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(54) **GOLF CLUB**

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Related U.S. Application Data

(62) Division of application No. 14/581,777, filed on Dec. 23, 2014, now abandoned, which is a division of application No. 13/234,208, filed on Sep. 16, 2011, now abandoned.

(30) **Foreign Application Priority Data**

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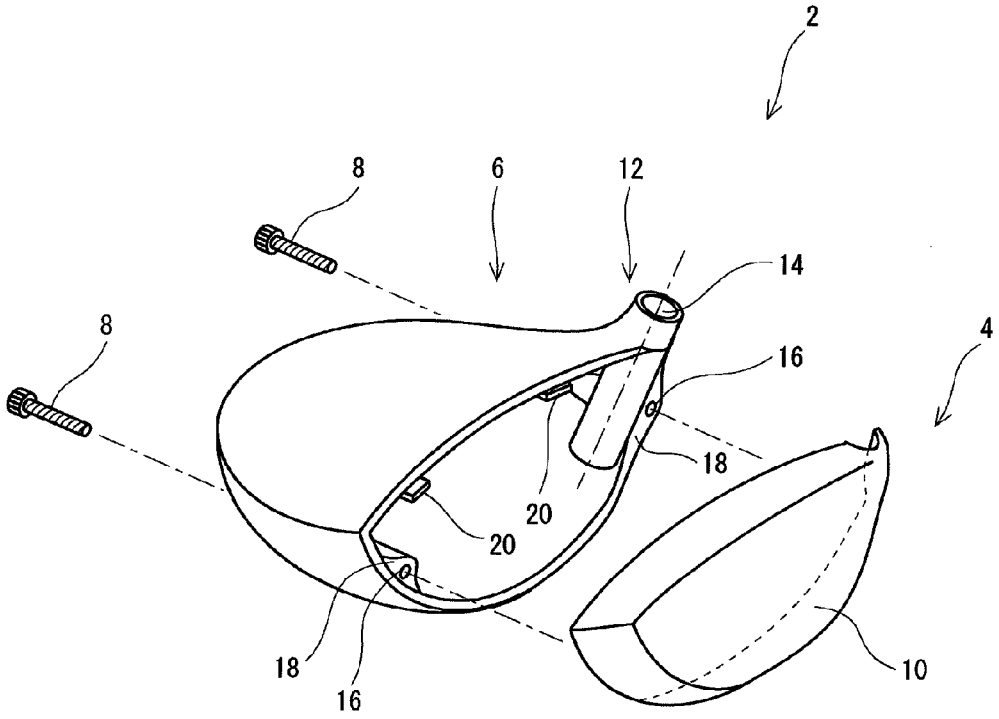
CPC ***A63B 53/02*** (2013.01); ***A63B 53/0466*** (2013.01); ***A63B 53/047*** (2013.01); *A63B 2053/0416* (2013.01); *A63B 2053/0491* (2013.01); *A63B 2053/0433* (2013.01); *A63B 2053/0437* (2013.01); *A63B 2053/026* (2013.01); *A63B 2053/0445* (2013.01); *A63B 2053/025* (2013.01); *A63B 2053/0408* (2013.01)

(57) **ABSTRACT**

A golf club includes a head; a shaft; and a grip, wherein the head includes a front member and a back member detachably mounted to the front member.



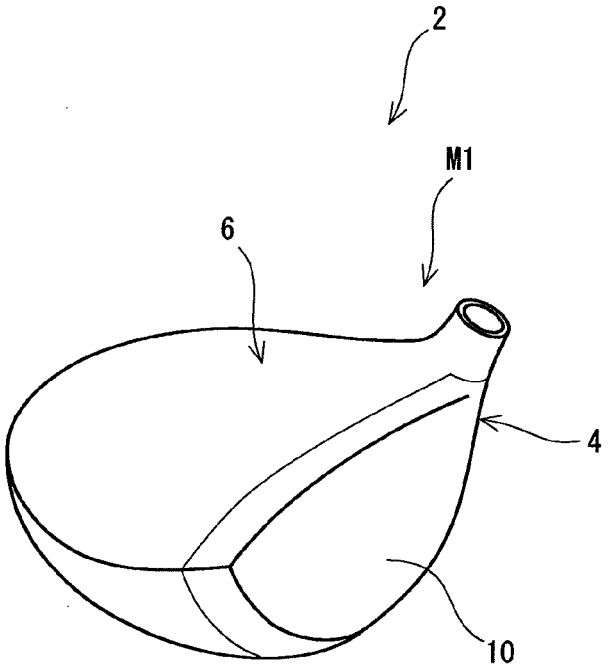


Fig. 1

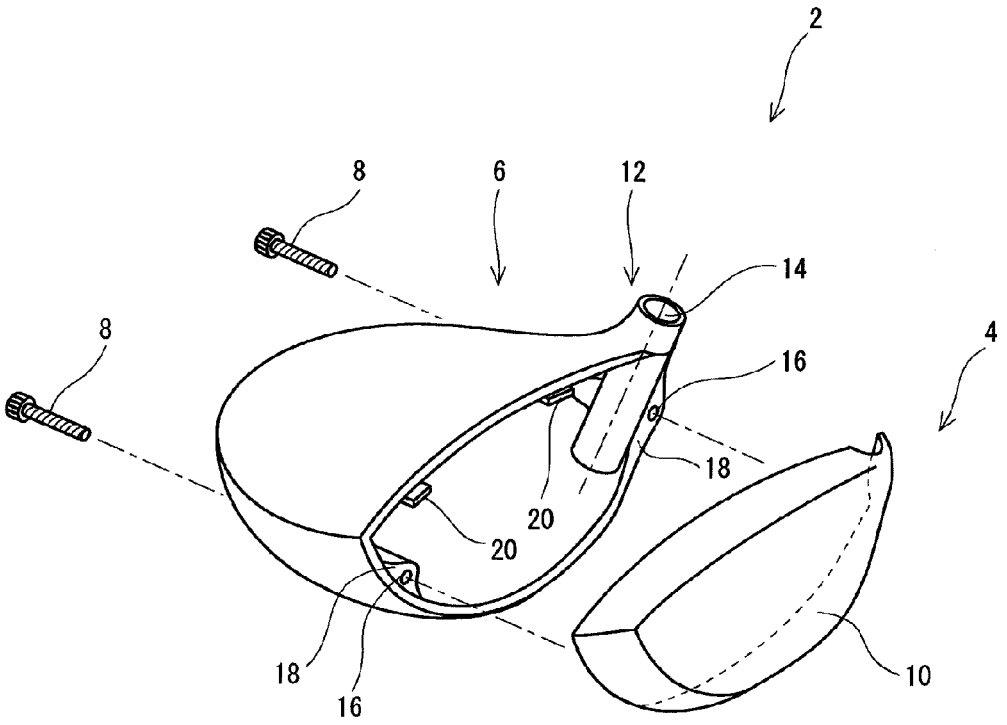


Fig. 2

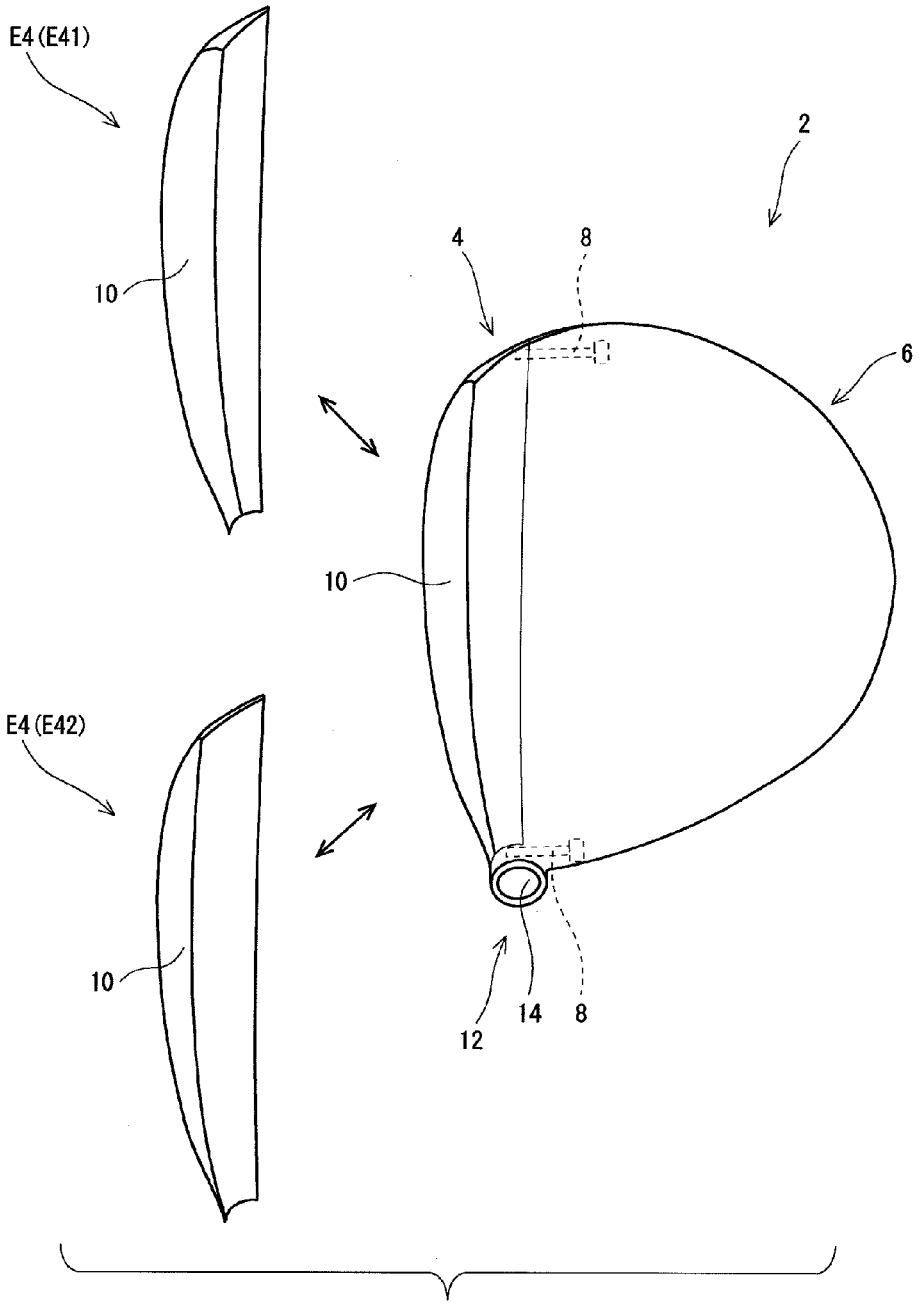


Fig. 3

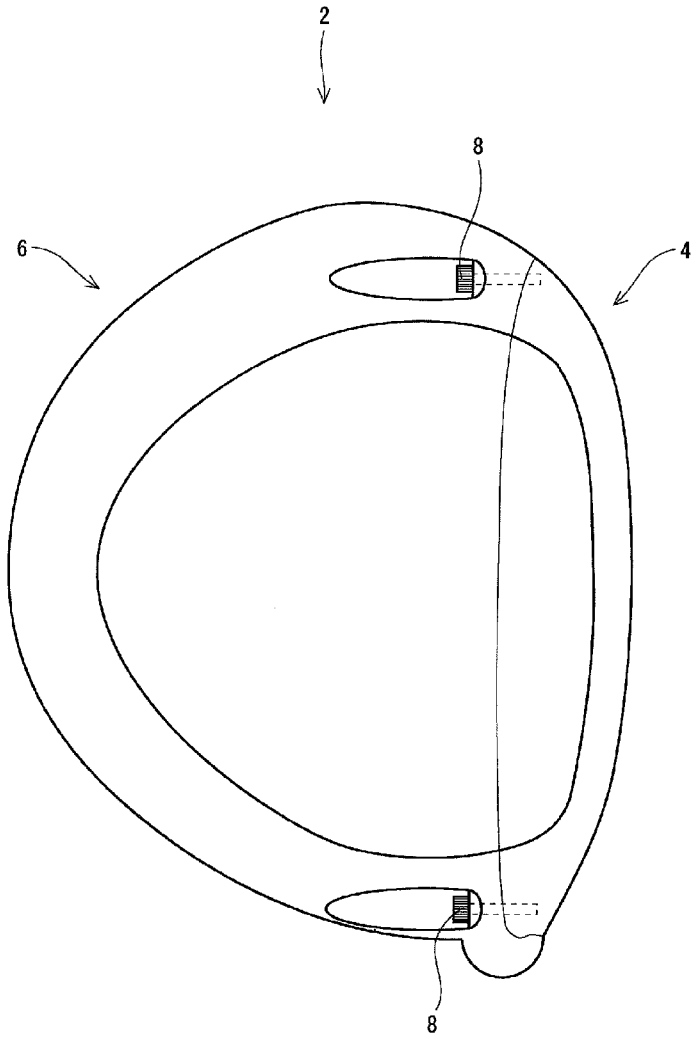


Fig. 4

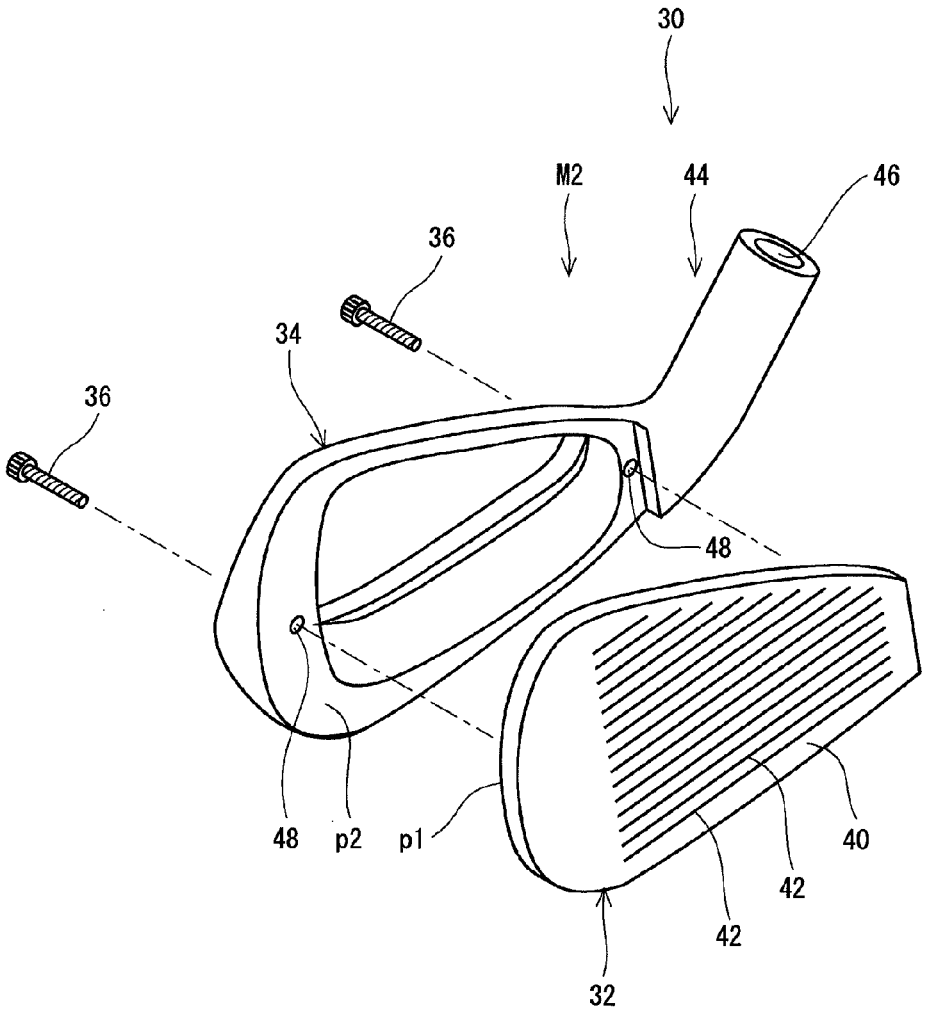


Fig. 5

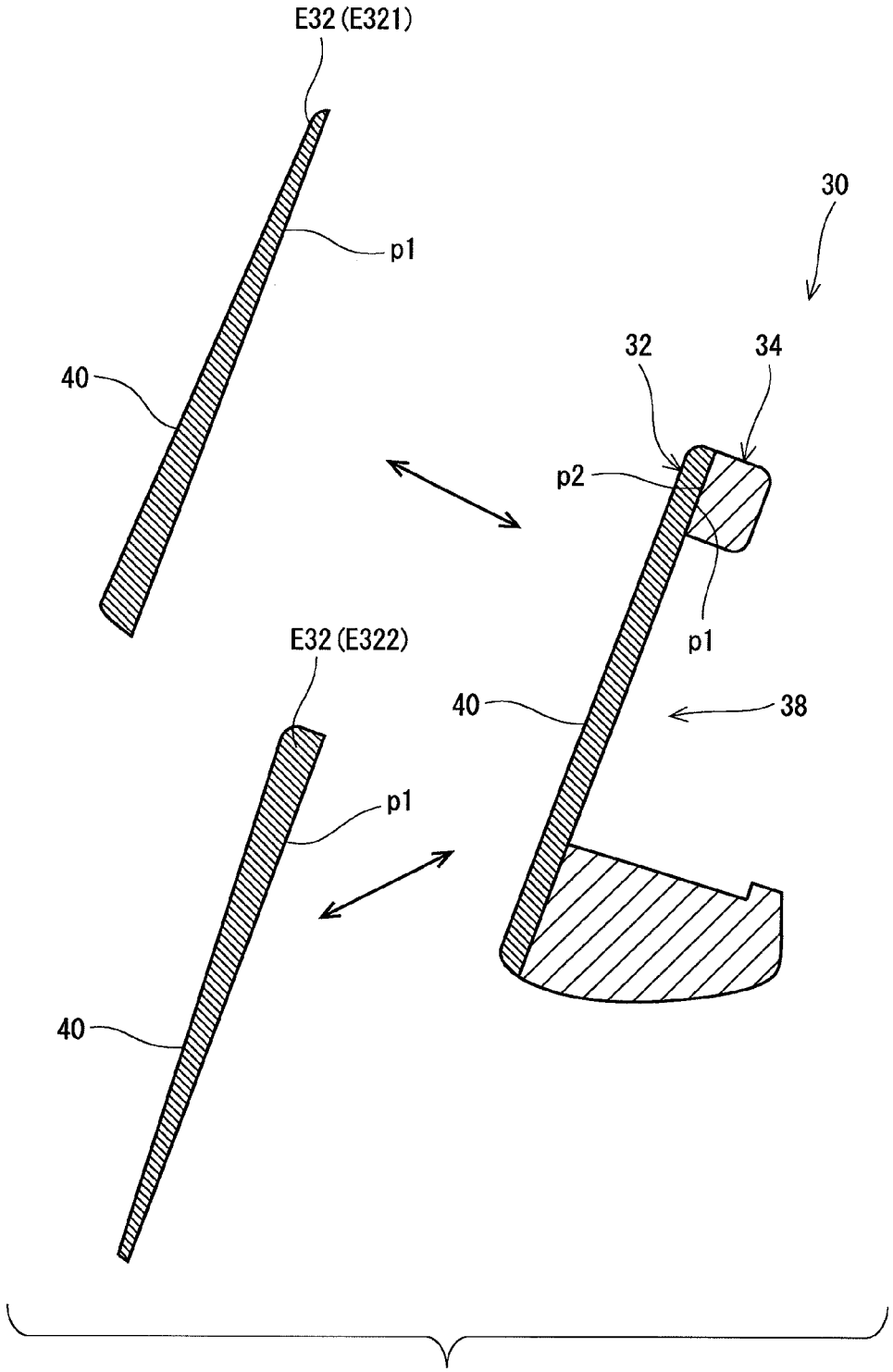


Fig. 6

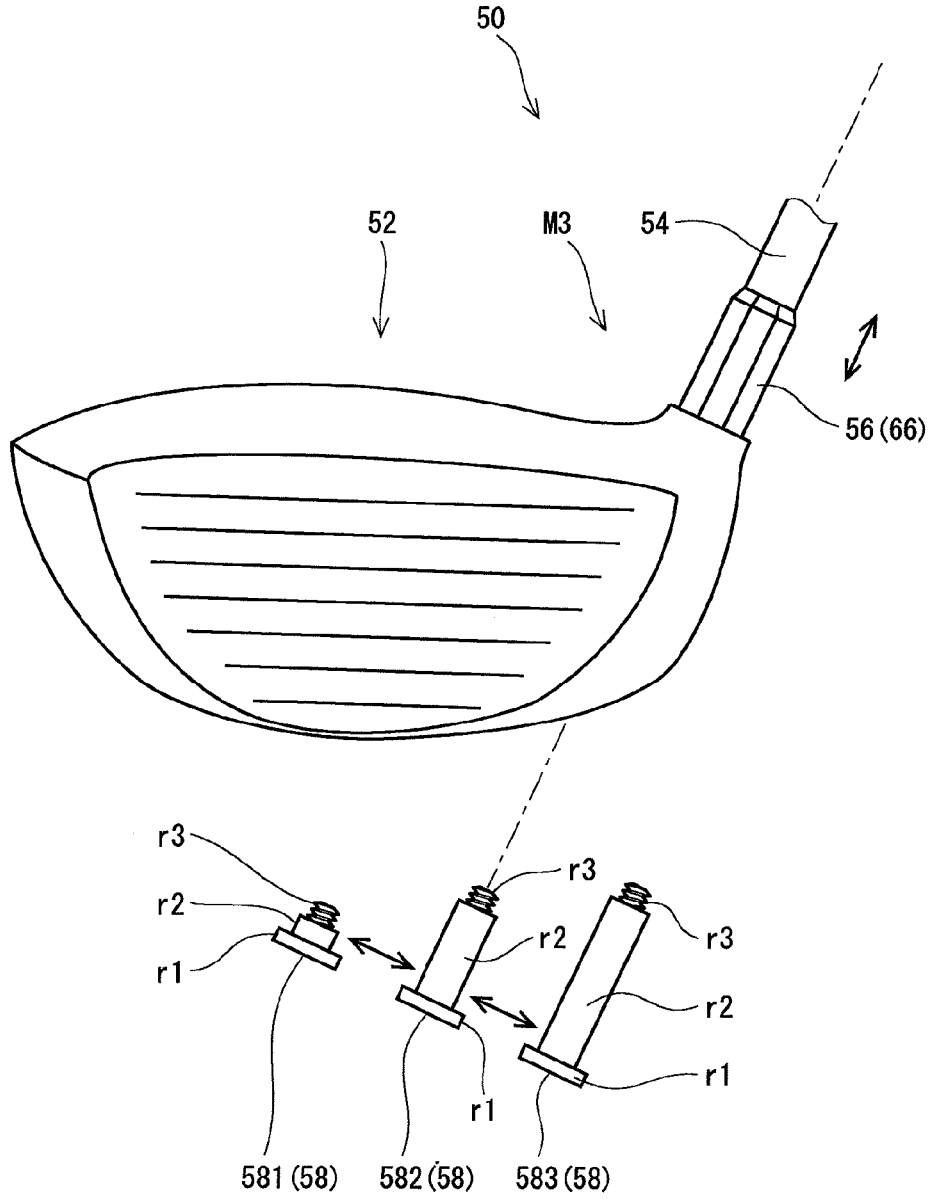


Fig. 7

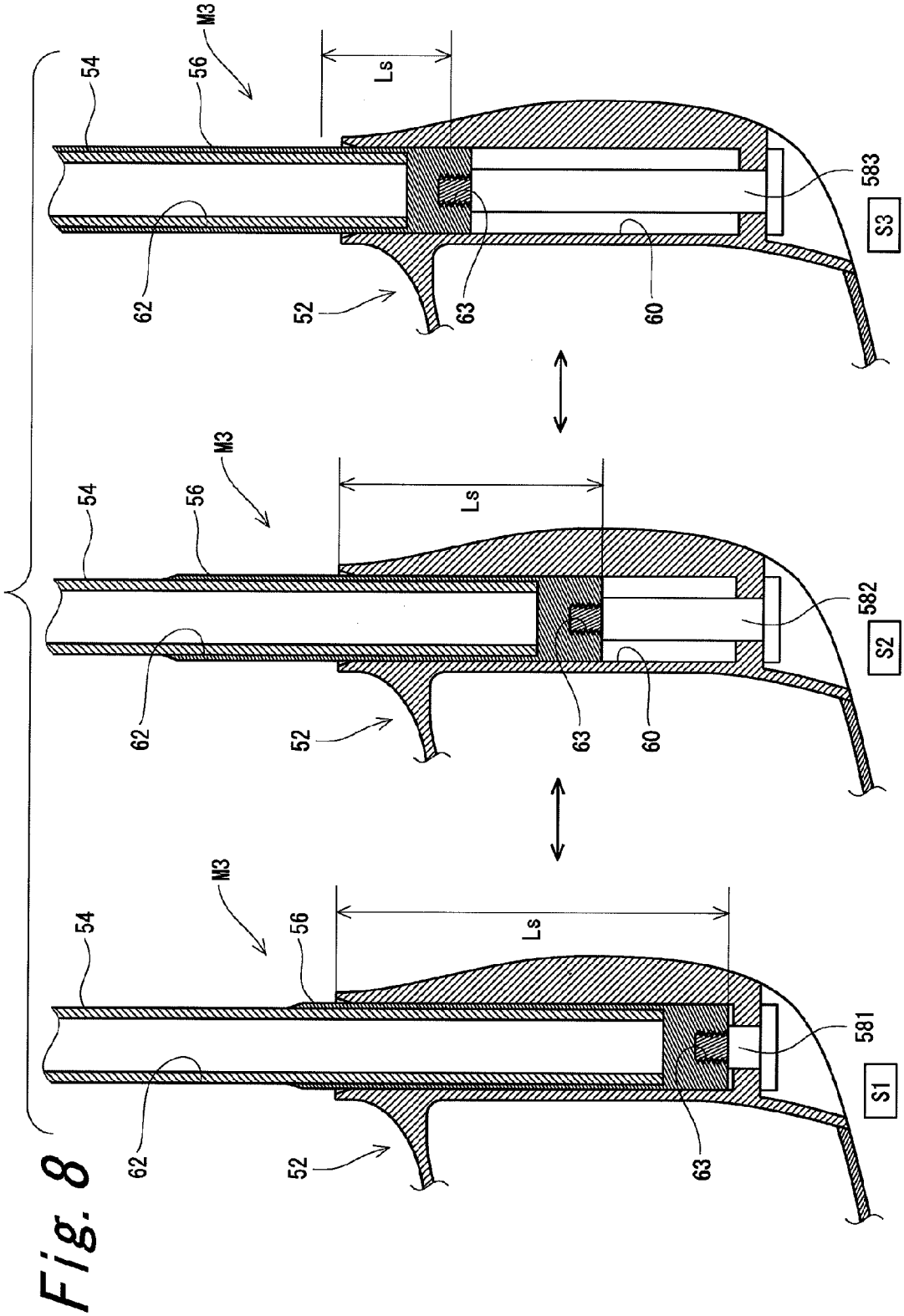

M3
54
56
Ls
583
S3
62
52
63
60
M3
54
56
Ls
582
S2
62
52
63
60
M3
54
56
Ls
581
S1
62
52
63

Fig. 8

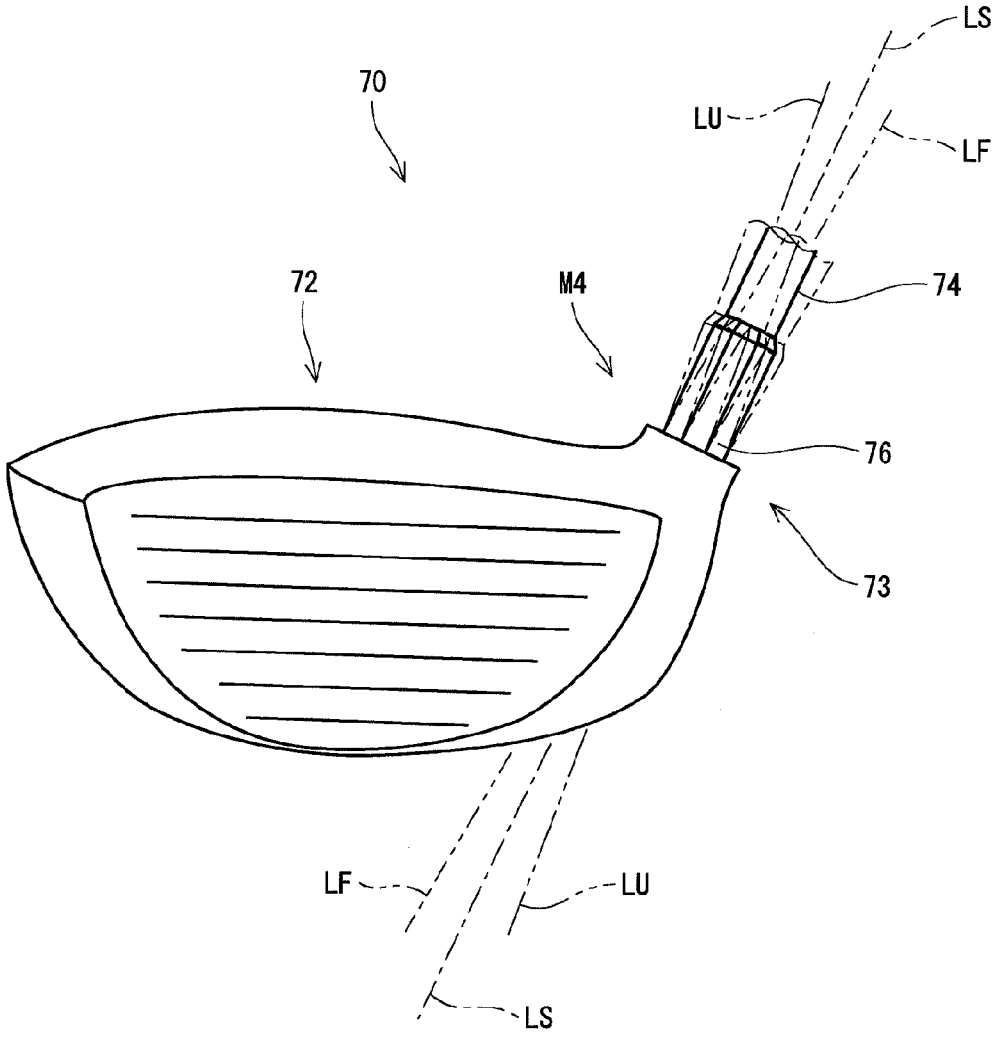


Fig. 9

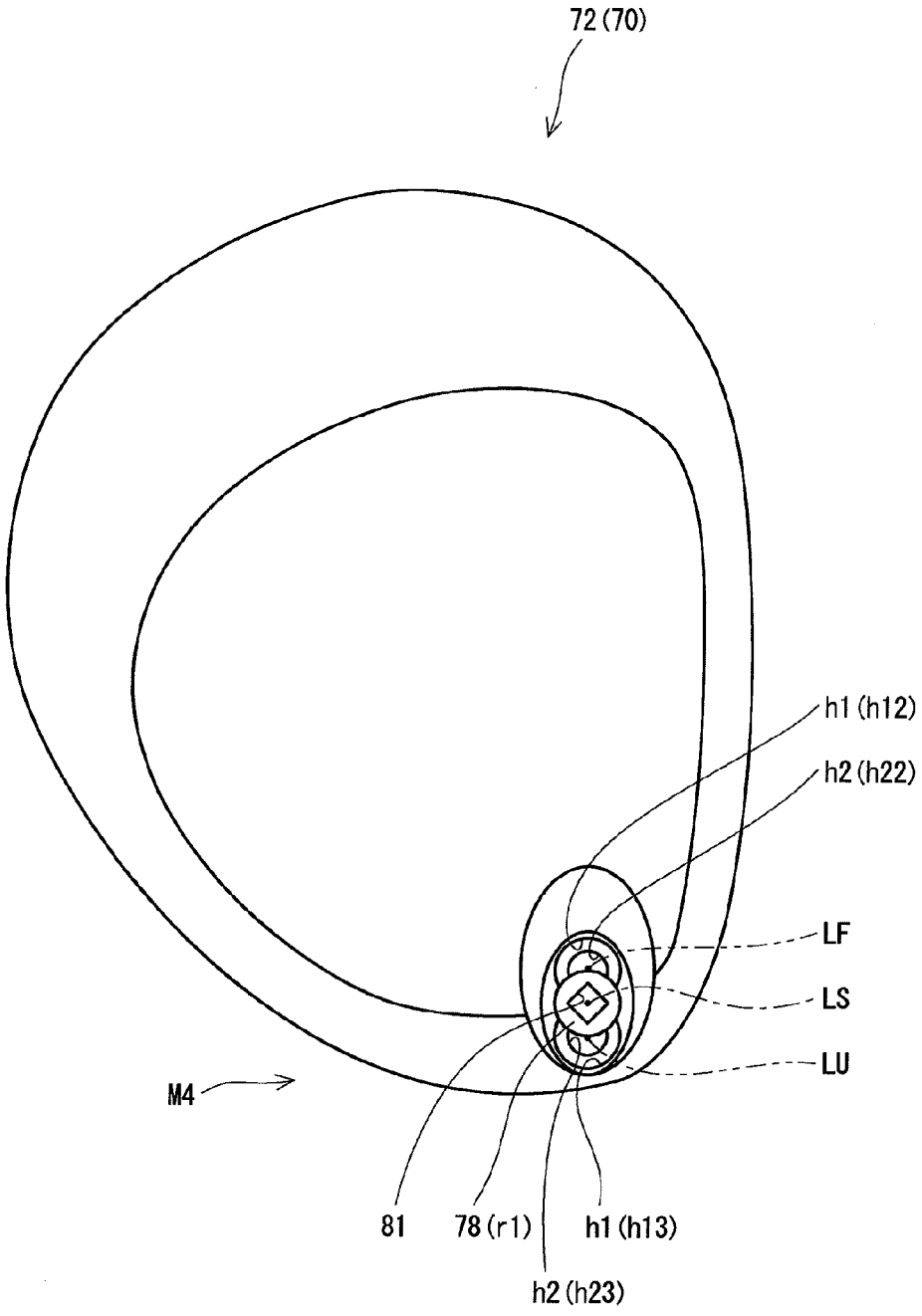


Fig. 10

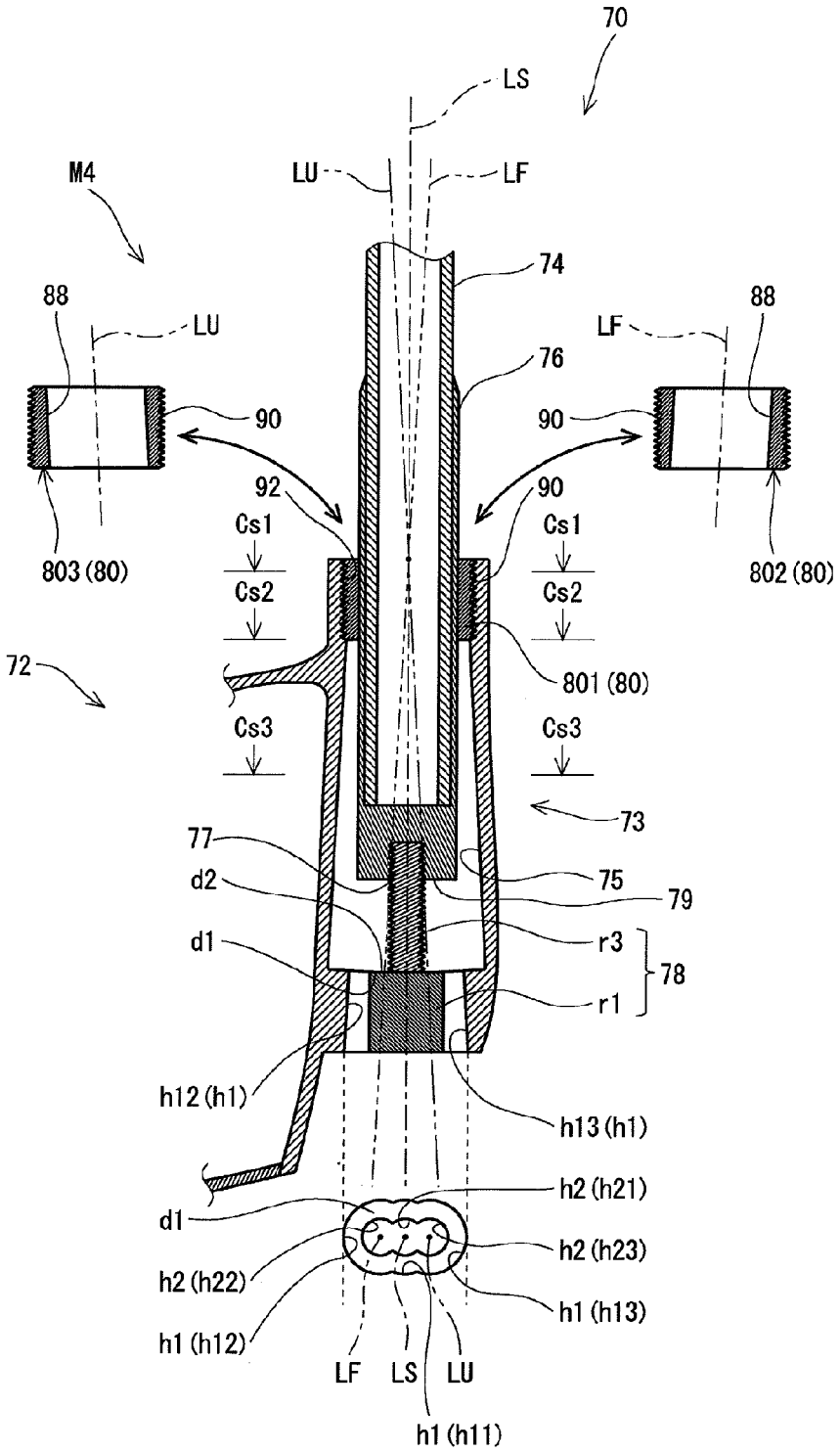

70
LS
M4
LU
LF
74
88
LU
LF
88
76
90
90
92
90
Cs1
Cs1
803 (80)
Cs2
Cs2
802 (80)
72
801 (80)
Cs3
Cs3
73
77
75
d2
79
d1
r3
78
r1
h12 (h1)
h13 (h1)
h2 (h21)
d1
h2 (h23)
h2 (h22)
h1 (h13)
h1 (h12)
LF
LS
LU
h1 (h11)

