



(12) **EUROPEAN PATENT APPLICATION**  
published in accordance with Art. 153(4) EPC

(43) Date of publication:  
**11.05.2016 Bulletin 2016/19**

(51) Int Cl.:  
**A47C 9/00** (2006.01) **A47C 9/02** (2006.01)  
**A47C 9/10** (2006.01)

(21) Application number: **14820562.8**

(86) International application number:  
**PCT/KR2014/005631**

(22) Date of filing: **25.06.2014**

(87) International publication number:  
**WO 2015/002403 (08.01.2015 Gazette 2015/01)**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA ME**

(71) Applicant: **Otfrees Co., Ltd.**  
**Ansan-si**  
**Gyeonggi-do 15432 (KR)**

(72) Inventor: **KIM, Hyung Joon**  
**Seongnam-si, Gyeonggi-do 463-862 (KR)**

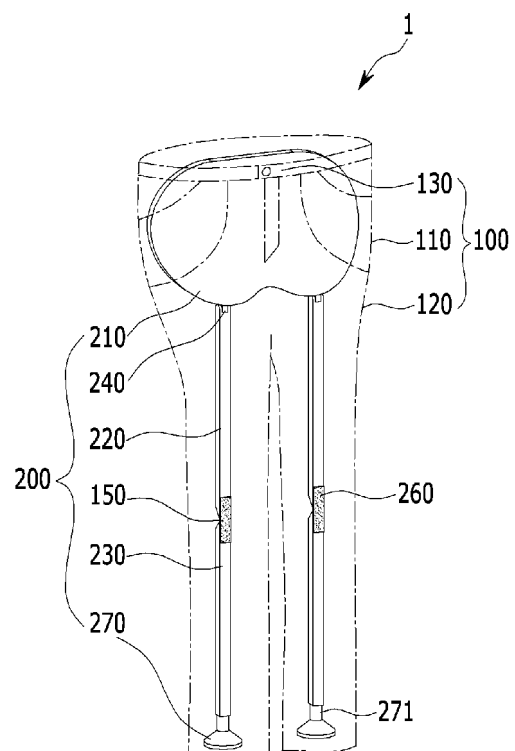
(30) Priority: **04.07.2013 KR 20130078360**  
**23.06.2014 KR 20140076305**

(74) Representative: **Cabinet Chaillot**  
**16/20, avenue de l'Agent Sarre**  
**B.P. 74**  
**92703 Colombes Cedex (FR)**

(54) **WEARABLE CHAIR DEVICE**

(57) A wearable chair apparatus is disclosed. The disclosed chair apparatus includes a pants unit configured such that the legs and buttocks of a wearer are inserted therein; and a chair unit configured to be coupled to the pants unit and support the buttocks of the wearer against a ground surface; wherein the chair unit includes: a buttocks support plate configured such that the buttocks are seated thereon; a pair of upper legs and a pair of lower legs configured to extend downward from the buttocks support plate and be coupled to both legs of the wearer; first joints configured to rotatably support the upper legs against the buttocks support plate; second joints configured to rotatably support the lower legs against the upper legs; and wherein upper inclined surfaces and lower inclined surfaces are formed at the lower ends of the upper legs and upper ends of the lower legs.

FIG. 1



**Description****Technical Field**

**[0001]** The present invention relates to a chair apparatus that is worn on a human body and then used, and more particularly to a chair apparatus that can facilitate sitting in the state of being worn on a human body.

**Background Art**

**[0002]** Visitors who view works of art in a place, such as an art gallery, a museum or the like, usually stand up for a long time at a single location in order to view works of art. Accordingly, a physical burden increases while viewing works of art. Furthermore, in ancient palaces, such as Gyeongbokgung Palace and Changgyeonggung Palace, and expositions, movement for a long time is required, and thus a physical burden is imposed on visitors.

**[0003]** This physical burden may be further increased when there is no seat in a sports game, such as a baseball game, a basketball game or the like, and thus a visitor views a game while standing up, or when there is no seat during the use of a public transportation means, such as a bus, a train, a subway train, or the like.

**[0004]** In this case, in public places, such as an art gallery, a museum, and an ancient place, it is not easy to provide the places with chairs for rest due to the need to maintain an unobstructed circulation path for large crowds of visitors.

**[0005]** Meanwhile, since it is difficult for workers, such as a mart salesclerk, a hotel employee, a laundry worker, a beautician, an assembly line worker, a teacher, a parking assistant, a barista, a gas station worker, etc., who are working while standing up, to move to adjacent chairs, sit on the chairs, and take rest due to the characteristics of their work, problems arise in that blood circulation is not smooth and thus the degree of fatigue is high because they are working while standing up for a long time. Furthermore, they are exposed to pain in the waist, the legs or the feet or a cardiovascular disorder, such as a stroke, a cardiac infarction, a varicose vein or the like, in worst cases.

**[0006]** In order to overcome these conventional problems, there was a demand for the development of a chair that can be easily carried. Korean Unexamined Utility Model Publication No. 20-2012-000140 entitled "Combined Stick and Chair capable of Facilitating Carrying" and Korean Registered Utility Model No. 20-0336096 entitled "Portable Chair for Mobile Work" are disclosed.

**[0007]** However, although the conventional chairs have been developed to facilitate carrying, they are problematic in that the carrying thereof is inconvenient because operators must carry them with the hands and in that aesthetics are degraded because they are exposed to the outside.

**Disclosure****Technical Problem**

**[0008]** Accordingly, the present invention is intended to overcome the above-described problems of the conventional technology, and an object of the present invention is to provide a chair apparatus that can be easily worn on a human body and then used.

**[0009]** Another object of the present invention is to provide a chair apparatus that enables convenient sitting regardless of location and time because a chair is combined with pants and thus the chair can be moved along with the pants in an integrated manner in the state in which a user wears the pants.

**[0010]** A further object of the present invention is to provide a wearable chair apparatus capable of facilitating storage and carrying, which can facilitate storage and carrying and enables a user to easily wear the chair apparatus and conveniently sit when necessary.

**Technical Solution**

**[0011]** In order to accomplish the above objects, the present invention provides a chair apparatus, including: a pants unit configured such that the legs and buttocks of a wearer are inserted therein; and a chair unit disposed on one side of the pants unit, and configured to be coupled to the pants unit, move along with the pants unit while the wearer is moving, and support the buttocks of the wearer against a ground surface so that a user can sit; wherein the chair unit includes: a buttocks support plate configured such that the buttocks are seated thereon when the wearer sits; a pair of upper legs and a pair of lower legs configured to extend downward from the buttocks support plate and be coupled to both legs of the wearer; first joints configured to rotatably support the upper legs against the buttocks support plate; second joints configured to rotatably support the lower legs against the upper legs; and wherein upper inclined surfaces and lower inclined surfaces that are rotated in relation to each other around the second joints, that come into contact with each other, and that support the weight of the wearer so that the wearer can sit are formed at the lower ends of the upper legs and the upper ends of the lower legs.

**[0012]** The chair unit may be integrated with the inside of the pants unit, and the inside of the pants unit may be separated into a space in which the chair unit is accommodated and a space in which a body of the wearer is accommodated, and may include a chair reception part configured such that the chair unit is accommodated therein.

**[0013]** The chair unit may be disposed outside the pants unit, and the chair apparatus may further include fastening members configured to fasten the upper legs and the lower legs to the legs reception part of the pants unit.

**[0014]** The second joints may be provided to be located

behind the knees of the wearer, and cushion members may be provided on the front surfaces of the second joints.

**[0015]** In order to accomplish the above objects, the present invention provides a chair apparatus including: a buttocks fastening unit including a body configured such that a storage space is formed therein and the body is fastened to the buttocks of a user while surrounding the buttocks when the user sits, and a pair of fastening strips configured to extend from the body and to fasten the body to the buttocks; a support unit configured to be detachably coupled and fastened to the buttocks fastening unit and to support the body against a ground surface so that the user can sit; and a legs fastening unit configured to fasten the support unit to the calves of the user; wherein the support unit includes: fastening plates detachably coupled to the body; a pair of upper legs and a pair of lower legs configured to extend downward from the fastening plates and to be coupled to both legs of the user; first joints configured to support the lower legs so that the lower legs can be rotated with respect to the upper legs; and second joints configured to support the upper legs so that the upper legs can be rotated with respect to the fastening plates; and wherein the fastening plates, the upper legs and the lower legs are configured to be foldable with respect to the first joints and the second joints, and maintain a state of being bent at a predetermined angle so that a wearer can sit.

**[0016]** The storage space may be formed to have a size that accommodates the support unit and the fastening members; and storage and carrying may be enabled by fastening the bag to the body of the user via the fastening strips in the state in which the support unit and the fastening members have been put into the storage space.

