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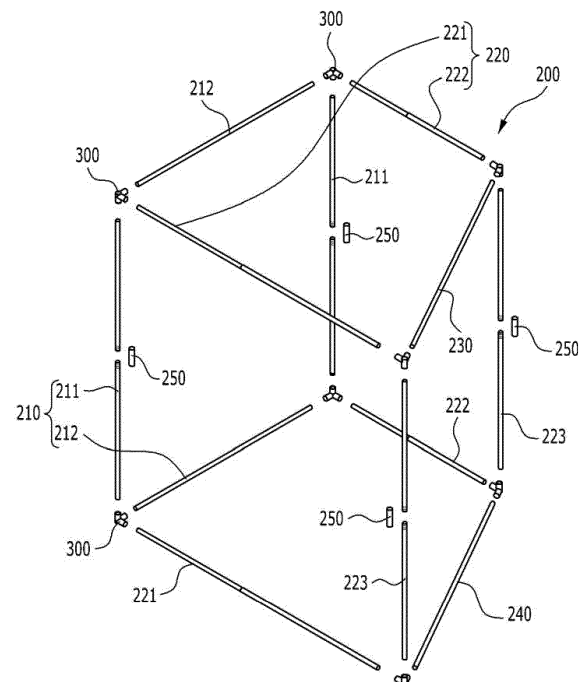
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(54) **GOLF PRACTICE NET**

(57) The present invention relates to a golf practice net golf including: a frame part having a rear frame constituted of rear vertical frames and rear horizontal frames, a front frame constituted of front left frames and front right frames, upper and lower connection frames connected to the front sides of the front right frames and the front left frames, and front left and right support frames for supporting the front left frames and the front right frames; connection caps for connecting the respective frames of the frame part; and a net part for surrounding the frame part, wherein the front left frames and the front right frames have different lengths from each other, and the upper and lower connection frames are located diagonally at the front sides of the front left frames and the front right frames.

FIG. 3



Description

Field of the Invention

[0001] The present invention relates to a golf practice net, and more particularly, to a golf practice net that is capable of allowing one of the left and right sides thereof to have a shorter length than the other according to a swing direction of a golf club, so that the golf club does not collide against the left or right side thereof, thereby enabling safe swing.

Background of the Related Art

[0002] Generally, golf is a sport in which players use various clubs to hit golf balls into a series of holes on a course in as few strokes as possible.

[0003] Recently, golf games are popularized so that many people enjoy playing golf, and so as to improve their golf skills, accordingly, a lot of practice has to be needed consistently. According to characteristics of golf, practice where a golf ball flies furthest toward an accurate direction should be needed. Also, such practice can be performed only in golf courses or golf practice facilities, but people who get busy work life have to visit the golf practice facilities so as to practice their swing, which undesirably needs a lot of time in visiting the golf practice facilities located at relatively long distances. Accordingly, they cannot practice golf consistently, thereby failing to improve their golf skills.

[0004] So as to overcome the above-mentioned problems, accordingly, a golf practice device for individual golf practice has been introduced, and the conventional golf practice device is configured to allow a structure having a given space to be coupled to a net so that if a golf ball hits at a given distance therefrom, the golf ball becomes caught therein, without any escape therefrom.

[0005] FIG. 1 is a perspective view showing a conventional golf practice net structure, and as shown, the conventional golf practice net structure includes frames 10 formed of a plurality of connection members to form a space portion at the inside thereof, a plurality of connectors 20 for connecting the frames 10 with each other, and a net 30 for surrounding the rear and side surfaces of the frames 10.

[0006] The conventional golf practice net structure is configured to allow the left and right frames to be connected to the rear frame by means of the connectors, but in this case, the length of the left frame is equal to that of the right frame. Generally, a golf ball hits in a state where it is located at a position close to the front side of the golf practice net structure so as to allow the golf ball to be caught in the net, but if the length of the left frame is equal to that of the right frame, a golf club may collide against the frames by means of a swing angle thereof when it hits the golf ball.

[0007] So as to prevent the golf club from colliding against the frames while swinging, accordingly, the golf

ball has to be located at a position far away from the front side of the golf practice net structure. In this case, the golf club does not collide against the frames, but since the golf ball is located at a position far away from the front side of the golf practice net structure, it may fly over the golf practice net structure, thereby undesirably causing dangers of safety accidents.

SUMMARY OF THE INVENTION

[0008] Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the related art, and it is an object of the present invention to provide a golf practice net that is capable of allowing left and right frames to which a net part is surroundedly coupled to have different lengths from each other in such a manner as to connect upper and lower connection frames to the front sides of the left and right frames, so that the upper and lower connection frames are located diagonally at the front sides of the left and right frames thereof, and accordingly, even if a golf ball hits at a position close to the front side of the golf practice net, the golf ball can be safely caught inside the golf practice net, without any collision of a golf club against the left or right frames, thereby improving a user's satisfaction and safety.

[0009] To accomplish the above-mentioned object, according to the present invention, there is provided a golf practice net including: a frame part for forming a frame of a predetermined shape and having a rear frame constituted of rear vertical frames spaced apart from each other by a given distance in such a manner as to be vertically erected on the left and right sides thereof and rear horizontal frames provided on tops and bottoms of the rear vertical frames, a front frame constituted of front left frames provided on the front left side of the rear frame and front right frames provided on the front right side of the rear frame, upper and lower connection frames connected to the top and bottoms of the front sides of the front right frames and the front left frames, and front left and right support frames vertically erected on the front ends of the front left frames and the front right frames so as to support the front left frames and the front right frames; connection caps for connecting the respective frames of the frame part; and a net part for surrounding the frame part, wherein the front left frames and the front right frames have different lengths from each other, and the upper and lower connection frames connected to the tops and bottoms of the front sides of the front right frames and the front left frames are located diagonally at the front sides of the front left frames and the front right frames.

