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(54) FACILITATED TIGHTENING DEVICE

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(57) **ABSTRACT**

A facilitated tightening device allowing a bolt to be inserted smoothly by preventing a screw block engaged with the bolt from being inclined or fallen down, comprising a base (**2**) having a bolt insert hole (**7**) partly forming a bolt receiving surface (**9**) and an inclined surface (**8**) gradually decreasing in diameter toward the insert side of the bolt (**6**) in the state of being continued with the bolt insert hole (**7**) formed therein, a screw block (**3**) slid along the inclined surface (**8**) according to the axial movement of the inserted bolt (**6**) to be engaged with the bolt (**6**), an energizing member (**5**) energizing the screw block (**3**) in inner radial direction, and guide means (**10, 11**) engaged with the screw block (**3**) to prevent the screw block (**3**) from being fallen down in the base (**2**).

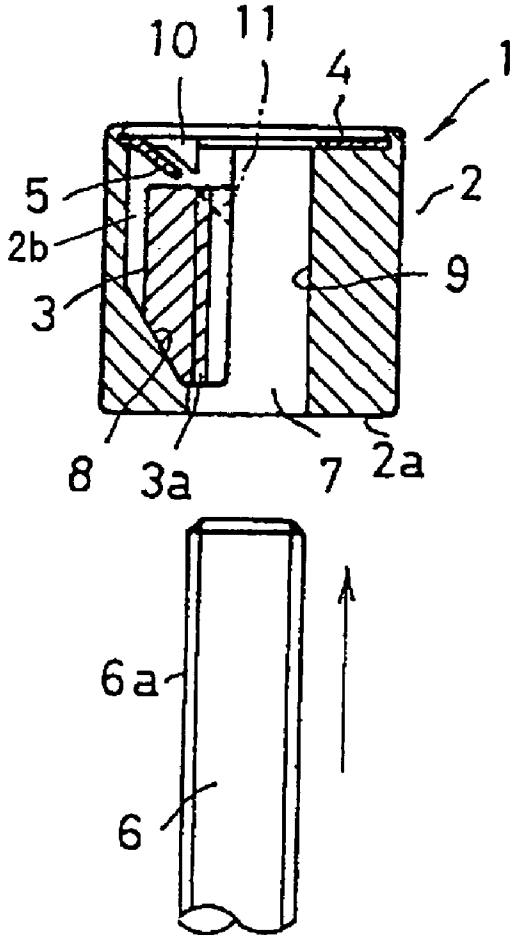

Fig. 1

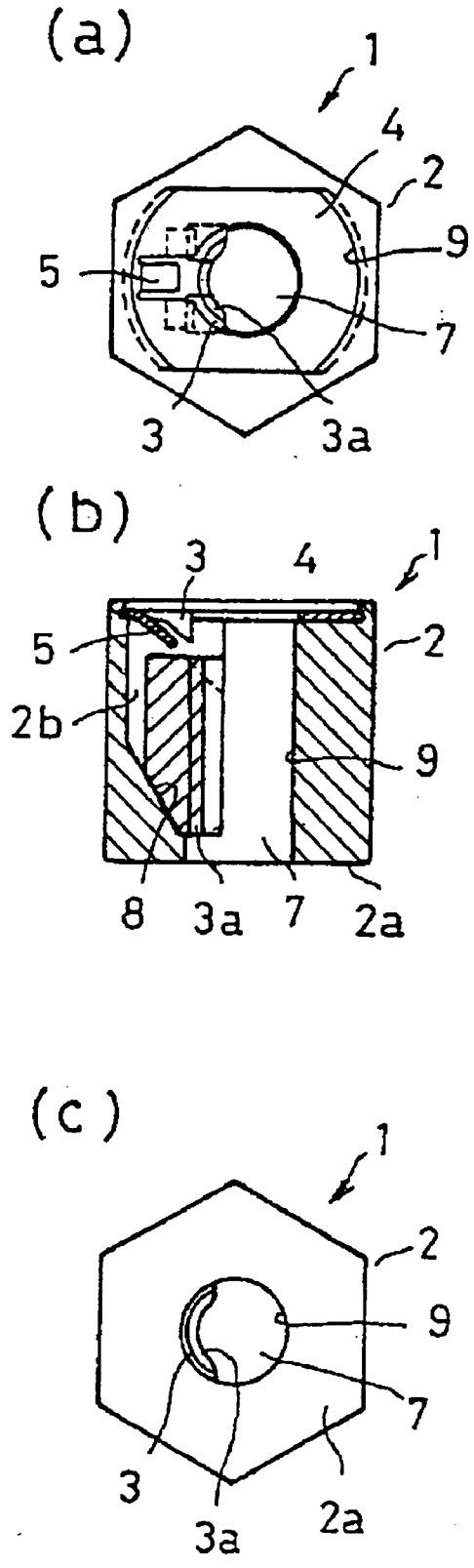

Fig. 2

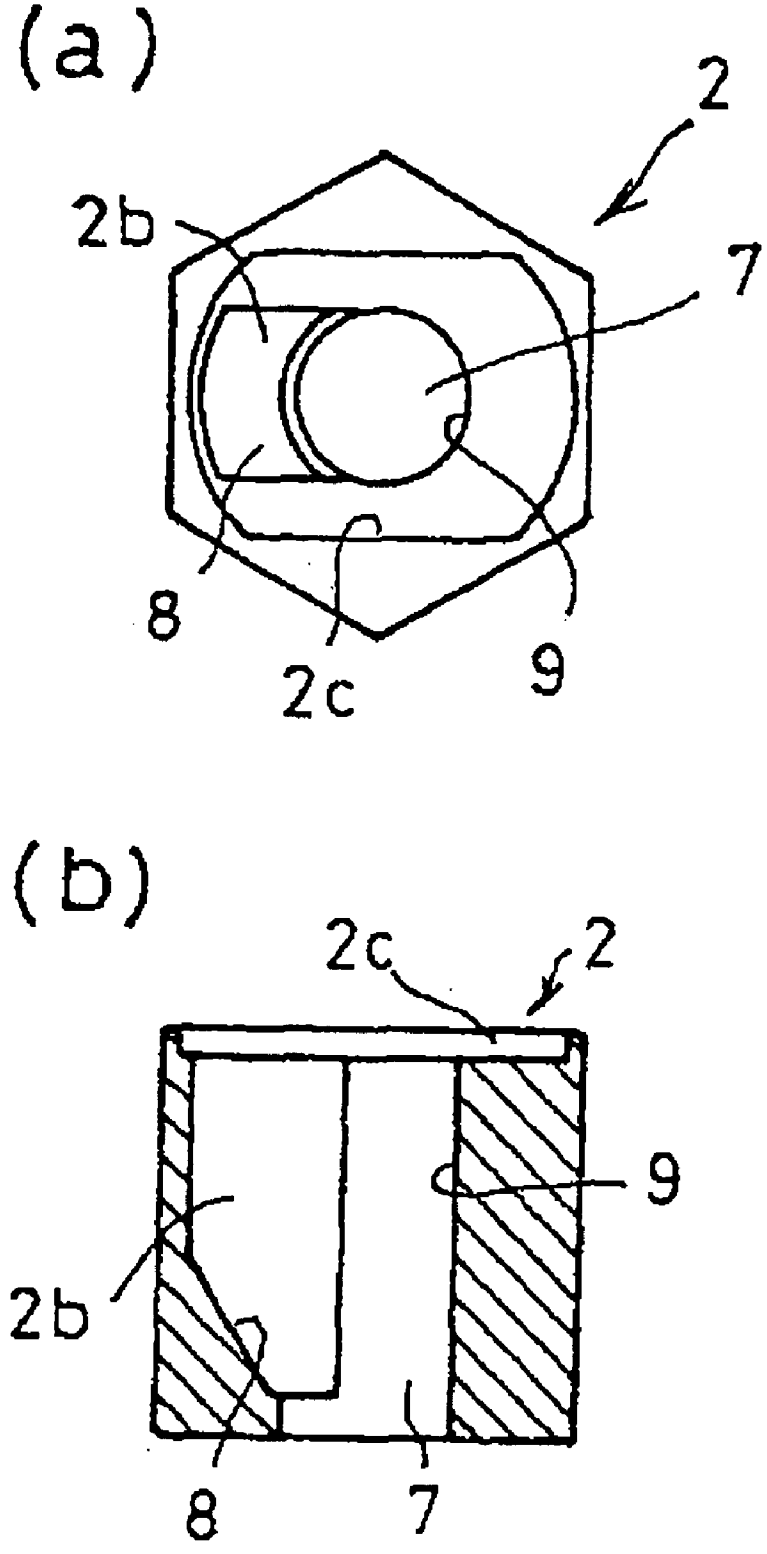

Fig.3

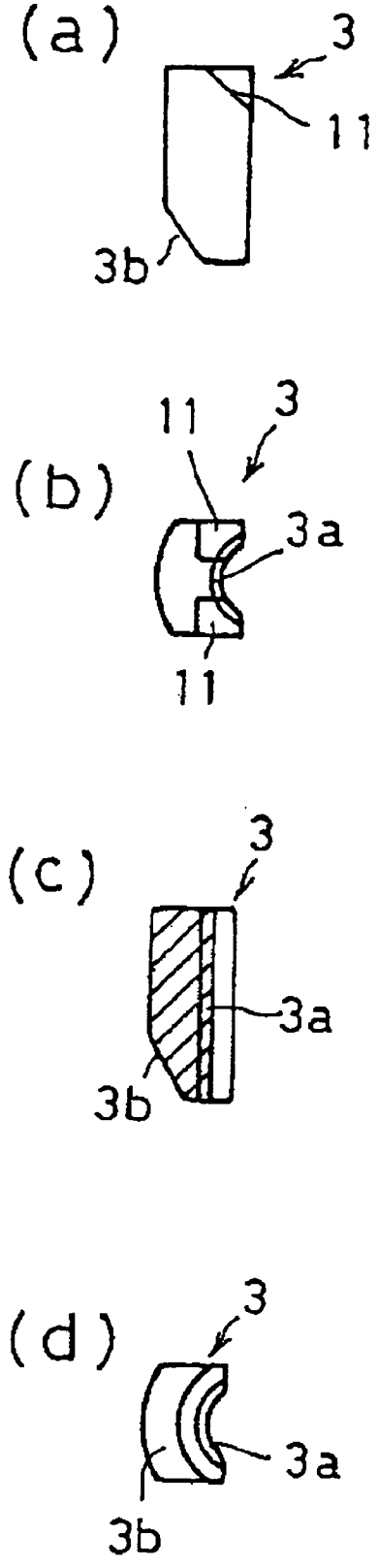

Fig.4

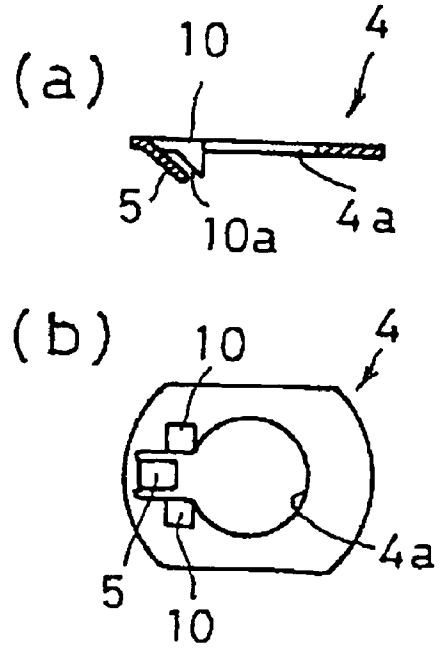

Fig.5

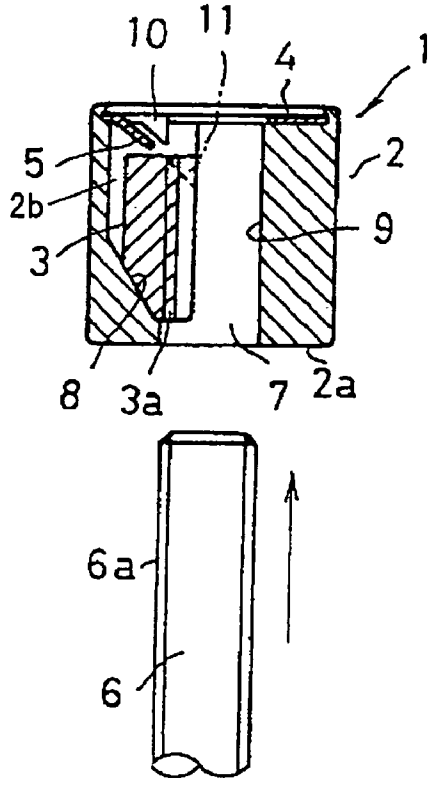

Fig.6

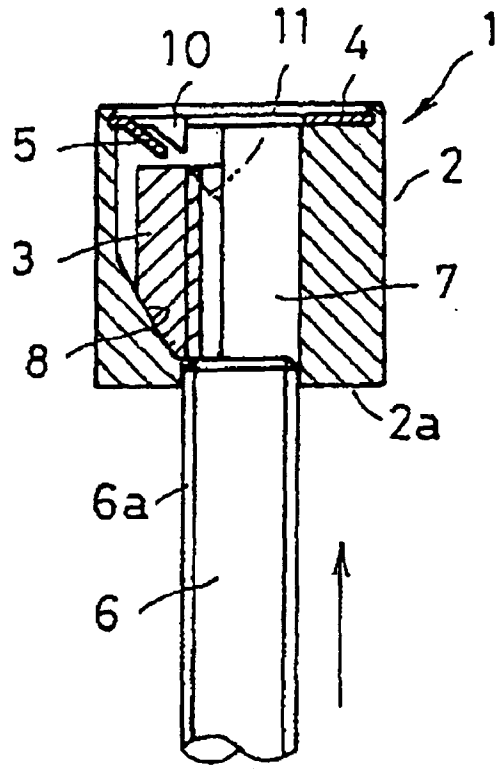

Fig.7

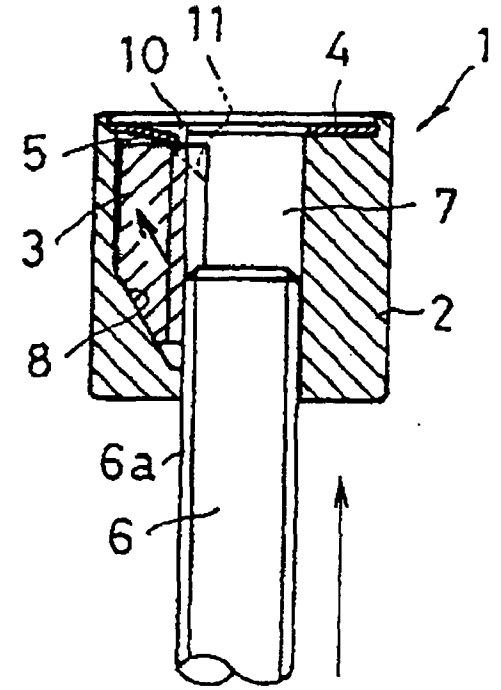

Fig.8

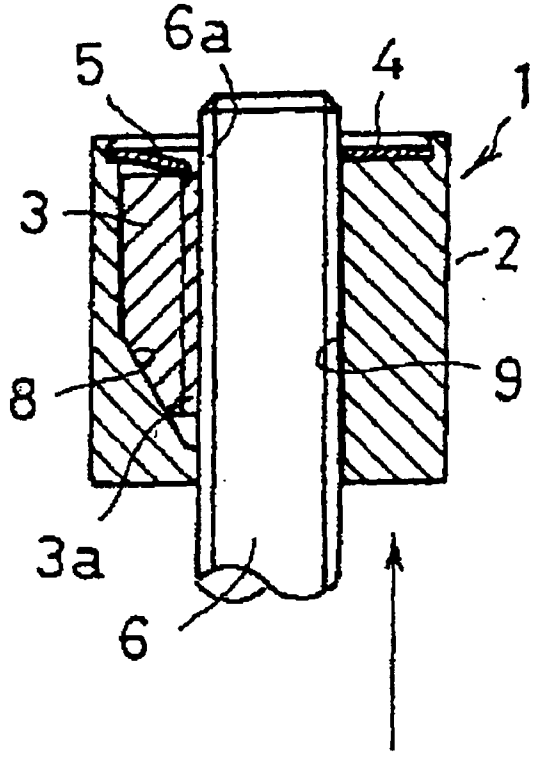

Fig.9

