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FASTENING DEVICE

Abstract

Provided is a fastening device including: a cover; a reel; and a base, in which the cover includes a flat portion, a first cover-side protruding portion, the reel includes a first reel-side flange portion, a first reel-side cylindrical portion, and a second reel-side flange portion, the base includes a base-side flange portion, a base-side protruding portion, and a claw, the reel is located on an inner peripheral side of the base-side protruding portion, the first cover-side protruding portion is located on the inner peripheral side of the base-side protruding portion and an outer peripheral side of the first reel-side flange portion, the ratchet gear and the claw are configured to engage with each other, and the first cover-side lock portion and a first reel-side lock portion are configured to engage with each other.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application is based on Japanese Patent Application No. 2024000384U filed with the Japan Patent Office on Feb. 8, 2024, the entire contents of which is hereby incorporated by reference.

BACKGROUND

1. Technical Field

[0002] The present disclosure relates to a fastening device made of synthetic resin.

2. Related Art

[0003] There has been known a fastening device used as a stopper for clothes. Particularly, shoelaces, which are inserted into shoelace holes such as grommets, of shoes such as sneakers are pulled to fasten shoe wing portions in order for the shoes to fit the foot size of a user. Accordingly, the degree of close contact between the shoes and the feet of the user is enhanced. Thus, the user can comfortably walk.

[0004] In a case where the user is, for example, a child of an early elementary school age or a preschool age or an elderly adult, it is not easy for the user to loosen and fasten the shoelaces. For this reason, there has been conventionally proposed a device for smoothly loosening and fastening shoelaces as described in Japanese Patent No. 6681386.

[0005] The fastening device described in Japanese Patent No. 6681386 has a reeling member **155** into which a wire L usable as, e.g., a shoelace is inserted and a rotation cover **151** for rotating the reeling member **155**. The wire L can be fastened by rotating the rotation cover **151** in one direction. Further, the reeling member **155** can be rotated in the other direction with the rotation cover **151** lifted. Both ends of the wire L are pulled in this state, and in this manner, the wire L can be loosened.

[0006] More specifically, the fastening device described in Japanese Patent No. 6681386 has an intermediate member **153** having a lock joint portion **153f**. The intermediate member **153** moves integrally with the rotation cover **151**. The reeling member **155** has a lock engagement portion **155f** joined to the lock joint portion **153f**.

[0007] When the wire L is fastened, the rotation cover **151** and the intermediate member **153** are lowered. Accordingly, the lock joint portion **153f** and the lock engagement portion **155f** are joined to each other. When the wire L is loosened, the rotation cover **151** and the intermediate member **153** are lifted. Accordingly, the lock joint portion **153f** and the lock engagement portion **155f** are released from each other.

SUMMARY

[0008] A fastening device according to an embodiment of the present disclosure includes: a cover; a reel; and a base. In the fastening device, the cover includes a flat portion, a first cover-side protruding portion, a first cover-side lock portion, and a ratchet gear, the first cover-side protruding portion is provided at a lower surface of the flat portion, and protrudes downward, the first cover-side lock portion is provided at an inner peripheral surface of the first cover-side protruding portion, the ratchet gear is provided at an outer peripheral surface of the first cover-side protruding portion, the reel includes a first reel-side flange portion, a first reel-side cylindrical portion, and a second reel-side flange portion, the first reel-side flange portion is provided, at an outer peripheral surface thereof, with a first reel-side lock portion, the first reel-side cylindrical portion is provided at a lower surface of the first reel-side flange portion, and protrudes downward, the second reel-side flange portion is provided at a lower end of the first reel-side cylindrical portion, the base includes a base-side flange portion, a base-side protruding portion, and a claw, the base-side protruding portion is provided at an upper surface of the base-side flange portion, and protrudes

upward, the claw is provided at an inner peripheral surface of the base-side protruding portion, the reel is located on an inner peripheral side of the base-side protruding portion, the first cover-side protruding portion is located on the inner peripheral side of the base-side protruding portion and an outer peripheral side of the first reel-side flange portion, the ratchet gear and the claw are configured to engage with each other, and the first cover-side lock portion and the first reel-side lock portion are configured to engage with each other.

Description

BRIEF DESCRIPTION OF DRAWINGS

[0009] FIG. 1 is a perspective view of a fastening device according to a first embodiment;

[0010] FIG. 2 is an exploded perspective view of the fastening device according to the first embodiment;

[0011] FIG. 3A is a bottom perspective view of a cover used in the first embodiment, and FIG. 3B is a front view of a reel used in the first embodiment;

[0012] FIG. 4A is a plan view of the fastening device according to the first embodiment upon unlocking, and FIG. 4B is a sectional view of the fastening device of FIG. 4A taken along A-A line;

[0013] FIG. 5A is a front view of the fastening device according to the first embodiment upon unlocking, and FIG. 5B is a sectional view of the fastening device of FIG. 5A taken along B-B line;

[0014] FIG. 6A is a plan view of the fastening device according to the first embodiment upon locking, and FIG. 6B is a sectional view of the fastening device of FIG. 6A taken along C-C line;

[0015] FIG. 7A is a front view of the fastening device according to the first embodiment upon locking, and FIG. 7B is a sectional view of the fastening device of FIG. 7A taken along D-D line;

[0016] FIG. 8 is a perspective view of a fastening device according to a second embodiment;

[0017] FIG. 9 is an exploded perspective view of the fastening device according to the second embodiment;

[0018] FIG. 10A is a bottom perspective view of a shaft used in the second embodiment, FIG. 10B is a bottom perspective view of a cover used in the second embodiment, and FIG. 10C is a front view of a reel used in the second embodiment;

[0019] FIG. 11A is a plan view of the fastening device according to the second embodiment upon unlocking, and FIG. 11B is a sectional view of the fastening device of FIG. 11A taken along E-E line;

[0020] FIG. 12A is a front view of the fastening device according to the second embodiment upon unlocking, and FIG. 12B is a sectional view of the fastening device of FIG. 12A taken along F-F line;

[0021] FIG. 13A is a plan view of the fastening device according to the second embodiment upon locking, and FIG. 13B is a sectional view of the fastening device of FIG. 13A taken along G-G line; and

[0022] FIG. 14A is a front view of the fastening device according to the second embodiment upon locking, and FIG. 14B is a sectional view of the fastening device of FIG. 14A taken along H-H line.

DETAILED DESCRIPTION

[0023] In the following detailed description, for purpose of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that one or more embodiments may be practiced without these specific details. In other instances, well-known structures and devices are schematically shown in order to simplify the drawing.

[0024] However, in the configuration of the fastening device described in Japanese Patent No. 6681386, the lock joint portion **153f** protrudes downward from the intermediate member **153**.

Moreover, the lock engagement portion **155f** protrudes upward from the reeling member **155**. Thus, the entire thickness of the fastening device in the up-down direction thereof is great. For this reason, there is a high probability of the fastening device being caught by other members upon, e.g., walking.

[0025] In addition, the fastening device described in Japanese Patent No. 6681386 includes many components such as the rotation cover **151**, the intermediate member **153**, the reeling member **155**, a housing **157**, and a support portion **160**. For this reason, a production cost may be high.

