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(54) Flip over saw

(57) A flip over saw in which locking and lock release of table rotation can be carried out with a simple structure is provided. On the rear side of a base (2), a lock lever (6) is pivotally provided by a stepped pin (22) and is urged to an upper locking position. At the rotating position of the table (3) in a miter saw mode, an engaging corner (30) of the lock lever (6) engages with a stopper screw (29) provided with the table (3) to regulate the rotation of the table (3). On the other hand, at the rotating position of the table (3) in a table saw mode, a hook portion (27) of the lock lever (6) engages with a stopper screw (28) of the table (3) to regulate the rotation of the table (3). When the lock lever (6) is pressed downward to a lock release position using an operating lever (26), engagement with the stopper screws (28, 29) is released from either of the above rotating positions, whereby the rotation of the table (3) is allowed.

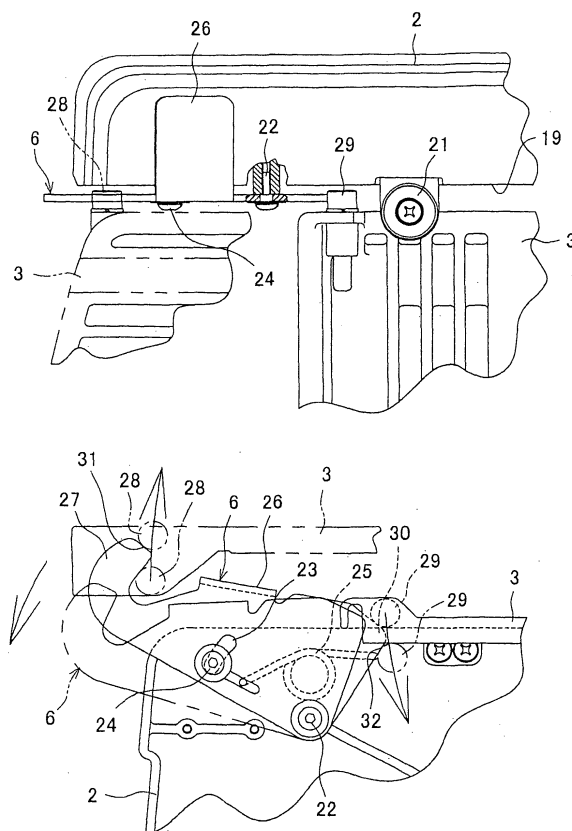


FIG. 5

EP 1 623 801 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a flip over saw including a main body having a saw blade driven to rotate and a table at which the main body is held movable up and down, and a base at which the table and the main body are held rotatable 180 degrees. The flip over saw can be used as a miter saw when the main body is positioned over the table, and can be used as a table saw when the main body is positioned under the table protruding the saw blade over the table.

Description of the Related Art

[0002] A conventional flip over saw has a rectangular mounting base on which a table is horizontally supported rotatable 180 degrees around a center portion of the table and capable of being secured even if either one or the other surface of the table faces upwardly. Moreover, on one side of the table a main body is pivotally mounted movable up and down, and the main body has a saw blade which rotates driven by a motor. With this configuration, the flip over saw can be used as a miter saw when the table is at the first rotating position that the main body is positioned over the table, in which the main body is lowered to cut a workpiece disposed on the table. On the other hand, the flip over saw can be used as a table saw when the table is at the second rotating position that the main body is positioned under the table by rotating the table with a condition that the saw blade is secured at the bottom dead center to penetrate the table downwardly. In a table saw mode, the workpiece on the table can be slid with respect to the saw blade and cutting is conducted.

[0003] As a locking mechanism which secures the table at each rotating position, the following structure is described in the German Patent No. DE4019222. In this patent, engaging pins are provided on lateral edges of a table, while engaging members to be engaged with the engaging pins at each reverse position of the table are provided at the front and the rear of a base and urged in the direction of engaging with the engaging pins. Then, the engaging members are connected with each other by means of a connecting bar. With this configuration, in a miter saw mode an engaging member holds an engaging pin to regulate rotation of a table, and in a table saw mode the engaging member releases the engaging pin to reverse the table and then another engaging member holds the engaging pin to regulate further rotation of the table.

[0004] However, the above-described locking mechanism requires a pair of locking members as well as a connecting bar to interlock the same. As a result, number of components increases, which leads to high expense.

[0005] In order to solve the above problem, an object of the present invention is to provide a flip over saw which enables locking and lock release of the table with a simple structure.

SUMMARY OF THE INVENTION

[0006] In order to achieve the above object, the first aspect of the present invention is characterized in that a locking member including a first engaging portion to engage with a table being at the first rotating position and a second engaging portion to engage with the table being at the second rotating position is provided on a base. The locking member is movable between a locking position where the corresponding engaging portion engages with the table and a lock release position where the engagement is released in accordance with each rotating position of the table.

[0007] The second aspect of the present invention, in addition to the object of the first aspect, is characterized in that, in order to improve operability of the locking member and reliability of locking, the locking position in which the first engaging portion of the locking member engages with the table is the same as that in which the second engaging portion of the locking member engages with the table. Moreover, a biasing means is provided to urge the locking member to the locking position.

[0008] The third aspect of the present invention, in addition to the object of the first or second aspect, is characterized in that, in order to improve operability of the locking member, inclined guide portions are provided with the first engaging portion and/or the second engaging portion. The inclined guide portions retract the locking member to the lock release position in abutment with the table moving to each rotating position, thereby permitting the table to be reversed to each rotating position.

[0009] According to the first aspect of the invention, locking and lock release of the table at each rotating position can be conducted by one locking member. Consequently, the structure of locking of the table rotation can be simplified, which reduces additional cost.

[0010] According to the second aspect of the invention, in addition to the effect of the first aspect, lock release of the table from either of the two rotating positions can be conducted through the same operation, so that the operability is excellent. Moreover, the biasing means ensures return to the locking position from the lock release position, which enables to keep the table in a locking state and thus operability is improved.

