A backpack strap includes a strap main body, an upper end of which is connected to a backpack frame, a pad attached to the strap main body on a user side, and a contact state holding unit holding an upper end of the pad in contact with the backpack frame. Upper portions of the strap main body and pad are spaced apart from each other by a specified distance. The upper end of the pad has a shape and a strength that is, when contacting the backpack frame, able to prevent the backpack strap from falling sideways. Due to a tensile force of the upper portion of the strap main body and a stiffness of the upper portion of the pad, the upper portion of the pad is held in a projecting state with the upper end of the pad acting as a support point.

**Fig. 1**

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a backpack strap attaching structure with which a backpack strap is attached to a backpack frame, and relates to a backpack strap included in the attaching structure.

2. Description of the Related Art

[0002] In a backpack device such as a backpack sprayer, a backpack brushcutter, or a backpack blower, a driving device including a prime mover or the like is mounted on the backpack frame. Upper portions of a pair of left and right backpack straps are connected to the backpack frame at an upper portion of the backpack frame so as to taper toward the backpack frame, and lower ends of the backpack straps are connected to the backpack frame at the left and right ends of a lower portion of the backpack frame.

[0003] In some of the related-art backpack strap attaching structures that attach the backpack straps to upper portions of the backpack frames, upper ends of the backpack straps are freely pivotably attached to upper frame portions of the backpack frames. When such a structure is not being carried on the back of a user, the backpack straps hang down along a front surface of the backpack frame due to their own weight. Thus, a sufficient space for the user to insert his or her arm is not formed between the backpack frame and each backpack strap, thereby causing difficulty in that the user feels for the backpack straps on his or her back when carrying the backpack frame. There also are problems including a problem in that backpack straps hanging down would degrade the appearance of a backpack device when the backpack device is displayed for sale.

[0004] In order to prevent the backpack straps from hanging down and form a large space between the backpack frame and each backpack strap, the space being a space suitable for the user to insert his or her arm and shoulder, a variety of proposals have been made.

[0005] Japanese Unexamined Utility Model Registration Application Publication No. 63-69571 discloses a technology in which an upper portion of a backpack strap is made to have semi-stiffness. Japanese Unexamined Utility Model Registration Application Publication No. 3-31872 discloses a technology in which an elastically deformable protrusion that protrudes toward the back of the user is formed on an upper end of a backpack frame, and a retainer of an upper end of the backpack strap is fastened to the protrusion. Japanese Unexamined Patent Application Publication No. 2007-289816 discloses a technology in which an elastic member is added to an upper portion of a backpack strap. The elastic member makes an upper portion of the backpack strap project to form an arch-like shape in a state in which the backpack strap is attached to the backpack frame.

[0006] In the above-described related-art structures, the upper portion of the backpack strap is made to be semi-stiff or the elastic member is used in the upper portion of the backpack strap, so that the upper portion of the backpack strap is made to project. However, comfort of the user may be degraded due to a strap member having a high stiffness being in contact with the shoulder of the user when the user carries such a structure on his or her back, the elastic member may be damaged as a result of repeated use, or the elastic property of the elastic member may tend to decrease. Thus, there are still drawbacks.

SUMMARY OF THE INVENTION

[0007] The present invention is proposed in view of the above-described situation and provides a backpack strap attaching structure and the backpack strap, in which or with which a large space is formed between the backpack frame and each backpack strap, the space being a space suitable for a user to insert his or her arm and shoulder. The backpack strap attaching structure and the backpack strap are not easily damaged and can ensure that comfort is provided for the shoulder of the user.

[0008] In order to solve the above-described problems, a backpack strap attaching structure according to a first aspect of the present invention has the following structure.