[0010] According to the present invention, desirably, a bottom surface of the net part is slant toward the rear side thereof from the front side thereof so as to allow the golf ball hitting the net part to be returned to the front side thereof.

[0011] According to the present invention, desirably,

the net part includes a target net as a target of the golf ball provided on the front frame in front of the rear frame.

[0012] According to the present invention, desirably, the net part includes a target fabric provided behind the target net in such a manner as to be connected to the front frame to absorb a hitting impact of the golf ball.

[0013] According to the present invention, desirably, the target net and the target fabric are pulled and detachably fixed to the front frame by means of wire clamps.

[0014] According to the present invention, desirably, if a swing direction of a golf club is toward the left side from the right side, lengths of the front right frames are longer than lengths of the front left frames, and if a swing direction of a golf club is toward the right side from the left side, lengths of the front left frames are longer than lengths of the front right frames.

[0015] According to the present invention, desirably, the upper and lower connection frames are connected with the front left frames and the front right frames at an angle of 20 to 40° according to distances between the front left frames and the front right frames.

[0016] According to the present invention, desirably, the rear vertical frames and the front left and right support frames are respectively divided into a plurality of frames connected adjustable in height by means of height adjustment members.

[0017] According to the present invention, desirably, the height adjustment members are formed of screw type turnbuckles.

[0018] According to the present invention, desirably, the front left frames and the front right frames are respectively divided into a plurality of frames adjustable in length for both of right-hand use and left-hand use.

[0019] According to the present invention, desirably, the plurality of frames constituting the front left frames and the front right frames are pipe-shaped frames connected to each other by means of fitting so that the lengths of the front left frames and the front right frames are adjusted.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The above and other objects, features and advantages of the present invention will be apparent from the following detailed description of the embodiments of the invention in conjunction with the accompanying drawings, in which:

FIG.1 is a perspective view showing a conventional golf practice net structure;

FIG.2 is an exploded perspective view showing a frame part for right-hand use before a net part is mounted in a golf practice net according to the present invention;

FIG.3 is an exploded perspective view showing a frame part adjustable in length for left-hand use before a net part is mounted in a golf practice net according to the present invention;

FIG.4 is a perspective view showing the golf practice net according to the present invention;

FIG.5 is a side view showing the golf practice net according to the present invention; and

FIG.6 is a top view showing the golf practice net according to the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0021] The present invention may be modified in various ways and may have several exemplary embodiments. Specific exemplary embodiments of the present invention are illustrated in the drawings and described in detail in the detailed description. However, this does not limit the invention within specific embodiments and it should be understood that the invention covers all the modifications, equivalents, and replacements within the idea and technical scope of the invention.

[0022] In the description, the thicknesses of the lines or the sizes of the components shown in the drawing may be magnified for the clarity and convenience of the description. Further, the terms as will be discussed later are defined in accordance with the functions of the present invention, but may be varied under the intention or regulation of a user or operator. Therefore, they should be defined on the basis of the whole scope of the present invention.

[0023] In the description, a term 'and/or' includes a combination of a plurality of relevant and described items or any one of a plurality of related and described items. When it is said that one element is described as being "connected" or "coupled" to the other element, one element may be directly connected or coupled to the other element, but it should be understood that another element may be present between the two elements. An expression referencing a singular value additionally refers to a corresponding expression of the plural number, unless explicitly limited otherwise by the context. In this application, terms, such as "comprise", "include", or "have", are intended to designate those characteristics, numbers, steps, operations, elements, or parts which are described in the specification, or any combination of them that exist.

[0024] In the description, when it is said that one layer (film), area, pattern or structure is located "on" or "under" another layer (film), area, pattern or structure, it means that one layer may come into direct contact with another layer as well as yet another layer may exist between the two layers. References of the layers located on or below each other will be described with reference to the attached drawings.

[0025] Hereinafter, the present invention will be in detail explained with reference to the attached drawings.

[0026] FIG.2 is an exploded perspective view showing a frame part for right-hand use before a net part is mounted in a golf practice net according to the present invention, FIG.3 is an exploded perspective view showing a frame part adjustable in length for left-hand use before

a net part is mounted in a golf practice net according to the present invention, FIG.4 is a perspective view showing the golf practice net according to the present invention, FIG.5 is a side view showing the golf practice net according to the present invention, and FIG.6 is a top view showing the golf practice net according to the present invention.

[0027] As shown in FIGS.2 to 6, a golf practice net 100 according to the present invention includes a frame part 200, connection caps 300, and a net part 400.

[0028] The frame part 200 serves to connect the front left and right sides of the golf practice net 100 with the rear side of the golf practice net 100 to form a frame of a predetermined shape.

[0029] Further, a length, a width, and a height of the frame part 200 may be changed according to a golf practice space.

[0030] The frame part 200 includes a rear frame 210, a front frame 220, an upper connection frame 230, and a lower connection frame 240.

[0031] The rear frame 210 includes a pair of rear vertical frames 211 spaced apart from each other by a given distance in such a manner as to be vertically erected on the right and left sides thereof and rear horizontal frames 212 respectively provided on tops and undersides of the rear vertical frames 211 to connect the rear vertical frames 211 thereto.

[0032] Accordingly, the rear vertical frames 211 and the rear horizontal frames 212 are connected with each other to form a frame of a rectangular shape.

[0033] At this time, the rear vertical frames 211 and the rear horizontal frames 212 are separably connected with each other by means of the connection caps 300.

[0034] Further, the rear vertical frames 211 are divided into a plurality of frames connected adjustable in height by means of height adjustment members 250.

[0035] At this time, the height adjustment members 250 are formed of screw type turnbuckles.

