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(54) **Grinder**

(57) A grinder (1) includes a lock mechanism inhibiting detachment and rotation of a cylindrical portion (15) of a wheel cover (13) and attached to a bearing box (4). The lock mechanism includes a lock member (22) and a torsion spring (25) urging the lock member (22) to the locked position. The lock member (22) is ring-shaped, with a larger diameter than the cylindrical portion (15), surrounds the bearing box (4) and has a protruding engagement hook (36) provided in a front side inner edge. The lock member (22) can be slid between a front-side lock released position at which the engagement hook (36) is separated away from the bearing box (4) and the cylindrical portion (15) can be attached to/detached from the bearing box (4), and a rear-side locked position at which the engagement hook (36) passes through the cylindrical portion (15) that surrounds the bearing box (4) and engages with an outer periphery of the bearing box (4) such that a front portion is contained within a gear housing (3).

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Description

BACKGROUND OF THE INVENTION

TECHNICAL FIELD

[0001] The present invention relates to a grinder in which a disk-shaped tool is attached to a spindle that protrudes downward from a housing, and the housing is provided with a protective cover that covers the disk-shaped tool from above.

BACKGROUND ART

[0002] Conventional grinders include a spindle which protrudes downward from a housing and to which a disk-shaped tool like a grinding stone, a diamond wheel etc. is attached. The housing is provided with a protective cover that covers the disk-shaped tool attached to the spindle from above.

[0003] The protective cover is attached in a removable manner using a lock mechanism that inhibits detachment and rotation, and thus angular adjustment can be made in accordance with a work operation. The lock mechanism is disclosed, for example, in International Patent Application Publication WO 2007/144219, in which a circular bearing supporting a spindle is provided with a ring-shaped lock member. The lock member is capable of moving forward and backward and is urged to the front. The lock member includes a through hole, into which the bearing unit is inserted with a clearance, and a latching portion that is protrudingly provided at a rear inner peripheral edge. A cylindrical portion provided at an upper edge of the protective cover is inserted between the bearing unit and the lock member so as to connect them. More specifically, when the cylindrical portion is positioned to surround the bearing unit, the latching portion of the lock member, which is urged to the front, engages with a through hole provided in the cylindrical portion. As a result, the cylindrical portion is attached to the bearing unit such that detachment and rotation are inhibited.

[0004] With the lock mechanism disclosed in W02007-144219, as the lock member is in a forward position when the protective cover is attached, the lock member is placed in a state in which it protrudes forward from the bearing unit. Accordingly, the protruding lock member could get caught during operation, thus impairing operability. Further, during working, the lock member accidentally could push back toward the rear, which makes the protective cover rotate and detach.

SUMMARY OF THE INVENTION

[0005] In light of the above, an object of the present invention is to provide a grinder that does not have a protruding lock member, so that good operability can be maintained. Further, reliability can be ensured when a protective cover is attached.

[0006] In order to achieve the above object, a first aspect of the invention is **characterized in that** a grinder includes a motor housing accommodating a motor, a front housing connected to a front side of the motor housing, a spindle supported in a vertical direction by the front housing, the spindle having a lower end that protrudes downward and to which a disc-shaped tool can be attached, a bearing unit having a circular external shape and supporting the spindle at a lower portion of the front housing, a protective cover that is attached to the bearing unit and includes a cover portion covering the disc-shaped tool from above and a cylindrical portion connecting to an upper edge of the cover portion and surrounding the bearing unit, and a lock mechanism that is provided on the bearing unit inhibiting the surrounding cylindrical portion from detaching and rotating.

[0007] The lock mechanism includes a ring-shaped lock member with a larger diameter than the cylindrical portion and an urging unit. The lock member surrounds the bearing unit and has a protruding engagement hook provided in a front side inner edge. The lock member is capable of sliding between a front-side lock released position and a rear-side locked position. The front-side lock released position is a position at which the cylindrical portion can be attached to/detached from the bearing unit as a result of the engagement hook separating away from the bearing unit to the front side. The rear-side locked position is a position at which the engagement hook passes through the cylindrical portion that surrounds the bearing unit and engages with an outer periphery of the bearing unit such that, at the least, a front portion is contained within the front housing when seen in a plan view. The urging unit urges the lock member to the locked position.

[0008] A second aspect of the invention is **characterized in that**, in the configuration of the first aspect, the urging unit is a torsion spring which is positioned in a left-right direction at one of an upper side and a lower side of the lock member, and has end portions that engage with the lock member.

[0009] A third aspect of the invention is **characterized in that**, in the configuration of the first aspect, an elastic member is embedded in the bearing unit. The elastic member protrudes from an outer peripheral surface of the bearing unit and forcibly pushes against an inner peripheral surface of the surrounding cylindrical portion.

[0010] A fourth aspect of the invention is **characterized in that**, in the configuration of the first aspect, a regulating member is provided in the lock mechanism. The regulating member can be operated to move between a regulation position and a regulation released position. The regulation position is a position at which the regulating member engages with the lock member in the lock released position so as to regulate sliding from the lock released position. The regulation released position is a position at which engagement of the regulating member and the lock member is released such that sliding of the lock member is permitted.

[0011] According to the first aspect of the invention, the lock member does not protrude to the front, and thus good operability can be maintained, and also reliability can be ensured when a protective cover is attached.

[0012] According to the second aspect of the invention, in addition to the benefits of the first aspect, the urging unit can be provided in a reduced space, thereby promoting compactness of the lock mechanism.

[0013] According to the third aspect of the invention, in addition to the benefits of the first and second aspects, rattling of the protective cover is prevented due to the elastic member when the protective cover is attached.

[0014] According to the fourth aspect of the invention, in addition to the benefits of the first to third aspects, the lock member can be held at the lock released position by the regulating member, thus allowing attachment and detachment of the protective cover to/from the bearing unit to be performed easily.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a perspective view of a front edge portion of a grinder.

FIG. 2 is perspective view of the front edge portion of the grinder when a wheel cover is not attached.

FIG. 3 is a left-side view of the front edge portion of the grinder.

FIG. 4 is a partial sectional view taken along a line A-A of FIG. 3.

FIG. 5 is a sectional view taken along a line B-B of FIG. 4.

FIG. 6 is a sectional view taken along a line C-C of FIG. 3.

FIG. 7 is a partial sectional view taken along a line D-D of FIG. 3.

FIG. 8 is a perspective view of a bearing box.

FIG. 9A, FIG. 9B and FIG. 9C are explanatory views of a base that respectively show a bottom surface, a rear surface and a cross section view taken along a line E-E of FIG. 9A.

FIG. 10A and FIG 10B are explanatory views of a lock member that respectively show a plan view and a longitudinal sectional view of the lock member.

FIG. 11A and FIG. 11B are bottom views of the front edge portion of the grinder with the cover omitted, with FIG. 11A illustrating a state where the lock member is at a rear position and FIG 11B illustrating a state where the locking member is at a forward position when the wheel cover is not attached.

FIG. 12 is a sectional view taken along the line C-C of FIG. 3 when the wheel cover is attached.

FIG. 13 is a sectional view taken along the line A-A of FIG. 3 when the wheel cover is attached.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] Hereinafter, an embodiment of the invention will be explained with reference to the figures.

[0017] FIG. 1 to FIG. 7 show one example of a grinder. A grinder 1 includes a motor housing 2 that houses a motor, not shown in the figures, and a gear housing 3 that is connected to a front edge of the motor housing 2 and serves as a front housing. A spindle 5 is supported in a vertical direction by the gear housing 3, and a bearing box 4 is attached to a lower side of the gear housing 3 and serves as a bearing unit. The spindle 5 protrudes downwards, and a disc-shaped tool T, such as a grinding stone or diamond wheel, is detachably attached to a lower end of the spindle 5.