[0026] The present embodiment has been developed in view of the above-described problems. The present embodiment is intended to provide a fastening device having, as a whole, a smaller thickness in the up-down direction than that of a general fastening device made of synthetic resin and having a lower probability of the device being caught by other members. Moreover, the present embodiment is intended to reduce a cost for producing the fastening device by reducing the number of components.

[0027] The fastening device according to the embodiment of the present disclosure has the following configurations in order to accomplish the above-described objects.

Configuration 1

[0028] A fastening device (**100, 200**) is configured to include: a cover (**110, 210**); a reel (**120, 220**); and a base (**130, 230**). The cover (**110, 210**) includes a flat portion (**111, 211**), a first cover-side protruding portion (**112, 212**), a first cover-side lock portion (**112a, 212a**), and a ratchet gear (**112b, 212b**), the first cover-side protruding portion (**112, 212**) is provided at a lower surface of the flat portion (**111, 211**), and protrudes downward, the first cover-side lock portion (**112a, 212a**) is provided at an inner peripheral surface of the first cover-side protruding portion (**112, 212**), the ratchet gear (**112b, 212b**) is provided at an outer peripheral surface of the first cover-side protruding portion (**112, 212**), the reel (**120, 220**) includes a first reel-side flange portion (**121, 221**), a first reel-side cylindrical portion (**122, 222**), and a second reel-side flange portion (**123, 223**), the first reel-side flange portion (**121, 221**) is provided, at an outer peripheral surface thereof, with a first reel-side lock portion (**121a, 221a**), the first reel-side cylindrical portion (**122, 222**) is provided at a lower surface of the first reel-side flange portion (**121, 221**), and protrudes downward, the second reel-side flange portion (**123, 223**) is provided at a lower end of the first reel-side cylindrical portion (**122, 222**), the base (**130, 230**) includes a base-side flange portion (**131, 231**), a base-side protruding portion (**132, 232**), and a claw (**132a, 232a**), the base-side protruding portion (**132, 232**) is provided at an upper surface of the base-side flange portion (**131, 231**), and protrudes upward, the claw (**132a, 232a**) is provided at an inner peripheral surface of the base-side protruding portion (**132, 232**), the reel (**120, 220**) is located on an inner peripheral side of the base-side protruding portion (**132, 232**), the first cover-side protruding portion (**112, 212**) is located on the inner peripheral side of the base-side protruding portion (**132, 232**) and an outer peripheral side of the first reel-side flange portion (**121, 221**), the ratchet gear (**112b, 212b**) and the claw (**132a, 232a**) are configured to engage with each other, and the first cover-side lock portion (**112a, 212a**) and the first reel-side lock portion (**121a, 221a**) are configured to engage with each other.

Configuration 2

[0029] The cover (**110, 210**) is movable upward relative to the reel (**120, 220**) and the base (**130, 230**), and when the cover (**110, 210**) moves upward, the first cover-side lock portion (**112a, 212a**) and the first reel-side lock portion (**121a, 221a**) disengage from each other.

Configuration 3

[0030] The first cover-side lock portion (**112a, 212a**) has a recessed-raised shape, and is provided over an entirety of the inner peripheral surface of the first cover-side protruding portion (**112, 212**), the ratchet gear (**112b, 212b**) has a recessed-raised shape, and is provided over an entirety of the outer peripheral surface of the first cover-side protruding portion (**112, 212**) as the recessed-raised shape, the recessed-raised shape of the ratchet gear (**112b, 212**) has a dimension greater than that of

the recessed-raised shape of the first cover-side lock portion (112a, 212a), and the claw (132a, 232a) has a dimension greater than that of the first reel-side lock portion (121a, 221a).

[0031] (Configuration 4) The first reel-side lock portion (121a, 221a) includes first reel-side lock portions (121a, 221a) provided at an interval of 90 degrees at the outer peripheral surface of the first reel-side flange portion (121, 221).

Configuration 5

[0032] When the cover (110) moves upward, the claw (132a) and the ratchet gear (112b) disengage from each other.

Configuration 6

[0033] The reel (120) includes a second reel-side cylindrical portion (124) and a second reel-side lock portion (124a, 124b), the second reel-side cylindrical portion (124) protrudes upward from a center position of the first reel-side flange portion (121, 221), the second reel-side lock portion (124a, 124b) is provided at an upper end of the second reel-side cylindrical portion (124), and extends to outer and inner peripheral sides of the second reel-side cylindrical portion (124), the cover (110) includes a cover-side cylindrical portion (114), a second cover-side protruding portion (115), and a second cover-side lock portion (115a), the cover-side cylindrical portion (114) protrudes upward from a center position of the flat portion (111), and has an upper end portion (114b), the second cover-side protruding portion (115) is provided at a center of a lower surface of the upper end portion (114b), and protrudes downward, the second cover-side lock portion (115a) is provided at an outer peripheral surface of the second cover-side protruding portion (115), when the first cover-side lock portion (112a) and the first reel-side lock portion (121a) engage with each other, the second reel-side lock portion (124b) engages with an upper portion of the second cover-side lock portion (115a), and when the cover (110) moves upward and the first cover-side lock portion (112a) and the first reel-side lock portion (121a) disengage from each other, the second reel-side lock portion (124a) engages with the flat portion (111) on the outer peripheral side, and the second reel-side lock portion (124b) on the inner peripheral side engages with a lower portion of the second cover-side lock portion (115a).

Configuration 7

[0034] The base (130) includes a retaining portion (132c) provided at the inner peripheral surface of the base-side protruding portion (132), and the second reel-side flange portion (123) is fixed to the base (130) by the retaining portion (132c).

Configuration 8

[0035] The fastening device (200) further includes: a shaft-side flange portion (251); a shaft-side protruding portion (252); and a shaft (250). The shaft-side protruding portion (252) is provided at a center of a lower surface of the shaft-side flange portion (251), and protrudes downward, the shaft (250) includes a shaft-side lock portion (252a) provided at an outer peripheral surface of the shaft-side protruding portion (252), the cover (210) includes a substantially circular second cover-side engagement portion (214), the second cover-side engagement portion (214) is provided at a center position of the flat portion (211), is elastically deformable in a radial direction, and at a center thereof, includes a second cover-side opening (214a). When the first cover-side lock portion (212a) and the first reel-side lock portion (221a) engage with each other, the second cover-side engagement portion (214) engages with a lower end side of the shaft-side lock portion (252a), and when the cover (210) moves upward, the first cover-side lock portion (212a) and the first reel-side lock portion (221a) disengage from each other, the second cover-side engagement portion (214) engages with an upper end side of the shaft-side lock portion (252a).