[0036] The front frame 220 includes front left frames 221 provided on the front left side of the rear frame 210 and front right frames 222 provided on the front right side of the rear frame 210.

[0037] Further, the front left frames 221 and the front right frames 222 are divided into a plurality of frames so that their length can be adjusted in longitudinal directions.

[0038] Also, the plurality of frames of the front left frames 221 and the front right frames 222 are pipe-shaped frames connected with each other by means of fitting so that their length can be adjusted.

[0039] In detail, the divided frames of the front left frames 221 and the front right frames 222 are connected to each other by means of fitting to allow the lengths of the front left frames 221 and the front right frames 222 to be adjusted appropriately.

[0040] Accordingly, the lengths of the front left frames 221 and the front right frames 222 can be adjusted appropriately according to a swing direction so that the golf practice net 100 can be conveniently used.

[0041] If the lengths of the front left frames 221 and the front right frames 222 are decreased through the adjustment, further, the net part 400 becomes loose so that it can be folded, and contrarily, if the lengths are increased through the adjustment, the net part 400 becomes tightly pulled.

[0042] The front left frames 221 are connected to the left top and bottom of the rear frame 210 to form one pair horizontally provided.

[0043] Further, a front left support frame 223 is vertically erected on the front ends of the front left frames 221 so as to support the front left frames 221 provided on top and bottom of the golf practice net 100.

[0044] The front right frames 222 are connected to the right top and bottom of the rear frame 210 to form one pair horizontally provided.

[0045] Further, a front right support frame 224 is vertically erected on the front ends of the front right frames 222 so as to support the front right frames 222 provided on top and bottom of the golf practice net 100.

[0046] The front left support frame 223 and the front right support frame 224 are divided into a plurality of frames connected adjustable in height by means of height adjustment members 250.

[0047] At this time, the height adjustment members 250 are formed of screw type turnbuckles.

[0048] Further, the front left frames 221 and the front right frames 222 have lengths differing from each other.

[0049] According to a user's swing direction, furthermore, the front left frames 221 are longer than the front right frames 222 or the front right frames 222 are longer than the front left frames 221.

[0050] In detail, if a swing direction of a golf club of a right-handed user is toward the left side from the right side, as shown in FIG.2, the lengths of the front right frames 222 are longer than those of the front left frames 221, thereby preventing the golf club from colliding against the front left frames 221, and if a swing direction of a golf club of a left-handed user is toward the right side from the left side, as shown in FIG.3, the lengths of the front left frames 221 are longer than those of the front right frames 222, thereby preventing the golf club from colliding against the front right frames 222.

[0051] The upper connection frame 230 is connected to the front sides of the upper side front right frame 222 and the upper side front left frame 221 to connect the upper side front right frame 222 and the upper side front left frame 221 with each other.

[0052] The lower connection frame 240 is connected to the front sides of the lower side front right frame 222 and the lower side front left frame 221 to connect the lower side front right frame 222 and the lower side front left frame 221 with each other.

[0053] The front left frames 221 and the front right frames 222 have different lengths from each other, and accordingly, when the upper connection frame 230 and the lower connection frame 240 are connected to the front right frames 222 and the front left frames 221, they

are located diagonally at the front sides of the front left frames 221 and the front right frames 222.

[0054] Connection angles θ of the upper connection frame 230 and the lower connection frame 240 with the front left frames 221 and the front right frames 222 are desirably in a range of an angle of 20 to 40° according to distances between the front left frames 221 and the front right frames 222.

[0055] If the distances between the front left frames 221 and the front right frames 222 are long, in detail, a swing range of the golf club becomes large so that the connection angles θ of the upper connection frame 230 and the lower connection frame 240 are decreased, and contrarily, if the distances between the front left frames 221 and the front right frames 222 are short, a swing range of the golf club becomes small so that the connection angles θ are increased.

[0056] A target net 410 as a target of a golf ball and a target fabric 420 for absorbing a hitting impact of the golf ball are located at the rear sides of the front left frames 221 and the front right frames 222.

[0057] The target net 410 and the target fabric 420 are tightly pulled and detachably fixed to the front left frames 221 and the front right frames 222 by means of wire clamps 430.

[0058] The connection caps 300 connect the respective frames of the frame part 200 to allow the frame part 200 to be kept to the frame of the predetermined shape.

[0059] Further, the connection caps 300 serve to connect the rear vertical frames 211 and the rear horizontal frames 212 of the rear frame 210 to each other, to connect the front left frames 221 and the front right frames 222 to the front side of the rear frame 210, and to the upper connection frame 230 and the lower connection frame 240 to the front sides of the front left frames 221 and the front right frames 222.

[0060] Generally, the connection caps 300 are like connectors for connecting poles for a tent, which is widely commercialized, and accordingly, a detailed explanation on the structures of the connection caps 300 will be avoided.

[0061] The net part 400 is connected to the frame part 200 to surround the frame part 200 so that the golf ball hit can be caught therein.

[0062] In detail, the net part 400 is located surroundingly on the inner surfaces of the rear frame 210, the front frame 220, and the upper connection frame 230, and the lower connection frame 240 to thus block the entire rear, left and right sides of the golf practice net 100 except the front side thereof, so that if the golf ball hits in front of the golf practice net 100, it falls down inside the net part 400, without falling down over the golf practice net 100.

[0063] Further, a bottom surface of the net part 400 is slant toward the rear side thereof from the front side thereof so as to allow the golf ball hitting the net part 400 to be returned to the front side thereof.

[0064] The net part 400 is fixed to the frame part 200 by means of a wire or Velcro tape.

[0065] Under the above-mentioned configuration, now, an explanation on an operating state of the golf practice net 100 according to the present invention will be given below.