[0011] According to the third aspect of the present invention, in addition to the effect of the first or second aspect, the locking member is automatically retracted when the table is reversed to each of the rotating positions. Therefore, the locking member requires no operation to prevent interference with the table, whereby operability is further improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Fig. 1 is an overall view of a flip over saw (in the miter saw mode).

Fig. 2 is a plain view of a flip over saw.

Fig. 3 is an explanation view of a flip over saw (in the miter saw mode).

Fig. 4 is an explanation view of a flip over saw (in the table saw mode).

Fig. 5 is an explanation view of a lock lever provided with a base (the upper figure is a plain view and the lower figure is a lateral view).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Hereinafter, embodiments of the present invention will be explained with reference to the drawings.

[0014] Fig. 1 is an overall view showing an example of a flip over saw and Fig. 2 is a plain view thereof. A flip over saw 1 has a base 2 which is a mounting in rectangular shape in a plain view and a table 3 placed on the base 2, and a saw blade unit 4 mounted on the table 3. The table 3 is held rotatable 180 degrees around the rotating shafts 5, 5 extending in the lateral direction (in Figs. 1 and 2, the right is forward). Moreover, the table 3 can be secured in a horizontal state by means of a lock lever 6 provided with the base 2 as a locking member even if either one or the other surface of the table 3 faces upwardly as described later. The table 3 also has a circular turntable 7 which is horizontally turnable, and a guide fence 8 parallel to the rotating shaft 5 so as to transverse on the turntable 7.

[0015] The saw blade unit 4 has a support arm 9 standing at the rear part of the turntable 7 and a main body 11 held to be movable up and down by a support shaft 10 at the upper end of the support arm 9. At the left side of a blade cover 12 which is a housing of the main body 11, a motor 13 and a handle 14 are provided. In the blade cover 12, a circular saw blade 15 driven to rotate by the motor 13 is provided. The main body 11 is urged toward the top dead center as shown in Fig. 1 by a torsion spring (not shown) provided on the support shaft 10. As shown in Fig. 3, the main body 11 is lowered to the bottom dead center where it penetrates a slit (not shown) provided at the center of the turntable 7 when a handle 14 is held down. Then a workpiece on the turntable 7 can be cut by the rotating saw blade 15. In this way, the flip over saw can be used as a miter saw. The reference number 16 denotes a safety cover which is at the position of covering the saw blade 15 when the main body 11 is at the top dead center and rotated to expose the saw blade 15 in accordance with lowering of the main body 11.

[0016] The support arm 9 can be tilted with the main body 11 in the right direction on the turntable 7. Fixing the tilted support arm 9 and the main body 11 by a lever

17 at an arbitrary tilting position provides the saw blade 15 with an angle in the perpendicular direction. With the tilt of the main body 11, bevel cutting can be conducted with respect to the workpiece on the turntable 7. Moreover, the turntable 7 can turn in a horizontal direction with the main body 11 when a handle 14 is held down. In accordance with the selected angle of the horizontal turn of the turntable 7, orthogonal cutting and miter cutting can be conducted. In the orthogonal cutting, the saw blade 15 is perpendicular to the guide fence 8. On the other hand, in the miter cutting the saw blade 15 is horizontally slanted from the perpendicular position.

[0017] The main body 11 can be secured at the bottom dead center by means of a locking mechanism 18 provided between the support arm 9 and the main body 11. As shown in Fig. 4, by reversing the table 3 with this secured condition of the main body 11, a table saw mode can be obtained wherein only the saw blade 15 protrudes above the table 3 on which a workpiece is slid for cutting.

[0018] In the miter saw mode, the rotating shafts 5, 5 of the table 3 are positioned on the table 3, so that there is a difference in height of the table 3 between at the first rotating position as shown in Figs. 1-3 (the miter saw mode) and at the second rotating position as shown in Fig. 4 (the table saw mode). (The table 3 in the table saw mode is higher.)

[0019] Moreover, in order to allow the table 3 to rotate, an opening 19 is provided at the center of the base 2 in the longitudinal direction. In the inner lateral edges of this opening 19, a pair of first stopper rubbers 20, 20 which support the lower surface of the table 3 at the first rotating position are provided on the front side of the opening 19. On the other hand, a pair of second stopper rubbers 21, 21 are provided on the rear side of the opening 19. The second stopper rubbers 21, 21 are positioned on the table 3 at the first rotating position, and support the lower surface of the table 3 at the second rotating position. With this configuration, the table 3 can be reversed only in the direction in which the front part of the table is flipped up (the direction of an arrow in Fig. 3) in converting from the miter saw mode to the table saw mode. On the other hand, the table 3 can be reversed only in the direction in which the rear part of the table is flipped up (the direction of an arrow of Fig. 4) in converting from the table saw mode to the miter saw mode. It should be noted that the rotating shafts 5, 5 are not positioned at the center of the table 3 in the longitudinal direction, but instead at a slightly rearward position in the first rotating position, so that the table 3 does not interfere with the first stopper rubbers 20, 20 upon conversion from the miter saw mode to the table saw mode.

[0020] As shown in Fig. 5, the lock lever 6 is a plate-like body disposed in the longitudinal direction so as to be fit into between the base 2 and the table 3 at the left side of the rear part of the opening 19. The lock lever 6 is provided with the base 2 pivotable around a stepped pin 22. The position of the stepped pin 22 is at a corner portion of the lock lever 6, which is the front bottom end

thereof. Moreover, the lock lever 6 has a slit 23 which is formed as an arc centered at the stepped pin 22 and which is penetrated by a stepped pin 24 threadedly mounted to the base 2. Because of this, the lock lever 6 is allowed to rotate only in the range that the stepped pin 24 can relatively move within the slit 23. Further, the lock lever 6 is urged by a torsion spring 25 which is used as a biasing means. One end of the torsion spring 25 is engaged with the base 2 and the other end thereof is engaged with the lock lever 6, whereby in a normal state the lock lever 6 is at the upper locking position where the stepped pin 24 is positioned at the bottom end of the slit 23 (as shown in a solid line of Fig. 5). The reference number 26 denotes an operating lever bent orthogonally toward the outer side of the base 2 at the upper end of the lock lever 6. At the rear side of the operating lever 26, there is provided a hook portion 27 whose upper end is bent upward and the top surface of the upper end is an inclined guide portion 31, linearly inclining downward while moving toward the front.