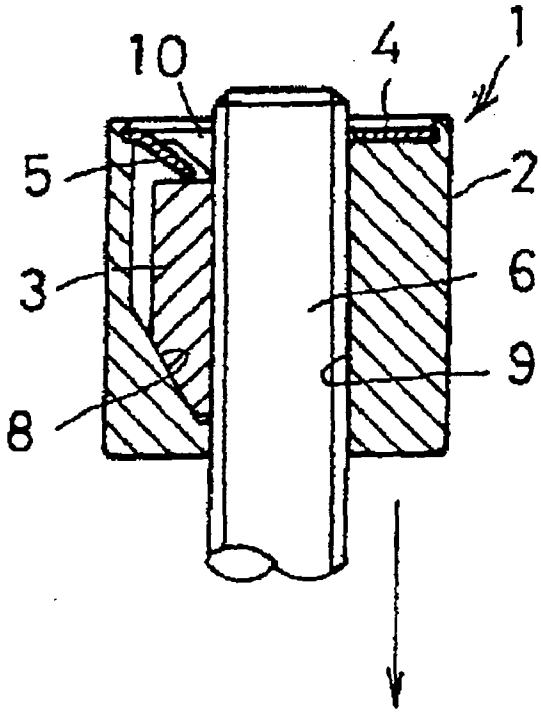

Fig.10

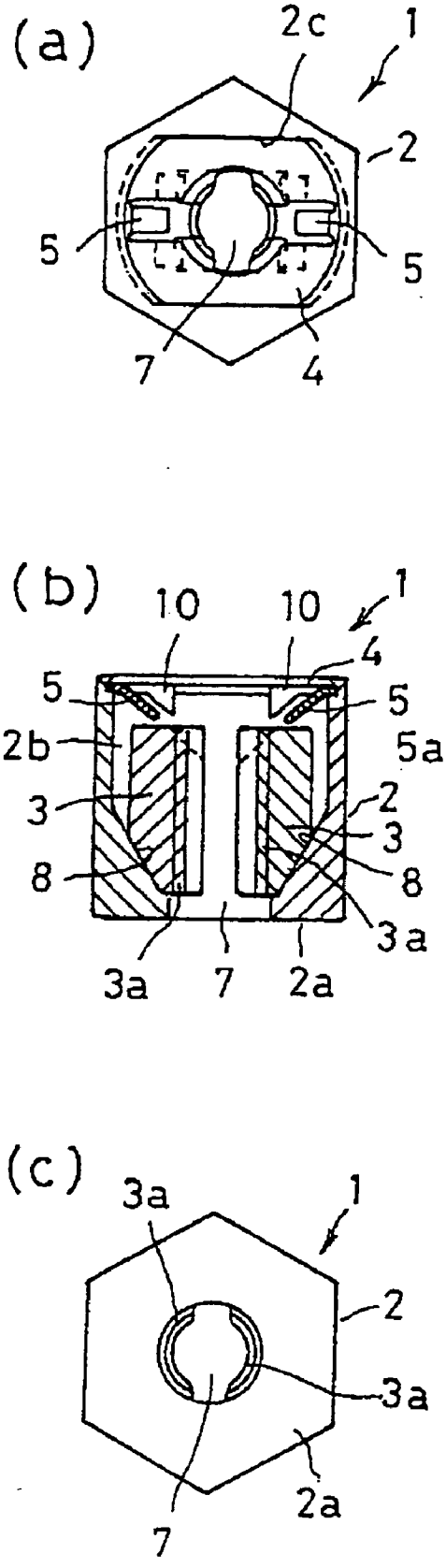

Fig.11

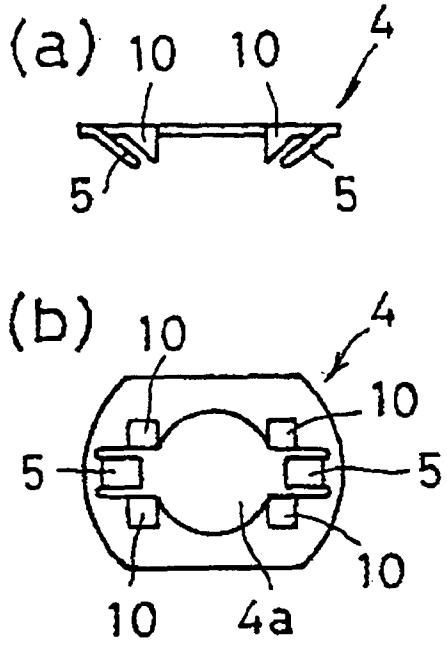

Fig.12

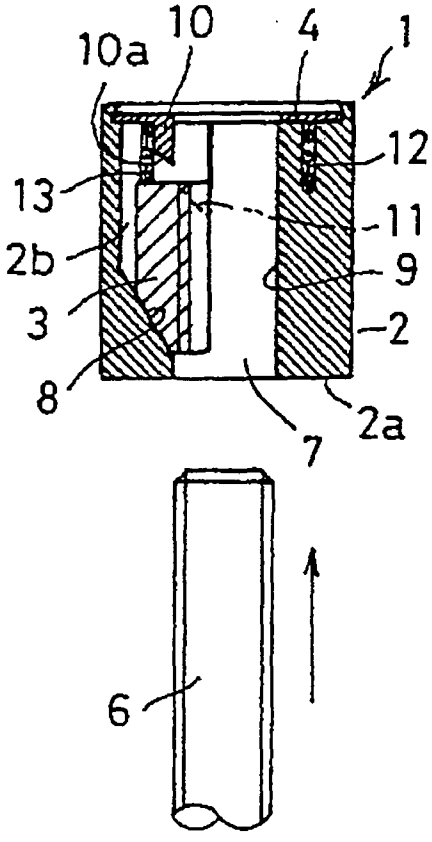

Fig.13

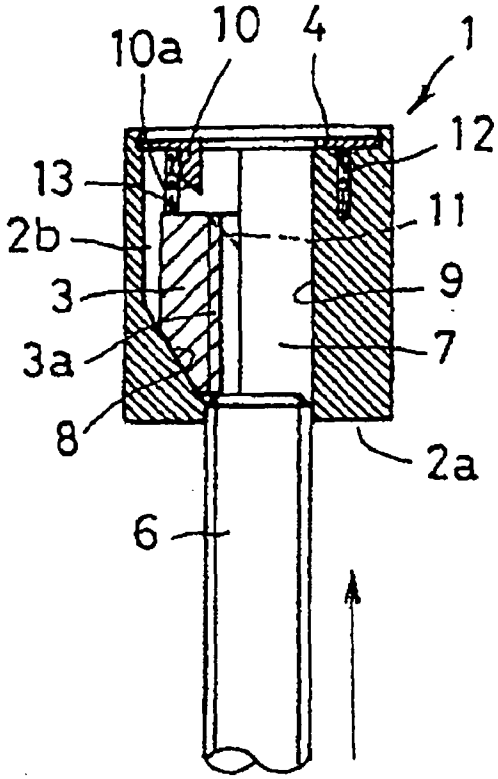

Fig.14

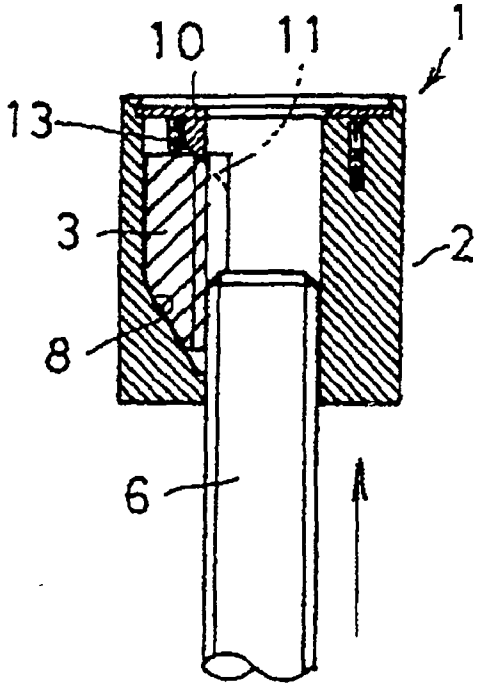

Fig.15

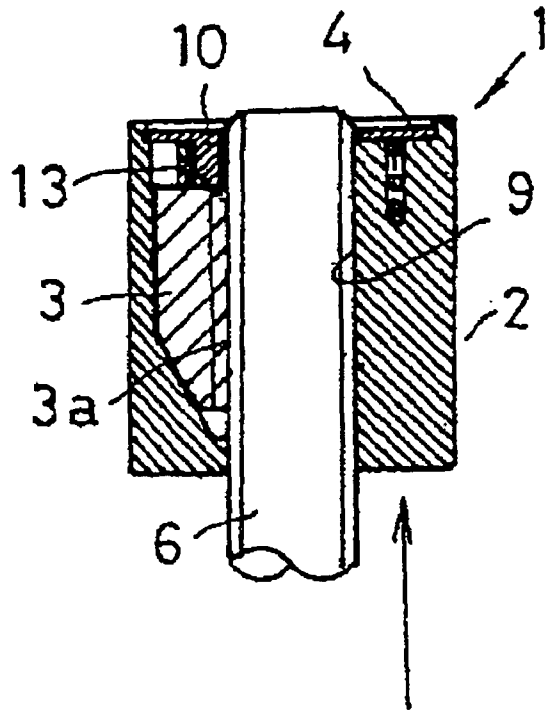

Fig.16

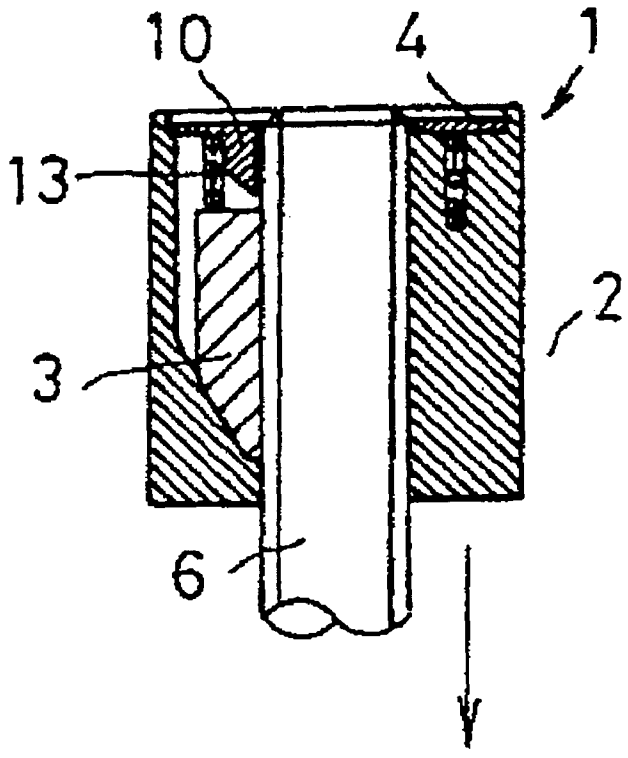

Fig.17

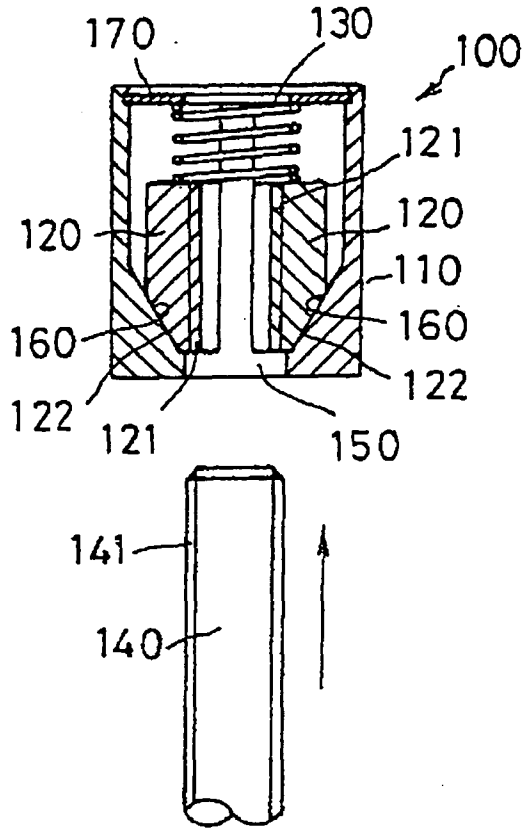
170
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Fig.18

