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(71) Applicant *(for all designated States except US)*: **VIGOR SPORTS, INC.** [US/US]; 16918 Edwards Road, Cerritos, CA 90703 (US).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **JEONG, Chanyoung** [KR/US]; 16918 Edwards Road, Cerritos, CA 90703 (US).

(74) Agents: **HANSEN, Scott, R.** et al.; Oppenheimer Wolff & Donnelly LLP, 840 Newport Center Drive, Suite 700, Newport Beach, CA 92660-7007 (US).

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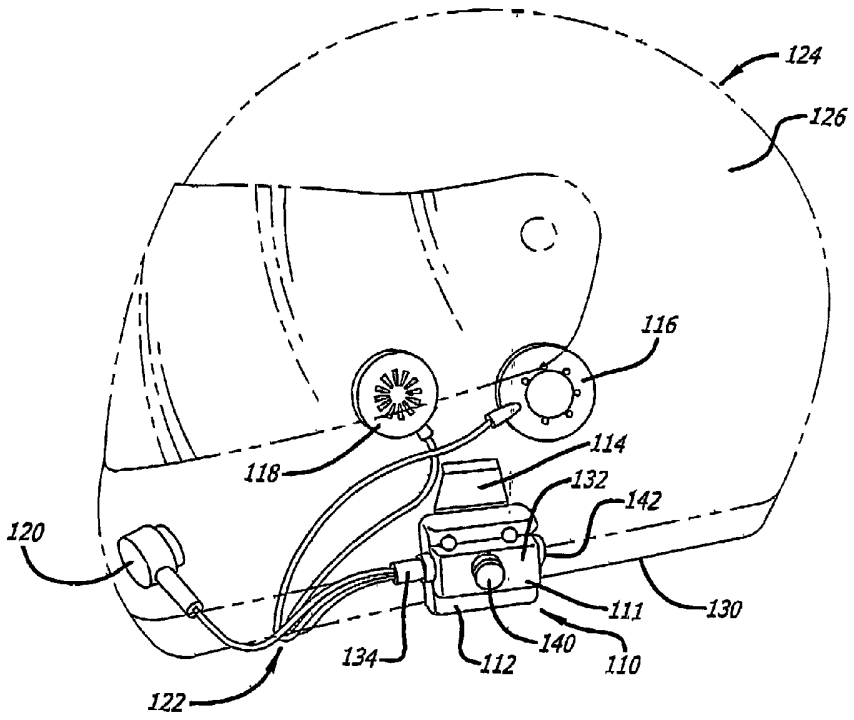
(54) Title: DETACHABLE HELMET-MOUNTED COMMUNICATIONS SYSTEM



(57) Abstract: A communications system (110) is attached to a helmet (124,136) using a resilient clip (114) adapted to use spring forces to elastically and removably grasp the lower peripheral rim (130) of the helmet. Rigidly fixed to the resilient clip is a junction box (132). A microphone (120) and speakers (116,118) are attached to the helmet and are electrically connected to a transceiver through the junction box.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DETACHABLE HELMET-MOUNTED COMMUNICATIONS SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates to the mounting of communications systems for convenient use, and more particularly to a communications system with a mounting clip for attachment to a motorcycle helmet for use by a motorcycle rider or passenger.

2. General Background and State of the Art:

Due to the loud background noise produced by motorcycle engines, as well as the wind, it is very difficult for motorcycle riders to communicate with each other using their unaided voices. Many jurisdictions now require that motorcycle riders and passengers wear helmets. The thick padding of the helmets makes it even more difficult for a motorcycle rider to hear what others are saying. Typically, motorcycle riders communicate with their passengers by turning their head around to look back at their passengers and by yelling loudly. However, turning one's head to look back at a passenger can have lethal consequences because the rider's eyesight is no longer directed toward the oncoming road.

Two-way radios have been adopted for use with motorcycle helmets. These two-way radios have a speaker and a microphone mounted to the motorcycle helmet. These radios allow the motorcycle rider to communicate with others via radio communications. For example, the motorcycle rider can communicate with a passenger or with other motorcycle riders wearing similarly equipped helmets. The two-way radios allow the driver to communicate with the passenger without looking away from the road.

The prior art teaches various attachments and communication devices for use with helmets. For example, U.S. Patent 3,249,873 to Whittemore et al. teaches a radio secured to a helmet for military use. A strap is permanently secured to the helmet and supporting clips are attached to the back of the radio. The clips are snapped onto the strap to secure the radio to the helmet. However, this design is not ideal for use with motorcycle helmets since motorcycle helmets typically do not include Whittemore's permanent strap.

U.S. Patent 3,273,163 to Andrews teaches an accessory attachment to a hard hat. The accessory attachment has a hole for attaching various accessories. The accessory attachment fits in a pocket formed in the thickened lower edge of the hard hat. This design is also not ideal for use with motorcycle helmets since motorcycle

helmets typically do not have the pocket formed in a thickened lower edge as does a hard hat.

U.S. Patent 3,889,190 to Palmer shows a transceiver mounted to a helmet using a clamp mechanism. The clamp mechanism uses a rivet to secure clamp members about the bottom edge of a helmet. This design is inconvenient because the rivet must be tightened or loosened to attach or remove the transceiver from the helmet.

U.S. Patent 3,983,602 to Barry teaches a one piece holder of molded plastic for attaching to the lower rim of a safety helmet. The holder is not suitable for holding a communications system to a safety helmet, however, because it is designed only to hold long, slender objects. In particular, the disclosure discusses using the holder to hold a pencil.