[0009] That is, the backpack strap includes a strap main body, an upper end of which is connected to a backpack frame, a pad attached to the strap main body on a user side of the strap main body, and a contact state holding unit that holds an upper end of the pad in contact with the backpack frame. An upper portion of the strap main body and an upper portion of the pad are spaced apart from each other by a specified distance. The upper end of the pad is made to have a shape and a strength such that, when the upper end of the pad is in contact with the backpack frame, the backpack strap is able to be prevented from falling sideways. When the backpack frame is not being carried on the back of a user, due to a tensile force of the upper portion of the strap main body and a stiffness of the upper portion of the pad, the upper portion of the pad is held in a projecting state with the upper end of the pad acting as a support point.

[0010] Thus, it is ensured that a space, which has a size sufficient to easily accommodate the arm and shoulder of the user, is formed between the backpack frame and the backpack strap. As a result, the backpack frame can be easily carried on the back of the user.

[0011] Furthermore, unlike the related-art proposals, the backpack strap is not made to be projecting using only the stiffness or the elastic property of the material. Thus, the backpack strap is not easily broken as a result of repetitive use, the pad attached on the user side of the strap main body is easily conform to the shape of the
In a preferable embodiment, a hole may be formed in the backpack frame and the contact state holding unit may include an auxiliary strap attached to the upper portion of the pad. In this case, the auxiliary strap is threaded through the hole and secured to a specified position.

In another preferable embodiment, a backpack strap attaching structure may have the following structure.

That is, a bar portion, to which the backpack strap is attached, is formed in an upper portion of the backpack frame. The upper end of the strap main body is hooked around the bar portion and fastened with a metal connection retainer. A winding strap, which extends in a direction that intersects the auxiliary strap, is attached to an end of the auxiliary strap. The auxiliary strap having been threaded through the hole is hooked around the bar portion, and the winding strap is wound around and secured to the strap main body so as to cover the metal connection retainer. Thus, there is no concern over the occurrence of situations such as a situation in which clothes that the user of the backpack frame is wearing become caught by the metal connection retainer.

In yet another preferable embodiment, the metal connection retainer may be secured to the upper end of the strap main body, and the metal connection retainer may have a slit through which the strap main body is threaded from a lateral direction. Thus, the strap main body can be connected to the bar portion only by inserting the strap main body into the slits, and accordingly, the strap main body can be easily and quickly connected to the bar portion. In addition, the winding strap is wound around and secured to the strap main body so as to cover the metal connection retainer. This prevents a situation in which the strap main body incidentally moves out of the slits from occurring.

In a second aspect of the present invention, a backpack strap includes a strap main body, an upper end of which is connected to a backpack frame, a pad attached to the strap main body on a user side, and a contact state holding unit that holds an upper end of the pad in contact with the backpack frame. An upper portion of the strap main body and an upper portion of the pad are spaced apart from each other by a specified distance. The upper end of the pad is made to have a shape and a strength such that, when the upper end of the pad is in contact with the backpack frame, the backpack strap is able to be prevented from falling sideways. When the backpack frame is not being carried on the back of a user, due to a tensile force of the upper portion of the strap main body and a stiffness of the upper portion of the pad, the upper portion of the pad is held in a projecting state with the upper end of the pad acting as a support point.

Fig. 1 is a left side view of a backpack device equipped with a backpack strap attaching structure according to an embodiment of the present invention;

Fig. 2 is a general perspective view of the backpack strap attaching structure illustrated in Fig. 1;

Fig. 3 is a diagram illustrating a method of attaching the backpack strap illustrated in Fig. 1 to a backpack frame;

Fig. 4 is a diagram illustrating the method of attaching the backpack strap illustrated in Fig. 1 to a backpack frame;

Fig. 5 is a diagram illustrating the method of attaching the backpack strap illustrated in Fig. 1 to the backpack frame;

Fig. 6 is a diagram illustrating the method of attaching the backpack strap illustrated in Fig. 1 to the backpack frame;

Fig. 7 is a diagram illustrating the method of attaching the backpack strap illustrated in Fig. 1 to the backpack frame; and

Fig. 8 is a perspective view of a state in which the backpack strap illustrated in Fig. 1 is attached to the backpack frame.