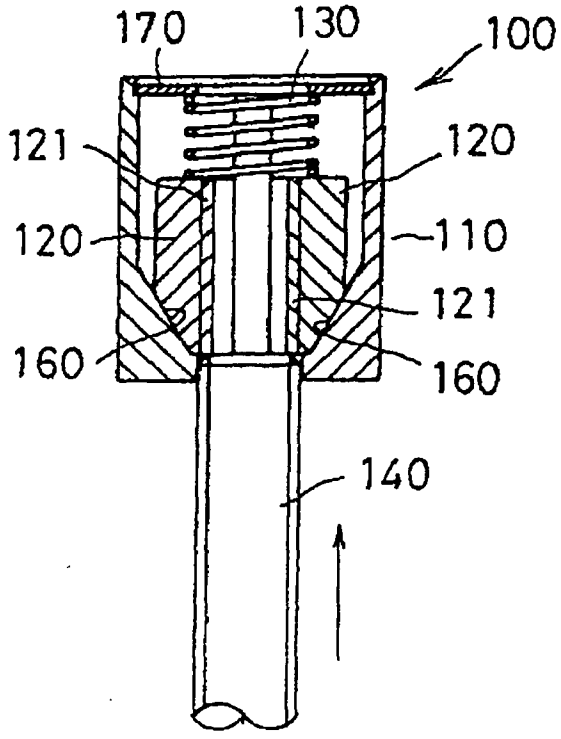
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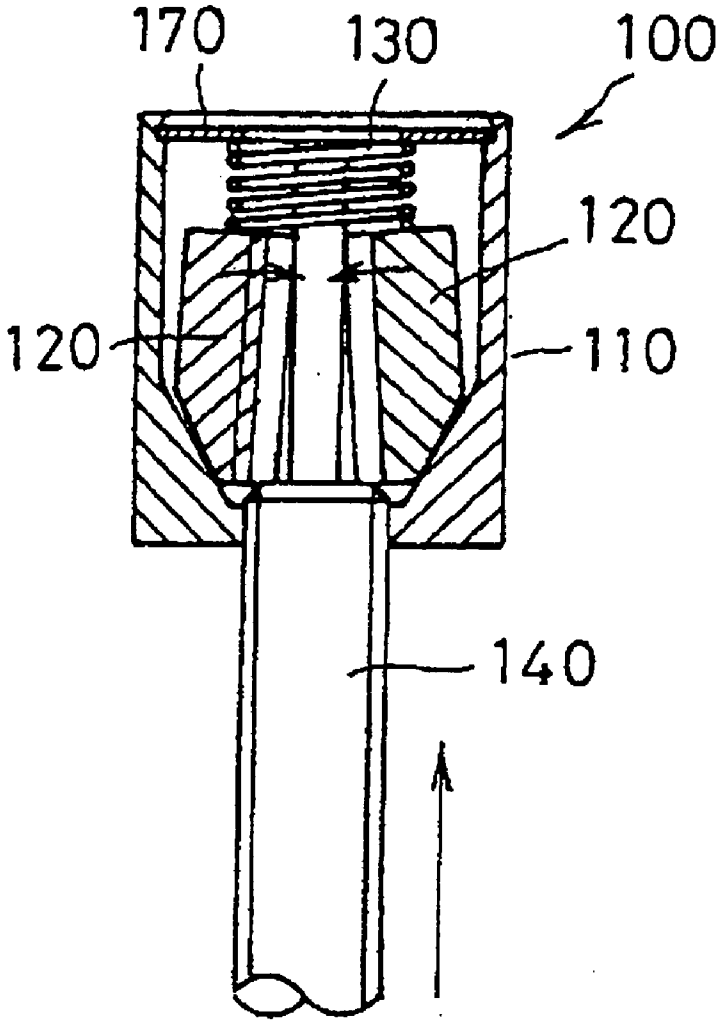
Fig.19



FACILITATED TIGHTENING DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a simple fastening device that can be used in various machines, such as construction, electrical, or mechanical equipment, and that can be inserted and clamped by a one-touch operation.

[0003] 2. Background of the Invention

[0004] Conventionally, there is a simple fastening device that can be inserted and clamped by a one-touch operation; this is described in Japanese Examined Utility Model Publication No. S55-48171. FIGS. **17-19** illustrate this conventional simple fastening device **100**, which comprises a base **110**, running screws **120**, **120**, and a spring **130** consisting of a coil spring.

[0005] A bolt **140** is inserted into the base **110**, and a bolt-insertion hole **150** is opened in the base **110**. The bolt-insertion hole **150** that is formed in the base **110** has slope portions **160**, **160**. The diameter of the lower parts of the slope portions **160**, **160** of the bolt-insertion hole **150** is made smaller than the diameter of the upper part of the slope portions **160**, **160** of the bolt-insertion hole **150**, and the running screws **120**, **120** are supported on the slope portions **160**, **160**, respectively.

[0006] The running screws **120**, **120** are opposed to each other in a pair, and female screws **121**, **121** that are to be engaged with a male screw **141** of the bolt **140** are formed in a longitudinal direction on the opposed faces of the running screws **120**, **120**. In addition, tapered faces **122**, **122** that can freely slide on the above-mentioned slope portions **160**, **160** are formed at the bottom of the running screws **120**, **120**.

[0007] A spring **130** is inserted into the base **110** in a manner so as to pressurize a pair of the opposed running screws **120**, **120** from above. In order that the spring **130** can pressurize the running screws **120**, **120**, a cover **170** is fixed on the top end of the base **110** by pressure fitting.

[0008] In such a structure, by mounting the cover **170** onto the base **110** with the spring **130** flexed to some degree, the running screws **120**, **120** are pressed to move toward the bolt-insertion hole **150**. As shown in **FIG. 18**, the bolt **140** is inserted in the base **110** from the bolt-insertion hole **150**, so that the running screws **120**, **120** slide upward on the slope portions **160**, **160** against the spring force of the spring **130**, and thus the bolt can be inserted between the running screws **120**, **120**. Then, the female screws **121**, **121** of the running screws **120**, **120** engage with the bolt **140** due to the spring force of the spring **130**, and thus the bolt **140** can be fastened by a one-touch operation.

[0009] However, this conventional simple fastening device **100** has a shortcoming that the insertion of the bolt **140** can cause the running screws **120**, **120** to become inclined or to slip down in the base **110**. **FIG. 19** shows such a situation where the running screws **120**, **120** slip down. When the inserted bolt **140** pushes up the running screws **120**, **120**, the top portions of the running screws **120**, **120** are inclined in a manner so as to approach or lean toward each other (as shown by the arrows), or to slip down. Such a displacement causes the bolt **140** to be hooked by the running screws **120**, **120** when the bolt **140** is inserted, which makes one-touch fastening of the bolt **140** difficult.

[0010] The present invention has been made in consideration of the above problems with a conventional simple fastening device, and one object of the present invention is to provide a simple fastening device that makes it possible to smoothly insert a bolt while preventing the inclination or slipping down of the running screws at the time that the bolt is inserted, and thereby makes it possible to perform fastening by a one-touch operation.

SUMMARY OF THE INVENTION

[0011] For the aforementioned purpose, the invention set forth in claim 1 is a simple fastening device wherein running screws are supported by slope portions formed on the sides of a bolt-insertion hole of a base, and a bolt is inserted in the bolt-insertion hole while the running screws are pressed by a pressing member, so that the running screws are engaged with the bolt. The invention set forth in claim 1 is also characterized such that a guide means is engaged with said running screws to prevent the running screws from slipping down in the base.

[0012] Under such a structure, by inserting the bolt into the bolt-insertion hole, the running screws are engaged and fastened with the bolt. According to the present invention, a guide means is engaged with the running screws, as a result of which the running screws will not become inclined or slip down, so that the bolt can be smoothly inserted without being hooked by the running screws.

[0013] The invention set forth in claim 2 comprises (1) a base, to which are formed (a) a bolt-insertion hole, whose one portion is a bolt-receiving face, and (b) a slope portion, whose diameter is gradually reduced toward the bolt-insertion side under a condition that it connects with the bolt-insertion hole, (2) a running screw, which slides along said slope portion and is engaged with the bolt as the bolt to be inserted moves in an axial direction, (3) pressing members for pressing the running screw downward, and (4) a guide means that engages with the running screw and prevents the running screw from slipping down in the base.