U.S. Patents 4,788,724; 4,977,975 and Re. 34,525; all to Lazzaroni et al. describe the attachment of a microphone and earphone to a motorcycle helmet using two separate clamp mechanisms. The clamp mechanisms work in a fashion similar to that shown in Palmer. The clamp mechanisms use rivets to secure clamp members about the bottom edge of a helmet. As with Palmer, Lazzaroni's design is inconvenient because the rivets must be tightened or loosened to attach or remove them from the helmet. It is also inconvenient because it requires two separate clamp mechanisms.

U.S. Patent 5,465,421 to McCormick et al. teaches attaching speakers to a helmet. The speakers are either built into the helmet or are embedded in the Styrofoam lower rim. In one embodiment, McCormick's design is used with a specially constructed helmet and thus lacks the versatility to be used with standard helmets. In an alternative embodiment, McCormick's design is attached to a standard helmet by embedding posts into the helmet, thus damaging the helmet and preventing ease of transfer to another helmet.

U.S. Patent 5,590,209 to Pratt et al. teaches a mount for supporting a microphone and speaker on a helmet. Pratt's mount is attached to the helmet using double-sided tape, which can make the transfer of the mount from one helmet to another slow and difficult. The tape can leave undesirable residue on a helmet and can fail to provide a secure attachment. Pratt alternatively provides for attaching the mount to the helmet using a screw passing through the mount and the helmet. This

mounting method leaves a permanent hole in the helmet and makes it inconvenient to move the mount from one standard helmet to another standard helmets.

It would be desirable to have a detachable helmet-mounted communications system for use with standard, unmodified helmets. It would further be desirable for the mounting assembly to be quickly and easily detachable from one standard, unmodified helmet for quick and easy reattachment to another standard, unmodified helmet. It would also be desirable for the mounting assembly to be securely attached to the helmet, preventing unintentional disengagement.

SUMMARY OF THE INVENTION

Accordingly, an object of the present invention is to provide a detachable helmet-mounted communications system for use with standard, unmodified helmets. Another object is for the system to be quickly and easily detachable from one standard, unmodified helmet for quick and easy reattachment to another standard, unmodified helmet. Another object is for the system to be securely attached to the helmet, preventing unintentional removal from the helmet.

These goals are achieved by the detachable helmet-mounted communications system of the present invention. A mounting assembly includes a junction box for electrically connecting speakers and a microphone to a communications device. The mounting assembly also includes an attached resilient clip adapted to use spring forces to elastically and removably grasp the lower peripheral rim of the helmet, thereby mounting the communications system to the helmet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of the detachable helmet-mounted communications system of the present invention. The mounting assembly is shown attached to a full-face motorcycle helmet (illustrated using phantom lines). Speakers and a microphone are shown secured to the inside of the motorcycle helmet and are electrically connected to the mounting assembly via wires.

FIGURE 2 is a perspective view of the detachable helmet-mounted communications system of FIGURE 1. The communications system is shown attached to an open-face motorcycle helmet (illustrated using phantom lines). Speakers are shown secured to the inside of the motorcycle helmet and are electrically connected to the mounting assembly via wires. A microphone is attached to the mounting assembly via a boom.

FIGURE 3 is a side-elevational view of the mounting assembly showing the electrical plugs.

FIGURE 4 is a side-elevational view of the mounting assembly showing the clip portion.

FIGURE 5 is a rear-elevational view of the mounting assembly showing the clip portion prior to engagement with the lower rim of a motorcycle helmet.

FIGURE 6 is a rear-elevational view of the mounting assembly engaged with the lower rim of a motorcycle helmet.

FIGURE 7 is a side-elevational view of the mounting assembly showing an embodiment of the clip portion formed from a single continuous resilient strand of spring-quality metal wire.

FIGURE 8 is a side-elevational view of the mounting assembly showing the connections to a communications device as well as to a second detachable helmet-mounted communications system.

DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 shows a detachable helmet-mounted communications system 110 of the present invention. The communications system 110 includes a mounting assembly 112 with a clip portion 114, a housing 111 encloses a junction box 132, two speakers or earphones 116, 118, a noise-canceling microphone 120 and wires 122 for providing communication connections between the speakers, microphone and mounting assembly. The wires extend from inside the junction box 132 by way of a conduit 134. As illustrated in FIGURE 8, the communications system 110 also includes a communications device 131, for example a transceiver, along with plugs 140, 142 providing access to the junction box 132 for connecting the mounting assembly 112 to the communications device 131. The plugs 140, 142 are also used to connect the communications system 110 to a second detachable helmet-mounted communications system 133 using a cable 143.

FIGURE 1 further shows the communications system 110 attached to a full-face motorcycle helmet 124 (illustrated using phantom lines). The motorcycle helmet 124 has an outer shell or headshell 126 surrounding inner liner or internal padding 128 (see FIGURE 6) and forms a lower peripheral rim 130. The clip portion 114 removably secures the mounting assembly 112 to the helmet 124 at the rim 130. The clip portion 114 can grip around both the headshell 126 and the internal padding 128 or can fit

between the headshell 126 and internal padding 128 to grip the headshell 126 as illustrated in FIGURE 6.

The speakers 116, 118 are mounted to the padding 128 in positions proximate to the ears of a person using the helmet 124. If the helmet 124 has built-in ear pockets, then the speakers 116, 118 can be mounted in the ear pockets. The microphone 120 is similarly mounted to the padding 128 of the chin bar in a position proximate to the mouth of a person using the helmet 124. The speakers and microphone can be mounted to the padding by using, for example, standard adhesive-backed Velcro pieces. Loop forming pieces of Velcro can be adhesively attached to the padding 128 at the positions where the speakers 116, 118 and microphone 120 are to be located. Hook forming pieces of Velcro can then be adhesively attached to the speakers 116, 118 and microphone 120 so that the speakers and microphone can be removably attached to the helmet 124. Some special helmets can have built in speaker pockets within the ear pockets for placement of the speakers 116, 118. If speaker pockets are built into the helmet then Velcro need not be used to secure the speakers 116, 118. Also, with some types of padding 128, the loop forming pieces of Velcro do not need to be attached because the hook forming pieces of Velcro can adhere directly to the padding 128 or to a lining material on the padding 128. Of course the speakers and microphone can be attached to the helmet 124 using any other conventional means as well.