[0021] In the table 3, on the lateral side where the lock lever 6 is provided, stopper screws 28, 29 are threadedly provided in the front and the rear to interfere with the lock lever 6 in accordance with rotation of the table 3. However, the turning radius (moving locus) of the stopper screw 28 is different from that of the stopper screw 29 because of the above-described location of the rotating shaft 5 of the table 3. That is, as shown in Figs. 2, 3 and 5, at the first rotating position of the table 3 the stopper screw 29 engages with an engaging corner 30 as a first engaging portion provided at the upper front end of the lock lever 6 from above. On the other hand, as shown in Figs. 4 and 5, at the second rotating position of the table 3 the stopper screw 28 engages with the hook portion 27 as a second engaging portion of the lock lever 6. Then, when the operating lever 26 is pressed against the biasing force of the torsion spring 25 (counterclockwise rotation in Fig. 5) at each rotating position, the lock lever 6 moves to a lock release position where interference with the stopper screws 28, 29 is released (shown in a two-dot chain line of Fig. 5). At the front side end of the engaging corner 30, provided is an inclined guide portion 32 linearly inclining backward while moving down when the lock lever 6 is at a locking position.

[0022] In the flip over saw 1 configured as described above, in the miter saw mode where the table 3 is positioned at the first rotating position as shown in Figs. 1-3, the front lower surface of the table 3 is supported by the first stopper rubbers 20, 20 and the rear part of the table 3 is supported by the stopper screw 29 engaging with the engaging corner 30 of the lock lever 6. Consequently, the table 3 is prevented from rotating and retains the horizontal state. Then the handle 14 is held to lower the main body 11 in which the blade saw 15 is rotating, so that a workpiece disposed on the turntable 7 can be cut, specifically, the bevel cutting by tilting the main body 11 and the miter cutting by horizontally turning the turntable 7 are achieved.

[0023] On the other hand, upon conversion into the table saw mode, the main body 11 is lowered to the bottom dead center to be secured by the locking mechanism 18. Then the operating lever 26 of the lock lever 6 is pressed to move the lock lever 6 to the lock release position. Then, as shown in a two-dot chain line of Figs. 3 and 5, the engaging corner 30 is retracted to the back position of the stopper screw 29 from the lower position thereof, allowing the stopper screw 29 to be lowered. As a result, the table 3 can be turned 180 degrees by flipping up the front part of the table 3 to the second rotating position. Here, when the lock lever 6 is released, the lock lever 6 again returns to the locking position.

[0024] Just before reverse completion, the stopper screw 28 of the table 3 abuts the inclined guide portion 31 of the hook portion 27 from above the lock lever 6. Here, when the rear part of the table 3 is further pressed downward, being guided by the inclined guide portion 31, the lock lever 6 is pressed downward by the stopper screw 28 to allow the table 3 to be rotated until the table 3 abuts the second stopper rubbers 21, 21 at the rear. At this time, the inclined guide portion 31 is separated from the stopper screw 28, and thus the lock lever 6 is released from the pressure of the stopper screw 28 to be rotated to the locking position urged by the torsion spring 25. With this operation, the hook portion 27 is engaged with the stopper screw 28. Consequently, the table 3 is prevented from rotating by the lock lever 6 and retains the horizontal state, whereby conversion into the table saw mode is completed.

[0025] Further, upon returning to the miter saw mode from the table saw mode, the operating lever 26 is pressed to rotate the lock lever 6. With this operation, the hook portion 27 is released from the stopper screw 28, so that the table 3 is turned 180 degrees by flipping up the rear part thereof. Just before reverse completion, the stopper screw 29 abuts the inclined guide portion 32 of the engaging corner 30 of the lock lever 6 from below. Here, when the front part of the table 3 is further pressed downward, being guided by the inclined guide portion 32, the stopper screw 29 once moves the lock lever 6 in the counterclockwise direction in Fig. 5 in a manner that pushes aside the lock lever 6, resulting that the stopper screw 29 moves above the engaging corner 30. This operation allows the table 3 to rotate until it abuts the first stopper rubbers 20, 20. Consequently, return to the miter saw mode is completed with the rotating position in Fig. 3.

[0026] As described above, according to the flip over saw 1 in the above embodiment, the base 2 includes one lock lever 6, which has an engaging corner 30 to engage with the table 3 at the first rotating position and a hook portion 27 to engage with the table 3 at the second rotating position. In addition, the lock lever 6 is movable between the locking position and the lock release position where it engages either the engaging corner 30 or the hook portion 27 respectively in accordance with each rotating position of the table 3. As a result, locking and lock release of the table 3 at each rotating position can be

conducted by operating only one lock lever 6. Consequently, the structure of locking of the table rotation can be simplified, which reduces additional cost.

[0027] In particular, the lock lever 6 is positioned at the same locking position to engage with the table 3 even when either the engaging corner 30 or the hook portion 27 is engaged. In addition, a biasing means is provided to urge the lock lever 6 to the locking position. Because of this, lock release of the table 3 from either of the rotating positions can be conducted through the same operation, that is, pressing the operating lever 26 downward, whereby the operability is excellent. Moreover, the biasing means ensures the return to the locking position from the lock release position, which enables to keep the table 3 in a locking state and thus operability is improved.