Fig. 11

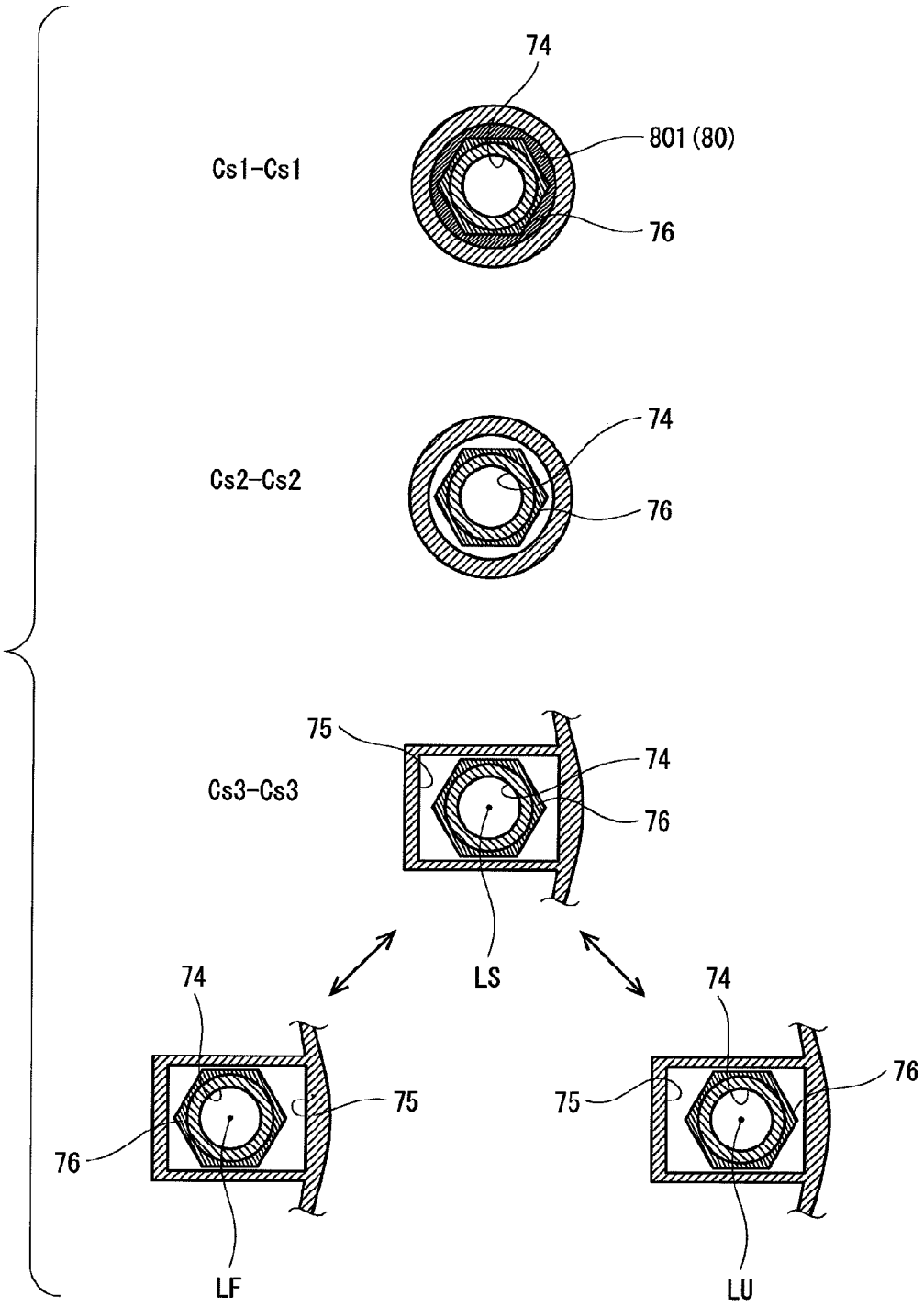

74
801 (80)
Cs1-Cs1
76
74
Cs2-Cs2
76
75
74
Cs3-Cs3
76
LS
74
74
75
76
75
76
LF
LU

Fig. 12

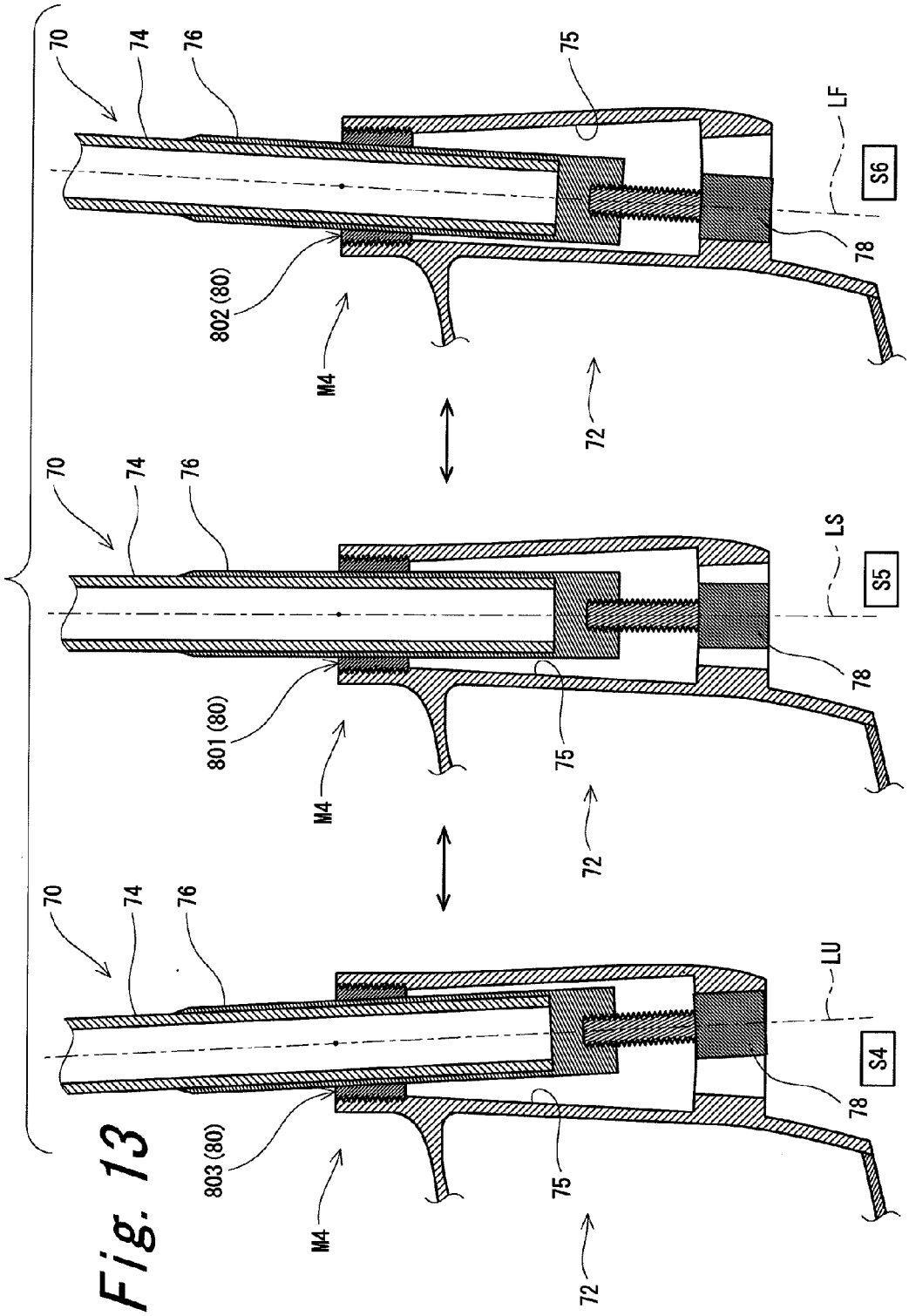

70
74
76
75
LF
S6
78
802 (80)
M4
72
70
74
76
LS
S5
78
801 (80)
75
M4
72
70
74
76
LU
S4
78
803 (80)
75
M4
72

Fig. 13

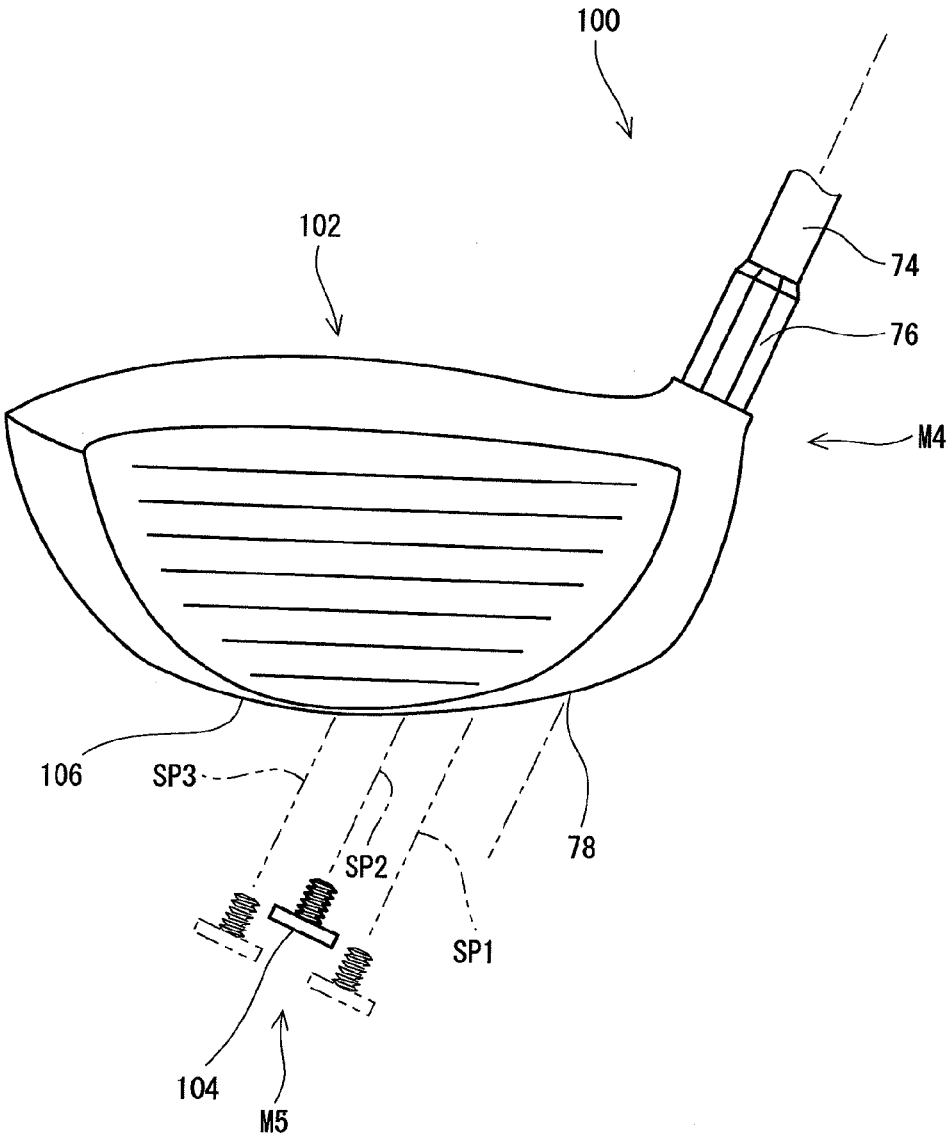


Fig. 14

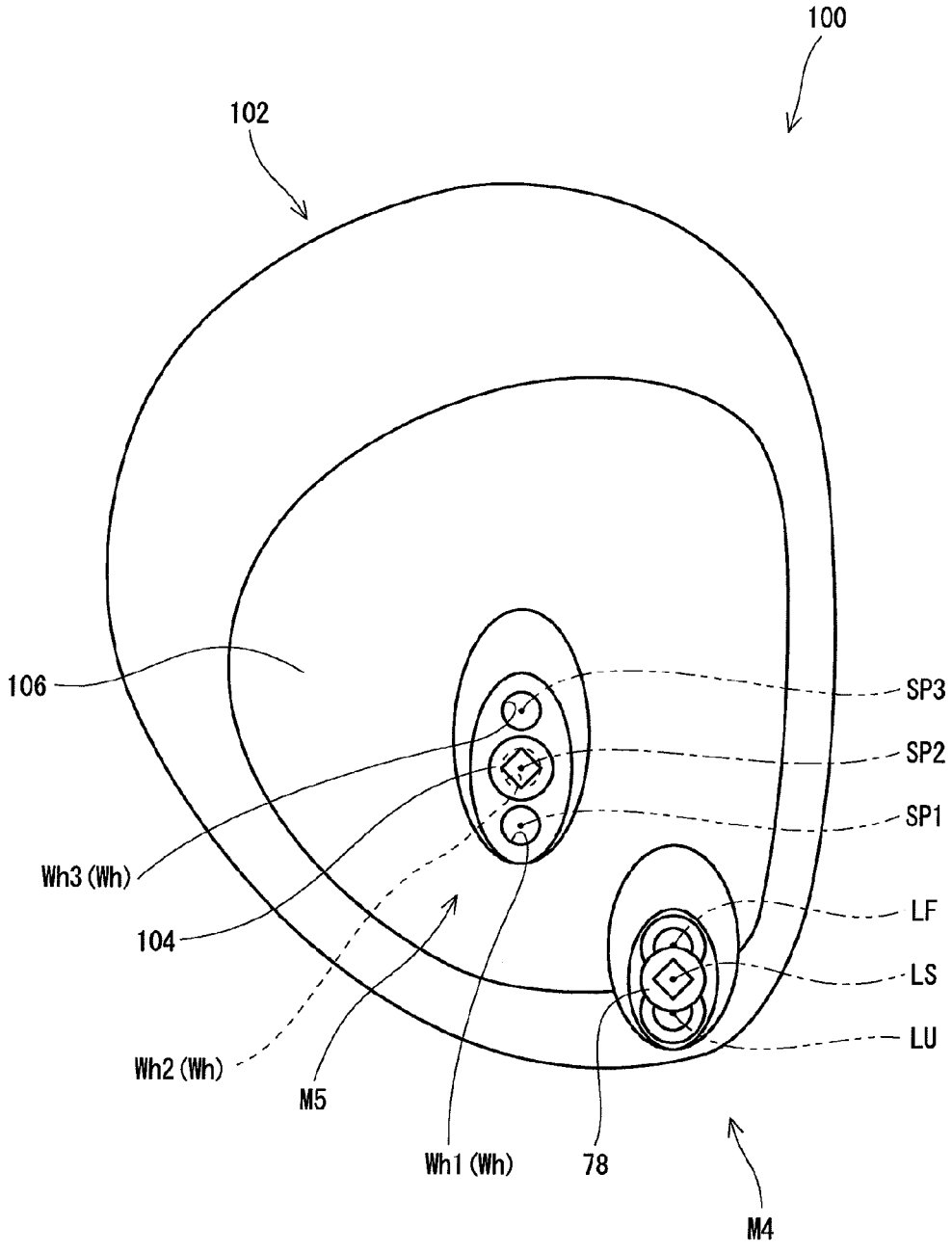


Fig. 15

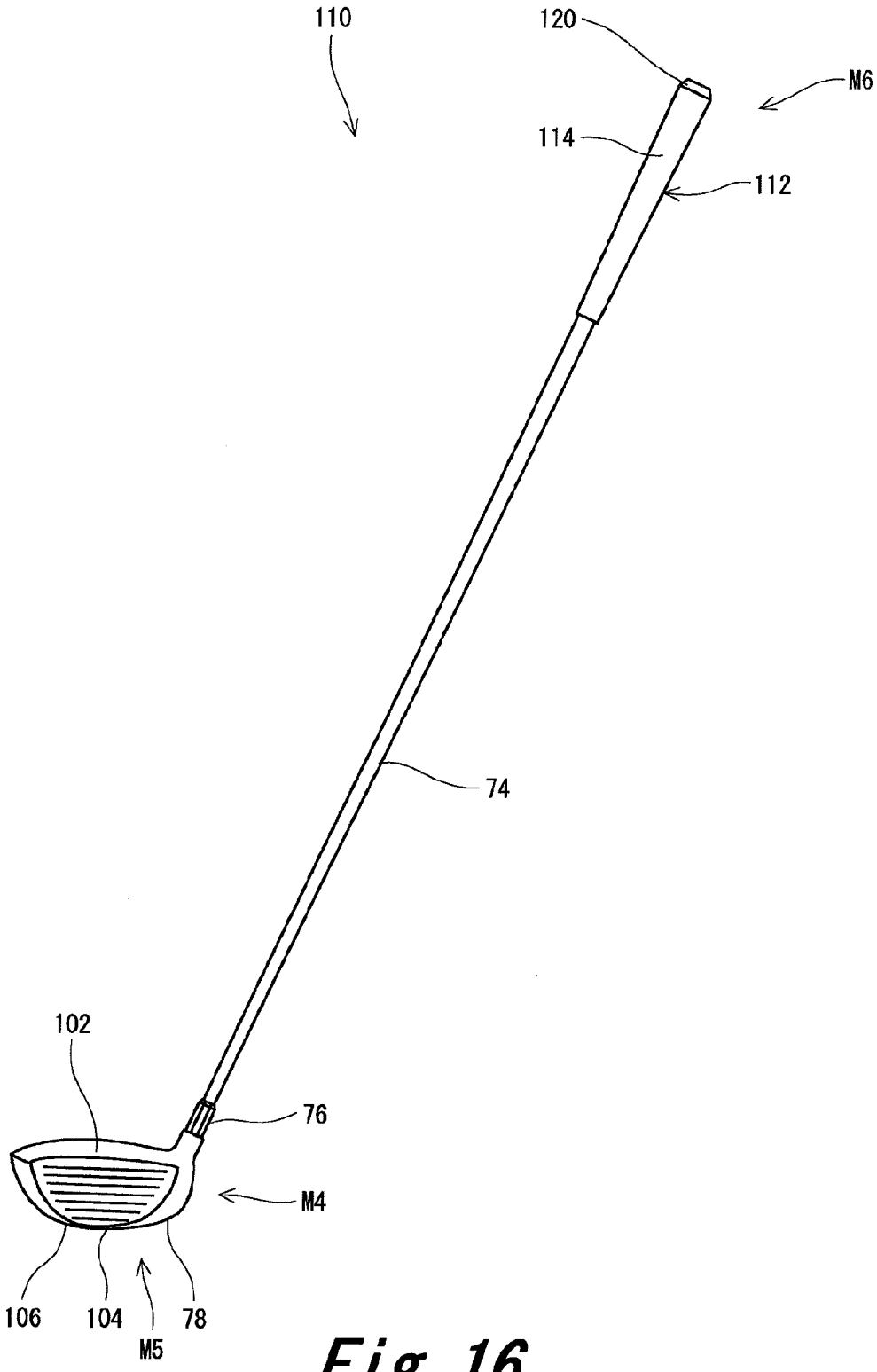


Fig. 16

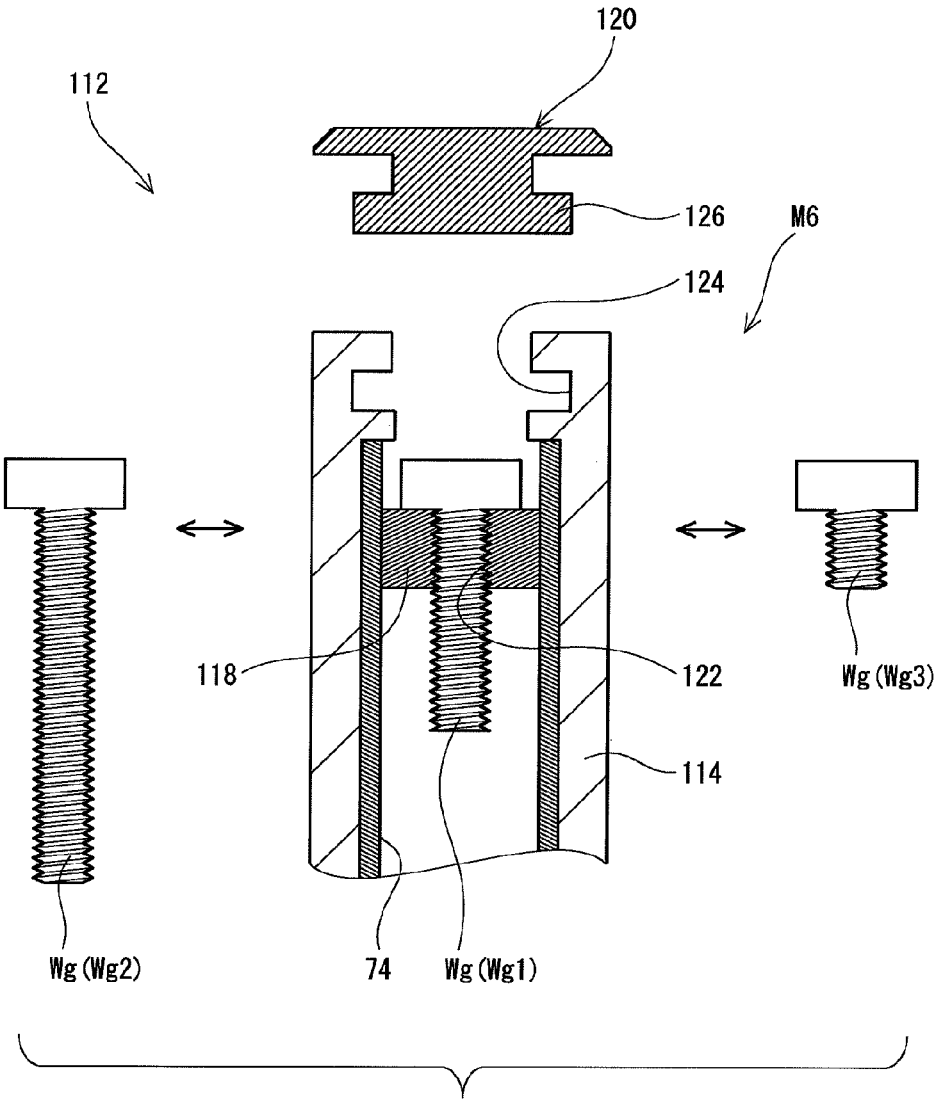


Fig. 17

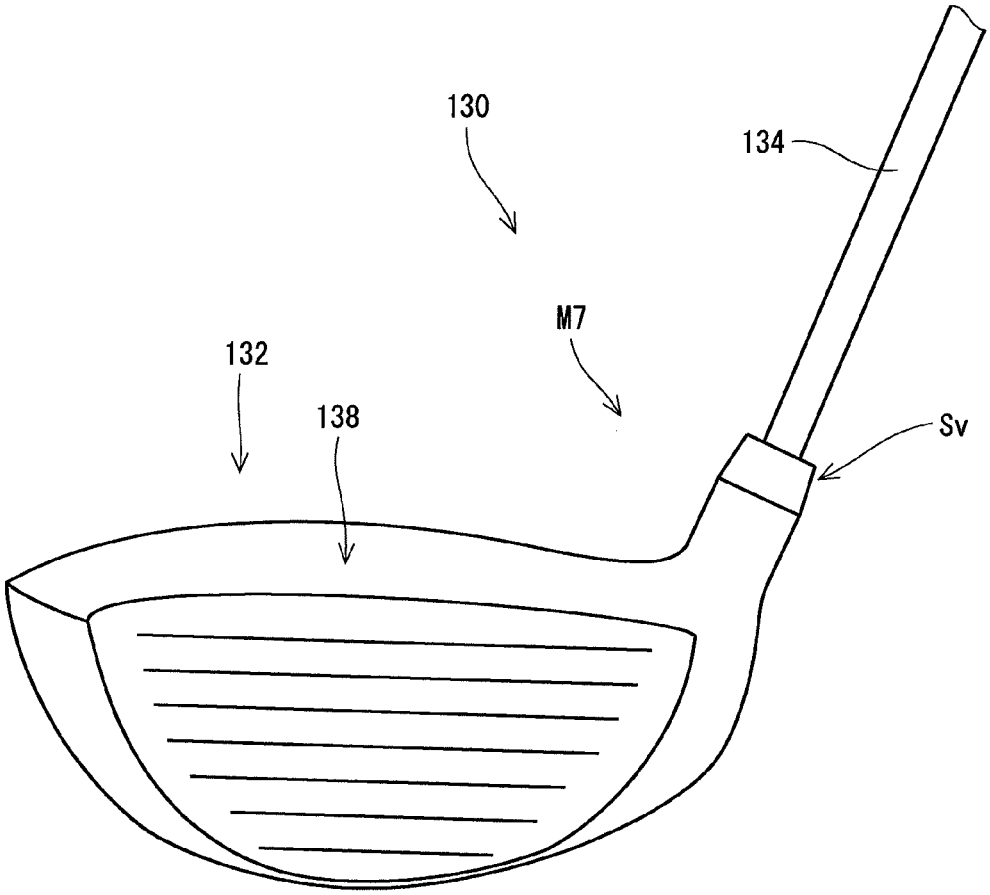


Fig. 18

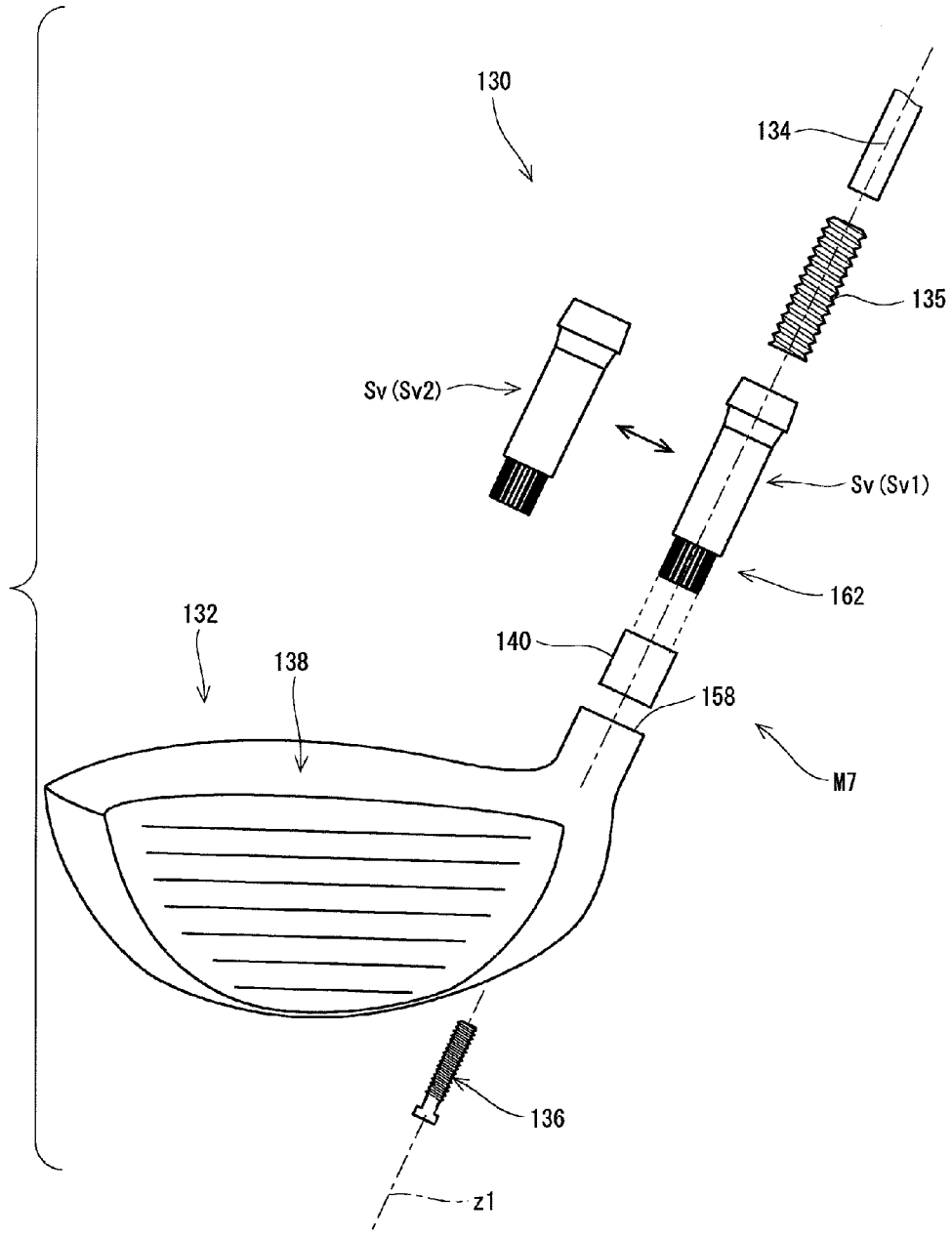


Fig. 19

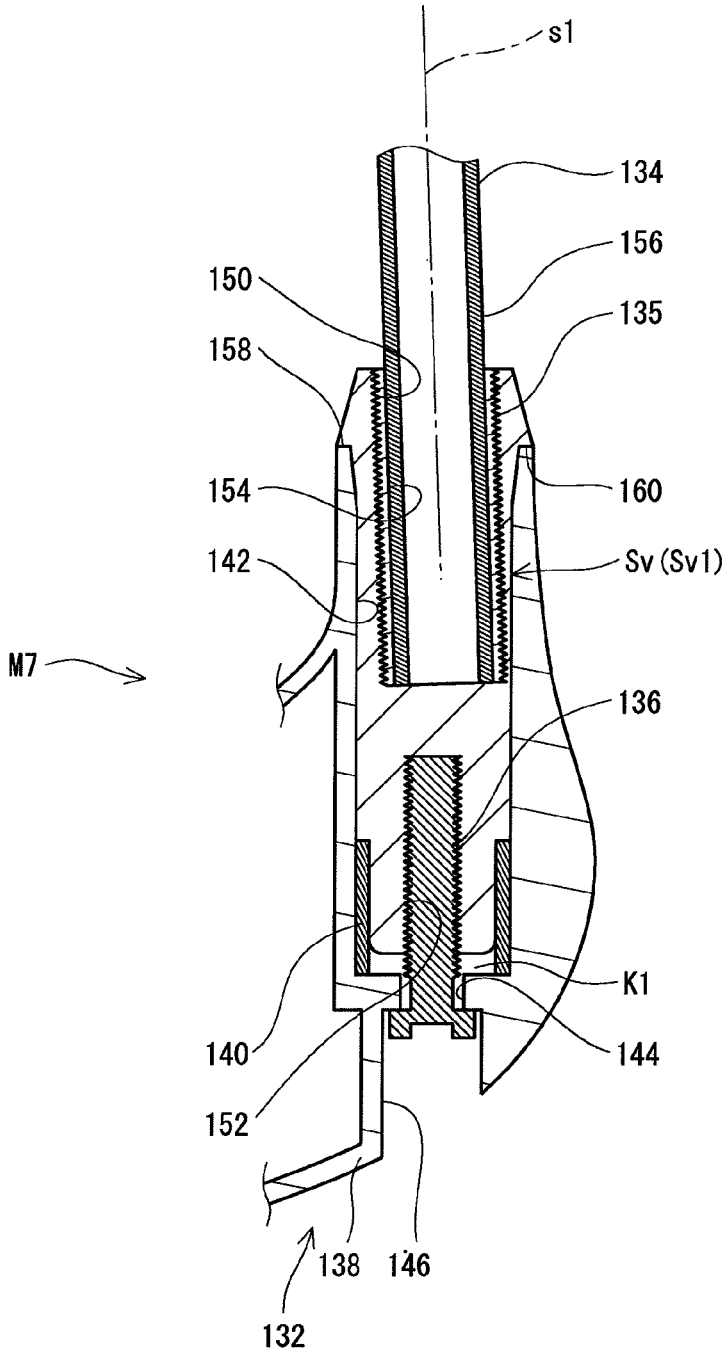

s1
134
156
150
135
158
154
160
142
Sv (Sv1)
M7
136
K1
140
144
152
138
146
132

Fig. 20

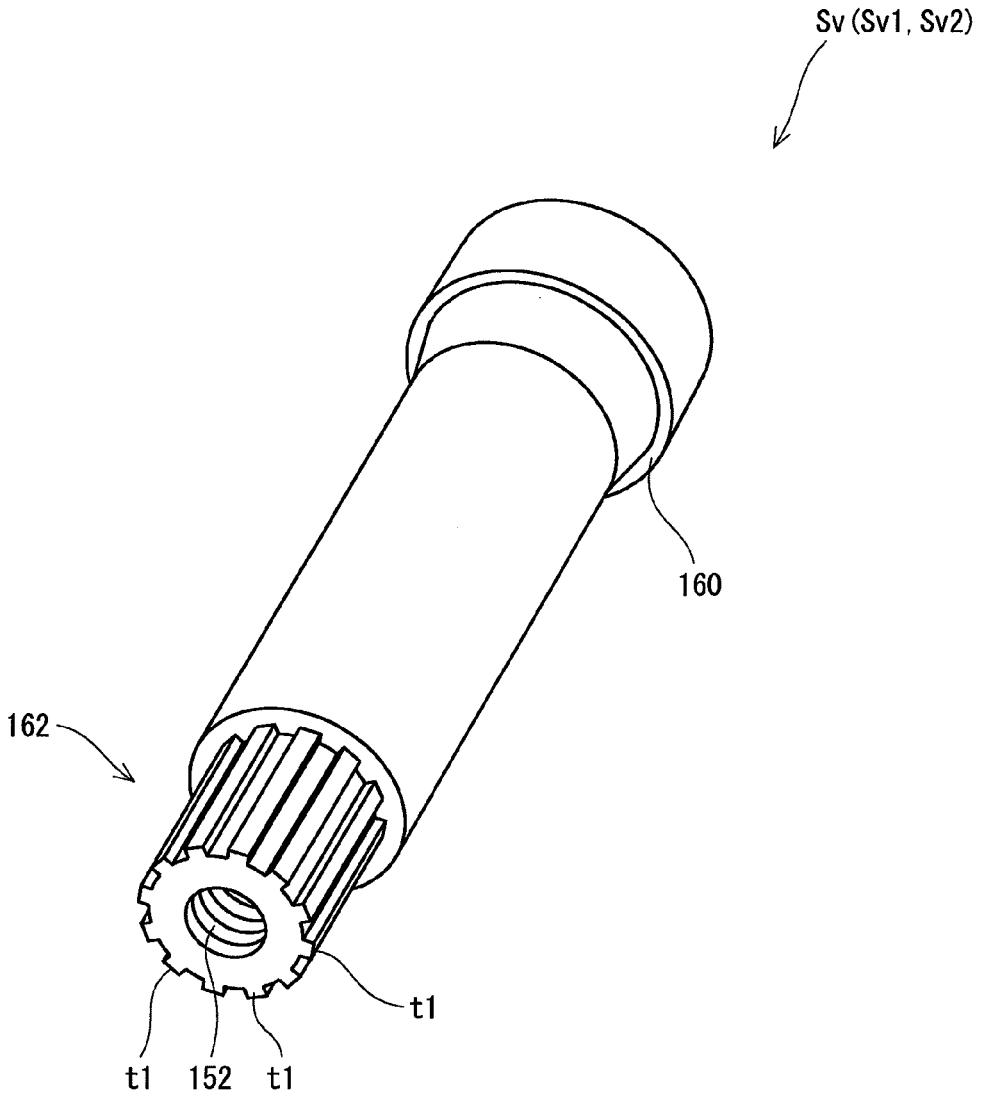


Fig. 21