An embodiment according to the present invention will be described below, by way of example only, with reference to the drawings.

Fig. 1 is a backpack device 1 as an example to which the present invention is applied. The backpack device 1 includes a device body 3, a backpack frame 4, and a pair of left and right backpack straps 5. The device body 3 includes components such as a prime mover 2 that serves as a power source for the device. The backpack frame 4 supports the device body 3 through a vibration absorbing member or a vibration absorbing structure. The backpack straps 5 are attached to the backpack frame 4. A specific form of the device body 3 differs depending on the type of the device such as, for example, a sprayer, a powder duster, a brushcutter, or a blower. Fig. 1 illustrates a backpack power sprayer as an example. Thus, in the example in Fig. 1, the device body 3 includes a spray pump 6 driven by the prime mover 2, a liquid tank 7, and so forth in addition to the prime mover 2, which uses a compact air-cooled two-stroke gasoline engine or the like. A chemical or the like in the liquid tank 7 is pumped by the spray pump 6 to be sprayed through a spray nozzle provided at a tip of a spray rod (not shown).

The backpack frame 4 includes a horizontal portion 8 and a vertical portion 9. The horizontal portion 8 horizontally extends so as to form a plate-like or frame-like shape, supporting the device body 3 and serving as
a portion that is in contact with the ground when the backpack frame 4 is placed on the ground. The vertical portion 9 extends upward from a front end edge of the horizontal portion 8 so as to form a plate-like or frame-like shape. A back contact plate 10 having a cushioning property is attached to a front surface (a surface on a side of the back of a user who carries the backpack frame 4 on his or her back) of the vertical portion 9. The backpack frame 4 is formed of a plastic, a metal pipe, or another adequate lightweight material having a strength required to support the device body 3.

[0021] As illustrated in Fig. 2, a pair of left and right bar portions 11 are provided in an upper portion of the vertical portion 9 as upper securing portions, to which the backpack straps 5 are attached. The left and right bar portions 11 are positioned so as to form a divergent shape seen from a front-rear direction and each have a hole 12 on a lower side thereof. The holes 12 define the respective bar portions 11, which are used as handles when the backpack frame 4 is moved. The holes 12 also contribute to reduction of the weight of the backpack frame 4. Upper end portions of the pair of left and right bar portions 11 are connected to each other at a central position in a lateral width direction of the vertical portion 9.

[0022] Upper ends of the pair of left and right backpack straps 5 are each connected to a corresponding one of the pair of left and right bar portions 11, and lower ends of the pair of left and right backpack straps 5 are each connected to a corresponding one of a pair of lower fixing portions 13. The lower fixing portions 13 are disposed at left and right ends of a lower portion of the vertical portion 9. According to the present invention, the backpack straps 5 may be attached to the lower fixing portions 13 in a desirable manner. The backpack straps 5 may be connected to the lower fixing portions 13, for example, in the following method or another method. That is, S-shaped hooks 14 have been attached to the lower ends of the pair of left and right backpack straps 5 and are hooked to the lower fixing portions 13.

[0023] The pair of left and right backpack straps 5 are laterally symmetrically formed with respect to each other so as to conform to the shapes of the left and right shoulders of the user. However, at least as far as the structures of upper and lower ends are concerned, the difference between the left and right backpack straps 5 is substantially negligible. Accordingly, the backpack straps 5 will be described below while the left and right backpack straps are not distinguished from each other under the assumption that the left and right backpack straps 5 are structured in the same manner.