[0066] The rear vertical frames 211 and the rear horizontal frames 212 are connected with each other by means of the connection caps 300 to form the frame of the rectangular shape, the front left frames 221 and the front right frames 222 of the front frame 220 are connected to the front side of the rear frame 210 by means of the connection caps 300, and the upper connection frame 230 and the lower connection frame 240 are connected to the front tops and bottoms of the front left frames 221 and the front right frames 222 by means of the connection caps 300. Next, the net part 400 is surroundingly located on the insides of the rear frame 210 and the front frame 220.

[0067] The front left frames 221 and the front right frames 222 have different lengths from each other, and accordingly, when the upper connection frame 230 and the lower connection frame 240 are connected to the front tops and bottoms of the front right frames 222 and the front left frames 221, they are connected at the predetermined connection angles θ to the front sides of the front left frames 221 and the front right frames 222 in such a manner as to form the diagonal lines.

[0068] Like this, the lengths of the front left frames 221 and the lengths of the front right frames 222 are different from each other. In detail, the lengths of the front right frames 222 are longer than those of the front left frames 221, and otherwise, the lengths of the front left frames 221 are longer than those of the front right frames 222, so that even if a golf club swings to hit a golf ball located at a position closest to the front side of the golf practice net 100, the golf club does not collide against the front left frames 221 or the front right frames 222, irrespective of the swing direction or angle thereof, thereby enabling safe swing.

[0069] Also, the front left frames 221 and the front right frames 222 have different lengths from each other, and accordingly, the upper connection frame 230 and the lower connection frame 240 connected to the front right frames 222 and the front left frames 221 are slantly located at the front side of the golf practice net 100 to the diagonal lines, so that if a golf club swings, it does not collide against the front left frames 221 or the front right frames 222. Accordingly, the golf ball can be located at a position closest to the front side of the golf practice net 100, so that it does not fly over the net part 400, but it flies to the inside of the net part 400, thereby preventing safety accidents from occurring.

[0070] Further, the front left frames 221 and the front right frames 222 are connected to each other by means of fitting, and accordingly, they are adjusted in length according to the swing direction of the golf club, thereby allowing the golf practice net 100 to be provided for the right-hand use and the left-hand use.

[0071] Furthermore, the rear vertical frames 211, the

front left support frame 223, and the front right support frame 224 are respectively divided into the plurality of frames capable of being connected with each other by means of the height adjustment members 250, so that the height of the golf practice net 100 can be adjusted, thereby making it easy to install the golf practice net 100, irrespective of the installation space, and also improving conveniences of the use.

[0072] As described above, the golf practice net according to the present invention is configured to allow the front left frames and the front right frames of the front frame in front of the rear frame to have different lengths from each other in such a manner as to be connected with each other by means of the upper connection frame and the lower connection frame, so that the upper connection frame and the lower connection frame are connected diagonally to the front left and frames and the front right frames. Accordingly, even if a golf club swings to hit a golf ball located at a position close to the front side of the golf practice net, the golf club does not collide against the front left frames or the front right frames, thereby maximizing conveniences of use and safety of swing.

[0073] While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiments but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

Claims

1. A golf practice net comprising:

a frame part for forming a frame of a predetermined shape and having a rear frame constituted of rear vertical frames spaced apart from each other by a given distance in such a manner as to be vertically erected on the left and right sides thereof and rear horizontal frames provided on tops and bottoms of the rear vertical frames, a front frame constituted of front left frames provided on the front left side of the rear frame and front right frames provided on the front right side of the rear frame, upper and lower connection frames connected to the top and bottoms of the front sides of the front right frames and the front left frames, and front left and right support frames vertically erected on the front ends of the front left frames and the front right frames so as to support the front left frames and the front right frames;
connection caps for connecting the respective frames of the frame part; and
a net part for surrounding the frame part, wherein the front left frames and the front right

frames have different lengths from each other, and the upper and lower connection frames connected to the tops and bottoms of the front sides of the front right frames and the front left frames are located diagonally at the front sides of the front left frames and the front right frames.

2. The golf practice net according to claim 1, wherein a bottom surface of the net part is slant toward the rear side thereof from the front side thereof so as to allow the golf ball hitting the net part to be returned to the front side thereof.
3. The golf practice net according to claim 1, wherein the net part comprises a target net as a target of the golf ball provided on the front frame in front of the rear frame.
4. The golf practice net according to claim 3, wherein the net part comprises a target fabric provided behind the target net in such a manner as to be connected to the front frame to absorb a hitting impact of the golf ball.
5. The golf practice net according to claim 4, wherein the target net and the target fabric are pulled and detachably fixed to the front frame by means of wire clamps.
6. The golf practice net according to claim 1, wherein if a swing direction of a golf club is toward the left side from the right side, lengths of the front right frames are longer than lengths of the front left frames, and if a swing direction of a golf club is toward the right side from the left side, lengths of the front left frames are longer than lengths of the front right frames.
7. The golf practice net according to claim 1, wherein the upper and lower connection frames are connected with the front left frames and the front right frames at an angle of 20 to 40° according to distances between the front left frames and the front right frames.
8. The golf practice net according to claim 1, wherein the rear vertical frames and the front left and right support frames are respectively divided into a plurality of frames connected adjustable in height by means of height adjustment members.
9. The golf practice net according to claim 8, wherein the height adjustment members are formed of screw type turnbuckles.
10. The golf practice net according to claim 1, wherein the front left frames and the front right frames are respectively divided into a plurality of frames adjustable in length for both of right-hand use and left-hand

use.

11. The golf practice net according to claim 10, wherein the plurality of frames constituting the front left frames and the front right frames are pipe-shaped frames connected to each other by means of fitting so that the lengths of the front left frames and the front right frames are adjusted.