[0018] The bearing box 4 is shaped as a circular, cylindrical body that holds ball bearings, not shown in the figures, which support the spindle 5. Four quadrangular flanges 7 are formed in an upper edge of the bearing box 4 and fixed to a lower surface of the gear housing 3 by four bolts 6, as shown in FIG. 8. In addition, a vertical groove 8 extending to the lower surface is formed in a front surface of the bearing box 4. A pair of engagement recesses 9 are formed in a radial direction to the left and right of the groove 8. Vertically extending grooves 10 are also formed to the right side of the engagement recess 9 on the right side and in a rear surface of the bearing box 4.

[0019] Moreover, insertion grooves 11 having a circular cross section are formed at positions different from those of the grooves 8, 10 and the engagement recesses 9 in a peripheral surface of the bearing box 4. The insertion grooves 11 have openings to the outside in a portion of a lower edge and a peripheral surface. Respective rubber pins 12 (see FIG. 7), as elastic members, are forcibly inserted in each insertion groove 11.

[0020] Moreover, a wheel cover 13, as a protective cover covering the disc-shaped tool T from above is detachably attached to the bearing box 4 by a lock mechanism 20. This wheel cover 13 is in a semi-circular shape when seen in a plan view, and includes a cover portion 14 and a cylindrical portion 15. The cover portion 14 covers an upper surface and a peripheral surface of a rear half of the disc-shaped tool T. The cylindrical portion 15 is provided in connection with an upper surface of the cover portion 14 and coaxially with the center of the semi-circular shape of the wheel cover 13. Protrusions 16 are formed in an upper inner edge of the cylindrical portion 15. The protrusions 16 are positioned in alignment with the grooves 8, 10 that are provided in the outer periphery of the bearing box 4 when the cover portion 14 is in a rear position. In addition, as shown in FIG. 2, a plurality of through holes 17 are formed at the same distance apart as the engagement recesses 9 in the cylindrical portion 15, with the exception of a rear portion thereof.

[0021] The lock mechanism 20 includes a base 21 that is assembled to the bearing box 4 from a rear side, a lock member 22 that surrounds the bearing box 4 at a lower

side of the base 21 and a cover 23 that is fixed to a lower face of the base 21.

[0022] The base 21, as shown in FIG. 9, is a C-shaped tabular body that covers the peripheral surface of the bearing box 4 including all of a rear half of the peripheral surface and a partly front of the peripheral surface. The base 21 is fixed to the flanges 7 by the bolts 6 at the rear side. An accommodating portion 24 for a torsion spring 25 is an urging unit, is provided in a protruding manner at the center in a left-right direction of a rear end edge of the base 21. The accommodating portion 24 holds a left-right pair of winded portions 26 formed in the torsion spring 25 along with a pin 27 passing through both of the winded portions 26. As a result, both end portions of the torsion spring 25 are latched inside the accommodating portion 24, and a latching portion 28 formed between the winded portions 26 and protruding downward latches the lock member 22 so as to urge the lock member 22 to the rear.

[0023] In addition, triangular guide portions 29 are provided so as to protrude downward at a through portion where the bolts 6 pass through at the lower surface of the base 21. Left-right side surfaces of the guide portions 29 are formed to extend in the front-rear direction in line with a direction that is tangential to the bearing box 4, and rear surfaces of the guide portions 29 also extend in line with a direction that is tangential to the bearing box 4 in the left-right direction. An inner diameter of the base 21 including the guide portions 29 is formed to be slightly larger than an outer diameter of the bearing box 4. When the base 21 is fixed to the flanges 7, as shown in FIG. 11, a gap in which the cylindrical portion 15 of the wheel cover 13 can be inserted with a clearance is formed between the bearing box 4 and the base 21 such that the cylindrical portion 15 is positioned coaxial with an inner peripheral surface of the base 21 and in a non-contacting state with respect to an outer periphery side of the bearing box 4.

[0024] Further, a lock button 30 is provided as a regulating member on a left side surface of the base 21. The lock button 30, as shown in FIG. 4 etc., can be fitted within/removed from the inside of an accommodating groove 31 that is formed extending in a left-right direction in the base 21. A coil spring 33 is provided between a retaining groove 32 provided in an upper surface of the lock button 30 and a bottom portion of the accommodating groove 31. The coil spring 33 urges the lock button 30 in a direction protruding away from the base 21. A regulating protrusion 34 protruding downward is formed in an end portion of a lower surface of the lock button 30 on the side that is inserted toward the base 21. The regulating protrusion 34 fits into a guidance groove 35 formed to extend from the accommodating groove 31 to the guide portion 29. The regulating protrusion 34 abuts with the lock member 22 through a side surface of the guide portion 29 so as to regulate a protrusion position of the lock button 30.

[0025] Moreover, the lock member 22 is a frame-shaped body having a round-shaped front side and rectangular-shaped rear side. An inner diameter of the front side is formed to have substantially the same dimensions as an outer diameter of the cylindrical portion 15 of the wheel cover 13. A gap between inner edges of the rear side is formed to have substantially the same dimensions as the gap between side surfaces to the left and right of the right guide portions 29 on the left and right. In addition, as shown in FIG. 10, a pair of engagement hooks 36 are provided in a protruding manner in an inner edge at a front side of the lock member 22, and correspond to the engagement recesses 9 of the bearing box 4. A recess 37, to which the latching portion 28 of the torsion spring 25 latches, is formed at the center of the inner edge of the rear side of the lock member 22.

[0026] As a result of the rear side of the lock member 22 fitting into the left and right guide portions 29, the lock member 22 surrounds the bearing box 4 such that it can only slide in the forward-backward direction. Lower surfaces of the guide portions 29 are fixed by the bolts 6 to the cover 23, which has a C-shape, so as to stop detachment downward.

[0027] Further, as a result of the latching portion 28 of the torsion spring 25 latching in the recess 37 on the rear side, as shown in FIG. 11A, the lock member 22 is normally urged to a rear position at which the engagement hooks 36 insert within the engagement recesses 9.

[0028] In addition, a pair of notches 38, with which the regulating protrusion 34 of the lock button 30 engages, are provided in a row in a front-rear direction in an inner edge surface of a side of the lock member 22. The notches 38 correspond with a front-side locked position at which the engagement hooks 36 pass through the cylindrical portion 15 and insert with the engagement recesses 9 when the cylindrical portion 15 of the wheel cover 13 is in a state in which it surrounds the bearing box 4 and a rear-side lock released position at which the engagement hooks 36 are separated away from the engagement recesses 9 and the cylindrical portion 15 to the front side. At each position, the lock button 30 regulates sliding of the lock member 22 due to the regulating protrusion 34 protruding toward a regulation position at which the regulating protrusion 34 engages with the notches 38. If the lock button 30 is pushed in resistance to the urging force of the coil spring 33, the lock button 30 permits sliding of the lock member 22 since the regulating protrusion 34 separates away backward from the notches 38 to a regulation released position.

[0029] With the grinder 1 with the above described configuration, when the wheel cover 13 is attached to the bearing box 4, first, the lock button 30 is pushed-in to release engagement of the regulation protrusion 34 with the front side notch 38. In this state, the lock member 22 is slid forward until the lock released position is reached. Then, the regulating protrusion 34 of the lock button 30, which has separated away from the notch 38 and ridden along the inner edge of the side of the lock member 22, engages with the rear side notch 38, thereby fixing the

lock member 22 in the lock released position. It should be noted that curved protrusions 39 are formed in left and right outside surfaces of the lock member 22 and increasingly protrude to the outside as curved protrusions 39 extend in the forward direction. As a result, the lock member 22 could be slid in the forward direction by a user placing their fingers on both the curved protrusions 39.