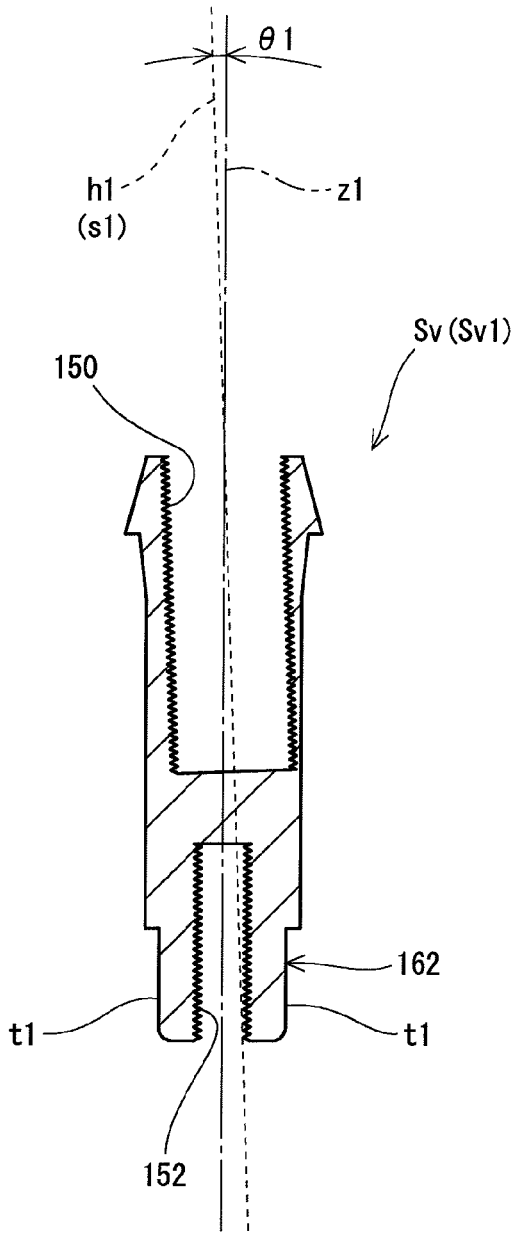


Fig. 22

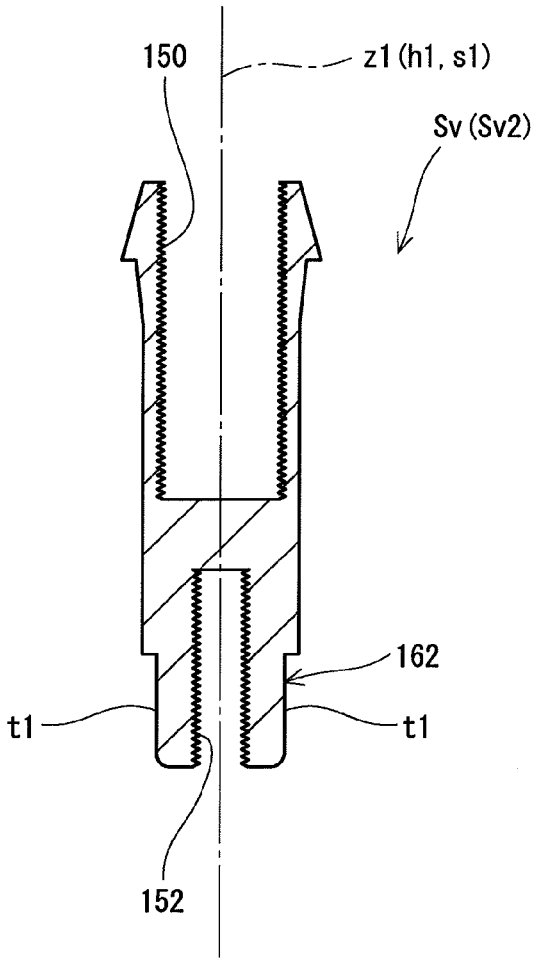


Fig. 23

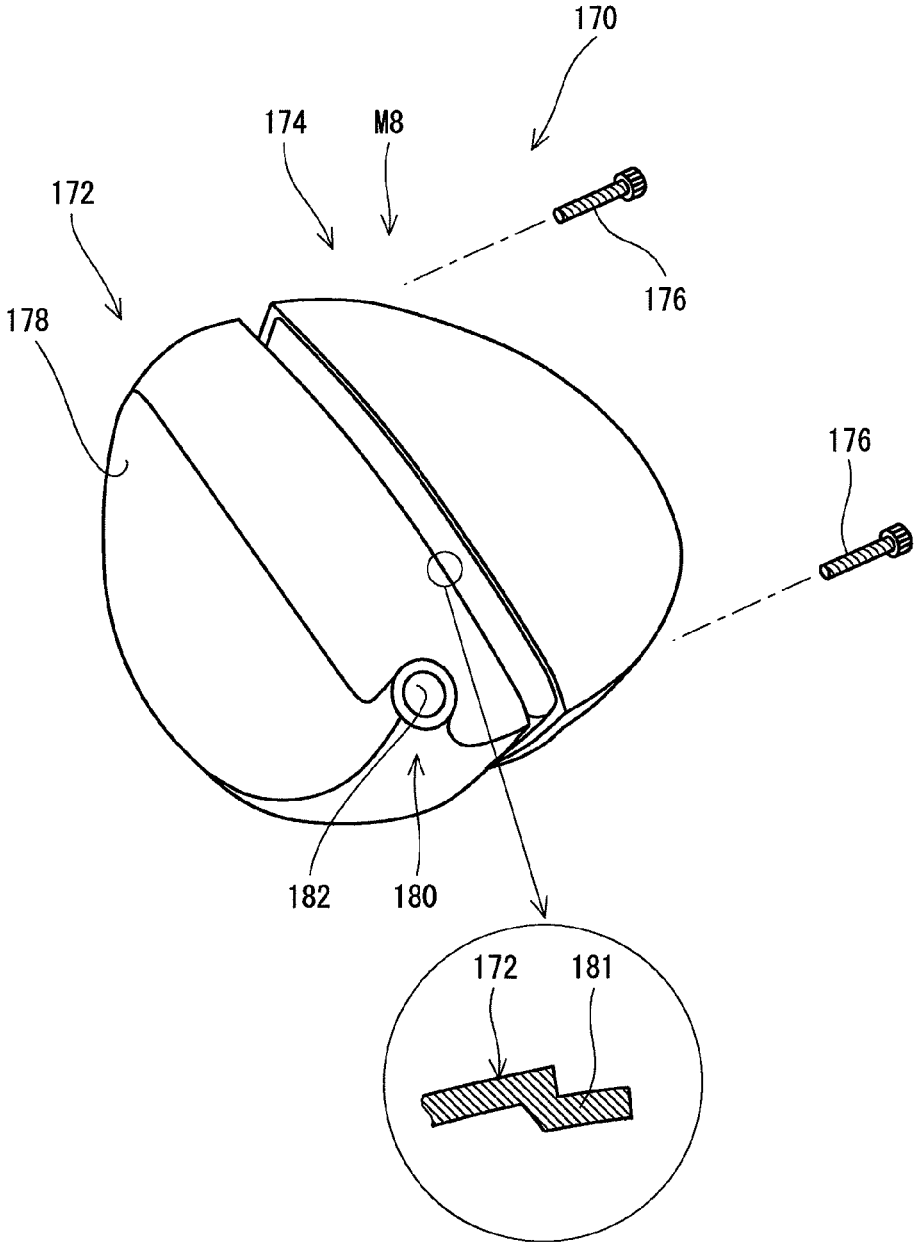


Fig. 24

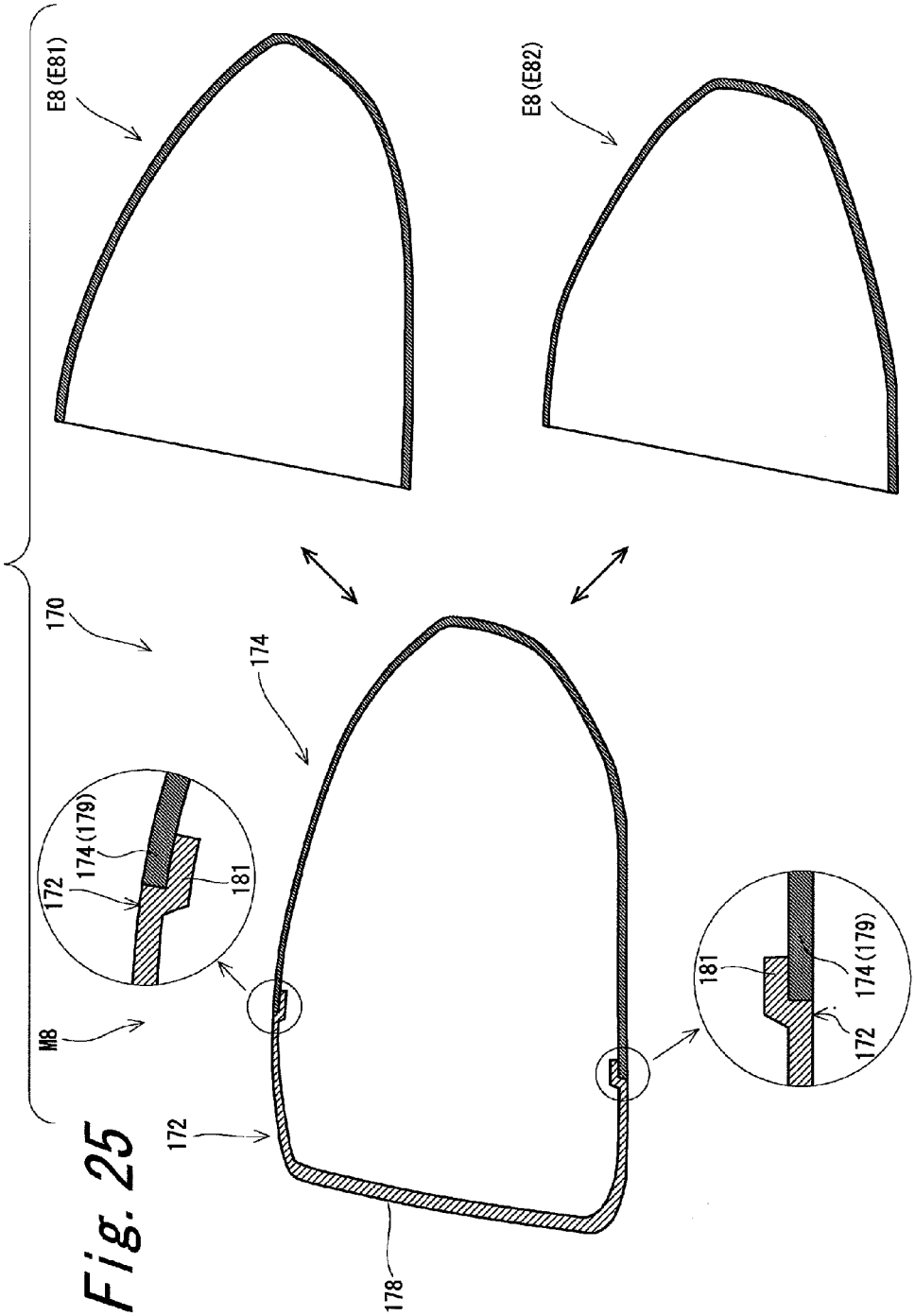


Fig. 25

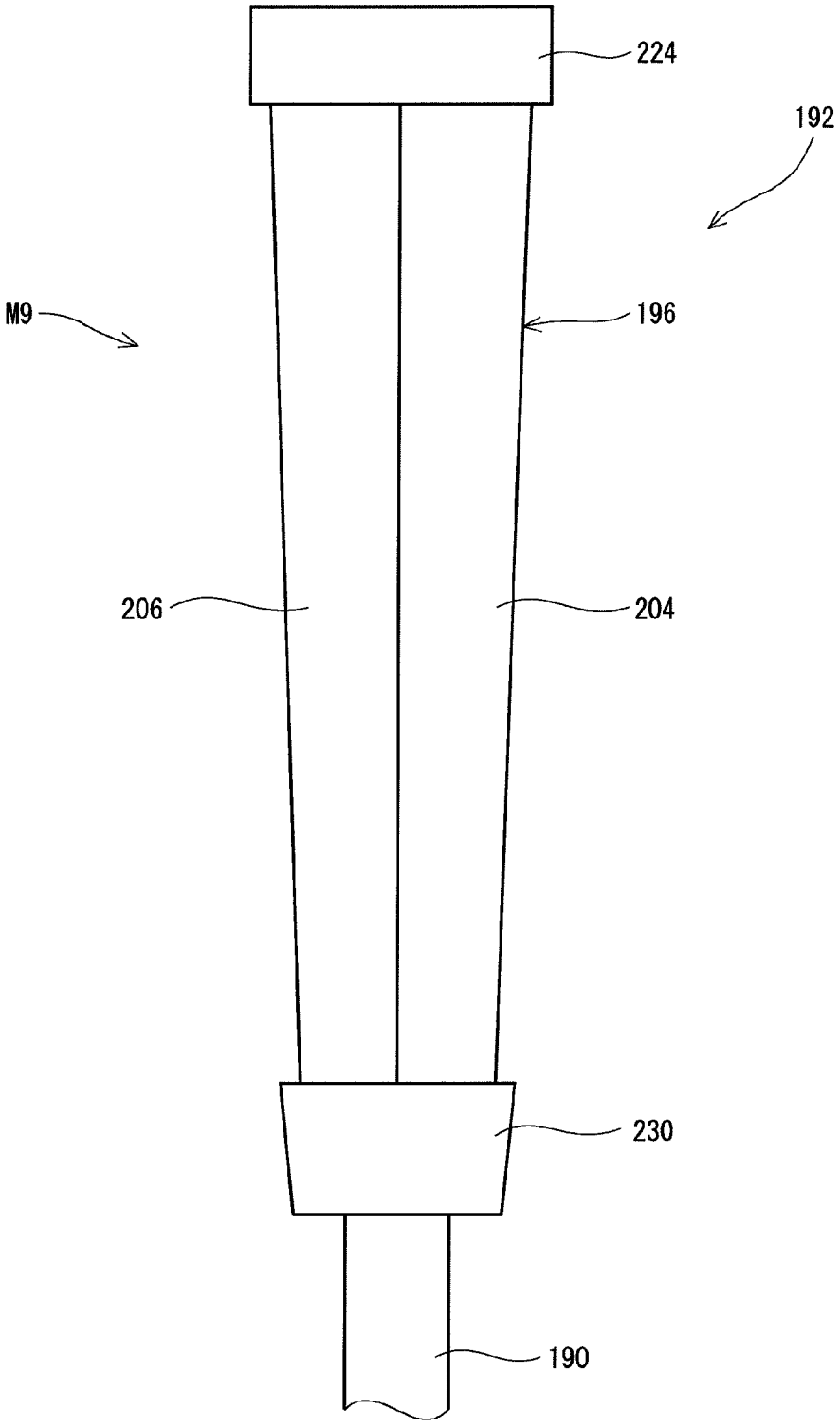


Fig. 26

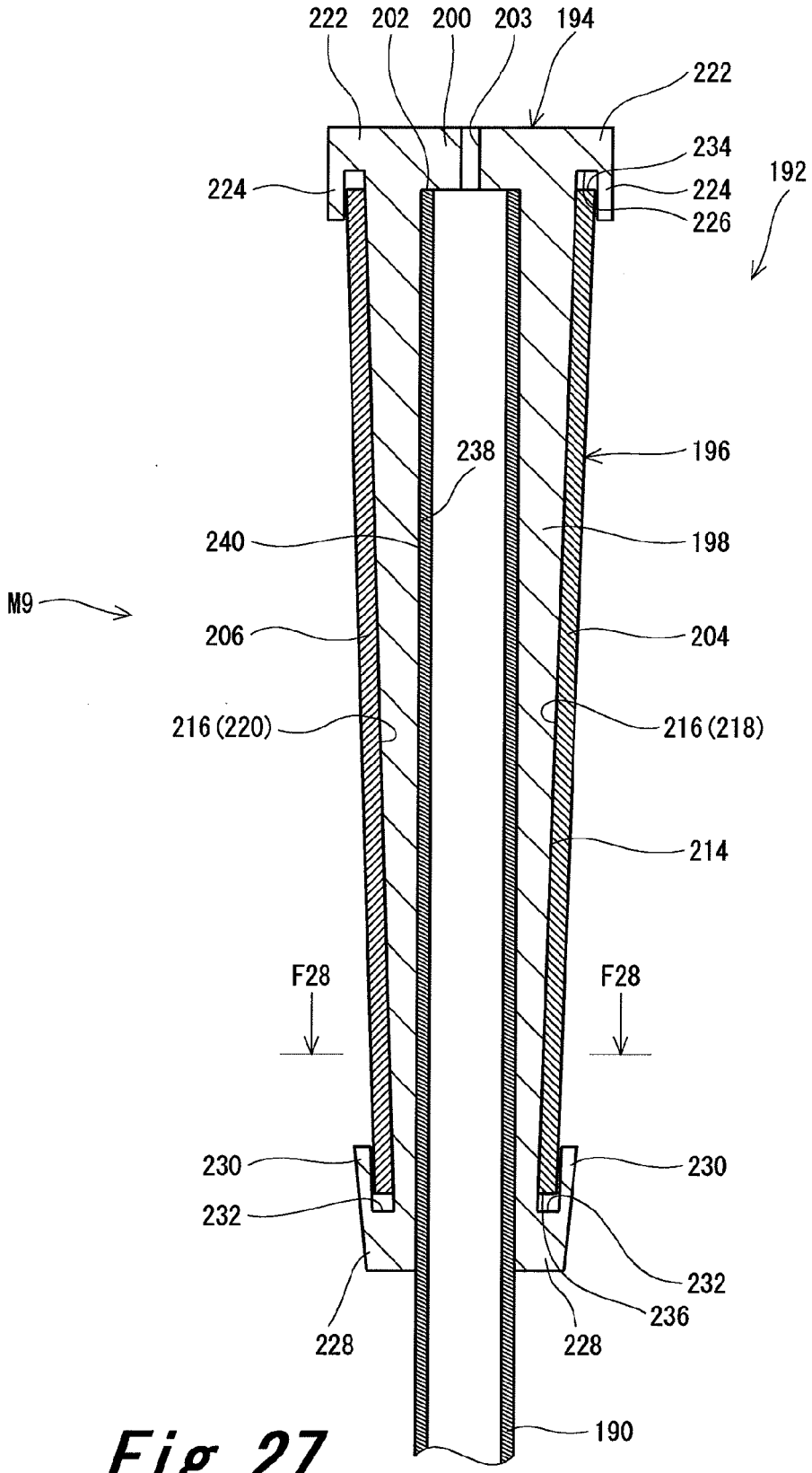

222
202
200
203
194
222
234
224
224
226
192
196
238
240
198
M9
206
204
216 (220)
216 (218)
214
F28
F28
230
230
232
232
236
228
228
190

Fig. 27

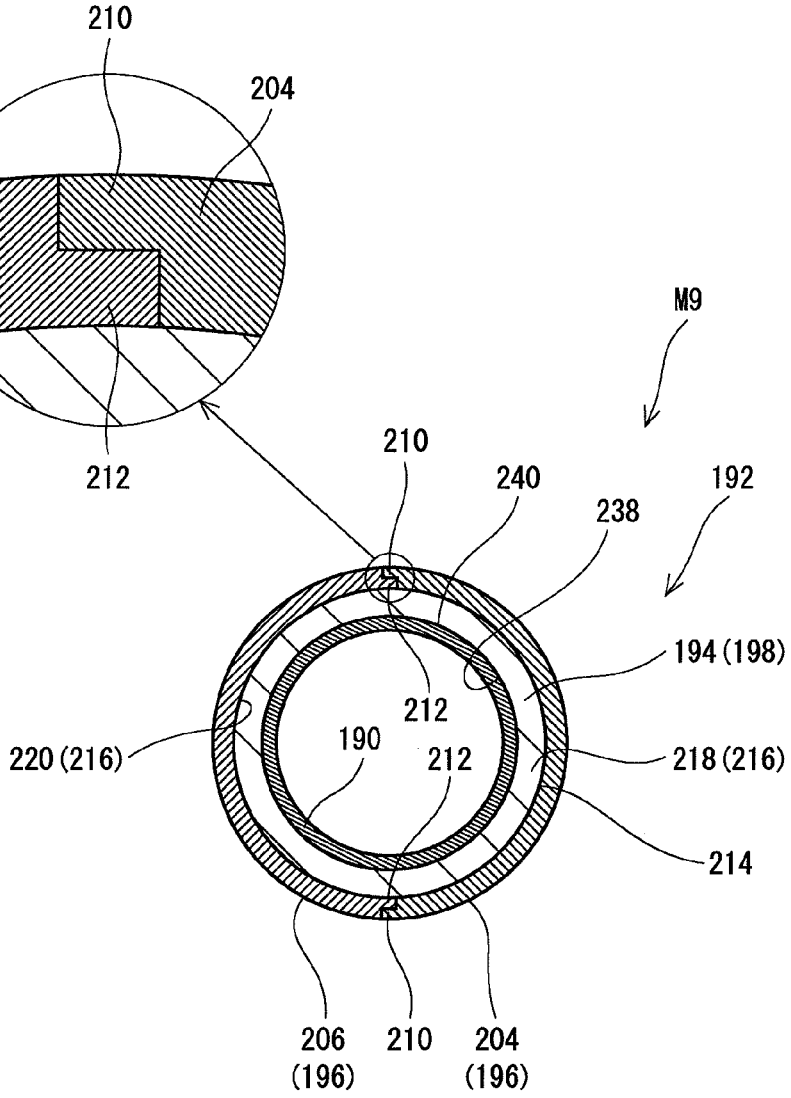

210
206
204
212
M9
210
240
192
238
194 (198)
212
220 (216)
190
212
218 (216)
214
206
(196)
210
204
(196)

Fig. 28

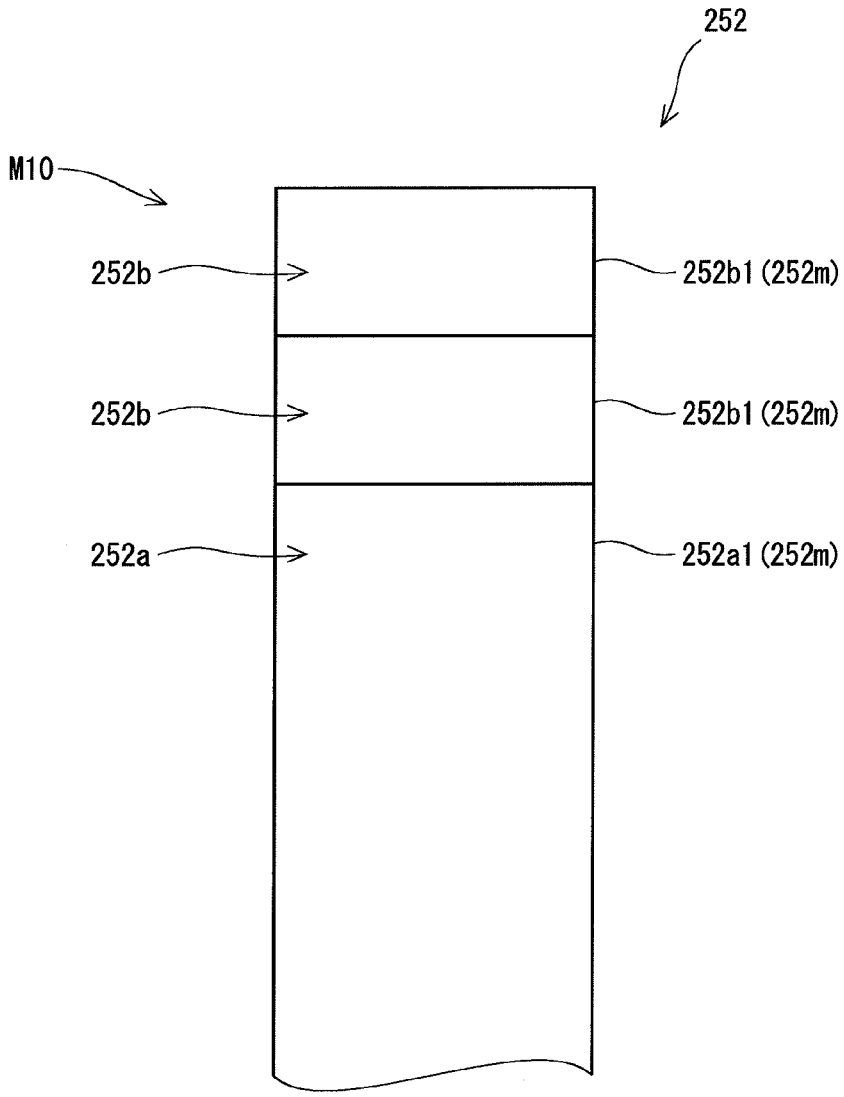


Fig. 29

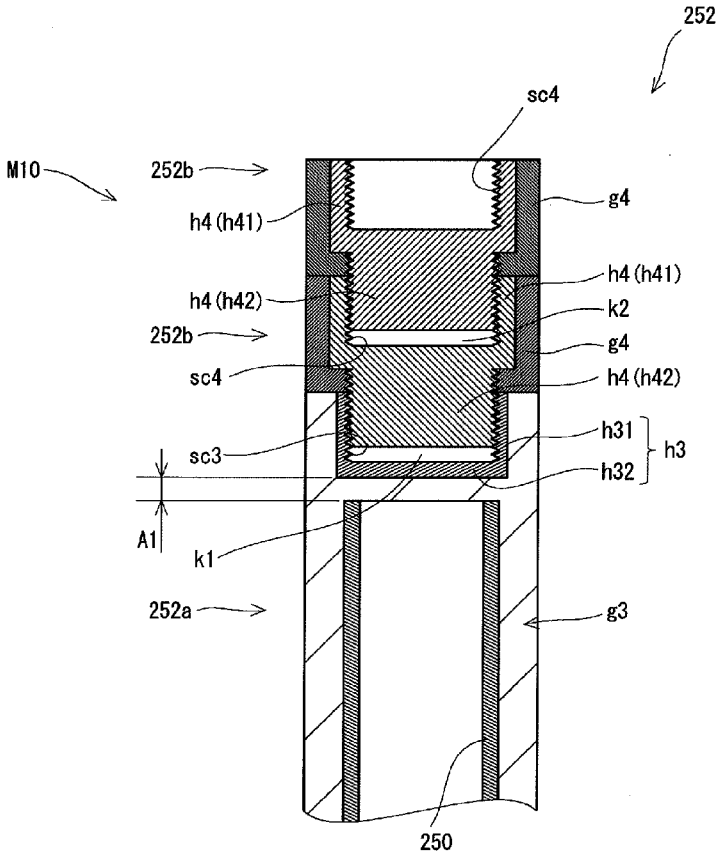

252
sc4
M10
252b
g4
h4 (h41)
h4 (h41)
h4 (h42)
k2
252b
g4
sc4
h4 (h42)
h31
h3
sc3
h32
A1
k1
252a
g3
250

