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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 July 2014 (24.07.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/112332 A2

(51) International Patent Classification:
A45F 3/10 (2006.01)

(21) International Application Number:
PCT/JP2014/000048

(22) International Filing Date:
9 January 2014 (09.01.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2013-006776 17 January 2013 (17.01.2013) JP

(71) Applicant: **HITACHI KOKI CO., LTD.** [JP/JP]; 15-1, Konan 2-chome, Minato-ku, Tokyo, 1086020 (JP).

(72) Inventors: **KOSUGI, Shingo**; 1060 Takeda, Hitachinaka-shi, Ibaraki, 3128502 (JP). **YAMAKI, Tunenori**; 1060 Takeda, Hitachinaka-shi, Ibaraki, 3128502 (JP). **SAKAI, Masato**; 1060 Takeda, Hitachinaka-shi, Ibaraki, 3128502 (JP).

(74) Agent: **TSUTSUI, Yamato**; Tsutsui & Associates, 3F, Shinjuku Gyoen Bldg., 3-10, Shinjuku 2-chome, Shinjuku-ku, Tokyo, 1600022 (JP).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

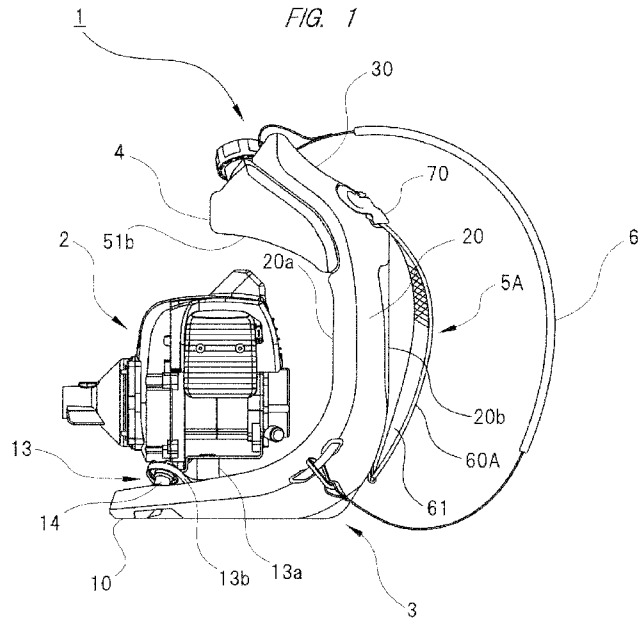
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) Title: BACKPACK CARRIER FOR WORKING MACHINE AND BACKPACK-TYPE WORKING MACHINE

FIG. 1



(57) Abstract: A backpack carrier 3 includes a mounting base 10 on which an engine 2 is mounted, a back face part 20 standing upright from the mounting base 10, and a backrest member 5A disposed on an outer surface 20b of the back face part 20 and in contact with a back of a worker. The backrest member 5A has an elastically deformable frame 60A whose at least two points in upper and lower parts are supported and which is curved so as to be separated from the outer surface 20b of the back face part 20, and an upholstery material 61 applied to the frame 60A and facing the outer surface 20b of the back face part 20 with a gap interposed therebetween. The frame 60A is regulated so that a distance between an upper support point and a lower support point is not extended when the frame is pressed toward the outer surface 20b of the back face part 20.

WO 2014/112332 A2

Description

Title of Invention: BACKPACK CARRIER FOR WORKING MACHINE AND BACKPACK-TYPE WORKING MACHINE

Technical Field

[0001] The present invention relates to a working machine, and particularly relates to a backpack-type working machine whose driving source and power source are carried on the back of a worker who uses the working machine.

Background Art

[0002] There is a backpack-type working machine whose engine or electric motor serving as a driving source or secondary battery serving as a power source of the driving source is carried on the back of a worker. For example, in a backpack-type bush cutter, which is one type of the backpack-type working machine, an engine serving as a driving source and a tank holding fuel to be supplied to the engine are mounted on a backpack carrier carried on the back of a worker.

[0003] Also, in a backpack-type sprayer, which is another type of the backpack-type working machine, an engine serving as a driving source and a blower driven by the engine are mounted on a backpack carrier carried on the back of a worker.

Citation List

Patent Literature

[0004] PTL 1: Japanese Patent Application Laid-Open Publication No. 2012-115776

Summary of Invention

Technical Problem

[0005] With regard to the backpack-type working machine mentioned above, various ideas for improving the comfortability and convenience of a worker have been proposed. For example, PTL 1 discloses a technique of removing moisture between a backpack carrier (backpack member) and the back of a worker and thereby eliminating the stuffy feeling of the back of the worker.

[0006] However, to eliminate the stuffy feeling of the back of the worker only is not sufficient for improving the comfortability and convenience of the worker, and a further improvement in the comfortability and convenience has been demanded.

[0007] An object of the present invention is to further improve the comfortability and convenience of a worker who uses a backpack-type working machine.

Solution to Problem

[0008] A backpack carrier for a working machine includes a back face part extended in an up and down direction, a mounting base on which a driving source or a power source

of the working machine is to be mounted, and a backrest member disposed on an outer surface of the back face part and in contact with a back of a worker. The backrest member has an elastically deformable frame whose at least two points in upper and lower parts are supported and which is curved so as to be separated from the outer surface of the back face part, and an upholstery material applied to the frame and facing the outer surface of the back face part with a gap interposed therebetween. The frame is regulated so that a distance between an upper support point and a lower support point is not extended when the frame is pressed toward the outer surface of the back face part.

[0009] A backpack-type working machine includes the backpack carrier for a working machine, and a driving source or a power source is mounted on the backpack carrier for a working machine.

Advantageous Effects of Invention

[0010] According to the present invention, it is possible to further improve the comfortability and convenience of a worker who uses a backpack-type working machine.

Brief Description of Drawings

[0011] [fig.1]FIG. 1 is a side view showing an example of a backpack-type bush cutter to which the present invention is applied.

[fig.2]FIG. 2 is a side view showing an example of a state of use of the backpack-type bush cutter.

[fig.3]FIG. 3 is a front side perspective view of a backpack carrier.

[fig.4]FIG. 4 is a rear side perspective view of the backpack carrier.

[fig.5]FIG. 5 is a side view of the backpack carrier.

[fig.6]FIG. 6 is a rear side perspective view of the backpack carrier from which a backrest member is removed.

[fig.7]FIG. 7 is an exploded perspective view of the backpack carrier.

[fig.8]FIG. 8 is a front view of the backpack carrier.

[fig.9]FIG. 9 is a sectional view taken along a B-B line shown in FIG. 8.

[fig.10]FIG. 10 is a sectional view taken along a C-C line shown in FIG. 8.

[fig.11]FIG. 11 is a sectional view taken along a D-D line shown in FIG. 8.

[fig.12]FIG. 12 is an enlarged perspective view of a tank.

[fig.13]FIG. 13 is another enlarged perspective view of the tank.

[fig.14]FIG. 14 is a front view of the backrest member.

[fig.15]FIG. 15 is a side view of the backrest member.

[fig.16]FIG. 16 is a top view of the backrest member.

[fig.17]FIG. 17 is an explanatory diagram showing a process of attaching the backrest member.

[fig.18]FIG. 18 is a rear view of the backpack carrier.

[fig.19]FIG. 19 is a side view showing another example of a state of use of the backpack-type bush cutter.

[fig.20]FIG. 20 is a schematic perspective view showing one modification example of the backrest member.

[fig.21A]FIG. 21A is a front view of the backrest member shown in FIG. 20.

[fig.21B]FIG. 21B is a top view of the backrest member shown in FIG. 20.

[fig.21C]FIG. 21C is a side view of the backrest member shown in FIG. 20.

[fig.22A]FIG. 22A is a front view schematically showing another modification example of the backrest member.

[fig.22B]FIG. 22B is a top view schematically showing another modification example of the backrest member.

[fig.22C]FIG. 22C is a side view schematically showing another modification example of the backrest member.

[fig.23]FIG. 23 is a front view schematically showing still another modification example of the backrest member.

Description of Embodiments

[0012] Hereinafter, an embodiment of the present invention will be described in detail with reference to the drawings. A backpack-type bush cutter 1 shown in FIG. 1 includes an engine 2 serving as a driving source, a rotating blade 7 (FIG. 2) driven by the engine 2, and a backpack carrier for a working machine (hereinafter, referred to as "backpack carrier 3") on which the engine 2 is mounted. The backpack carrier 3 is fitted with a tank 4, a backrest member 5A, and shoulder belts 6.

[0013] The engine 2 shown in FIG. 1 is a small 2-cycle engine. Power output from the engine 2 is transmitted through a driving force transmission mechanism to the rotating blade 7 shown in FIG. 2. As shown in FIG. 2, one end of a flexible shaft 8 is connected to an output shaft of the engine 2. The other end of the flexible shaft 8 is connected to a drive shaft (not shown) inserted in an operating lever 9. Furthermore, the drive shaft is connected to a gear in a gear case disposed on a front end of the operating lever 9. A driving force output from the engine 2 is transmitted through the driving force transmission mechanism composed of the flexible shaft 8, the drive shaft and gears to the rotating blade 7, and the rotating blade 7 is driven to rotate.

[0014] The backpack-type bush cutter 1 is carried on the back of a worker who uses the backpack-type bush cutter 1 in a manner as shown in FIG. 2. More specifically, the worker slings two shoulder belts 6 (only one of them is shown in FIG. 2) attached to the backpack carrier 3 over the left and right shoulders, and thereby carries the backpack carrier 3 on the back. The worker carrying the backpack carrier 3 on the back

grasps a grip 9a provided on the operating lever 9 with the right or left hand. The worker grasping the grip 9a mows grass and lawn by the rotating blade 7 attached to the front end of the operating lever 9, while moving the operating lever 9 left and right. In the following descriptions, words of up and down, front and rear, and left and right will be used as the words expressing the directions defined based on the worker carrying the backpack-type bush cutter 1 on the back as indicated in FIG. 2. Though not shown, a throttle lever for controlling the number of revolutions of the engine 2 is disposed near the grip 9a.

[0015] As shown in FIG. 3, the backpack carrier 3 has a mounting base 10 on which the engine 2 (FIG. 1) is mounted, a back face part 20 standing upright from the mounting base 10, and a handle 30 extending from the back face part 20 in approximately the same direction as the mounting base 10 in relation to the back unit 20. These mounting base 10, back face part 20 and handle 30 are integrally molded into a continuous single piece by a blow molding method, and are formed to have a continuous, almost arched structure when seen in a side view as shown in FIG. 5. In other words, the mounting base 10, the back face part 20, and the handle 30 are distinguished from each other merely for convenience of description, and no specific boundary is defined between them.

[0016] As shown in FIGs. 3 and 4, an approximately rectangular opening 11 is formed at the center of the mounting base 10, and three pedestals 12 are formed around the opening 11. As shown in FIG. 1, the engine 2 is mounted on the mounting base 10 via a metal mount 13 striding across the opening 11 (FIGs. 3 and 4). The mount 13 includes a support shaft 13a supported by a bearing (not shown) and three legs 13b (only one of them is shown in FIG. 1) extending from the bearing toward the pedestals 12 (FIGs. 3 and 4), respectively. An end of each of the legs 13b is fastened with a bolt to each pedestal 12 via a rubber bush 14. The bottom of the engine 2 is supported by the support shaft 13a of the mount 13 and the engine 2 can be rotated on the mounting base 10.

[0017] As shown in FIGs. 3 and 6, the back face part 20 has an inner surface 20a continuous with the engine mounting surface of the mounting base 10 and an outer surface 20b opposite to the inner surface 20a. As shown in FIG. 2, when the worker carries the backpack carrier 3 on the back, the outer surface 20b of the back face part 20 faces the back of the worker.

[0018] As shown in FIGs. 3 and 6, an approximately triangular opening 21 penetrating through the back face part 20 between the inner and outer surfaces thereof is formed, and two screw-fastening parts 22 are formed above and below the opening 21, respectively. In FIGs. 3 and 6, however, only two screw-fastening parts 22 formed in a lower part of the back face part 20 are shown. The screw-fastening parts 22 are used to

fix the backrest member 5A shown in FIG. 3 and others. A structure and a method for fixing the backrest member 5A using the screw-fastening parts 22 will be described in detail later.

[0019] The screw-fastening parts 22 will be described specifically. As shown in FIGs. 7, 10, and 11, four inner recesses 23 recessed toward the outer surface are formed in the inner surface 20a of the back face part 20. Meanwhile, as shown in FIGs. 10 and 11, four outer recesses 24 recessed toward the inner surface are formed in the outer surface 20b of the back face part 20. The inner recesses 23 and the outer recesses 24 corresponding to each other are disposed back to back to form respective pairs, and the bottoms of the inner recesses 23 and the outer recesses 24 forming the respective pairs communicate with each other through communication holes. As shown in FIGs. 7, 10, and 11, a boss member 25 having a screw hole is housed in each of the inner recesses 23. The screw hole of the boss member 25 penetrates through the boss member 25 and one end of the screw hole communicates with the communication hole. In other words, one end of the screw hole of the boss member 25 communicates with the bottom of the outer recess 24. The inner recesses 23, outer recesses 24, boss members 25, and communication holes described above constitute the respective screw-fastening parts 22. As shown most clearly in FIG. 7, an approximately rectangular flange is formed integrally on the outer peripheral surface of each boss member 25 so as to prevent the rotation of the boss member 25 in the inner recess 23.