[0030] In this state, the engagement hooks 36 of the lock member 22 are placed at a distant apart to the front from the engagement recesses 9 of the bearing box 4 as shown in FIG. 11B. Thus, the cylindrical portion 15 of the wheel cover 13 is caused to surround the bearing box 4 from below in a state in which the grooves 8 and 10 and the protrusions 16 are positioned in alignment with the cover portion 14 positioned to the rear. Then, as shown in FIG. 6, in a state in which the through holes 17 at the front side of the cylindrical portion 15 are positioned to the outside of the engagement recesses 9 of the bearing box 4, the cylindrical portion 15 is sandwiched between the bearing box 4 and the base 21. Thus, a side surface of the rubber pin 12 provided in the bearing box 4 forcibly pushes against an inner peripheral surface of the cylindrical portion 15 such that the wheel cover 13 is held without being able to rattle or rotate.

[0031] Next, when the lock button 30 is pushed-in, the slide regulation of the lock member 22 is released, and the lock member 22 slides toward the rear due to urging force of the torsion spring 25 until a front side inner edge abuts against an outer periphery of the cylindrical member 15. Then, as shown in FIG. 12, the engagement hooks 36 of the lock member 22 pass through the through holes 17 of the cylindrical portion 15 and insert within the engagement recesses 9 of the bearing box 4 that are beyond the cylindrical portion 15. As a result, the cylindrical portion 15 becomes an integrated unit with the bearing box 4 in a state in which detachment and rotation are inhibited. At this time, if the lock button 30 is pushed-in to release, as shown in FIG. 13, the regulating protrusion 34 once again engages with the front side notch 38 of the lock member 22 such that the locked position of the lock member 22 is maintained. The lock member 22 at the locked position does not protrude to the front from the gear housing 3 when seen in a plan view.

[0032] It should be noted that, when an angle of the wheel cover 13 is adjusted in line with an operation, the same procedure is taken as when the wheel cover 13 is attached. Namely, after the lock member 22 is slid to the lock released position and fixed using the lock button 30, the wheel cover 13 is removed once from the bearing box 4, and then the angle is changed to a different one at which the protrusions 16 of the cylindrical portion 15 and the grooves 8 and 10 of the bearing box 4 are at aligned positions. Then the wheel cover 13 is attached again.

[0033] In this manner, according to the grinder 1 of the above-described embodiment, the lock mechanism 20 includes the lock member 22 and the urging unit (the torsion spring 25). Due to the lock member 22 surrounding the bearing box 4 and having the protruding engagement hooks 36 provided in the front side inner edge and the ring-shape with a larger diameter than the cylindrical portion 15. The lock member 22 can be slid between the front-side lock released position and the rear-side locked position. The front-side lock released position is a position at which the cylindrical portion 15 can be attached to/detached from the bearing box 4 as a result of the engagement hooks 36 being separated away to the front from the bearing box 4. The rear-side locked position is a position at which the engagement hooks 36 pass through the cylindrical portion 15 surrounding the bearing box 4 and engage with the outer periphery of the bearing box 4 such that the front portion is contained within the gear housing 3 when seen in a plan view. The urging unit urges the lock member 22 to the locked position. As a result of the lock mechanism 20 having the above configuration the lock member 22 can be prevented from protruding to the front and maintain good operability, as well as ensure reliability when the wheel cover 13 is attached.

[0034] More particularly, as a result of providing, as the urging unit, the torsion spring 25 with the end portions are positioned in the left and right directions at the upper side of the lock member 22. Further, the end portions of the torsion spring 25 is engaged with the lock member 22. As a result, the urging unit can be provided in a reduced space, thereby promoting compactness of the lock mechanism 20.

[0035] In addition, the rubber pin 12 is embedded in the bearing box 4. Further, the rubber pin 12 protrudes from the outer peripheral surface of the bearing box 4 and forcibly pushes against the inner peripheral surface of the cylindrical portion 15. Thus, rattling of the wheel cover 13 can be favorably prevented when the wheel cover 13 is attached.

[0036] Furthermore, the lock button 30 is provided in the lock mechanism 20. The lock button 30 can be operated to move between the regulation position and the regulation released position. The regulation position is a position at which the lock button 30 engages with the lock member 22 in the lock released position so as to regulate sliding from the lock released position. The regulation released position is a position at which engagement of the lock button 30 and the lock member 22 is released such that sliding of the lock member 22 is permitted. As a result of the lock mechanism 20 having the above configuration, the lock member 22 can be held at the lock released position, thus allowing attachment and detachment of the cylindrical portion 15 to/from the bearing box 4 to be performed easily.

[0037] It should be noted that, in the above-described embodiment, the pair of engagement hooks are provided in the lock member. However, three or more engagement hooks may be provided. In addition, the shape of the engagement hooks is not limited to the form described above, and a tabular shape or a pin shape may be used.

[0038] Furthermore, the lock member of the above described embodiment has the round front side and the rectangular rear side. However, various modifications are possible as appropriate. For example, depending on the shape of the front housing, the lock member may have a square shape in which the front side is also rectangular, or may have an oval shape in which the rear side is also round, or have an overall round shape in which left and right inner peripheral edges have been chamfered.

[0039] In addition, the lock member of the above-described embodiment is provided with the curved protrusions in the left and right side surfaces, and in the locked position, only the front portion is contained within the front housing when seen in the plan view. However, the curved protrusions need not necessarily be provided, and instead of protrusions, recesses may be provided for the user's fingers to be placed on, and the left and right side surface may also be contained within the front housing when seen in a plan view.

[0040] Furthermore, the torsion spring, which acts as the urging unit, latches the latching portion provided between the pair of winded portions with the lock member. However, various modifications are possible as appropriate. For example, the respective end portions of the torsion spring disposed as a left-right pair may be latched to the lock member and urged to the rear. Moreover, the torsion spring may be provided at the lower side of the lock member rather than the top side, and the configuration is not limited to using a torsion spring but may utilize another elastic member like a coil spring or a flat spring.

[0041] In addition, in the above-described embodiment, the lock button engages at both of the respective locked position and the lock released position of the lock member so that sliding of the lock member is regulated even at the locked position, thus improving reliability when locked. However, one less notch may be provided in the lock member such that the lock button is only engaged in the lock released position. Moreover, various modifications are possible as appropriate. For example, the regulating member like the lock button can be provided at a different position such as at the right side of the bearing unit, or the form of the regulating member may be changed such that the regulating member is not pushed-in but is, for example, engaged and released from the lock member by an upward-downward slide.

[0042] In addition, the elastic member provided in the bearing unit can utilize, in addition to a cylindrical pin, a pin with a semi-circular or trapezoid cross-section, a ball-shaped rubber etc.

[0043] Furthermore, the form of the protective cover may also be changed such that, for example, the cover portion is not semi-circular but has an overall circular shape, or the number of through holes provided in the cylindrical portion may be increased or reduced. In addition, instead of through holes, notches can be provided by opening up the lower edge.

[0044] It is explicitly stated that all features disclosed in the description and/or the claims are intended to be disclosed separately and independently from each other for the purpose of original disclosure as well as for the purpose of restricting the claimed invention independent of the composition of the features in the embodiments and/or the claims. It is explicitly stated that all value ranges or indications of groups of entities disclose every possible intermediate value or intermediate entity for the purpose of original disclosure as well as for the purpose of restricting the claimed invention, in particular as limits of value ranges.