Configuration 9

[0036] The shaft (250) includes a small diameter portion (252b) and a screw hole (252d), the small diameter portion (252b) has a smaller diameter, and is provided lower than the shaft-side lock portion (252a), the screw hole (252d) is provided at a center of a lower end of the shaft-side protruding portion (252), the reel (220) includes a reel-side protruding portion (222b), the reel-side

protruding portion (222b) is provided at an inner peripheral surface of the first reel-side cylindrical portion (222), and protrudes to an inner peripheral side, the base (230) includes a screw insertion hole (233a) at a center of the base-side flange portion (231), and the screw hole (252d) is configured such that the small diameter portion (252b) is located at the reel-side protruding portion (222b) and a screw (260) is screwed into the screw hole (252d) through the screw insertion hole (233a).

[0037] The fastening device (100, 200) according to the present embodiment has the configurations described above. With these configurations, the fastening device (100, 200) provided by the present embodiment has a smaller thickness in the up-down direction than that of the general fastening device made of synthetic resin. In addition, the configuration of the fastening device can be simplified.

[0038] Hereinafter, the present embodiment will be described with reference to the drawings. These embodiments are not independent of each other. Those skilled in the art can combine these embodiments as necessary without excessive description. Moreover, those skilled in the art can also grasp synergistic effects of these combinations. Description of elements overlapping between the embodiments will be omitted in principle.

[0039] In the description of the present embodiment, directions will be defined as follows. An up-down direction is a direction in which a rotary operation axis of a fastening device 100 extends (specifically, up-down direction in a sectional view shown in FIG. 4B). A direction from a cover 110, 210 to a base 130, 230 as described later will be defined as a down direction. Conversely, a direction from the base 130, 230 to the cover 110, 210 will be defined as an up direction.

First Embodiment

[0040] A first embodiment of the present disclosure will be described with reference to FIGS. 1 to 7B.

[0041] A fastening device 100 includes a cover 110, a reel 120, and a base 130.

[0042] FIG. 1 is a view showing the assembled fastening device 100.

[0043] The size of the fastening device 100 is changed, for example, according to the thickness of a cord 140 or a use application. In a case where the use application is shoes, a length (diameter) in a radial direction is preferably about 35 millimeters. A thickness in the up-down direction is about 10 millimeters.

(Cover 110)

[0044] The cover 110 is formed using thermoplastic resin such as polyamide, polyacetal, polypropylene, polyethylene terephthalate, polyethylene, or ABS. As shown in FIGS. 2 and 3A, the cover 110 has a flat portion 111, a first cover-side protruding portion 112, an operation portion 113, a first cover-side lock portion 112a, a ratchet gear 112b, a cover-side cylindrical portion 114, a second cover-side protruding portion 115, and a second cover-side lock portion 115a. A first cover-side opening 111a is provided in a center portion of the flat portion 111. The first cover-side protruding portion 112 is provided at the lower surface of the flat portion 111, and protrudes downward. The operation portion 113 is provided at the lower surface of the outer peripheral end of the flat portion 111, and protrudes downward. The first cover-side lock portion 112a is provided at the inner peripheral surface of the first cover-side protruding portion 112. The ratchet gear 112b is provided at the outer peripheral surface of the first cover-side protruding portion 112. The cover-side cylindrical portion 114 protrudes upward from the first cover-side opening 111a, and in a side portion thereof, has a second cover-side opening 114a. The cover-side cylindrical portion 114 further has an upper end portion 114b. The second cover-side protruding portion 115 is provided at the center of the lower surface of the upper end portion 114b, and protrudes downward. The second cover-side lock portion 115a is provided at the outer peripheral surface of the second cover-side protruding portion 115.

[0045] As shown in FIG. 4A, the flat portion 111 has a circular shape in plan view. As shown in FIG. 5B, the first cover-side protruding portion 112 and the operation portion 113 have circular ring

shapes.

[0046] The first cover-side lock portion **112a** provided at the inner peripheral surface of the first cover-side protruding portion **112** is configured to engage with a first reel-side lock portion **121a** of the reel **120** described later. The ratchet gear **112b** provided at the outer peripheral surface (surface facing the first cover-side lock portion **112a**) of the first cover-side protruding portion **112** is configured to engage with a claw **132a** of the base **130** described later.

[0047] As shown in FIG. 5B, the first cover-side lock portion **112a** has a recessed-raised shape, and is provided over the entire inner peripheral surface of the first cover-side protruding portion **112**. The ratchet gear **112b** has a recessed-raised shape, and is provided over the entire outer peripheral surface of the first cover-side protruding portion **112**. The ratchet gear **112b** is configured such that the recessed-raised shape of the ratchet gear **112b** has a dimension greater than that of the recessed-raised shape of the first cover-side lock portion **112a**.

[0048] As shown in FIG. 4B, the first cover-side protruding portion **112** provided with the first cover-side lock portion **112a** and the ratchet gear **112b** does not protrude downward beyond the operation portion **113** provided at the lower surface of the outer peripheral end of the flat portion **111**. With this configuration, when the fastening device **100** is attached to clothes, the first cover-side protruding portion **112** is not visible from a user. Thus, design can be improved.

[0049] Preferably, an anti-slip portion is provided at the peripheral surface of the operation portion **113**. The configuration of the anti-slip portion is not particularly limited. For example, as shown in FIG. 2, a recessed-raised portion may be provided as the anti-slip portion in the outer peripheral surface of the operation portion **113**.

[0050] As shown in FIG. 4B, the second cover-side opening **114a** of the cover-side cylindrical portion **114** protruding upward from the first cover-side opening **111a** has such a shape that an end portion of a second reel-side lock portion **124a** of the reel **120** described later is fitted therein. Two second cover-side opening **114a** are provided at opposing positions (positions apart from each other by 180 degrees) at the side surface of the cover-side cylindrical portion **114**.

[0051] The second cover-side protruding portion **115** has a substantially circular columnar shape. As shown in FIG. 4B, the second cover-side protruding portion **115** is configured to fit in the second reel-side cylindrical portion (**124**) of the reel **120** described later.

[0052] The second cover-side lock portion **115a** provided at the outer peripheral surface of the second cover-side protruding portion **115** is configured to engage with a second reel-side lock portion **124b** of the reel **120** described later.

(Reel **120**)

[0053] As in the cover **110**, the reel **120** is formed using thermoplastic resin such as polyamide, polyacetal, polypropylene, polyethylene terephthalate, polyethylene, or ABS. As shown in FIGS. 2 and 3B, the reel **120** has a first reel-side flange portion **121**, a first reel-side cylindrical portion **122**, a reel-side cord insertion hole **122a**, a second reel-side flange portion **123**, the second reel-side cylindrical portion **124**, and the second reel-side lock portions **124a**, **124b**. The first reel-side lock portion **121a** is provided at the outer peripheral surface of the first reel-side flange portion **121**. The first reel-side cylindrical portion **122** is provided at the lower surface of the first reel-side flange portion **121**, and protrudes downward. The reel-side cord insertion hole **122a** is provided in a side portion of the first reel-side cylindrical portion **122**. The second reel-side flange portion **123** is provided at the lower end of the first reel-side cylindrical portion **122**. The second reel-side cylindrical portion **124** protrudes upward from the center position of the first reel-side flange portion **121**. The second reel-side lock portions **124a**, **124b** are provided at an upper end portion of the second reel-side cylindrical portion **124**, and extend to the outer peripheral side and inner peripheral side of the second reel-side cylindrical portion **124**.