[0020] As shown in FIGs. 4 and 6, the handle 30 has a pair of arms 31 extending from the back face part 20 in approximately the same direction as the mounting base 10 and a grip 32 extending in a direction intersecting with the arms 31 to connect the front ends of the two arms 31 to each other. The worker can carry the backpack carrier 3 while holding the grip 32 when necessary.

[0021] As shown in FIGs. 3 and 5, the tank 4 holding fuel to be supplied to the engine 2 (FIG. 1) is disposed under the handle 30. The tank 4 extends integrally with the handle 30 in approximately the same direction as the handle 30 and a gap between the backpack carrier 3 (mainly the handle 30) and the tank 4 is kept almost constant. Since the tank 4 extending integrally with the handle 30 is disposed under the handle 30 extending in approximately the same direction as the mounting base 10, the engine 2 is placed between the mounting base 10 and the tank 4 as shown in FIG. 1. In other words, the handle 30 and the tank 4 overhang the engine 2 mounted on the mounting base 10 like eaves.

[0022] As shown in FIGs. 12 and 13, the tank 4 has a bulged part 42 which is fitted into a recess 41 (FIGs. 7, 10, and 11) formed on the backpack carrier 3. Also, the tank 4 has two cavities 44 which receive two ribs 43 (FIGs. 7 and 10) that are projections formed on the backpack carrier 3. More specifically, as shown in FIGs. 10 and 11, recesses

and projections on the inner surface of the backpack carrier and recesses and projections on the outer surface of the tank are fitted together, so that the gap between the backpack carrier 3 and the tank 4 is kept almost constant.

[0023] As shown in FIG. 10, the tank 4 is fixed with screws 46 serving as first fixtures to the backpack carrier 3 (handle 30). Specifically, as shown in FIG. 7, the screws 46, which penetrate through the holes formed in the ceilings 44a of the cavities 44 (FIG, 12) and the holes formed in the ceilings 43a of ribs 43 under the ceilings 44a, are connected to boss members 45 disposed inside the ribs 43. The boss members 45 have the same shape and structure as those of the boss members 25 shown in FIG. 7.

[0024] A tongue part 47 extends from the bottom of the tank 4 and the tongue part 47 is fixed to the backpack carrier 3 (back face part 20). Specifically, as shown in FIG. 9, a nut 49 is connected to a shank of a bolt 48 serving as a second fixture that penetrates through the back face part 20 and the tongue part 47 to project from the tongue part 47.

[0025] As shown in FIG. 7, the tank 4 is fixed to the backpack carrier 3 in different two directions. More specifically, the tank 4 is fixed to the backpack carrier 3 with the screws 46 penetrating through the backpack carrier 3 in the up-and-down direction and is fixed to the backpack carrier 3 with the bolt 48 penetrating through the backpack carrier 3 in the front-to-rear direction. Fixing the tank 4 to the backpack carrier 3 in different two directions in this manner may raise a concern that a stress caused by the vibration of the engine 2 (FIG. 1) and others is concentrated on one of the two fixed spots. Therefore, as shown in FIGs. 7 and 9, a rubber bush 50 serving as a vibration absorption member is provided around the shank of the bolt 48. In other words, the tongue part 47 of the tank 4 and the back face part 20 of the backpack carrier 3 are fixed together via the rubber bush 50.

[0026] The shape of the tank 4 is designed so that a space large enough to allow the worker to put his or her hand therein is formed between the grip 32 and the tank 4 while suppressing the increase of the height (H) of the backpack carrier 3 of FIG. 9. Specifically, as shown in FIGs. 12 and 13, a pair of rising parts 52 extending toward the arms 31 (FIGs. 3 and 4) of the handle 30 are formed on both outer sides of the top face 51a of the tank 4. As a result, as shown in FIGs. 3 and 4 and others, the handle 30 and the tank 4 make up an integral structure having a smooth and continuous appearance. Also, a clearance part lower than the rising parts 52 is formed above the top face 51a of the tank 4 between the left and right rising parts 52. More specifically, a space large enough to allow the worker to put his or her hand therein is formed between the grip 32 and the tank 4, and at the same time, the working machine as a whole is downsized and the convenience in carrying the working machine and the like is enhanced. As shown in FIGs. 12 and 13, a cylinder 53 forming a fuel supply port extends from one of the rising parts 52 of the tank 4, and a screw-type fuel cap 54 is attached to the front

end of the cylinder 53.

[0027] As shown in FIGs. 9 to 11, a lower face 51b of the tank 4 is curved so that the central part of the lower face 51b in its width direction (left-right direction) becomes the farthest from the engine 2 (FIG. 1). In other words, the lower face 51b of the tank 4 is curved to sink toward the interior of the tank 4. As a result, since the tank 4 can be disposed so as to avoid the engine 2, the height (H) of the backpack carrier 3 can be further reduced. In addition, since a space between the engine 2 (FIG. 1) and the tank lower face 51b is expanded, heat dissipation performance can be improved. As shown in FIG. 12, a fuel nozzle 55 extends from the tank lower face 51b. This fuel nozzle 55 is connected to the engine 2 (FIG. 1) via a fuel pipe (not shown), so that the fuel is supplied from the tank 4 to the engine 2. Therefore, as shown in FIG. 6, a groove 56 for placing the fuel pipe therein is formed on the outer surface 20b of the back face part 20. One end of the fuel pipe placed in the groove 56 is connected to a carburetor of the engine 2 (FIG. 1) via the opening 21.

[0028] As shown in FIG. 2 and others, the tank 4 extends obliquely upward from the back face part 20. In other words, as shown in FIGs. 9 to 11, the tank lower face 51b is inclined so as to be gradually increased in height as the distance from the back face part 20 is increased. Since the fuel nozzle 55 shown in FIG. 12 is provided at the lowermost point of the tank lower face 51b or near the lowermost point, the fuel in the tank 4 is collected at the fuel nozzle 55 because of the inclination of the tank lower face 51b. Therefore, even when the fuel in the tank 4 decreases or the upper part of the backpack carrier 3 shown in FIG. 2 falls backward, fuel supply to the engine 2 is not interrupted.

[0029] Next, the backrest member 5A shown FIGs. 1 and 3 and others will be described in detail. As shown in FIGs. 14 to 16, the backrest member 5A has an elastically deformable frame 60A made of spring steel and an upholstery material 61 applied to the frame 60A.

[0030] As shown in FIG. 14, the frame 60A is formed into an annular shape from a single piece of spring steel. Also, as shown in FIGs. 15 and 16, the frame 60A has a complicated shape curved three-dimensionally in accordance with the shape of the back of a person, and by and large, the frame 60A is curved so as to be separated from the outer surface 20b of the back face part 20 (see FIGs. 10 and 11). The upholstery material 61 applied to the frame 60A is a mesh sheet having breathability and stretchability. When the worker carries the backpack carrier 3 on the back in the manner as shown in FIG. 2, the upholstery material 61 contracts and expands in accordance with the shape of the back of the worker, and comes in close contact with the back. In other words, the upholstery material 61 forms a backrest face in contact with the back of the worker. Since the frame 60A is curved in the manner as described

above, the upholstery material 61 applied to the frame 60A faces the outer surface 20b of the back face part 20 with a gap interposed therebetween as shown in FIGs. 10 and 11. In other words, a space 62 is present between the outer surface 20b of the back face part 20 and the upholstery material 61. This space 62 is maintained even in the state where the worker carries the backpack carrier 3 on the back (see FIG. 2).

[0031] As described above, the frame 60A is curved in accordance with the shape of the back of a person and the upholstery material 61 can contract and expand in accordance with the shape of the back of a person. Therefore, as shown in FIG. 2, the backrest member 5A fits to the back of the worker who carries the backpack carrier 3 on the back, and this gives the worker a comfortable wear feeling.

[0032] As shown in FIG. 14, the frame 60A of the backrest member 5A has a lower side 63 and an upper side 64 opposed to each other and lateral sides 65a and 65b connecting both ends of the lower side 63 to both ends of the upper side 64. Although having said that, since the frame 60A is formed by bending a single piece of spring steel, the lower side 63, the upper side 64, and the lateral sides 65a and 65b are continuous with each other.

[0033] As shown in FIG. 17, the lower side 63 of the frame 60A is fitted with a pair of fixing brackets 66a and 66b which are bent to hold the lower side 63. The fixing brackets 66a and 66b have holes through which screws 67 are inserted, respectively, and the screws 67 inserted through these holes are connected to the two screw-fastening parts 22 formed in the lower part of the back face part of the backpack carrier 3, respectively (FIGs. 6 and 10). In other words, at least one point in the lower part of the frame 60A is fixed to the outer surface 20b of the back face part 20.

[0034] The upper side 64 of the frame 60A is supported by a support member 70 shown in FIGs. 1 and 4 and others. As shown in FIGs. 7 and 17, the support member 70 is fixed with screws 71 to the two screw-fastening parts 22 formed in the upper part of the back face part (FIG. 11). As shown in FIG. 10, the upper side 64 of the frame 60A is inserted between the outer surface 20b of the back face part 20 and the support member 70 so as to abut on the support member 70. In other words, at least one point in the upper part of the frame 60A is made to abut on the support member 70.

[0035] As shown in FIG. 14, a band member 68 is sewed onto the upholstery material 61. The band member 68 is disposed so as to bridge over the upholstery material 61, and both ends thereof are fixed to the lateral sides 65a and 65b of the frame 60A, respectively. The band member 68 reinforces the upholstery material 61, and forms the backrest face together with the upholstery material 61.

[0036] The backrest member 5A having the structure described above is attached to the back face part 20 of the backpack carrier 3, for example, in the following manner. First, as shown in FIG. 17B, the fixing brackets 66a and 66b attached to the lower side 63 of

the frame 60A (only the fixing bracket 66b is shown in FIG. 17B) are fixed with the screws 67 to the back face part 20. Then, the backrest member 5A is rotated around the lower side 63 of the frame 60A so that the upper side 64 of the frame 60A is made to abut on the back face part 20 as shown in FIG. 17C. Subsequently, the support member 70 is fitted on the upper side 64 of the frame 60A, and the support member 70 fitted on the upper side 64 is then fixed with the screws 71 to the back face part 20. In other words, the upper side 64 of the frame 60A is held between the outer surface 20b of the back face part 20 and the support member 70.

[0037] When the worker carries the backpack carrier 3 on the back as shown in FIG. 2, the backrest face formed of the upholstery material 61 and the band member 68 shown in FIG. 14 and others comes in contact with the back of the worker. As a result, a load caused from the weights of the backpack carrier 3 and the engine 2 mounted on the backpack carrier 3 is applied to the backrest member 5A. The applied load presses the backrest member 5A (frame 60A) toward the back face part 20 of the backpack carrier 3. However, at least one point of each of the upper part and the lower part of the frame 60A is supported. Specifically, as shown in FIG. 10, the lower side 63 of the frame 60A is fastened with the screws to the outer surface 20b of the back face part 20, and the upper side 64 of the same is made to abut on the support member 70. Therefore, when a force that presses the frame 60A toward the outer surface 20b of the back face part 20 acts on the frame 60A, the lateral sides 65a and 65b shown in FIG. 14 may deform elastically so as to move away from each other leftward and rightward, but the lower side 63 and the upper side 64 are not deformed elastically to move away from each other upward and downward. In other words, the frame 60A is regulated so that the distance between the upper support point and the lower support point is not extended. For this reason, the backrest member 5A shown in FIG. 2 is not deformed heavily, and the space 62 between the upholstery material 61 and band member 68 (FIG. 14) and the outer surface 20b of the back face part 20 is maintained. Consequently, in combination with the fact that the upholstery material 61 forming the backrest face is a mesh sheet having breathability, the stuffy feeling on the back of the worker is eliminated. In addition, since a part of the load is supported by the elastic resilience of the backrest member 5A (frame 60A), the load applied to the worker is reduced. Of course, the upholstery material 61 is not limited to a mesh sheet, and may be, for example, fabrics, knits, or vinyl sheet with multiple holes.

[0038] As shown in FIG. 18, one ends of the respective shoulder belts 6 are fixed to the handle 30 of the backpack carrier 3, and the other ends of the same are fixed to the back face part 20. Specifically, the one ends of the shoulder belts 6 are wrapped around the grip 32 of the handle 30, and the other ends of the same are coupled via locking rings 73 to fixing parts 72 formed on the lower parts of the side faces of the back face

part 20, respectively.

[0039] As shown in FIG. 6, the head of the bolt 48 fixing the tank 4 is buried in a recess formed in the outer surface 20b of the back face part 20. As mentioned above, the fuel pipe (not shown) connecting the tank 4 to the engine 2 (FIG. 1) is placed in the groove 56 formed on the outer surface 20b of the back face part 20. In other words, the outer surface 20b of the back face part 20 has no projection and most part of the outer surface 20b is flat. As a result, even when the worker carries the backpack carrier 3 on the back without attaching the backrest member 5A (FIG. 2) as shown in FIG. 19, the worker does not feel a pain or discomfort on the back.