**[0017]** The buttocks fastening unit may further include fastening portions installed inside the body, and configured to detachably couple the fastening plates to the body.

**[0018]** The fastening portions may include: socket members fastened to the inside surfaces of the body, and configured such that the fastening plates are inserted thereinto and seated therein; covers configured to extend from the socket members and to cover opening portions of the socket members; and fastening members installed on the covers and the socket members, and configured to fasten the covers to the socket members so that the fastening plates inserted into the socket members are prevented from being separated from the socket members.

**[0019]** The legs fastening unit may include: bands formed in the form of gaiters, and configured to be fastened to the calves while surrounding the calves; and tubes vertically installed on the first sides of the bands, and configured such that the lower legs are inserted thereinto.

**[0020]** The legs fastening unit may further include bands fastening means configured to fasten the bands to shoes worn by the user and to prevent the bands from

moving.

**[0021]** The legs fastening unit may further include dedicated shoes integrated with the bands fastening means to which the bands are detachably coupled.

**[0022]** The buttocks fastening unit may further include auxiliary fastening strips formed on the first sides of the body, and configured to fasten the body while surrounding the thighs of the user.

**[0023]** The first joints may be provided to be located behind the knees of the user.

**[0024]** Meanwhile, a chair apparatus of the present invention includes: a buttocks fastening unit configured to be fixedly wearable on the buttocks; a support unit coupled and fastened to the buttocks fastening unit, and configured to support the buttocks fastening unit against a ground surface so that a user can sit; and a legs fastening unit configured to wear the lower portion of the support unit on the calves of the user; wherein the support unit includes: fastening plates coupled to the buttocks fastening unit; a pair of upper legs and a pair of lower legs formed to extend downward from the fastening plates, and coupled to both legs of the user; first joints configured to support the lower legs so that the lower legs can be rotated with respect to the upper legs; and second joints configured to support the upper legs so that the upper legs can be rotated with respect to the fastening plates; and wherein the fastening plates, the upper legs and the lower legs are configured to be foldable with respect to the first joints and the second joints, and maintain the state of being bent at a predetermined angle so that a wearer can sit.

### Advantageous Effects

**[0025]** According to the above description, the chair apparatus of the present invention has the effects of enabling a user to wear the chair apparatus and to easily sit when necessary.

**[0026]** Furthermore, the chair apparatus according to the present invention is configured such that the chair unit is coupled to the inside or outside of the pants and is moved along with the pants that are worn by a wearer in an integrated manner. In this case, the chair unit is accommodated inside the pants and performs joint movement in conjunction with the operation of legs via the first joint and the second joints, thereby applying minimum interference when the wearer walks.

**[0027]** Furthermore, the chair apparatus is configured such that the buttocks support plate stably supports the buttocks of a wearer when the wearer desires sitting and such that the upper legs and the lower legs are bent and thus the center of gravity is formed, thereby enabling stable sitting.

**[0028]** Furthermore, the chair apparatus is configured such that the chair unit is accommodated inside the pants unit and thus the chair unit is not exposed to the outside, thereby providing the convenience in which the wearer can sit according to his or her desire anywhere and an-

vertime without degrading aesthetics.

**[0029]** Furthermore, the chair apparatus is configured such that the lengths of the pair of upper legs and the pair of lower legs can be adjusted, and thus the chair apparatus can be adjusted and used in accordance with the physical conditions of a wearer.

**[0030]** Furthermore, the chair apparatus of the present invention has an effect in which the support unit and the legs fastening unit are accommodated in the body and are easily stored and carried, and, when a user desires to sit, the support unit and the legs fastening unit are easily taken out of the body anywhere and anytime, are assembled, are simply worn, and enable a user to sit.

**[0031]** Furthermore, the chair apparatus is configured such that the body supports buttocks and the fastening plate, the upper legs and the lower legs are bent at a predetermined angle and thus the center of gravity is formed, thereby enabling stable sitting and thus allowing a user to feel a comfortable sitting sensation. Accordingly, the chair apparatus has a structure in which the chair apparatus can be easily worn and used when necessary in a place that is not furnished with a chair, and has an effect in which the chair apparatus can be advantageously used in various places, such as a museum, a theater, a stadium, etc.

**[0032]** Furthermore, the chair apparatus has an effect in which a worker, such as a mart salesclerk, a hotel employee, a laundry worker, a beautician, an assembly line worker, a teacher, a parking assistant, a barista, a gas station worker or the like, who is working while standing up for a long time wears the chair apparatus of the present invention and sits, thereby reducing fatigue and decreasing the degree of muscle exhaustion.

## Description of Drawings

### [0033]

Fig. 1 is a perspective view showing the configuration of a chair apparatus according to a first embodiment of the present invention;

Fig. 2 is a sectional view showing the side sectional configuration of the chair apparatus according to the first embodiment of the present invention;

Fig. 3 is a diagram illustrating an example of the state of sitting while wearing the chair apparatus according to the first embodiment of the present invention;

Fig. 4 is a sectional view showing the configuration of a chair apparatus according to a second embodiment of the present invention;

Fig. 5 is a perspective view showing the configuration of a chair apparatus according to a third embodiment of the present invention;

Fig. 6 is a perspective view illustrating the configuration of a chair apparatus according to a fourth embodiment of the present invention;

Figs. 7 to 9 are enlarged perspective views showing the support unit of Fig. 6 in detail, wherein Fig. 7 is

a diagram showing the state in which the support unit is spread in the form of a rectilinear line, Fig. 8 is a diagram showing the state in which the support unit is folded in a storage state, and Fig. 9 is a diagram showing the state in which the support unit is bent when a user sits;

Fig. 10 is a perspective view showing the state in which the fastening plates of the support unit are separated from the fastening portions in the chair apparatus of Fig. 6;

Fig. 11 is a perspective view showing the state in which the fastening plates of the support unit are coupled to the fastening portions in Fig. 10;

Fig. 12 is a perspective view showing the state in which the legs fastening unit of Fig. 6 is spread;

Fig. 13 is a diagram showing the state in which a user wears the wearable chair apparatus according to the fourth embodiment of the present invention and sits;

Fig. 14 is a diagram showing the state in which a user wears the wearable chair apparatus according to the fourth embodiment of the present invention and stands up;

Fig. 15 is a diagram showing the state of carrying the wearable chair apparatus according to the fourth embodiment of the present invention; and

Fig. 16 is a diagram showing another configuration of the legs fastening unit of the wearable chair apparatus according to the fourth embodiment of the present invention.

## Best Mode

**[0034]** The objects, other objects, features and advantages of the present invention can be easily understood via the following preferred embodiments related to the accompanying drawings. However, the present invention is not limited to embodiments described herein, but may be embodied in other forms. Rather, embodiments described herein are provided to make disclosed content thorough and complete and to sufficiently deliver the spirit of the present invention to those skilled in the art.

**[0035]** In the present specification, when an element is referred to as being disposed on another element, this means that the former element may be directly formed on another element or a third element may intervene between the elements. In the drawings, the thicknesses of elements are exaggerated for the effective description of technical features.

**[0036]** The embodiments described herein will be described with reference to sectional views and/or plan views that are ideal illustrations of the present invention. In the drawings, the thicknesses of films and regions are exaggerated for the effectively description of technical content. Accordingly, the shapes of the illustrated drawings may be varied according to the manufacturing technology and/or tolerance. Therefore, the embodiments of the present invention are not limited to the illustrated par-

ticular shapes, but include deviations in the shapes which result from manufacturing. For example, an etched region illustrated as a rectilinear line may have a rounded or curved shape. Thus, the regions illustrated in the drawings have features, and their shapes are not intended to illustrate the actual shapes of regions of a device but are not intended to limit the scope of the present invention. Although the terms "first," "second," etc. are used to describe various elements in various embodiments of the present specification, these elements should not be limited by these terms. These terms are used merely to distinguish one element from another element. The embodiments described and illustrated herein also include complementary embodiments.

**[0037]** The terms used herein are intended for the description of embodiments, and are not intended for the limitation of the present invention. In the present specification, singular forms also include plural forms, unless the context clearly indicates otherwise. The terms "comprises" and/or "comprising" used herein do not exclude the presence or addition of one or more other components.

**[0038]** In the following description of specific embodiments, various specific details are provided to describe the present invention in detail and assist in the comprehensive understanding of the present invention. However, it will be understood that a reader who has knowledge in the art to the extent that he or she can understand the present invention can practice the present invention without these specific details. It is noted that in some cases, descriptions of elements that are well known and are not highly related to the present invention are omitted to prevent confusion from occurring in the description of the present invention without a special reason.