[0024] As illustrated in Figs. 1 and 2, each backpack strap 5 includes a strap main body 15 and a pad 16, which is attached to the strap main body 15 on the user side. The pad 16 is formed of a sponge member of about 30 mm in thickness covered by a piece of cloth and has an appropriate degree of cushioning property. The pad 16 causes a total load of the backpack frame 4 and the device body 3 applied to the strap main body 15 to distribute, thereby avoiding concentration of an excessive burden in a specific part of the strap main body 15. The load applied to the backpack frame 4 is supported only by the strap main body 15. The pad 16 does not support the load. An upper portion 15a of the strap main body 15 and an upper portion 16a of the pad 16 are spaced apart from each other by a specified distance. The reason is that, as will be described later, due to the tensile force of the upper portion 15a of the strap main body 15 and the stiffness of the upper portion 16a of the pad 16, the upper portion 16a of the pad 16 is held in a projecting state in order for the pad 16 to follow the shape of the shoulder of the user.

[0025] As illustrated in Fig. 3, an upper end 15b of the strap main body 15 is connected to the backpack frame 4. Specifically, the upper end 15b of the strap main body 15 is hooked around the bar portion 11 and fastened by a metal connection retainer 17. The metal connection retainer 17 is secured to the upper end 15b of the strap main body 15 and has slits 18 through which the strap main body 15 is threaded from lateral directions.

[0026] One of preferred examples of the above-described metal connection retainer is an S-shaped metal connection retainer 17 having a generally square outline. The S-shaped metal connection retainer 17 has three bars 19 that are arranged parallel to one another, and each slit 18 is formed between adjacent bars 19. Thus, there are the upper and lower two slits 18 having respective openings on their sides, which are opposite to each other. As illustrated in Figs. 4 and 5, the strap main body 15 is threaded into each slit 18 from the lateral directions. The upper end 15b of the strap main body 15 is secured to one of the bars 19 on an end side of the S-shaped metal connection retainer 17.

[0027] As illustrated in Fig. 3, the S-shaped metal connection retainer 17 is threaded through the hole 12 from a front side to a rear side of the backpack frame 4 and routed toward the front of the backpack frame 4 from an upper side of the bar portion 11. After that, as illustrated in Figs. 4 and 5, the upper portion 15a of the strap main body 15 is inserted into the two slits 18 alternately from one and the other lateral directions. Thus, connection of the strap main body 15 to the bar portion 11 is completed (see Fig. 6).

[0028] As illustrated in Fig. 3, an auxiliary strap 20 is attached to an upper end 16b of the pad 16 as contact state holding means, which holds the upper end 16b in contact with the backpack frame 4. The auxiliary strap 20 has a lateral width that allows the auxiliary strap 20 to be threaded through the hole 12. The auxiliary strap 20 is threaded through the hole 12 from the front side to rear side of the backpack frame 4 and secured to a specified position. Thus, a state in which the upper end 16b of the pad 16 is in contact with the backpack frame 4 is maintained.

[0029] The contact state holding means is sufficient when the contact state holding means can hold the upper end 16b of the pad 16 in contact with the vertical portion
9 of the backpack frame 4 so as not to allow the upper end 16b of the pad 16 to move downward from the specified position. Thus, the contact state holding means may instead be the following engagement structure: an engagement portion is formed at the upper end 16b of the pad 16 and an engagement receiving portion is formed in the vertical portion 9 such that the engagement portion and the engagement receiving portion are engaged with each other.

[0030] The upper end 16b of the pad 16 is made to have a shape and a strength such that, when the upper end 16b of the pad 16 is in contact with the backpack frame 4 (vertical portion 9), the backpack strap 5 can be prevented from falling sideways. Specifically, as illustrated in Figs. 2 and 3, the upper end 16b of the pad 16 has a specified stiffness and a lateral width larger than that of the hole 12 in a direction perpendicular to the longitudinal direction of the pad 16 so as not to enter the hole 12. The auxiliary strap 20 is secured to a substantially central position with respect to the lateral width of the upper end 16b of the pad 16.