[0040] The present invention is not limited to the foregoing embodiment and various modifications and alterations can be made within the scope of the present invention. For example, the engine as a driving source can be mounted on an inner side of the back face part. As described above, there is no specific boundary between the mounting base, the back face part and the handle. Therefore, the mounting base is a part of the backpack carrier on which a driving source or a power source is to be mounted. Also, the backrest member in the above-described embodiment may be modified into various forms. Some modification examples of the backrest member will be described below with reference to the drawings. In the following description, the same components as those described above are denoted by the same reference symbols throughout the drawings, and the repetitive description thereof will be omitted.

First Modification Example

[0041] A frame 60B constituting a backrest member 5B shown in FIG. 20 has a right frame member 81 and a left frame member 82 independent of each other and a sheet-like coupling member 83 to which the frame members 81 and 82 are fixed.

[0042] The right frame member 81 and the left frame member 82 are formed into a strip shape from spring steel. The right frame member 81 is curved so as to be separated from the outer surface 20b of the back face part 20 (FIG. 21C) of the backpack carrier, and an upper end 81a of the right frame member 81 is fixed to the upper right corner of the coupling member 83 and a lower end 81b thereof is fixed to the lower right corner of the coupling member 83. Also, the left frame member 82 is curved in the same manner as the right frame member 81, and an upper end 82a of the left frame member 82 is fixed to the upper left corner of the coupling member 83 and a lower end 82b thereof is fixed to the lower left corner of the coupling member 83. In other words, the upper ends of the frames 81 and 82 and the lower ends of the same are coupled to each other via the coupling member 83. Thus, two points in the upper part and two points in the lower part of the frame 60B composed of the two frame members 81 and 82 are respectively supported.

[0043] As shown in FIGs. 21A and 21B, the right frame member 81 and the left frame

member 82 are arranged in parallel with each other. Therefore, the distance (D1) between the two support points (upper ends 81a and 82a) in the upper part of the frame 60B is equal to the distance (D2) between the two support points (lower ends 81b and 82b) in the lower part of the frame 60B. Furthermore, the maximum width (W) of the frame 60B is substantially equal to each of the distances (D1, D2).

[0044] As shown in FIG. 21C, when the worker carries the backpack carrier (not shown) with the backrest member 5B attached thereto on the back, a load caused from the weights of the backpack carrier and the engine (not shown) mounted on the backpack carrier is applied to the backrest member 5B. The load presses the backrest member 5B (frame 60B) toward the outer surface 20b of the back face part 20.

[0045] As shown in FIG. 20, however, the upper end 81a and the lower end 81b of the right frame member 81 constituting the frame 60B are coupled to each other via the coupling member 83. Also, the upper end 82a and the lower end 82b of the left frame member 82 are also coupled to each other via the coupling member 83. Hence, the two points in the upper part of the frame 60B and the two points in the lower part of the same are respectively supported. Therefore, the distances between the upper support points and the lower support points of the frame 60B are not extended even when a force that presses the frame 60B toward the outer surface 20b of the back face part 20 (FIG. 21C) acts on the frame 60B. In other words, the frame 60B is regulated so that the distances between the upper support points and the lower support points of the frame 60B are not extended.

Second Modification Example

[0046] A frame 60C constituting a backrest member 5C shown in FIG. 22 has the right frame member 81 and the left frame member 82 independent of each other and the sheet-like coupling member 83 to which the frame members 81 and 82 are fixed. In this respect, the frame 60C is identical with the frame 60B shown in FIG. 20.

[0047] However, the left and right frame members 81 and 82 constituting the frame 60C shown in FIG. 22 are curved so that respective longitudinal central parts of the frame members 81 and 82 project outward. Therefore, the distance (D1) between the two support points (upper ends 81a and 82a) in the upper part of the frame 60C is equal to the distance (D2) between the two support points (lower ends 81b and 82b) in the lower part of the frame 60C, but the maximum width (W) of the frame 60C is larger than each of the distances (D1, D2).

[0048] The two points in the upper part of the frame 60C shown in FIG. 22 and the two points in the lower part of the same are respectively supported. Therefore, the distances between the upper support points and the lower support points of the frame 60C are not extended even when a force that presses the frame 60C toward the outer surface 20b of the back face part 20 (FIG. 22C) acts on the frame 60C. In other words, the frame 60C

is regulated so that the distances between the upper support points and the lower support points of the frame 60C are not extended. In the frame 60C shown in FIG. 22, however, since the frame members 81 and 82 elastically deform so as to move away from each other leftward and rightward when the force that presses the frame 60C toward the outer surface 20b of the back face part 20 acts on the frame 60C, the pressing force is properly released and the load applied to the worker is further reduced.

Third Modification Example

[0049] A frame 60D constituting a backrest member 5D shown in FIG. 23 is formed into an annular shape from a single piece of spring steel. In this respect, the frame 60D is identical with the frame 60A shown in FIG. 14 and others. Though not shown, an upholstery material forming the backrest face is applied also to the frame 60D shown in FIG. 23.

[0050] However, in the frame 60A shown in FIG. 14, the lower side 63 and the upper side 64 thereof have different lengths. In other words, the frame 60A shown in FIG. 14 has a vertically asymmetrical shape. In contrast, the frame 60D shown in FIG. 23 is formed along circular arcs with their center at a point O. More specifically, the frame 60D shown in FIG. 23 has a circular shape.

[0051] Two points in the upper part of the frame 60D shown in FIG. 23 and two points in the lower part of the same are respectively supported. Furthermore, the distance (D1) between the two support points in the upper part is equal to the distance (D2) between the two support points in the lower part, and the frame 60D is identical with the frame 60B shown in FIG. 21 in this respect. On the other hand, the maximum width (W) of the frame 60D is larger than each of the distances (D1, D2), and the frame 60D is identical with the frame 60C shown in FIG. 22 in this respect.

[0052] The embodiment in which a driving source is mounted on the backpack carrier has been described in this specification, but another embodiment in which a power source is mounted on the backpack carrier may also be possible. In another embodiment, for example, a secondary battery serving as the power source that supplies power to an electric motor serving as the driving source is mounted on the backpack carrier. In still another embodiment, both of the electric motor serving as the driving source and the secondary battery serving as the power source are mounted on the backpack carrier.

[0053] Also, the present invention can be applied to a backpack-type working machine other than the backpack-type bush cutter. For example, the present invention can be applied to a backpack-type sprayer and a backpack-type blower.

Claims

[Claim 1] A backpack carrier for a working machine, comprising:
a back face part extended in an up and down direction;
a mounting base on which a driving source or a power source of the working machine is to be mounted; and
a backrest member disposed on an outer surface of the back face part and in contact with a back of a worker,
characterized in that the backrest member includes:
an elastically deformable frame whose at least two points in upper and lower parts are supported and which is curved so as to be separated from the outer surface of the back face part; and
an upholstery material applied to the frame and facing the outer surface of the back face part with a gap interposed therebetween, and
the frame is regulated so that a distance between an upper support point and a lower support point is not extended when the frame is pressed toward the outer surface of the back face part.

[Claim 2] The backpack carrier for a working machine according to claim 1, wherein at least one of the upper and lower support points of the frame is fixed to the outer surface of the back face part.

[Claim 3] The backpack carrier for a working machine according to claim 2, wherein one of the upper and lower support points of the frame is fixed to the outer surface of the back face part, and
the other of the upper and lower support points of the frame is made to abut against a support member fixed to the outer surface of the back face part.

[Claim 4] The backpack carrier for a working machine according to claim 1, wherein the upper and lower support points of the frame are coupled to each other via a coupling member.

[Claim 5] The backpack carrier for a working machine according to claim 1, wherein two points in the upper part of the frame and two points in the lower part of the frame are respectively supported, and
a maximum width of the fame is larger than both of a distance between the upper two support points and a distance between the lower two support points.

[Claim 6] The backpack carrier for a working machine according to claim 5, wherein the frame has an annular shape.

[Claim 7] The backpack carrier for a working machine according to claim 1,

wherein the upholstery material has breathability.

[Claim 8] The backpack carrier for a working machine according to claim 7, wherein the upholstery material has stretchability.

[Claim 9] A backpack-type working machine comprising:
the backpack carrier for a working machine according to claim 1; and
a driving source or a power source mounted on the backpack carrier for a working machine.

[Fig. 1]

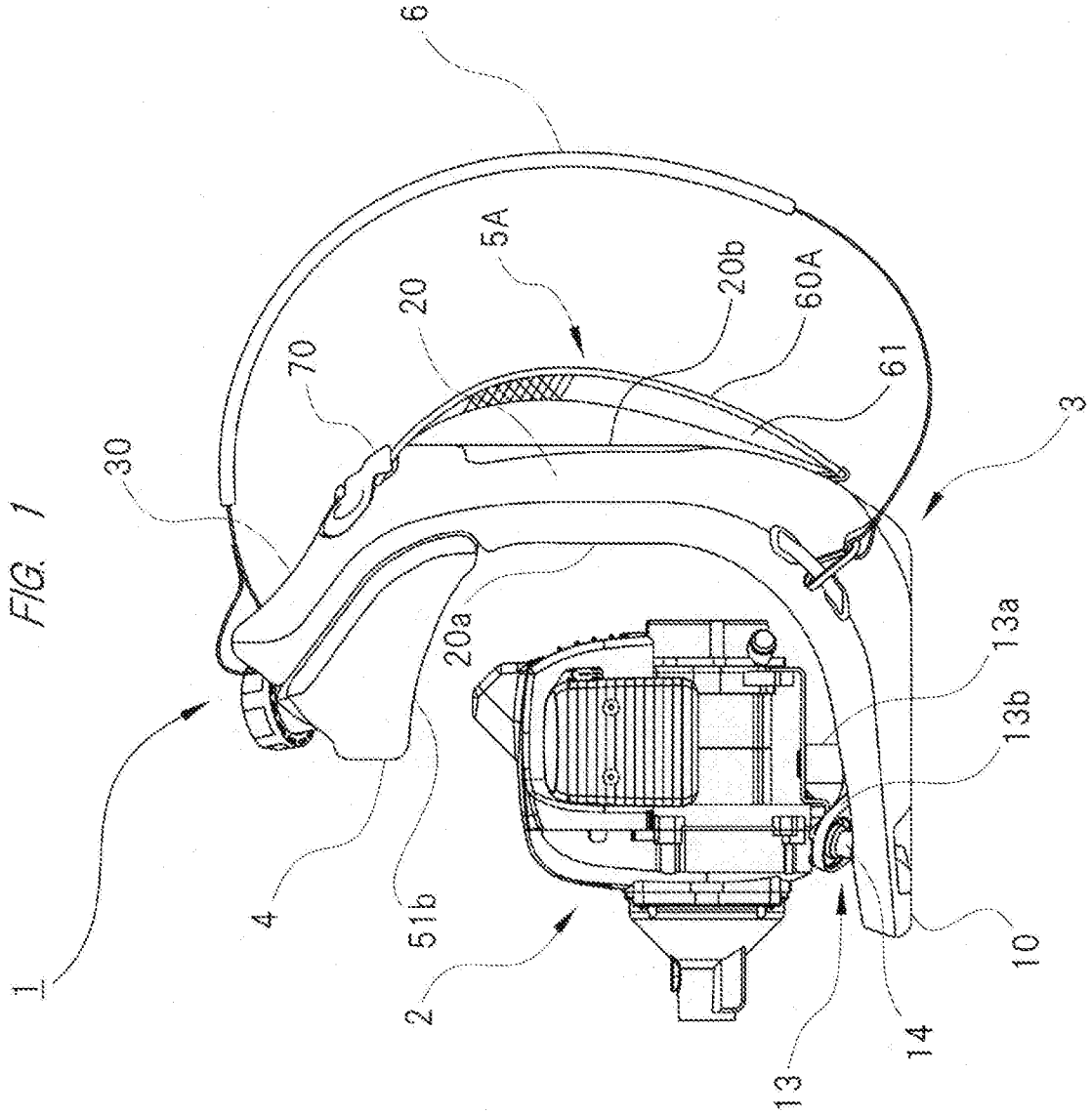


FIG. 1

[Fig. 2]