Claims

1. A grinder (1) including: a motor housing (2) that accommodates a motor; a front housing (3) that supports a spindle (5) in an upward-downward direction, the front housing being connected to a front side of the motor housing (2); a bearing unit (4) that allows a disc-shaped tool (T) to be attached to a lower end of the spindle (5) that protrudes downward from the front housing (3), the bearing unit (4) having a circular external shape and supporting the spindle (5) at a lower portion of the front housing (3); a protective cover (13) including a cover portion (14) that covers the disc-shaped tool (T) from above, and a cylindrical portion (15) that connects to an upper edge of the cover portion and that can surround the bearing unit (4), the protective cover (13) being attached to the bearing unit (4); and a lock mechanism (20), provided on the bearing unit (4), that inhibits the surrounding cylindrical portion (15) from detaching and rotating, the grinder being **characterized in that** the lock mechanism (20) includes:

a lock member (22) that has a ring-shape with a larger diameter than the cylindrical portion (15) and that surrounds the bearing unit (4) and has a protruding engagement hook (36) provided in a front side inner edge, the lock member (22) being capable of sliding between a front-side lock released position at which the cylindrical portion (15) can be attached to or detached from the bearing unit (4) as a result of the engagement hook (36) separating away from the bearing unit (4) to the front side, and a rear-side locked position at which the engagement hook (36) passes through the cylindrical portion (15) that surrounds the bearing unit (4) and engages with an outer periphery of the bearing unit (4) such that, at the least, a front portion is contained within the front housing (3) when seen in a plan view; and

an urging unit (25) for urging the lock member (22) to the locked position.

2. The grinder according to claim 1, wherein the urging unit is a torsion spring (25) which is positioned in a left-right direction at one of an upper side and a lower side of the lock member (22), and which has end portions that engage with the lock member (22).

3. The grinder according to claim 1 or 2, wherein an elastic member (12) is embedded in the bearing unit (4), the elastic member (12) protruding from an outer peripheral surface of the bearing unit (4) and forcibly pushing against an inner peripheral surface of the surrounding cylindrical portion (15).

4. The grinder according to claim 3, wherein the elastic member (12) is a rubber pin (12) that is forcibly inserted in an insertion groove (11) formed in the outer peripheral surface of the bearing unit (4).

5. The grinder according to any one of claims 1 to 4, wherein a regulating member (30) is provided in the lock mechanism (20), the regulating member (30) being operable to move between a regulation position at which the regulating member (30) engages with the lock member (22) in the lock released position so as to regulate sliding from the lock released position, and a regulation released position at which engagement of the regulating member (30) and the lock member (22) is released such that sliding of the lock member (22) is permitted.

6. The grinder according to claim 5, wherein the regulating member (30) is a lock button (30) that is urged to the regulation position by a coil spring (33).

7. The grinder according to any one of claims 1 to 6, wherein the lock member (22) is a frame-shaped body having a front side that is round and a rear side that is rectangular.

8. The grinder according to claim 7, wherein a base (21) is assembled to the bearing unit (4), the base including guide portions (29) having left and right side surfaces that are formed to extend in a front-rear direction in line with a direction tangential to the bearing unit (4), and the lock member (22) surrounds the bearing unit (4) with the rear side of the lock member (22) being fitted to the guide portions (29) such that the lock member (22) can only slide in the front-rear direction.

9. The grinder according to claim 7 or 8, wherein curved protrusions (39) are formed in left and right outside surfaces of the lock member (22) and increasingly protrude to an outer side as the curved protrusions extend in the forward direction.

10. The grinder according to any one of claims 1 to 9, wherein the engagement hook (36) is provided as a pair of engagement hooks.

11. The grinder according to any one of claims 1 to 10, wherein the cover portion (14) has a semi-circular shape when seen in a plan view, the semi-circular shape covering a rear half portion of the disc-shaped tool (T).

12. The grinder according to claim 11, wherein a groove (8, 10) that runs parallel to an axial direction is formed in the outer peripheral surface of the bearing unit (4), and a protrusion (16) is formed in the cylindrical portion (15), the protrusion (16) being formed to be in alignment with the groove (8, 10) when the cover portion (14) is position at the rear side.