FIGURE 2 shows the communications system 110 attached to an open-face motorcycle helmet 136 (illustrated using phantom lines). Because the open-face design has no chin guard for securing the microphone 120 a microphone and boom assembly 138 is used. The microphone and boom assembly 138 can attach to the conduit 134. The assembly 138 includes the microphone 120 mounted on the distal end of a flexible tubular element or boom 139. Leads are electrically connected to the microphone 120 and extend through the flexible boom for transmission of the electrical signals detected by the microphone 120 to the junction box 132. The flexible boom 139 is adjusted so that the microphone 120 is positioned generally in a position proximate to the mouth of a person using the helmet 136.

As shown in FIGURES 1 and 2, and additionally in FIGURES 4-6, the communications system 110 utilizes the clip portion 114 to attach the mounting assembly 132 to the lower rim 130 of the helmet 124 or 126. In one embodiment, the clip portion 114 is a single sheet of metal. Preferably the clip portion 114 is stamped

from a thin, flat, planar sheet of stainless steel. The clip portion 114 is formed by folding over the stamped metal sheet of to form first 144 and second 146 opposing arms connected by a generally U-shaped joining portion or bend 148 (note FIGURE 6). The first arm 144 is attached to the housing 111 of the mounting assembly 112 and is adapted to engage the outside of the helmet 124 proximate the lower rim 130 of the helmet 124. The second arm 146 is adapted to grip the inside of the helmet proximate the lower rim 130 of the helmet 124. The bend 148 is adapted to be positioned near the lower rim 130 of the helmet 124.

Normally, the first 144 and second 146 arms are positioned relative to each other as shown in FIGURE 5. When spread apart from each other to a distance approaching or greater than the thickness of the lower rim 130, the arms 144, 146 and the bend 148 exert an elastic spring force urging the first and second arms back towards each other. The elastic spring force is used to grip the helmet between the first and second arms to mount the communications system to the helmet as illustrated in FIGURE 6. The arms can sandwich the headshell 126 and internal padding 128 or can fit between the headshell 126 and internal padding 128 to sandwich only the headshell 126.

When attaching the communications system 110 to the motorcycle helmet 124 as shown in FIGURE 6, the clip portion 114 is placed at the bottom of the lower rim 130 and the second arm 146 is slid between the internal padding 128 and the headshell 126. As the clip portion is slid around the lower rim 130, the housing 111 is held out to spread the first 144 and second 146 arms apart. The clip portion is slid around the lower rim until the bend 148 is near the lower rim. Once in position, the housing 111 is released to allow the elastic spring forces to bring the arms together and grip the lower rim 130 and surrounding area of the headshell. As mentioned above, rather than sliding the second arm 146 between the internal padding and the headshell, the arms can be positioned to sandwich both the internal padding and the headshell. A lip portion 150 is proximate an edge of the second arm 146 and bends away from the first arm 144. As the clip portion 114 is slid onto the headshell, the lip portion 150 engages the lower rim 130 and assists in spreading the first and second arms apart from each other. The lip portion 150 also helps prevent the second arm 146 from becoming caught on the internal padding 128 or headshell 126 as the clip portion 114 is slid over the lower rim 130.

After clipping the mounting apparatus 112 to the helmet 124 or 136, the speakers 116, 118 can be secured to the inside of the motorcycle helmet using Velcro or other methods as described above. If the motorcycle helmet 124 is to be used, the microphone 120 is similarly attached to the motorcycle helmet as described above. If the motorcycle helmet 136 is to be used, the microphone and boom assembly 138 is used to position the microphone 120.

The clip portion 114 can form a side wall of the housing 111 or can be attached to a side wall of the housing 111. Also, the clip portion 114 can be made from molded plastic or other resilient materials. For example, the housing 111 and the clip portion 114 can be a unitary body made from a single piece of molded plastic.

In an alternative embodiment, illustrated in FIGURE 7, the mounting assembly utilizes a clip portion 151 formed from a single continuous resilient strand of spring-quality metal wire 152. Like the clip portion 114 of the embodiment of FIGURES 1-6, the clip portion 151 has first and second arms and U-shaped bends 156 using elastic spring force to hold the mounting assembly 112 to the helmet 124, 136. The first arm can be secured within the housing 111 as illustrated by the hidden line outline of the metal wire portion 154. The wire 152 can also be shaped to have a lip portion like the lip portion 150. In other respects the embodiment of FIGURE 7 is the same as the other embodiments.

FIGURES 3 and 8 more clearly show the plugs 140, 142 which are used to provide communication connections with various types of communications devices 131. The plugs 140, 142 can be standard five pin DIN plugs, for example. The plugs 140, 142 can be used to provide communications between a motorcycle-attached communications device and the communications system 110 using a compatible electrical cable 141. Alternatively, the communications device 131 can be attached to the rider, for example, on the rider's belt. Here, rider can mean the person driving the motorcycle or the passenger, although it can also mean the driver and not the passenger. The communications device can be, for example, a two-way communications device or transceiver such as two-way radio, a cellular device, a CB radio, a satellite communications device, transceiver or audio computer interface. Alternatively, the communications device can be one-way communications device such as a radio, radio scanner, CD player or MDI player. The communications devices described above can also be attached to the helmet 124, 136 and can be enclosed within the housing 111. It is particularly advantageous to include the

communications device 131 within the housing 111 or attached to the housing 111 as this allows greater mobility of the user and removes the inconvenience of having the cable 141 extending from the helmet. Although combining the communications device 111 with the mounting assembly 112 increases the weight on the helmet 124, 136, there are many light-weight communications devices which do not increase the weight by enough to be of any bother to the wearer.