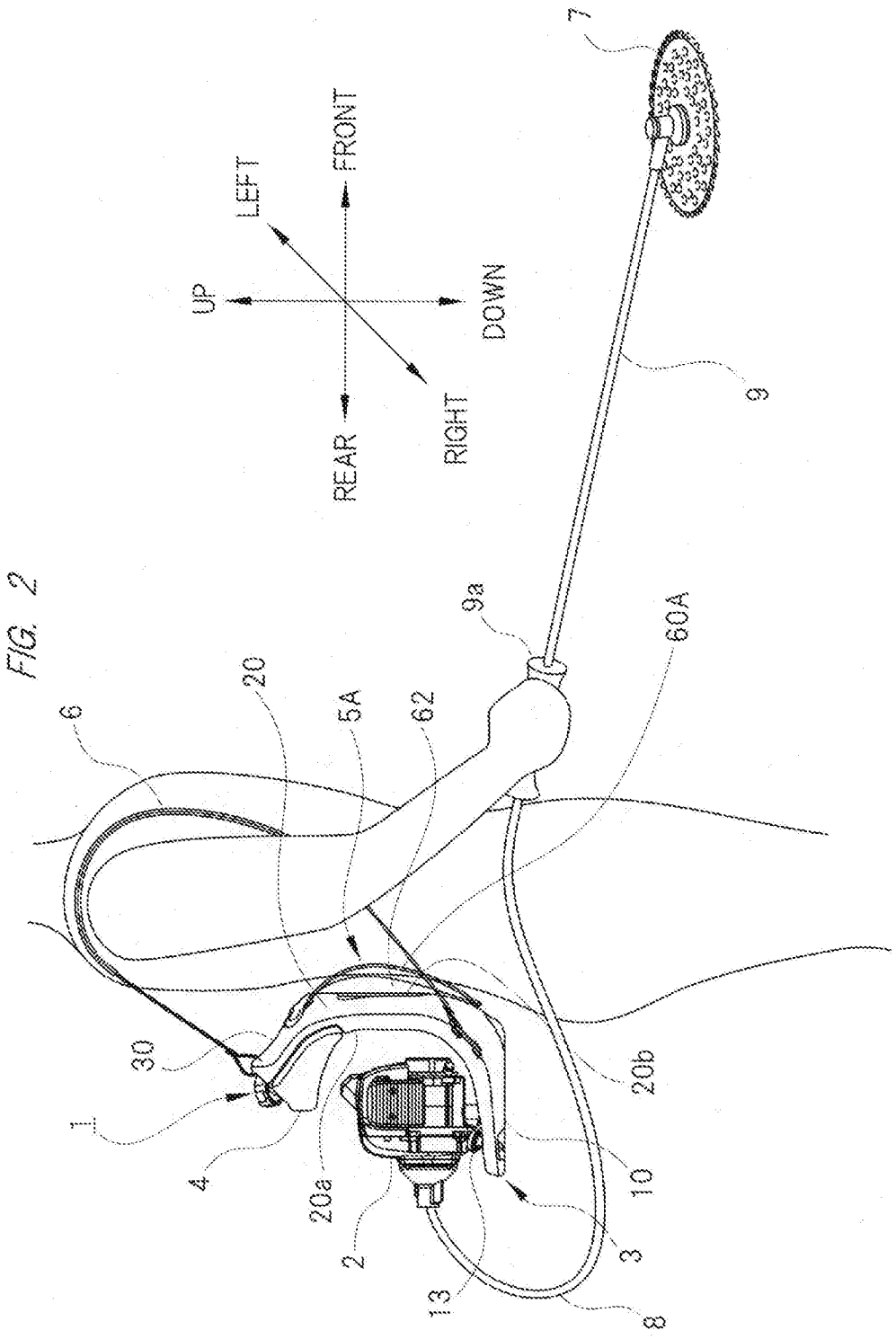
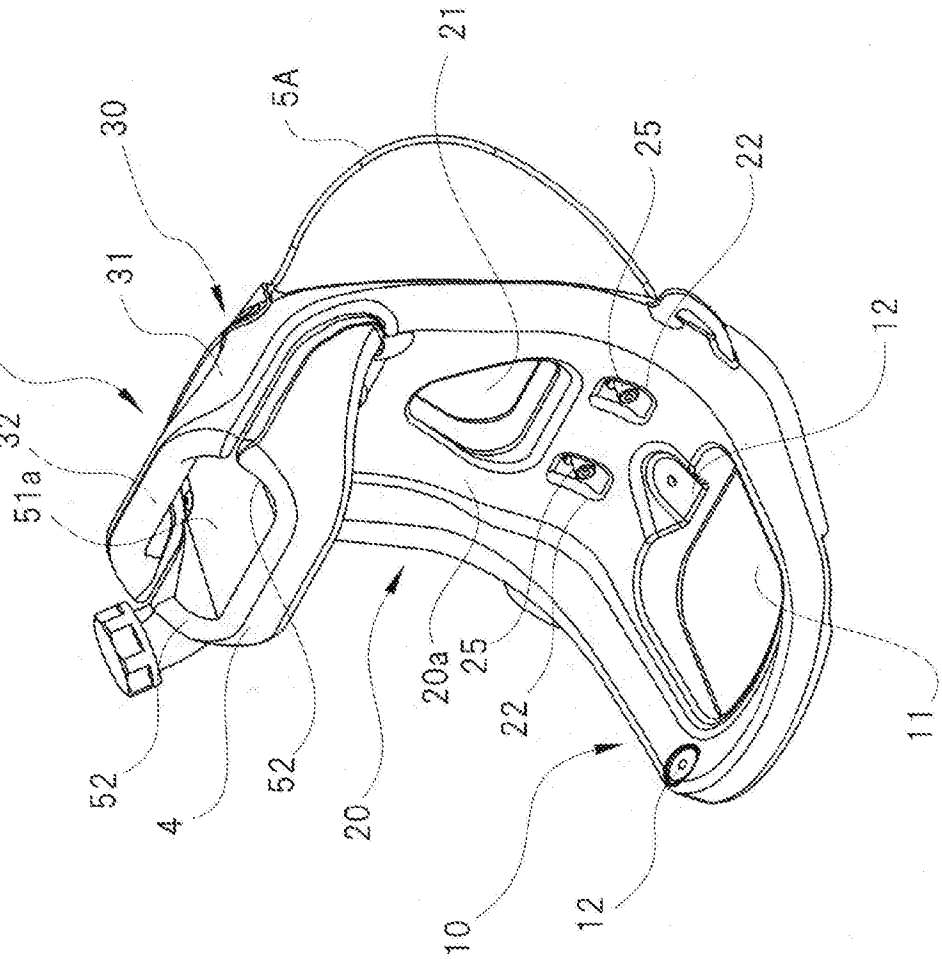


FIG. 2
UP
LEFT
FRONT
DOWN
REAR
RIGHT
7
9
9a
60A
6
20
5A
62
30
1
4
20a
2
13
3
10
20b
8

[Fig. 3]

FIG. 3



[Fig. 4]

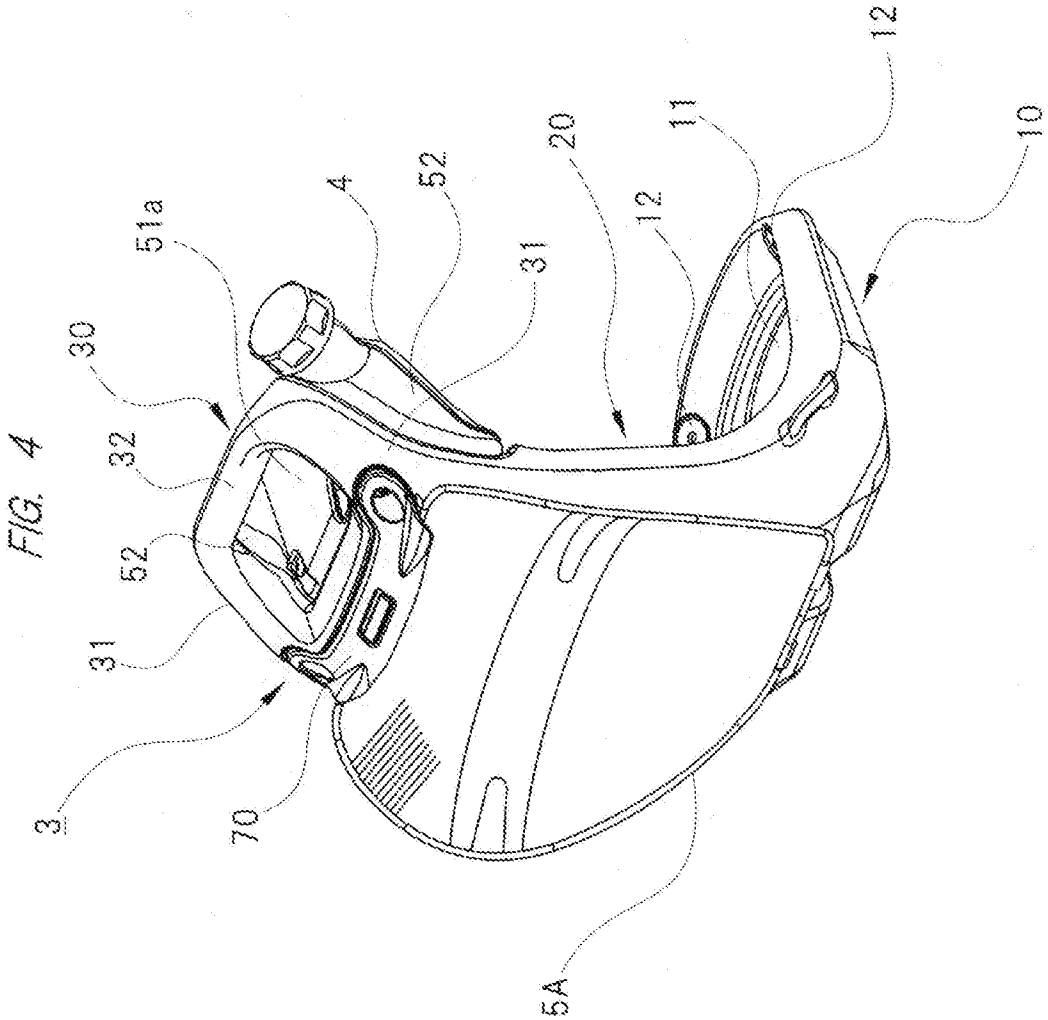
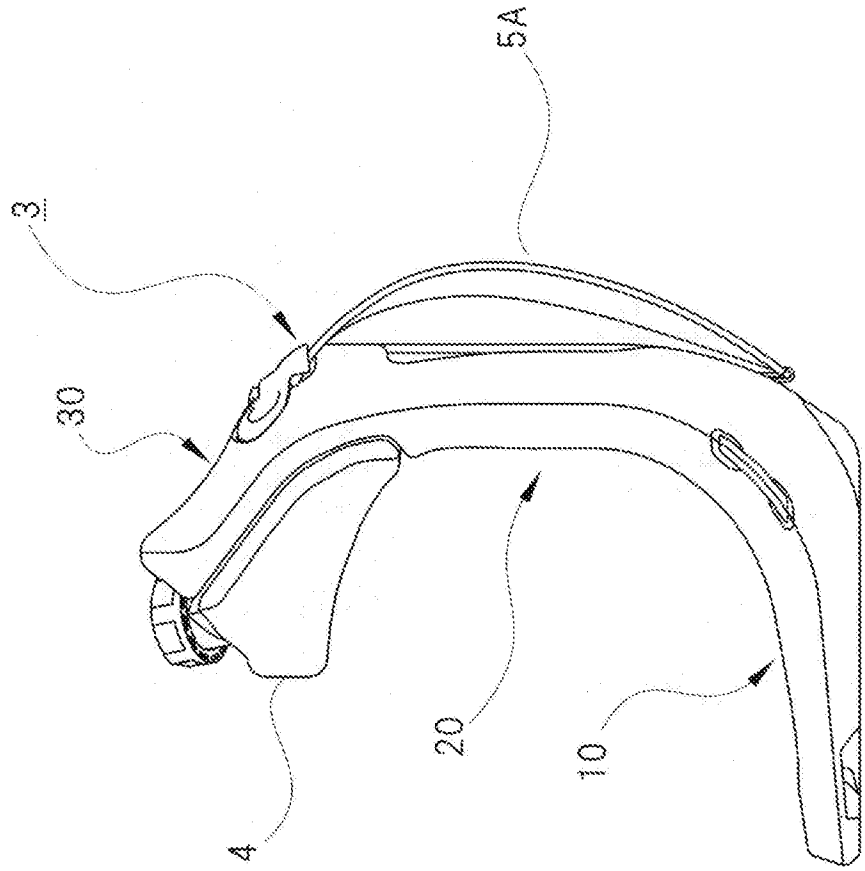


FIG. 4

[Fig. 5]

FIG. 5



[Fig. 6]

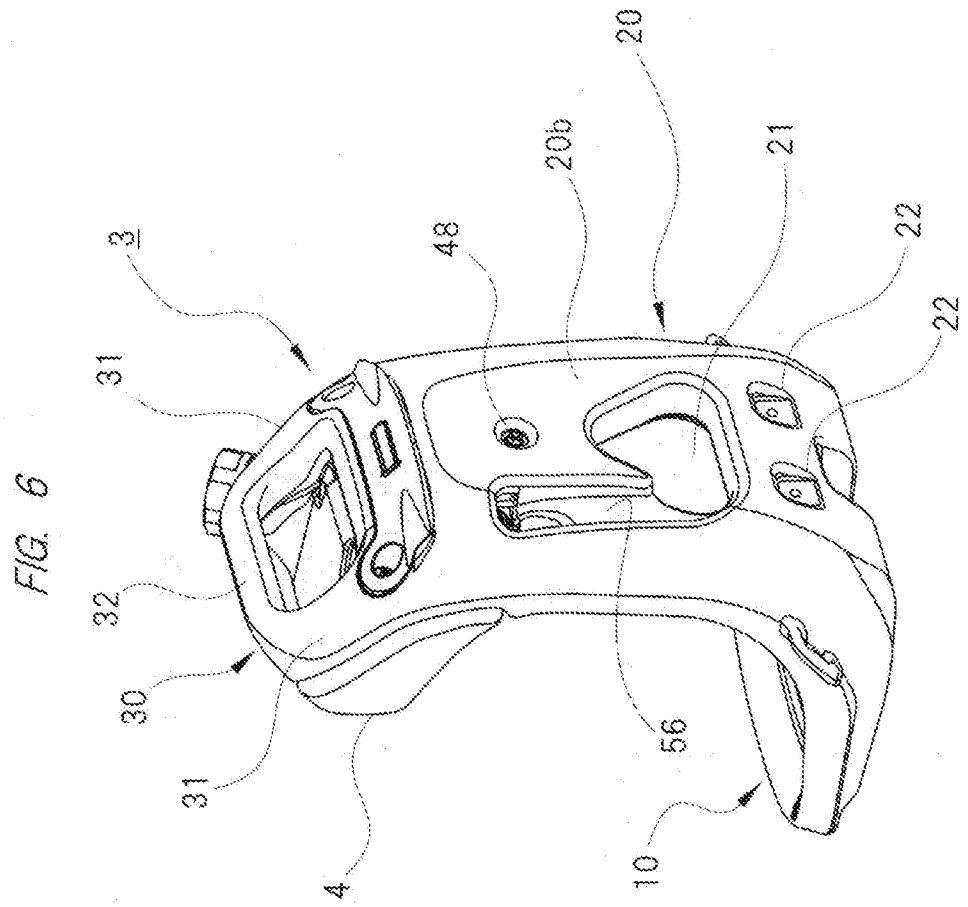


FIG. 6

[Fig. 7]

