højtalersystem ifølge krav 12, hvori en given kommentar eller illustration, der for eksempel angiver hvordan mikserindretningen (2) skal bruges, er angivet på bagpanelet (2').


15. Højtalerapparat ifølge ethvert af krav 1 – 6, som yderligere omfatter et bagpanel (2') til afgørende afdækning af højtalerkasselegemets (1) forsønkedede afsnit (1A) i stedet for mikserindretningen (2), hvori holdekonstruktionen (11, 11a, 11b, 22a, 12, 12a, 12b, 12c, 24) holder bagpanelet (2') til højtalerkasselegemet (1), hvori enhver ønsket af mikserindretningen (2) og bagpanelet (2') kan fæstnes til højtalerapparatet via holdekonstruktionen, og hvori, når mikserindretningen (2) ikke optages i det forsønkedede afsnit, et eller flere ønskede emner kan udtageligt opbevares i det forsønkedede afsnit (1A), så vidt det forsønkedede afsnits (1A) lagerstørrelse tillader.
16. Højtalerapparat ifølge krav 15, hvor en given kommentar eller illustration, der for eksempel angiver hvordan mikserindretningen (2) skal bruges, er angivet på bagpanelet (2').


18. Højtalerapparat ifølge krav 17, hvori bagpanelet (2') hindrer de emner, som opbevares i højtalerkasselegemets (1) forsønkede afsnit, i at falde ud af det forsønkedespase (1A).

19. Højtalerapparat ifølge ethvert af krav 15 – 18, hvori mikserindretningen (2) har et standemonteringsafsnit (23), og når mikserindretningen (2) er i en tilstand fjernet fra det forsønkedespase (1A) af højtalerkasselegemet (1), kan mikserindretningen (2) monteres via standemonteringsafsnittet (23) til en given stander (4C).

20. Højtalerapparat ifølge krav 19, hvori standemonteringsafsnittet (23) er tilvejebragt på et sted, som er usynligt udefra, når mikserindretningen (2) er optaget i højtalerkasselegemet (1) forsønkedespase (1A).

21. Højtalerapparat ifølge krav 19, hvori højtalerkasselegemet (1) har et standemonteringsafsnit (13) tilvejebragt på en overflade deraf, som er forskellig fra en overflade af højtalerkasselegemet (1), mod hvilken en forreste overflade af højtaleren vender, og hvor mikserindretningens (2) standemonteringsafsnit (23) er konstrueret tilsvarende højtalerkasselegemets (1) standemonteringsafsnit (13).

22. Højtalerapparat ifølge ethvert af krav 1 – 14, som yderligere omfatter et bagpanel (2') til aftagelig dækning af højtalerkasselegemets (1) forsønkedespase (1A) i stedet for mikserindretningen (2), og hvori holdekonstruktionen holder panelet til højtalerkasselegemet (1), og en tegning relateret til en forudbestemt form for brug af mikserindretningen (2) er tilvejebragt på en overflade af bagpanelet (2').
23. Højttalerapparat ifølge krav 22, hvori tegningen på bagpanelets (2') overflade angiver en flerhed af eksempler på forbindelser svarende til en flerhed af anvendelsesformer for mikserindretningen (2).