**[0039]** A chair apparatus 1 according to a first embodiment of the present invention will be described with reference to Figs. 1 to 3 below.

**[0040]** Fig. 1 is a perspective view showing the configuration of the chair apparatus 1 according to the first embodiment of the present invention, and Fig. 2 is a sectional view showing the side sectional configuration of the chair apparatus 1.

**[0041]** As shown in these drawings, the chair apparatus 1 includes a pants unit 100 configured such that the body part of a wearer below his or her waist is inserted thereinto, and a chair unit 200 fixedly accommodated inside the pants unit 100 and configured to enable a user to sit.

**[0042]** The pants unit 100 is worn on the body part of the wearer below his or her waist. The pants unit 100 includes a buttocks reception part 110 configured to receive the buttocks H of the wearer, a legs reception part 120 configured to receive a pair of legs L, and a chair reception part 140 coupled to traverse the buttocks reception part 110 and the legs reception part 120 and configured to receive the chair unit 200.

**[0043]** The buttocks reception part 110 and the legs reception part 120 are formed by cutting out a pair of front

and rear clothes in accordance with dimensions and sewing the clothes so that spaces for receiving the buttocks H and the legs L are formed therein. The chair reception part 140 is vertically coupled inside the buttocks reception part 110 and the legs reception part 120, and partitions the internal space of the pants unit 100 into the space into which the chair unit 200 is inserted and the space into which the body of the wearer is inserted.

**[0044]** The chair reception part 140 is formed by sewing a separate cloth on the inner wall surfaces of the buttocks reception part 110 and the legs reception part 120. The width of the chair reception part 140 is preferably a minimum width corresponding to the width of the buttocks support plate 210 of the chair unit 200 because the chair unit 200 can immediately react in the operation of the wearer.

**[0045]** In this case, the cloths that form the pants unit 100 are preferably made of flexible material in order to improve the wearing sensation of the wearer. Furthermore, when the cloths are made of flexible material, the distance between lower legs 230 and the legs L can be widened when the wearer sits, thereby improving a sitting sensation.

**[0046]** The chair unit 200 moves along with the wearer in the state of being accommodated inside the pants unit 100, and supports the wearer with respect to a ground surface so that the wearer can sit regardless of the location when the wearer desires to sit.

**[0047]** The chair unit 200 includes the buttocks support plate 210 configured such that the buttocks H of the wearer come into contact therewith and are supported thereby, upper legs 220 formed to extend downward from the buttocks support plate 210, the lower legs 230 formed to extend downward from the upper legs 220, first joints 240 provided between the buttocks support plate 210 and the upper legs 220, second joints 250 provided between the upper legs 220 and the lower legs 230, and ground surface supports 270 coupled to the lower legs 230 and configured to come into contact with a ground surface.

**[0048]** The buttocks support plate 210 is accommodated in the chair reception part 140 at a location corresponding to the buttocks H of the wearer. The buttocks H are seated on the buttocks support plate 210 when the wearer sits. The buttocks support plate 210 is preferably formed in a minimum size allowing sitting because interference can be minimized when the wearer is walking.

**[0049]** In this case, the buttocks support plate 210 is preferably formed in a gradually curved surface form, as shown in Fig. 2, by taking into account the curved shape of the buttocks H. The buttocks support plate 210 is rotated relative to the upper legs 220 around the first joint 240s when the wearer walks or sits. Accordingly, the buttocks support plate 210 is maintained in a vertical state, as shown in Fig. 2, when the wearer stands up, and is rotated to a horizontal direction by a predetermined angle, as shown in Fig. 3, when the wearer sits.

**[0050]** The upper legs 220 and the lower legs 230 are disposed between the buttocks support plate 210 and

the ground surface, and are operated in conjunction with the movement of the legs of the wearer. The upper legs 220 are disposed in accordance with the thighs, and the lower legs 230 are disposed in accordance with the calves. The upper legs 220 and the lower legs 230 are provided to be rotated relative to each other around the second joints 250.

**[0051]** The second joints 250 are formed at locations corresponding to the knees N of the wearer.

**[0052]** As to the upper legs 220, upper joint coupling portions 221 at the upper ends of the upper legs 220 are rotatably coupled to the buttocks support plate 210 by the first joints 240, and first inclined surfaces 223 that are coupled to the second joints 250 are provided at the lower ends of the upper legs 220. As to the lower legs 230, second inclined surfaces 231 at the upper ends of the lower legs 230 are coupled to the second joints 250, and the upper portions of the lower legs 230 are coupled to the ground surface supports 270.

**[0053]** In this case, each of the first inclined surfaces 223 and each of the second inclined surface 231 are inclined to form a predetermined angle  $\theta$  therebetween. The first inclined surfaces 223 and the second inclined surfaces 231 are maintained in the state of being spaced apart from each other, as shown in Fig. 1, when the wearer stands up, and the upper legs 220 and the lower legs 230 come into contact with each other through rotation, as shown in Fig. 3, when the wearer sits.

**[0054]** When the wearer sits, the weight of the wearer is applied to contact surfaces between the first inclined surfaces 223 and the second inclined surfaces 231, and the center of gravity is formed by an angle at which the upper legs 220 and the lower legs 230 are inclined, thereby maintaining the state in which the wearer sits.

**[0055]** That is, when the wearer stands up in the state of wearing the chair apparatus 1, as shown in Fig. 1, the upper legs 220 and the lower legs 230 are disposed perpendicular to a ground surface. Furthermore, when the wearer walks, the upper legs 220 and the lower legs 230 operate to be bent around the first joints 240 and the second joints 250 in conjunction with the operation of the legs L because the chair unit 200 is in the state of being accommodated inside the chair reception part 140.

**[0056]** The first joints 240 and the second joints 250 are implemented in the form of shafts. The first joints 240 are coupled through the buttocks support plate 210 and the upper joint coupling portions 221, and the second joints 250 are coupled through the lower portions of the upper legs 220 and the upper joint coupling portions 221 of the lower legs 230.

**[0057]** The upper legs 220 perform link movement between the first joints 240 and the second joints 250, and may operate variously in accordance with the operation of the legs L. Furthermore, the lower legs 230 may operate variously in accordance with the operation of the legs L and the locations of the upper legs 220.

**[0058]** When the wearer sits, the upper legs 220 and the lower legs 230 are inclined such that the first inclined

surfaces 223 and the second inclined surfaces 231 come into contact with each other, as shown in Fig. 3. In this case, the second joints 250 come into contact with the backs of the knees of the wearer. Accordingly, since the second joints 250 press the backs of the knees of the wearer and thus pain is caused, and cushion members 260 are provided in front of the second joints 250.

**[0059]** The cushion members 260 may be implemented as rubber or sponge having a predetermined thickness. Accordingly, when the wearer walks or sits, inconvenience can be reduced.

**[0060]** When the wearer bends the legs L to sit, the lower legs 230 are inclined at a predetermined angle with respect to a ground surface. The lower legs 230 are bent in a direction opposite the direction in which the feet F are directed. As the first inclined surfaces 223 and the second inclined surfaces 231 come into contact with each other, the weight of the wearer is distributed among the second joints 250, the ground surface supports 270 and the feet F. Furthermore, as the pair of ground surface supports 170 and the four points of the pair of feet F come into contact with a ground surface, the center of gravity is formed, and thus the state of sitting is maintained.

**[0061]** Meanwhile, in the chair unit 200 according to the above-described preferred embodiment of the present invention, the lengths of the upper legs 220 and the lower legs 230 are fixed. Accordingly, when the height of the wearer differs, there may occur cases where balance is not maintained when the wearer walks or sits.

**[0062]** As a result, as a chair unit according to another embodiment of the present invention, the length of each of the upper legs 220 and the lower legs 230 may be provided to be variable.

**[0063]** Meanwhile, Fig. 4 is a side view showing the configuration of a chair apparatus 1a according to a second embodiment of the present invention. The chair apparatus 1 according to the previous preferred first embodiment is disposed in an integrated manner in the state in which the chair unit 200 has been accommodated inside the pants unit 100. In contrast, in the chair apparatus 1a according to the second embodiment, a chair unit 200b is coupled to the outside of a pants unit 100a.

**[0064]** Although the configuration of the chair unit 200b is the same, the chair unit 200b is disposed on the back surface of the pants unit 100a, and is coupled to the pants unit 100a by fastening members 310. The fastening members 310 may be implemented as bands including male and female Velcro members.

**[0065]** The wearer may dispose the chair unit 200b behind himself or herself in the state of wearing the pants unit 100, and may fasten the chair unit 200b to himself or herself via the fastening members 310.