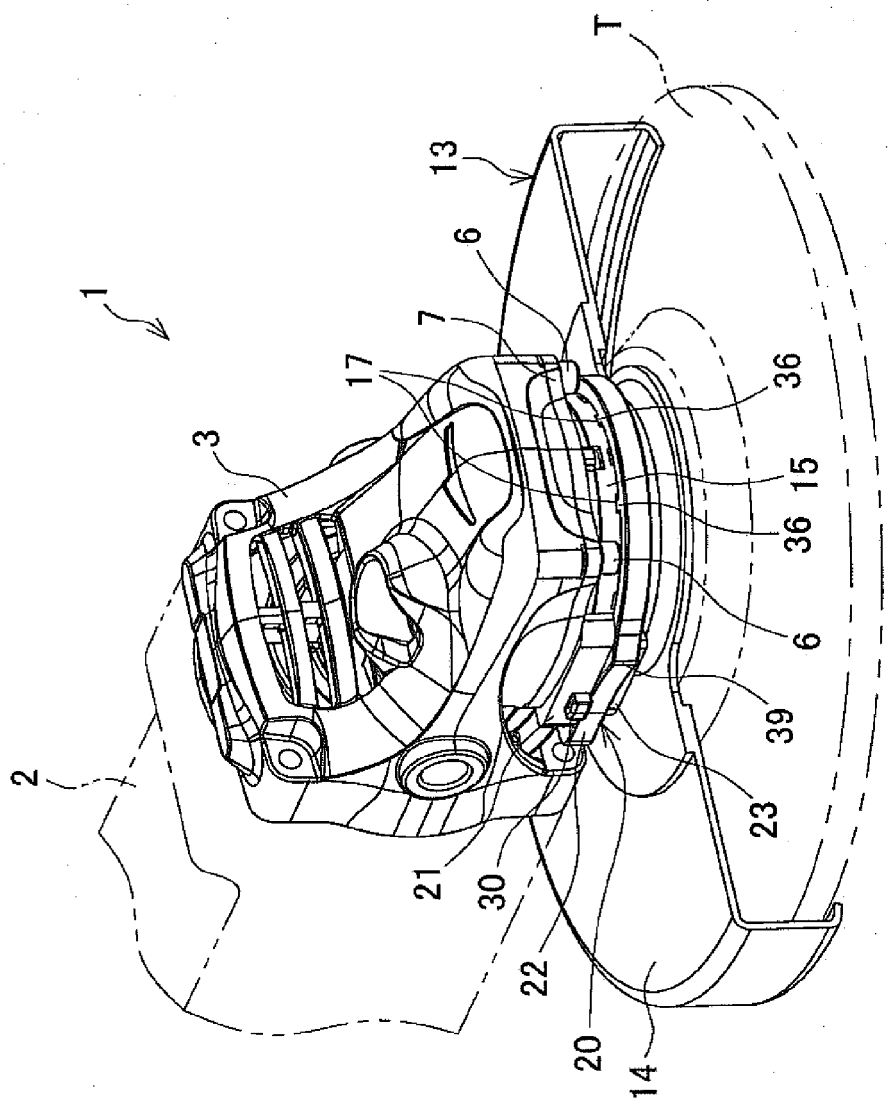


FIG. 1

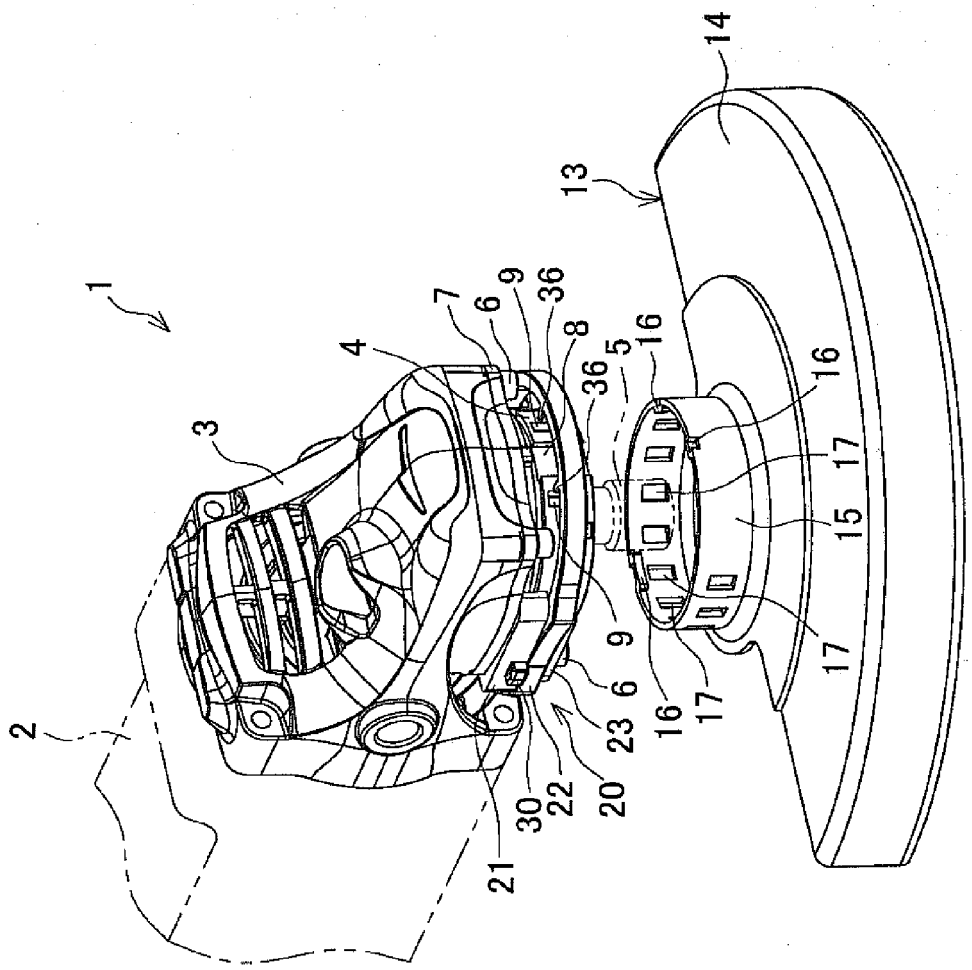


FIG. 2

FIG. 3

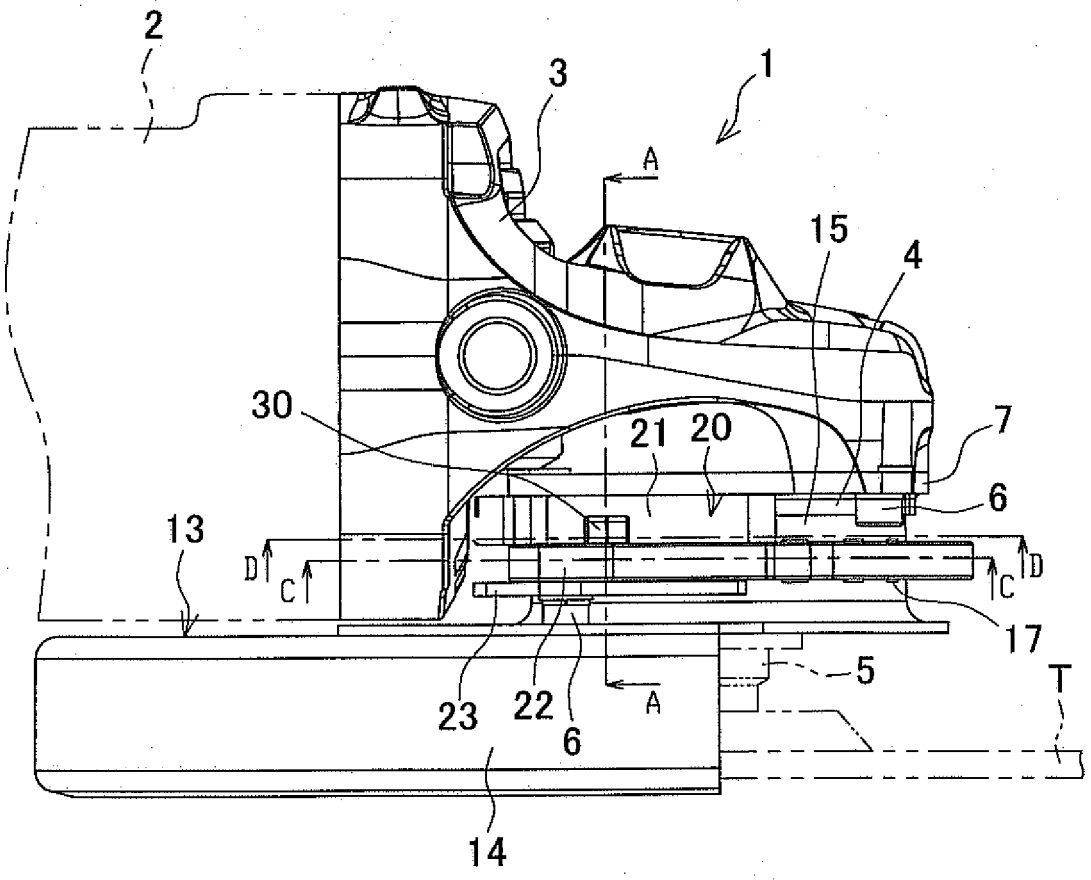