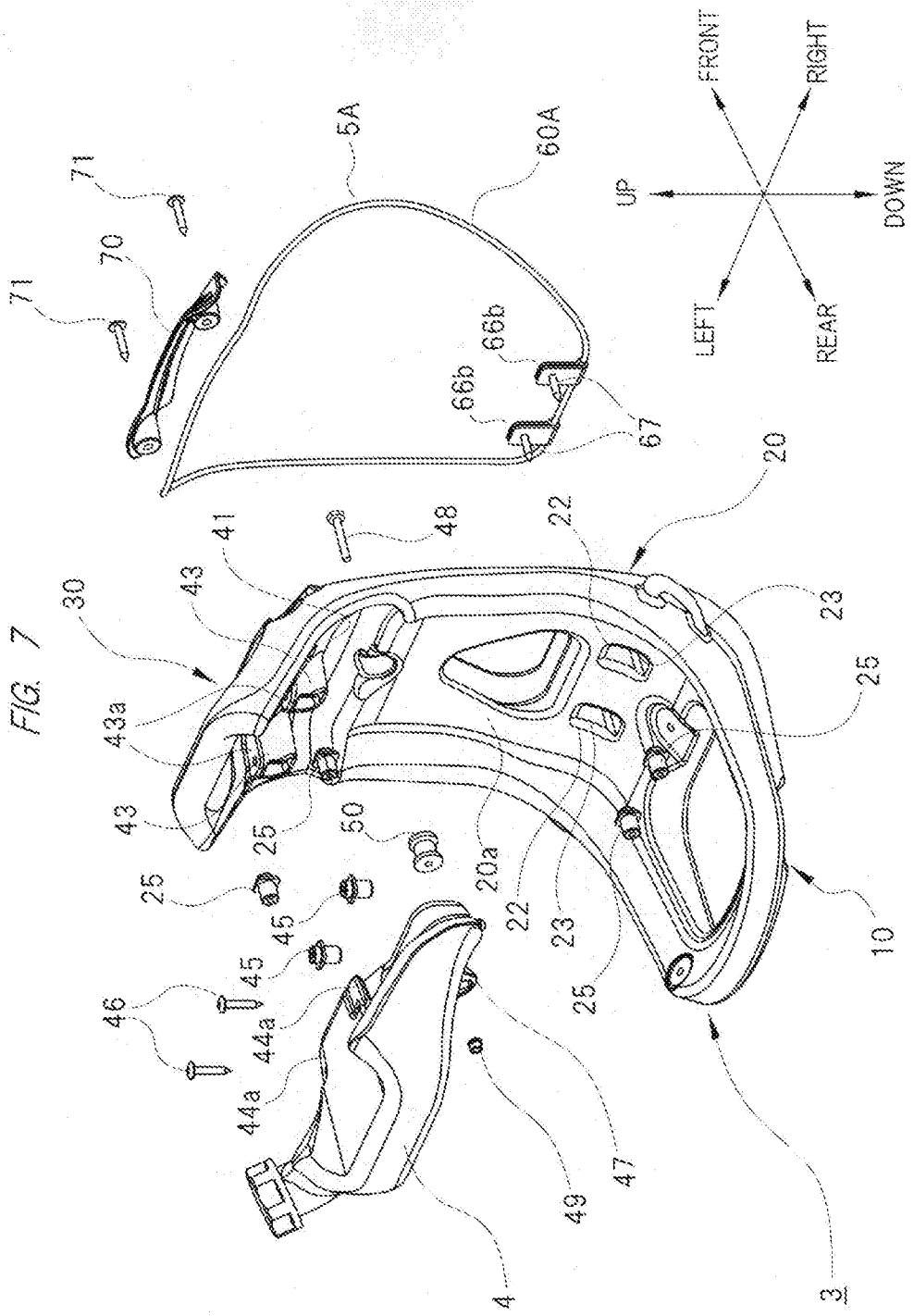


FIG. 7
FRONT
RIGHT
UP
DOWN
LEFT
REAR
5A
60A
71
70
66b
67
20
41
48
22
30
43
23
43a
25
50
20a
45
46
44a
47
49
4
3
10

[Fig. 8]

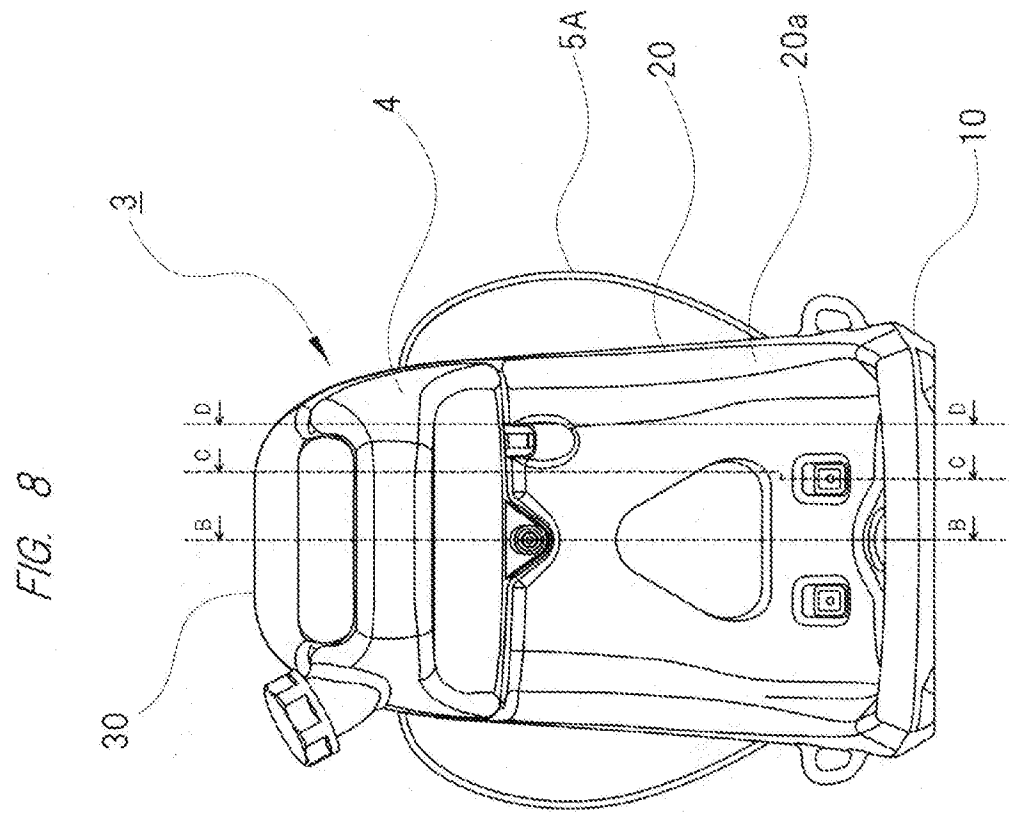
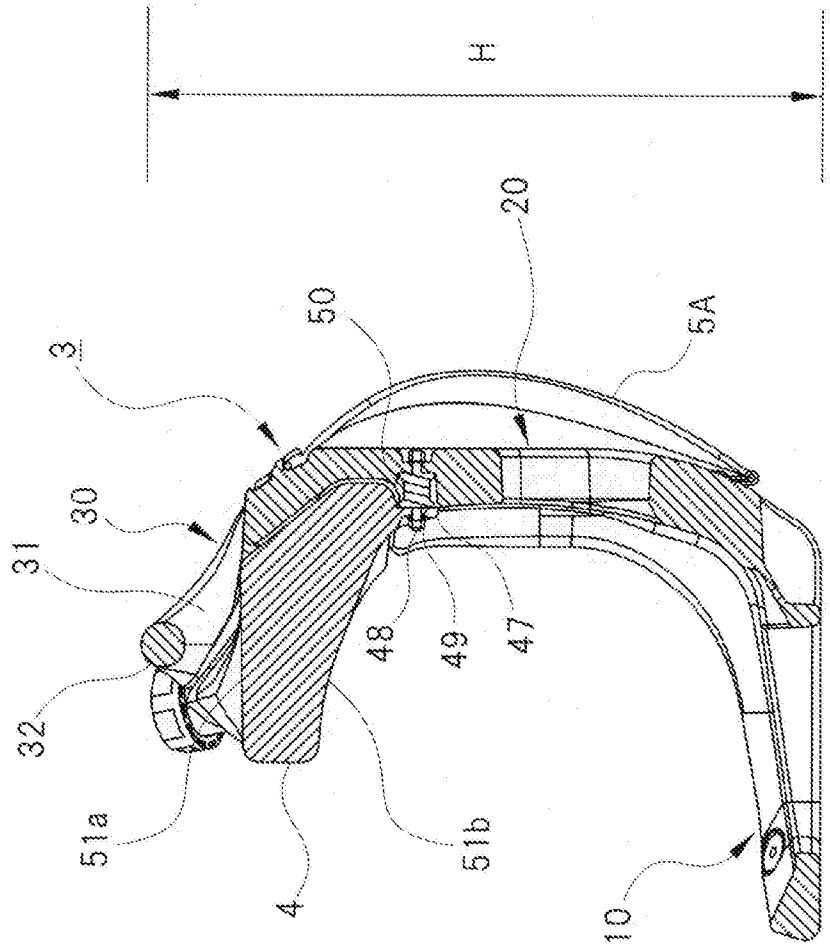


FIG. 8

[Fig. 9]

FIG. 9



[Fig. 10]

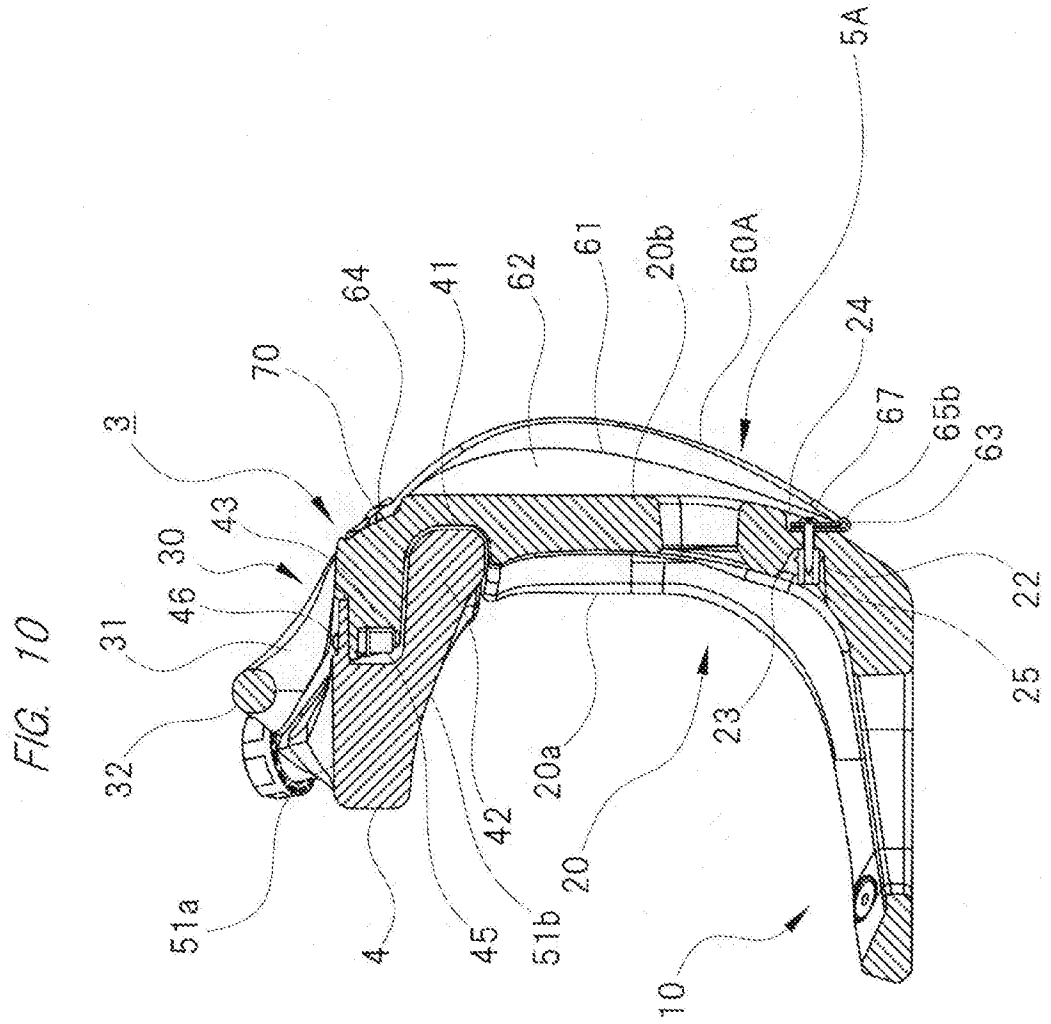
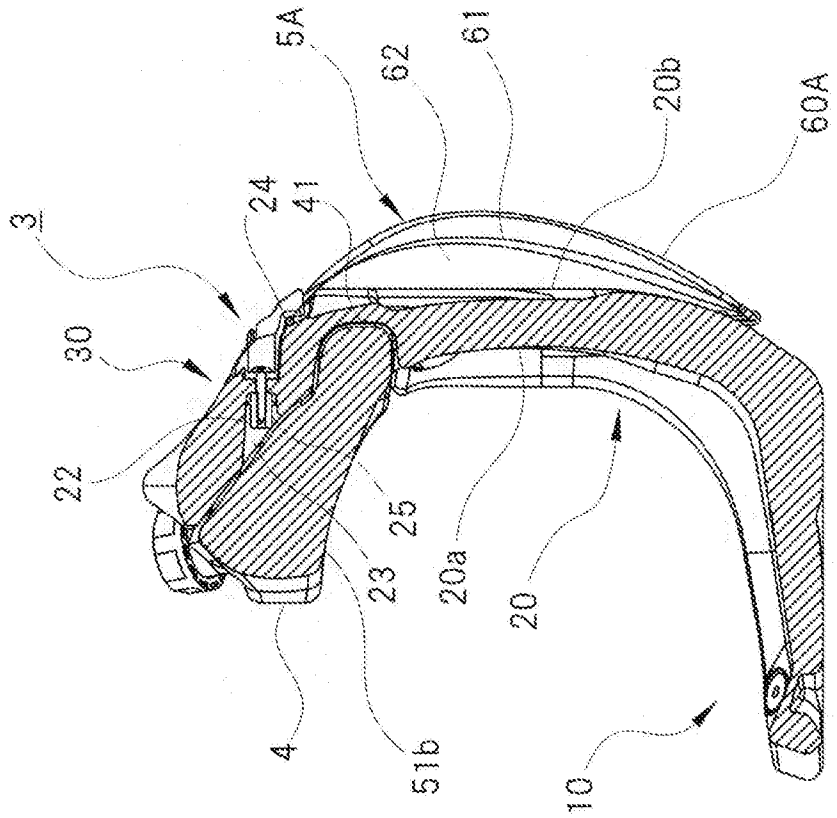