[0028] Moreover, the engaging corner 30 and the hook portion 27 have inclined guide portions 31, 32 which retract the lock lever 6 to the lock release position in abutment with the table 3 moving to each rotating position, thereby permitting the table 3 to be reversed. Consequently, automatic setback of the lock lever 6 at each rotating position can be achieved. Therefore, the lock lever 6 requires no operation to avoid interference with the table 3, whereby operability is further improved.

[0029] The structure for engagement between a locking member and a table is not limited to the above embodiment, and may be modified arbitrarily. As one example, a hook shape may be applied to both the first engaging portion and the second engaging portion of the locking member. Another example is that the table may be provided with a ring member, a hook or a hole instead of a stopper screw. Moreover, the structure of an inclined guide portion is not limited to be a linear inclination as described above, and a bulging or curved inclination may be applied. Further, either the first engaging portion or second engaging portion may have inclination, or both of them may be omitted.

[0030] Still further, the structure of the locking member may be changed, such as the pivot point of the locking member may be provided at the center thereof, the locking member may be formed in a rod shape and so on. In addition, the locking member can be slid between a locking position and a lock release position linearly. Still further, as a biasing means a coil spring or a plate spring may be used, or alternatively, the locking position and the lock release position can be changed manually without a biasing means.

[0031] In addition, the locking structure may be disposed before or behind the table to engage with or disengage from the table, not limited to the above-described structure where the locking member is engaged with or disengaged from the lateral side of the table, being disposed on the corresponding side of the base.

[0032] Further, in the above embodiment, the lock lever 6 is moved to the same locking position when the table 3 is engaged with either the engaging corner 30 as the first engaging portion or the hook portion 27 as the second engaging portion. However, it is conceivable that

each engaging portion is moved in the different directions for engagement or disengagement in accordance with its position or shape.

[0033] In addition, the structure of the flip over saw itself is not limited to the above embodiment. That is, the following structures can be applied to the present invention, which are, the height of the table is constant at the first or second rotating position, the main body can be tilted to right and left, or bevel cutting and miter cutting are excluded.

[0034] 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 flip over saw comprising:

a base (2);
 a horizontal table (3) supported on the base (2) rotatable 180 degrees;
 a main body (11) supported by a support arm (9) provided on one side of the table (3) and having a saw blade (4) driven to rotate, and
 a locking mechanism (18) provided between the main body (11) and the support arm (9), being able to lock the main body (11) at the bottom dead center in which the saw blade (4) penetrates the table (3),
 wherein the flip over saw can be used as a miter saw in which the saw blade (4) cuts a workpiece on the table (3) by lowering the main body (11) when the table (3) is at the first rotating position where the main body (11) is positioned above the table(3),
 and wherein the flip over saw can be used as a table saw in which a workpiece is slid with respect to the saw blade (4) protruding upwardly while penetrating the table (3) when the table (3) is at the second rotating position where the main body (11) locked at the bottom dead center by the locking mechanism (18) is positioned below the table (3), **characterized in that** the base (2) is provided with a locking member (6) having a first engaging portion (30) to be engaged with the table (3) at the first rotating position and a second engaging portion (27) to be engaged with the table (3) at the second rotating position

- and the locking member (6) is movable between a locking position where the corresponding engaging portion (27 or 30) engages with the table (3) and a lock release position where the engagement is released in accordance with each rotating position of the table (3).
2. A flip over saw according to Claim 1, **characterized in that** the locking position in which the first engaging portion (30) of the locking member (6) engages with the table (3) is the same as that in which the second engaging portion (27) of the locking member (6) engages with the table (3), and that a biasing means (25) is provided to urge the locking member (6) to the locking position.
 3. A flip over saw according to Claim 1 or 2, **characterized in that** the first engaging portion (30) has an inclined guide portion (32) which temporarily retracts the locking member (6) to the lock release position in abutment with the table (3) moving to each rotating position, thereby permitting the table (3) to be reversed to each rotating position.
 4. A flip over saw according to one of Claims 1 to 3, **characterized in that** the second engaging portion (27) has an inclined guide portion (31) which temporarily retracts the locking member (6) to the lock release position in abutment with the table (3) moving to each rotating position, thereby permitting the table (3) to be reversed to each rotating position.
 5. A flip over saw according to one of Claims 1 to 4, **characterized in that** the locking member (6) is a plate-like body disposed at the rear in an opening (19) of the base (2) so as to be rotatable between the locking position and the lock release position, and that the locking member (6) has the first engaging portion (30) on the front side of the center of rotation, and the second engaging portion (27) on the rear side of the center of rotation.
 6. A flip over saw according to Claim 5, **characterized in that** the first engaging portion is an engaging corner (30) to abut a stopper (29) protruding at the rear of the lateral side of the table (3) when the table (3) is at the first rotating position.
 7. A flip over saw according to Claim 5 or 6, **characterized in that** the second engaging portion is a hook portion (27) to be fit by a stopper (28) protruding at the rear of the lateral side of the table (3) when the table (3) is at the second rotating position.
 8. A flip over saw according to one of Claims 1 to 7, **characterized in that** the locking member (6) has an operating lever (26) to rotate the locking member (6) from the locking position to the lock release position.
 9. A flip over saw according to one of Claims 5 to 8, **characterized in that** an arc slit (23) is formed on a circle which is concentric with respect to the center of rotation of the locking member (6), the arc slit (23) being penetrated by a screw member (24) threadedly mounted to the base (2), whereby the locking member (6) is allowed to rotate in the range that the screw member (24) can relatively move within the slit (23).
 10. A flip over saw according to one of Claims 2 to 8, **characterized in that** the biasing means is a torsion spring (25).
 11. A flip over saw according to one of Claims 1 to 10, **characterized in that** the center of rotation (5) of the table (3) is positioned rearward when the table (3) is at the first rotating position, wherein at the first rotating position the table (3) is supported by a first stopper (20) protruding into the lateral inner surfaces at the front of an opening (19) of the base (2), and wherein at the second rotating position the table (3) is supported by a second stopper (21) protruding into the lateral inner surfaces at the rear of the opening (19) of the base (2).
 12. A flip over saw according to Claim 11, **characterized in that** the table (3) is reversed in the direction in which the front part of the table (3) is flipped up in reversing from the first rotating position to the second rotating position.
 13. A flip over saw according to Claim 11 or 12, **characterized in that** the center of rotation (5) of the table (3) is positioned on the table (3) at the first rotating position, so that the table (3) at the second rotating position is higher than that at the first rotating position.
 14. A flip over saw according to one of Claims 1 to 13, **characterized in that** a biasing means which urges the main body (11) to the top dead center is provided.
 15. A flip over saw according to one of Claims 1 to 14, **characterized in that** the table (3) has a turntable (7) which can turn horizontally and on which the main body (11) is provided, whereby miter cutting is conducted in accordance with the selected angle of the horizontal turn of the turntable (7) when the flip over saw is used as a miter saw.
 16. A flip over saw according to one of Claims 1 to 15, **characterized in that** the main body (11) can be tilted to right and left sides and fixed at an arbitrary tilting position by a lever (17), whereby bevel cutting is conducted in accordance with the selected angle perpendicular to the saw blade (4) when the flip over