When used for rider to passenger communications, the helmets of the rider and passenger are each equipped with the communications system 110 and a second communications system 133, respectively. A cable 143 can be used to attach one of the plugs 140, 142 of the communications system 110 of the rider to one of the plugs 140, 142 of the passenger's communications system 133, thereby allowing direct communication. The driver's communications system 110 can be attached to the communications device 131 and the passenger's communications system 133 attached to the driver's communications system 110 to allow the passenger to communicate with the driver and/or to use the communications device 131.

The communications system 110 preferably works in full duplex mode using a cellular-type battery power system. The communications system 110 can be voice activated for safety and convenience. The speakers 116, 118 preferably provide full stereo sound to the user. Rather than using the wires 122 to provide communications connections between the microphone 120, speakers 116, 120 and the mounting assembly 112, wireless methods can be used. Similar wireless methods can also be substituted for the cables 141, 143 attached to the electrical plugs 140, 142 to communicate between the mounting assembly 112 and the chosen communications device 131. The wireless methods can include electromagnetic transmissions such as microwave, radio wave, infrared or optical. In some configurations, particularly when the wires 122 are not used, the housing does not require the conduit 134. In some configurations using wireless methods the electrical plugs are not needed.

The junction box 132 is enclosed in the housing 111 and can include a circuit board for mounting the five pin DIN plugs and the leads from the speakers and microphone. The circuit board electrically connects the speakers and microphone to each other as well as to a communications device and/or a second communications system through the DIN plugs. The communications device can alternatively share the same circuit board and be enclosed in the housing 111. A junction box, as used

here, is defined as a device for joining different runs of raceway or cable, plus space for connecting and branching the enclosed conductors.

The communications device 131 can include several parts, with a part attached to the helmet as part of the mounting apparatus 112, and another part attached somewhere else, such as on a belt or on the motorcycle itself, with communications between the parts achieved through wires or via wireless communication connections.

The invention having been described with particular reference to the preferred embodiments, the scope of the invention is limited only by the following claims.

I CLAIM:

1. A communications system for detachably mounting to a helmet, comprising a mounting assembly having a junction box and attached resilient clip adapted to use spring forces to elastically and removably grasp the lower peripheral rim of the helmet, thereby mounting the communications system to the helmet.

2. The communications system of Claim 1, wherein the resilient clip is made of a single flat piece stamped from a sheet of metal.

3. The communications system of Claim 1, wherein the resilient clip is stamped from a flat sheet of stainless steel.

4. The communications system of Claim 1, wherein the resilient clip is made of a single piece of molded plastic.

5. The communications system of Claim 1, wherein the resilient clip is a single continuous strand of spring-quality metal wire.

6. The communications system of Claim 1, wherein the mounting assembly, including the junction box and the resilient clip, is a unitary body made from a single piece of molded plastic.

7. The communications system of Claim 1, further comprising

a speaker, including communications connections to the mounting assembly, for mounting inside the helmet proximate to an ear of a person using the helmet;

a microphone, including communications connections to the mounting assembly for mounting proximate to the mouth of a person using the helmet; and

a transceiver, including communications connections to the mounting assembly.

8. The communications system of Claim 1, further comprising

a housing enclosing a portion of the mounting assembly; and

a transceiver enclosed in the housing.

9. The communications system of Claim 8, wherein the clip forms a wall of the housing.

10. The communications system of Claim 8, wherein the clip is attached to a wall of the housing.

11. A communications system for detachably mounting to a helmet comprising:

a mounting assembly including a junction box for electrically attaching a transceiver to a microphone and speakers;

a folded over sheet of resilient material having first and second opposing arms connected by a generally U-shaped bend;

wherein:

the first arm is attached to the mounting assembly and is adapted to grip the outside of the helmet proximate a lower rim of the helmet;

the second arm is adapted to grip the inside of the helmet proximate the lower rim of the helmet;

the bend is adapted to be near the lower rim of the helmet; and

the first and second arms, when spread apart from each other to a distance approaching or greater than the thickness of the lower rim, exert an elastic spring force urging the first and second arms back towards each other, said elastic spring force used to grip the helmet between the first and second arms to mount the communications system to the helmet.

12. The communications system of Claim 11 wherein the first and second arms are substantially planar and flat.

13. The communications system of Claim 11, further comprising a lip portion proximate an edge of the second arm and bending away from the first arm so as to assist in spreading the first and second arms apart from each other when placing the first and second arms into engagement with the lower rim of the helmet.

14. The communications system of Claim 11, further comprising:

a speaker, including communications connections to the junction box, for mounting inside the helmet proximate to an ear of a person using the helmet;

a microphone, including communications connections to the junction box, for mounting proximate to the mouth of a person using the helmet; and

wherein the transceiver includes communications connections to the junction box.

15. In combination, a communications system and motorcycle helmet comprising:

a mounting assembly including a junction box for electrically attaching a transceiver to a microphone and speakers;

a motorcycle helmet;

the mounting assembly including a folded over sheet of resilient material having first and second opposing arms connected by a generally U-shaped bend;

wherein:

the first arm is attached to the mounting assembly and is gripping the outside of the helmet proximate a lower rim of the helmet;

the second arm is gripping the inside of the helmet proximate the lower rim of the helmet;

the bend is near the lower rim of the helmet; and

the first and second arms and the bend, when the first and second arms are spread apart from each other to a distance approaching or greater than the thickness of the lower rim, exert an elastic spring force urging the first and second arms back towards each other, said elastic spring force causing the first and second arms to grip the helmet and to mount the transceiver to the helmet.