[0014] Under such a structure, when the bolt is inserted into the bolt-insertion hole, the running screw slides along the slope portion, so that the bolt can be introduced between the running screw and the bolt-receiving face. The running screw engages with the introduced bolt due to the pressure of the pressing member. A reaction force that is generated at this time is received by the bolt-receiving face, and therefore the bolt can be securely fastened.

[0015] According to the invention set forth in claim 2, a guide means is engaged with the running screw, as a result of which the running screw will not become inclined or slip down, so that the bolt can be smoothly inserted without being hooked by the running screw, as with the case of the invention set forth in claim 1.

[0016] The invention set forth in claim 3 comprises (1) a base, to which formed are (a) a bolt-insertion hole, and (b) a plurality of slope portions, whose diameters are gradually reduced toward the bolt-insertion side under the condition that the bolt is inserted into the bolt-insertion hole, (2) a plurality of running screws that slide along the slope portions and are engaged with the bolt as the inserted bolt

moves in an axial direction, (3) a pressing member for pressing the running screws downward, and (4) a guide means that engages with the running screws and prevents the running screws from slipping down in the base.

[0017] Under such a structure, when the bolt is inserted into the bolt-insertion hole, a plurality of the running screws slide along the slope portion, so that the bolt can be introduced between the running screws. Furthermore, because a plurality of the running screws engage with the bolt due to the pressure of a pressing member, the bolt can be securely fastened.

[0018] According to this invention, a guide means is engaged with the running screw, as a result of which the running screw will not become inclined or slip down, so that the bolt can be smoothly inserted without being hooked by the running screw, as with the cases mentioned above.

[0019] The invention set forth in claim 4 is an invention described in any of claims 1 to 3, and is characterized in that said guide means comprises (1) a guide projection that is provided to the base in a manner so as to project toward the bolt-insertion side, and (2) a guide groove that is formed on said running screw so as to engage with the guide projection.

[0020] Under such a structure, the guide projection is engaged with the guide groove of the running screw, which slides due to insertion of the bolt, so that the running screws can be prevented from being inclined or slipping down. According to this invention, a guide means can be formed easily because of a simple structure that comprises the guide groove and the guide projection.

[0021] The invention set forth in claim 5 is an invention as described in claim 4, and is characterized such that a cover, into which said bolt can be inserted, is attached on the base in its downstream side of the bolt-insertion direction, and said guide projection is provided on the cover.

[0022] According to this invention, since the guide projection is formed on a cover that is separate from the base, the guide projection can be formed easily.

[0023] The invention set forth in claim 6 is an invention as described in claim 4 or claim 5, and is characterized such that said guide projection has a guide face, which is inclined in the same direction as a sliding direction of said running screw, and that the guide face is engaged with said guide groove.

[0024] Thus, because the guide face is formed in a manner so as to become inclined along the sliding direction of the running screw, the running screw can be surely prevented from being inclined or slipping down at the time of sliding.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] **FIG. 1** illustrates Embodiment 1 of the present invention, a plan view of which is shown by (a), a vertical cross-sectional view of which is shown by (b), and a bottom view of which is shown by (c).

[0026] **FIG. 2**(*a*) is a plan view of a base of the present invention, and **FIG. 2**(*b*) is a vertical cross-sectional view thereof

[0027] **FIG. 3**(*a*) is a front view of a running screw, **FIG. 3**(*b*) is a plan view thereof, **FIG. 3**(*c*) is a vertical cross-sectional view thereof, and **FIG. 3**(*d*) is a bottom view thereof

[0028] **FIG. 4**(*a*) is a vertical cross-sectional view of a cover, and **FIG. 4**(*b*) is a plan view thereof

[0029] **FIG. 5** is a cross-sectional view showing the condition before a bolt is inserted in Embodiment 1.

[0030] **FIG. 6** is a cross-sectional view showing a condition when a bolt is about to be inserted in Embodiment 1.

[0031] **FIG. 7** is a cross-sectional view showing the condition when a bolt is being inserted in Embodiment 1.

[0032] **FIG. 8** is a cross-sectional view showing the condition after a bolt has been inserted in Embodiment 1.

[0033] **FIG. 9** is a cross-sectional view showing the condition that the bolt is being pulled out of Embodiment 1.

[0034] **FIG. 10** illustrates Embodiment 2 of the present invention, a plan view of which is shown by (a), a vertical cross-sectional view of which is shown by (b), and a bottom view of which is shown by (c).

[0035] **FIG. 11** (a) is a vertical cross-sectional view of a cover in Embodiment 2, and **FIG. 11** (b) is a plan view thereof

[0036] **FIG. 12** is a cross-sectional view showing the condition before a bolt is inserted in Embodiment 3.

[0037] **FIG. 13** is a cross-sectional view showing the condition when a bolt is about to be inserted in Embodiment 3.

[0038] **FIG. 14** is a cross-sectional view showing the condition when a bolt is being inserted in Embodiment 3.

[0039] **FIG. 15** is a cross-sectional view showing the condition after the bolt has been inserted in Embodiment 3.

[0040] **FIG. 16** is a cross-sectional view showing the condition when the bolt is being pulled out of Embodiment 3.

[0041] **FIG. 17** is a cross-sectional view showing a conventional simple fastening device.

[0042] **FIG. 18** is a cross-sectional view showing the condition when a bolt is about to be inserted into the conventional simple fastening device.

[0043] **FIG. 19** is a cross-sectional view showing downward of the running screws in conventional simple fastening device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0044] Embodiments illustrating the present invention will be described in detail as follows. In each embodiment, the same reference number is used to refer to a given part that is found in one or more of the embodiments.

[0045] (Embodiment 1)

[0046] FIGS. **1-9** illustrate Embodiment 1 of the present invention and, as shown by **FIG. 1, a** simple fastening device **1** comprises a base **2**, a running screw **2**, a cover **4**, and a spring piece **5**.

[0047] A bolt **6** (FIGS. **5-9**) is inserted into the base **2**, and a bolt-insertion hole **7** penetrates through the base in an axial direction as shown by **FIG. 2**. A bolt-insertion face, into which the bolt **6** is inserted, is illustrated as **2***a* in **FIG. 1**. A

moving groove **2***b* is formed inside the base **2**. The moving groove **2***b* is designed in such a manner that a below-described running screw **3** moves therein, and the moving groove **2***b* is formed in such a way that the diameter of the bolt-insertion hole **7** varies in a prescribed way. A slope portion **8** is formed on the side of the bolt-insertion face **2***a* of the moving groove **2***b*.

[**0048**] The slope portion **8** is formed into a conical shape whose diameter is gradually reduced toward the bolt-insertion face **2***a*, in a manner so as to match the bolt-insertion hole **7**. The slope portion **8** supports the running screw **3** in such a way that the running screw **3** can slide, and the slope portion **8** is formed into a shape that fits along the outer profile of the running screw **3**. Accordingly, when the running screw **3** moves along the slope portion **8**, a female screw **3***a* (which will be described later and which is shown in FIGS. **1**(*a*), (*b*), and (*c*) and in FIGS. **3**(*b*), (*c*), and (*d*)) of the running screw **3** that engages with the outer surface of the bolt **6** moves in a horizontal direction.

[**0049**] In this embodiment, the inner face of the bolt-insertion hole **7**, which is opposed to the moving groove **2***b* (the running screw **3**), is an arc-shaped bolt-receiving face **9** having approximately the same curvature as that of the bolt **6**. The bolt-receiving face **9** receives the reaction force generated when the running screw **3** is engaged with the bolt **6**, thereby securely fastening the bolt **6**.