saw is used as a miter saw.

17. A flip over saw according to one of Claims 1 to 16,
characterized in that the main body (11) is held
movable up and down by a support shaft (10) pro- 5
vided with a support arm (9) standing on the table (3).
18. A flip over saw according to one of Claims 15 to 17,
characterized in that on the table (3) a guide fence
(8) parallel to the rotating shaft (5) of the table (3) is 10
provided so as to transverse on the turntable (7).
19. A flip over saw according to one of Claims 1 to 18,
characterized in that the motor (13) is positioned
on the left side of the main body (11) and that a han- 15
dle (14) by which the main body (11) is moved up
and down is provided on the side where the motor
(13) is provided.

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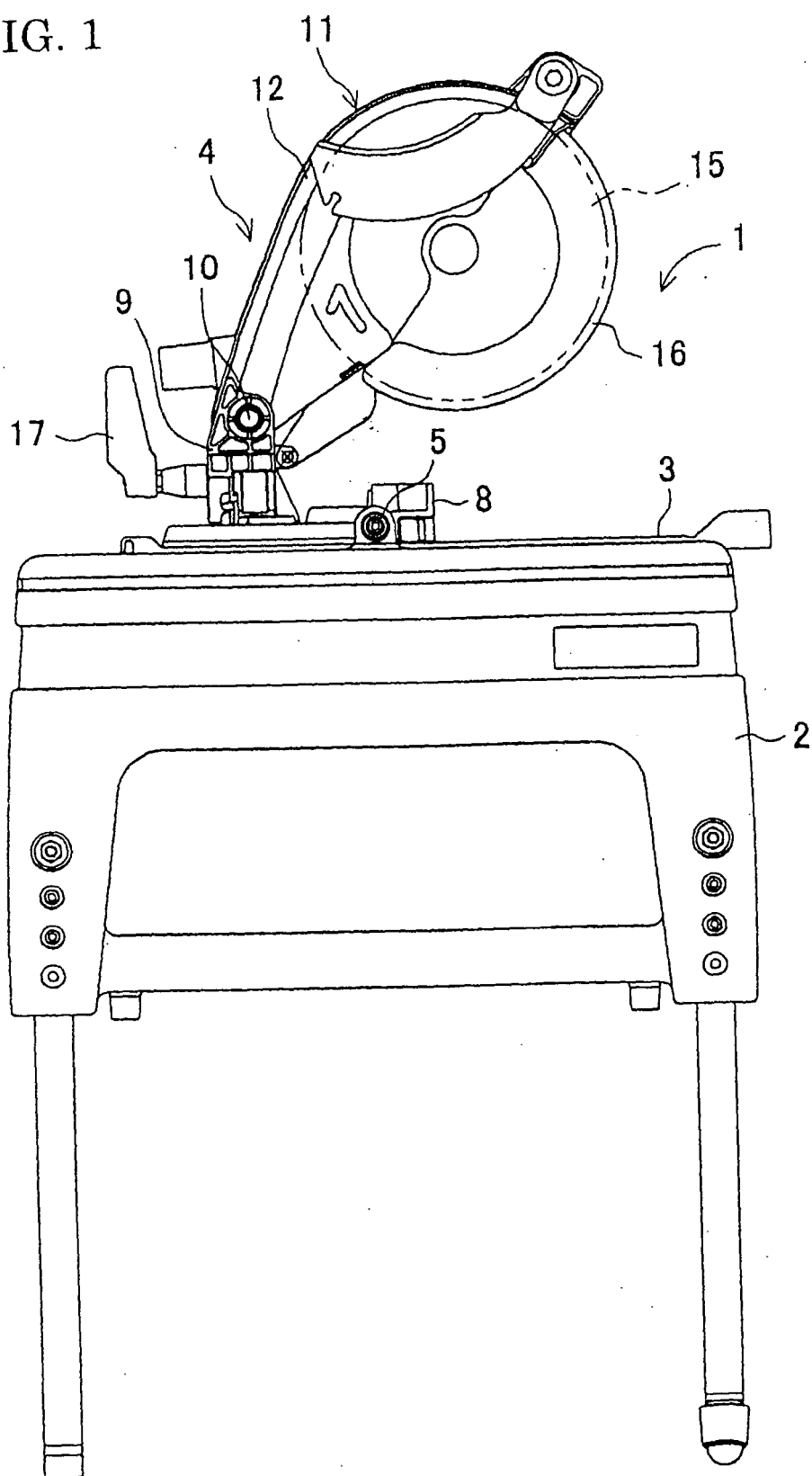
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FIG. 1