[0031] As illustrated in Fig. 1, at least the upper portion 16a of the pad 16, that is, at least part of the pad 16 closer to the backpack frame 4 than a separation point P of the related art, is not bent, is held in the projecting state due to the tensile force of the upper portion 15a of the strap main body 15 and the stiffness of the upper portion 16a of the pad 16 with a contact portion C acting as a support point. The upper end 16b of the pad 16 is in contact with the vertical portion 9 of the backpack frame 4 at the contact portion C. Thus, at least the upper portion 16a of the pad 16 needs to have a stiffness at which the projecting state is achievable. A degree of stiffness at which the upper portion 16a of the pad 16 is not easily bent is sufficient.

[0032] As illustrated in Fig. 3, a winding strap 21 is attached to an end of the auxiliary strap 20. The winding strap 21 extends in a direction that intersects the auxiliary strap 20. The winding strap 21 secures the auxiliary strap 20 to the specified position, thereby holding the upper end 16b of the pad 16 in contact with the backpack frame 4. The winding strap 21 has retainers 22 that maintain the wound state of the winding strap 21 having been wound. The retainer 22 may be an appropriate retainer such as a button retainer or a surface fastener.

[0033] According to the present embodiment, the auxiliary strap 20 is secured to the strap main body 15 with the winding strap 21 having retainers. Specifically, as illustrated in Fig. 3, the auxiliary strap 20 is threaded through the hole 12 from the front side to the rear side of the backpack frame 4, and then, as illustrated in Fig. 7, hooked around the upper portion of the bar portion 11. The winding strap 21 is wound around the S-shaped metal connection retainer 17, which has been connected to the strap main body 15 as illustrated in Fig. 6, and then secured with the retainers 22 (see Fig. 8).

[0034] According to the backpack strap attaching structure of the present embodiment, as illustrated in Fig. 1, the upper end 16b of the pad 16 is held in contact with the backpack frame 4 using the auxiliary strap 20 and the winding strap 21. The upper portion 16a of the pad 16 is held in the projecting state due to the tensile force of the upper portion 15a of the strap main body 15 and the stiffness of the upper portion 16a of the pad 16. Furthermore, the backpack strap 5 is prevented from falling sideways due to the shape and strength of the upper end 16b of the pad 16 that is in contact with the backpack frame 4. Thus, it is ensured that a space S, which has a size sufficient to easily accommodate the arm and shoulder of the user, is formed between the backpack frame 4 and the backpack strap 5. As a result, the backpack frame 4 can be easily carried on the back of the user. Since the backpack strap 5 is held in a state in which the backpack strap 5 is stretched forward relative to the backpack frame 4, a desirable design suitable for occasions such as display and sales is realized. Furthermore, unlike the related-art proposals in which the backpack strap 5 is stretched forward using only the stiffness or the elastic property of the material, the tensile force of the strap main body 15 is also used. Thus, the backpack strap 5 is not easily broken as a result of repetitive use, and it can be assured that the user feels comfortable at the shoulders.

[0035] According to the present embodiment, the following advantages are also achieved.

[0036] The strap main body 15 and the auxiliary strap 20 are connected to the bar portion 11 such that the strap main body 15 and the auxiliary strap 20 are laterally movable relative to the backpack frame 4. Thus, the lateral position of the backpack strap 5 in the projecting state is finely adjustable within the lateral width of the hole 12. Thus, the backpack frame 4 can be more easily carried on the back of the user.

[0037] The backpack strap 5 has a simple structure and can be easily attached to the backpack frame 4 without use of a tool. This can simplify a production process and contribute to reduction of the production cost. In addition, the backpack frame 4 itself is not changed compared to that of the related art. This also contributes to reduction of the production cost.

[0038] Since the backpack strap 5 can be easily attached to or detached from the backpack frame 4, the user can replace the backpack strap 5 in a convenient manner.

[0039] The strap main body 15 can be connected to the bar portion 11 only by inserting the strap main body 15 into the slits 18 of the S-shaped metal connection retainer 17 from lateral directions. Thus, the strap main body 15 can be easily and quickly connected to the bar portion 11.