**[0066]** The chair apparatus 1a according to the second embodiment of the present invention allows only the chair unit 200b to be rented to a visitor in a place, such as a museum or an exhibition hall, and also allows the visitor to couple the chair unit 200b to his or her pants and to sit at a desired location.

**[0067]** Meanwhile, Fig. 5 is a perspective view showing the configuration of a chair apparatus 1b according to a third embodiment of the present invention.

**[0068]** In the chair apparatus 1 according to the above-described third embodiment of the present invention, the buttocks support plate 210 is implemented in the form of a single plate. In contrast, in the chair apparatus 1b according to the third embodiment of the present invention, a buttocks support plate 210a is implemented as a pair of support plates 211 and 213. Accordingly, the pair of support plates 211 and 213 are disposed on both side buttocks, and cause less interference while the wearer is walking than the buttocks support plate 210 of the chair apparatus 1 of the preferred embodiment, thereby increasing a wearing sensation.

**[0069]** In this case, a pair of support plates 211 and 213 are connected by a connection bar 215. In some cases, the length of the connection bar 215 is implemented to be variable, thereby further improving a wearing sensation.

**[0070]** As described above, in the chair apparatuses 1, 1a and 1b according to the present invention, the chair unit is coupled to the inside or outside of pants, and the wearer moves along with the worn pants in an integrated manner. In this case, the chair unit is accommodated inside the pants, and performs joint movement in conjunction with the operation of the legs of the first joint and the second joints, thereby causing minimum interference when the wearer walks.

**[0071]** Furthermore, in the chair apparatus, when the wearer desires to sit, the buttocks support plate stably supports the buttocks of the wearer, and the upper legs and the lower legs are bent and thus the center of gravity is formed, thereby enabling stable sitting.

**[0072]** Furthermore, in the chair apparatus, the chair unit is accommodated inside the pants unit, and thus the chair unit is not exposed to the outside, thereby providing the convenience in which the wearer can sit according to his or her desire anywhere and anytime without degrading aesthetic beauty.

**[0073]** A wearable chair apparatus 10 capable of facilitating storage and carrying according to a fourth embodiment of the present invention will be described with reference to Figs. 6 to 16.

**[0074]** Referring to Figs. 6 to 9, the chair apparatus 10 according to the present invention includes a buttocks fastening unit 400, a support unit 500, and a legs fastening unit 600.

**[0075]** The buttocks fastening unit 400 includes a body 410 and fastening strips 420.

**[0076]** In the body 410, a storage space is formed in the body 410, like in a common bag, and a zipper 416 is formed above an opening portion, so that a user can selectively open and close the body 410 by moving the grip 414 of the zipper 416. In the present embodiment, the body 410 is made of flexible material, and is formed in an elliptical shape having a predetermined length.

**[0077]** The fastening strips 420 are composed of a pair

of strips, and are formed to extend from both side ends of the body 410, respectively. Velcro members 421 and 422 are provided on the fastening strips 420 as a fastening means. A user forms the pair of fastening strips 420 in the form of shoulder straps by fastening the Velcro members 421 and 422 formed on the pair of fastening strips 420, thereby enabling the body 410 to be carried on the shoulders in the form of a cross-bag, as shown in Fig. 15. When a user sits using the chair apparatus 10 of the present invention, the user surrounds the buttocks of the user with the body 410, surrounds the waist with the two fastening strips 420 and fastens the Velcro members 421 and 422 in a cross form, thereby fixedly wearing the body 410 on the buttocks of the user so that the body 410 comes into close contact with the buttocks of the user.

**[0078]** Meanwhile, in the buttocks fastening unit 400 of the present invention, the body 410 is provided with two pairs of auxiliary fastening strips 430, and buckle members 433 are formed on the ends of each pair of auxiliary fastening strips 430 as a fastening means. Accordingly, the user fastens the body 410 around the waist using the fastening strips 420. Additionally, the user may firmly fasten the body 410 to his or her buttocks by surrounding the thighs with the auxiliary fastening strips 430 and fastening the buckle members 433 at the ends of the auxiliary fastening strips 430.

**[0079]** Furthermore, the buttocks fastening unit 400 of the present invention includes fastening portions 440 so that the upper ends of the support unit 500 are detachably coupled to the body 410.

**[0080]** Referring to Figs. 6, 10 and 11, each of the fastening portions 440 includes a socket member 442, a cover member 444, and fastening members 445 and 446.

**[0081]** The socket member 442 is fixedly mounted on the inner surface of the body 410. One side of the socket member 442 is open, and thus the fastening plate 530 of the support unit 500 may be inserted through the open portion. The socket member 442 is made of soft fabric material, such as leather, and may be coupled to the body 410 by sewing. However, the socket member 442 is not limited thereto. The socket member 442 may be made of hard plastic material, and may be bonded to the body 410. Any configuration may be employed as long as the fastening plates 530 can be inserted and thus the fastening plates 530 can be coupled to the body 410.

**[0082]** The cover members 444 are formed to extend from the opening portions of the socket members 442, and are configured to cover the opening portions of the socket members 442 in the state in which the fastening plates 530 have been inserted into the socket members 442.

**[0083]** The fastening members 445 and 446 are composed of Velcro members, and are formed on the socket member 442 and the cover member 444. Accordingly, the fastening members 445 and 446 fasten the cover members 444 to the socket members 442, thereby preventing the fastening plates 530 inserted into the socket

members 442 from being separated therefrom.

**[0084]** In this case, any configuration in which two members are detachably fastened to each other, such as dot buttons (snap buttons) or general buttons, other than Velcro members, may be applied to the fastening members 445 and 446.

**[0085]** The support unit 500 is configured such that the upper end thereof is detachably fastened to the body 410 of the buttocks fastening unit 400, and supports the body 410 against a ground surface so that the user can sit.

**[0086]** The support unit 500 includes rod-shaped lower legs 510 configured to have a predetermined length, upper legs 520 formed to extend above the rod-shaped lower legs 510, the fastening plates 530 formed to extend above the upper legs 520, first joints 540 provided between the lower legs 510 and the upper legs 520, and second joints 550 provided between the upper legs 520 and the fastening plates 530.

**[0087]** When the lower legs 510 and the upper legs 520 are worn by a wearer, they are disposed between the fastening plates 530 and a ground surface, and operate in conjunction with the movement of the legs of the wearer. The lower legs 510 are disposed in accordance with the calves, and the upper legs 520 are disposed in accordance with the thighs. The lower legs 510 and the upper legs 520 are provided to be rotated in relation to each other around the first joints 540.

**[0088]** When the present invention is worn by the wearer, the first joints 540 are formed at locations corresponding to the knees N (see Figs. 13 and 14).

**[0089]** The upper ends of the lower legs 510 and the lower ends of the upper legs 520 are rotatably coupled to each other by hinge pins h1. More specifically, rotation support members 516 in each of which a recess 517 is provided are provided at the upper ends of the lower legs 510, and the recesses 517 are engaged with the lower ends of the upper legs 520 by the hinge pins h1 in the state in which the lower ends of the upper legs 520 have been inserted into the recesses 517, thereby forming the first joints 540. In this case, when rotation is performed in direction A in the state in which the lower legs 510 and the upper legs 520 are spread in the form of a rectilinear line, as shown in Fig. 7, the support unit 500 enters the state in which the lower legs 510 are tilted with respect to the upper legs 520, as shown in Fig. 3. When rotation is performed in direction B, the support unit 500 maintains the state in which the upper legs 520 are stopped by the inner ends of the recesses 517 of the lower legs 510 and thus the support unit 500 is not completely bent and is bent at a predetermined angle, as shown in Fig. 9. For reference, the state in which the lower legs 510 are tilted with respect to the upper legs 520, as shown in Fig. 9, refers to the state in which the support unit 500 is deformed when a user sits.

**[0090]** Meanwhile, curved bent portions 515 are provided at the lower ends of the lower legs 510, and are portions that come into contact with a ground surface. The curved bent portions 515 increase contact areas on

a ground surface, thereby improving support capability.

**[0091]** The fastening plates 530 are configured in the form of rectangular plates having a width greater than that of the lower legs 510 and the upper legs 520, and the lower ends of the fastening plates 530 and the upper ends of the upper legs 520 are coupled to each other by the hinge pins h2, thereby forming the second joints 550.

**[0092]** In this case, angle maintenance members 527 having inclined surfaces 527a at a predetermined angle are formed at the upper ends of the upper legs 520, and limit the rotation ranges of the fastening plates 530 in one direction. Accordingly, when the fastening plates 530 are rotated in direction C in the state in which the upper legs 520 and the fastening plates 530 are spread, as shown in Fig. 7, the fastening plates 530 come to close contact with the inclined surfaces 527a of the angle maintenance members 527, and the fastening plates 530 maintain the state of being tilted at a predetermined angle with respect to the upper legs 520 and are not rotated any longer, as shown in Fig. 9. For reference, the state in which the fastening plates 530 are tilted with respect to the upper legs 520, as shown in Fig. 9, refers to the state in which the support units 500 are deformed when the user sits.