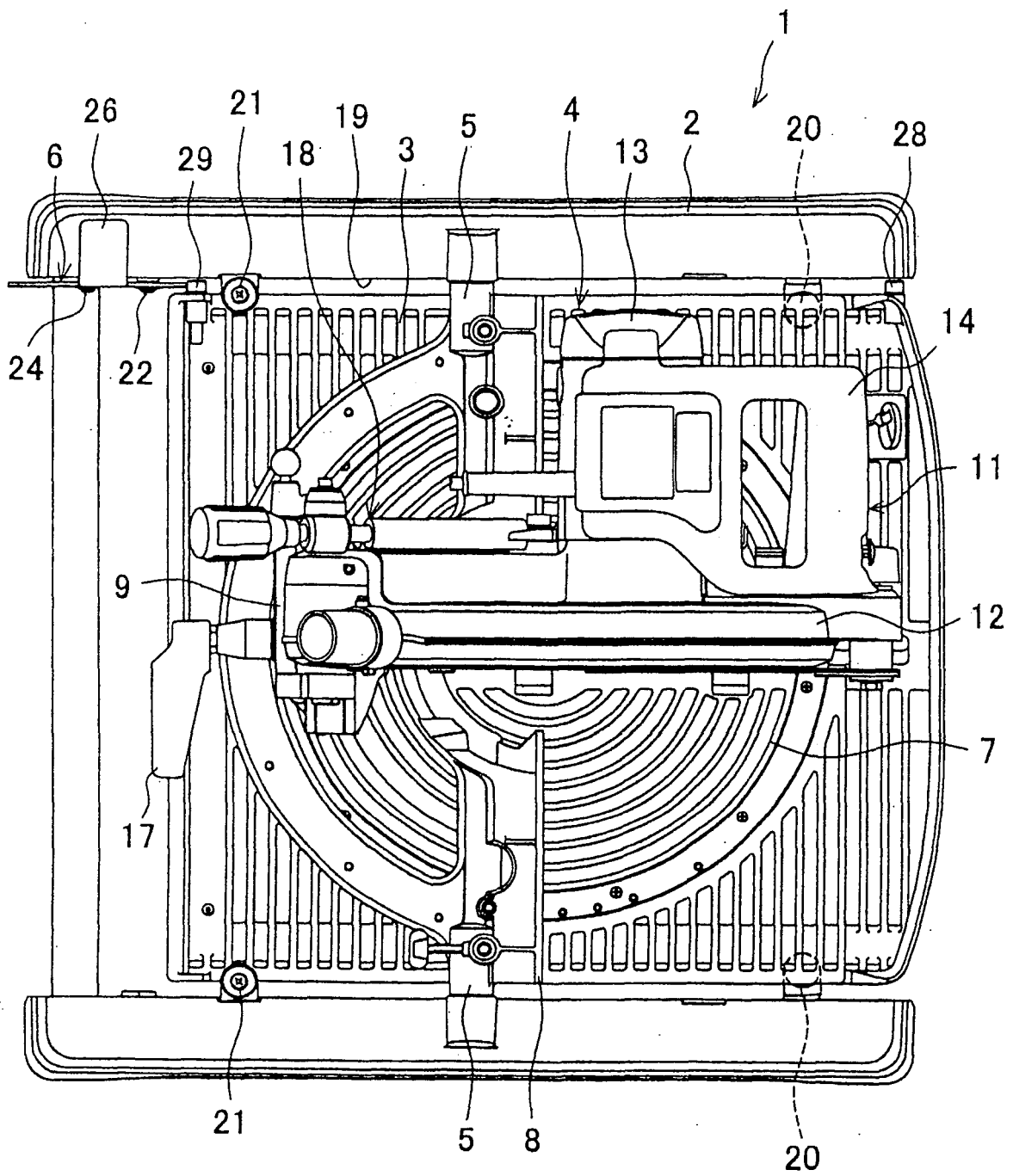


FIG. 2

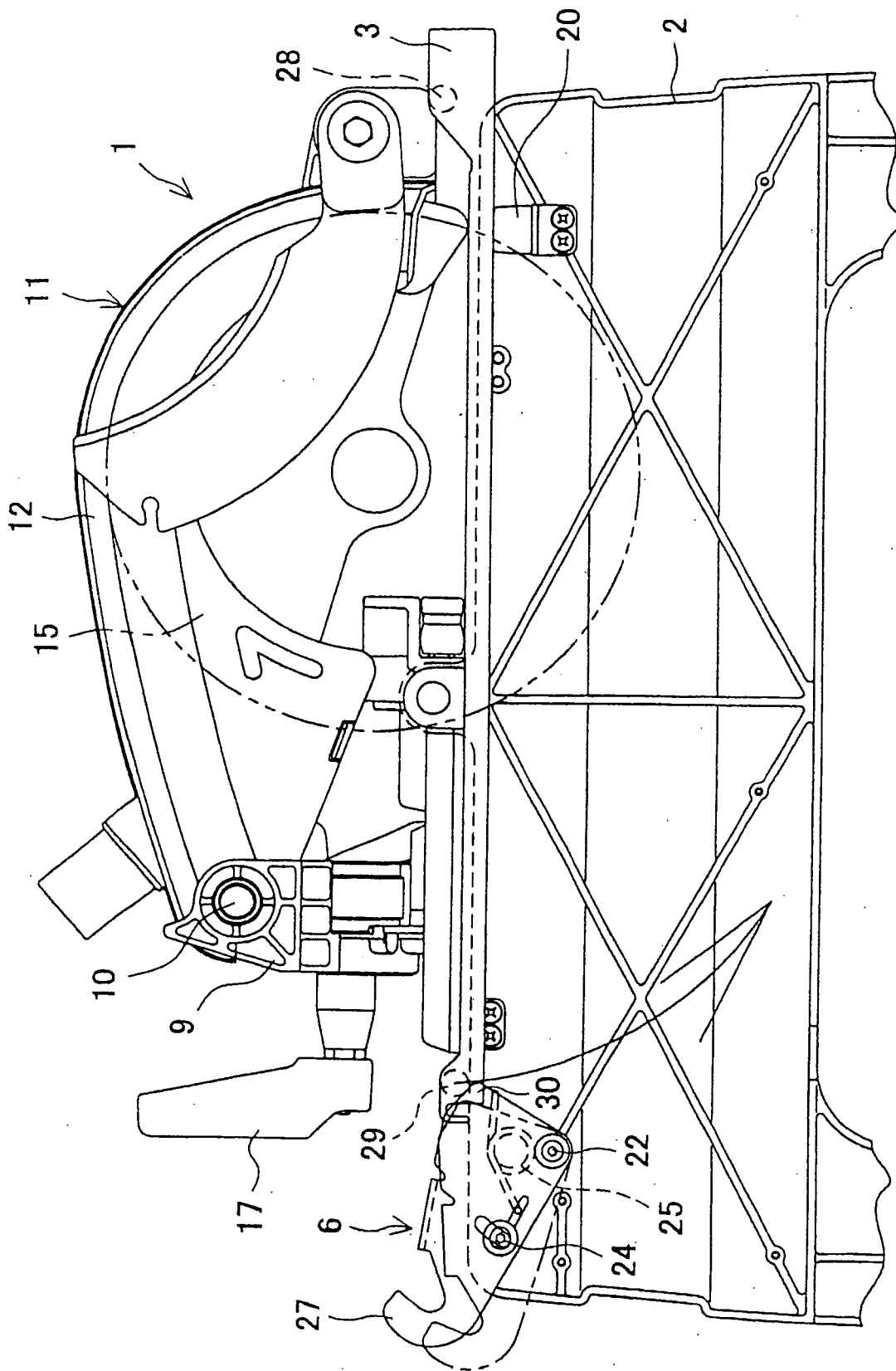


FIG. 3

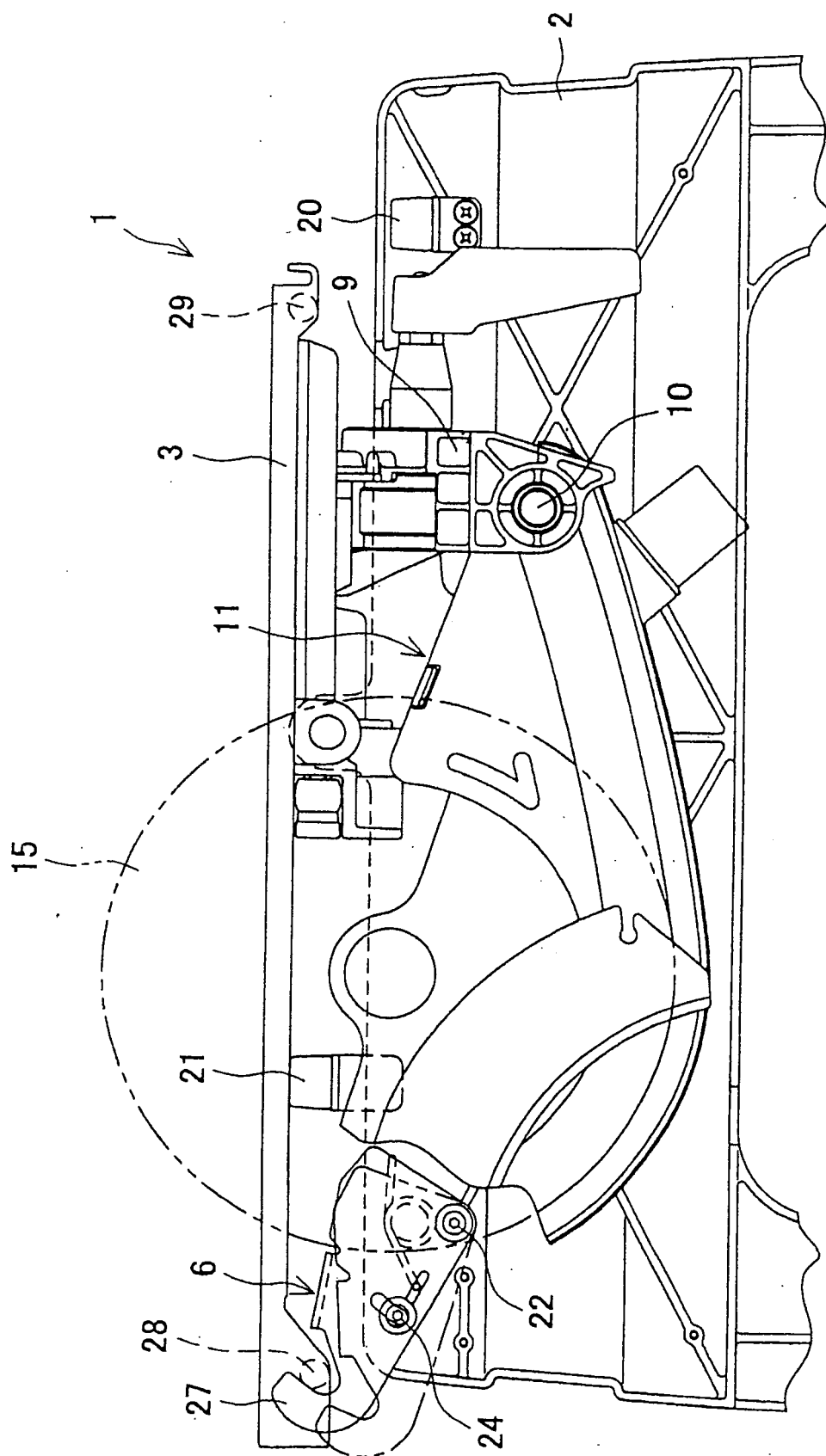


FIG. 4

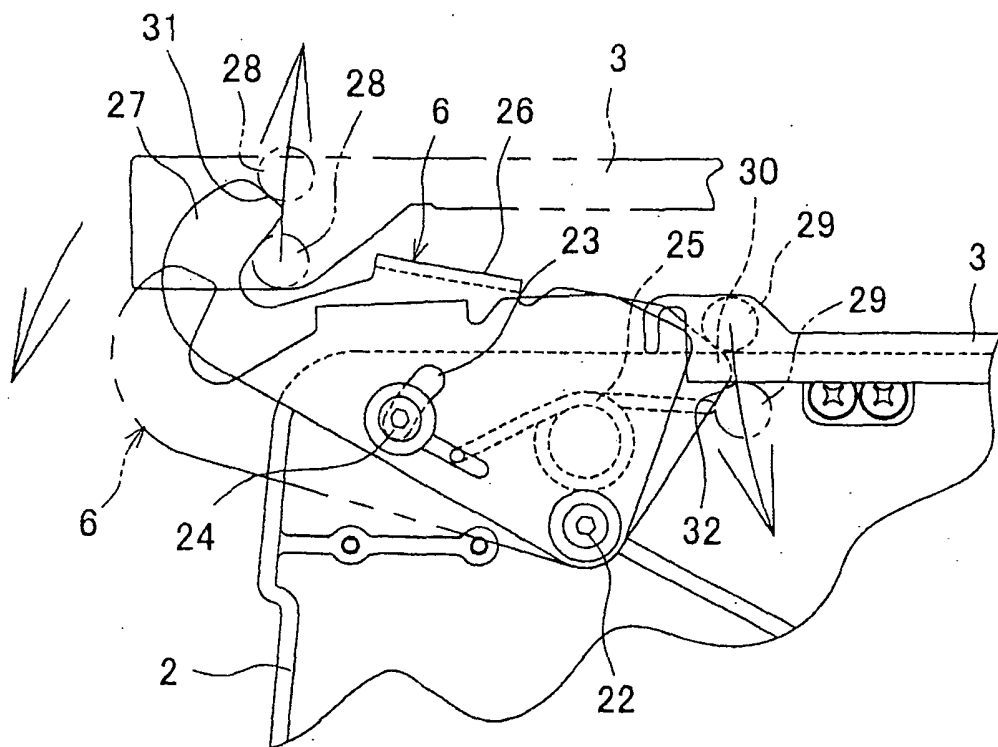
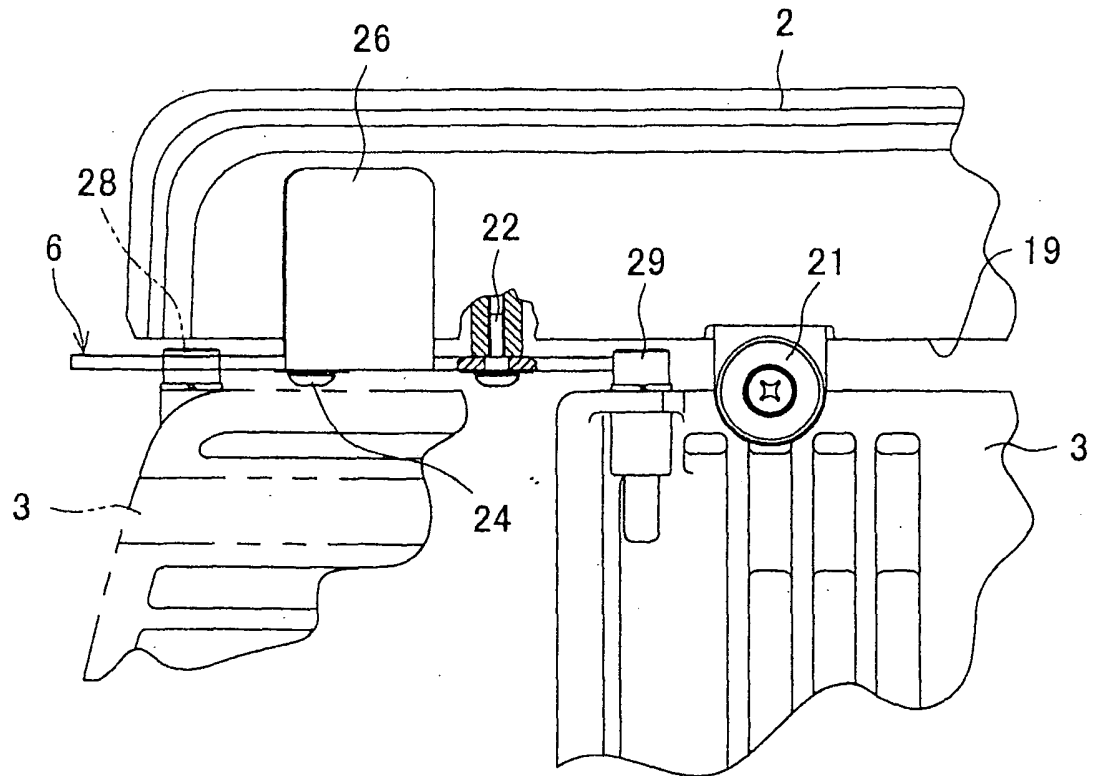


FIG. 5



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 01 6702

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 234 215 A (EUGEN LUTZ GMBH & CO. MASCHINENFABRIK; BLACK & DECKER OVERSEAS AG) 2 September 1987 (1987-09-02) * the whole document *	1-4,8, 10,14,17	B27B5/16
Y		16	
A		5-7,9, 11-13, 15,18,19	
X	----- US 3 570 564 A (OTTO BERGLER) 16 March 1971 (1971-03-16) * the whole document * * in particular: * * column 4, line 3 - line 11 * * figures 1-4 *	1,2,14, 15,17-19	
A		3-13,16	
Y	----- US 4 531 441 A (BERGLER ET AL) 30 July 1985 (1985-07-30) * the whole document * * in particular: * * column 3, line 58 - column 4, line 3 * * figure 2 *	16	
A		14,15, 17-19	

The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 17 October 2005	Examiner Rijks, M
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