[0054] As shown in FIG. 2, the first reel-side flange portion **121** and the second reel-side flange portion **123** have circular shapes.

[0055] As shown in FIG. 6B, the thickness of the first reel-side flange portion **121** in the height

direction thereof is substantially the same as the thickness of the first cover-side protruding portion **112** of the cover **110** in the height direction thereof.

[0056] As shown in FIG. **6B**, the diameter of the first reel-side flange portion **121** is substantially the same as the diameter of the circular shape defined by the inner peripheral surface of the first cover-side protruding portion **112** of the cover **110**. With this configuration, the first reel-side lock portion **121a** can engage with the first cover-side lock portion **112a** provided at the inner peripheral surface of the first cover-side protruding portion **112**.

[0057] The first reel-side lock portion **121a** includes first reel-side lock portions **121a** provided at an interval of 90 degrees at the outer peripheral surface of the first reel-side flange portion **121**.

[0058] If the interval of the first reel-side lock portions **121a** is less than 90 degrees, when the reel **120** is integrally produced by resin injection molding using a mold, undercut is caused between the first reel-side lock portions **121a** in the resin injection molding. For this reason, a mold for forming an undercut portion needs to be additionally prepared.

[0059] However, in a case where the interval of the first reel-side lock portions **121a** is 90 degrees, the reel **120** can be molded without the need for an additional mold for forming an undercut portion of the first reel-side lock portion **121a**. Thus, the reel **120** can be more easily produced.

[0060] The reel-side cord insertion hole **122a** includes two reel-side cord insertion holes **122a** provided at opposing positions (positions apart from each other by 180 degrees) in the side portion of the first reel-side cylindrical portion **122** provided at the lower surface of the first reel-side flange portion **121** and protruding downward.

[0061] The reel-side cord insertion hole **122a** is configured to communicate with a base-side cord insertion hole **132b** of the base **130** described later.

[0062] The reel-side cord insertion hole **122a** has a shape smaller than a cord-side lock portion **141** provided at the cord **140** described later. With this size, the cord-side lock portion **141** is caught by the reel-side cord insertion hole **122a** when the cord **140** is pulled. Thus, when the cord **140** is reeled by rotation of the reel **120**, misalignment of the cord **140** from a reeling position or rotation of the reel **120** without reeling the cord **140** can be reduced.

[0063] As shown in FIG. **3B**, two slits **124c** are provided at opposing positions (positions apart from each other by 180 degrees) in a side portion of the second reel-side cylindrical portion **124** protruding upward from the center position of the first reel-side flange portion **121**. With these slits **124c**, the second reel-side cylindrical portion **124** is elastically deformable in the radial direction.

[0064] The second reel-side lock portions **124a**, **124b** extending to the outer peripheral side and inner peripheral side of the second reel-side cylindrical portion **124** are provided at an upper end portion of the second reel-side cylindrical portion **124**. As shown in FIG. **4B**, the second reel-side lock portion **124a** is configured to engage with the flat portion **111** of the cover **110**. The second reel-side lock portion **124b** is configured to engage with the second cover-side lock portion **115a** provided at the second cover-side protruding portion **115**.

[0065] Specifically, the outer diameter of the second reel-side cylindrical portion **124** and the diameter of the first cover-side opening **111a** are substantially the same as each other. Thus, the second reel-side lock portion **124a** extending to the outer peripheral side of the second reel-side cylindrical portion **124** can engage with the flat portion **111** at the position at which the second cover-side opening **111a** is provided. The second reel-side lock portion **124b** extending to the inner peripheral side of the second reel-side cylindrical portion **124** defines a hole into which the second cover-side protruding portion **115** is to be inserted. The diameter of such a hole and the outer diameter of the second cover-side protruding portion **115** are substantially the same as each other. Thus, the second reel-side lock portion **124b** can engage with the second cover-side lock portion **115a**.

(Base **130**)

[0066] As in the cover **110** and the like, the base **130** is formed using thermoplastic resin such as polyamide, polyacetal, polypropylene, polyethylene terephthalate, polyethylene, or ABS. As shown

in FIG. 2, the base **130** has a base-side flange portion **131**, a base-side protruding portion **132**, the claw **132a**, the base-side cord insertion hole **132b**, and a retaining portion **132c**. The base-side protruding portion **132** is provided at the upper surface of the base-side flange portion **131**, and protrudes upward. The claw **132a** is provided at the inner peripheral surface of the base-side protruding portion **132**. The base-side cord insertion hole **132b** is provided in a side portion of the base-side protruding portion **132**. The retaining portion **132c** is provided at the inner peripheral surface of the base-side protruding portion **132**.

[0067] As shown in FIG. 2, the base-side protruding portion **132** has a substantially circular ring shape as a whole.

[0068] In the configuration of the base-side protruding portion **132**, the inner diameter of the base-side protruding portion **132** is greater than the diameter of the second reel-side flange portion **123** so that the second reel-side flange portion **123** of the reel **120** can be housed therein.

[0069] As shown in FIG. 2, the retaining portion **132c** is provided at the inner peripheral surface of the base-side protruding portion **132**. The retaining portion **132c** has such a shape that an upper end portion of the second reel-side flange portion **123** housed in the base **130** can be covered therewith. Thus, detachment of the second reel-side flange portion **123** housed in the base **130** can be reduced with a simple configuration.

[0070] As shown in FIG. 2, the retaining portion **132c** includes two retaining portions **132c** provided at opposing positions (positions apart from each other by 180 degrees). Note that the number of retaining portions **132c** can be adjusted as necessary, for example, according to the arrangement and sizes of the claw **132a** and the base-side cord insertion hole **132b**.

[0071] As shown in FIG. 2, the claw **132a** of the base-side protruding portion **132** has a shape obtained by bending the base-side protruding portion **132** to the inner peripheral side.

[0072] A slit **132d** extending in a circumferential direction is provided in an inner peripheral portion of the base-side protruding portion **132** at the position at which the claw **132a** is provided. With this configuration, the claw **132a** is easily elastically deformable in the radial direction of the base-side protruding portion **132**.

[0073] As shown in FIG. 2, the claw **132a** includes two claws **132a** provided at opposing positions (positions apart from each other by 180 degrees). Note that the number of claws **132a** can be adjusted as necessary, for example, according to the arrangement and sizes of the retaining portion **132c** and the base-side cord insertion hole **132b**.

[0074] The claw **132a** is configured to engage with the ratchet gear **112b** of the cover **110**.

[0075] The claw **132a** has a shape fitting the recessed-raised shape of the ratchet gear **112b**. For example, when the recessed-raised shape of the ratchet gear **112b** is large, the claw **132a** is preferably configured to further protrude to the inner peripheral side in accordance with such a recessed-raised shape. With this configuration, the claw **132a** and the ratchet gear **112b** can adjust resistance generated when the cover **110** is rotated.

[0076] As shown in FIG. 2, the base-side protruding portion **132** has two base-side cord insertion holes **132b** located at opposing positions (positions apart from each other by 180 degrees).