16. The combination of Claim 15, wherein:

the first and second arms are substantially planar and flat.

17. The combination of Claim 15, further comprising:

a lip portion proximate an edge of the second arm and bending away from the first arm so as to assist in spreading the first and second arms apart from each other when placing the first and second arms into engagement with the lower rim of the helmet.

18. The combination of Claim 15, further comprising:

a speaker, including communications connections to the transceiver, mounted inside the helmet proximate to an ear of a person using the helmet;

a microphone, including communications connections to the transceiver, mounted proximate to the mouth of a person using the helmet; and

wherein the transceiver, includes communications connections to the junction box.

19. A method of mounting a communications system to a helmet having a headshell, rim and internal padding, the helmet worn by a rider, comprising the steps of:

placing a clip portion having a first arm and a second arm connected by a bend portion near the rim of the helmet, the second arm rigidly fixed to a junction box, the junction box electrically connected to speakers and a microphone;

sliding the first arm between the internal padding and the headshell;

pulling on a housing portion attached to the clip portion to spread the first and second arms apart from each other;

sliding the clip portion onto the headshell until the bend is near the lower rim;

releasing the housing to allow elastic spring forces to bring the arms together and grip the lower rim and surrounding area of the headshell, thereby mounting the communications system to the helmet.

20. The method of Claim 19, further comprising the step of:

securing the speakers to ear pockets within the internal padding.

21. The method of Claim 19, further comprising the step of:

attaching a cable from a transceiver to a plug on the junction box to electrically connect the transceiver to the speakers and microphones.

22. The method of Claim 19, further comprising the step of:

attaching a cable from a second plug on the junction box to a plug on a second junction box on a second helmet so that a user of the second helmet can communicate with the transceiver and with the rider.

FIG. 1

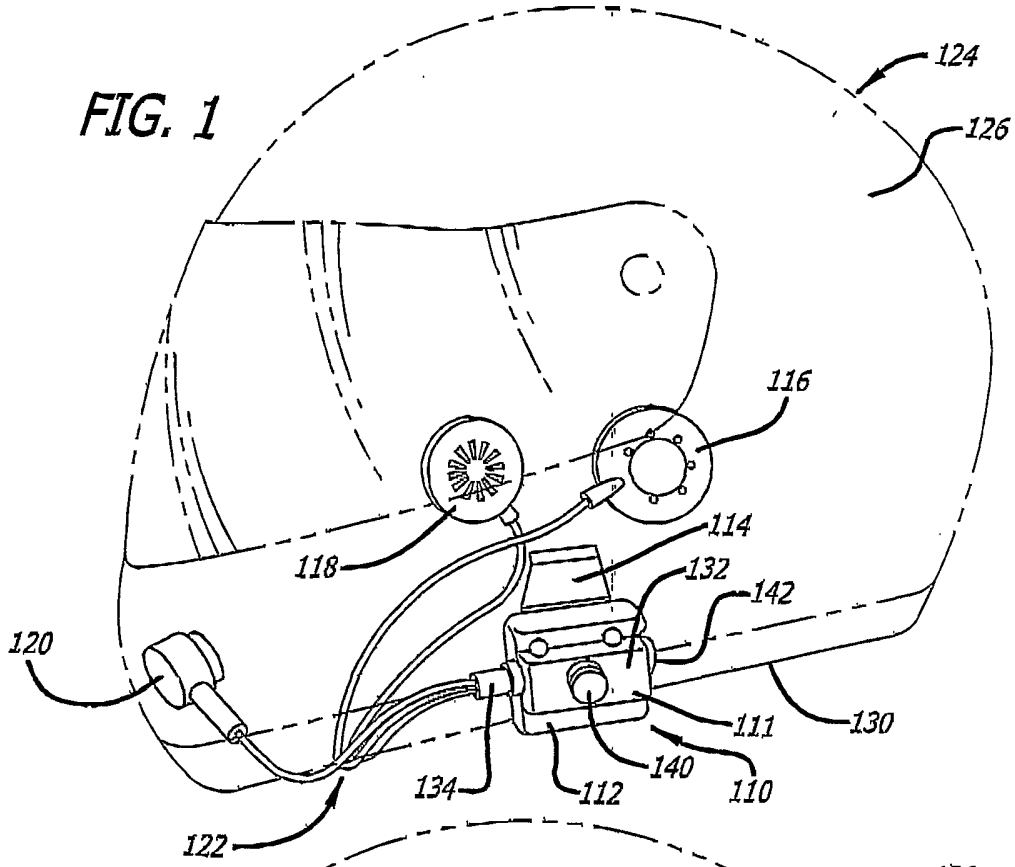
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FIG. 2