**[0093]** Meanwhile, in the present invention, when the support unit 500 is in the state of being folded, as shown in Fig. 8, the size of the support unit 500 becomes smaller than the size of a storage space in the body 410, and thus the support unit 500 may be put into the body 410 though the opening portion of the body 410 in which the zipper 416 is formed.

**[0094]** Referring to Figs. 6 and 12, the legs fastening unit 600 is intended to fasten the lower legs 510 of the support unit 500 to the calves (L1; see Fig. 8) of a user, and includes bands 601 and tubes 605. The bands 610 are coupled to the calves like gaiters by making the bands 601 using soft fabric materials in which Velcro members 606 and 607 are formed at both ends thereof and then fastening the Velcro members 606 and 607 to each other while surrounding the calves with the bands 610.

**[0095]** The tubes 605 are formed in the bands 601 in a vertical longitudinal direction, and the lower legs 510 are inserted into the tubes 605 upon wearing the chair apparatus, as shown in Fig. 8.

**[0096]** An example of the use of the wearable chair apparatus 10 capable of facilitating storage and carrying according to the fourth embodiment of the present invention is described with reference to the drawings.

**[0097]** First, the user puts the support unit 500 and the legs fastening unit 600, folded in the state of Fig. 3, into the body 500, does up the zipper 416, couples the fastening strips 420 to each other using the Velcro members 421 and 422, and shoulders the buttocks fastening unit 400 in the form of a cross-bag, as shown in Fig. 15, thereby carrying the wearable chair apparatus to a required location while easily storing and carrying the wearable chair apparatus.

**[0098]** Thereafter, when the user desires to sit, he or she takes the support unit 500 and the legs fastening unit



600 out of the body 410, assembles the buttocks fastening unit 400, the support unit 500 and the legs fastening unit 600, and then wears the wearable chair apparatus. More specifically, the user assembles the wearable chair apparatus by coupling the pair of fastening plates 530 to the pair of fastening portions 440 and then inserting the lower legs 510 into the tubes 605 of the legs fastening unit 600.

**[0099]** In the state in which the chair apparatus 10 has been assembled as described above, the user disposes the body 410 to surround the buttocks, surrounds the waist with the pair of fastening strips 420, fastens the Velcro members 421 and 422, and fastens the buckle members 433 in the state of surrounding the thighs with the auxiliary fastening strips 430, thereby fastening the body 410 to the buttocks. Thereafter, the user fastens the bands 601 to the calves by fastening the Velcro members 606 and 607 in the state of surrounding the calves with the pair of bands 601, respectively, thereby completing wearing, as shown in Fig. 14.

**[0100]** In the state in which the wearing of the chair apparatus 10 has been completed as described above, when the user walks, the lower legs 510, upper legs 520 and fastening plates 530 of the support unit 500 perform joint movement in conjunction with the operation of the legs by the first joints 540 and the second joints 550, thereby enabling natural walking without interfering with the walking of the user. During the above-described joint movement of the support unit 500 attributable to the walking of the user, the lower legs 510 are guided by the tubes 605 through vertical movement, thereby achieving more natural walking.

**[0101]** Meanwhile, when the user desires to sit and bends his or her legs, the body 410 supports the buttocks and the support unit 500 supports the weight of the user, as shown in Fig. 13, and thus the state of being bent is maintained, as shown in Figs. 9 and 13, and the center of gravity is formed, thereby enabling stable sitting.

**[0102]** More specifically, when the user sits, the lower legs 510 are inclined with respect to a ground surface at a predetermined angle, as shown in Fig. 13, the first joints 540 between the lower legs 510 and the upper legs 520 and the second joints 550 between the upper legs 520 and the fastening plates 530 are maintained in the state of being bent at a predetermined angle regardless of the weight of the user, as shown in Figs. 9 and 13. The weight of the user is distributed among the first joints 540, the second joints 550, and the feet of the user and the lower ends of the lower legs 510 that come into contact with a ground surface. As the lower ends of the pair of lower legs 510 and the four points of the pair of feet come into contact with a ground surface, the center of gravity is formed, thereby maintaining the state of sitting.

**[0103]** In the fourth embodiment, each of the fastening portions 440 used to detachably mount the fastening plates 530 on the body 410 is composed of the socket member 442 and the cover 444, but is not limited thereto. Any other configuration may be employed as long as the

configuration can detachably couple the fastening plates 530 to the body 410.

**[0104]** Furthermore, in the support unit 520 of the present invention, the first joints 540 and the second joints 550 may be configured in the form as shown in the drawing, but is not limited thereto. Any configuration may be employed as long as two members are completely folded when the configuration is rotated in one direction and have the state of being bent at a predetermined angle regardless of weight when the configuration is rotated in another direction. That is, a configuration different from the joint configuration of the first embodiment may be employed.

**[0105]** Referring to Fig. 16, in the present invention, a legs fastening unit 600' may further include bands fastening means 609 for preventing bands 601 from moving in order to prevent the bands 601, worn on the calves of a user, from being rotated to the left or right.

**[0106]** The bands fastening means 609 are configured in the form of strips having a predetermined length, and are configured such that both ends thereof are fastened to the lower portions of the bands 601 via fastening means 609a, such as snap buttons or Velcro members. In the state in which the bands 601 have been worn on the calves of a user, the first ends of the bands fastening means 609 are fastened to the first lower sides of the bands 601, the lower portions of shoes 611 worn by the user are surrounded with the bands fastening means 609, and then the second ends of the bands fastening means 609 are fastened to the remaining lower sides of the bands 601, thereby preventing the bands 601 from moving.

**[0107]** Meanwhile, in the fourth embodiment, the bands fastening means 609 are configured to surround shoes and prevent the bands 601 from moving, but are not limited thereto. Chair apparatus-dedicated shoes in which a pair of bands fastening means are integrated with both side surfaces of shoes, respectively, are configured, and a user wears these dedicated shoes and couples the ends of the pair of bands fastening means to both sides of the bands 601, worn on the calves, by fastening means, such as Velcro members or snap buttons, thereby preventing the bands 601 from moving.

**[0108]** Reference symbol 535 denotes weight reduction portions 535 that are configured in the form of recesses in order to reduce the material of the fastening plates 530.

**[0109]** Meanwhile, although in the present invention of the fourth embodiment, a unit that is coupled to the fastening plates 530 of the support unit 500 and is worn to come into close contact with the buttocks has been described as being composed of the buttocks fastening unit 400 having a bag function, the unit is not limited thereto. The unit may be composed of a buttocks fastening unit having a different configuration, such as common Velcro bands, as long as the buttocks fastening unit can be coupled to the fastening plates 530 of the support unit 500 and can be worn to detachably fasten the fastening plates

530 to the buttocks.

**[0110]** Furthermore, although the legs fastening unit 600 has been described as being configured in the form of gaiters, the legs fastening unit 600 is not limited thereto. The legs fastening unit 600 may have any configuration as long as the configuration enables the legs fastening unit 600 to be fixedly worn on the calves of a user. In this case, the legs fastening unit 600 is preferably provided with a configuration, such as the tubes 605, which can receive the lower legs 510 and can be vertically moved in response to the joint movement of a user.

**[0111]** Although the present invention has been illustrated and described in connection with the preferred embodiments in order to illustrate the principle of the present invention, the present invention is not limited to the configurations and operations that have been illustrated and described as described above. Rather, it will be well understood by those skilled in the art that pluralities of changes and modifications can be made to the present invention without departing from the spirit and scope of the attached claims. Therefore, all these appropriate changes and modifications and equivalents thereto should be considered to fall within the range of the present invention.

#### Industrial Applicability

**[0112]** The present invention can be utilized in the chair-related industries.

#### Claims

##### 1. A chair apparatus, comprising:

a pants unit configured such that legs and buttocks of a wearer are inserted therein; and  
a chair unit disposed on one side of the pants unit, and configured to be coupled to the pants unit, move along with the pants unit while the wearer is moving, and support the buttocks of the wearer against a ground surface so that a user can sit;  
wherein the chair unit comprises:

a buttocks support plate configured such that the buttocks are seated thereon when the wearer sits;  
a pair of upper legs and a pair of lower legs configured to extend downward from the buttocks support plate and be coupled to both legs of the wearer;  
first joints configured to rotatably support the upper legs against the buttocks support plate;  
second joints configured to rotatably support the lower legs against the upper legs;  
and

wherein upper inclined surfaces and lower inclined surfaces that are rotated in relation to each other around the second joints, that come into contact with each other, and that support a weight of the wearer so that the wearer can sit are formed at lower ends of the upper legs and upper ends of the lower legs.