[0077] The positions at which the base-side cord insertion holes **132b** are located are not limited to the positions at which the base-side cord insertion holes **132b** face each other. Note that the positions at which the base-side cord insertion holes **132b** face each other are preferred, for example, in consideration of easy communication with the reel-side cord insertion holes **122a** of the reel **120**.

[0078] The number of base-side cord insertion holes **132b** is not limited to two. Note that the two base-side cord insertion holes **132b** are preferred, for example, in consideration of easy communication with the reel-side cord insertion holes **122a** of the reel **120**.

(Cord **140**)

[0079] As shown in FIG. 4B, the cord-side lock portion **141** is formed in the vicinity of the center of the cord **140** or the vicinity of an end portion of the cord **140**.

[0080] The cord-side lock portion **141** has a shape larger than the reel-side cord insertion hole **122a** of the reel **120**. With this size, in this configuration, the cord-side lock portion **141** is less likely to be detached from the first reel-side cylindrical portion **122** after having placed in the first reel-side cylindrical portion **122**.

[0081] With this configuration, when the cord **140** is reeled by rotation of the reel **120**, misalignment of the cord **140** from the reeling position and rotation of the reel **120** without reeling the cord **140** can be reduced.

(Method for Assembling Fastening Device **100**)

[0082] A method for assembling the fastening device **100** will be described.

[0083] First, the cord **140** is inserted into the reel-side cord insertion hole **122a** and the base-side cord insertion hole **132b**. Thereafter, the reel **120** is pushed in from the upper side to the lower side in the up-down direction until the second reel-side flange portion **123** fits in the retaining portion **132c** of the base **130** in the base-side protruding portion **132** of the base **130**. Thereafter, the cover **110** is pushed in from the upper side to the lower side in the up-down direction such that the second cover-side protruding portion **115** of the cover **110** fits in the second reel-side cylindrical portion **124** of the reel **120**. In this manner, the assembly is completed.

[0084] As shown in FIG. 2, the upper surface of the retaining portion **132c** of the base **130** is a tapered surface inclined downward toward the inside of the base-side protruding portion **132** in the radial direction. Thus, when the reel **120** is pushed in from the upper side to the lower side in the up-down direction, the second reel-side flange portion **123** is guided downward. In addition, the retaining portion **132c** is elastically deformed outward in the radial direction of the base-side protruding portion **132**. Thus, when the second reel-side flange portion **123** reaches a position (unlock position) shown in FIG. 4B, the retaining portion **132c** elastically deformed outward in the radial direction of the base-side protruding portion **132** returns to an original shape, and contacts an end portion of the second reel-side flange portion **123**. At this time, click sound is generated. This sound makes the user or manufacturer of the fastening device **100** grasp that the second reel-side flange portion **123** is fixed to the base **130**.

[0085] The second reel-side cylindrical portion **124** of the reel **120** has the slits **124c**. The outer diameter of the second reel-side lock portion **124a** extending to the outer peripheral side of the second reel-side cylindrical portion **124** is greater than the inner diameter of the first cover-side opening **111a** of the cover **110**. Thus, the cover **110** is pushed in from the upper side to the lower side in the up-down direction such that the second cover-side protruding portion **115** of the cover **110** fits in the second reel-side cylindrical portion **124**. At this time, the second reel-side lock portion **124a** extending to the outer peripheral side is pushed by the first cover-side opening **111a** of the cover **110**. As a result, the second reel-side cylindrical portion **124** is elastically deformed inward in the radial direction.

[0086] In this manner, the flat portion **111** reaches the position (unlock position) shown in FIG. 4B. At this time, the second reel-side cylindrical portion **124** elastically deformed inward in the radial direction returns to an original shape, and contacts an end portion of the flat portion **111**.

Accordingly, click sound is generated. This sound makes the user or manufacturer of the fastening device **100** grasp that the cover **110** is fixed at the position (unlock position) shown in FIG. 4B.

[0087] The cover **110** is further pushed in downward from the position (unlock position) shown in FIG. 4B. Then, the second reel-side lock portion **124b** extending to the inner peripheral side is pushed by the second cover-side lock portion **115a** of the cover **110**. As a result, the second reel-side cylindrical portion **124** is elastically deformed outward in the radial direction.

[0088] In this manner, the second cover-side lock portion **115a** reaches a position (lock position) shown in FIG. 6B. At this time, the second reel-side cylindrical portion **124** elastically deformed outward in the radial direction returns to the original shape, and contacts the outer peripheral surface of the second cover-side protruding portion **115**. Accordingly, click sound is generated.

This sound makes the user or manufacturer of the fastening device **100** grasp that the cover **110** is

fixed at the position (lock position) shown in FIG. 6B.

[0089] In the above-described configuration, the recessed-raised shape of the ratchet gear **112b** of the cover **110** has the dimension greater than that of the recessed-raised shape of the first cover-side lock portion **112a**, as shown in FIG. 5B. The claw **132a** of the base **130** has a dimension greater than that of the first reel-side lock portion **121a**.

[0090] With this configuration, the recessed-raised shapes of the first cover-side lock portion **112a** and the first reel-side lock portion **121a** are relatively small. Thus, when the fastening device **100** is assembled, both these portions more easily engage with each other. In addition, the recessed-raised shapes of the ratchet gear **112b** and the claw **132a** are relatively large. Thus, when the cover **110** rotates to reel the cord **140**, resistance in a rotation direction increases. As a result, the cord **140** is less likely to be naturally loosened.

(Method for Unlocking Fastening Device **100**)

[0091] A method for using the fastening device **100**, particularly a method (unlocking method) for moving the cover **110** from the position (lock position) shown in FIG. 6B to the position (unlock position) shown in FIG. 4B, will be described.

[0092] The unlocking method includes only lifting, using the operation portion **113** of the cover **110**, the cover **110** upward relative to the reel **120** and the base **130**.

[0093] The cover **110** is lifted upward relative to the reel **120** and the base **130** from the lock position as described above. Then, the claw **132a** of the base **130** and the ratchet gear **112b** of the cover **110** disengage from each other, and the first cover-side lock portion **112a** and the first reel-side lock portion **121a** disengage from each other. In this manner, the cover **110** reaches the unlock position. At the unlock position, the reel **120** is freely rotatable.

[0094] At the unlock position, the cord **140** extending out of the fastening device **100** is pulled from both sides of the fastening device **100**. In this manner, the cord **140** can be loosened.

[0095] Certain friction force acts between the second reel-side lock portion **124b** extending to the inner peripheral side of the second reel-side flange portion **123** and, for example, the second cover-side protruding portion **115**. Thus, the cord **140** can also be loosened by rotating the cover **110** at the unlock position in a direction of loosening the cord **140**.

[0096] When the cover **110** is at the unlock position, a lower portion of the second reel-side lock portion **124a** on the outer peripheral side of the second reel-side cylindrical portion **124** engages with an upper portion of the flat portion **111** of the cover **110**, as shown in FIG. 4B. In addition, an upper portion of the second reel-side lock portion **124b** on the inner peripheral side of the second reel-side cylindrical portion **124** engages with a lower portion of the second cover-side lock portion **115a** of the cover **110**.