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FIG. 1

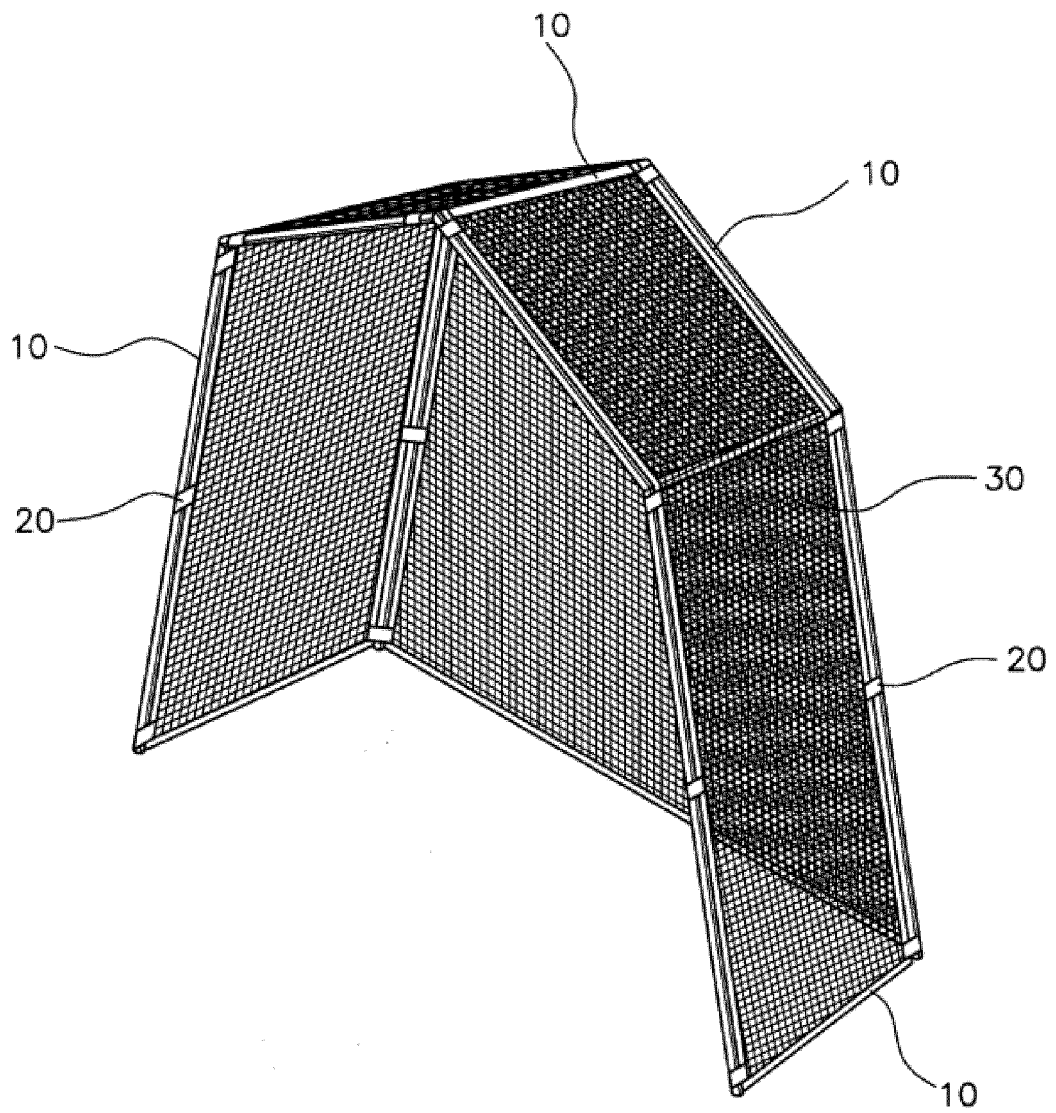


FIG. 2

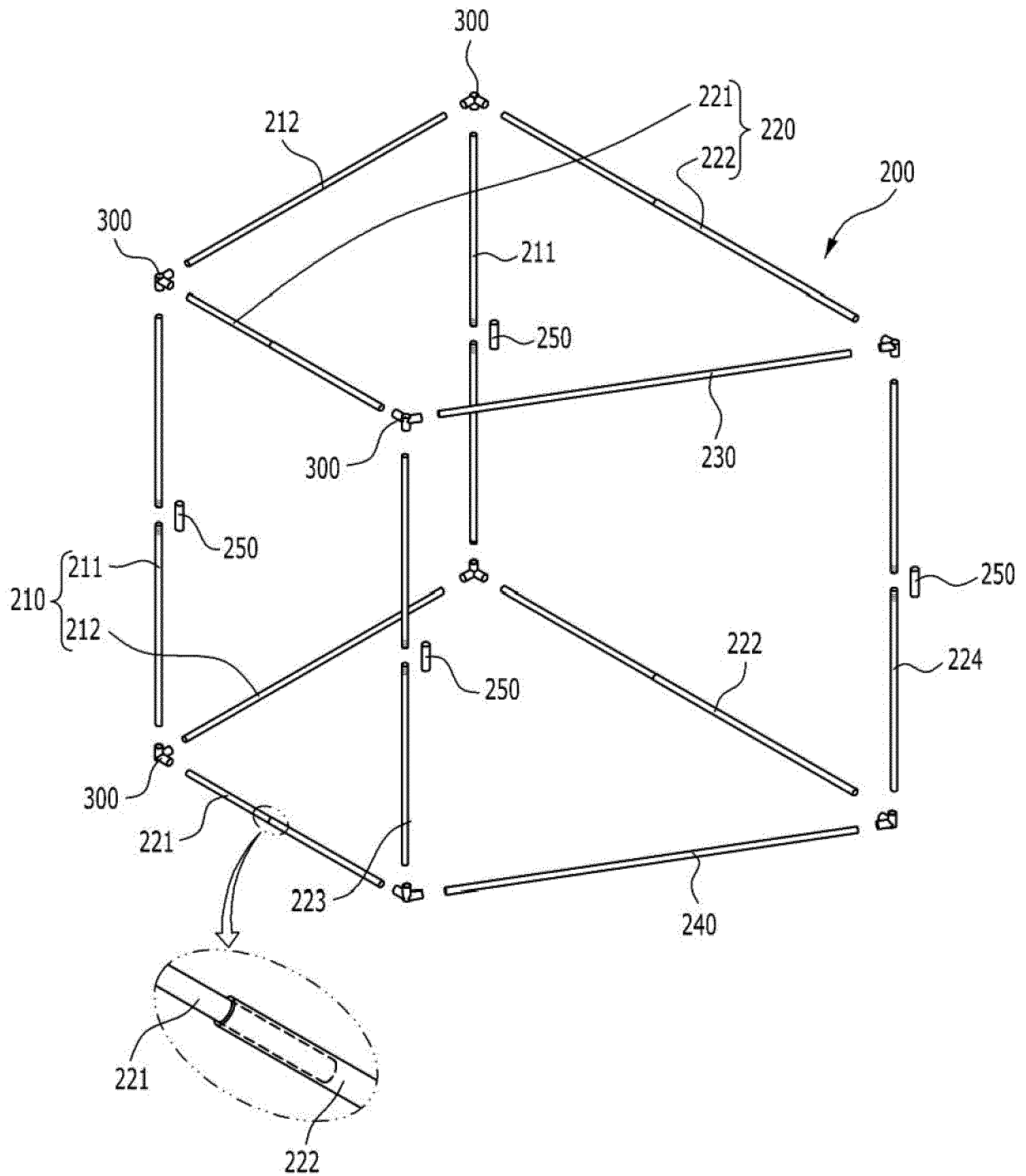


FIG. 3

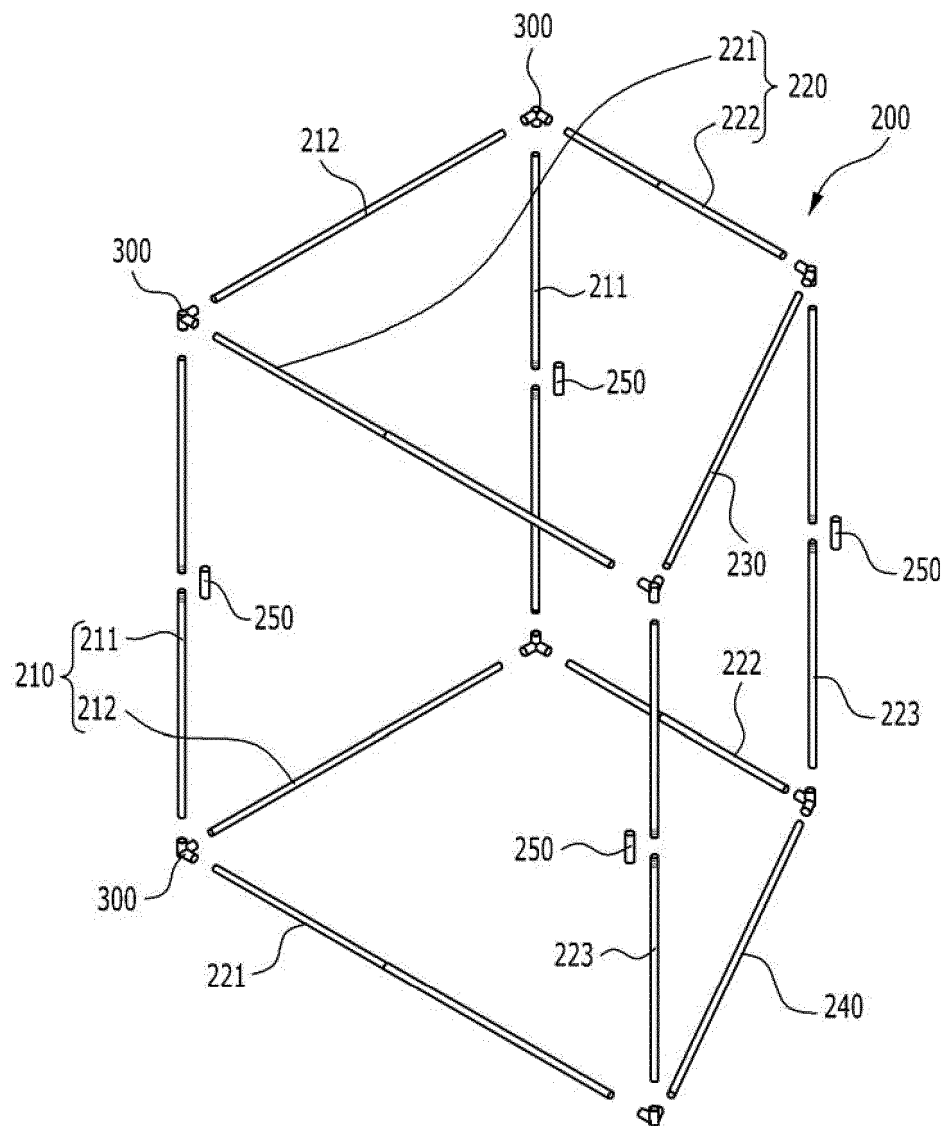


FIG. 4

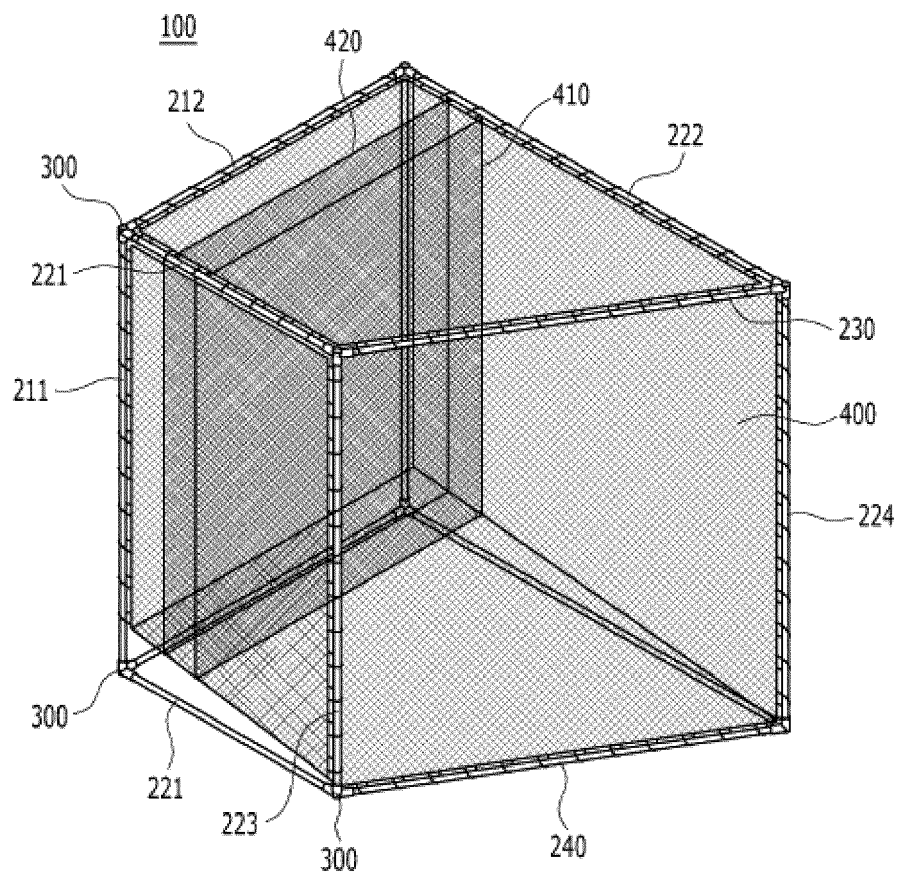


FIG. 5

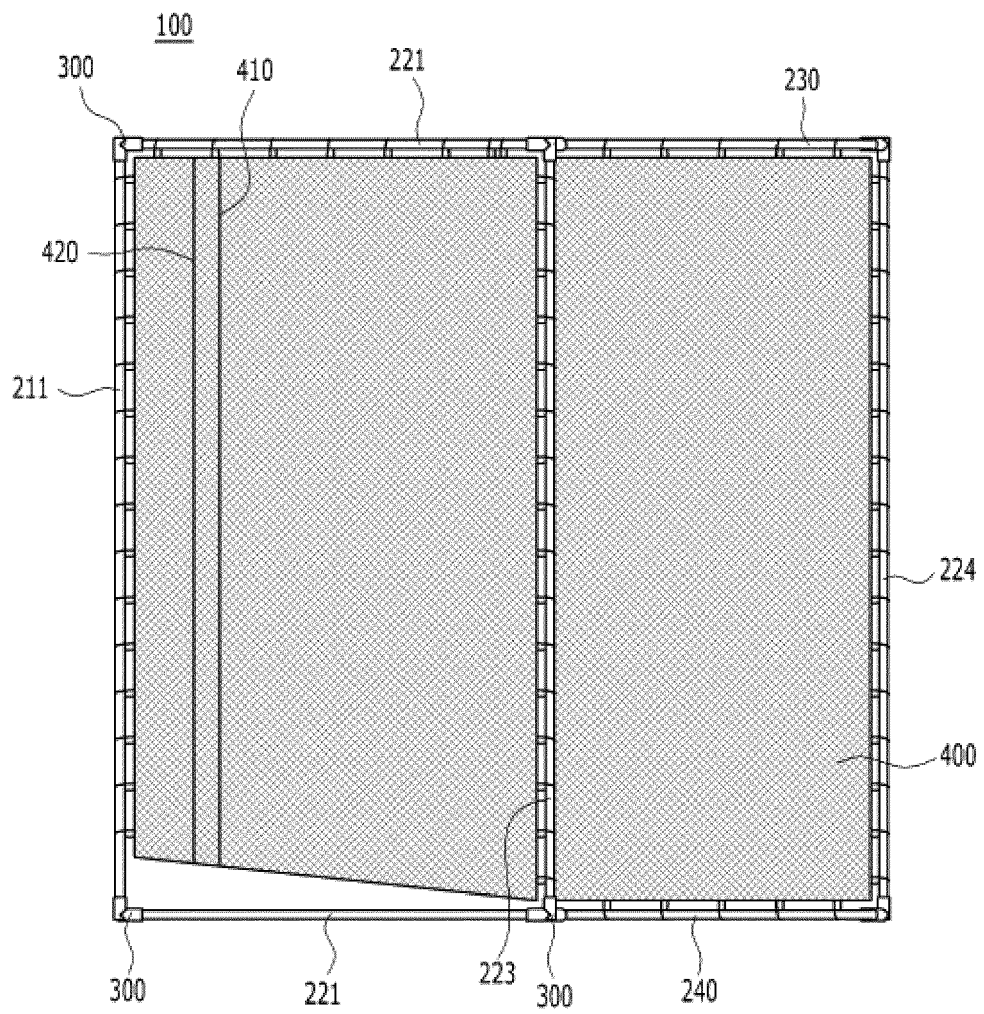
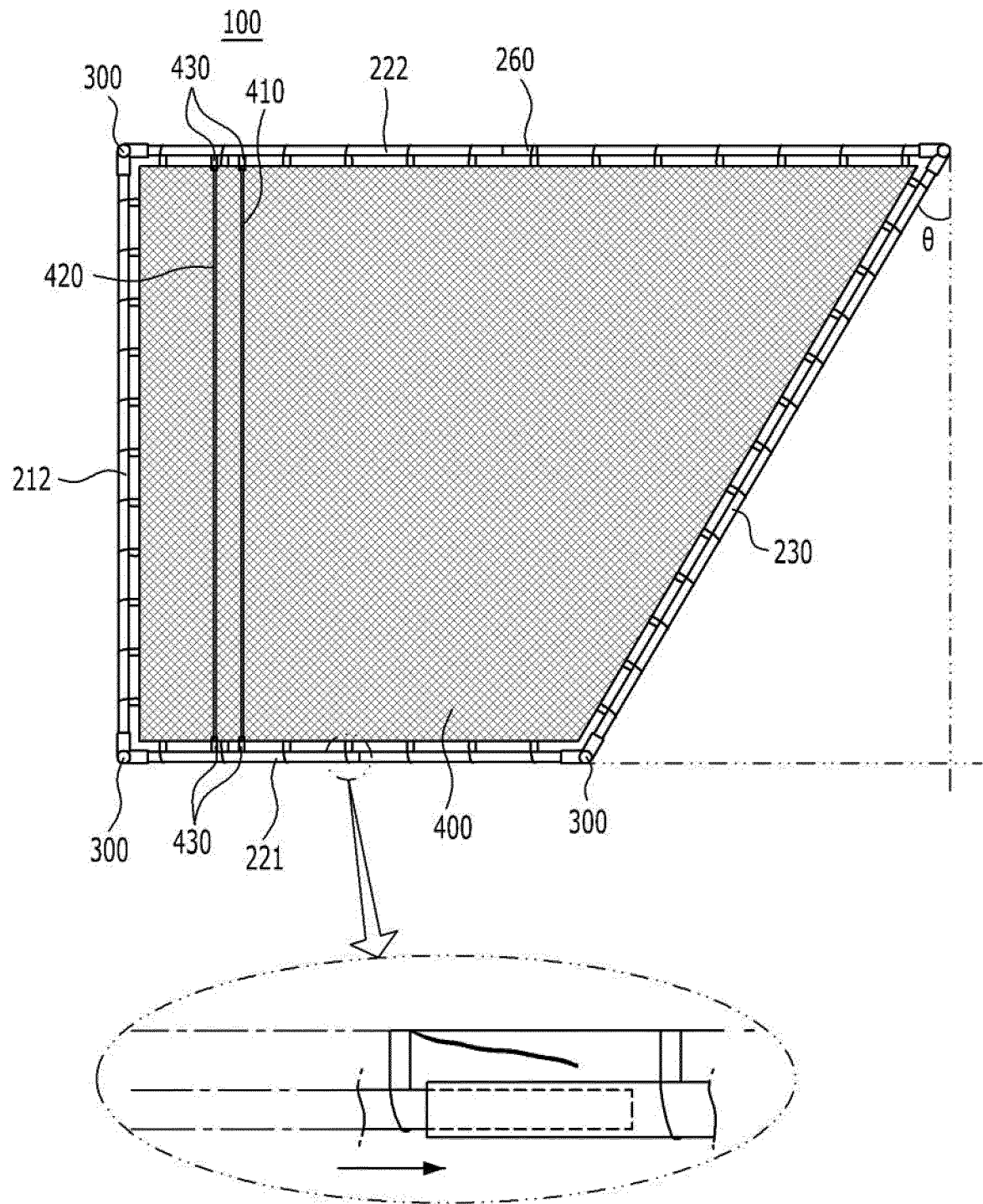


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2019/001734

5	A. CLASSIFICATION OF SUBJECT MATTER														
	<i>A63B 69/36(2006.01)i, A63B 71/04(2006.01)i, A63B 102/32(2014.01)i</i>														
	According to International Patent Classification (IPC) or to both national classification and IPC														