Fig. 30

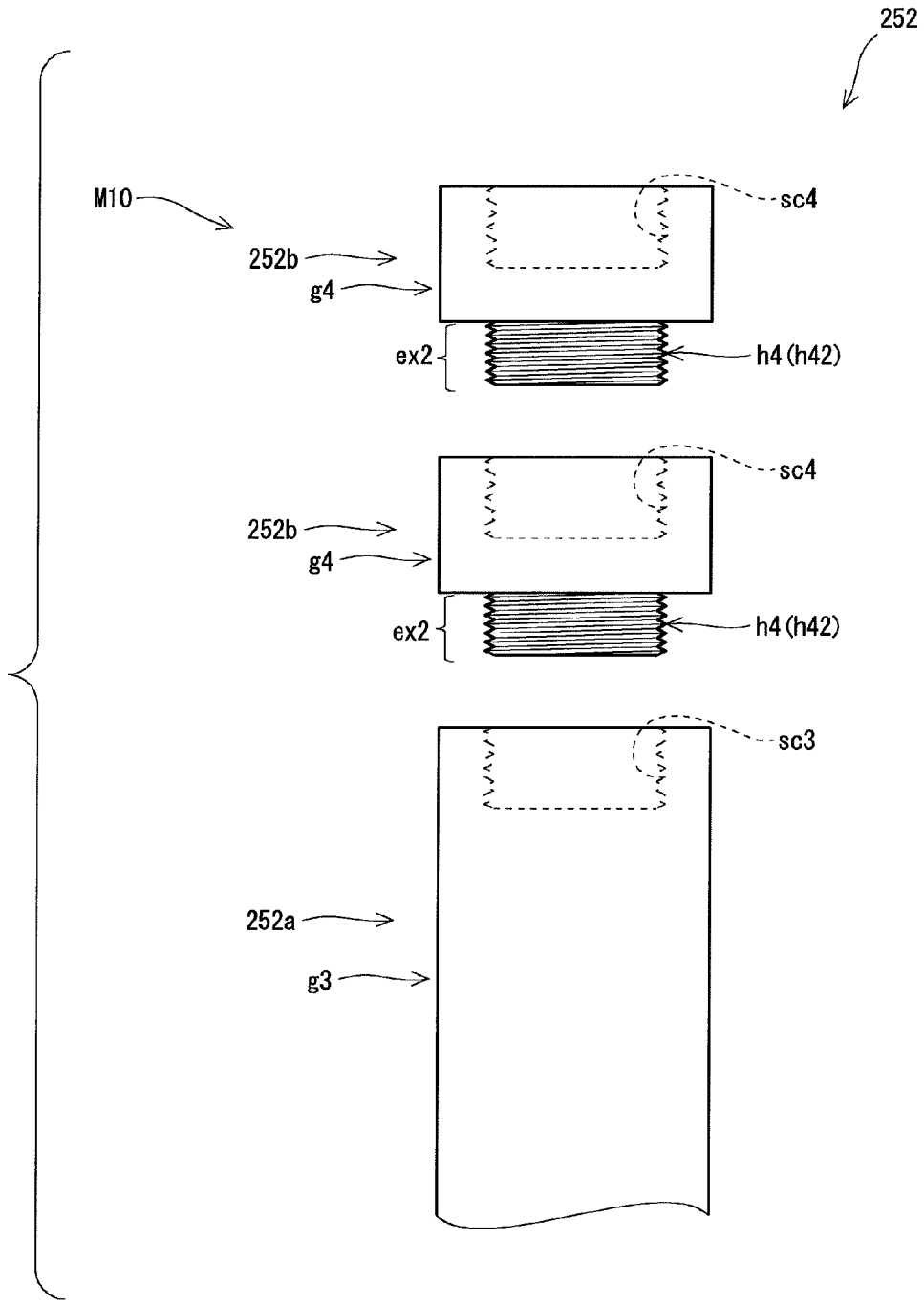


Fig. 31

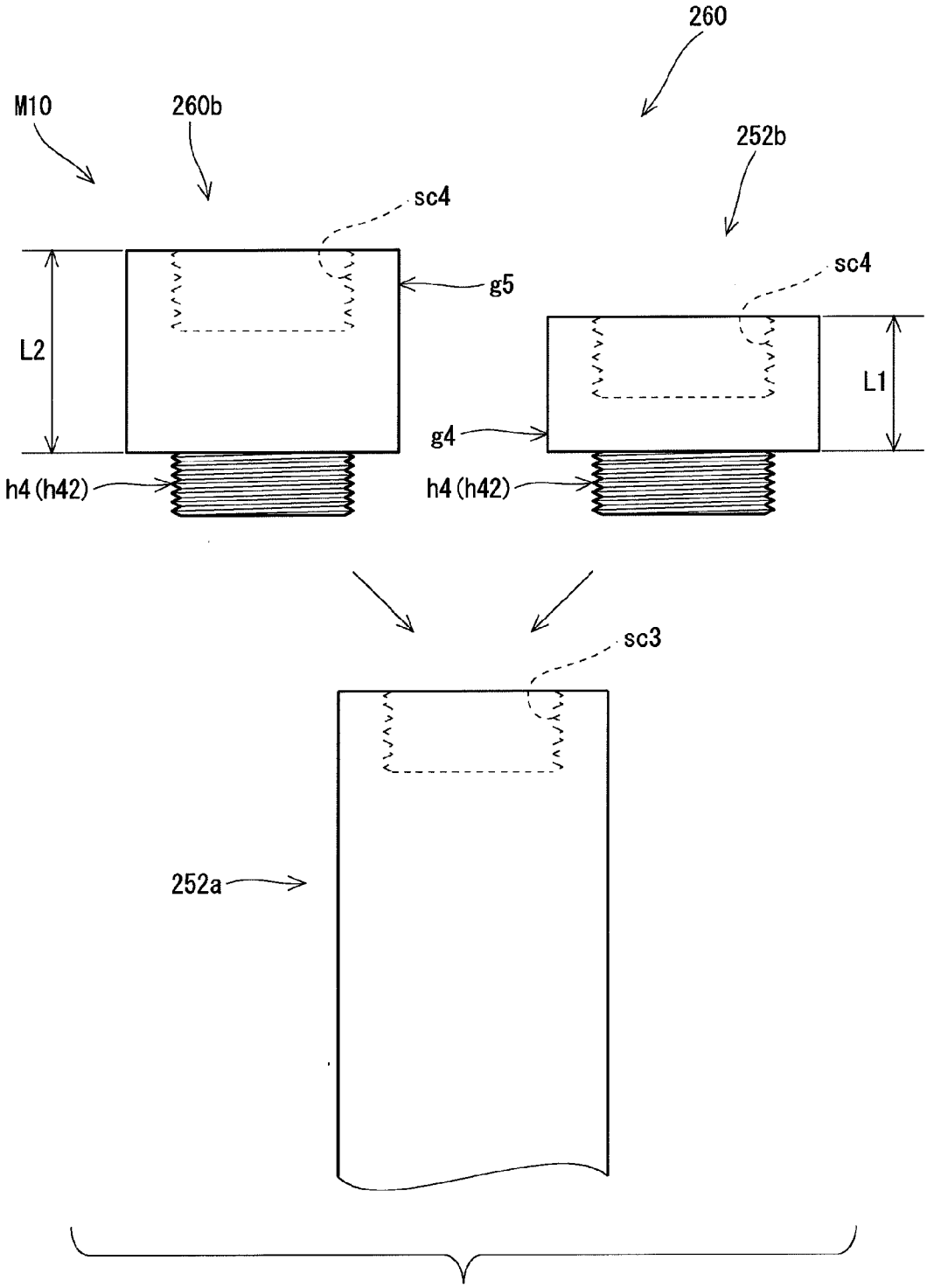


Fig. 32

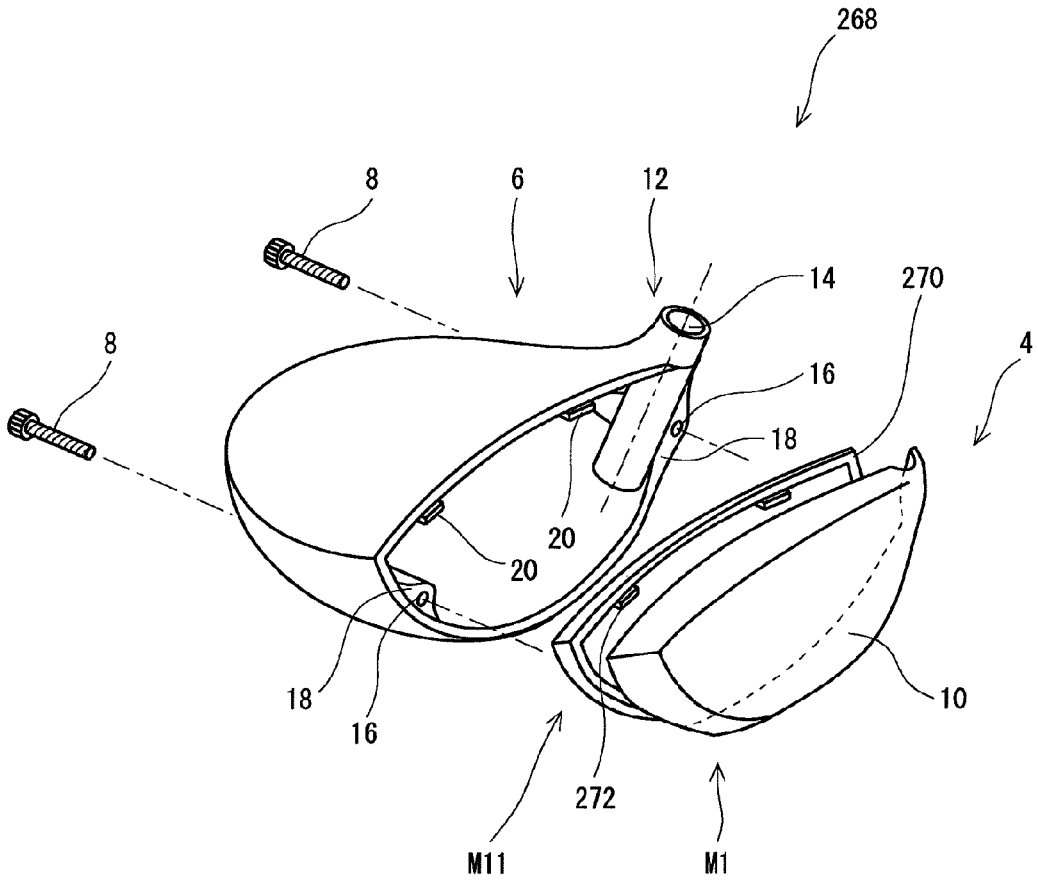


Fig. 33

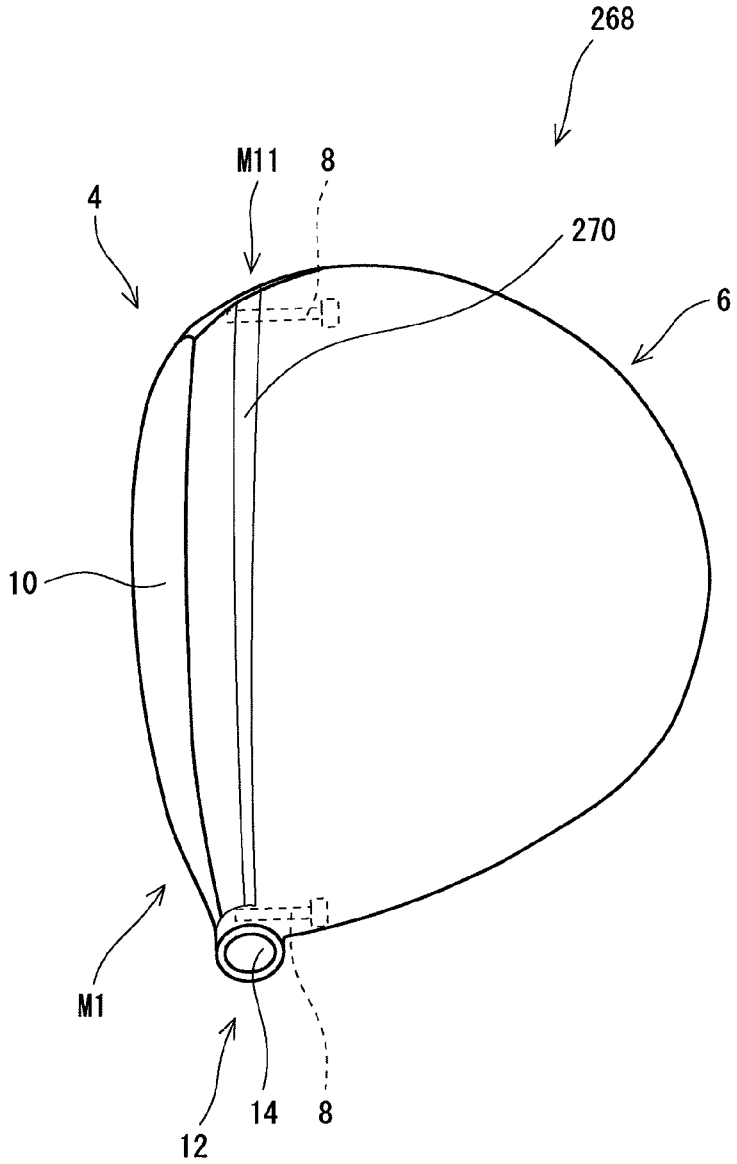


Fig. 34

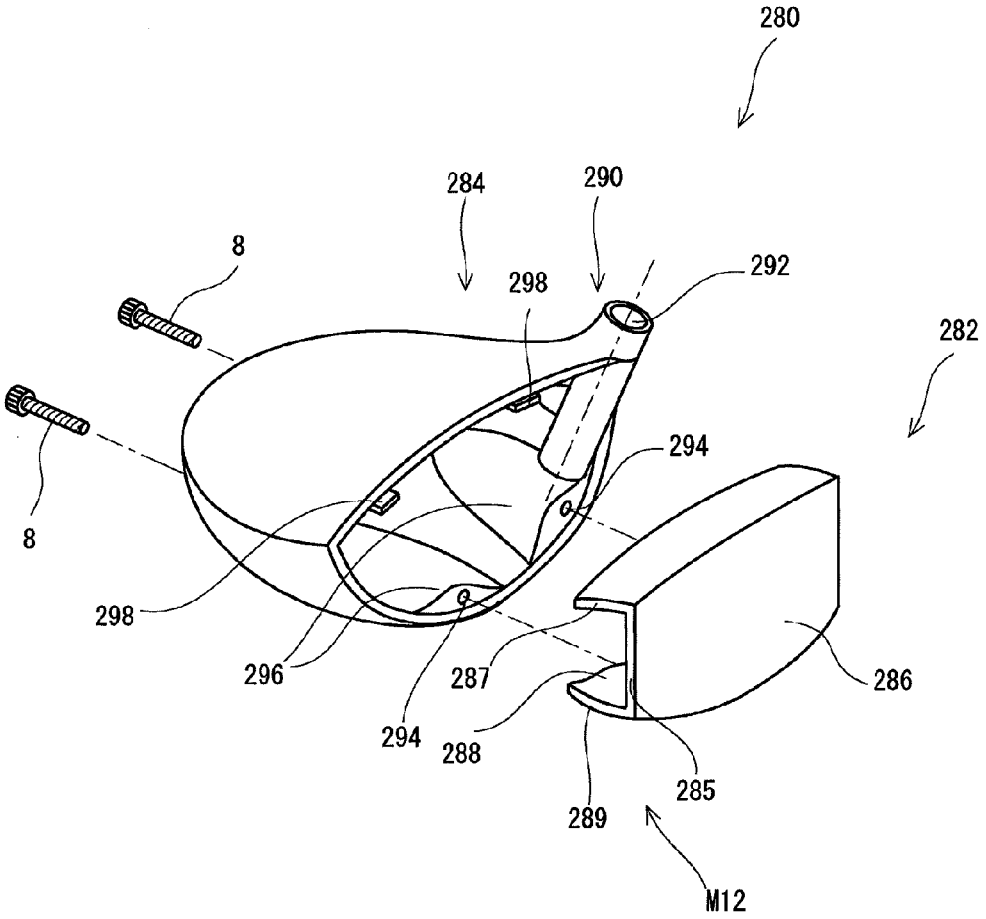

280
284
290
8
298
292
282
8
294
298
296
287
286
294
288
285
289
M12

Fig. 35

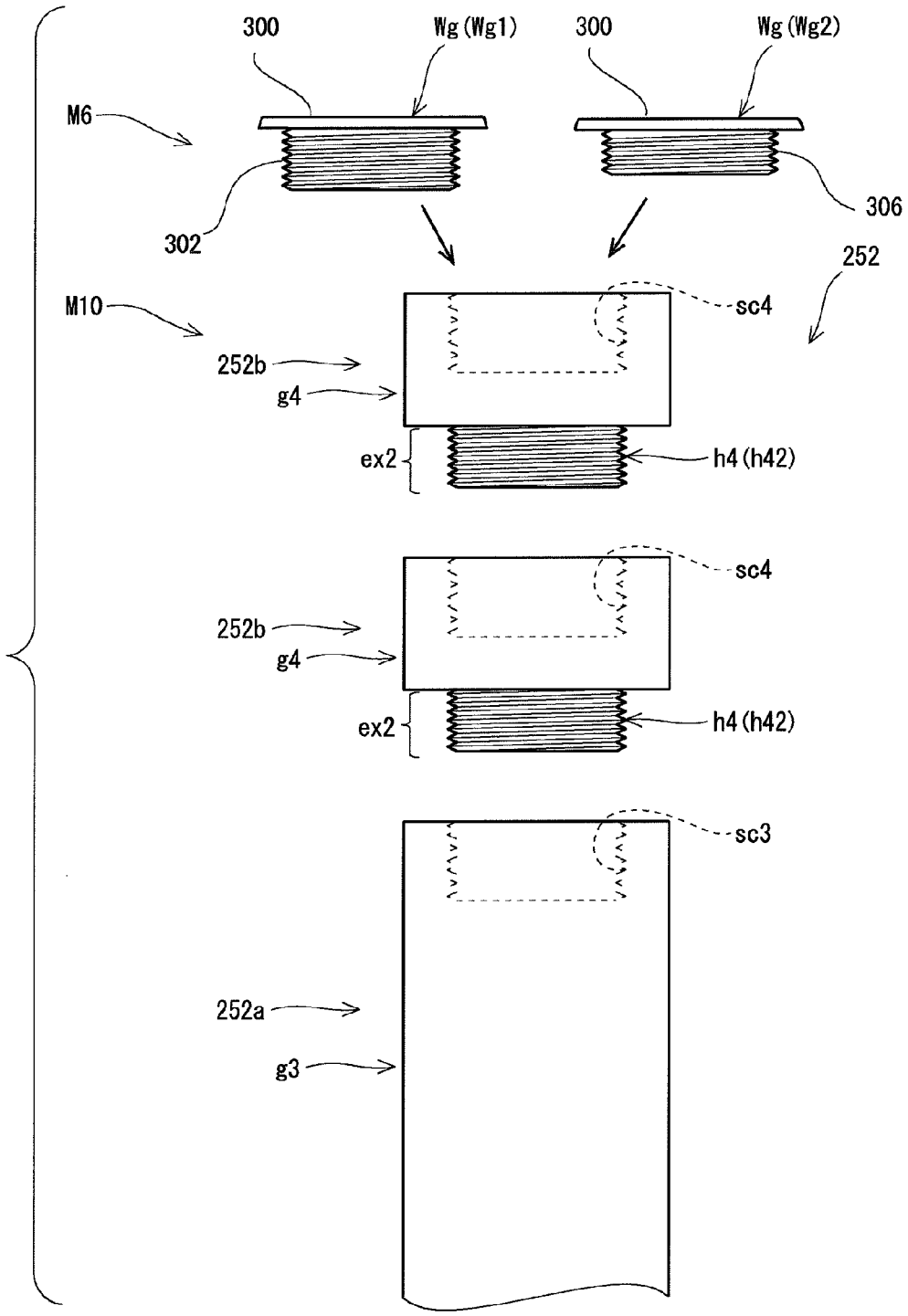

300
Wg (Wg1)
300
Wg (Wg2)
M6
302
306
252
M10
sc4
252b
g4
ex2
h4 (h42)
sc4
252b
g4
ex2
h4 (h42)
sc3
252a
g3

Fig. 36

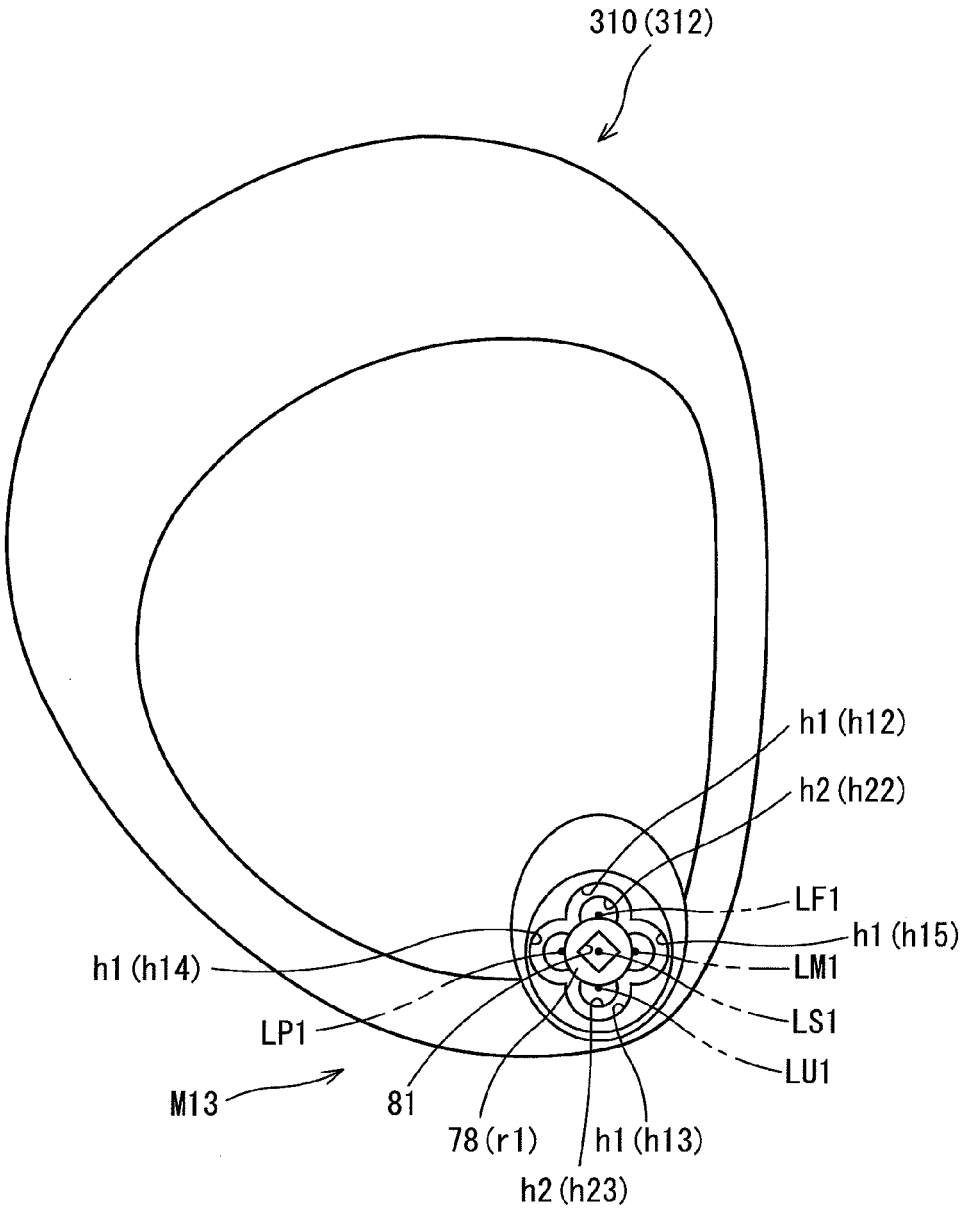

310 (312)
h1 (h12)
h2 (h22)
LF1
h1 (h15)
h1 (h14)
LM1
LP1
LS1
LU1
M13
81
78 (r1)
h1 (h13)
h2 (h23)