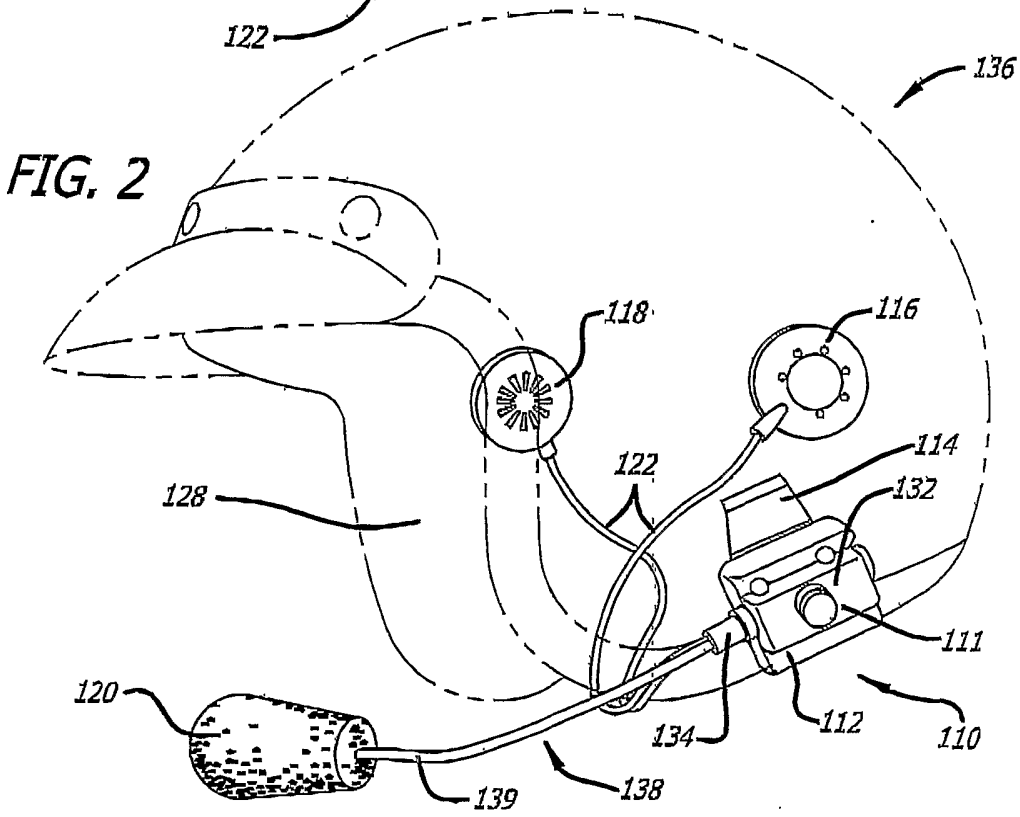
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FIG. 3

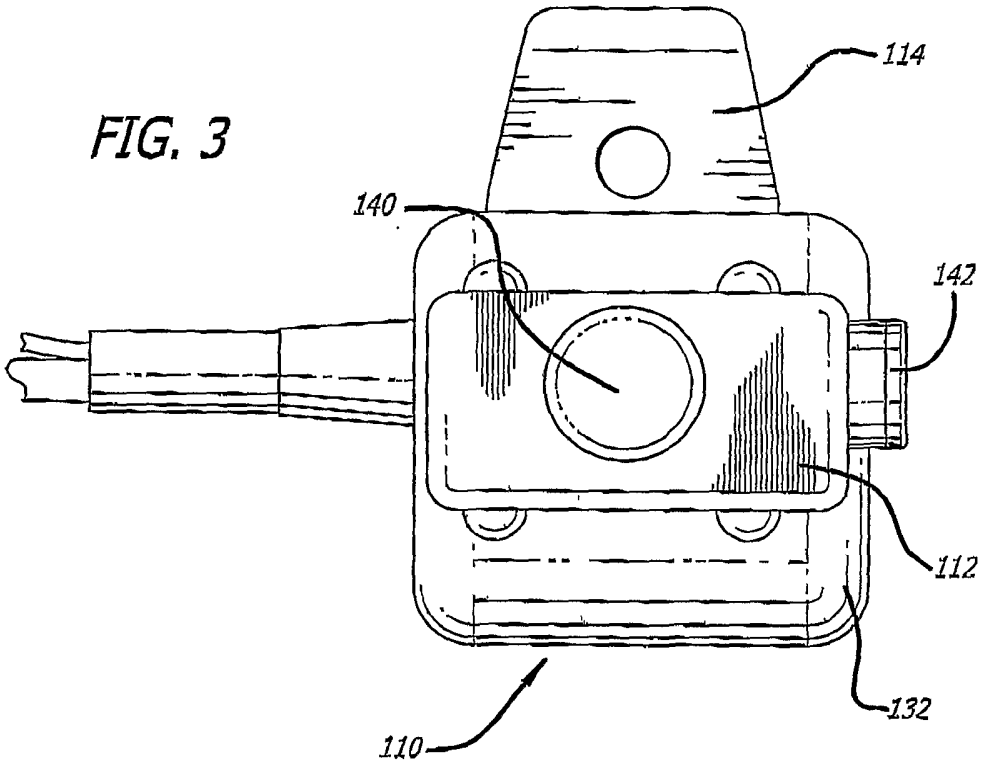
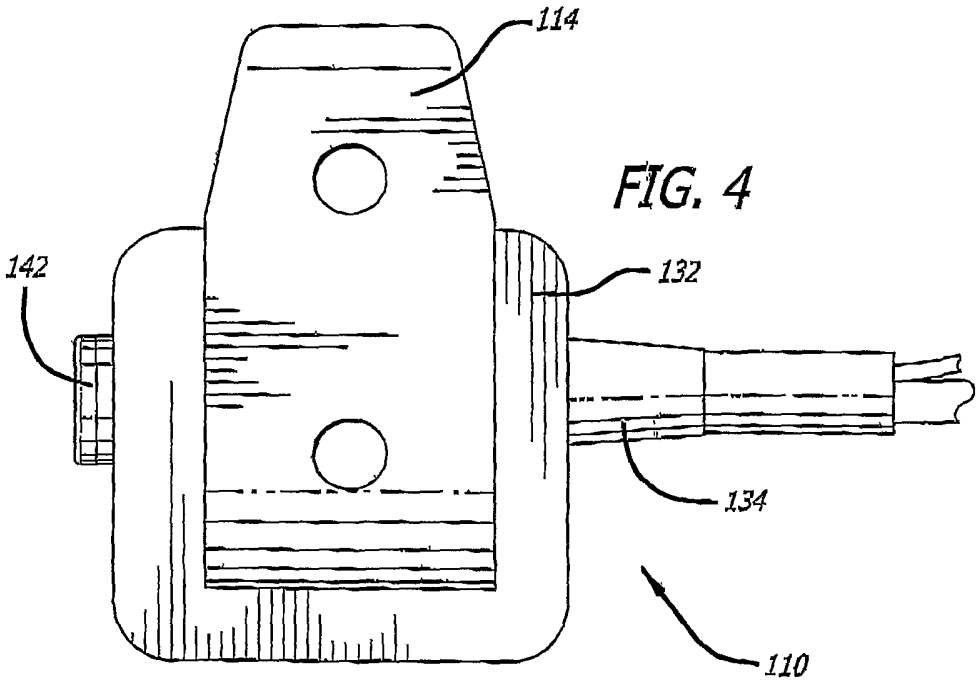