[0040] Since the S-shaped metal connection retainer 17 is covered with the winding strap 21, there is no concern over the occurrence of situations such as a situation in which clothes that the user of the backpack frame 4 is wearing become caught by the S-shaped metal connection retainer 17. In addition, the winding strap 21 is wound around and secured to the strap main body 15 so as to
cover the S-shaped metal connection retainer 17. This prevents a situation in which the strap main body 15 incidentally moves out of the slits 18 of the S-shaped metal connection retainer 17 from occurring.

Claims

1. A backpack strap attaching structure that attaches a backpack strap (5) to a backpack frame (4), wherein the backpack strap (5) includes a strap main body (15), an upper end (15b) of which is connected to the backpack frame (4), a pad (16) attached to the strap main body (15) on a user side of the strap main body (15), and contact state holding means (20, 21, 22) that holds an upper end (16b) of the pad (16) in contact with the backpack frame (4), wherein an upper portion (15a) of the strap main body (15) and an upper portion (16a) of the pad (16) are spaced apart from each other by a specified distance, wherein the upper end (16b) of the pad (16) is made to have a shape and a strength such that, when the upper end (16b) of the pad (16) is in contact with the backpack frame (4), the backpack strap (5) is able to be prevented from falling sideways, and wherein, when the backpack frame (4) is not being carried on the back of a user, due to a tensile force of the upper portion (15a) of the strap main body (15) and a stiffness of the upper portion (16a) of the pad (16), the upper portion (16a) of the pad (16) is held in a projecting state with the upper end (16b) of the pad (16) acting as a support point.

2. The backpack strap attaching structure according to Claim 1, wherein a hole (12) is formed in the backpack frame (4), wherein the contact state holding means includes an auxiliary strap (20) attached to the upper end (16b) of the pad (16), and wherein the auxiliary strap (20) is threaded through the hole (12) and secured to a specified position.

3. The backpack strap attaching structure according to Claim 2, wherein a bar portion (11) is formed in an upper portion of the backpack frame (4), the backpack strap (5) being attached to the bar portion (11), wherein the upper end (15b) of the strap main body (15) is hooked around the bar portion (11) and fastened with a metal connection retainer (17), wherein a winding strap (21) is attached to an end of the auxiliary strap (20), the winding strap (21) extending in a direction that intersects the auxiliary strap (20), and wherein the auxiliary strap (20) having been thread-

4. The backpack strap attaching structure according to Claim 3, wherein the metal connection retainer (17) is secured to the upper end (15b) of the strap main body (15), the metal connection retainer (17) having a slit (18) through which the strap main body (15) is threaded from a lateral direction.

5. A backpack strap comprising:

- a strap main body (15), an upper end (15b) of which is connected to a backpack frame (4),
- a pad (16) attached to the strap main body (15) on a user side; and
- contact state holding means (20, 21, 22) that holds an upper end (16b) of the pad (16) in contact with the backpack frame (4), wherein an upper portion (15a) of the strap main body (15) and an upper portion (16a) of the pad (16) are spaced apart from each other by a specified distance, wherein the upper end (16b) of the pad (16) is made to have a shape and a strength such that, when the upper end (16b) of the pad (16) is in contact with the backpack frame (4), the backpack strap (5) is able to be prevented from falling sideways, and wherein, when the backpack frame (4) is not being carried on the back of a user, due to a tensile force of the upper portion (15a) of the strap main body (15) and a stiffness of the upper portion (16a) of the pad (16), the upper portion (16a) of the pad (16) is held in a projecting state with the upper end (16b) of the pad (16) acting as a support point.
Fig. 2
### DOCUMENTS CONSIDERED TO BE RELEVANT

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The present search report has been drawn up for all claims

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ON EUROPEAN PATENT APPLICATION NO.

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on 26-09-2012.
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For more details about this annex: see Official Journal of the European Patent Office, No. 12/82
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