##### 2. The chair apparatus of claim 1, wherein:

the chair unit is integrated with an inside of the pants unit; and  
the inside of the pants unit is separated into a space in which the chair unit is accommodated and a space in which a body of the wearer is accommodated, and comprises a chair reception part configured such that the chair unit is accommodated therein.

##### 3. The chair apparatus of claim 1, wherein:

the chair unit is disposed outside the pants unit; further comprising fastening members configured to fasten the upper legs and the lower legs to the legs reception part of the pants unit.

##### 4. The chair apparatus of any one of claims 1 to 3, wherein:

the second joints are provided to be located behind knees of the wearer; and  
cushion members are provided on front surfaces of the second joints.

##### 5. A chair apparatus comprising:

a buttocks fastening unit comprising a body configured such that a storage space is formed therein and the body is fastened to buttocks of a user while surrounding the buttocks when the user sits, and a pair of fastening strips configured to extend from the body and to fasten the body to the buttocks;  
a support unit configured to be detachably coupled and fastened to the buttocks fastening unit and to support the body against a ground surface so that the user can sit; and  
a legs fastening unit configured to fasten the support unit to the calves of the user;  
wherein the support unit comprises:

fastening plates detachably coupled to the body;  
a pair of upper legs and a pair of lower legs configured to extend downward from the fastening plates and to be coupled to both legs of the user;

- first joints configured to support the lower legs so that the lower legs can be rotated with respect to the upper legs; and second joints configured to support the upper legs so that the upper legs can be rotated with respect to the fastening plates; and wherein the fastening plates, the upper legs and the lower legs are configured to be foldable with respect to the first joints and the second joints, and maintain a state of being bent at a predetermined angle so that a wearer can sit.
6. The chair apparatus of claim 5, wherein:
- the storage space is formed to have a size that accommodates the support unit and the fastening members; and storage and carrying are enabled by fastening the bag to a body of the user via the fastening strips in a state in which the support unit and the fastening members have been put into the storage space.
7. The chair apparatus of claim 5, wherein the buttocks fastening unit further comprises fastening portions installed inside the body, and configured to detachably couple the fastening plates to the body.
8. The chair apparatus of claim 7, wherein:
- the fastening portions comprise:
- socket members fastened to inside surfaces of the body, and configured such that the fastening plates are inserted therein and seated therein;
- covers configured to extend from the socket members and to cover opening portions of the socket members; and
- fastening members installed on the covers and the socket members, and configured to fasten the covers to the socket members so that the fastening plates inserted into the socket members are prevented from being separated from the socket members.
9. The chair apparatus of claim 5, wherein:
- the legs fastening unit comprises:
- bands formed in a gaiter form, and configured to be fastened to the calves while surrounding the calves; and
- tubes vertically installed on first sides of the bands, and configured such that the lower legs are inserted therein.
10. The chair apparatus of claim 9, wherein the legs fastening unit further comprises bands fastening means configured to fasten the bands to shoes worn by the user and to prevent the bands from moving.
11. The chair apparatus of claim 9, wherein the legs fastening unit further comprises dedicated shoes integrated with the bands fastening means to which the bands are detachably coupled.
12. The chair apparatus of claim 5, wherein the buttocks fastening unit further comprises auxiliary fastening strips formed on first sides of the body, and configured to fasten the body while surrounding thighs of the user.
13. The chair apparatus of claim 5, wherein the first joints are provided to be located behind knees of the user.
14. A chair apparatus comprising:
- a buttocks fastening unit configured to be fixedly wearable on buttocks;
- a support unit coupled and fastened to the buttocks fastening unit, and configured to support the buttocks fastening unit against a ground surface so that a user can sit; and
- a legs fastening unit configured to wear a lower portion of the support unit on calves of the user; wherein the support unit comprises:
- fastening plates coupled to the buttocks fastening unit;
- a pair of upper legs and a pair of lower legs formed to extend downward from the fastening plates, and coupled to both legs of the user;
- first joints configured to support the lower legs so that the lower legs can be rotated with respect to the upper legs; and
- second joints configured to support the upper legs so that the upper legs can be rotated with respect to the fastening plates; and
- wherein the fastening plates, the upper legs and the lower legs are configured to be foldable with respect to the first joints and the second joints, and maintain a state of being bent at a predetermined angle so that a wearer can sit.