FIG. 4

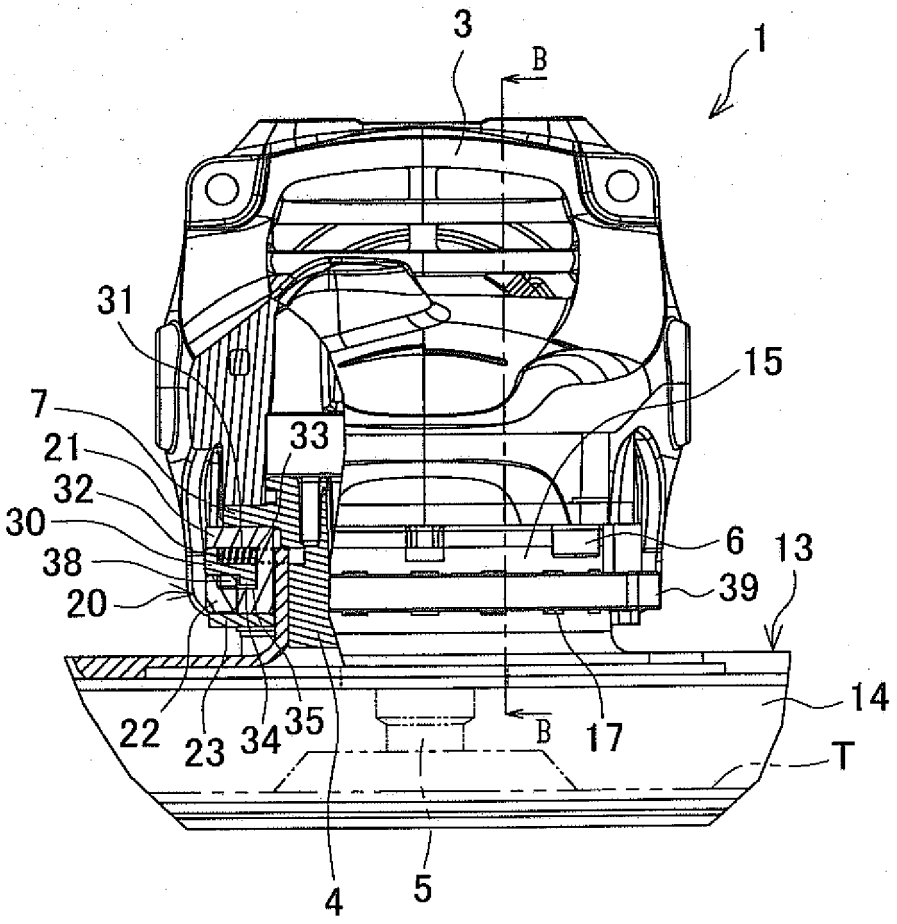


FIG. 5

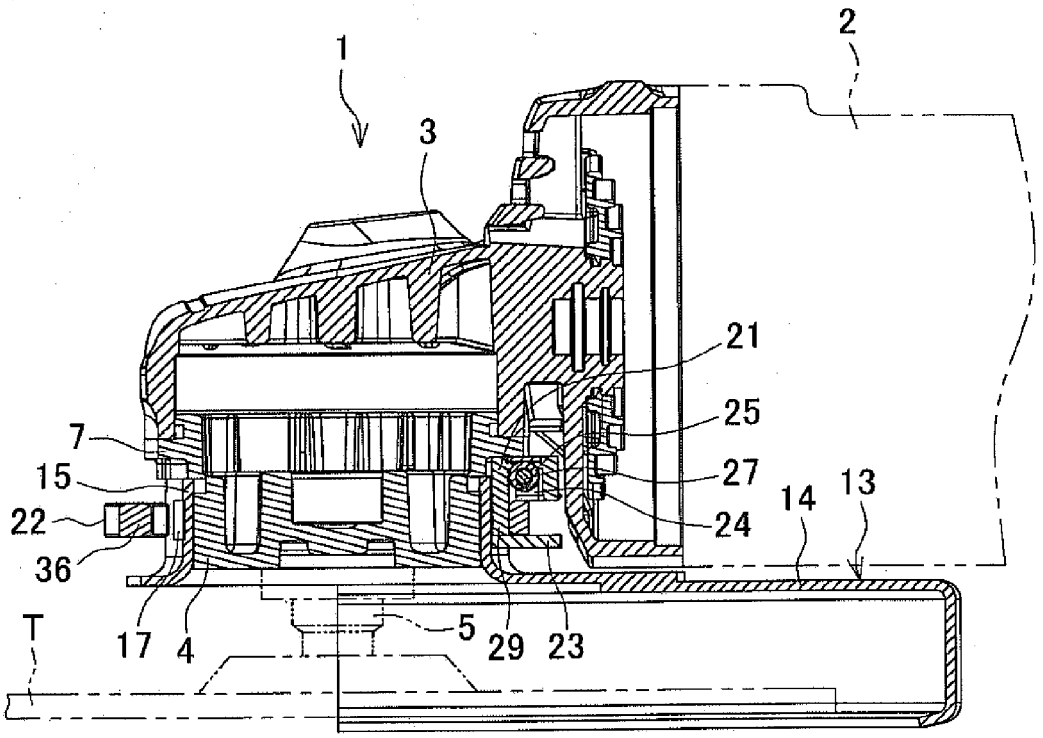


FIG. 6