5A
64
41
62
61
20b
60A
24
70
67
65b
63
3
43
30
46
31
22
25
32
20a
23
42
20
51a
4
45
51b
10

FIG. 10

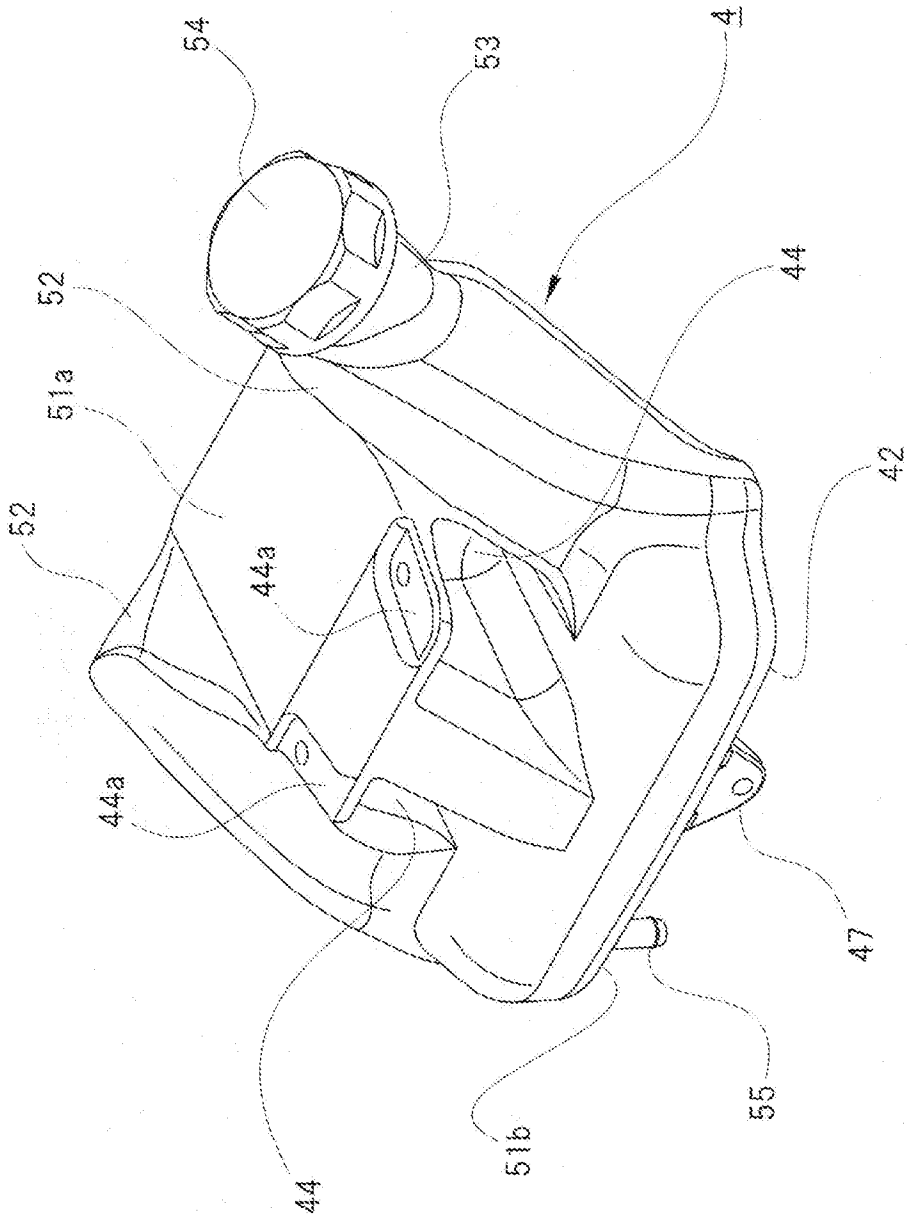
[Fig. 11]

FIG. 11



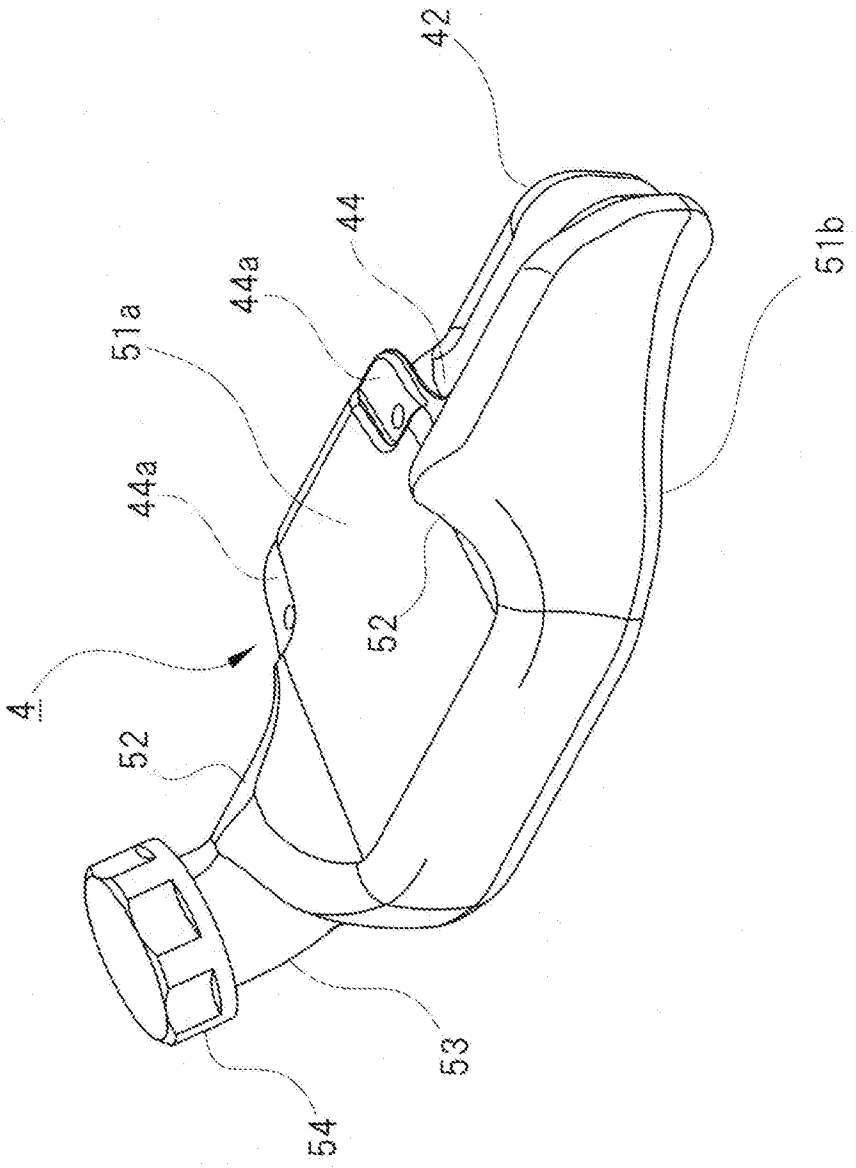
[Fig. 12]

FIG. 12



[Fig. 13]

FIG. 13



[Fig. 14]

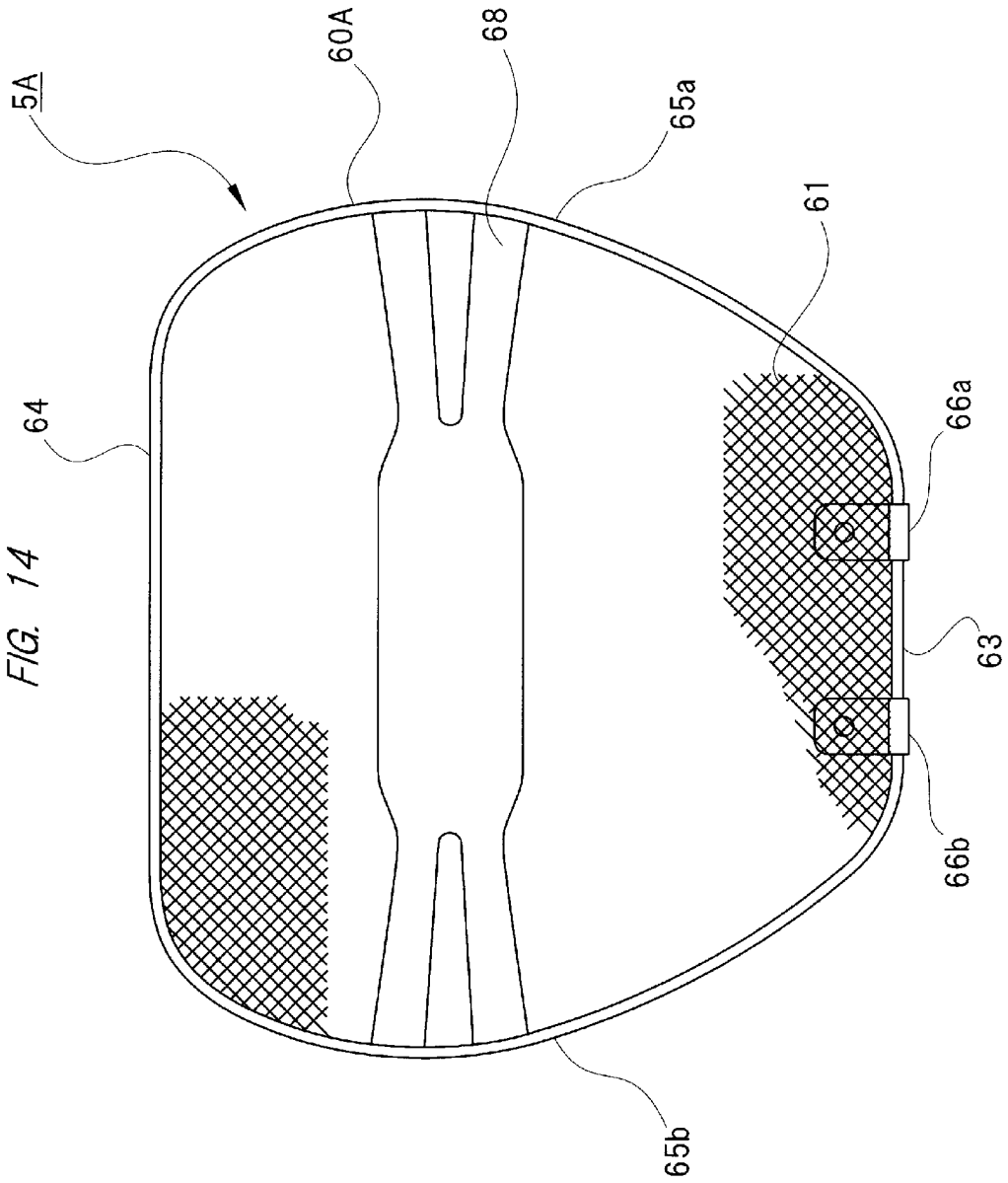
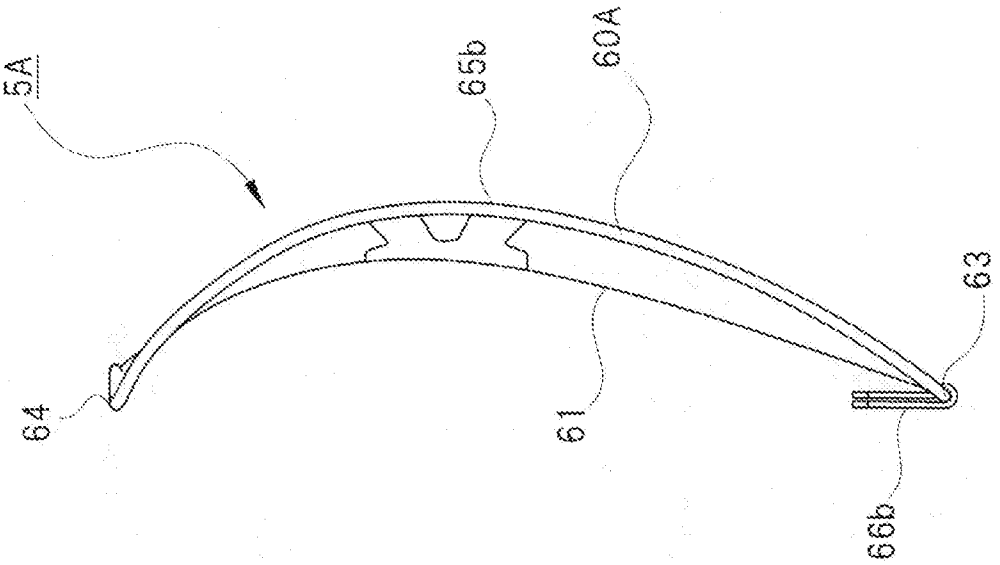