[0097] Thus, when the cover **110** is at the unlock position, an unlock state of the fastening device **100** can be maintained.

[0098] In the embodiment shown in FIG. 4B, when the cover **110** is at the unlock position, the claw **132a** of the base **130** and the ratchet gear **112b** of the cover **110** disengage from each other. Note that both these portions do not necessarily disengage from each other.

[0099] For example, the amount of upward protrusion of the base-side protruding portion **132** and the claw **132a** can be set greater than that of the first reel-side flange portion **121**. In this case, the claw **132a** and the ratchet gear **112b** do not disengage from each other.

[0100] Note that in a case where the claw **132a** of the base **130** and the ratchet gear **112b** of the cover **110** do not disengage from each other as described above when the cover **110** is at the unlock position, the cover **110** is supported not only at a center portion (second cover-side protruding portion **115**) thereof but also an outer peripheral portion (ratchet gear **112b**) thereof upon unlocking. Thus, the cover **110** is stably held. As a result, there is an advantage that an operation of moving the cover **110** from the unlock position to the lock position is facilitated.

(Method for Locking Fastening Device **100**)

[0101] A method for using the fastening device **100**, particularly a method (locking method) for

moving the cover **110** from the position (unlock position) shown in FIG. 4B to the position (lock position) shown in FIG. 6B, will be described.

[0102] The locking method includes only pushing in the cover **110** downward relative to the reel **120** and the base **130**.

[0103] The cover **110** is pushed in downward relative to the reel **120** and the base **130**. Then, the claw **132a** of the base **130** and the ratchet gear **112b** of the cover **110** engage with each other. In addition, the first cover-side lock portion **112a** and the first reel-side lock portion **121a** engage with each other. In this manner, the cover **110** reaches the lock position. At this time, the reel **120** is rotatable only in one direction set by the claw **132a** and the ratchet gear **112b**.

[0104] The cord **140** can be fastened by rotating the cover **110** in the set direction in such a lock state of the fastening device **100**.

[0105] When the cover **110** is at the lock position, a lower portion of the second reel-side lock portion **124b** extending to the inner peripheral side of the reel **120** engages with an upper portion of the second cover-side lock portion **115a** of the cover **110**, as shown in FIG. 6B.

[0106] Thus, when the cover **110** is at the lock position, the lock state of the fastening device **100** can be maintained.

Second Embodiment

[0107] A second embodiment of the present disclosure will be described with reference to FIGS. 8 to 14B.

[0108] A fastening device **200** includes a cover **210**, a reel **220**, a base **230**, and a shaft **250**.

[0109] Note that description of the same configurations as or configurations similar to those of the first embodiment will be omitted.

[0110] FIG. 8 is a view showing the assembled fastening device **200**.

(Cover **210**)

[0111] The cover **210** is mainly different from the cover **110** of the first embodiment in configurations described below. As shown in FIGS. 9 and 10B, a substantially circular second cover-side engagement portion **214** elastically deformable in the radial direction of the cover **210** is provided at the inner peripheral surface of a first cover-side opening **211a**. A second cover-side opening **214a** is provided at the center of the second cover-side engagement portion **214**. A circular ring-shaped guide portion **215** is provided at the upper surface of a flat portion **211**. Note that no cover-side cylindrical portion **114** is provided.

[0112] The configurations and functions of a first cover-side protruding portion **212** and an operation portion **213** are similar to the configurations and functions of the elements of the same names in the first embodiment. Thus, description thereof will be omitted.

[0113] As shown in FIG. 11B, the second cover-side engagement portion **214** is configured such that a shaft-side protruding portion **252** of the shaft **250** described later fits therein. With this configuration, the second cover-side engagement portion **214** can engage with a shaft-side lock portion **252a**.

[0114] As shown in FIG. 11B, the guide portion **215** is configured to guide movement of a shaft-side flange portion **251** of the shaft **250** described later in the up-down direction.

(Reel **220**)

[0115] The reel **220** is mainly different from the reel **120** of the first embodiment in configurations described below. As shown in FIGS. 9, 10C, and 11B, a reel-side protruding portion **222b** protruding to the inner peripheral side of a first reel-side cylindrical portion **222** is provided at the inner peripheral surface of the first reel-side cylindrical portion **222**. Moreover, a second reel-side opening **221c** communicating with a first reel-side opening **221b** provided at the center of a first reel-side flange portion **221** is provided. Note that no second reel-side cylindrical portion **124** is provided.

[0116] The configurations and functions of the first reel-side flange portion **221** and a second reel-side flange portion **223** are similar to the configurations and functions of the elements of the same

names in the first embodiment. Thus, description thereof will be omitted.

[0117] As shown in FIG. **11B**, the reel-side protruding portion **222b** is configured such that a small diameter portion **252b** of the shaft **250** described later fits therein. With this configuration, the reel-side protruding portion **222b** can engage with the shaft-side protruding portion **252**.

[0118] Although not shown in the figure, the second reel-side opening **221c** is configured to house a cord-side lock portion **241** of a cord **240**.

(Base **230**)

[0119] The base **230** is mainly different from the base **130** of the first embodiment in configurations described below. As shown in FIGS. **9** and **13B**, a second base-side protruding portion **233** protruding upward is provided at the center of a base-side flange portion **231**. The second base-side protruding portion **233** has a screw insertion hole **233a**. Note that no retaining portion **132c** is provided.

[0120] The configurations and functions of the base-side flange portion **231** and a base-side protruding portion **232** are similar to the configurations and functions of the elements of the same names in the first embodiment. Thus, description thereof will be omitted.

[0121] The second base-side protruding portion **233** has a circular shape. As shown in FIG. **13B**, the diameter of the second base-side protruding portion **233** is substantially the same as the inner diameter of the first reel-side opening **221b** of the reel **220**.

[0122] The screw insertion hole **233a** is configured to communicate with a screw hole of the shaft **250** described later.

(Cord **240**)

[0123] The cord **240** has configurations and functions similar to those of the element of the same name in the first embodiment. Thus, description thereof will be omitted.

(Shaft **250**)

[0124] The shaft **250** is formed using thermoplastic resin such as polyamide, polyacetal,

[0125] polypropylene, polyethylene terephthalate, polyethylene, or ABS. As shown in FIGS. **10A** and **11B**, the shaft **250** has the shaft-side flange portion **251**, the shaft-side protruding portion **252**, the shaft-side lock portion **252a**, the small diameter portion **252b**, and a screw hole **252d**. The shaft-side protruding portion **252** is provided at the center of the lower surface of the shaft-side flange portion **251**, and protrudes downward. The shaft-side lock portion **252a** is provided at the outer peripheral surface of the shaft-side protruding portion **252**. The small diameter portion **252b** has a smaller diameter, and is provided lower than the shaft-side lock portion **252a**. The screw hole **252d** is provided at the center of the lower end of the shaft-side protruding portion **252**.