FIG. 37

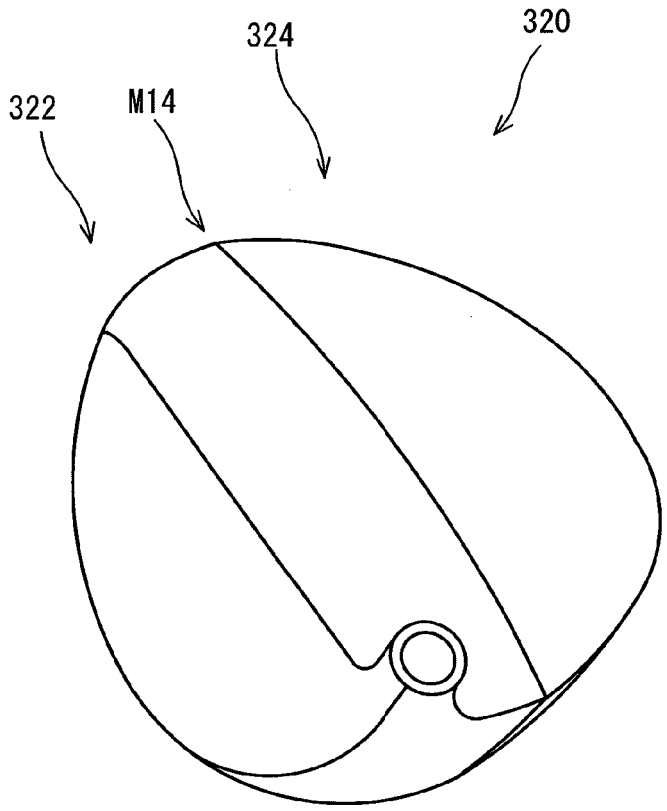


FIG. 38

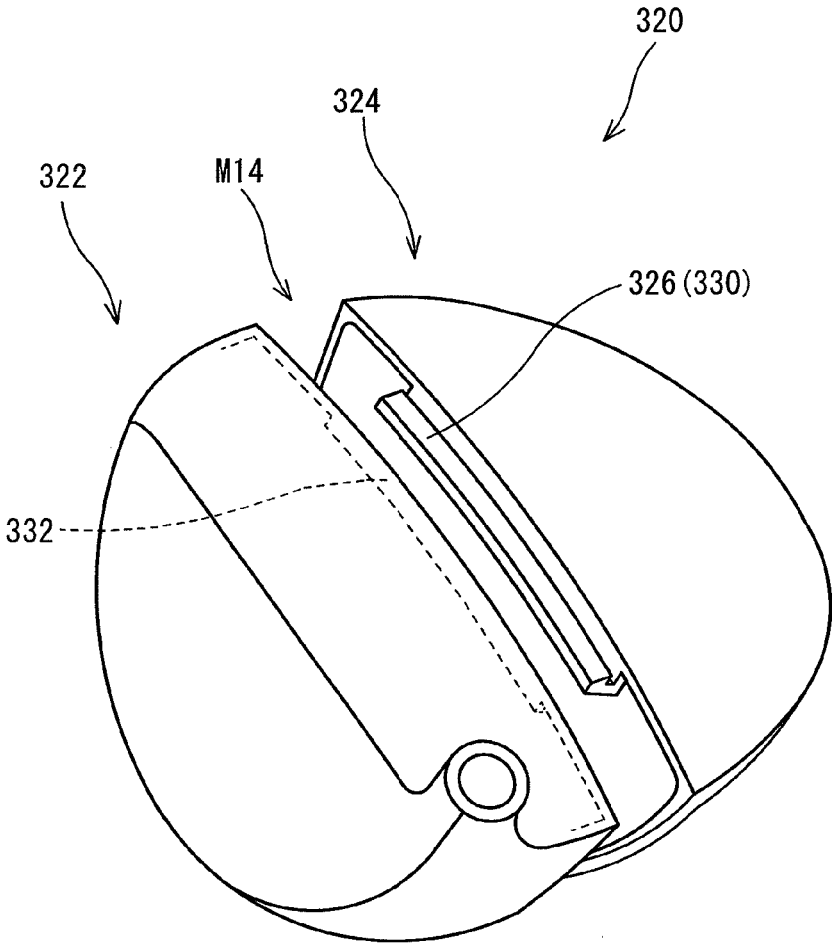


FIG. 39

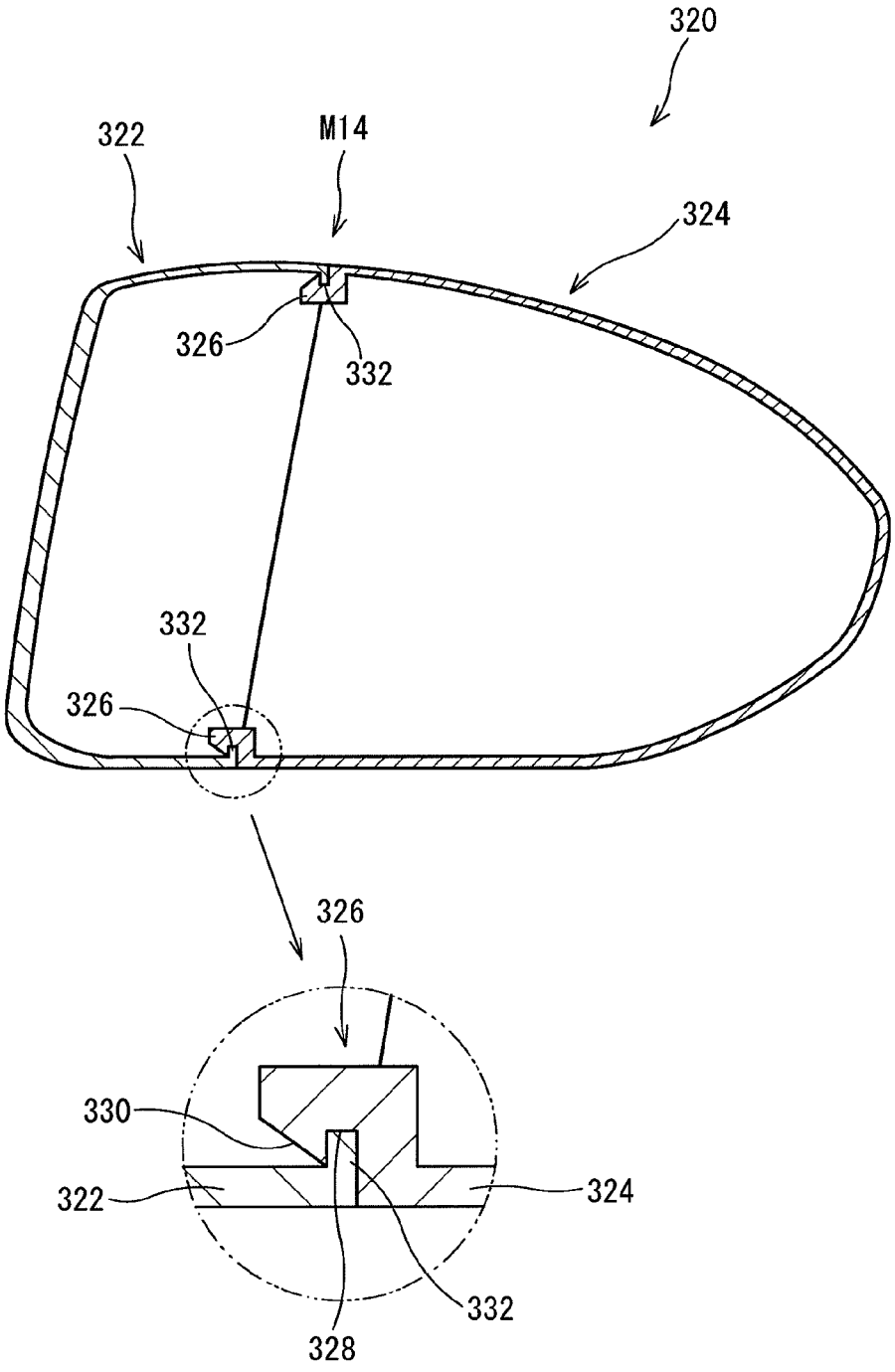


FIG. 40

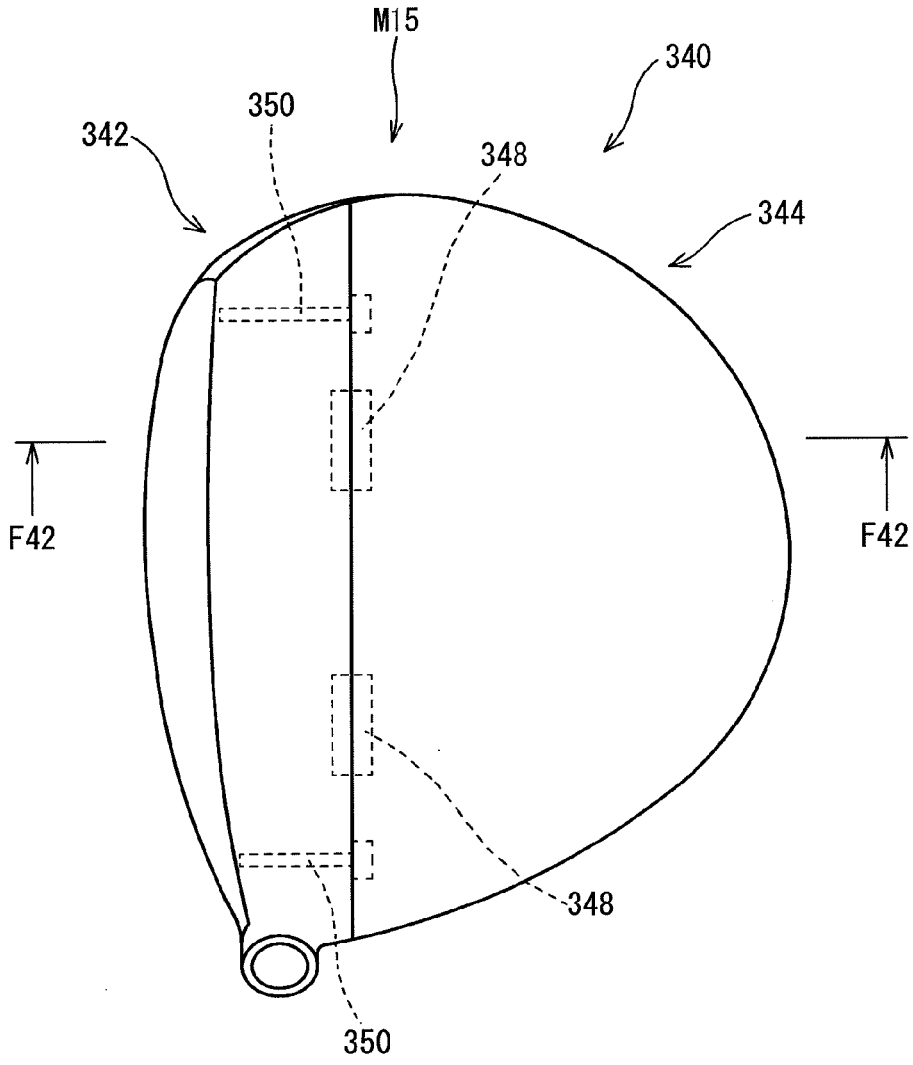


FIG. 41

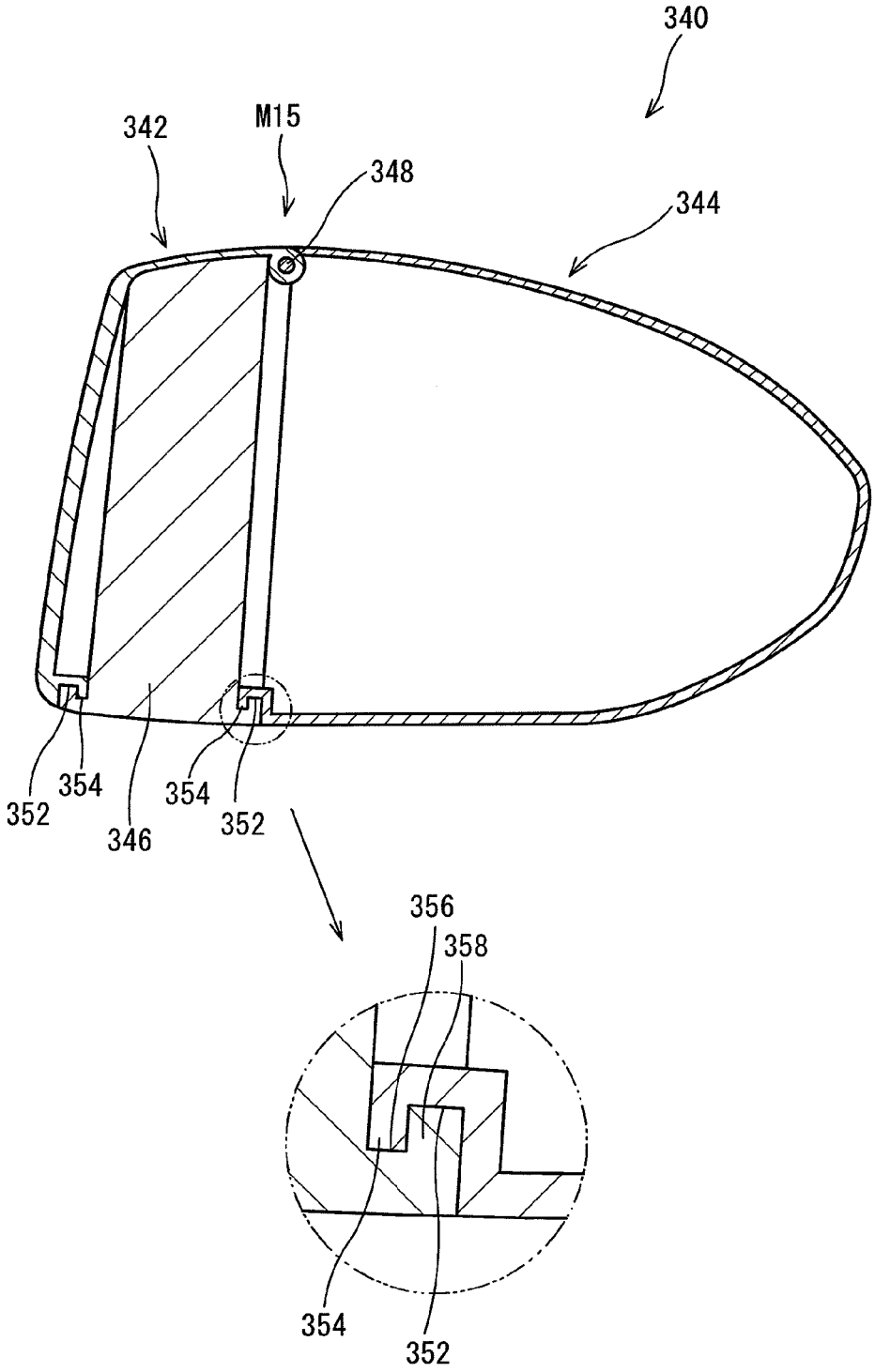


FIG. 42

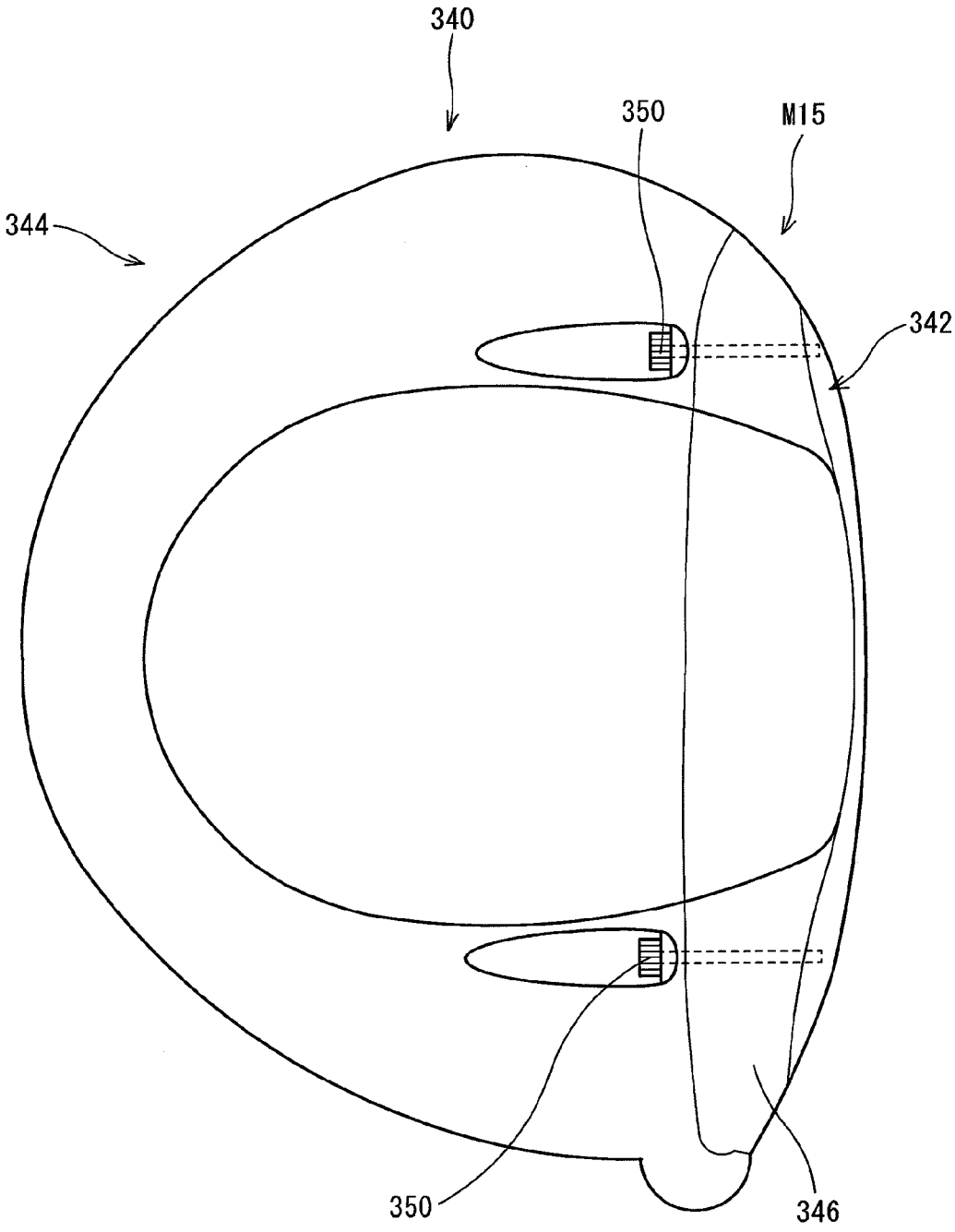


FIG. 43

GOLF CLUB

[0001] This application is a Divisional of co-pending application Ser. No. 14/581,777 filed on Dec. 23, 2014, which is a Divisional of application Ser. No. 13/234,208 filed on Sep. 16, 2011, now abandoned. Application Ser. No. 13/234,208 claims priority under 35 U.S.C. §119(a) on Patent Application No. 2010-208923 filed in JAPAN on Sep. 17, 2010 and Patent Application No. 2011-166179 filed in JAPAN on Jul. 29, 2011. The entire contents of each of the above applications are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a golf club. In particular, the present invention relates to a golf club having adjustability.

Description of the Related Art

[0003] Golf players select and use golf clubs suited to themselves. The number of golf clubs capable of being used during playing golf is 14 in respect of the Golf Rules. The golf players usually select 14 clubs and make a round.

[0004] However, a condition may be varied according to days even in the same golf player. Setting of a golf course also has an influence on selection of the golf club. Weather also has an influence on the selection of the golf club. In order to deal with a plurality of golf courses, it is advantageous to prepare changing golf clubs in addition to 14 clubs to be used. Similarly, in order to deal with weather change, it is advantageous to prepare changing golf clubs. In order to improve a degree of freedom of selection, it is advantageous to prepare changing golf clubs.

[0005] In the golf club having adjustability, a specification can be adjusted. One golf club having adjustability can be adjusted to a plurality of specifications. The adjustability can eliminate the use of the changing golf club.

[0006] A golf club having adjustability has been proposed. Japanese Patent Application Laid-Open No. 9-201433 discloses a golf club having a variable loft angle. Japanese Patent Application Laid-Open No. 2004-267460 discloses a golf club having an adjustable face angle. US 2006/0293115 discloses a structure where a head is easily mounted and detached to and from a shaft. An embodiment in which a shaft axis inclined to a hosel axis is shown in FIG. 17 of US 2006/0293115. In the embodiment of FIG. 17 of US 2006/0293115, a loft angle, a lie angle, and a face angle are varied in relation to each other due to a circumferential position of a sleeve.

SUMMARY OF THE INVENTION

[0007] It was found that there is room for improvement in the adjustability in the conventional technique.

[0008] It is an object of the present invention to provide a golf club having excellent adjustability.

[0009] A golf club of the present invention comprises at least one adjusting mechanism. In the golf club, at least two specifications can be adjusted independently of each other.

[0010] Preferably, a head, a shaft, a grip, or a joined part therebetween has an adjusting mechanism (**1**). The head, the shaft, the grip, or the joined part has further other adjusting mechanism (**2**). Preferably, the adjusting mechanism (**1**) and the adjusting mechanism (**2**) can work independently of each other. The joined part means a joined part between the head and the shaft, and a joined part between the shaft and the grip.

[0011] Preferably, the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located at a place other than a hosel part.

[0012] Preferably, the adjusting mechanism (**1**) and the adjusting mechanism (**2**) are located at places other than a hosel part.

[0013] Preferably, all the adjusting mechanisms are located at places other than a hosel part.

[0014] Preferably, in the golf club, the two or more specifications selected from a loft angle, a lie angle, a face angle, a face area, a position of a center of gravity of a head, a swingweight, a club length, a position of a center of gravity of a club, a frequency of the club, a club weight, a head shape, a head volume, a head weight, a flex of a shaft, a flex point of a shaft, a torque of the shaft, flexural rigidity distribution of the shaft, torsional rigidity distribution of the shaft, a shaft weight, weight distribution of the shaft, a position of a center of gravity of the shaft, a length of the shaft, a grip outer diameter, a grip weight, a position of a center of gravity of a grip, a grip length, a specification of a face groove, a face progression, a moment of inertia of the head, a moment of inertia of the club, a coefficient of restitution of the head to a ball, and a friction coefficient of the head to the ball can be adjusted independently of each other.

[0015] The number of the specifications capable of being adjusted independently of each other may be equal to or greater than 3, and furthermore equal to or greater than 4.

[0016] Preferably, the plurality of specifications includes one or more specific specifications selected from a loft angle, a lie angle, a club length, and a club weight. An adjustment range is equal to or greater than a width corresponding to two-number clubs in all the specific specifications.

[0017] A golf club set of the present invention comprises the plurality of golf clubs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] FIG. **1** is a perspective view of a head provided with an adjusting mechanism M**1** (front member changing mechanism);

[0019] FIG. **2** is an exploded view of the head of FIG. **1**;

[0020] FIG. **3** is a view for explaining change of the front member;

[0021] FIG. **4** is a view of the head of FIG. **1**, as viewed from a sole side;

[0022] FIG. **5** is a perspective view of the head provided with an adjusting mechanism M**2** (face plate changing mechanism);

[0023] FIG. **6** is a view for explaining change of a face plate,

[0024] FIG. **7** is a view showing a golf club provided with an adjusting mechanism M**3** (club length adjusting mechanism);

[0025] FIG. **8** is a view for explaining adjustment of a club length,

[0026] FIG. **9** is a view showing a golf club provided with an adjusting mechanism M**4** (lie angle adjusting mechanism);

[0027] FIG. **10** is a view of the golf club of FIG. **9**, as viewed from a sole side;

[0028] FIG. **11** is a cross sectional view of the golf club of FIG. **9**;

[0029] FIG. **12** is a cross sectional view taken along line Cs**1**-Cs**1** of FIG. **11**, a cross sectional view taken along line Cs**2**-Cs**2**, and a cross sectional view taken along line Cs**3**-Cs**3**;

[0030] FIG. **13** is a view for explaining adjustment of a lie angle;

[0031] FIG. **14** is a view showing a golf club provided with an adjusting mechanism M**4** and an adjusting mechanism M**5**;

[0032] FIG. **15** is a view of the golf club of FIG. **14**, as viewed from a sole side;

[0033] FIG. **16** is a view showing a golf club provided with an adjusting mechanism M**4**, an adjusting mechanism M**5**, and an adjusting mechanism M**6**;

[0034] FIG. **17** is a cross sectional view of a golf club provided with an adjusting mechanism M**6**;

[0035] FIG. **18** is a view of a golf club provided with an adjusting mechanism M**7**;

[0036] FIG. **19** is an exploded view of the golf club of FIG. **18**;

[0037] FIG. **20** is a cross sectional view of the golf club of FIG. **18**;

[0038] FIG. **21** is a perspective view of a sleeve used for the golf club of FIG. **18**;

[0039] FIG. **22** is a cross sectional view of a first sleeve;

[0040] FIG. **23** is a cross sectional view of a second sleeve;

[0041] FIG. **24** is an exploded perspective view of a golf club head provided with an adjusting mechanism M**8**;

[0042] FIG. **25** is a view for explaining change of a back member;

[0043] FIG. **26** is a view showing a golf club provided with an adjusting mechanism M**9**;

[0044] FIG. **27** is a cross sectional view of FIG. **26**;

[0045] FIG. **28** is a cross sectional view of the golf club taken along line F**28**-F**28** of FIG. **27**;

[0046] FIG. **29** is a view showing a golf club provided with an adjusting mechanism M**10**;

[0047] FIG. **30** is a cross sectional view of FIG. **29**;

[0048] FIG. **31** is an exploded view of FIG. **29**;

[0049] FIG. **32** is an exploded view of other golf club provided with an adjusting mechanism M**10**;

[0050] FIG. **33** is an exploded perspective view of a golf club head provided with an adjusting mechanism M**1** and an adjusting mechanism M**11**;

[0051] FIG. **34** is a view of the head of FIG. **33**, as viewed from a crown side;

[0052] FIG. **35** is an exploded perspective view of a head provided with an adjusting mechanism M**12**;

[0053] FIG. **36** is an exploded view of a club provided with an adjusting mechanism M**6** and an adjusting mechanism M**10**;

[0054] FIG. **37** is a bottom view of a golf club provided with an adjusting mechanism M**13**;

[0055] FIG. **38** is a perspective view of a golf club head provided with an adjusting mechanism M**14**;

[0056] FIG. **39** is an exploded perspective view of the head of FIG. **38**;

[0057] FIG. **40** is a cross sectional view of the head of FIG. **38**;

[0058] FIG. **41** is a plan view of a golf club head provided with an adjusting mechanism M**15**;

[0059] FIG. **42** is a cross sectional view taken along line F**41**-F**41** of FIG. **41**; and

[0060] FIG. **43** is a bottom view of the head of FIG. **41**.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0061] The present invention will be described below in detail based on preferred embodiments with reference to the drawings.

[0062] An adjusting mechanism in the present invention satisfies the Golf Rules defined by Royal and Ancient Golf Club of Saint Andrews (R&A). That is, the adjusting mechanism in the present invention satisfies requirements specified in "1b adjustability" in "1 Club" of "Appendix II design of club" defined by R&A. The requirements defined by the "1b adjustability" are the following items (i), (ii), and (iii):

[0063] (i) the adjustment cannot be readily made;

[0064] (ii) all adjustable parts are firmly fixed and there is no reasonable likelihood of them working loose during a round; and

[0065] (iii) all configurations of adjustment conform with the Rules.

[0066] FIG. **1** shows a head **2**. The head **2** is provided with an adjusting mechanism M**1** capable of being used for the present invention. Preferably, the adjusting mechanism M**1** is used with other adjusting mechanisms independent of each other.

[0067] Although not shown in the drawings, a golf club provided with the head **2** is provided with the head **2**, a shaft and a grip. The head **2** is a wood type golf club head.

[0068] FIG. **2** is an exploded perspective view of the head **2**. The head **2** has a front member **4**, a back member **6**, and a connecting member **8**. The front member **4** is connected to the back member **6** by the connecting member **8**. The front member **4** is connected to the back member **6** in a state where no gap substantially exists. The hollow head **2** is completed by the connection.

[0069] The front member **4** has a face surface **10**. The front member **4** has the whole face surface **10**. Although not shown in the drawings, the front member **4** has a screw hole into which the connecting member **8** is screwed, and a thick part for forming the screw hole. The front member **4** is approximately cup-shaped as a whole. Although illustration is omitted, face grooves are formed in the face surface **10**.

[0070] The back member **6** has a hosel part **12**. The hosel part **12** has a shaft hole **14**. The back member **6** has a through hole **16** through which the connecting member **8** passes, and a thick part **18** for forming the through hole **16**. The through hole **16** is formed on each of a toe side and heel side of the head **2**. The thick part **18** is also formed on each of the toe side and heel side of the head **2**. Positions of the through hole **16** and thick part **18** are not restricted.

[0071] The back member **6** has a protruding part **20**. In the embodiment, a plurality of (two) protruding parts **20** is provided. The protruding parts **20** protrude forward from an opening part of the back member **6**. The protruding parts **20** facilitate position adjustment of the front member **4**. The protruding parts **20** facilitate screwing between the front member **4** and the back member **6**.

[0072] The heel side through hole **16** is formed on the heel side from the shaft hole **14**. The heel side thick part **18** is formed on the heel side from the shaft hole **14**. The disposal can contribute to shortening of a length of the through hole

16. The disposal can contribute to lessening of a volume of the thick part **18**. The disposal can contribute to miniaturizing of a screw mechanism.

[0073] The connecting member **8** is a screw. The front member **4** is connected to the back member **6** by the connecting member **8**.

[0074] The head **2** has the adjusting mechanism M**1**. The adjusting mechanism M**1** is a screwing mechanism between the front member **4** and the back member **6**. The adjusting mechanism M**1** can change the front member **4**.

[0075] A changing front member E**4** is shown with the head **2** in FIG. **3**. A changing front member E**41** and other changing front member E**42** are shown as the changing front member E**4** in FIG. **3**. The changing front member E**41** and the changing front member E**42** can be connected to the back member **6** by the connecting member **8**. A golf club with an adjusting function includes the head **2** and the at least one changing front member E**4**.

[0076] For example, a loft angle (real loft angle) is changed by changing the front member **4** to the changing front member E**4**. For example, a face angle is changed by changing the front member **4** to the changing front member E**4**.

[0077] Examples of specifications capable of being adjusted by the adjusting mechanism M**1** include a loft angle, a face angle, a face area, and a face progression. Each of these specifications can be independently adjusted in the adjusting mechanism M**1**. Furthermore, in the adjusting mechanism M**1**, a coefficient of restitution of the head to a ball, and a friction coefficient of the head to the ball can be adjusted. The coefficient of restitution of the head to the ball can be adjusted by, for example, changing the front member to another changing front member having rigidity different from that of the front member. The friction coefficient of the head to the ball can be adjusted by, for example, changing the front member to another changing front member having a face surface having surface roughness different from that of the front member.

[0078] Examples of adjustments of the specifications by the adjusting mechanism M**1** include the following adjustments:

[0079] (adjustment **1***a*) a loft angle is changed and a face angle is not substantially varied;

[0080] (adjustment **1***b*) a loft angle is changed and a face angle is also changed;

[0081] (adjustment **1***c*) a loft angle is not substantially changed but a face angle is changed;

[0082] (adjustment **1***d*) a face area is changed, and a loft angle and a face angle are not varied; and

[0083] (adjustment **1***e*) a face progression is changed, and a loft angle and a face angle are not varied.

[0084] Although the adjusting mechanism M**1** is applied to the wood type golf club head, the adjusting mechanism M**1** may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0085] FIG. **5** is an exploded perspective view of a head **30** provided with an adjusting mechanism M**2** according to other embodiment. FIG. **6** is a cross sectional view of the head **30**. Although not shown in the drawings, a golf club provided with the head **30** is provided with a shaft and a grip. The head **30** is an iron type golf club head. Preferably, the adjusting mechanism M**2** is used with other adjusting mechanism.

[0086] The head **30** has a face plate **32**, a head body **34**, and a connecting member **36**. The face plate **32** is connected to the head body **34** by the connecting member **36**. The face plate **32** is connected to the head body **34** in a state where no gap substantially exists. The head **30** having a cavity **38** (see FIG. **6**) formed in a back face is completed by the connection. In the head **30**, a plane p**1** provided on a back surface of the face plate **32** is brought into surface contact with a plane p**2** provided on a front surface of the head body **34** (see FIG. **6**).

[0087] The face plate **32** has a face surface **40**. The face plate **32** has the whole face surface **40**. Although not shown in the drawings, the face plate **32** has a screw hole into which the connecting member **36** is screwed. The face plate **32** is a plate-shaped as a whole. Face grooves **42** are formed in the face surface **40**.

[0088] The head body **34** has a hosel part **44**. The hosel part **44** has a shaft hole **46**. The head body **34** has a through hole **48** through which the connecting member **36** passes. The through hole **48** is formed on each of a toe side and heel side of the head body **34**. A position of the through hole **48** is not restricted.

[0089] The connecting member **36** is a screw. The face plate **32** is connected to the head body **34** by the connecting member **36**.

[0090] The head **2** has an adjusting mechanism M**2**. The adjusting mechanism M**2** is a screwing mechanism between the face plate **32** and the head body **34**. The adjusting mechanism M**2** can change the face plate **32**.

[0091] FIG. **6** shows a cross sectional view of a changing face plate E**32** with a cross sectional view of the head **30**. A first changing face plate E**321** and a second changing face plate E**322** are shown as the changing face plate E**32** in FIG. **6**. The changing face plate E**32** can be connected to the head body **34** by the connecting member **36**. A golf club with an adjusting function includes the head **30** and at least one changing face plate E**32**.

[0092] For example, a loft angle (real loft angle) is changed by changing the face plate **32** to the changing face plate E**32**. For example, a specification of the face groove is changed by changing the face plate **32** to the changing face plate E**32**.

[0093] Examples of specifications capable of being adjusted by the adjusting mechanism M**2** include a loft angle, a specification of the face groove, a face progression, and a friction coefficient of a head to a ball. Each of these specifications can be independently adjusted in the adjusting mechanism M**2**.

[0094] Examples of adjustments of the specifications by the adjusting mechanism M**2** include the following adjustments:

[0095] (adjustment **2***a*) a loft angle is changed, and a specification of a face groove is not substantially varied;

[0096] (adjustment **2***b*) a loft angle is changed, and a specification of a face groove is also changed;

[0097] (adjustment **2***c*) a loft angle is not substantially changed, and a specification of a face groove is changed; and

[0098] (adjustment **2***d*) a face progression is changed, and specifications of a loft angle and a face groove are not changed.

[0099] Although the adjusting mechanism M**2** is applied to the iron type golf club head, the adjusting mechanism M**2** may be used also for other type golf clubs (wood type, utility type, and putter type golf clubs or the like).

[0100] FIG. **7** shows a golf club **50** according to other adjusting mechanism. The golf club **50** is provided with ahead **52**, a shaft **54**, a sleeve **56**, and a grip (not shown). The head **52** is a wood type golf club head. The shaft **54** is tube-shaped.

[0101] As described later, the golf club **50** has an adjusting mechanism M**3**. Preferably, the golf club **50** has other adjusting mechanisms independent of each other, with the adjusting mechanism M**3**.

[0102] The golf club **50** has a plurality of connecting members **58**. The golf club **50** of the embodiment has three connecting members **58** (see FIG. **7**). The golf club **50** has a first connecting member **581**, a second connecting member **582**, and a third connecting member **583** as the connecting members **58**.

[0103] FIG. **8** is a cross sectional view of the golf club **50**. A section of a hosel portion is shown in FIG. **8**. A left side (configuration S**1**) of FIG. **8** shows a state where the first connecting member **581** is used. A center (configuration S**2**) of FIG. **8** shows a state where the second connecting member **582** is used. A right side (configuration S**3**) of FIG. **8** shows a state where the third connecting member **583** is used.

[0104] The head **52** has a hosel hole **60**. The sleeve **56** is inserted into the hosel hole **60**. A cross sectional shape of the hosel hole **60** corresponds to a cross sectional shape of an outer surface of the sleeve **56**.

[0105] The sleeve **56** has a shaft hole **62** and a screw hole **63**. The shaft hole **62** is opened upward. The screw hole **63** is downwardly opened.

[0106] As shown in FIG. **8**, a tip part of the shaft **54** is inserted into the shaft hole **62**. The sleeve **56** is fixed to the tip part of the shaft **54**. The sleeve **56** is bonded to the tip part of the shaft **54**.

[0107] An outer surface **66** of the sleeve **56** has a portion having a noncircular cross sectional shape. In the embodiment, the outer surface **66** of the sleeve **56** has a hexagonal cross sectional shape. Meanwhile, the hosel hole **60** also has a noncircular (hexagonal) cross sectional shape. Rotation of the sleeve **56** to the hosel hole **60** is regulated by these noncircular cross sectional shapes.

[0108] The outer surface of the sleeve **56** and the hosel hole **60** may have a circular cross sectional shape. Regulation of relative rotation can be also achieved by only the connecting member **58**.

[0109] The connecting member **58** has a head part r**1**, an axis part r**2**, and a screw part r**3**. The axis part r**2** is provided between the head part r**1** and the screw part r**3**.

[0110] The plurality of connecting members **58** has different lengths. The different lengths are achieved by a difference in the length of the axis part r**2**.

[0111] As shown in FIG. **8**, the screw part r**3** of the connecting member **58** is connected to the screw hole **63** of the sleeve **56**. Withdrawal of the sleeve **56** from the shaft hole **62** is prevented by the screw connection.

[0112] As shown in FIG. **8**, an insertion length Ls (see FIG. **8**) of the sleeve **56** to the shaft hole **62** is varied depending on the connecting member **58** to be used. A club length is changed due to the variation.

[0113] The golf club **50** has an adjusting mechanism M**3**. The adjusting mechanism M**3** is an changing mechanism of a shaft insertion length.

[0114] For example, the club length is changed by the adjusting mechanism M**3**. For example, a swingweight is changed by the adjusting mechanism M**3**. Examples of adjustments of the specifications by the adjusting mechanism M**3** include the following adjustments:

[0115] (adjustment **3***a*) a club length is changed, and a swingweight is not substantially varied; and

[0116] (adjustment **3***b*) a club length is changed, and a swingweight is also changed.

[0117] Examples of means for realizing the (adjustment **3***a*) include reducing a weight of a longer connecting member **58**. Examples of the means include using a material having smaller specific gravity for a longer connecting member **58**, and reducing an outer diameter of an axis part r**2** of a longer connecting member **58**.

[0118] Although the adjusting mechanism M**3** is applied to the wood type golf club, the adjusting mechanism M**3** may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0119] FIG. **9** shows a golf club **70** according to other adjusting mechanism. FIG. **10** is a view of the golf club **70**, as viewed from a sole side. FIG. **11** is a cross sectional view of a vicinity of a hosel of the golf club **70**. FIG. **12** is a cross sectional view in each of positions shown in FIG. **11**. The golf club **70** is provided with a head **72**, a shaft **74**, a sleeve **76**, a connecting member **78** (see FIG. **11**), and a grip (not shown). The head **72** is a wood type golf club head. The shaft **74** is tube-shaped.

[0120] As described later, the golf club **70** has an adjusting mechanism M**4**. Preferably, the golf club **70** has further other adjusting mechanism independent of the adjusting mechanism M**4**.

[0121] The head **72** has a hosel part **73**. The hosel part **73** has a sleeve insertion hole **75** (see FIG. **11**).

[0122] The sleeve **76** is bonded to the shaft **74**. The sleeve **76** has a screw hole **77**. The screw hole **77** is formed in a bottom surface **79** of the sleeve **76**.

[0123] Furthermore, the golf club **70** has a plurality of sleeve supporting members **80** (see FIG. **11**). The golf club **70** has a first sleeve supporting member **801**, a second sleeve supporting member **802**, and a third sleeve supporting member **803** as the sleeve supporting members **80**.

[0124] The connecting member **78** is a screw. The connecting member **78** has a head part r**1** and a screw part r**3** (see FIG. **11**). A concave part **81** for axially rotating the connecting member **78** is formed in the head part r**1** of the connecting member **78** (see FIG. **10**). The concave part **81** has a noncircular cross sectional shape.

[0125] The connecting member **78** is screw-connected to the screw hole **77**. Retention of the shaft **74** is achieved by the screw connection.

[0126] The golf club **70** has the adjusting mechanism M**4**. The adjusting mechanism M**4** can adjust a lie angle. The golf club **70** of the embodiment can be adjusted to three lie angles. The lie angle is adjusted by changing a direction of a shaft axis line. The sleeve insertion hole **75** does not disturb adjustment of the lie angle.

[0127] A shaft axis line in the case of a first lie angle is represented by reference character LS (see FIGS. **9** and **11**). A shaft axis line in the case of a second lie angle is represented by reference character LF. A shaft axis line in the case of a third lie angle is represented by reference character LU.

[0128] The head **72** has a plurality of holding holes h**1**. In the embodiment, the head **72** has a first holding hole h**11**, a second holding hole h**12**, and a third holding hole h**13**. FIG.

11 shows profile lines of the holding holes h**1**, as viewed from the lower side of the head **72**, in addition to a cross sectional view of the golf club **70**. A central axis line of the first holding hole h**11** coincides with the shaft axis line LS. A central axis line of the second holding hole h**12** coincides with the shaft axis line LF. A central axis line of the third holding hole h**13** coincides with the shaft axis line LU.

[0129] Each of the holding holes h**1** is positioned so that a central axis line of (the head part r**1** of) the connecting member **78** coincides with a position of any one of the plurality of shaft axis lines.

[0130] As shown in FIG. **11**, the plurality of holding holes h**1** is mutually and partially overlapped. Adjustment interval of the lie angle can be reduced by the partial overlapping. The lie angle can be delicately adjusted by the partial overlapping.

[0131] The head **72** has a plurality of insertion holes h**2**. Into the insertion holes h**2**, (the screw part r**3** of) the connecting member **78** is inserted. In relation to the position of the section, the insertion holes h**2** do not appear in the cross sectional view of FIG. **11**. In the embodiment, the head **72** has a first insertion hole h**21**, a second insertion hole h**22**, and a third insertion hole h**23**. The profile lines of the insertion holes h**2**, as viewed from the lower side of the head **72** are also shown. A central axis line of the first insertion hole h**21** coincides with the shaft axis line LS. A central axis line of the second insertion hole h**22** coincides with the shaft axis line LF. A central axis line of the third insertion hole h**23** coincides with the shaft axis line LU.

[0132] As shown in FIG. **11**, the plurality of insertion holes **12** is mutually and partially overlapped. Adjustment interval of the lie angle can be reduced by the partial overlapping. The lie angle can be delicately adjusted by the partial overlapping.

[0133] The holding hole h**1** and the insertion hole h**2** are continuous. A diameter of the holding hole h**1** is greater than that of the insertion hole h**2**. A bump surface d**1** exists on a boundary between the holding hole h**1** and the insertion hole h**2**. The bump surface d**1** abuts on a bump surface d**2** of the connecting member **78**.

[0134] As shown in FIGS. **11** and **12**, the sleeve supporting member **80** has a through hole **88** and an outer surface **90**. A through hole **88** of a first sleeve supporting member **801** corresponds to the shaft axis line LS. A through hole **88** of a second sleeve supporting member **802** corresponds to the shaft axis line LF. A through hole **88** of a third sleeve supporting member **803** corresponds to the shaft axis line LU.

[0135] An outer surface **90** of the sleeve supporting member **80** is a screw. A screw (female screw) **92** capable of being connected to the screw (male screw) of the outer surface **90** is formed in an inner surface of the sleeve insertion hole **75** (see FIG. **11**). The sleeve supporting member **80** is fixed to the sleeve insertion hole **75** by screw connection. The screw connection may be absent. For example, the outer surface **90** of the sleeve supporting member **80** may have a noncircular cross sectional shape, and the cross sectional shape of the inner surface of the sleeve insertion hole **75** abutting on the outer surface **90** also may correspond to the cross sectional shape of the outer surface **90**. In this case, rotation of the sleeve supporting member **80** to the sleeve insertion hole **75** is prevented due to the noncircular cross sectional shape.

[0136] The sleeve supporting member **80** supports the sleeve **76** along a predetermined axial direction. Simultaneously, the sleeve supporting member **80** disturbs relative rotation of the sleeve **76** and the sleeve insertion hole **75**.

[0137] FIG. **13** shows states of three lie angles. A left side (configuration S**4**) of FIG. **13** shows a cross sectional view when the shaft axis line LU is employed. In this case, the third sleeve supporting member **803** of the plurality of sleeve supporting members **80** is used. The holding hole h**13** is used as the holding hole h**1**. The insertion hole h**23** is used as the insertion hole h**2**. In the configuration S**4**, the lie angle is comparatively upright. That is, the lie angle is comparatively great.

[0138] A center (configuration S**5**) of FIG. **13** shows a cross sectional view when the shaft axis line LS is employed. In this case, the first sleeve supporting member **801** of the plurality of sleeve supporting members **80** is used. The holding hole h**11** is used as the holding hole h**1**. The insertion hole h**21** is used as the insertion hole h**2**.

[0139] A right side (configuration S**6**) of FIG. **13** shows a cross sectional view when the shaft axis line LF is employed. In this case, a second sleeve supporting member **802** of the plurality of sleeve supporting members **80** is used. The holding hole h**12** is used as the holding hole h**1**. The insertion hole h**22** is used as the insertion hole h**2**. In the configuration S**6**, the lie angle is comparatively flat. That is, the lie angle is comparatively small.

[0140] In the golf club **70**, support of the sleeve **76** in each of the lie angles (each of the shaft axis lines) is achieved by the sleeve supporting member **80** and the holding hole h**1**. The support of the sleeve **76** in each of the lie angles may be achieved by only the sleeve supporting member **80**. The support of the sleeve **76** in each of the lie angles may be achieved by only the holding hole h**1**. In respect of alleviating dimensional accuracy of the hosel part, the support of the sleeve **76** in each of the lie angles is preferably achieved by either the sleeve supporting member **80** or the holding hole h**1**. In respect of alleviating the dimensional accuracy of the hosel part, a resin is also preferably used as a material of the sleeve supporting member **80**. The sleeve supporting member **80** made of the resin is suitable for supporting the sleeve **76** while being deformed so as to absorb a dimensional gap.