FIG. 14

[Fig. 15]

FIG. 15



[Fig. 16]

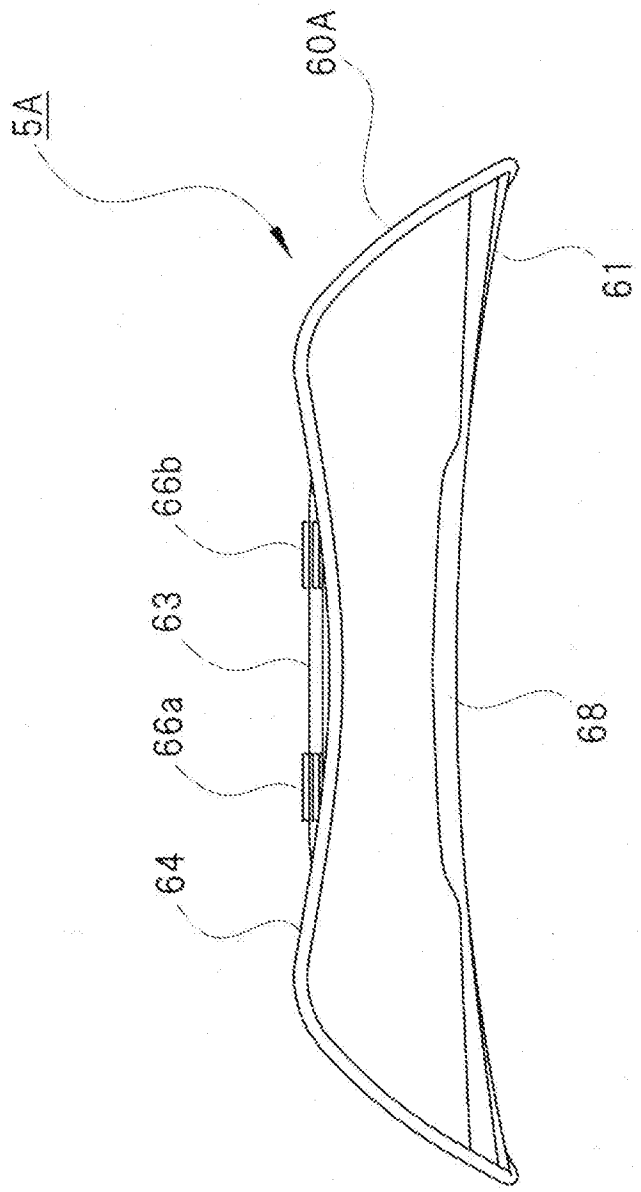
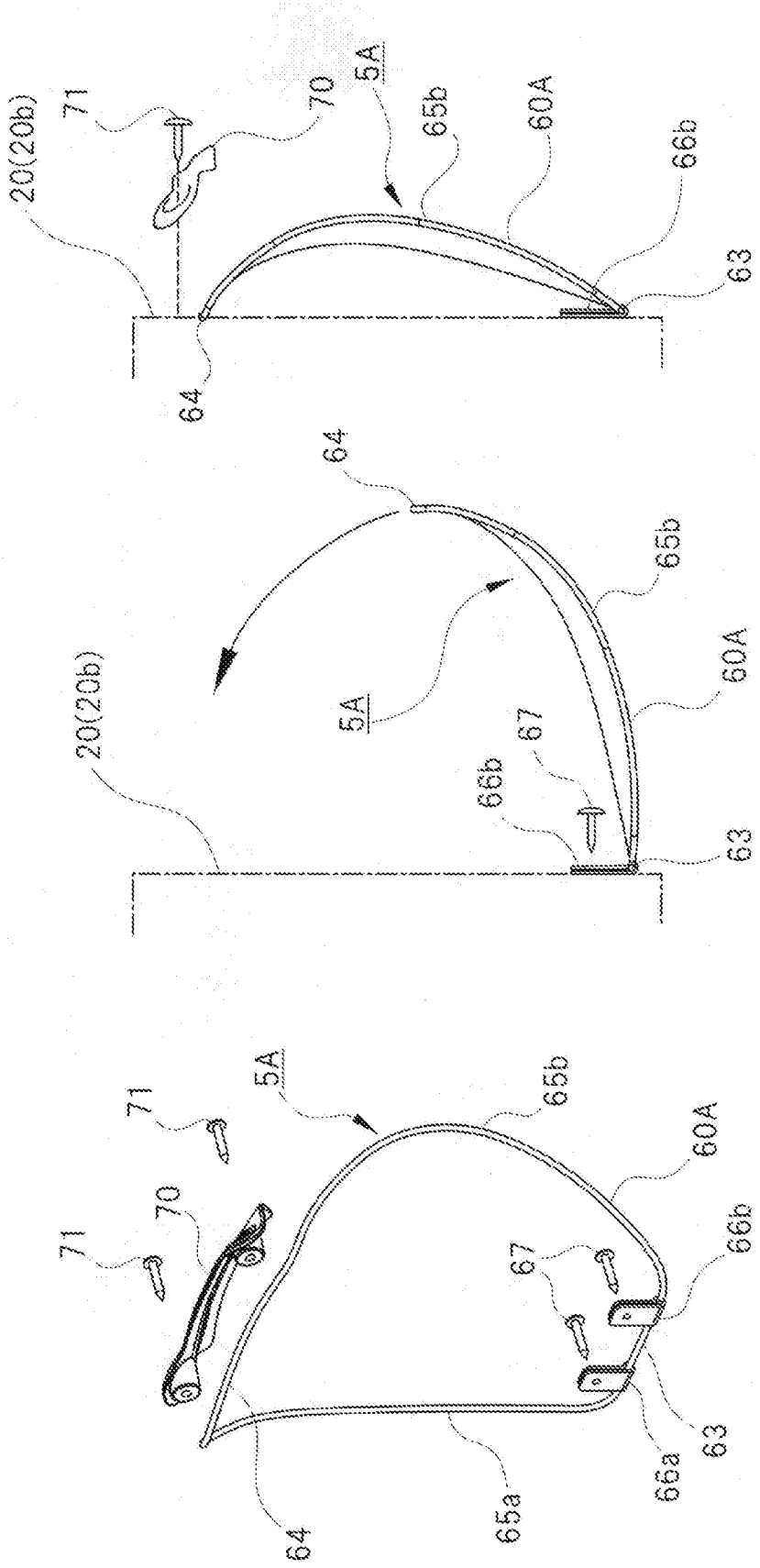


FIG. 16

[Fig. 17]

FIG. 17


20(20b)
71
70
5A
65b
60A
66b
63
64
64
65b
60A
5A
20(20b)
67
66b
63
5A
65b
71
60A
70
71
66b
67
63
66a
64
65a

[Fig. 18]

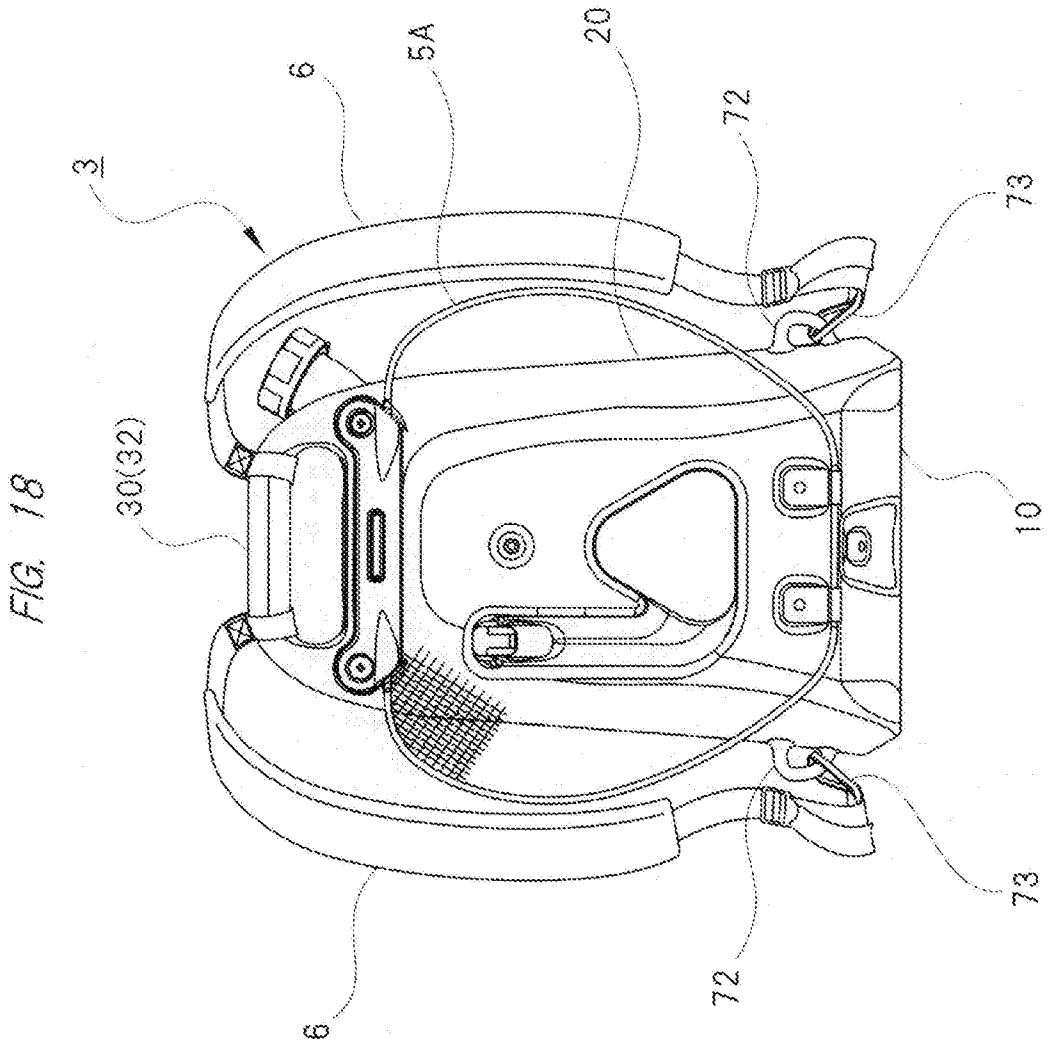
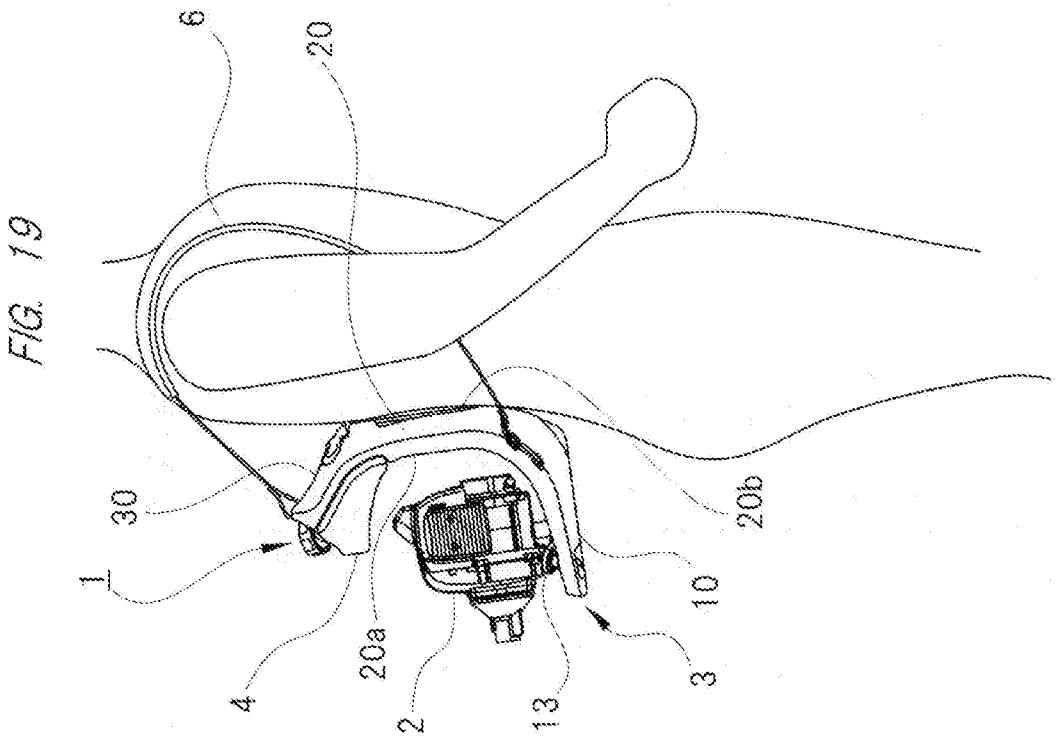