[0126] As shown in FIG. **9**, the shaft-side flange portion **251** has a circular shape.

[0127] As shown in FIG. **11B**, the shaft-side protruding portion **252** is configured to fit in the second cover-side opening **214a** of the cover **210** and the first reel-side opening **221b** of the reel **220**. In this configuration, the shaft-side lock portion **252a** engages with the second cover-side engagement portion **214**.

[0128] As shown in FIG. **11B**, the outer diameter of the small diameter portion **252b** is substantially the same as the inner diameter of the reel-side protruding portion **222b** of the reel **220**.

[0129] As shown in FIG. **11B**, the screw hole **252d** is configured to communicate with the screw insertion hole **233a** of the base **230**.

(Method for Assembling Fastening Device **200**)

[0130] A method for assembling the fastening device **200** will be described.

[0131] First, the cord **240** is inserted into a reel-side cord insertion hole **222a** and a base-side cord insertion hole **232b**. Thereafter, the reel **220** is disposed in the base-side protruding portion **232** of the base **230**. The cover **210** is disposed on the reel **220** such that the second cover-side opening **214a** and the first reel-side opening **221b** of the reel **220** communicate with each other.

[0132] Thereafter, the shaft-side protruding portion **252** of the shaft **250** is inserted into the second cover-side opening **214a** and the first reel-side opening **221b**.

[0133] Then, a screw **260** is screwed into the screw hole **252d** of the shaft **250** through the screw insertion hole **233a** of the base **230**. In this manner, the assembly is completed.

[0134] The entirety of the fastening device **200** is fixed with the screw **260**. Thus, the entire device has a stronger configuration.

(Method for Unlocking Fastening Device **200**)

[0135] A method for using the fastening device **200**, particularly a method (unlocking method) for moving the cover **210** from a position (lock position) shown in FIG. **13B** to a position (unlock position) shown in FIG. **11B**, will be described.

[0136] The unlocking method includes only lifting, using the operation portion **213** of the cover **210**, the cover **210** upward relative to the reel **220** and the base **230**.

[0137] The cover **210** is lifted upward relative to the reel **220** and the base **230** from the lock position. Then, a claw **232a** of the base **230** and a ratchet gear **212b** of the cover **210** disengage from each other, and a first cover-side lock portion **212a** and a first reel-side lock portion **221a** disengage from each other. In this manner, the cover **210** reaches the unlock position. At the unlock position, the reel **220** is freely rotatable.

[0138] At the unlock position, the cord **240** extending out of the fastening device **200** is pulled from both sides of the fastening device **200**. In this manner, the cord **240** can be loosened.

[0139] When the cover **210** is at the unlock position, a lower portion of the second cover-side engagement portion **214** of the cover **210** and an upper portion of the shaft-side lock portion **252a** engage with each other, as shown in FIG. **11B**.

[0140] Thus, when the cover **210** is at the unlock position, an unlock state of the fastening device **200** can be maintained.

(Method for Locking Fastening Device **200**)

[0141] A method for using the fastening device **200**, particularly a method (locking method) for moving the cover **210** from the position (unlock position) shown in FIG. **11B** to the position (lock position) shown in FIG. **13B**, will be described.

[0142] The locking method includes only pushing in the cover **210** downward relative to the reel **220** and the base **230**.

[0143] The cover **210** is pushed in downward relative to the reel **220** and the base **230**. Then, the claw **232a** of the base **230** and the ratchet gear **212b** of the cover **210** engage with each other. In addition, the first cover-side lock portion **212a** and the first reel-side lock portion **221a** engage with each other. In this manner, the cover **210** reaches the lock position. At this time, the reel **220** is rotatable only in one direction set by the claw **232a** and the ratchet gear **212b**.

[0144] The cord **240** can be fastened by rotating the cover **210** in the set direction in such a lock state of the fastening device **200**.

[0145] When the cover **210** is at the lock position, an upper portion of the second cover-side engagement portion **214** engages with a lower portion of the shaft-side lock portion **252a**, as shown in FIG. **13B**.

[0146] Thus, when the cover **210** is at the lock position, the lock state of the fastening device **200** can be maintained.

[0147] The fastening device according to the present embodiment has the configurations described above. Thus, according to the present embodiment, a fastening device can be provided, which has, as a whole, a smaller thickness in the up-down direction than that of a general fastening device made of synthetic resin and has a lower probability of the device being caught by other members. Moreover, according to the present embodiment, the number of components can be reduced, and therefore, a cost for producing the fastening device can be reduced.

[0148] The use application of the fastening device of the present embodiment is not particularly limited. For example, the fastening device of the present embodiment can be used for protective shoes, kid's shoes, sports shoes, and high cut shoes. The use application is not limited to shoes, and the fastening device of the present embodiment can also be used for, e.g., a lace around the waist of

clothes.

[0149] Note that the present embodiment is not limited only to the embodiments described above. A technique recognized by those skilled in the art can be used as necessary as the substantially same technique as each technique described above in the embodiments or a technique producing an effect similar to that of each technique described above in the embodiments. That is, such a technique can be used as a substitute for that in the embodiments above, or can be added to the embodiments above.

[0150] The foregoing detailed description has been presented for the purposes of illustration and description. Many modifications and variations are possible in light of the above teaching. It is not intended to be exhaustive or to limit the subject matter described herein to the precise form disclosed. Although the subject matter has been described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described above. Rather, the specific features and acts described above are disclosed as example forms of implementing the claims appended hereto.

Claims

1. A fastening device comprising: a cover; a reel; and a base, wherein the cover includes a flat portion, a first cover-side protruding portion, a first cover-side lock portion, and a ratchet gear, the first cover-side protruding portion is provided at a lower surface of the flat portion, and protrudes downward, the first cover-side lock portion is provided at an inner peripheral surface of the first cover-side protruding portion, the ratchet gear is provided at an outer peripheral surface of the first cover-side protruding portion, the reel includes a first reel-side flange portion, a first reel-side cylindrical portion, and a second reel-side flange portion, the first reel-side flange portion is provided, at an outer peripheral surface thereof, with a first reel-side lock portion, the first reel-side cylindrical portion is provided at a lower surface of the first reel-side flange portion, and protrudes downward, the second reel-side flange portion is provided at a lower end of the first reel-side cylindrical portion, the base includes a base-side flange portion, a base-side protruding portion, and a claw, the base-side protruding portion is provided at an upper surface of the base-side flange portion, and protrudes upward, the claw is provided at an inner peripheral surface of the base-side protruding portion, the reel is located on an inner peripheral side of the base-side protruding portion, the first cover-side protruding portion is located on the inner peripheral side of the base-side protruding portion and an outer peripheral side of the first reel-side flange portion, the ratchet gear and the claw are configured to engage with each other, and the first cover-side lock portion and the first reel-side lock portion are configured to engage with each other.

2. The fastening device according to claim 1, wherein the cover is movable upward relative to the reel and the base, and when the cover moves upward, the first cover-side lock portion and the first reel-side lock portion disengage from each other.