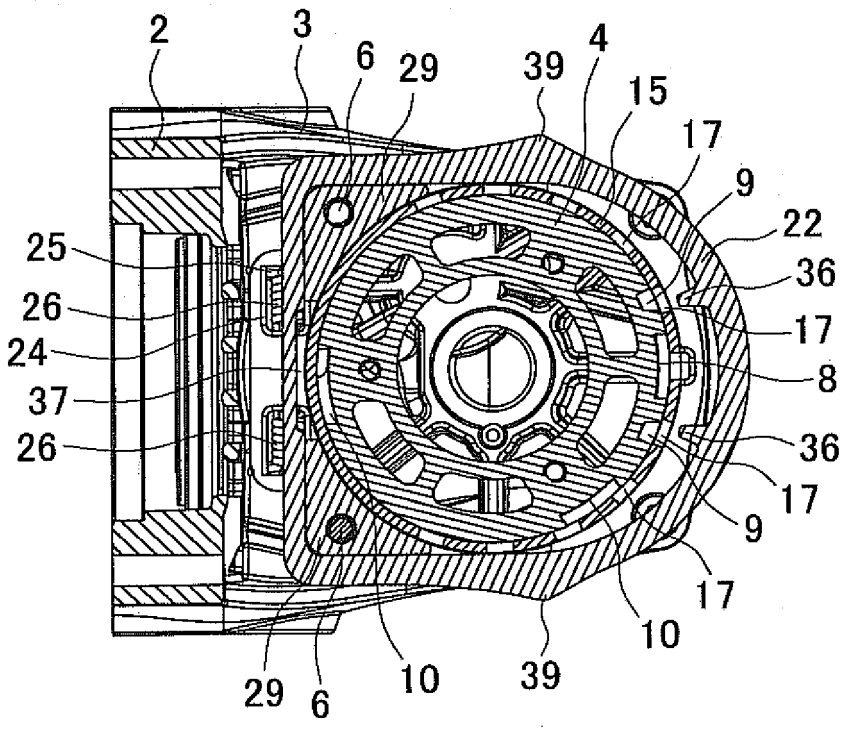


FIG. 7

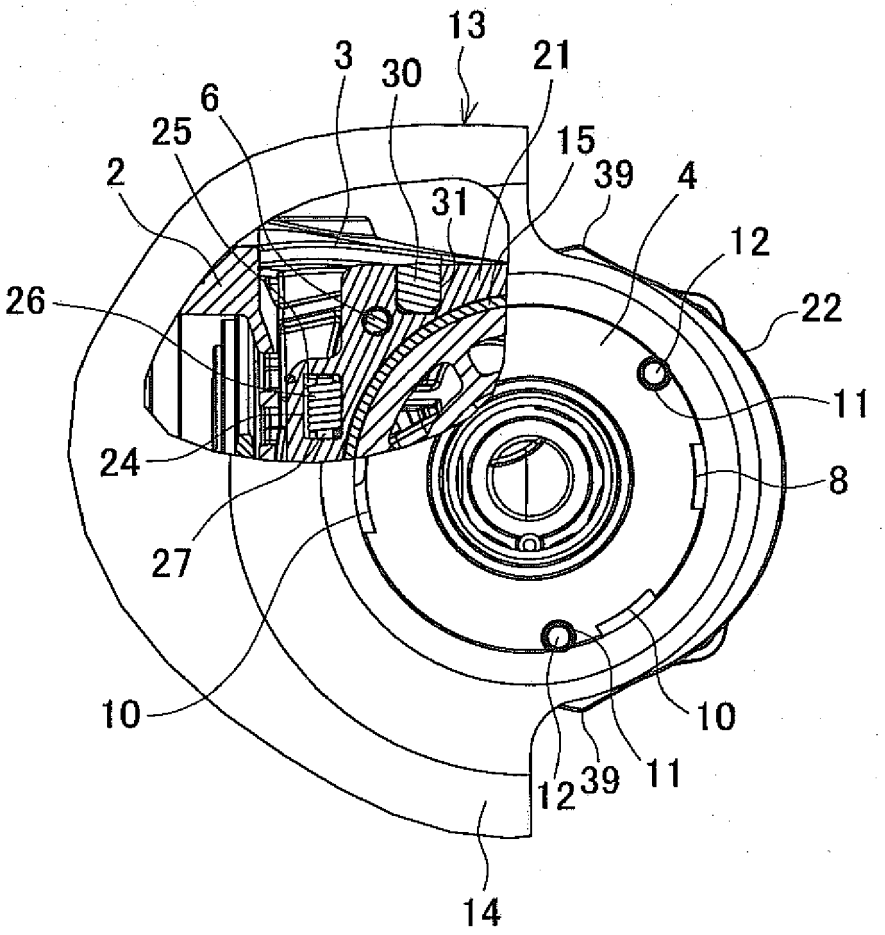
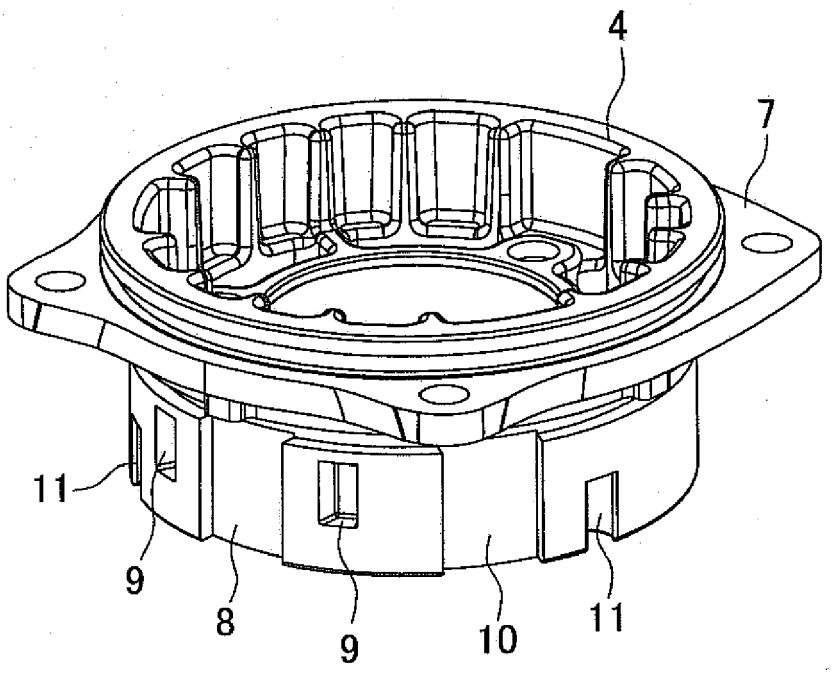