	B. FIELDS SEARCHED														
10	Minimum documentation searched (classification system followed by classification symbols) A63B 69/36; A63B 63/00; A63B 71/04; A63B 102/32														
	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														
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) & Keywords: net, frame, diagonal line, verticality, connection, length														
	C. DOCUMENTS CONSIDERED TO BE RELEVANT														
20	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.												
	A	KR 20-0472558 Y1 (YANG, Jai Youl) 07 May 2014 See paragraphs [29]-[36], and figure 4.	1-11												
25	A	KR 10-2011-0067561 A (FIELD CLUB CO., LTD.) 22 June 2011 See paragraphs [25]-[27], and figures 1-2.	1-11												
	A	KR 10-2014-0008867 A (YOON, Jae Hwan) 22 January 2014 See paragraphs [24]-[39], and figure 1.	1-11												
30	A	KR 10-0849196 B1 (FIELD CLUB CO., LTD.) 31 July 2008 See the entire document.	1-11												
35	A	JP 2004-187833 A (KITA, Shigeru) 08 July 2004 See the entire document.	1-11												
40	☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.														
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55	Name and mailing address of the ISA/KR  Korean Intellectual Property Office Government Complex Daejeon Building 4, 189, Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578		Authorized officer Telephone No.												

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2019/001734

Patent document cited in search report	Publication date	Patent family member	Publication date
KR 20-0472558 Y1	07/05/2014	None	
KR 10-2011-0067561 A	22/06/2011	KR 10-1153340 B1	03/07/2012
KR 10-2014-0008867 A	22/01/2014	KR 10-1397118 B1	19/05/2014
KR 10-0849196 B1	31/07/2008	None	
JP 2004-187833 A	08/07/2004	None	

Form PCT/ISA/210 (patent family annex) (January 2015)