3. The fastening device according to claim 1, wherein the first cover-side lock portion has a recessed-raised shape, and is provided over an entirety of the inner peripheral surface of the first cover-side protruding portion, the ratchet gear has a recessed-raised shape, and is provided over an entirety of the outer peripheral surface of the first cover-side protruding portion, the recessed-raised shape of the ratchet gear has a dimension greater than that of the recessed-raised shape of the first cover-side lock portion, and the claw has a dimension greater than that of the first reel-side lock portion.

4. The fastening device according to claim 1, wherein the first reel-side lock portion includes first reel-side lock portions provided at an interval of 90 degrees at the outer peripheral surface of the first reel-side flange portion.

5. The fastening device according to claim 1, wherein when the cover moves upward, the claw and

the ratchet gear disengage from each other.

6. The fastening device according to claim 1, wherein the reel includes a second reel-side cylindrical portion and a second reel-side lock portion, the second reel-side cylindrical portion protrudes upward from a center position of the first reel-side flange portion, the second reel-side lock portion is provided at an upper end of the second reel-side cylindrical portion, and extends to outer and inner peripheral sides of the second reel-side cylindrical portion, the cover includes a cover-side cylindrical portion, a second cover-side protruding portion, and a second cover-side lock portion, the cover-side cylindrical portion protrudes upward from a center position of the flat portion, and has an upper end portion, the second cover-side protruding portion is provided at a center of a lower surface of the upper end portion, and protrudes downward, the second cover-side lock portion is provided at an outer peripheral surface of the second cover-side protruding portion, when the first cover-side lock portion and the first reel-side lock portion engage with each other, the second reel-side lock portion engages with an upper portion of the second cover-side lock portion, and when the cover moves upward and the first cover-side lock portion and the first reel-side lock portion disengage from each other, the second reel-side lock portion engages with the flat portion on the outer peripheral side, and engages with a lower portion of the second cover-side lock portion on the inner peripheral side.

7. The fastening device according to claim 1, wherein the base includes a retaining portion provided at the inner peripheral surface of the base-side protruding portion, and the second reel-side flange portion is fixed to the base by the retaining portion.

8. The fastening device according to claim 1, further comprising: a shaft-side flange portion; a shaft-side protruding portion; and a shaft, wherein the shaft-side protruding portion is provided at a center of a lower surface of the shaft-side flange portion, and protrudes downward, the shaft includes a shaft-side lock portion provided at an outer peripheral surface of the shaft-side protruding portion, the cover includes a substantially circular second cover-side engagement portion, the second cover-side engagement portion is provided at a center position of the flat portion, is elastically deformable in a radial direction, and at a center thereof, includes a second cover-side opening, when the first cover-side lock portion and the first reel-side lock portion engage with each other, the second cover-side engagement portion engages with a lower end side of the shaft-side lock portion, and when the cover moves upward and the first cover-side lock portion and the first reel-side lock portion disengage from each other, the second cover-side engagement portion engages with an upper end side of the shaft-side lock portion.

9. The fastening device according to claim 8, wherein the shaft includes a small diameter portion and a screw hole, the small diameter portion has a smaller diameter, and is provided lower than the shaft-side lock portion, the screw hole is provided at a center of a lower end of the shaft-side protruding portion, the reel includes a reel-side protruding portion, the reel-side protruding portion is provided at an inner peripheral surface of the first reel-side cylindrical portion, and protrudes to an inner peripheral side, the base includes a screw insertion hole at a center of the base-side flange portion, and the screw hole is configured such that the small diameter portion is located at the reel-side protruding portion and a screw is screwed into the screw hole through the screw insertion hole.

10. The fastening device according to claim 2, wherein the first cover-side lock portion has a recessed-raised shape, and is provided over an entirety of the inner peripheral surface of the first cover-side protruding portion, the ratchet gear has a recessed-raised shape, and is provided over an entirety of the outer peripheral surface of the first cover-side protruding portion, the recessed-raised shape of the ratchet gear has a dimension greater than that of the recessed-raised shape of the first cover-side lock portion, and the claw has a dimension greater than that of the first reel-side lock portion.

11. The fastening device according to claim 2, wherein the first reel-side lock portion includes first reel-side lock portions provided at an interval of 90 degrees at the outer peripheral surface of the first reel-side flange portion.

12. The fastening device according to claim 2, wherein when the cover moves upward, the claw and the ratchet gear disengage from each other.

13. The fastening device according to claim 2, wherein the reel includes a second reel-side cylindrical portion and a second reel-side lock portion, the second reel-side cylindrical portion protrudes upward from a center position of the first reel-side flange portion, the second reel-side lock portion is provided at an upper end of the second reel-side cylindrical portion, and extends to outer and inner peripheral sides of the second reel-side cylindrical portion, the cover includes a cover-side cylindrical portion, a second cover-side protruding portion, and a second cover-side lock portion, the cover-side cylindrical portion protrudes upward from a center position of the flat portion, and has an upper end portion, the second cover-side protruding portion is provided at a center of a lower surface of the upper end portion, and protrudes downward, the second cover-side lock portion is provided at an outer peripheral surface of the second cover-side protruding portion, when the first cover-side lock portion and the first reel-side lock portion engage with each other, the second reel-side lock portion engages with an upper portion of the second cover-side lock portion, and when the cover moves upward and the first cover-side lock portion and the first reel-side lock portion disengage from each other, the second reel-side lock portion engages with the flat portion on the outer peripheral side, and engages with a lower portion of the second cover-side lock portion on the inner peripheral side.

14. The fastening device according to claim 2, wherein the base includes a retaining portion provided at the inner peripheral surface of the base-side protruding portion, and the second reel-side flange portion is fixed to the base by the retaining portion.

15. The fastening device according to claim 2, further comprising: a shaft-side flange portion; a shaft-side protruding portion; and a shaft, wherein the shaft-side protruding portion is provided at a center of a lower surface of the shaft-side flange portion, and protrudes downward, the shaft includes a shaft-side lock portion provided at an outer peripheral surface of the shaft-side protruding portion, the cover includes a substantially circular second cover-side engagement portion, the second cover-side engagement portion is provided at a center position of the flat portion, is elastically deformable in a radial direction, and at a center thereof, includes a second cover-side opening, when the first cover-side lock portion and the first reel-side lock portion engage with each other, the second cover-side engagement portion engages with a lower end side of the shaft-side lock portion, and when the cover moves upward and the first cover-side lock portion and the first reel-side lock portion disengage from each other, the second cover-side engagement portion engages with an upper end side of the shaft-side lock portion.

16. The fastening device according to claim 15, wherein the shaft includes a small diameter portion and a screw hole, the small diameter portion has a smaller diameter, and is provided lower than the shaft-side lock portion, the screw hole is provided at a center of a lower end of the shaft-side protruding portion, the reel includes a reel-side protruding portion, the reel-side protruding portion is provided at an inner peripheral surface of the first reel-side cylindrical portion, and protrudes to an inner peripheral side, the base includes a screw insertion hole at a center of the base-side flange portion, and the screw hole is configured such that the small diameter portion is located at the reel-side protruding portion and a screw is screwed into the screw hole through the screw insertion hole.