FIG. 8



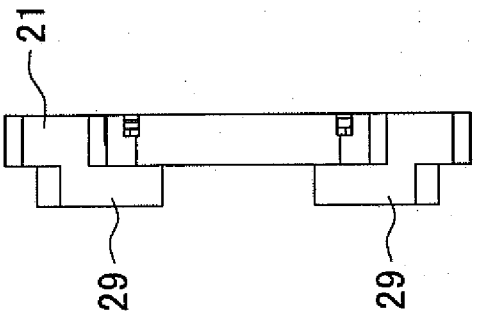


FIG. 9C

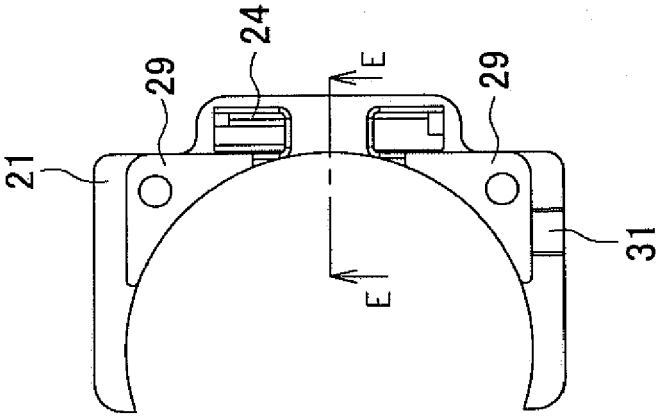


FIG. 9A

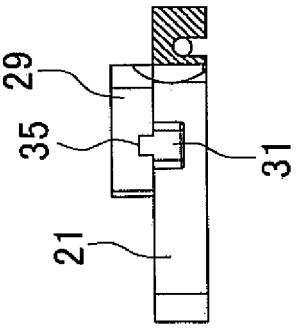


FIG. 9B

FIG. 10A

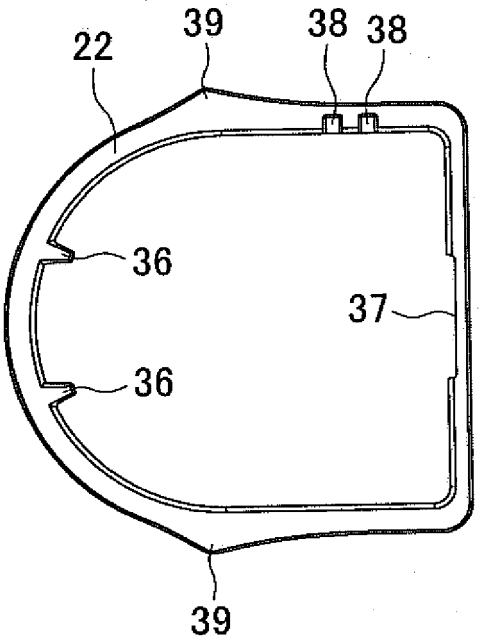


FIG. 10B

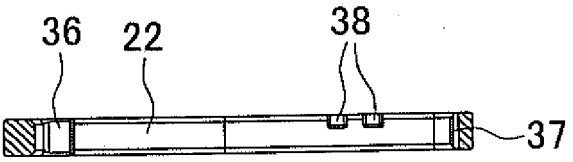


FIG. 11A

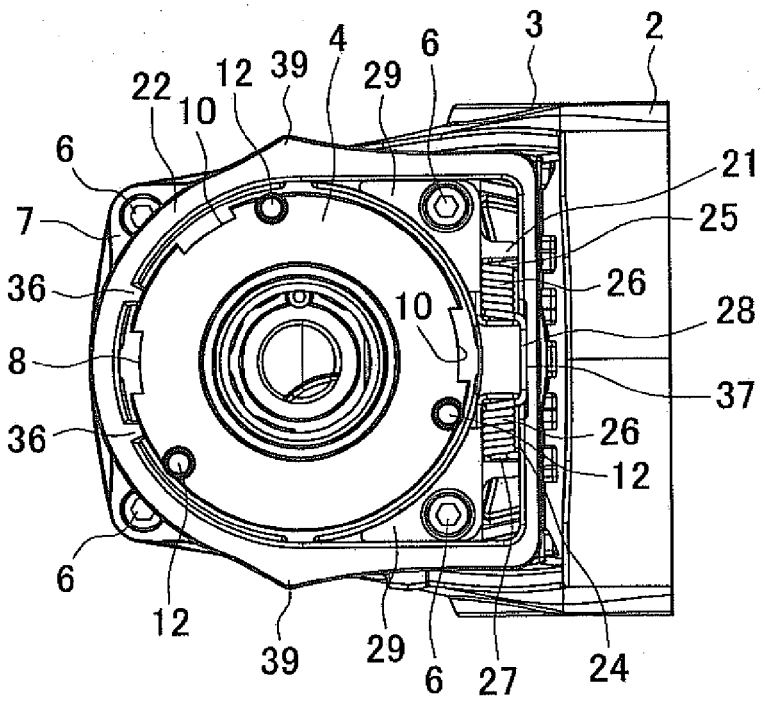


FIG. 11B

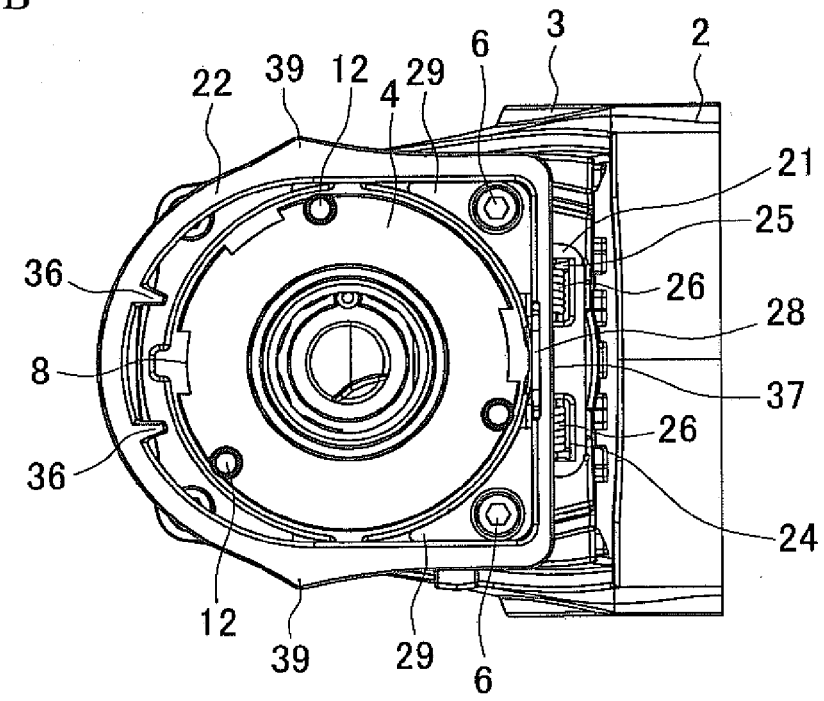
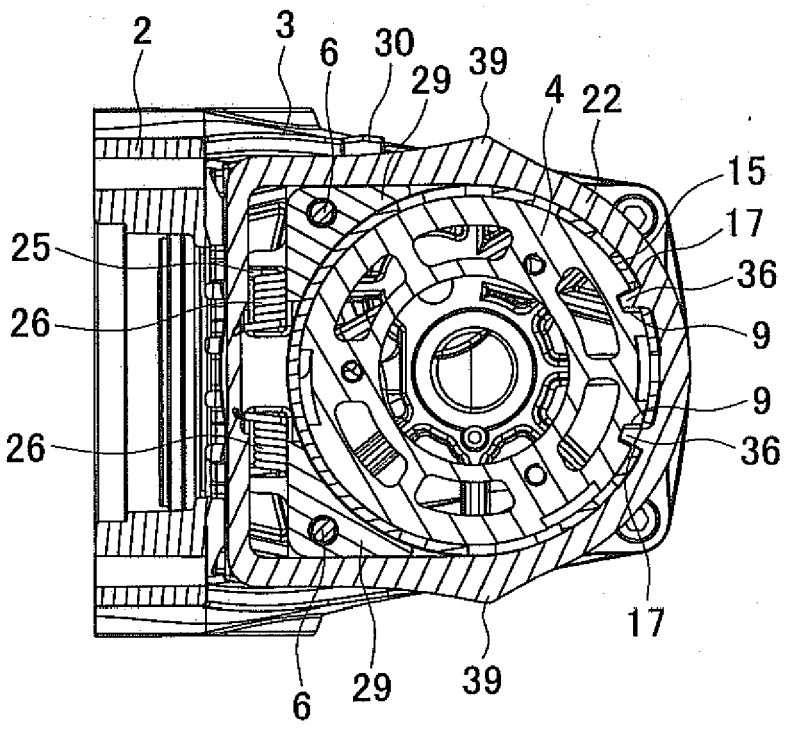


FIG. 12



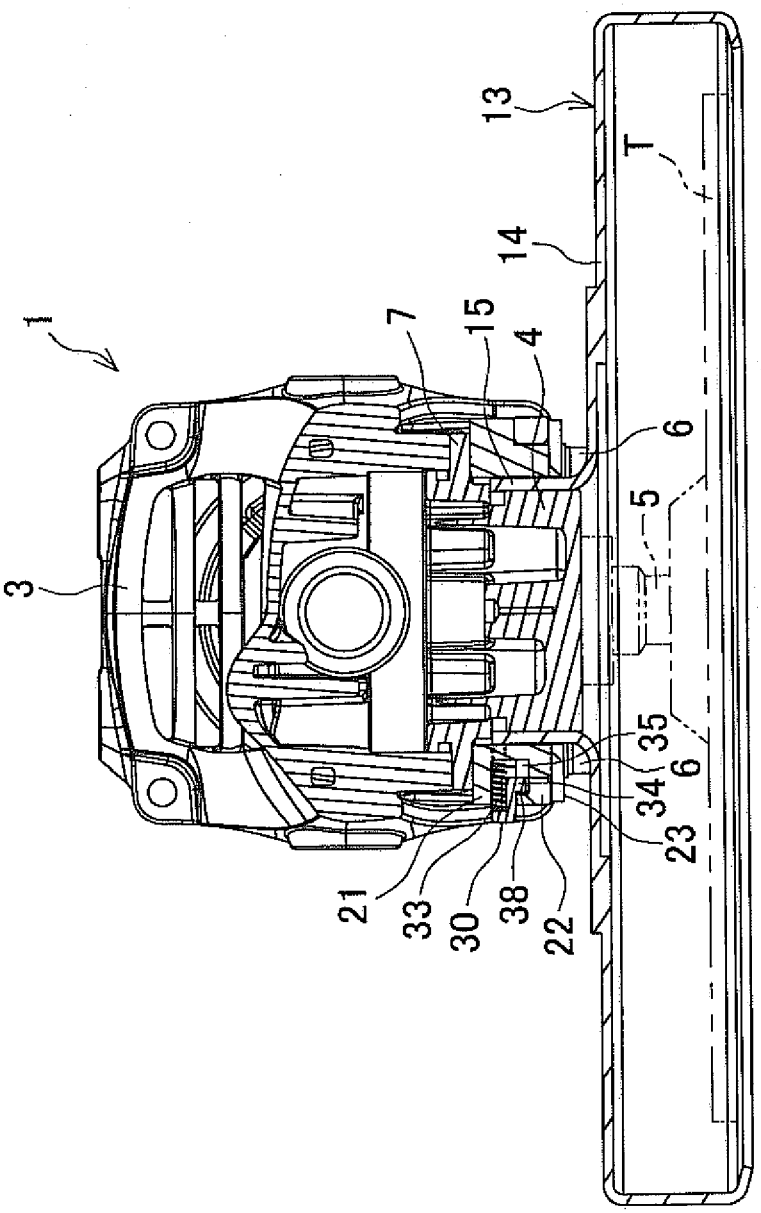


FIG. 13

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EUROPEAN SEARCH REPORT

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B24B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 August 2012	Müller, Andreas

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