FIG. 4



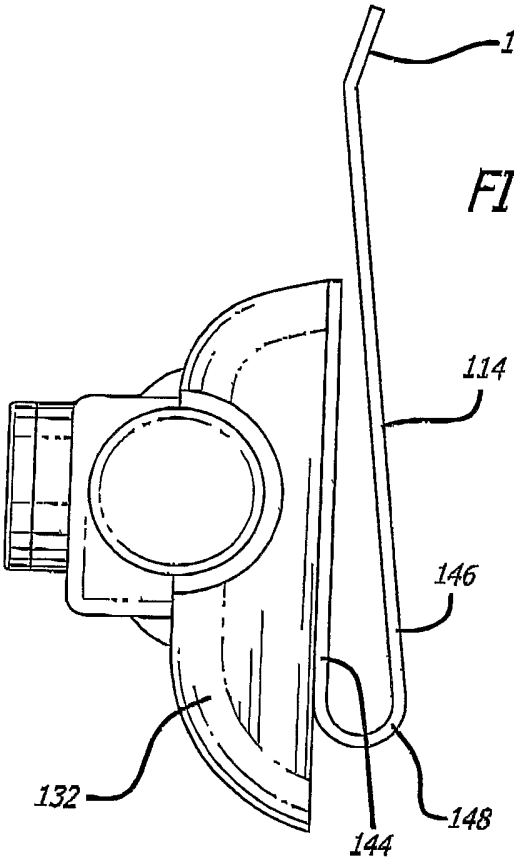

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FIG. 5

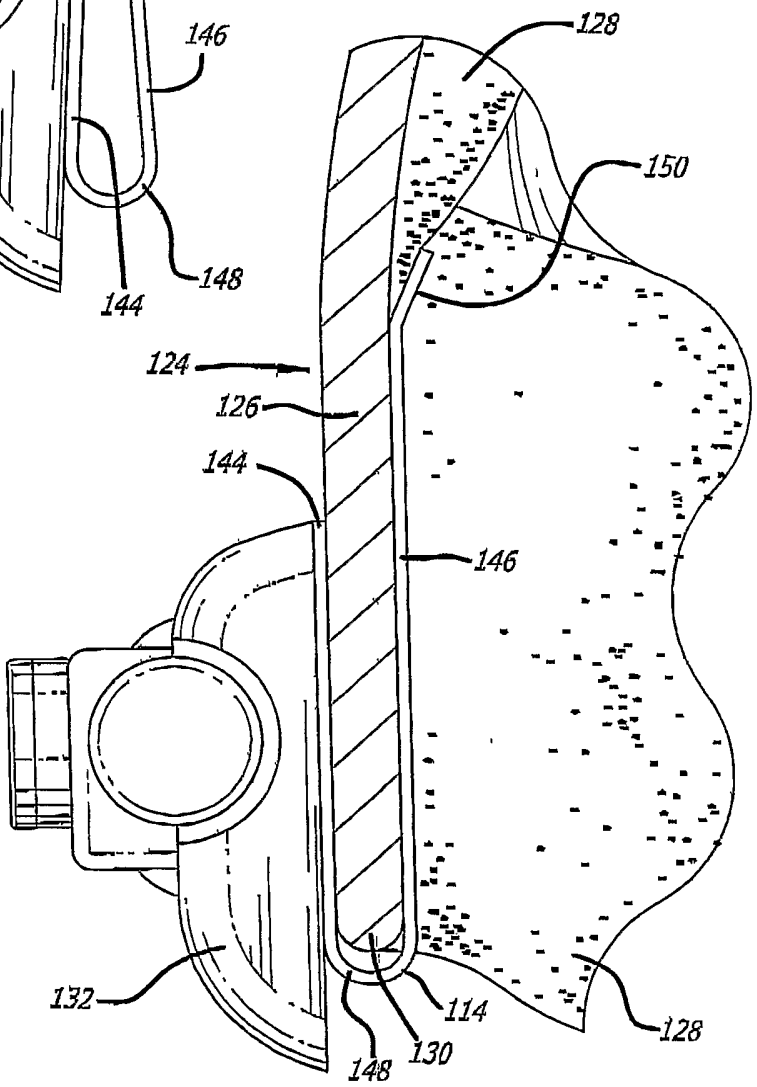
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FIG. 6