FIG. 1

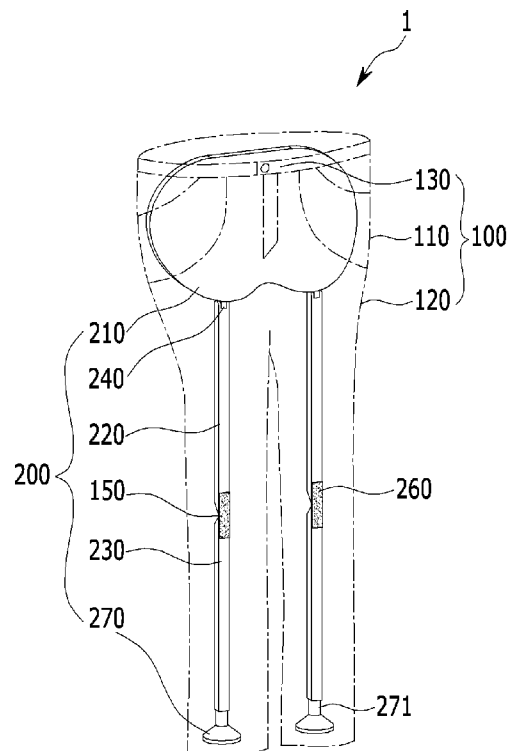


FIG. 2

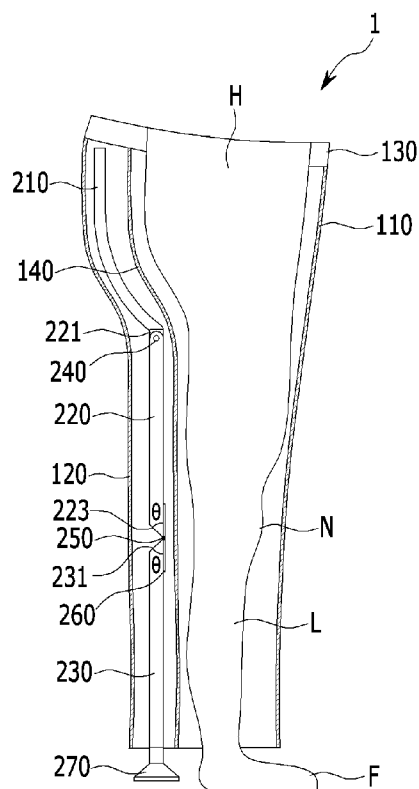


FIG. 3

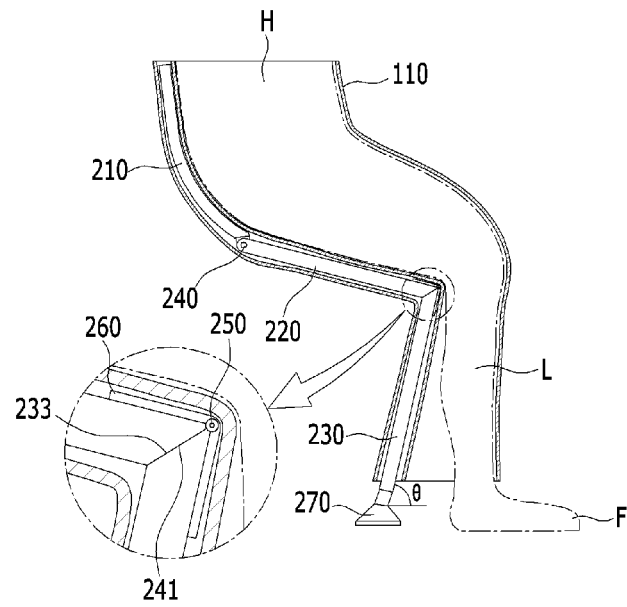


FIG. 4

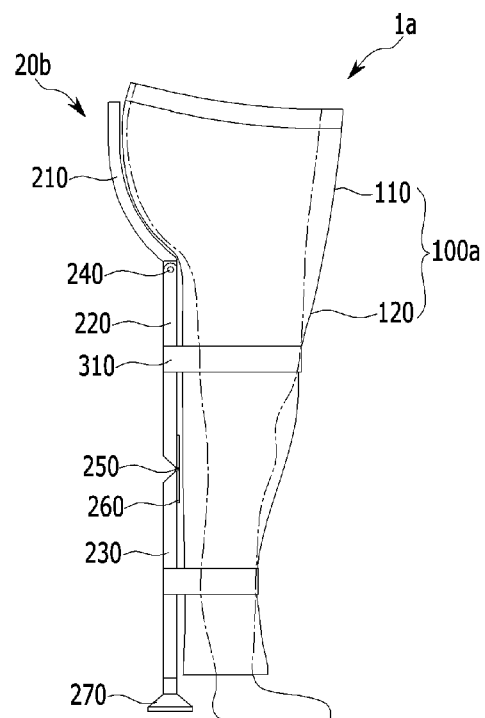


FIG. 5

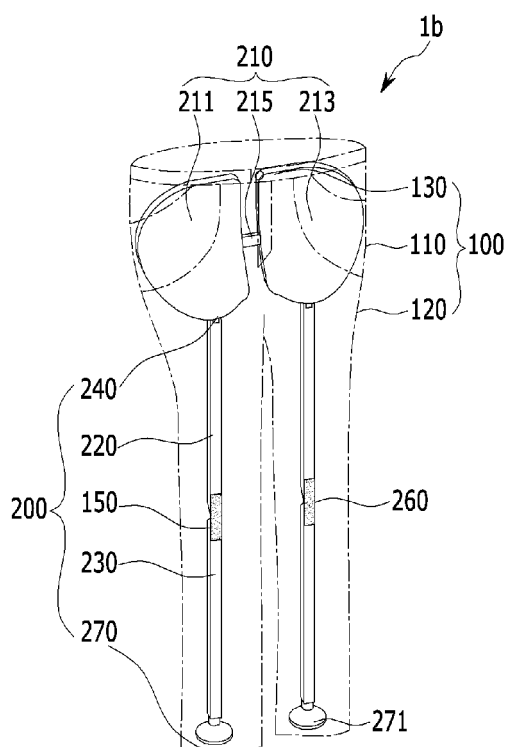


FIG. 6

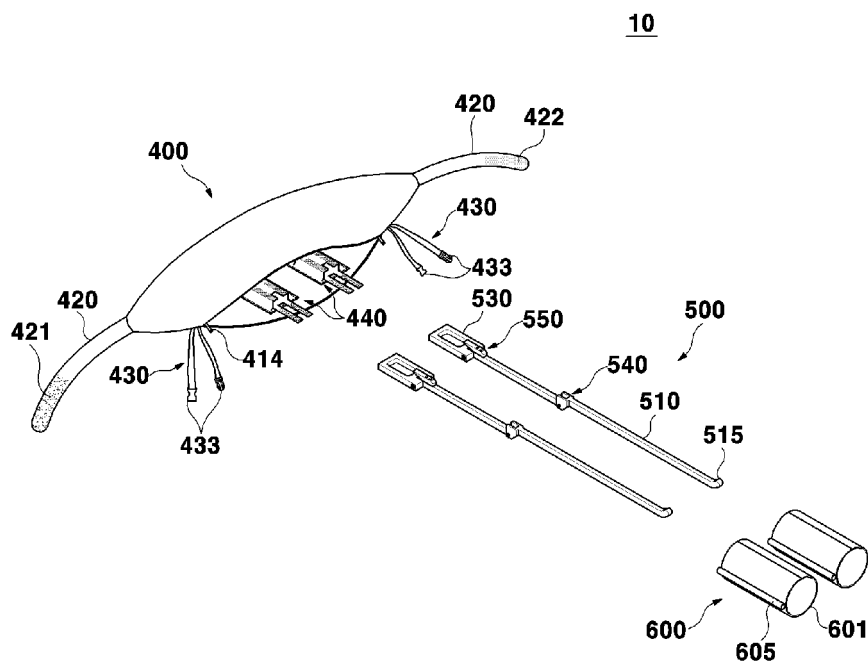


FIG. 7

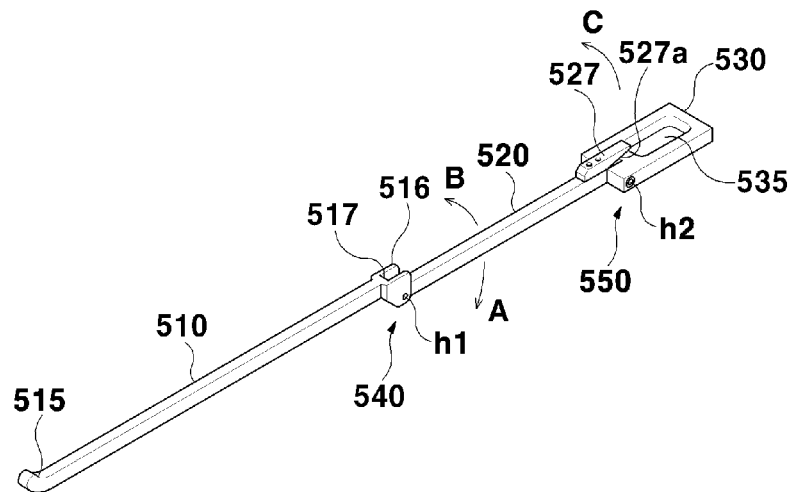


FIG. 8

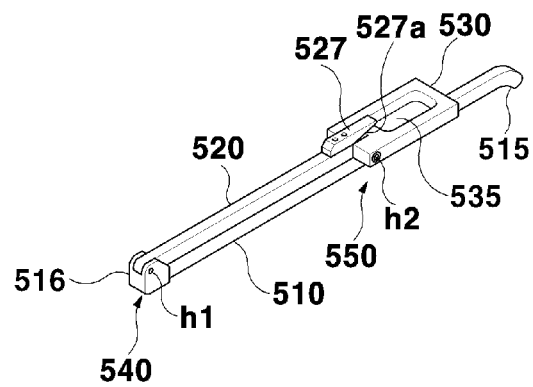


FIG. 9

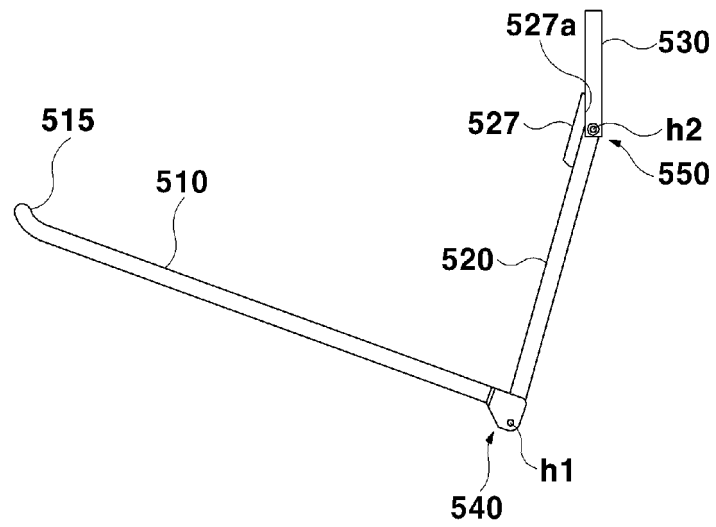


FIG. 10

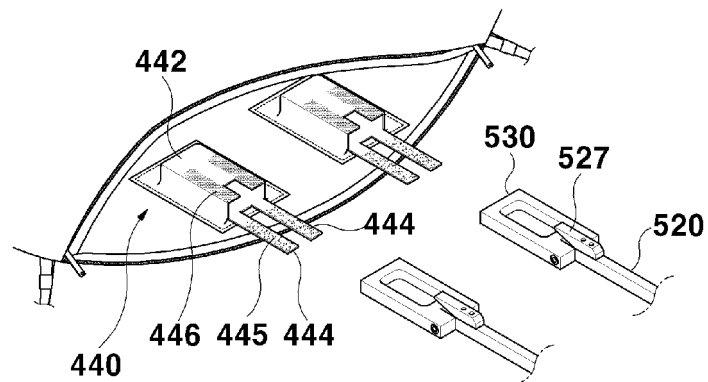




FIG. 11

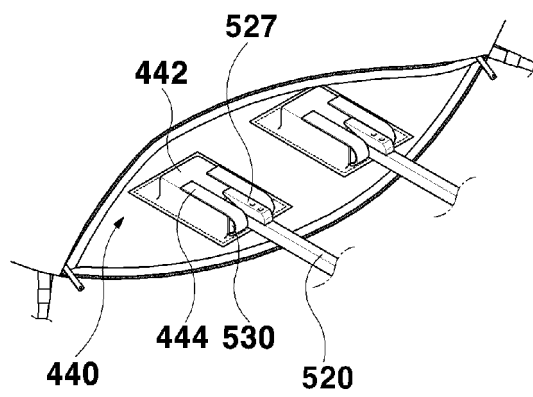


FIG. 12

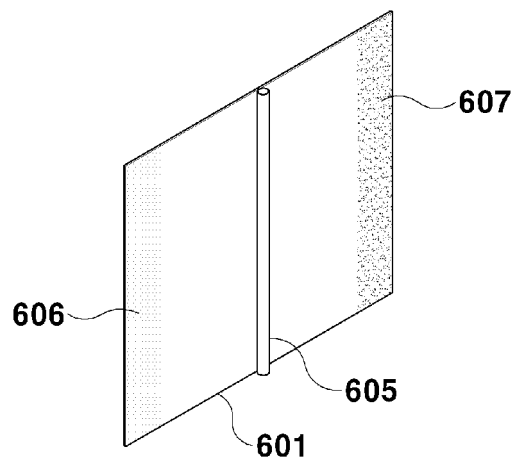


FIG. 13

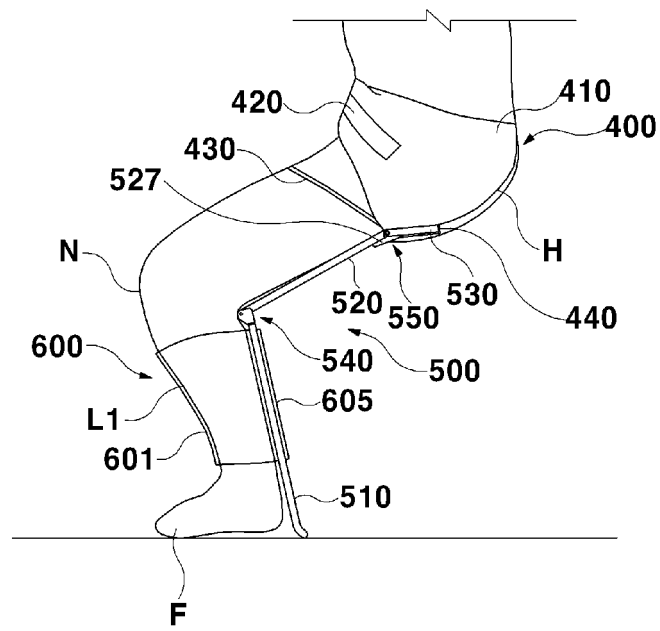


FIG. 14

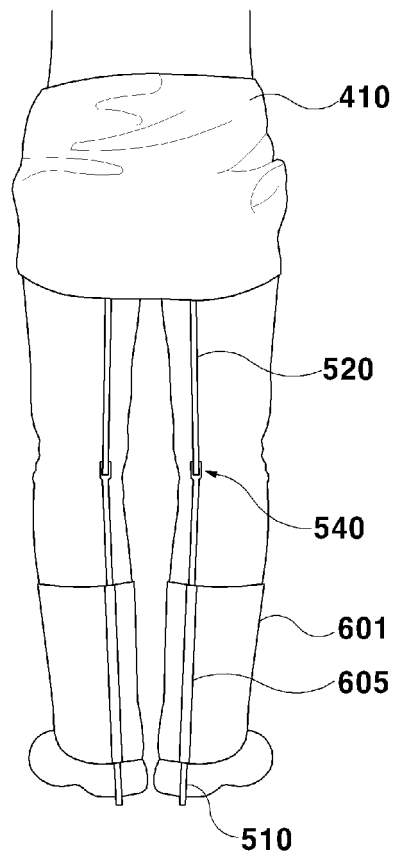


FIG. 15

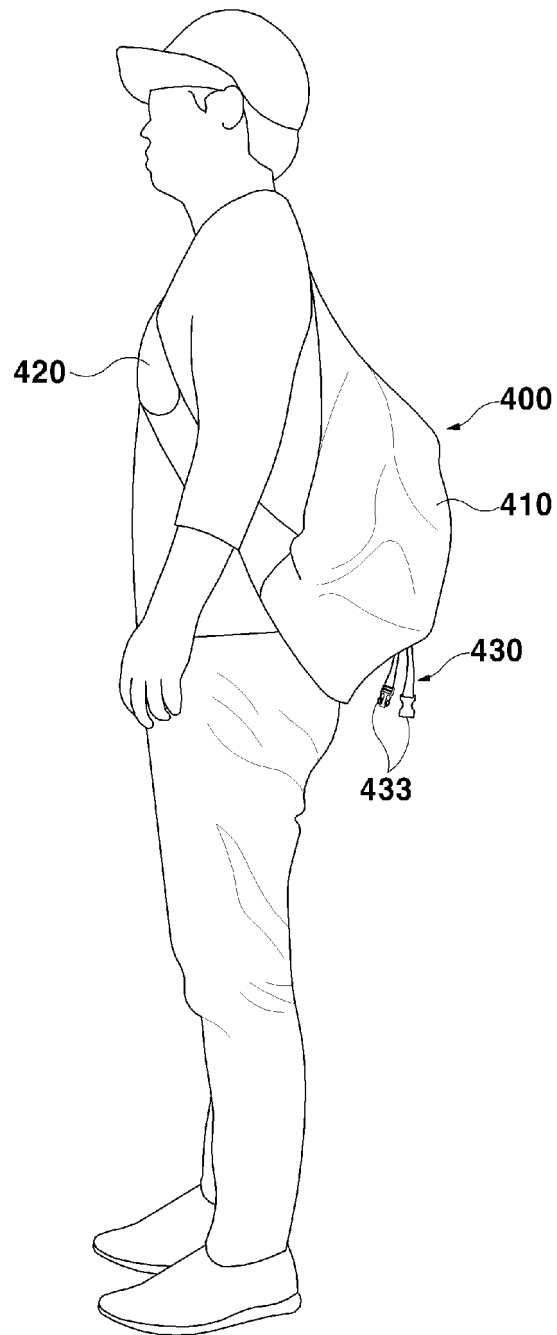
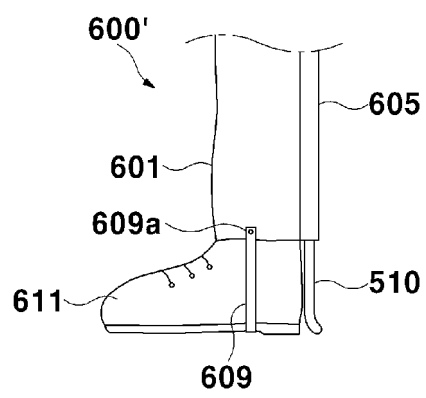


FIG. 16



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2014/005631

## A. CLASSIFICATION OF SUBJECT MATTER

*A47C 9/00(2006.01)i, A47C 9/02(2006.01)i, A47C 9/10(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47C 9/00; A45F 4/00; A41D 13/00; A61F 3/00; A45C 9/00; A47C 9/02; A47C 9/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) &amp; Keywords: chair pants, portable chair, buttocks support

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 04408600 A (DAVIS, Edward P.) 11 October 1983 See abstract, claims 1, 5, 14-17 and figures 1, 14, 21, 23	1-14
A	KR 20-0336096 Y1 (LEE, Jong Joo) 18 December 2003 See claim 1, figures 1-3	1-14