[**0050**] A cover-attaching concavity **2***c* is formed on the end face of the base **2** on the opposite side of the bolt-insertion face **2***a*. The cover-attaching concavity **2***c* is formed in a noncircular shape and, in this embodiment, it is formed into a noncircular shape with parallel cuts on two sides. Furthermore, the base **2** in this embodiment is molded so as to have a hexagonal nut-like outer profile, but it is not limited to this shape, and it can also be formed into other shapes.

[**0051**] As shown in **FIG. 3**, the running screw **3** has a split shape that is obtained by splitting a circular column shape into plural pieces along the direction of its diameter. On the surface that is opposed to the bolt-receiving face **9** of the bolt-insertion hole **7**, there is formed a female screw **3***a* that engages with a male screw **6***a* on the outer surface of the bolt **6**. Also, a slide face **3***b*, which is formed into a conical tapered shape and which slides on the slope portion **8**, is formed at the bottom of the running screw **3**. In this embodiment, one running screw **3** is used, and it is inserted in the base **2** in a manner so that the female screw **3***a* of the running screw **3** is opposed to the bolt-receiving face **9**, in order to fasten the bolt **6** between the running screw **3** and the bolt-receiving face **9**.

[**0052**] The cover **4** is fit into the cover-attaching concavity **2***c* of the base **2** so as to close the face that is opposite to the bolt-insertion face **2***a* of the base **2**. The cover **4**, as shown in **FIG. 4**, is formed into a noncircular outer profile that is similar to that of the cover-attaching concavity **2***c*, and an insertion hole **4***a*, through which the bolt **6** penetrates, is formed at the center of the cover **4**. After the cover **4** is fit into the cover-attaching concavity **2***c* of the base **2**, the cover **4** clamps the end face of the base **2** and is thereby affixed to the base **2**. A spring piece **5** and a guide projection **10** that constitutes a guide means are formed on such a cover **4**.

[**0053**] One part of the cover **4** is bent toward the side of the base **2**, so that elasticity is given to the spring piece **5**. The spring piece **5** acts as a pressing means for pressing the running screw **3**, which is inserted in the base **2**, downward. Thus, the spring piece **5** is integrated with the cover **4**, and the number of parts that constitute a simple fastening device is reduced, resulting in easy assembly, which is advantageous.

[**0054**] The guide projection **10** is formed on the cover **4** on the side of the spring piece **5**. In this embodiment, the guide projection **10** is formed in a manner so as to project toward the base **2** (the insertion side of the bolt **6**) from both sides of the spring piece **5**. In this way, the guide projection **10** is formed into a triangular piece that protrudes downward, and it has a guide face **10***a* that is inclined in the same direction as the slope portion **8** of the above-mentioned base **2**.

[**0055**] Guide grooves **11** constituting a guide means, together with the guide projections **10**, are formed on the running screws **3**. As shown in **FIG. 3**, the guide grooves **11** are provided on both sides of the top face of the running screw **3** and are engaged with the guide projections **10**. This engagement of the guide projections **10** and the guide grooves **11** prevent the running screw **3** from slipping down.

[**0056**] FIGS. **5-9** illustrate the action of this embodiment. As shown in **FIG. 5, a** running screw **3** is inserted into the moving groove **2***b* of the base **2** in a manner so that a female screw **3***a* is opposed to the bolt-receiving face **9** of the bolt-insertion hole **7**. In addition, under a free condition that the bolt is not fastened, the running screw **3** is supported by the slope portion **8**. Under such a supported condition, both ends of the running screw **3**, which are perpendicular to the axial direction of the running screw **3**, are brought into contact with and fastened to the inner face of the base **2**, and thus the running screw **3** is prevented from falling out of the base **2**. In addition, both ends of the running screw **3**, which are perpendicular to the axial direction of the running screw **3**, protrude inside the bolt-insertion hole **7** (see **FIG. 1**).

[**0057**] The bolt **6** is formed in an upright fashion from an unfastened member (not shown), and when the simple fastening device **1** is made to approach the bolt **6**, the bolt **6** is inserted into the bolt-insertion hole **7** of the base **2** from the side of the bolt-insertion face **2***a*. As shown in **FIG. 6**, due to this insertion, the bolt **6** pushes up the running screw **3**. As shown in **FIG. 7**, due to this pushing up, the running screw **3** slides upwards along the slope portion **8**, and the running screw **3** moves upward.

[**0058**] As a result of this movement upward, the guide projections **10** of the cover **4** are engaged with the guide grooves **11** of the running screw **3**. The guide face **10***a* of the guide projection **10** slides in the guide groove **11** so as to achieve such an engagement. The guide face **10***a* is inclined in the same direction as the slope portion **8** of the base **2**, so that the guide projection **10** prevents the running screw **3** from displacement, namely from slipping down or being inclined, toward the bolt-insertion hole **7**. As a result, the bolt **6** is smoothly inserted in the base **2** without being hooked by the running screw **3**. In this embodiment, the guide grooves **11** are formed on both sides of the running screw **3**, and engaged with the guide projections **10**, respectively, so that the running screw **3** can be prevented from slipping down or being inclined.

[**0059**] **FIG. 8** illustrates the condition after the bolt **6** has been inserted into the base **2**, in which the spring piece **5** of

the cover **4** elastically presses the top end of the running screw **3** and presses the running screw **3** downward. Due to this pressing, the running screw **3** moves downward along the slope portion **8**, and the female screw **3***a* is engaged with the male screw **6***a* of the bolt **6**. Due to this engagement, the bolt **6** is bought into contact with the bolt-receiving face **9** of the bolt-insertion hole **7**, and the bolt-receiving face **9** receives the reaction force of the engagement. As a result, the running screw **3** can fasten the bolt **6** without loosening. **FIG. 9** illustrates the condition when the inserted bolt **6** has been returned slightly downward, and the female screw **3***a* of the running screw **3** is engaged with the male screw **6***a* of the bolt **6**.

[**0060**] In such an embodiment, the guide projections **10**, which constitute a guide means, and the guide grooves **11** are engaged with each other so as to prevent slipping down or inclination of the running screw **3**, and thus the bolt **6** can be smoothly inserted without being hooked by the running screw **3**. Thereby, fastening can be surely performed by one-touch insertion. Also, in this embodiment, because the spring piece **5** is integrated with the cover **4**, the number of parts can be reduced, and the entire axial length of the device can be shortened.

[**0061**] (Embodiment 2)

[**0062**] **FIGS. 10 and 11** illustrate Embodiment 2 of the present invention. In this embodiment, as shown in **FIG. 10, a** moving groove **2***b*, which has a slope portion **8**, is formed opposite to both sides of the bolt-insertion hole **7**. Furthermore, a pair of running screws **3** are supported by the slope portion **8** in such a way that the running screws **3** face each other. A pair of the running screws **3** are inserted in the base **2** in such a way that the female screws **3***a* face each other.

[**0063**] Guide grooves **11** are formed on the top faces of the running screws **3** and, as shown in **FIG. 11**, the guide projections **10** to be engaged with the guide grooves **11** are formed on the cover **4** in such a way that the number of the guide protrusions **10** equals the number of running screws **3**. Furthermore, the spring pieces **5** for pressing each of the running screws **3** downward are formed at positions of the cover **4** that correspond to the running screws **3**.