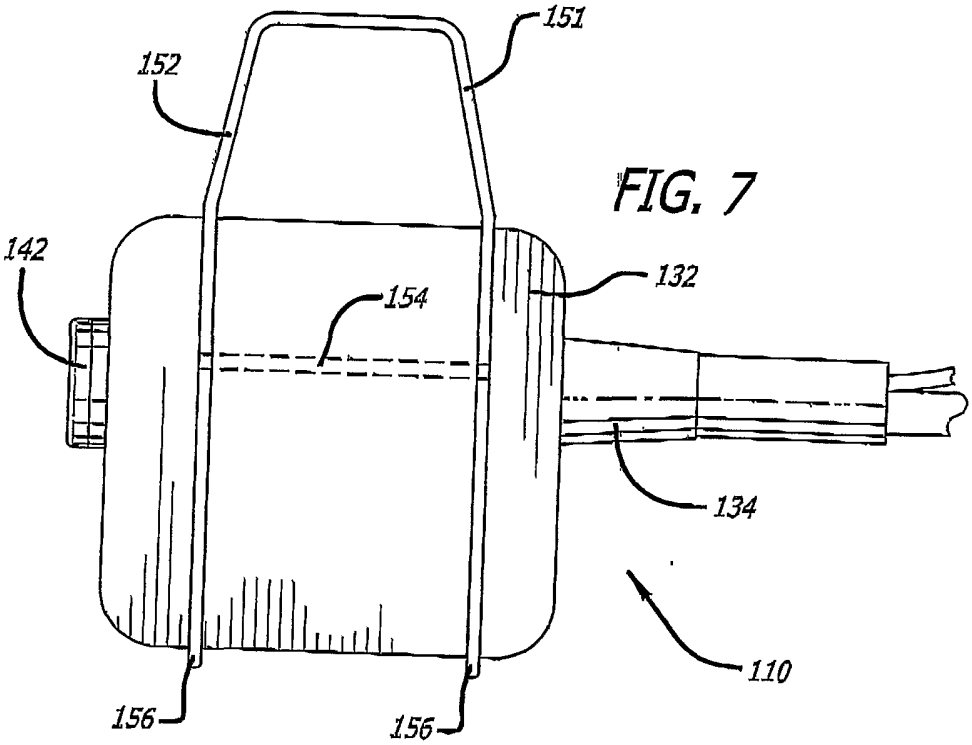
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FIG. 7

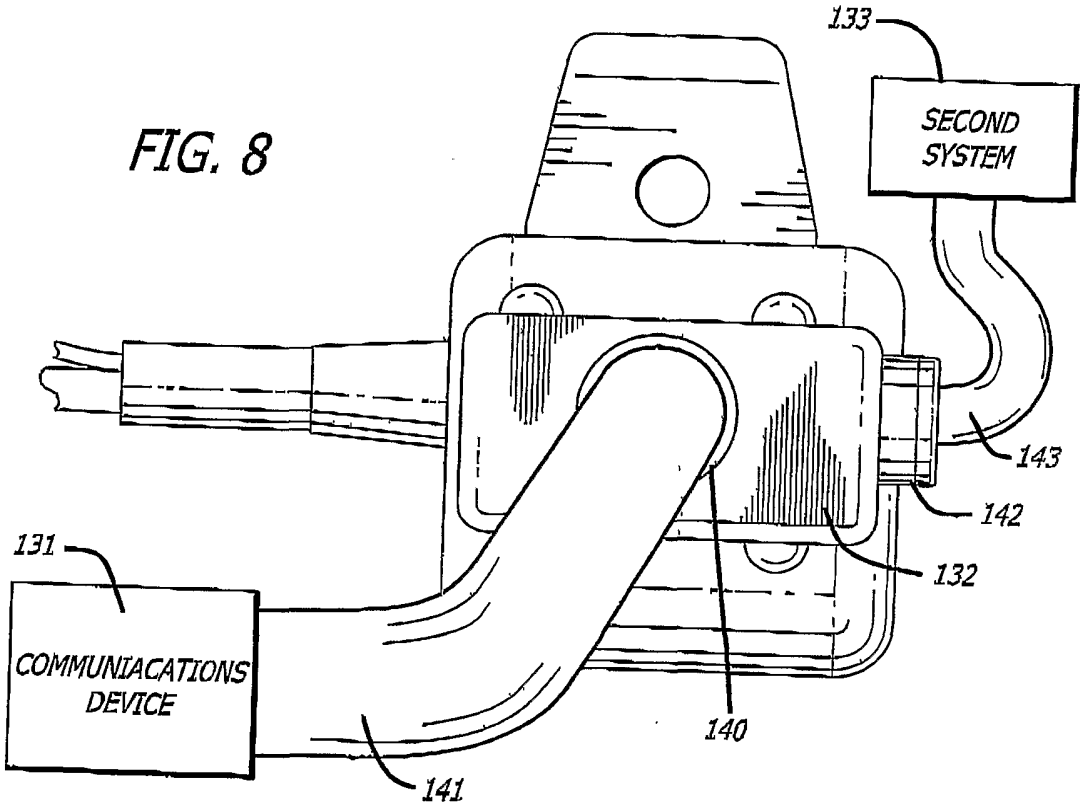
133
SECOND SYSTEM
143
142
132
131
COMMUNIACATIONS DEVICE
140
141

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US02/12907

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04R 25/00
US CL : 381/367, 376

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)
U.S. : 381/367, 376

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)
EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,590,209 A (PRATT et al) 31 December 1996 (31.12.1996), see figures 1-5.	1-22
Y	US 4,979,586 A (LAZZERONI et al) 25 December 1990 (25.12.1990), see figures 1-8.	1-22
A	US 4,977,975 A (LAZZERONI et al) 18 December 1990 (18.12.1990), see figures 1-6a	1-22
Y	US 4,788,724 A (LAZZERONI et al) 06 December 1988, see figures 1-14	1-22
A	US Re. 34,525 A (LAZZARONI et al) 01 February 1994 (01.02.1994), see figures 1-14	1-22
A	US Des. 363,934 A (PRATT et al) 07 November 1995, see figures 1-5	1-22

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

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Date of the actual completion of the international search	Date of mailing of the international search report
30 June 2002 (30.06.2002)	02 AUG 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Phylesha L Dabney Telephone No. 703-305-4700

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