[0141] In the golf club **70**, rotation stopping of the sleeve **76** is achieved by the sleeve supporting member **80** and the connecting member **78**. The rotation stopping of the sleeve **76** may be achieved by only the sleeve supporting member **80**. The rotation stopping of the sleeve **76** may be achieved by only the connecting member **78**. When the connecting member **78** is made to function as the rotation stopping of the sleeve **76**, the connecting member **78** is preferably tightened by a force received from a ball at hitting the ball. When the connecting member **78** is made to function as the rotation stopping of the sleeve **76**, the holding hole h**1** and the head part r**1** preferably have a noncircular cross sectional shape, to prevent relative rotation of the holding hole h**1** and the head part r**1**.

[0142] FIGS. **14** and **15** show a golf club **100** according to other adjusting mechanism. FIG. **15** is a view, as viewed from a sole side. The golf club **100** is provided with a head **102**, a shaft **74**, a sleeve **76**, a connecting member **78** (see FIG. **15**), and a grip (not shown). The head **102** is a wood type golf club head. The shaft **74** is tube-shaped.

[0143] The head **102** has the above-mentioned adjusting mechanism M**4**. The description of the adjusting mechanism M**4** is omitted.

[0144] Furthermore, the head **102** has an adjusting mechanism M**5**. The adjusting mechanism M**5** is a center-of-gravity position adjusting mechanism. The head **102** has a weight body **104** and a disposing hole Wh as the adjusting mechanism M**5**. As shown in FIG. **15**, in the embodiment, a plurality of disposing holes Wh are formed. These disposing holes Wh are formed in a sole **106** of the head **102**.

[0145] The disposing hole Wh is a screw hole. The weight body **104** is a screw. The weight body **104** is screwed into the disposing holes Wh. The position of the center of gravity of the head is adjusted depending on the disposing hole Wh in which the weight body **104** is located.

[0146] Examples of specifications capable of being adjusted by the adjusting mechanism M**5** include a position of a center of gravity of a head and a moment of inertia of the head.

[0147] Examples of adjustments of the specifications by the adjusting mechanism M**5** include the following adjustments:

[0148] (adjustment **5***a*) Although a distance of a center of gravity is changed, a depth of the center of gravity is not substantially varied, and a height of the center of gravity is not also substantially varied;

[0149] (adjustment **5***b*) All of a distance of a center of gravity, a depth of the center of gravity, and a height of the center of gravity are varied; and

[0150] (adjustment **5***c*) A distance of a center of gravity is changed; any one of a depth of the center of gravity and a height of the center of gravity is varied; and the other is not substantially varied.

[0151] As shown in FIG. **15**, in the embodiment, the plurality of disposing holes Wh is substantially aligned along a toe-heel direction. That is, a central axis line SP**1** of a first disposing hole Wh**1**, a central axis line SP**2** of a second disposing hole Wh**2**, and a central axis line SP**3** of a third disposing hole Wh**3** are aligned along the toe-heel direction. In the embodiment, when disposal of the weight body **104** is changed, a distance of a center of gravity is mainly varied by the disposal, and a depth of the center of gravity is hardly varied. Specifically, when an amount of variation of the depth of the center of gravity is defined as Cd (mm) and an amount of variation of the distance of a center of gravity is defined as Cs (mm), a ratio (Cd/Cs) is preferably equal to or less than 0.2, and more preferably equal to or less than 0.1. In this case, the distance of the center of gravity can be selectively adjusted. It is useful to selectively adjust the distance of the center of gravity in order to adjust the direction of the face in impact.

[0152] Although the adjusting mechanism M**5** is applied to the wood type golf club head, the adjusting mechanism M**5** may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0153] FIG. **16** shows a golf club **110** according to other adjusting mechanism. The golf club **110** is provided with a head **102**, a shaft **74**, a sleeve **76**, a connecting member **78** (not shown), and a grip **112**.

[0154] The head **102** has the above-mentioned adjusting mechanism M**4** and adjusting mechanism M**5**. The descriptions of the adjusting mechanism M**4** and the adjusting mechanism M**5** are omitted.

[0155] The grip **112** has a main body **114**, a weight body Wg, and a holding body **118**. Furthermore, the grip **112** has a cover **120**.

[0156] The holding body **118** has a screw hole **122**. The holding body **118** is disposed medially in the shaft **74**. The holding body **118** is bonded to an inner surface of the shaft **74**.

[0157] The weight body Wg is detachably mounted to the holding body **118**. The mounting/demounting is achieved by a screw mechanism.

[0158] The main body **114** is made of rubber. A concave part **124** is formed in a vicinity of a back end part of the main body **114**. The concave part **124** is a circumferential groove. The cover **120** has a convex part **126** corresponding to the concave part **124**. The convex part **126** is a flange. The main body **114** made of rubber can be deformed, to fit the convex part **126** into the concave part **124**. The cover **120** is detachably mounted.

[0159] The grip **112** has a weight adjusting mechanism as an adjusting mechanism M**6**. The weight adjusting mechanism is achieved by changing the weight body Wg. The swingweight can be adjusted by changing the weight body Wg to other weight body Wg having a weight different from that of the weight body Wg. For example, the swingweight is lightened by changing a first weight body Wg**1** to a second weight body Wg**2** having a weight greater than that of the first weight body Wg**1**. For example, the swingweight is weighted by changing the first weight body Wg**1** to a third weight body Wg**3** having a weight smaller than that of the first weight body Wg**1**. The adjusting mechanism M**6** has at least two weight bodies Wg having weights different from each other.

[0160] Examples of specifications capable of being adjusted by the adjusting mechanism M**6** include a swingweight, a moment of inertia of a club, a grip weight, and a position of a center of gravity of a grip.

[0161] Although the adjusting mechanism M**6** is applied to the wood type golf club head, the adjusting mechanism M**6** may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0162] FIG. **18** shows a golf club **130** according to other adjusting mechanism. FIG. **19** is an exploded view of the golf club **130**. FIG. **20** is a cross sectional view of the golf club **130**.

[0163] As described later, the golf club **130** has an adjusting mechanism M**7**. Preferably, the golf club **130** further has other adjusting mechanism independent of the adjusting mechanism M**7**.

[0164] The golf club **130** has a head **132**, a shaft **134**, a sleeve Sv, a screw cylinder **135**, and a connecting member **136**. The screw cylinder **135** is fixed to a tip of the shaft **134**. A grip (not shown) is mounted to a back end of the shaft **134**.

[0165] The head **132** has a head body **138** and an engaging member **140**. The head body **138** has a hosel hole **142** into which the sleeve Sv is inserted, and a through hole **144** into which the connecting member **136** is inserted. The through hole **144** penetrates a bottom part of the hosel hole **142**. The head body **138** has a sole hole **146** opened in a sole (see FIG. **20**). The sole hole **146** is continuous with the hosel hole **142** via the through hole **144**.

[0166] The engaging member **140** is fixed to the head body **138** (see FIG. **20**). The fixing method is not restricted, and examples thereof include bonding, welding, fitting, and a combination thereof. The engaging member **140** is intro-

duced into the hosel hole **142** from an upper side opening of the hosel hole **142**. The engaging member **140** is fixed to the bottom part of the hosel hole **142**.

[0167] FIG. **21** is a perspective view of the sleeve Sv. FIG. **22** is a cross sectional view of the sleeve Sv.

[0168] The sleeve Sv has a shaft insertion hole **150** and a lower side hole **152**. The shaft insertion hole **150** is opened to an upper side. The lower side hole **152** is opened to a lower side. The lower side hole **152** is disposed on a lower side of the shaft insertion hole **150**.

[0169] The sleeve Sv has an engaging part **162**. The engaging part **162** has a convex part t**1**. A plurality of convex parts t**1** is aligned in the circumferential direction. The convex parts t**1** are equally disposed in the circumferential direction. The convex parts t**1** are disposed at every 30 degrees.

[0170] Although not shown in the drawings, an engaging surface capable of being engaged with the engaging part **162** of the sleeve Sv is formed in an inner surface of the engaging member **140**. A cross sectional shape of the engaging surface corresponds to that of an outer surface of the engaging part **162**. Rotation of the sleeve Sv to the hosel hole **142** is prevented by engagement between the engaging surface (inner surface) of the engaging member **140** and the engaging part **162**.

[0171] The shaft insertion hole **150** is a screw hole. That is, the shaft insertion hole **150** is a female screw.

[0172] The screw cylinder **135** is approximately cylindrical-shaped as a whole. An outer surface of the screw cylinder **135** is a screw. The outer surface of the screw cylinder **135** is a male screw. An inner surface **154** of the screw cylinder **135** is a circumferential surface. An outer surface **156** of the shaft **134** is bonded to the inner surface **154** of the screw cylinder **135**.

[0173] As shown in FIG. **20**, the shaft insertion hole **150** of the sleeve Sv is screw-connected to the screw cylinder **135**. The shaft **134** is fixed to the sleeve Sv by the screw connection.

[0174] Retention of the sleeve Sv is achieved by the screw connection. As shown in FIG. **20**, the lower side hole **152** of the sleeve Sv is screw-connected to the connecting member **136**. Withdrawal of the sleeve Sv is prevented by the screw connection. An axial force caused by the screw connection brings a hosel end face **158** into close contact with a bump surface **160** of the sleeve Sv. In order to collateralize the axial force, a clearance K**1** exists between a tip of the connecting member **136** and a bottom surface of the lower side hole **152** in a state where the screw connection is completed (see FIG. **20**).

[0175] In the embodiment, a first sleeve Sv**1** and a second sleeve Sv**2** are prepared as the sleeve Sv (see FIG. **19**). The sleeve Sv**1** and the sleeve Sv**2** are mutually changeable. As described above, this is because the sleeve Sv is detachably mounted to the shaft **134** (screw cylinder **135**) by the screw mechanism.

[0176] FIG. **22** is a cross sectional view of the first sleeve Sv**1**. As shown in FIG. **22**, an axis line h**1** of the shaft insertion hole **150** is inclined to an axis line z**1** of the sleeve Sv. The inclination angle θ**1** is a maximum value of an angle between the axis line h**1** and the axis line z**1**. The axis line z**1** of the sleeve Sv is substantially equal to an axis line of the hosel hole **142**.

[0177] FIG. **23** is a cross sectional view of the second sleeve Sv**2**. As shown in FIG. **23**, the axis line h**1** of the shaft insertion hole **150** is not inclined to the axis line z**1** of the sleeve Sv. The axis line h**1** of the shaft insertion hole **150** coincides with the axis line z**1** of the sleeve Sv.

[0178] Although not shown in the drawings, other sleeve Sv having an inclination angle **82** different from the inclination angle θ**1** may be used.

[0179] Variation of the sleeve Sv is not restricted to the inclination angle of the shaft insertion hole **150**. For example, other sleeve Sv in which a position of the shaft insertion hole **150** is changed may be also used. For example, other sleeve Sv in which the shaft insertion hole **150** of the second sleeve Sv**2** is moved in parallel may be used. In this case, although the axis line z**1** is parallel to the axis line h**1**, the axis line z**1** does not coincide with the axis line h**1**.

[0180] The adjusting mechanism M**7** of the embodiment is a sleeve changing mechanism. In the adjusting mechanism M**7**, one or more specifications selected from a loft angle, a lie angle, and a face angle are adjusted by changing the sleeve Sv.

[0181] Examples of specifications capable of being adjusted by the adjusting mechanism M**7** include a face progression, a lie angle, a loft angle, a face angle, a swingweight, a club length, a position of a center of gravity of a club, a frequency of the club, a moment of inertia of the club, a flex point of a shaft, a torque of the shaft, flexural rigidity of the shaft, torsional rigidity of the shaft, a shaft weight, weight distribution of the shaft, a position of a center of gravity of the shaft, and a length of the shaft.

[0182] Examples of adjustments of the specifications by the adjusting mechanism M**7** include the following adjustments:

[0183] (adjustment **7***a*) although a lie angle is changed, a loft angle and a face angle are not substantially varied;

[0184] (adjustment **7***b*) although a loft angle and a face angle are changed, a lie angle is not substantially varied;

[0185] (adjustment **7***c*) although a club length is changed, a loft angle, a face angle, and a lie angle are not substantially varied;

[0186] (adjustment **7***d*) although a flex point of a shaft is changed, a loft angle, a face angle, and a lie angle are not substantially varied;

[0187] (adjustment **7***e*) although a face progression is changed, a loft angle, a face angle, and a lie angle are not substantially varied; and

[0188] (adjustment **7***f*) although a distance of a center of gravity (a distance between a shaft axis line and a center of gravity of a head) is changed, a loft angle, a face angle, and a lie angle are not substantially varied.

[0189] When the inclination angle θ**1** of the sleeve Sv is 0 degree, the shaft can be changed without varying the loft angle, the lie angle, and the face angle.

[0190] A plurality of sleeves Sv in which the inclination angle θ**1** is 0 degree and positions of the shaft insertion holes **150** are different from each other may be prepared. In this case, the axis line of the shaft insertion hole **150** can be moved in parallel by changing the sleeve Sv. In this case, the adjustment **7***e* and the adjustment **7***f* are possible.

[0191] FIG. **25** is an exploded perspective view of a head **170** used for a golf club according to other adjusting mechanism. FIG. **26** is a cross sectional view of the head **170**. Although not shown in the drawings, the golf club is provided with the head **170**, and a shaft, and a grip. The head **170** is a wood type golf club head.

[0192] As described later, the head **170** has an adjusting mechanism M**8**. Preferably, the golf club having the head **170** is further provided with other adjusting mechanism independent of the adjusting mechanism M**8**.

[0193] The head **170** has a front member **172**, a back member **174**, and a connecting member **176**. The front member **172** is connected to the back member **174** by the connecting member **176**. The front member **172** is connected to the back member **174** in a state where no gap substantially exists. The hollow head **170** is completed by the connection.

[0194] The front member **172** has a face surface **178**. The front member **172** has the whole face surface **178**. Although not shown in the drawings, the front member **172** has a screw hole into which the connecting member **176** is screwed, and a thick part for forming the screw hole. The front member **172** has a hosel part **180**. The hosel part **180** has a shaft hole **182**. Although illustration is omitted, face grooves are formed in the face surface **178**.

[0195] A back part of the front member **172** has an opening. An extending part **181** capable of supporting an edge part **179** of the back member **174** from an inner side is formed in an edge of the opening. The extending part **181** facilitates position adjustment of the back member **174** to the front member **172**.

[0196] Although not shown in the drawings, the back member **174** has a through hole through which the connecting member **176** passes and a thick part for forming the through hole.

[0197] The connecting member **176** is a screw. The front member **172** is connected to the back member **174** by the connecting member **176**.

[0198] The head **170** has the adjusting mechanism M**8**. A structure of the adjusting mechanism M**8** is similar to the above-mentioned adjusting mechanism M**1**. The adjusting mechanism M**8** is a screwing mechanism. The adjusting mechanism M**8** can change the back member **174**.

[0199] A changing back member E**8** is shown with the head **170** in FIG. **24**. A changing back member E**81** and other changing back member E**82** are shown as the changing back member E**8** in FIG. **25**. The changing back member E**81** and the changing back member E**82** can be connected to the front member **172** by the connecting member **176**. A golf club with an adjusting function includes the head **170** and at least one changing back member E**8**.

[0200] For example, a head shape is changed by changing the back member **174** to the changing back member E**8**. For example, a position of a center of gravity is changed by changing the back member **174** to the changing back member E**8**. For example, a head volume is changed by changing the back member **174** to the changing back member E**8**. A coefficient of restitution of a head to a ball can be varied by changing the back member **174** to the changing back member E**8**.

[0201] Examples of adjustments of the specifications by the adjusting mechanism M**8** include the following adjustments:

[0202] (adjustment **8***a*) a head shape is changed, and a position of a center of gravity of a head is not substantially varied;

[0203] (adjustment **8***b*) a head volume is changed, and a position of a center of gravity of a head is not substantially varied;

[0204] (adjustment **8***c*) a position of a center of gravity is changed, and a head shape is not varied;

[0205] (adjustment **8***d*) a moment of inertia is changed, and a head shape is not varied; and

[0206] (adjustment **8***e*) two or more adjustments selected from a head shape, a head volume, and a position of a center of gravity of a head, and a moment of inertia are changed.

[0207] It is preferable that a head weight is not varied in the adjusting mechanism M**8** in respect of maintaining the swingweight.

[0208] Although the adjusting mechanism M**8** is applied to the wood type golf club, the adjusting mechanism M**8** may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0209] FIG. **26** shows a vicinity of a grip of a golf club according to other adjusting mechanism. The golf club has a head (not shown), a shaft **190**, and a grip **192**. The head is mounted to one end part of the shaft **190**. The grip **192** is mounted to the other end part of the shaft **190**.

[0210] As described later, the golf club has an adjusting mechanism M**9**. Preferably, the golf club has other adjusting mechanism independent of the adjusting mechanism M**9**.

[0211] FIG. **27** is a cross sectional view of FIG. **26**. FIG. **28** is a cross sectional view of a golf club taken along line F**28**-F**28** of FIG. **27**.

[0212] As shown in FIGS. **27** and **28**, the shaft **190** is tube-shaped. The inside of the shaft **190** is a cavity.

[0213] The grip **192** has an inner side grip member **194** and an outer side grip member **196**. The inner side grip member **194** has a cylindrical shaft insertion part **198**. As shown in FIGS. **27** and **28**, the shaft **190** is inserted into the shaft insertion part **198**.

[0214] The inner side grip member **194** has an end part **200**. An end face **202** of the shaft **190** abuts on the end part **200**. A through hole **203** is formed in a center of the end part **200**.

[0215] The outer side grip member **196** has a first division body **204** and a second division body **206**. The first division body **204** is semitube-shaped. The second division body **206** is also semitube-shaped. The tubular outer side grip member **196** is formed by the first division body **204** and the second division body **206**. As shown in FIG. **28**, a bump part **210** is formed in an edge of the first division body **204**. As shown in FIG. **28**, a bump part **212** is formed in an edge of the second division body **206**. A shape of the second division body **206** is the same as that of the first division body **204** except for a shape of the bump part.

[0216] In the outer side grip member **196**, the bump part **210** of the first division body **204** abuts on the bump part **212** of the second division body **206**. The bump part **210** is in mesh with the bump part **212**. The outer side grip member **196** has an overlapping part in which the first division body **204** overlaps the second division body **206**. The bump part **210** and the bump part **212** form the overlapping part in which the first division body **204** overlaps the second division body **206**. A thickness of the outer side grip member **196** is set constant in the whole circumference of the circumferential direction, including the overlapping part. In the outer side grip member **196**, no gap exists in a portion in which the first division body **204** abuts on the second division body **206**. The cylindrical outer side grip member **196** is formed by a combination of the first division body **204** and the second division body **206**.

[0217] An outer surface **214** of the shaft insertion part **198** is covered with the outer side grip member **196**. At least a part of the outer surface **214** is covered with the outer side

grip member **196**. Preferably, the whole outer surface **214** is covered with the outer side grip member **196**.

[0218] An inner surface **216** of the outer side grip member **196** includes an inner surface **218** of the first division body **204** and an inner surface **220** of the second division body **206**. The inner surface **218** of the first division body **204** is applied to the outer surface **214** of the shaft insertion part **198**. The inner surface **220** of the second division body **206** is also applied to the outer surface **214** of the shaft insertion part **198**.

[0219] As shown in FIG. **27**, the inner side grip member **194** has a first annular part **222** extending outside in the radial direction from a grip-end side end of the shaft insertion part **198**, and a first cylindrical part **224** extending to a head side from a radial outer side edge of the first annular part **222**. The first annular part **222** is a single annular portion. The first cylindrical part **224** is a single cylindrical portion. A first concave part **226** having the first annular part **222** formed as a bottom is formed by the first annular part **222** and the first cylindrical part **224**.

[0220] As shown in FIG. **27**, the inner side grip member **194** has a second annular part **228** extending outside in the radial direction from a head side end of the shaft insertion part **198**, and a second cylindrical part **230** extending to a grip end side from a radial outer side edge of the second annular part **228**. The second annular part **228** is a single annular portion. The second cylindrical part **230** is a single cylindrical portion. A second concave part **232** having the second cylindrical part **230** formed as a bottom is formed by the second annular part **228** and the second cylindrical part **230**.

[0221] As shown in FIG. **27**, the outer side grip member **196** has a grip-end side end **234**. Each of the first division body **204** and the second division body **206** has the grip-end side end **234**. The grip-end side end **234** is inserted into the first concave part **226**. The grip-end side end **234** is covered with the first cylindrical part **224**. The grip-end side end **234** is protected by the first cylindrical part **224**. Since the grip-end side end **234** is not exposed to the outside, the grip-end side end **234** is hardly turned up. Therefore, the first division body **204** and the second division body **206** are hardly peeled off.

[0222] The outer side grip member **196** has a head side end **236**. Each of the first division body **204** and the second division body **206** has the head side end **236**. The head side end **236** is inserted into the second concave part **232**. The head side end **236** is covered with the second cylindrical part **230**. The head side end **236** is protected by the second cylindrical part **230**. Since the head side end **236** is not exposed to the outside, the head side end **236** is hardly turned up. Therefore, the first division body **204** and the second division body **206** are hardly peeled off.

[0223] The whole inner side grip member **194** is integrally formed. The first annular part **222** and the first cylindrical part **224** are integrated with the shaft insertion part **198**. The second annular part **228** and the second cylindrical part **230** are integrated with the shaft insertion part **198**.

[0224] An inner circumferential surface **238** of the inner side grip member **194** is bonded to an outer surface **240** of the shaft **190** by a double-stick tape. The inner side grip member **194** is mounted to the shaft **190** in the same way as a general grip.

[0225] The inner surface **216** of the outer side grip member **196** is bonded to the outer surface **214** of the shaft insertion part **198** by a double-stick tape. In other words, the inner surface **218** of the first division body **204** is bonded to the outer surface **214** by a double-stick tape, and the inner surface **220** of the second division body **206** is bonded to the outer surface **214** by a double-stick tape.

[0226] For example, a procedure for applying the outer side grip member **196** to the shaft insertion part **198** of the inner side grip member **194** is as follows:

[0227] (**1***b*) A double-stick tape is applied to the inner surface **218** of the first division body **204**. A double-stick tape is applied to the inner surface **220** of the second division body **206**;

[0228] (**2***b*) Any one of the first division body **204** and the second division body **206** is applied to the shaft insertion part **198**; and

[0229] (**3***b*) The other of the first division body **204** and the second division body **206** is applied to shaft insertion part **198**. At this time, the bump part **210** is meshed with the bump part **212**.

[0230] In the steps (**2***b*) and (**3***b*), the grip-end side end **234** is inserted into the first concave part **226**, and the head side end **236** is inserted into the second concave part **232**. The grip-end side end **234** is inserted into the first concave part **226** while the first cylindrical part **224** is turned up. The head side end **236** is inserted into the second concave part **232** while the second cylindrical part **230** is turned up.

[0231] A method for removing the first division body **204** is as follows. The first division body **204** is removed by turning up the first cylindrical part **224** or the second cylindrical part **230**, and pulling the grip-end side end **234** or the head side end **236**. A method for removing the second division body **206** is the same as that of the first division body **204**. Thus, the first division body **204** and the second division body **206** are easily removed. The first division body **204** and the second division body **206** are changeable.

[0232] The adjusting mechanism M**9** is a changing mechanism for the outer side grip member. In the adjusting mechanism M**9**, a position of a center of gravity of the club and a swingweight can be adjusted by changing the outer side grip member to the division bodies **204** and **206** having different weights in relation to each other. A grip weight can be changed without varying a grip outer diameter by changing specific gravity of the division bodies **204** and **206**. An outer diameter of the grip **192** is changed by changing thicknesses of the division bodies **204** and **206**.

[0233] A material of the inner side grip member **194** is not restricted. Preferably, the material of the inner side grip member **194** is rubber. Examples of the rubber include crude rubber (specific gravity: 0.91 to 0.93), styrene-butadiene rubber (specific gravity: 0.92 to 0.97), EPDM (specific gravity: 0.86 to 0.87), isoprene rubber (0.92 to 0.93), and a mixture thereof. In respect of formability, ethylene-propylene diene rubber (EPDM) and styrene-butadiene rubber (SBR) are preferable. When the inner side grip member **194** is rubber, the first cylindrical part **224** and the second cylindrical part **230** can be turned up.

[0234] A material of the outer side grip member **196** is not restricted. Preferably, the material of the outer side grip member **196** is rubber. Examples of the rubber include crude rubber (specific gravity: 0.91 to 0.93), styrene-butadiene rubber (specific gravity: 0.92 to 0.97), EPDM (specific gravity: 0.86 to 0.87), isoprene rubber (0.92 to 0.93), and a mixture thereof. In respect of formability, ethylene-propylene diene rubber (EPDM) and styrene-butadiene rubber

(SBR) are preferable. In respect of facilitating weight adjustment, rubber blended with a metal powder having specific gravity equal to or greater than 10 is preferable, and rubber blended with a metal powder having specific gravity equal to or greater than 15 is more preferable. Examples of the metal powder include a tungsten alloy powder.

[0235] Examples of adjustments of the specifications by the adjusting mechanism M**9** include the following adjustments:

[0236] (adjustment **9***a*) a thickness of a grip (grip outer diameter) is changed, and a swingweight is not substantially varied;

[0237] (adjustment **9***b*) a thickness of a grip is changed, and a swingweight is also changed;

[0238] (adjustment **9***c*) a grip weight and a swingweight are changed, and a thickness of a grip is not substantially varied; and

[0239] (adjustment **9***d*) a grip weight and a swingweight are changed, and a thickness of a grip is also changed.

[0240] FIG. **29** shows a vicinity of a grip end of a golf club provided with an adjusting mechanism M**10** according to other embodiment. The golf club has a head (not shown), a shaft **250**, and a grip **252**. The head is mounted to one end part of the shaft **250**. The grip **252** is mounted to the other end part of the shaft **250**.

[0241] Preferably, the golf club is further provided with other adjusting mechanism independent of the adjusting mechanism M**10**.

[0242] Although a groove is formed in an outer surface (grip grasping surface) of the grip **252**, the description of the groove is omitted in FIGS. **29** to **32**.

[0243] FIG. **30** is a cross sectional view of FIG. **29**. FIG. **31** is an exploded view of FIG. **29**.

[0244] The grip **252** has a grip body **252***a* and two extending members **252***b*. The two extending members **252***b* are mounted to a back end of the grip body **252***a*.

[0245] The grip body **252***a* is fixed to a back end part of the shaft **250** by a double-stick tape. A bonding method using the double-stick tape is the same as a usual grip bonding method.

[0246] The first extending member **252***b* is mounted to the back end of the grip body **252***a*. The second extending member **252***b* is mounted to a back end of the first extending member **252***b*.

[0247] An outer surface **252***a***1** of the grip body **252***a* is substantially steplessly connected to an outer surface **252***b***1** of the extending member **252***b*. Furthermore, the outer surfaces **252***b***1** of the extending members **252***b* are substantially steplessly connected to each other. A grasping surface **252**m is formed by the outer surface **252***a***1** and the two outer surfaces **252***b***1**.

[0248] The grip body **252***a* has a rubber part g**3** and a hard base h**3**. A material of the rubber part g**3** is rubber.

[0249] The hard base h**3** is provided medially in the rubber part g**3**. The hard base h**3** is covered with the rubber part g**3**. The outer surface **252***a***1** of the grip body **252***a* is an outer surface of the rubber part g**3**.

[0250] As shown in FIGS. **30** and **31**, the hard base h**3** has a screw hole sc**3**. The hard base h**3** has a cylinder part h**31** and a bottom face part h**32**. An inner surface of the cylinder part h**31** is the screw hole sc**3**. The screw hole sc**3** is opened upward.

[0251] The hard base h**3** is fixed to the rubber part g**3**. The fixing method is not restricted, and for example, is bonding using an adhesive.

[0252] The first extending member **252***b* is located between the grip body **252***a* and the second extending member **252***b*. The first extending member **252***b* has a rubber part g**4** and a hard connector h**4**. A material of the rubber part g**4** is rubber. An upper part of the hard connector h**4** is covered with the rubber part g**4**.

[0253] The hard connector h**4** is provided medially in the rubber part g**4**. The outer surface **252***b***1** of the extending member **252***b* is an outer surface of the rubber part g**4**.

[0254] The hard connector h**4** has a cylindrical part h**41** and a columnar part h**42** (see FIG. **30**). An inner surface of the cylindrical part h**41** is a screw hole sc**4** (female screw). An outer surface of the columnar part h**42** is a male screw. The cylindrical part h**41** is disposed coaxially with the columnar part h**42**. The columnar part h**42** has an exposed part ex**2** exposed from the rubber part g**4** (see FIG. **31**). At least a part of the columnar part h**42** is the exposed part ex**2**. The exposed part ex**2** protrudes downward.

[0255] The columnar part h**42** (male screw) is screwed into the screw hole sc**3** (female screw) of the grip body **252***a* for connection between the first extending member **252***b* and the grip body **252***a*. The columnar part h**42** of the second extending member **252***b* is screwed into the screw hole sc**4** of the first extending member **252***b* for connection between the extending members **252***b*.

[0256] All the extending members **252***b* are common. The screw hole sc**3** is similar to the screw hole sc**4**.

[0257] An axial length of the exposed part ex**2** is shorter than that of the screw hole sc**3**. Therefore, a clearance K**1** exists between the bottom face part h**32** and the columnar part h**42** in a state where the grip body **252***a* is connected to the extending member **252***b* (see FIG. **30**). The clearance K**1** prevents a gap from occurring in a boundary between the outer surface **252***a***1** of the grip body **252***a* and the outer surface **252***b***1** of the extending member **252***b*.

[0258] The axial length of the exposed part ex**2** is shorter than that of the screw hole sc**4**. Therefore, a clearance K**2** exists between an end face of the columnar part h**42** and a bottom surface of the cylindrical part h**41** in a state where the extending members **252***b* are connected to each other (see FIG. **30**). The clearance K**2** prevents a gap from occurring in a boundary between the outer surfaces **252***b***1** of the extending members **252***b*.

[0259] The second extending member **252***b* is located on a grip back end side rather than the first extending member **252***b*. The second extending member **252***b* is a backmost extending member **252***b*.

[0260] The second extending member **252***b* is the same as the above-mentioned first extending member **252***b*. Therefore, the description of the second extending member **252***b* is omitted.

[0261] Thus, in the embodiment, the grip body **252***a* can be joined to the extending member **252***b* by screw connection. Furthermore, the extending members **252***b* can be joined to each other by screw connection.

[0262] In the embodiment, the extending member **252***b* is detachably mounted. The extending member **252***b* is removed by rotating the extending member **252***b* and releasing the screw connection. A grip length can be adjusted by mounting/demounting the extending member **252***b*.

[0263] In the embodiment, the case where the number of the extending members **252***b* is 2 is shown. The grip length can be further changed by changing the number of the extending members **252***b*. The grip length can be shortened when the number of the extending members **252***b* is 0. The number of the extending members **252***b* may be 1.

[0264] The number of the extending members **252***b* may be equal to or greater than 3. Since a joining structure of the extending members **252***b* is the same, the number of the extending members **252***b* to be joined can be freely selected.

[0265] Thus, the adjusting mechanism M**10** according to the embodiment is a grip length adjusting mechanism. The adjusting mechanism M**10** is also a club length adjusting mechanism.

[0266] FIG. **32** is an exploded view of a grip **260** according to other embodiment using the adjusting mechanism M**10**. The grip **260** has a grip body **252***a*, an extending member **252***b*, and an extending member **260***b*. The grip body **252***a* is used for the above-mentioned grip **252**. The extending member **252***b* is also used for the above-mentioned grip **252**.

[0267] The extending member **260***b* has a rubber part g**5** and a hard connector h**4**. The hard connector h**4** of the extending member **260***b* is the same as that of the above-mentioned extending member **252***b*. A difference between the extending member **252***b* and the extending member **260***b* is only a length of the rubber part.

[0268] A length of a rubber part g**4** of the extending member **252***b* is shown by a double pointed arrow L**1** in FIG. **32**. A length of a rubber part g**5** of the extending member **260***b* is shown by a double pointed arrow L**2** in FIG. **32**. The length L**1** is different from the length L**2**. In the embodiment, a length of the grip **260** can be adjusted by selecting any one of the extending members **252***b* and **260***b*.

[0269] A material of the hard base is harder than that of a grip grasping surface. Certainty of the connection and rigidity of the inner part of the grip can be improved by using the hard base. A material of the hard base is preferably a metal or a resin, and more preferably the metal. Examples of the resin include a thermoplastic resin and a carbon fiber reinforced resin. In respect of processability, preferable examples of the resin include nylon, polyether block amide copolymer (PEBAX), and polycarbonate. Examples of the metal include stainless steel, an aluminium alloy, and a titanium alloy. In respect of a swingweight, a high specific gravity metal (specific gravity: equal to or greater than 12) such as tungsten and a tungsten alloy can be also used.

[0270] A material of the hard connector is harder than that of a grip grasping surface. Certainty of the connection and rigidity of the inner part of the grip can be improved by using the hard connector. A material of the hard connector is preferably a metal or a resin, and more preferably the metal. Examples of the resin include a thermoplastic resin and a carbon fiber reinforced resin. In respect of processability, preferable examples of the resin include nylon, polyether block amide copolymer (PEBAX), and polycarbonate. Examples of the metal include stainless steel, an aluminium alloy, and a titanium alloy. In respect of a swingweight, a high specific gravity metal (specific gravity: equal to or greater than 12) such as tungsten and a tungsten alloy can be also used.

[0271] The rubber which is a material of the rubber part is not restricted. The rubber is preferably a rubber elastic body made of vulcanized rubber or the like. It should be understood that a thermoplastic elastomer is also included in the rubber. In respect of low slidability or the like, crude rubber (specific gravity: 0.91 to 0.93), styrene-butadiene rubber (specific gravity: 0.92 to 0.97), EPDM (specific gravity: 0.86 to 0.87), isoprene rubber (specific gravity: 0.92 to 0.93), and a mixture thereof are preferable.

[0272] Examples of specifications capable of being adjusted by the adjusting mechanism M**10** include a club length, a position of a center of gravity of a club, a frequency of the club, a moment of inertia of the club, a grip weight, a position of a center of gravity of a grip, and a grip length.

[0273] Examples of adjustments of the specifications by the adjusting mechanism M**10** include the following adjustments:

[0274] (adjustment **10***a*) a grip length and a club length are changed, and a swingweight is also changed; and

[0275] (adjustment **10***b*) a grip length and a club length are changed, and a swingweight is not substantially varied.