[**0064**] In this embodiment, when the bolt **6** is inserted in the bolt-insertion hole **7** from the side of the bolt-insertion face **2***a*, a pair of the running screws **3** move upward along the slope portion **8**. Due to this movement, the guide projections **10** are engaged with the guide grooves **11** of the running screws **3**. As a result, the running screws **3** can be prevented from inclining or slipping down, and the bolt **6** can be smoothly inserted. After the bolt **6** is inserted, the pair of running screws **3** are pressed by the spring piece **5**, and thus the running screws **3** are engaged with the bolt **6** in such a way that the running screws **3** clamp the bolt **6** from both sides of the bolt **6**. Thereby, the force for fastening the bolt **6** becomes large, so that the bolt **6** can be stably fastened.

[**0065**] (Embodiment 3)

[**0066**] FIGS. **12-16** illustrate Embodiment 3 of the present invention. In this embodiment, a spring-accommodating groove **12** is formed at the end opposite to the bolt-insertion face **2***a* of the base **2**. The spring-accommodating groove **12** is formed so as to have a predetermined length in the axial direction of the base **2**, so that a coil spring **13** can be partially inserted therein.

[**0067**] Because the coil spring **13** is inserted into the spring-accommodating groove **12**, one part of the coil spring **13** is positioned in the moving groove **2***b* of the base **2**, and thus the coil spring **13** presses the running screws **3**, which are inserted in the grooves **2***b*, downward. Accordingly, in this embodiment, a spring piece **5** is not formed on the cover **4**, and therefore the shape of the cover **4** is simple.

[**0068**] Guide projections **10**, which are to be engaged with the guide grooves **11** of the running screws **3**, are formed on the cover **4**. The guide projection **10** projects from the cover **4** in an upright fashion on the bolt-insertion face **2***a* of the base **2**, in the condition that the guide projection **10** has the guide face **10***a* so as to be engaged with the guide groove **11** of the running screw **3**.

[**0069**] **FIGS. 12 and 13** illustrate the condition before a bolt is inserted into the base **2** in this embodiment, **FIG. 14** illustrates the condition while a bolt is being inserted, **FIG. 15** illustrates the condition after a bolt has been inserted, and **FIG. 16** illustrates the condition when the bolt **6** is returned slightly downward and the female screw **3***a* of the running screw **3** is engaged with the male screw **6***a* of the bolt **6**. When the bolt **6** is inserted in the base **2**, the running screw **3** moves upward along the slope portion **8**. Because the guide projection **10** of the cover **4** is engaged with the guide groove **11** of the running screw **3**, the running screw **3** can be prevented from inclining or slipping down. Further, because the coil spring **13** presses the running screw **3** downward, the female screw **3***a* of the running screw **3** can be engaged with the bolt **6**. In addition, because the bolt-receiving face **9** of the bolt-insertion hole **7** receives the reaction force from this engagement, the bolt **6** can be securely fastened.

[**0070**] The present invention is not limited to the above embodiments, and it can be implemented in various ways. For example, the cover **4** can be omitted from the base **2**.

[**0071**] In this case, the running screw **3** can be prevented from inclining or slipping down by forming the guide projection **10** at a portion of the base **2** that faces the running screw **3**. Also, when a plurality of running screws **3** are provided, more than one pair can be provided.

Possibility of Industrial Utilization

[**0072**] According to the invention set forth in claim 1, because the guide means is engaged with the running screw so as to prevent the running screw from slipping down, the bolt is not hooked by the running screw, so that the bolt can be inserted smoothly.

[**0073**] According to the invention set forth in claim 2, because the bolt can securely fastened by the running screw and the bolt-receiving face of the bolt-insertion hole, and because the running screw is prevented from slipping down, the bolt is not hooked by the running screw, so that the bolt can be inserted smoothly.

[**0074**] According to the invention set forth in claim 3, because a plurality of running screws are engaged with the bolt, the bolt can be securely fastened and the running screws are prevented from slipping down. Thereby, the bolt is not hooked by the running screws, so that the bolt can be inserted smoothly.

[**0075**] According to the invention set forth in claim 4, in addition to the same effects of the invention set forth in any of claims 1-3, a guide means can be formed easily.

[0076] According to the invention set forth in claim 5, in addition to the same effects of the invention set forth in claim 4, because a guide projection is formed on a cover that is separate from the base, the guide projection can be formed easily.

[0077] According to the invention set forth in claim 6, in addition to the same effects of the invention set forth in claim 4 or 5, the running screw can be surely prevented from slipping down at the time of sliding.

Explanation of Numbers in the Drawings

[0078] **1**. Simple fastening device

[0079] **2**. Base

[0080] **2***a*. Bolt-insertion face

[0081] **2***b*. Moving groove

[0082] **2***c*. Cover-attaching concavity

[0083] **3**. Running screw

[0084] **3***a*. Female screw

[0085] **3***b*. Slide face

[0086] **4**. Cover

[0087] **5**. Spring piece

[0088] **6**. Bolt

[0089] **6***a*. Male screw

[0090] **7**. Bolt-insertion hole

[0091] **8**. Slope portion

[0092] **9**. Bolt-receiving face

[0093] **10**. Guide projection

[0094] **10***a*. Guide face

[0095] **11**. Guide groove

[0096] **12**. Spring-accommodating groove

[0097] **100**. Simple fastening device

[0098] **110**. Base

[0099] **120**. Running screw

[0100] **121**. Female screw

[0101] **122**. Tapered face

[0102] **130**. Spring

[0103] **140**. Bolt

[0104] **141**. Male screw

[0105] **150**. Bolt-insertion face

[0106] **160**. Slope portion

[0107] **170**. Cover

What is claimed is:

1. A simple fastening device wherein a running screw is supported by a slope portion that is formed in a bolt-insertion hole of a base, and a bolt is inserted into the bolt-insertion hole under the condition that the running screw is pressed by a pressing member, so that the running screw is engaged with the bolt, and wherein a guide means is engaged with said running screw, so that the running screw is prevented from slipping down in the base.

2. A simple fastening device that comprises **(1)** a base, to which are formed (a) a bolt-insertion hole whose one portion is a bolt-receiving face, and (b) a slope portion whose diameter is gradually reduced toward the bolt-insertion side under the condition that it connects with the bolt-insertion hole, **(2)** a running screw that slides along said slope portion and is engaged with the bolt as the bolt to be inserted moves in its axial direction, **(3)** a pressing member for pressing the running screw downward, and **(4)** a guide means that engages with the running screw and prevents the running screw from slipping down in the base.

3. A simple fastening device that comprises **(1)** a base to which are formed (a) a bolt-insertion hole, and (b) a plurality of slope portions whose diameters are gradually reduced toward the bolt-insertion side under the condition that they connect with the bolt-insertion hole, **(2)** a plurality of running screws that slide along the slope portions and are engaged with the bolts as the inserted bolt moves in its axial direction, **(3)** a pressing member for pressing the running screws downward, and **(4)** a guide means that is engaged with the running screws and prevents the running screws from slipping down in the base.

4. A simple fastening device, as set forth in any of claims **1-3**, wherein said guide means comprises **(1)** a guide projection that is provided to the base in a manner so as to project toward the bolt-insertion side, and **(2)** a guide groove that is formed on said running screw so as to engage with the guide projection.

5. A simple fastening device, as set forth in claim 4, wherein a cover into which said bolt can be inserted is attached to the base on the lower side of the bolt-insertion direction, and such that the aforementioned guide projection is provided on the cover.

6. A simple fastening device, as set forth in claim 4 or **5**, wherein said guide projection has a guide face that is inclined in the same direction as the sliding direction of said running screw, and such that the guide face is engaged with said guide groove.

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