FIG. 18

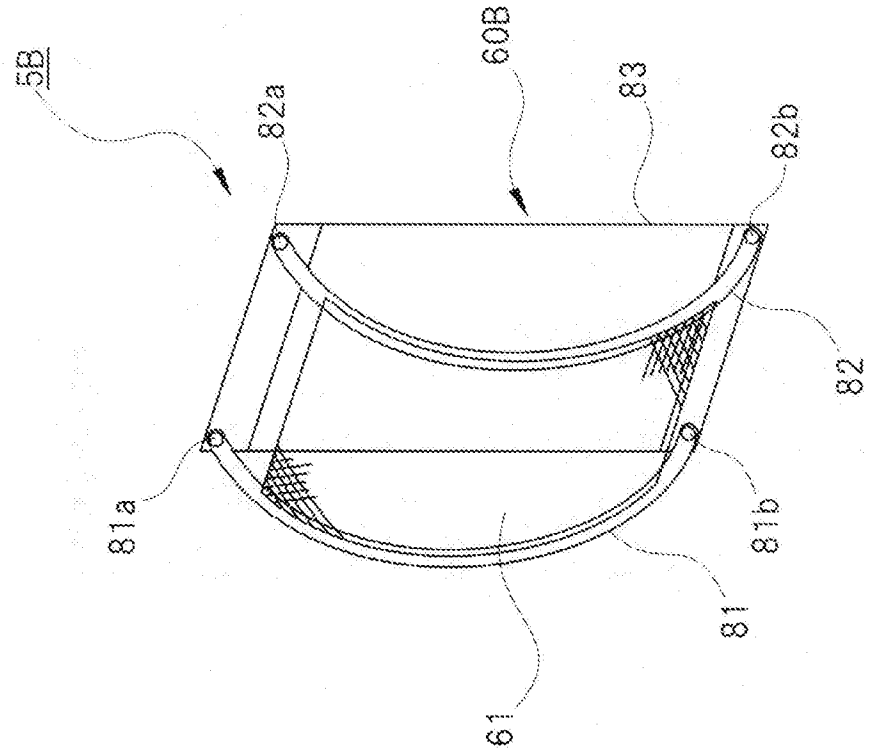
[Fig. 19]

FIG. 19



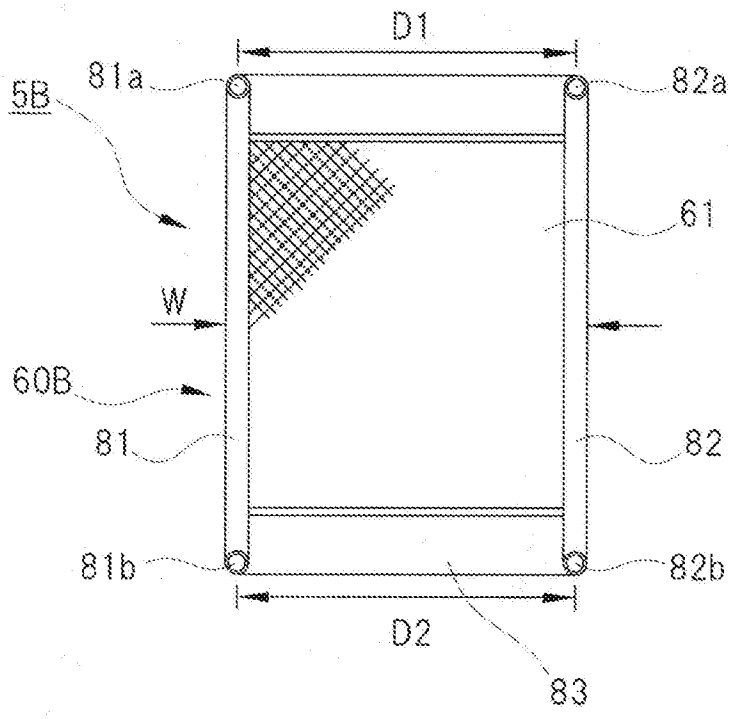
[Fig. 20]

FIG. 20



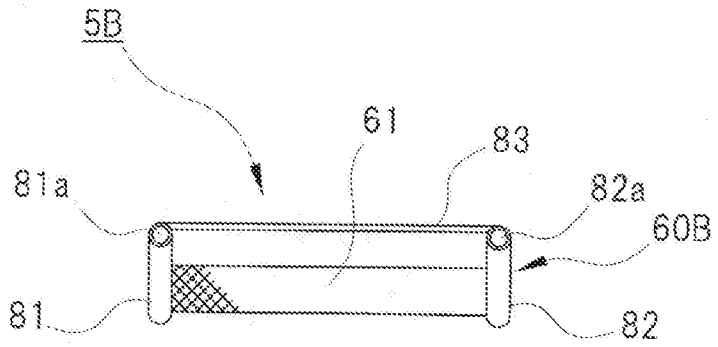
[Fig. 21A]

FIG. 21A



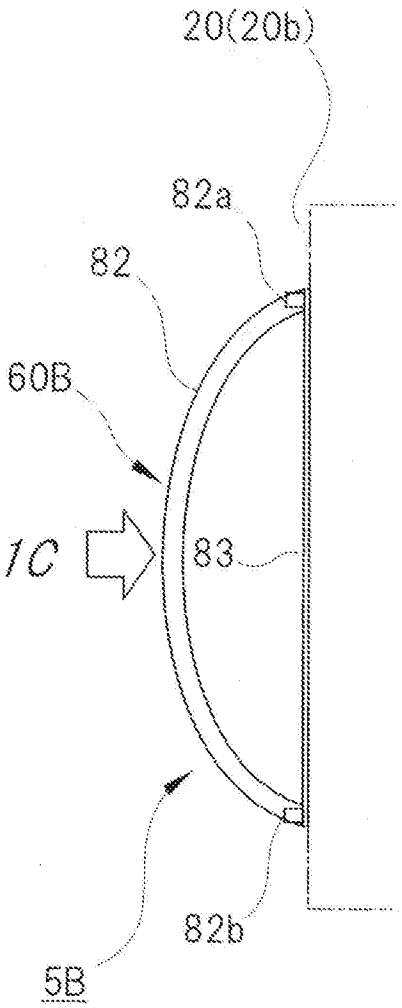
[Fig. 21B]

FIG. 21B



[Fig. 21C]

FIG. 21C



[Fig. 22A]

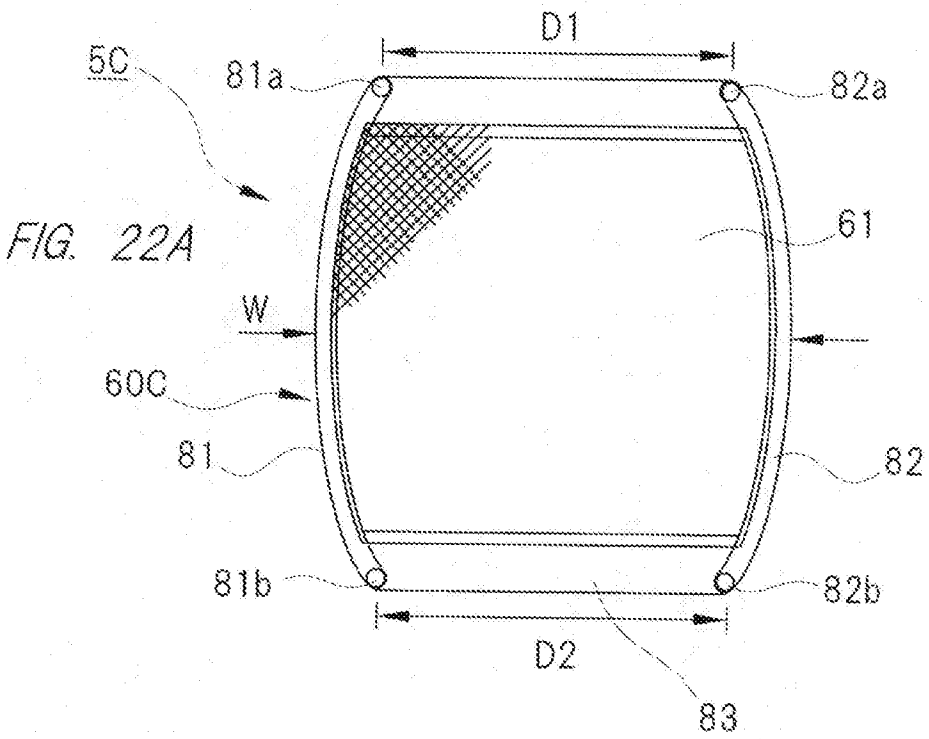


FIG. 22A

[Fig. 22B]

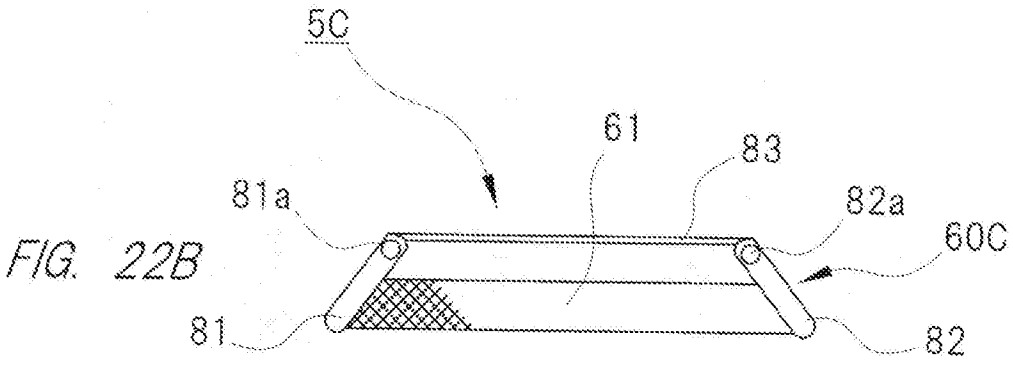


FIG. 22B

[Fig. 22C]

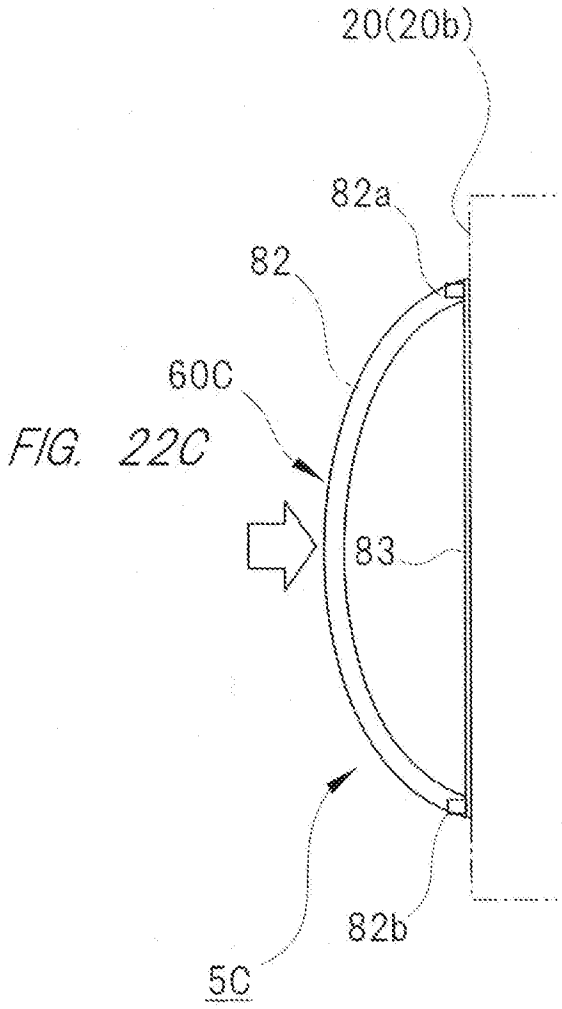


FIG. 22C

[Fig. 23]

FIG. 23