[0276] The club length is extended by mounting the extending member. The extension of the club length increases the swingweight. On the other hand, an effect of so-called counter balance is caused by mounting the extending member. The counter balance decreases the swingweight. The setoff of both the club length and the swingweight can be promoted by setting a weight and length of the extending member. The promotion can suppress increase of the swingweight while increasing the club length. Furthermore, variation of the swingweight can be substantially eliminated while increasing the club length.

[0277] In all the specifications described in the present application, the term "is not substantially varied" means an amount of variation of less than 10%. The term "is not substantially varied" for the swingweight means variation equal to or less than ±**1** point. The swingweight is a **14** inch form. The swingweight is also referred to as swing balance.

[0278] FIG. **33** is an exploded perspective view of a head **268**. FIG. **34** is a view of the head **268**, as viewed from a crown side. The head **268** is provided with an adjusting mechanism M**11** in addition to the above-mentioned adjusting mechanism M**1**. Although not shown in the drawings, a golf club provided with the head **268** is provided with the head **268**, a shaft, and a grip. The head **268** is a wood type golf club head.

[0279] In the embodiment, the adjusting mechanism M**1** is used as a loft angle adjusting mechanism. On the other hand, the adjusting mechanism M**11** is used as a face angle adjusting mechanism.

[0280] A constitution of the head **268** is the same as that of the above-mentioned head **2** except for existence of the adjusting intermediate member **270**. The same portions of the head **268** as those of the head **2** are designated by the same reference numerals as those of the head **2**, and the repeated description is omitted.

[0281] The adjusting mechanism M**11** has the adjusting intermediate member **270** and a changing adjusting intermediate member (not shown). The adjusting intermediate member **270** is disposed between the front member **4** and the back member **6**. The front member **4**, the adjusting intermediate member **270**, and the back member **6** are connected to each other in a state where no gap substantially exists. The adjusting intermediate member **270** is fixed with the adjusting intermediate member **270** sandwiched between the front member **4** and the back member **6**. The fixation is achieved by screw connection of the connecting member **8**.

[0282] The adjusting intermediate member **270** is a ring-shaped member. The adjusting intermediate member **270** has a protruding part **272** (see FIG. **33**). The protruding part **272** protrudes toward the front member **4**. The protruding part **272** facilitates position adjustment of the adjusting intermediate member **270** and the front member **4**.

[0283] A face angle can be adjusted by varying a plane shape (see FIG. **34**) of the adjusting intermediate member **270**. The face angle can be adjusted by changing the adjusting intermediate member **270** to other adjusting intermediate member which is not shown.

[0284] Thus, the head **268** has the plurality of (two) adjusting mechanisms M**1** and M**11**. The plurality of adjusting mechanisms M**1** and M**11** can be adjusted independently of each other. In the head **268**, the loft angle and the face angle can be adjusted independently of each other.

[0285] Examples of specifications capable of being adjusted by the adjusting mechanism M**11** include a face angle and a loft angle. The face angle and the loft angle can be adjusted by only the adjusting mechanism M**11** without using the adjusting mechanism M**1**.

[0286] Examples of adjustments of the specifications by the adjusting mechanism M**11** include the following adjustments:

[0287] (adjustment **11***a*) a face angle is changed, and a loft angle is also varied;

[0288] (adjustment **11***b*) a face angle is changed, and a loft angle is not substantially varied; and

[0289] (adjustment **11***c*) a loft angle is changed, and a face angle is not substantially varied.

[0290] FIG. **35** is an exploded perspective view of a head **280** provided with an adjusting mechanism M**12**. Although not shown in the drawings, a golf club provided with the head **280** is provided with the head **280**, a shaft, and a grip. The head **280** is a wood type golf club head.

[0291] The head **280** has a front member **282**, a back member **284**, and a connecting member **8**. The front member **282** is connected to the back member **284** by the connecting member **8**. The front member **282** is connected to the back member **284** in a state where no gap substantially exists.

[0292] The front member **282** has a face surface **286**. The front member **282** has the whole face surface **286**. Although not shown in the drawings, the front member **282** has a screw hole into which the connecting member **8** is screwed. The front member **282** further has a thick part **288** for forming the screw hole. Two thick parts **288** are provided at two positions.

[0293] The front member **282** has a plate-shaped face part **285**, an upper side backward extending part **287**, and a lower side backward extending part **289**. Both the two thick parts **288** are provided in the lower side backward extending part **289**.

[0294] The front member **282** may not have the upper side backward extending part **287** and the lower side backward extending part **289**. That is, the whole front member **282** may be plate-shaped. In this case, the thick part **288** can be eliminated. In this case, the screw hole can be formed in the plate-shaped front member **282**.

[0295] The back member **284** has a hosel part **290**. The hosel part **290** has a shaft hole **292**. The back member **284** has a through hole **294** through which the connecting member **8** passes and a thick part **296** for forming the through hole **294**. The thick part **296** is formed on each of the toe side and heel side of a sole of the head **280**.

[0296] The back member **284** has a protruding part **298**. In the embodiment, a plurality of (two) protruding parts **298** are provided. The protruding parts **298** protrude forward from an opening part of the back member **284**. The protruding parts **298** facilitate position adjustment of the front member **282**. The protruding parts **298** facilitate screwing between the front member **282** and the back member **284**.

[0297] The connecting member **8** is a screw. The front member **282** is connected to the back member **284** by the connecting member **8**. The protruding parts **298** improve certainty of the connection.

[0298] The head **2** has the adjusting mechanism M**12**. The adjusting mechanism M**12** is similar to the above-mentioned adjusting mechanism M**1**. A main difference between the adjusting mechanism M**12** and the adjusting mechanism M**1** is a shape of the front member. The front member **282** has a shape formed by cutting a toe portion and heel portion of the above-mentioned front member **4** (see FIG. **2**). The front member **282** does not close the whole opening part of the back member **284**. A hollow part of the head **280** is opened to the outside on the toe side of the front member **282**. Furthermore, the hollow part of the head **280** is opened to the outside on the heel side of the front member **282**.

[0299] The adjusting mechanism M**12** can change the front member **282**. For example, a loft angle (real loft angle) is changed by changing the front member **282**. For example, a face angle is changed by changing the front member **282**.

[0300] Examples of specifications capable of being adjusted by the adjusting mechanism M**12** include a loft angle, a face angle, a face area, and a face progression. Each of these specifications can be independently adjusted by the adjusting mechanism M**12**. Furthermore, a coefficient of restitution of the head to a ball, and a friction coefficient of the head to the ball can be adjusted by the adjusting mechanism M**12**. The coefficient of restitution of the head to the ball can be adjusted by, for example, changing the front member to a changing front member having rigidity different from that of the front member. The friction coefficient of the head to the ball can be adjusted by, for example, changing the front member to a changing front member having a face surface having surface roughness different from that of the front member.

[0301] In the adjusting mechanism M**12**, a shape of the front member is simplified as compared with the above-mentioned adjusting mechanism M**1**. A mold for the front member can be manufactured at low cost by the simplification. The simplification of the shape reduces a manufacture cost of the front member.

[0302] Examples of adjustments of the specifications by the adjusting mechanism M**12** include the following adjustments:

[0303] (adjustment **12***a*) a loft angle is changed, and a face angle is not substantially varied;

[0304] (adjustment **12***b*) a loft angle is changed, and a face angle is also changed;

[0305] (adjustment **12***c*) a loft angle is not substantially changed, and a face angle is changed;

[0306] (adjustment **12***d*) a face area is changed, and a loft angle and a face angle are not varied; and

[0307] (adjustment **12***e*) a face progression is changed, and a loft angle and a face angle are not varied.

[0308] Although the adjusting mechanism M**12** is applied to the wood type golf club head, the adjusting mechanism

M12 may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0309] FIG. **37** is a view of a golf club **310** having an adjusting mechanism M**13**, as viewed from a sole side. The club **310** has a head **312**. The adjusting mechanism M**13** is a modification example of the above-mentioned adjusting mechanism M**4**. The adjusting mechanism M**13** can adjust a real loft angle in addition to a lie angle. Although the number of positions of the shaft axis line capable of being selected is 3 in the above-mentioned adjusting mechanism M**4**, the number of positions of the shaft axis line capable of being selected is 5 in the adjusting mechanism M**13**.

[0310] A reference shaft axis line is represented by reference character LS**1** (see FIG. **37**). A second shaft axis line is represented by reference character LF**1**. A third shaft axis line is represented by reference character LU**1**. A fourth shaft axis line is represented by reference character LP**1**. A fifth shaft axis line is represented by reference character LM**1**.

[0311] Although the number of the holding holes h**1** is 3 in the above-mentioned adjusting mechanism M**4**, the number of the holding holes h**1** is 5 in the adjusting mechanism M**13**. That is, the head **312** has five holding holes h**1**. In the embodiment, the head **312** has a first holding hole h**11**, a second holding hole h**12**, a third holding hole h**13**, a fourth holding hole h**14**, and a fifth holding hole h**15**. A constitution of the golf club **310** is the same as that of the above-mentioned adjusting mechanism M**4** (golf club **70**) except that the five holding holes h**1** are formed; a space is secured so that the positions of the five kinds of shaft axis lines are allowed; and five kinds of sleeve supporting members **80** (described above) are provided.

[0312] The lie angle can be adjusted to three kinds by the adjusting mechanism M**13**. The three kinds of lie angles are achieved by the reference shaft axis line LS**1**, the second shaft axis line LF**1**, and the third shaft axis line LU**1**. Furthermore, in the adjusting mechanism M**13**, the real loft angle can be adjusted to three kinds. The three kinds of real loft angles are achieved by the reference shaft axis line LS**1**, the fourth shaft axis line LP**1**, and the fifth shaft axis line LM**1**. The real loft angle is increased in the fourth shaft axis line LP**1** as compared with the reference shaft axis line LS**1**. The real loft angle is decreased in the fifth shaft axis line LM**1** as compared with the reference shaft axis line LS**1**.

[0313] FIG. **38** is a perspective view of a head **320** having an adjusting mechanism M**14**. FIG. **39** is an exploded perspective view of the head **320**. FIG. **40** is a cross sectional view of the head **320**.

[0314] The head **320** has a front member **322** and a back member **324**. As shown in FIGS. **39** and **40**, the back member **324** has an engagement protruding part **326**. The engagement protruding part **326** has an engaging groove **328** and an inclined surface **330** (see an enlarged part of FIG. **40**). The engagement protruding part **326** is formed in each of crown part and a sole part of the head **320** (see FIG. **40**). On the other hand, the front member **322** has an inner extending part **332**. The inner extending part **332** is fitted into a groove **328** of the engagement protruding part **326**. The front member **322** is connected to the back member **324** by engagement between the engagement protruding part **326** and the inner extending part **332**. In the connected state, the outer surface of the front member **322** is almost smoothly continuous with the outer surface of the back member **324**.

[0315] The front member **322** is detachably mounted to the back member **324**. In the case of mounting, the engagement protruding part **326** of the back member **324** is press fitted into an opening part of the front member **322**. In the press fitting, a tip of the inner extending part **332** can slide on a surface of the inclined surface **330**. The sliding can facilitate the press fitting. The crown part and sole part of the back member **324** are compressed toward the inner side of the head in the case of press fitting if needed.

[0316] In the case of removal, the crown part and sole part of the back member **324** are compressed toward the inner side of the head, to release engagement between the engaging groove **328** and the inner extending part **332**. The front member **322** can be removed from the back member **324** by the release. The adjusting mechanism M**14** can change the back member **324**.

[0317] Plastic deformation of the back member **324** is required for mounting/demounting. In respect of facilitating the mounting/demounting, a material of the back member **324** may be fiber-reinforced plastic.

[0318] For example, a position of a center of gravity is changed by changing the back member **324**. For example, a head volume is changed by changing the back member **324**.

[0319] Examples of adjustments of the specifications by the adjusting mechanism M**14** include the following adjustments:

[0320] (adjustment **14***a*) a head shape is changed, and a position of a center of gravity of a head is not substantially varied;

[0321] (adjustment **14***b*) a head volume is changed, and a position of a center of gravity of a head is not substantially varied;

[0322] (adjustment **14***c*) a position of a center of gravity is changed, and a head shape is not varied;

[0323] (adjustment **14***d*) a moment of inertia is changed, and a head shape is not varied; and

[0324] (adjustment **14***e*) two or more selected from a head shape, a head volume, a position of a center of gravity of a head, and a moment of inertia are changed.

[0325] It is preferable that a head weight is not varied in the adjusting mechanism M**14** in respect of maintaining a swingweight.

[0326] Although the adjusting mechanism M**14** is applied to the wood type golf club, the adjusting mechanism M**14** may be used also for other type golf clubs (iron type, utility type, and putter type golf clubs or the like).

[0327] FIG. **41** is a plan view of a head **340** having an adjusting mechanism M**15**. FIG. **42** is a cross sectional view taken along line F**42**-F**42** of FIG. **41**. FIG. **43** is a bottom view of the head **340**. The head **340** has a front member **342**, a back member **344**, and a spacer **34 6**. A crown part of the front member **342** is rotatably joined to a crown part of the back member **344**. A hinge **348** is used for the joining.

[0328] The spacer **346** is interposed between the front member **342** and the back member **344**. The spacer **346** is located in the head **340**. However, a bottom surface of the spacer **346** is exposed to the outside. The bottom surface of the spacer **346** constitutes a part of a sole surface of the head **340**.

[0329] The hinge **348** allows rotation of the front member **342** to the back member **344**. The rotation can adjust a real loft angle. On the other hand, when the head **340** is used, the rotation is fixed. The fixation is achieved by a screw member

350. The screw member **350** passes through the spacer **346**, and connects the front member **342** to the back member **344**.

[0330] A groove **352** opened downward and a protruding part **354** extending downward are formed in an edge of a lower end of the front member **342** (a lower end of a face part). Similarly, a groove **352** opened downward and a protruding part **354** extending downward are formed in an edge of a front end of a sole part of the back member **344**. On the other hand, a groove **356** opened upward and a protruding part **358** extending upward are formed in a front edge of a lower surface of the spacer **346**. Similarly, a groove **356** opened upward and a protruding part **358** extending upward are formed in a back edge of the lower surface of the spacer **346**.

[0331] As shown in an enlarged part of FIG. **42**, the protruding part **354** is fitted into the groove **356** in the back edge of the lower surface of the spacer **346**, and the protruding part **358** is fitted into the groove **352**. The protruding part **354** is fitted into the groove **356** also in the front edge of the lower surface of the spacer **346**, and the protruding part **358** is fitted into the groove **352**. Fixation of the spacer **346** is achieved by these fittings.

[0332] A real loft angle can be varied by a thickness and shape of the spacer **346**. The real loft angle can be adjusted by changing the spacer **346**.

[Specification]

[0333] In the present invention, the specification capable of being adjusted is not restricted. Examples of the specification include a loft angle, a lie angle, a face angle, a face area, a position of a center of gravity of a head, a swingweight, a club length, a position of a center of gravity of a club, a frequency of the club, a club weight, a head shape, a head volume, a head weight, a flex of a shaft (shaft hardness), a flex point of a shaft, a torque of the shaft, flexural rigidity distribution of the shaft, torsional rigidity distribution of the shaft, a shaft weight, weight distribution of the shaft, a position of a center of gravity of the shaft, a length of the shaft, a grip outer diameter, a grip weight, a position of a center of gravity of a grip, a grip length, a specification of a face groove, a face progression, a moment of inertia of the head, a moment of inertia of the club, a coefficient of restitution of the head to a ball, and a friction coefficient of the head to the ball.

[0334] In the present invention, at least two specifications can be adjusted independently of each other. More preferably, all the specifications capable of being adjusted can be adjusted independently of each other.

[0335] The specification includes a specification according to the head, a specification according to the shaft, a specification according to the grip, and a specification according to the whole club.

[0336] Examples of the specification according to the head include a loft angle, a lie angle, a face angle, a face area, a position of a center of gravity of a head, a head shape, a head volume, a head weight, a face progression, a moment of inertia of the head, a coefficient of restitution of the head to a ball,and a friction coefficient of the head to the ball. Examples of the position of the center of gravity of the head include a distance of a center of gravity (a distance between a shaft axis line and a center of gravity of the head), a depth of the center of gravity, and a sweet spot height besides an actual (three-dimensional) position of a center of gravity of the head.

[0337] Examples of the specification according to the shaft in the specifications include a flex of a shaft, a flex point of a shaft, a torque of the shaft, flexural rigidity distribution of the shaft, torsional rigidity distribution of the shaft, a shaft weight, weight distribution of the shaft, a position of a center of gravity of the shaft, and a length of the shaft.

[0338] Examples of the specification according to the grip in the specifications include a grip outer diameter, a grip weight, a position of a center of gravity of a grip, and a grip length.

[0339] Examples of the specification according to the whole club in the specifications include a swingweight, a club length, a position of a center of gravity of a club, a frequency of the club, a club weight, and a moment of inertia of the club.

[0340] An adjustment range of the specification is not restricted. In respect of a degree of freedom of adjustment, the adjustment range is preferably wider. In this respect, the adjustment range of the loft angle is preferably equal to or greater than 2 degrees, preferably equal to or greater than 3 degrees, and still more preferably equal to or greater than 4 degrees. The adjustment range of the face angle is preferably equal to or greater than 2 degrees, more preferably equal to or greater than 3 degrees, and still more preferably equal to or greater than 4 degrees. The adjustment range of the lie angle is preferably equal to or greater than 1 degree, more preferably equal to or greater than 2 degrees, and still more preferably equal to or greater than 3 degrees. The adjustment range of the distance of a center of gravity is preferably equal to or greater than 5 mm, more preferably equal to or greater than 10 mm, and still more preferably equal to or greater than 15 mm. The adjustment range of the club length is preferably equal to or greater than 1 inch, more preferably equal to or greater than 1.5 inches, and still more preferably equal to or greater than 2 inches. The adjustment range of the head volume is preferably equal to or greater than 10 cc, more preferably equal to or greater than 20 cc, and still more preferably equal to or greater than 30 cc. The adjustment range of the grip outer diameter is preferably equal to or greater than 0.5 mm, more preferably equal to or greater than 1 mm, and still more preferably equal to or greater than 1.5 mm. The adjustment range of the swingweight is preferably equal to or greater than 1 point, more preferably equal to or greater than 2 points, and still more preferably equal to or greater than 3 points.

[0341] In respect of improving the degree of freedom of adjustment, an adjustment range in a specific specification is preferably equal to or greater than a range corresponding to two-number clubs. The range corresponding to two-number clubs is as follows. The specific specification is one or more selected from a loft angle, a lie angle, a club length, and a club weight.

[Range Corresponding to Two-Number Clubs]

[0342] Loft angle: 6 degrees

[0343] Lie angle: 1 degree

[0344] Club length: 1 inch

[0345] Club weight: 14 g

[Adjusting Mechanism]

[0346] The golf club of the present invention has one or more adjusting mechanisms. The adjusting mechanism is not restricted. The adjusting mechanism can adjust the

specification. One adjusting mechanism can adjust one or more specifications. One adjusting mechanism may be able to adjust two or more specifications. Two or more specifications adjusted by one adjusting mechanism may be adjusted so as to be interlocked with each other, and may be independently adjusted without being interlocked with each other.

[0347] Preferably, the golf club has a plurality of adjusting mechanisms. Preferably, two or more specifications can be adjusted independently of each other by the plurality of adjusting mechanisms.

[0348] Preferably, the adjusting mechanism can adjust the specification according to the head without changing the whole head. Preferably, the adjusting mechanism can adjust the specification according to the grip without changing the whole grip. Preferably, the adjusting mechanism can adjust the specification according to the shaft without changing the whole shaft.

[0349] Examples of the adjusting mechanism include the adjusting mechanism M**1**, the adjusting mechanism M**2**, the adjusting mechanism M**3**, the adjusting mechanism M**4**, the adjusting mechanism M**5**, the adjusting mechanism M**6**, the adjusting mechanism M**7**, the adjusting mechanism M**8**, the adjusting mechanism M**9**, the adjusting mechanism M**10**, the adjusting mechanism M**11**, the adjusting mechanism M**12**, the adjusting mechanism M**13**, the adjusting mechanism M**14**, and the adjusting mechanism M**15**. The adjusting mechanisms described in the above-mentioned Patent Documents can be also applied to the present invention.

[0350] Examples of the golf club provided with a plurality of adjusting mechanisms include a golf club provided with two or more adjusting mechanisms selected from the adjusting mechanism M**1**, the adjusting mechanism M**2**, the adjusting mechanism M**3**, the adjusting mechanism M**4**, the adjusting mechanism M**5**, the adjusting mechanism M**6**, the adjusting mechanism M**7**, the adjusting mechanism M**8**, the adjusting mechanism M**9**, the adjusting mechanism M**10**, the adjusting mechanism M**11**, the adjusting mechanism M**12**, the adjusting mechanism M**13**, the adjusting mechanism M**14**, and the adjusting mechanism M**15**.

[0351] The adjusting mechanisms described in the embodiment can be independent from each other. That is, when the plurality of adjusting mechanisms is provided in a single golf club, the plurality of adjusting mechanisms can function without being interlocked with each other. The independence between the adjusting mechanisms improves the degree of freedom of adjustment.

[0352] Two or more adjusting mechanisms selected from the above-mentioned adjusting mechanisms M**1** to M**15** can be set in a single golf club. The two or more adjusting mechanisms can be set in the single golf club within the technical level of a person skilled in the art except that it is particularly difficult to provide the two or more adjusting mechanisms.

[0353] The head may have a plurality of adjusting mechanisms. In this case, the degree of freedom of adjustment of the specification according to the head is improved. The shaft may have a plurality of adjusting mechanisms. In this case, a degree of freedom of adjustment of the specification according to the shaft is improved. The grip may have a plurality of adjusting mechanisms. In this case, a degree of freedom of adjustment of the specification according to the grip is improved.

[0354] When a plurality of adjusting mechanisms independent of each other is provided, the specification adjusted by one adjusting mechanism and the specification adjusted by other adjusting mechanism can be adjusted independently of each other. The independence between the specifications improves the degree of freedom of adjustability.

[0355] Even if the number of the adjusting mechanisms is **1**, the plurality of specifications may be adjusted independently of each other. For example, the face angle and the loft angle can be independently adjusted in the adjusting mechanism M**1**. That is, in setting a direction of the face surface of the front member **4**, the loft angle can be also varied without varying the face angle,and the face angle can be also varied without varying the loft angle. In addition, the loft angle and the face angle can be also varied independently of each other.

[0356] Preferably, the plurality of adjusting mechanisms is provided. In respect of the degree of freedom of adjustability When two or more adjusting mechanisms are provided, at least two of the adjusting mechanisms can be preferably adjusted independently of each other. For example, in the case of a golf club having three adjusting mechanisms, a first adjusting mechanism and a second adjusting mechanism can be preferably adjusted independently of each other, and the first adjusting mechanism, the second adjusting mechanism, and a third adjusting mechanism can be preferably adjusted independently of each other. That is, when the two or more adjusting mechanisms are provided, all the adjusting mechanisms can be most preferably adjusted independently of each other.

[0357] In the embodiment shown in FIG. 17 of the above-mentioned US 2006/0293115, the loft angle, the lie angle, and the face angle are varied in relation to each other due to the circumferential position of the sleeve. In this case, the three specifications cannot be adjusted independently of each other. The non-independence reduces the degree of freedom of adjustability. The present invention can solve the problem.

[0358] A material of the head (or the head body) is not restricted. Preferable examples of the material include a titanium alloy, stainless steel, an aluminium alloy, a magnesium alloy, carbon fiber reinforced plastic (CFRP), and a combination thereof. A manufacturing method of the head is not restricted, and examples thereof include forging, casting, pressing, and a combination thereof. The head may be made of a plurality of combined materials. A structure of the head body is not restricted.

[0359] A material of the shaft is not restricted. Examples of the material of the shaft include carbon fiber reinforced plastic (CFRP) and a metal. A so-called carbon shaft and steel shaft can be suitably used. A structure of the shaft is not restricted.

[0360] A material of the sleeve is not restricted. Preferable examples of the material include a titanium alloy, stainless steel, an aluminium alloy, a magnesium alloy, and a resin. It is preferable that the resin has excellent mechanical strength. For example, the resin is preferably a resin referred to as an engineering plastic or a super-engineering plastic. As described above, the engaging member may be integrally formed with the head body. In respect of a balance between strength and lightweight, for example, the aluminium alloy and the titanium alloy are more suitable.

[0361] A material of the engaging member is not restricted. Preferable examples of the material include a

titanium alloy, stainless steel, an aluminium alloy, a magnesium alloy, and a resin. It is preferable that the resin has excellent mechanical strength. For example, the resin is preferably a resin referred to as an engineering plastic or a super-engineering plastic. As described above, the engaging member may be integrally formed with the head body.

[0362] A material of the connecting member (screw) is not restricted. Preferable examples of the material include a titanium alloy, stainless steel, an aluminium alloy, and a magnesium alloy.

[0363] A material of the sleeve supporting member **80** is not restricted. Preferable examples of the material include a titanium alloy, stainless steel, an aluminium alloy, and a magnesium alloy besides the above-mentioned resin.

[0364] The specifications can be measured by known measuring devices. Examples of the measuring devices for the loft angle, the lie angle, and the face angle include a golf club head gauge manufactured by Sheng Feng Iron Enterprise Co. Some typical specifications may be described in a product catalog.

[0365] A combination of the specifications capable of being adjusted is not restricted. The number of the specifications capable of being adjusted is not restricted. The number is preferably equal to or greater than 3, and more preferably equal to or greater than 4.

[0366] A golf club A having the adjusting mechanism capable of adjusting the loft angle and the adjusting mechanism capable of adjusting the distance of a center of gravity is effective in a situation where a mistake of pulling a ball using a short iron is apt to occur, for example. In this case, the mistake can be resolved by increasing the loft angle and lengthening the distance of a center of gravity. The golf club A is effective in a situation where a mistake of opening a face of the short iron is apt to occur, for example. In this case, the mistake can be resolved by increasing the loft angle and shortening the distance of a center of gravity. In a condition where a wind is strong and a ball is apt to be pulled, adjustment for decreasing the loft angle and increasing the distance of a center of gravity is effective.

[0367] A golf club B having the adjusting mechanism capable of adjusting the loft angle and the adjusting mechanism capable of adjusting the club length is effective in increasing a flight distance. An example of effective adjustment in this case is adjustment for lengthening the club length to increase the head speed and increasing the loft angle to increase a launch angle. The golf club B is effective in improving controllability. An example of effective adjustment in this case is adjustment for shortening the club length to decrease the flight distance and increasing the loft angle to increase the launch angle. In this case, a ball having a high trajectory to tend to stop at a fall spot can be achieved. Since adjustment for decreasing the loft angle and lengthening the club length can achieve a low launch angle and improvement in the head speed, the adjustment is effective in improving the total flight distance including a run. Since adjustment decreasing the loft angle and shortening the club length can achieve a low launch angle and decrease in the head speed, the adjustment is effective when the run is desired to be increased by a low hit ball.

[0368] A golf club C having the adjusting mechanism capable of adjusting the loft angle and the adjusting mechanism capable of adjusting the swingweight is effective in improving controllability. As an example of effective adjustment in this case, the swingweight is increased to stabilize a swing, and the loft angle is increased to increase the launch angle. Alternatively, the swingweight is decreased to increase the head speed, and the loft angle is increased to increase the launch angle. In this case, a ball having a high trajectory to tend to stop at a fall spot can be achieved. Since adjustment for decreasing the loft angle and increasing the swing balance can achieve a low launch angle and a stable (slow) swing, the adjustment is effective in obtaining a low trajectory having excellent directivity. Since adjustment for decreasing the loft angle and decreasing the swing balance can achieve a low launch angle and improvement in a head speed, it is effective in increasing a run by a low trajectory to increase the total flight distance.

[0369] An impact force caused by hitting concentrates on the hosel part. Strength is required for the hosel part. Since a weight of the hosel part is increased when the adjusting mechanism is located in the hosel part, a degree of freedom of design of the center of gravity of the head is reduced. It is preferable that the hosel part has a light weight. In respect of strength of the hosel part and reduction in a weight of the hosel part, the following constitution (a) is preferable; the following constitution (b) is more preferable; and the following constitution (c) is still more preferable:

[0370] (a) the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located at a place other than the hosel part;

[0371] (b) the adjusting mechanism (**1**) and the adjusting mechanism (**2**) are located at places other than the hosel part; and

[0372] (c) all the adjusting mechanisms are located at places other than the hosel part.

[0373] The adjusting mechanisms M**3**, M**4**, M**7**, and M**13** are located in the hosel part in the embodiments. The adjusting mechanisms M**1**, M**2**, M**5**, M**6**, M**8**, M**9**, M**10**, M**11**, M**12**, M**14**, and M**15** are located at places other than the hosel part.

[0374] Examples in which the adjusting mechanism located at a place other than the hosel part is combined with the adjusting mechanism located in the hosel part include examples 2 to 11 to be described later. Examples in which the adjusting mechanisms located at places other than the hosel part are combined with each other include examples 1 and 12 to 28 to be described later.

[0375] Examples of the constitution (a) include the following constitutions (a**1**) to (a**5**):

[0376] (a**1**) the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located in the grip;

[0377] (a**2**) the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located in the shaft;

[0378] (a**3**) the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located in the joined part between the shaft and the grip;

[0379] (a**4**) the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located in the sole of the head; and

[0380] (a**5**) the adjusting mechanism (**1**) or the adjusting mechanism (**2**) is located in the head other than the hosel part.

[0381] In respect of adjusting a mounting angle of the shaft to the head, the other of the adjusting mechanism (**1**) or the adjusting mechanism (**2**) may be located in the hosel part in each of the constitutions (a**1**), (a**2**), (a**3**), (a**4**), and (a**5**).

[0382] Examples of the constitution (b) include the following constitutions (b**1**) to (b**8**):

[0383] (b**1**) the adjusting mechanism (**1**) and the adjusting mechanism (**2**) are located in the grip;

[0384] (b**2**) the adjusting mechanism (**1**) and the adjusting mechanism (**2**) are located in the shaft;

[0385] (b**3**) the adjusting mechanism (**1**) and the adjusting mechanism (**2**) are located in the head other than the hosel part;

[0386] (b**4**) the adjusting mechanism (**1**) and the adjusting mechanism (**2**) are located in the sole of the head;

[0387] (b**5**) the adjusting mechanism (**1**) is located in the shaft, and the adjusting mechanism (**2**) is located in the grip;

[0388] (b**6**) the adjusting mechanism (**1**) is located in the shaft, and the adjusting mechanism (**2**) is located in the head other than the hosel part;

[0389] (b**7**) the adjusting mechanism (**1**) is located in the grip, and the adjusting mechanism (**2**) is located in the head other than the hosel part; and

[0390] (b**8**) the adjusting mechanism (**1**) is located in the grip, and the adjusting mechanism (**2**) is located in the sole of the head.

[0391] The adjusting mechanism M**1** is located in the head other than the hosel part. The adjusting mechanism M**2** is located in the head other than the hosel part. The adjusting mechanism M**3** is located in the hosel part. The adjusting mechanism M**4** is located in the hosel part. The adjusting mechanism M**5** is located in the head other than the hosel part, and is located in the sole of the head. The adjusting mechanism M**6** is located in the grip, and is located in the shaft. The adjusting mechanism M**7** is located in the hosel part. The adjusting mechanism M**8** is located in the head other than the hosel part. The adjusting mechanism M**9** is located in the grip. The adjusting mechanism M**10** is located in the grip. The adjusting mechanism M**11** is located in the head other than the hosel part. The adjusting mechanism M**12** is located in the head other than the hosel part. The adjusting mechanism M**13** is located in the hosel part. The adjusting mechanism M**14** is located in the head other than the hosel part. The adjusting mechanism M**15** is located in the head other than the hosel part.

[0392] When the two adjusting mechanisms interfere with each other, the mechanism becomes complicated. The complicated mechanism is apt to cause a trouble. The complicated mechanism may require high dimensional accuracy. The high dimensional accuracy reduces productivity. In these respects, it is preferable that the adjusting mechanism (**1**) and the adjusting mechanism (**2**) do not interfere with each other. The meaning of the term "interfere" is as follows. When at least one member constituting an adjusting mechanism A involves in an adjusting mechanism B, the adjusting mechanisms A and B are defined to interfere with each other. When at least one member constituting the adjusting mechanism B involves in the adjusting mechanism A, the adjusting mechanisms A and B are defined to interfere with each other. One example of the interference is a case where a screw for fixing the adjusting mechanism A contributes also to fixation of the adjusting mechanism B, for example.

[0393] The specification of the shaft can be adjusted by changing the shaft. However, a cost of the shaft is high. Golf players request desired adjustment of other specifications without changing the shaft preferred by the golf players themselves. In these respects, it is preferable that the adjusting mechanism (**1**) and the adjusting mechanism (**2**) involve no shaft change. It is more preferable that all the adjusting mechanisms involve no shaft change.

[0394] On the other hand, a sleeve is preferably used in a golf club having a changeable shaft. The sleeve is used in the adjusting mechanisms M**4** and M**7**, for example. As shown in the adjusting mechanism M**4**, the sleeve is typically bonded to the shaft. The shaft is detachably mounted to the head by using the sleeve, to facilitate the change of the shaft. A large impact force from hitting acts on the sleeve. In respect of ensuring fixation of the sleeve, it is preferable that the sleeve is supported by surface contact in the whole circumferential direction (360 degrees). The sleeve is supported by the surface contact in the whole circumferential direction in the adjusting mechanism M**4** and the adjusting mechanism M**7**. Of these, in the adjusting mechanism M**4**, the sleeve supporting member **80** is brought into surface contact with the sleeve **76** in the whole circumferential direction.

[0395] In a golf club set having the plurality of the golf clubs described above, advantages of the clubs are synergistically combined, and thereby the golf club set having excellent adjustability can be achieved.

[0396] As exemplified above, the golf club having the two or more specifications capable of being adjusted independently enables adjustments corresponding to situations such as course setting, weather, and a condition of a player. A combination of specifications other than the above description enables adjustments corresponding to various situations.

EXAMPLES

[0397] Hereinafter, the effects of the present invention will be clarified by examples. However, the present invention should not be interpreted in a limited way based on the description of the examples. The following adjusting mechanisms are the same as those described in the above-mentioned embodiment unless particularly described.

Example 1

[0398] A head having the adjusting mechanism M**1** (face angle adjusting mechanism) and the adjusting mechanism M**5** (a head-center-of-gravity position adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). A material of a connecting member **8** (screw) was a titanium alloy (Ti-6Al-4V). A screw hole into which a weight body **104** (screw) of the adjusting mechanism M**5** was screwed was formed in a sole of the back member **6**, and was produced by NC processing. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 1. The golf club was a number three wood golf club.