A	KR 20-0217999 Y1 (YOO, Byoung Woon) 15 March 2001 See abstract, claims 1-5, figures 1-3	1-14
A	US 03900898 A (ACKERMAN, Eugene J.) 26 August 1975 See abstract, claims 1-4, figures 1-5	1-14

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

\* Special categories of cited documents:

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

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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family


Date of the actual completion of the international search

02 OCTOBER 2014 (02.10.2014)

Date of mailing of the international search report

06 OCTOBER 2014 (06.10.2014)

Name and mailing address of the ISA/KR


 Korean Intellectual Property Office  
 Government Complex-Daejeon, 189 Seonsa-ro, Daejeon 302-701,  
 Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Telephone No.

# EP 3 017 723 A1

## INTERNATIONAL SEARCH REPORT Information on patent family members

International application No.

**PCT/KR2014/005631**

Patent document cited in search report	Publication date	Patent family member	Publication date
US 04408600 A	11/10/1983	EP 0039578 A1 EP 0039578 B1	11/11/1981 10/04/1985
KR 20-0336096 Y1	18/12/2003	NONE	
KR 20-0217999 Y1	15/03/2001	NONE	
US 03900898 A	26/08/1975	NONE	

Form PCT/ISA/210 (patent family annex) (July 2009)

**REFERENCES CITED IN THE DESCRIPTION**

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

**Patent documents cited in the description**

- KR 202012000140 [0006]
- KR 200336096 [0006]