Example 2

[0399] A golf club having the adjusting mechanism M**1** (face angle adjusting mechanism), the adjusting mechanism M**4** (lie angle adjusting mechanism), the adjusting mechanism M**5** (a head-center-of-gravity position adjusting mechanism), and the adjusting mechanism M**6** (swingweight adjusting mechanism) was produced. The adjusting mechanism M**4** was added to a hosel part of the back member of the example 1, and a grip with the adjusting mechanism M**5** shown in FIG. **17** was mounted in place of the grip of the example 1. A material of a sleeve **76** was an aluminium alloy. A material of a sleeve supporting member

80 was an aluminium alloy. A golf club of example 2 was obtained in the same manner as in the example 1 as for the rest.

Comparative Example 1

[0400] A head of comparative example 1 was obtained in the same manner as in the example 1 except that the head did not have all the adjusting mechanisms. The head was obtained by welding a front member **4** to a back member **6**. The same shaft and grip as those of the example 1 were mounted to the head, to obtain a golf club according to the comparative example 1.

Comparative Example 2

[0401] The same structure as that of the above-mentioned adjusting mechanism M**7** (see FIG. **20**) was formed in the back member **6** of the example 1. The same front member as that of the example 1 was welded to the back member, to obtain a head. The screw groove of the inner surface of the sleeve Sv in the adjusting mechanism M**7** was removed, to form a circumferential surface. The sleeve Sv was bonded to the tip part of the same shaft as that of the example 1. That is, the shaft was directly bonded to the inner surface of the sleeve Sv without using the screw cylinder **135**. A shaft insertion hole was inclined to a hosel hole **142** as in the above-mentioned sleeve Sv**1** (to see FIG. **22**). The inclination angle θ**1** (see FIG. **22**) was set to 1.0 degree. A material of the sleeve Sv was an aluminium alloy. A material of an engaging member **140** was a titanium alloy (Ti-6Al-4V). Furthermore, the same grip as that of the example 1 was mounted, to obtain a golf club according to comparative example 2. In the golf club, the shaft can be detachably mounted to the head by a screw mechanism. In the golf club, a loft angle, a lie angle, and a face angle are varied in relation to each other by a relative position relation in a circumferential direction between the sleeve Sv and the hosel hole.

[0402] An evaluation test was performed by tester's actual hitting using these clubs. The tester had a driver head speed of about 40 m/s, and was a slicer (the tester was apt to slice a ball). Specifications and evaluation results of the examples and comparative examples are shown in the following Table 1.

[0403] In "directivity" in Table 1 and each of the following Tables, "+" means that the direction is deviated to the right side from the target direction, and "−" means that the direction is deviated to the left side from the target direction. In "side spin" in Table 1 and each of the following Tables, a positive value means slice rotation, and a negative value means hook rotation.

[0404] The example 1 can be adjusted to the specification of the comparative example 1 shown in Table 1. The example 1 was adjusted to the specification shown in Table 1, and an evaluation test thereof was performed.

[0405] The example 2 can be adjusted to the specification of the comparative example 1 shown in Table 1. The example 2 was adjusted to the specification shown in Table 1, and an evaluation test thereof was performed.

[0406] A club having a state of comparative example 2-1 was produced using the comparative example 2, and an evaluation test thereof was performed. Next, a club having a state of comparative example 2-2 was produced by varying a relative position relation in a circumferential direction between a sleeve Sv (shaft) and a hosel hole, and an evaluation test thereof was performed.

[0407] As shown in Table 1, since a loft angle, a lie angle, and a face angle are varied in relation to each other in the comparative example 2, the adjustment was insufficient. Therefore, the slice was insufficiently resolved, and the flight distance was also relatively short. The examples 1 and 2 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 3

[0408] A head having the adjusting mechanism M**1** (face angle adjusting mechanism) and the adjusting mechanism M**4** (lie angle adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). The adjusting mechanism M**4** was provided in a hosel part of the back member **6**. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 3. The golf club was a number three wood golf club.

TABLE 1

Specifications and evaluation results of examples and comparative examples

	Comparative example 1	Comparative example 2-1	Comparative example 2-2	Example 1	Example 2
Loft angle (°)	16.5	17.5	15.5	16.5	17.5
Face angle (°)	3	5	1	5	5
Lie angle (°)	58.5	58	59	58.5	59.5
Distance of center of gravity (mm)	35	35	35	33	33
Club length (inch)	42.5	42.5	42.5	42.5	42.5
Balance	D1	D1	D1	D1	D0
Ball initial speed (m/s)	53	52.5	53	54	53
Launch angle (°)	20	23	17	20	23
Backspin amount (rpm)	3200	3500	2800	3000	3300
Side spin amount (rpm)	1500	1000	2000	500	200
Flight distance (yard)	170	176	165	184	190
Directivity (yard)	+25	+10	+40	+5	0

Comparative Example 3

[0409] A head of comparative example 3 was obtained in the same manner as in the comparative example 1 except that the specification was changed to the specification of Table 2. The same shaft and grip as those of the example 1 were mounted to the head, to obtain a golf club according to comparative example 3.

Comparative Example 4

[0410] A head of comparative example 4 was obtained in the same manner as in the comparative example 2 except that the specification was changed to the specification of Table 2. In the golf club, a shaft is detachably mounted to a head by a screw mechanism. In the golf club, a loft angle, a lie angle, and a face angle are varied in relation to each other by a relative position relation in a circumferential direction between a sleeve Sv and a hosel hole.

[0411] An evaluation test was performed by tester's actual hitting using these clubs. The tester had a driver head speed of about 40 m/s, and was a slicer (the tester was apt to slice a ball). Specifications and evaluation results of the examples and comparative examples are shown in the following Table 2.

TABLE 2

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 3-1	Example 3-2
Loft angle (°)	16.5	17.5	15.5	16.5	16.5
Face angle (°)	3	5	1	5	6
Lie angle (°)	58.5	58	59	59	59
Distance of center of gravity (mm)	30	30	30	30	30
Club length (inch)	42	42	42	42	42
Balance	D1	D1	D1	D1	D1
Ball initial speed (m/s)	53	52.5	53	54	54
Launch angle (°)	20	23	17	20	20
Backspin amount (rpm)	3200	3500	3000	3000	3000
Side spin amount (rpm)	1500	1000	2000	500	200
Flight distance (yard)	170	160	165	184	190
Directivity (yard)	+25	+10	+40	+5	0
Variable mechanism				Face angle Lie angle	Face angle Lie angle

[0412] The golf club of the example 3 was adjusted to a specification of example 3-1 shown in Table 2 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 3 was adjusted to a specification of example 3-2 shown in Table 2 using the adjusting mechanism, and was evaluated.

[0413] A club having a state of comparative example 4-1 was produced using the comparative example 4, and an evaluation test thereof was performed. Next, a club having a state of comparative example 4-2 was produced by varying a relative position relation in a circumferential direction between a sleeve Sv (shaft) and a hosel hole, and an evaluation test thereof was performed.

[0414] As shown in Table 2, since a loft angle, a lie angle, and a face angle are varied in relation to each other in the comparative example 4, the adjustment was insufficient. Therefore, the slice was insufficiently resolved, and the flight distance was also relatively short. The example 3 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 4

[0415] A head having the adjusting mechanism M**1** (loft angle adjusting mechanism) and the adjusting mechanism M**4** (lie angle adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). The adjusting mechanism M**4** was provided in a hosel part of the back member **6**. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 4. The golf club was a number three wood golf club.

[0416] The example 4 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 3.

TABLE 3

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 4-1	Example 4-2
Loft angle (°)	16.5	17.5	15.5	17	16
Face angle (°)	3	5	1	3	3
Lie angle (°)	58.5	58	59	59	59.5
Distance of center of gravity (mm)	30	30	30	30	30
Club length (inch)	42	42	42	42	42
Balance	D1	D1	D1	D1	D1
Ball initial speed (m/s)	53	52.5	53	54	54
Launch angle (°)	20	23	17	20	18
Backspin amount (rpm)	3200	3500	3000	3100	2800
Side spin amount (rpm)	1500	1000	2000	700	500
Flight distance (yard)	170	160	165	175	180
Directivity (yard)	+25	+10	+40	+8	+5
Variable mechanism				Loft angle Lie angle	Loft angle Lie angle

[0417] The golf club of the example 4 was adjusted to a specification of example 4-1 shown in Table 3 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 4 was adjusted to a specification of example 4-2 shown in Table 3 using the adjusting mechanism, and was evaluated. The example 4 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 5

[0418] A head having the adjusting mechanism M**1** (face angle adjusting mechanism), the adjusting mechanism M**4** (lie angle adjusting mechanism), and the adjusting mechanism M**5** (head-center-of-gravity position adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). A screw hole of the adjusting mechanism M**5** was formed in a sole part of the back member **6**. The screw hole was produced by NC processing. The adjusting mechanism M**4** was provided in a hosel part of the back member **6**. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 5. The golf club was a number three wood golf club.

[0419] The example 5 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 4.

TABLE 4

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 5-1	Example 5-2
Loft angle (°)	16.5	17.5	15.5	16.5	16.5
Face angle (°)	3	5	1	5	6
Lie angle (°)	58.5	58	59	59	59
Distance of center of gravity (mm)	30	30	30	27	25
Club length (inch)	42	42	42	42	42
Balance	D1	D1	D1	D1	D1
Ball initial speed (m/s)	53	52.5	53	54	54
Launch angle (°)	20	23	17	20	20
Backspin amount (rpm)	3200	3500	3000	3000	3000
Side spin amount (rpm)	1500	1000	2000	500	200
Flight distance (yard)	170	160	165	188	195
Directivity (yard)	+25	+10	+40	+0	−5

TABLE 4-continued

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 5-1	Example 5-2
Variable mechanism				Face angle Lie angle Distance of center of gravity	Face angle Lie angle Distance of center of gravity

[0420] The golf club of the example 5 was adjusted to a specification of example 5-1 shown in Table 4 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 5 was adjusted to a specification of example 5-2 shown in Table 4 using the adjusting mechanism, and was evaluated. The example 5 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 6

[0421] A head having the adjusting mechanism M**1** (loft angle adjusting mechanism), the adjusting mechanism M**4** (lie angle adjusting mechanism), and the adjusting mechanism M**5** (head-center-of-gravity position adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). A screw hole of the adjusting mechanism M**5** was formed in a sole part of the back member **6**. The screw hole was produced by NC processing. The adjusting mechanism M**4** was provided in a hosel part of the back member **6**. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 6. The golf club was a number three wood golf club.

[0422] The example 6 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 5.

TABLE 5

Specifications and evaluation results of examples and comparative examples

	Comparative example3	Comparative example 4-1	Comparative example 4-2	Example 6-1	Example 6-2
Loft angle (°)	16.5	17.5	15.5	17	16
Face angle (°)	3	5	1	3	3
Lie angle (°)	58.5	58	59	59	59.5
Distance of center of gravity (mm)	30	30	30	27	25
Club length (inch)	42	42	42	42	42
Balance	D1	D1	D1	D1	D1
Ball initial speed (m/s)	53	52.5	53	54	54
Launch angle (°)	20	23	17	20	18
Backspin amount (rpm)	3200	3500	3000	3100	2800
Side spin amount (rpm)	1500	1000	2000	700	500
Flight distance (yard)	170	160	165	175	180
Directivity (yard)	+25	+10	+40	+0	−5
Variable mechanism				Loft angle Lie angle Distance of center of gravity	Loft angle Lie angle Distance of center of gravity

[0423] The golf club of the example 6 can be adjusted to the specification of the comparative example 3. The golf club of the example 6 was adjusted to a specification of example 6-1 shown in Table 5 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 6 was adjusted to a specification of example 6-2 shown in Table 5 using the adjusting mechanism, and was evaluated. The example 6 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 7

[0424] A head having the adjusting mechanism M**1** (face angle adjusting mechanism) and the adjusting mechanism M**3** (club length adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). The adjusting mechanism M**3** was provided in a hosel part of the back member **6**. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 7. The golf club was a number three wood golf club.

[0425] The example 7 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 6.

TABLE 6

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 7-1	Example 7-2
Loft angle (°)	16.5	17.5	15.5	16.5	16.5
Face angle (°)	3	5	1	5	6
Lie angle (°)	58.5	58	59	58.5	58.5
Distance of center of gravity (mm)	30	30	30	30	30
Club length (inch)	42	42	42	41.5	43
Balance	D1	D1	D1	D4	D9
Ball initial speed (m/s)	53	52.5	53	52.5	54
Launch angle (°)	20	23	17	20	20
Backspin amount (rpm)	3200	3500	3000	2800	3000
Side spin amount (rpm)	1500	1000	2000	500	200
Flight distance (yard)	170	160	165	186	190
Directivity (yard)	+25	+10	+40	0	+5
Variable mechanism				Face angle Club length	Face angle Club length

[0426] The golf club of the example 7 can be adjusted to the specification of the comparative example 3. The golf club of the example 7 was adjusted to a specification of example 7-1 shown in Table 6 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 7 was adjusted to a specification of example 7-2 shown in Table 6 using the adjusting mechanism, and was evaluated. The example 7 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 8

[0427] A head having the adjusting mechanism M**1** (loft angle adjusting mechanism) and the adjusting mechanism M**3** (club length adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). The adjusting mechanism M**3** was provided in a hosel part of the back member **6**. A shaft (carbon shaft) and a grip were mounted to the head, to obtain a golf club according to example 8. The golf club was a number three wood golf club.

[0428] The example 8 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 7.

TABLE 7

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 8-1	Example 8-2
Loft angle (°)	16.5	17.5	15.5	17	15.5
Face angle (°)	3	5	1	3	3
Lie angle (°)	58.5	58	59	58.5	58.5
Distance of center of gravity (mm)	30	30	30	30	30
Club length (inch)	42	42	42	41.5	41.5
Balance	D1	D1	D1	D4	D9
Ball initial speed (m/s)	53	52.5	53	52	52
Launch angle (°)	20	23	17	22	18
Backspin amount (rpm)	3200	3500	3000	3200	2800
Side spin amount (rpm)	1500	1000	2000	700	500
Flight distance (yard)	170	160	165	172	175
Directivity (yard)	+25	+10	+40	+0	+0
Variable mechanism				Loft angle Club length	Loft angle Club length

[0429] The golf club of the example 8 can be adjusted to the specification of the comparative example 3. The golf club of the example 8 was adjusted to a specification of example 8-1 shown in Table 7 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 8 was adjusted to a specification of example 8-2 shown in Table 7 using the adjusting mechanism, and was evaluated. Also in the test, the example 8 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 9

[0430] A club having the adjusting mechanism M**1** (face angle adjusting mechanism), the adjusting mechanism M**3** (club length adjusting mechanism), the adjusting mechanism M**5** (head-center-of-gravity distance adjusting mechanism), and the adjusting mechanism M**6** (swingweight adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). The adjusting mechanism M**3** was provided in a hosel part of the back member **6**. A screw hole of the adjusting mechanism M**5** was formed in a sole part of the back member **6**. A shaft grip assembly having the adjusting mechanism M**6** was mounted to the head, to obtain a golf club according to example 9. The golf club was a number three wood golf club.

[0431] The example 9 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 8.

TABLE 8

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 9-1	Example 9-2
Loft angle (°)	16.5	17.5	15.5	16.5	16.5
Face angle (°)	3	5	1	5	6
Lie angle (°)	58.5	58	59	59	59
Distance of center of gravity (mm)	30	30	30	27	25
Club length (inch)	42	42	42	41.5	43
Balance	D1	D1	D1	D1	D1
Ball initial speed (m/s)	53	52.5	53	52.5	54
Launch angle (°)	20	23	17	20	20
Backspin amount (rpm)	3200	3500	3000	2800	3000

TABLE 8-continued

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 9-1	Example 9-2
Side spin amount (rpm)	1500	1000	2000	300	100
Flight distance (yard)	170	160	165	190	192
Directivity (yard)	+25	+10	+40	−5	+0
Variable mechanism				Face angle Club length Balance Distance of center of gravity	Face angle Club length Balance Distance of center of gravity

[0432] The golf club of the example 9 can be adjusted to the specification of the comparative example 3. The golf club of the example 9 was adjusted to a specification of example 9-1 shown in Table 8 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 9 was adjusted to a specification of example 9-**2** shown in Table 8 using the adjusting mechanism, and was evaluated. Also in the test, the example 9 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 10

[0433] A club having the adjusting mechanism M**1** (loft angle adjusting mechanism), the adjusting mechanism M**3** (club length adjusting mechanism), the adjusting mechanism M**5** (head-center-of-gravity distance adjusting mechanism), and the adjusting mechanism M**6** (swingweight adjusting mechanism) was produced. A front member **4** and back member **6** of the head were produced by a lost-wax precision casting using a titanium alloy (Ti-6Al-4V). The adjusting mechanism M**3** was provided in a hosel part of the back member **6**. A screw hole of the adjusting mechanism M**5** was formed in a sole part of the back member **6**. A shaft grip assembly having the adjusting mechanism M**6** was mounted to the head, to obtain a golf club according to example 10. The golf club was a number three wood golf club.

[0434] The example 10 was compared with the comparative examples 3 and 4. The specifications and evaluation results of the examples and comparative examples are shown in the following Table 9.

TABLE 9

Specifications and evaluation results of examples and comparative examples

	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 10-1	Example 10-2
Loft angle (°)	16.5	17.5	15.5	17	15.5
Face angle (°)	3	5	1	3	3
Lie angle (°)	58.5	58	59	58.5	58.5
Distance of center of gravity (mm)	30	30	30	27	25
Club length (inch)	42	42	42	41.5	41.5
Balance	D1	D1	D1	D1	D1
Ball initial speed (m/s)	53	52.5	53	53	53
Launch angle (°)	20	23	17	22	18
Backspin amount (rpm)	3200	3500	3000	3200	2800
Side spin amount (rpm)	1500	1000	2000	700	500
Flight distance (yard)	170	160	165	175	178
Directivity (yard)	+25	+10	+40	−5	+0
Variable mechanism				Loft angle Club length Balance Distance	Loft angle Club length Balance Distance

TABLE 9-continued

Specifications and evaluation results of examples and comparative examples					
	Comparative example 3	Comparative example 4-1	Comparative example 4-2	Example 10-1	Example 10-2
				of center of gravity	of center of gravity

[0435] The golf club of the example 10 can be adjusted to the specification of the comparative example 3. The golf club of the example 10 was adjusted to a specification of example 10-1 shown in Table 9 using the adjusting mechanism, and was evaluated. Furthermore, the golf club of the example 10 was adjusted to a specification of example 10-2 shown in Table 9 using the adjusting mechanism, and was evaluated. The example 10 had excellent adjustability, and provided good results in resolution of slice and a flight distance.

Example 11

[0436] A golf club provided with the adjusting mechanism M**7** and the adjusting mechanism M**8** was produced.

[0437] The adjusting mechanism M**7** was provided with two sleeves Sv having the inclination angle θ**1** of 0 degree. Positions of shaft insertion holes **150** were made different between the two sleeves Sv. In the first sleeve Sv, an axis line of the shaft insertion hole **150** was coaxial with a central axis line of a sleeve outer surface. On the other hand, in the second sleeve Sv, the axis line of the shaft insertion hole deviated from the central axis line of the sleeve outer surface. That is, in the second sleeve Sv, the shaft insertion hole was eccentric.

[0438] The adjusting mechanism M**8** was provided with two changing back members E**8** having different positions of centers of gravity.

[0439] In the golf club according to the example 11, a face progression could be changed by changing the sleeve Sv. A lie angle, a face angle, and a loft angle were not varied by changing the sleeve Sv. Furthermore, in the golf club, a position of a center of gravity of a head could be changed by changing the changing back members E**8**. In the golf club, the face progression and the position of the center of gravity of the head could be adjusted independently of each other.

Example 12

[0440] A golf club provided with the adjusting mechanism M**1** and the adjusting mechanism M**9** was produced.

[0441] The adjusting mechanism M**1** was provided with two changing front members E**4** which are different only in the loft angles.

[0442] The adjusting mechanism M**9** was provided with two outer side grip members **196** having different thicknesses.

[0443] In the golf club according to the example 12, a loft angle could be changed by changing the changing front member E**4**. A face angle was not varied by changing the changing front member E**4**. Furthermore, in the golf club, a thickness of a grip could be changed by changing the outer side grip member **196**. In the golf club, the loft angle and the thickness of the grip could be adjusted independently of each other.

Example 13

[0444] A golf club provided with the adjusting mechanism M**1** and the adjusting mechanism M**10** was produced.

[0445] The adjusting mechanism M**1** was provided with two changing front members E**4** which are different only in the face angles.

[0446] The adjusting mechanism M**10** was provided with one extending member **252***b*.

[0447] In the golf club according to the example 13, a face angle could be changed by changing the changing front member E**4**. A loft angle was not varied by changing the changing front member E**4**. Furthermore, in the golf club, a club length could be changed by mounting/demounting the extending member **252***b*. The face angle and the club length could be adjusted independently of each other.

Example 14

[0448] A golf club provided with the adjusting mechanism M**1** and the adjusting mechanism M**11** was produced. An exploded perspective view of a head according to example 14 is the same as that of the head **268** shown in FIGS. **33** and **34**.

[0449] In the example 14, a front member can be changed, and an adjusting intermediate member can be also changed. A face angle and a loft angle can be adjusted by changing only the front member. The face angle and the loft angle can be adjusted by changing only the adjusting intermediate member. Furthermore, various adjustments are enabled by combining the front members with the adjusting intermediate members.

Example 15

[0450] A golf club provided with the adjusting mechanism M**1** and the adjusting mechanism M**6** was produced.

[0451] The adjusting mechanism M**1** was provided with two changing front members E**4** which are different only in the face angles (see FIG. **3**).

[0452] The adjusting mechanism M**6** was provided with a plurality of weight bodies Wg having different weights in relation to each other (see FIG. **17**).

[0453] In the golf club according to the example 15, a face angle could be changed by changing the changing front member E**4**. Furthermore, in the golf club, a swingweight could be changed by changing and mounting/demounting the weight body Wg. The face angle and the swingweight could be adjusted independently of each other.

Example 16

[0454] A golf club provided with the adjusting mechanism M**1** and the adjusting mechanism M**8** was produced.

[0455] A head according to the example 16 was the same as the above-mentioned head **170** (see FIGS. **24** and **25**).

[0456] In the example 16, a plurality of front members **172** shown in FIG. **24** was prepared as the adjusting mechanism M**1**. The plurality of front members **172** had different face angles in relation to each other. Furthermore, in the example 16, a plurality of back members **174** having different volumes in relation to each other was prepared as the adjusting mechanism M**8**.

[0457] In the golf club according to the example 16, a face angle could be changed by changing the front member **172**. Furthermore, in the golf club, a head volume (a depth of a center of gravity and a moment of inertia of the head) could be changed by changing the back member **174**. The face angle and the head volume (the depth of a center of gravity and the moment of inertia of the head) could be adjusted independently of each other.

Example 17

[0458] A golf club provided with the adjusting mechanism M**1** and the adjusting mechanism M**10** was produced.

[0459] The adjusting mechanism M**1** was provided with two front members E**4** which are different only in the face angles (see FIG. **3**).

[0460] The adjusting mechanism M**10** was provided with two extending members **252***b* having an identical shape in relation to each other (see FIG. **31**).

[0461] In the golf club according to the example 17, a face angle could be changed by changing the changing front member E**4**. Furthermore, in the golf club, a club length (swingweight) could be changed by the number of the mounted extending members **252***b*. The face angle and the club length (swingweight) could be adjusted independently of each other.

Example 18

[0462] A golf club provided with the adjusting mechanism M**5** and the adjusting mechanism M**6** was produced.

[0463] The adjusting mechanism M**5** was provided with one weight body **104** (see FIG. **14**).

[0464] The adjusting mechanism M**6** was provided with a plurality of weight bodies Wg having different weights in relation to each other (see FIG. **17**).

[0465] In the golf club according to the example 18, a position of a center of gravity of a head could be changed by changing a position of the weight body **104**. Furthermore, in the golf club, a swingweight could be changed by changing and mounting/demounting the weight body Wg. The position of the center of gravity of the head and the swingweight could be adjusted independently of each other.

Example 19

[0466] A golf club provided with the adjusting mechanism M**5** and the adjusting mechanism M**8** was produced.

[0467] A basic structure of a head according to the example 19 was set as shown in FIG. **24**. Furthermore, a plurality of disposing holes Wh (see FIG. **15**) was formed in a front member **172** (see FIG. **24**) of the head. That is, the adjusting mechanism MS was provided in the front member **172**. The adjusting mechanism M**5** may be provided in the back member **174** (see FIG. **24**). That is, a plurality of disposing holes Wh (see FIG. **15**) maybe formed in the back member **174**.

[0468] The adjusting mechanism M**5** was provided with one weight body **104** (see FIG. **14**).

[0469] The adjusting mechanism M**8** was provided with a plurality of back member **174** having different volumes (see FIG. **24**).

[0470] In the golf club according to the example 19, a position of a center of gravity of the head could be changed by changing a position of the weight body **104**. Furthermore, in the golf club, a head volume could be changed by changing the back member **174**. The position of the center of gravity of the head and the head volume could be adjusted independently of each other.

[0471] On the other hand, the position of the center of gravity of the head was also varied by the adjusting mechanisms M**5**, and was also varied by the adjusting mechanisms M**8**. Therefore, the position of the center of gravity of the head could be variously adjusted. That is, a high degree of freedom was achieved in adjustment of the position of the center of gravity of the head.

Example 20

[0472] A golf club provided with the adjusting mechanism M**5** and the adjusting mechanism M**9** was produced.

[0473] The adjusting mechanism M**5** was provided with one weight body **104** (see FIG. **14**).

[0474] The adjusting mechanism M**9** was provided with a plurality of outer side grip members **196** having different thicknesses (see FIGS. **27** and **28**).

[0475] In the golf club according to the example 20, a position of a center of gravity of a head could be changed by changing a position of the weight body **104**. Furthermore, in the golf club, a thickness of a grip could be changed by changing the outer side grip member **196**. In the golf club, the position of the center of gravity of the head and the thickness of the grip could be adjusted independently of each other.

Example 21

[0476] A golf club provided with the adjusting mechanism M**5** and the adjusting mechanism M**10** was produced.

[0477] The adjusting mechanism M**5** was provided with one weight body **104** (see FIG. **14**).

[0478] The adjusting mechanism M**10** was provided with two extending members **252***b* having an identical shape in relation to each other (see FIG. **31**).

[0479] In the golf club according to the example 21, a position of a center of gravity of a head could be changed by changing a position of the weight body **104**. Furthermore, in the golf club, a club length (grip length and swingweight) could be changed by the number of the mounted extending members **252***b*. The position of the center of gravity of the head and the club length (grip length and swingweight) were adjusted independently of each other.

Example 22

[0480] A golf club provided with the adjusting mechanism M**6** and the adjusting mechanism M**8** was produced.

[0481] The adjusting mechanism M**6** was provided with a plurality of weight bodies Wg having different weights in relation to each other (see FIG. **17**).

[0482] The adjusting mechanism M**8** was provided with a plurality of back members **174** having different shapes (see FIGS. **24** and **25**).

[0483] In the golf club according to the example 22, a swingweight was changed by mounting/demounting and

changing the weight body Wg. Furthermore, in the golf club, a head shape could be changed by changing the back member **174**. The swingweight and the head shape were adjusted independently of each other.

Example 23

[0484] A golf club provided with the adjusting mechanism M**6** and the adjusting mechanism M**9** was produced.

[0485] The adjusting mechanism M**6** was provided with a plurality of weight bodies Wg having different weights in relation to each other (see FIG. **17**).

[0486] The adjusting mechanism M**9** was provided with a plurality of outer side grip members **196** having different thicknesses (see FIGS. **27** and **28**).

[0487] In the golf club according to the example 23, a swingweight was changed by mounting/demounting and changing the weight body Wg. Furthermore, in the golf club, a grip outer diameter was changed by changing the outer side grip member **196**. The swingweight and the grip outer diameter were adjusted independently of each other.

Example 24

[0488] A golf club provided with the adjusting mechanism M**6** and the adjusting mechanism M**10** was produced.

[0489] FIG. **36** is an exploded view of a grip part of the golf club according to the example 24. The golf club has the above-mentioned grip **252** (see FIG. **31**). Furthermore, the golf club has two weight bodies Wg.

[0490] A first weight body Wg**1** has a head part **300** and a body part **302**. The head part **300** is a disk-shaped. The body part **302** is a male screw. The head part **300** is coaxial with the body part **302**. A second weight body Wg**2** has a head part **300** and a body part **306**. The body part **306** is a male screw. The head part **300** is coaxial with the body part **306**. An axial length of the body part **302** is different from that of the body part **300**. The difference causes a weight difference between the weight body Wg**1** and the weight body Wg**2**.

[0491] The body parts **302** and **306** of the weight body Wg conforms to a screw hole sc**4** of the extending member **252***b*. The body parts **302** and **306** can be screwed into the screw hole sc**4**.

[0492] The adjusting mechanism M**10** in the example 24 is the same as that of the embodiment of FIG. **30**. On the other hand, the adjusting mechanism M**6** in the example 24 is different from that of the embodiment of FIG. **17**. The adjusting mechanism M**6** includes the weight body Wg and the extending member **252***b* as shown in FIG. **36**. A swingweight can be adjusted by mounting any of the weight bodies Wg to the extending member **252***b*. The swingweight can be adjusted by presence or absence of the mounted weight body Wg.

[0493] In the golf club according to the example 24, the swingweight was changed by mounting/demounting and changing the weight body Wg. Furthermore, in the golf club, the swingweight and a club length were changed by the number of the mounted extending members **252***b*. In the example 24, the club length can be adjusted. In the example 24, the swingweight could be variously adjusted by a combinations of the extending member **252***b* and the weight body Wg.

Example 25

[0494] A golf club provided with the adjusting mechanism M**8** and the adjusting mechanism M**9** was produced.

[0495] The adjusting mechanism M**8** was provided with two backmembers **174** having different positions of centers of gravity (see FIGS. **24** and **25**).

[0496] The adjusting mechanism M**9** was provided with a plurality of outer side grip members **196** having different thicknesses (see FIGS. **27** and **28**).

[0497] A position of a center of gravity of a head was changed by changing the back member **174** in the golf club according to the example 25. Furthermore, in the golf club, a grip outer diameter was changed by changing the outer side grip member **196**. The position of the center of gravity of the head and the grip outer diameter were adjusted independently of each other.

Example 26

[0498] A golf club provided with the adjusting mechanism M**8** and the adjusting mechanism M**10** was produced.

[0499] The adjusting mechanism M**8** was provided with two backmembers **174** having different positions of centers of gravity (see FIGS. **24** and **25**).

[0500] The adjusting mechanism M**10** was provided with two extending members **252***b* having an identical shape in relation to each other (see FIG. **31**).

[0501] In the golf club according to the example 26, a position of a center of gravity of a head was changed by changing the back member **174**. Furthermore, in the golf club, a swingweight and a club length were changed by the number of the mounted extending members **252***b*. The position of the center of gravity of the head and the swingweight (club length) were adjusted independently of each other.

Example 27

[0502] A golf club provided with the adjusting mechanism M**6** and the adjusting mechanism M**12** was produced.

[0503] The adjusting mechanism M**6** was provided with a plurality of weight bodies Wg having different weights in relation to each other (see FIG. **17**).

[0504] The adjusting mechanism M**12** was provided with a plurality of front members **282** having different loft angles in relation to each other (see FIG. **35**).

[0505] In the golf club according to the example 27, a swingweight was changed by changing the weight body Wg. Furthermore, in the golf club, a loft angle was changed by changing the front member **282**. The swingweight and the loft angle were adjusted independently of each other.

Example 28

[0506] A golf club provided with the adjusting mechanism M**10** and the adjusting mechanism M**12** was produced.

[0507] The adjusting mechanism M**10** was provided with two extending members **252***b* having an identical shape in relation to each other (see FIG. **31**).

[0508] The adjusting mechanism M**12** was provided with a plurality of front members **282** having different loft angles in relation to each other (see FIG. **35**).

[0509] In the golf club according to the example 28, a club length (swingweight) was changed by the number of the mounted extending members **252***b*. Furthermore, in the golf

club, a loft angle was changed by changing the front member **282**. The club length (swingweight) and the loft angle were adjusted independently of each other.

[0510] The combination of the adjusting mechanisms is not restricted to the combinations in these examples. The number of the combinations of the adjusting mechanisms is not also restricted. For example, any two selected from the adjusting mechanisms M**1** to M**12** can be combined. Any three selected from the adjusting mechanisms M**1** to M**12** can be combined.

[0511] The invention described above can be applied to all golf clubs such as a wood type, utility type, hybrid type, iron type, and putter type golf clubs.

[0512] The description hereinabove is merely for an illustrative example, and various modifications can be made in the scope not to depart from the principles of the present invention.

What is claimed is:

1. A golf club comprising:

a head;

a shaft; and

a grip;

wherein the head includes a front member and a back member detachably mounted to the front member.

2. The golf club according to claim **1**, wherein the head further includes a connecting member connecting the front member to the back member.

3. The golf club according to claim **2**, wherein the connecting member includes at least one screw.

4. The golf club according to claim **3**, wherein the front member has at least one screw hole into which the at least one screw is screwed.

5. The golf club according to claim **4**, wherein the back member has at least one through hole through which the at least one screw passes into the at least one screw hole of the front member.

6. The golf club according to claim **1**, wherein the front member has a hosel part having a shaft hole into which the shaft is inserted.

7. The golf club according to claim **1**, wherein the front member has an extending part supporting an inner side of an edge part of the back member.

8. The golf club according to claim **7**, wherein the extending part of the front member is located at an edge of an opening of the front member.

9. The golf club according to claim **1**, wherein the back member is press fitted into the front member.

10. The golf club according to claim **9**, wherein the back member has an engagement protruding part with an engaging groove, and the engagement protruding part of the back member is press fitted into an opening part of the front member.

11. The golf club according to claim **9**, wherein the front member has an inner extending part fitted into the engaging groove of the engagement protruding part of the back member to connect the front member to the back member.

12. The golf club according to claim **9**, wherein the engagement protruding part of the back member has an inclined surface facilitating press fitting of the back member into the front member.

13. The golf club according to claim **1**, wherein one or more disposing holes are formed in the front member or the back member for receiving one or more weight bodies.

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