



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.05.2006 Bulletin 2006/21

(51) Int Cl.:
B27G 19/02 (2006.01) B27G 19/08 (2006.01)

(21) Application number: **05022895.6**

(22) Date of filing: **20.10.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(72) Inventors:
• **Sugiura, Takehiko**
Anjo-shi
Aichi-ken (JP)
• **Uchida, Masaaki**
Anjo-shi
Aichi-ken (JP)

(30) Priority: **17.11.2004 JP 2004333117**

(71) Applicant: **Makita Corporation**
Anjo-shi, Aichi-ken (JP)

(74) Representative: **Kramer - Barske - Schmidtchen**
Radeckestrasse 43
81245 München (DE)

(54) **Cover-mounting structures for mounting covers to splitters in cutting devices**

(57) A mounting structure for pivotally mounting a cover (10; 30) (for covering a cutting blade (4)) to a splitter (12) includes a mounting slot (12a) formed in the splitter (12) throughout the thickness of the splitter (12), first and second support portions (10a, 10b; 30a, 30b) formed on the cover (10; 30) and defining a slit (10e; 30e) therebetween for receiving the splitter (12), and a mounting device (20; 40; 46; 50). First and second support holes (10c, 10d; 30c, 30d; 30c1, 30d1) are respectively formed in the first and second support portions (10a, 10b; 30a, 30b) along a common axis on opposite sides of the slit (10e; 30e). The mounting device (20; 40; 46; 50) has first and second rotary members (21, 22; 41, 42; 52, 53), a shaft (21a; 41; 51), and an operation device (22; 43; 45). The first and second rotary members (21, 22; 41, 42; 52, 53) are rotatably and axially movably received within the first and second holes (10c, 10d; 30c, 30d; 30c1, 30d1). The shaft (21a; 41b; 51) is axially movably inserted into at least one of the first and second rotary members (21, 22; 41, 42; 52, 53). The mounting shaft (21a; 41b; 51) has a shaft portion that is insertable into the mounting slot (12a). The operation device (22; 43; 45) is operable to move the first and second rotary members (21, 22; 41, 42; 52, 53) relative to each other and has a mounting position and a releasing position.

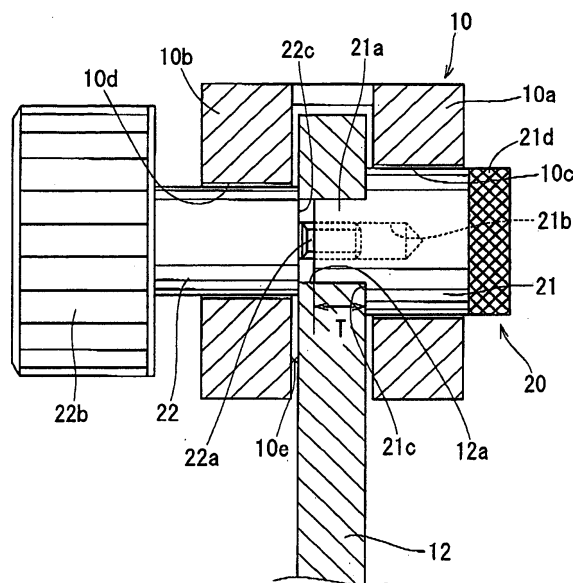


FIG. 1

Description

[0001] [0000] This application claims priority to Japanese patent application serial number 2004-333117, the contents of which are incorporated herein by reference.

[0002] The present invention relates to cover-mounting structures for mounting covers (for covering cutting blades) to splitters (also called "riving knives") in cutting devices.

[0003] As shown in FIG. 10, a cutting device 1, generally called a "table saw", includes a table 3 for placing a workpiece W thereon, a base 2 supporting the table 3, and a circular cutting blade 4 rotatably supported by the base 2. The upper part of the cutting blade 4 extends upward from the upper surface of the table 3. In order to cut the workpiece W, the workpiece W is placed on the upper surface of the table 3 and is then moved in a direction indicated by an arrow outline in FIG. 11. This causes the workpiece W to be pressed against the extended upper part of the cutting blade 4.

[0004] In this kind of cutting device, a flat plate-like splitter 7, also known as a riving knife, is disposed in alignment with the cutting blade 4 on the rear side (i.e., the left side as viewed in FIG. 10) of the cutting blade 4 with respect to the cutting direction of the cutting blade 4. In general, the splitter 7 is made of thin steel plate having substantially the same thickness as the cutting blade 4, such as approximately 2 mm. Because the splitter 7 is disposed in alignment with the cutting blade 4, the splitter 7 may enter the kerf formed in the workpiece W by the cutting blade 4 as the workpiece W moves in the cutting direction of the cutting blade 4. The splitter 7 entering the kerf may prevent a portion of the workpiece W that has already been cut (a portion of the workpiece W positioned on opposing sides of the flat side surfaces of the cutting blade 4) from inadvertently contacting the side surfaces of the cutting blade 4. During cutting, the cutting blade 4 is rotating in a clockwise direction as viewed in FIG. 11 at a high speed. Therefore, an undesired phenomenon, commonly known as a kickback phenomenon (which causes the workpiece W to rapidly move upward due to the rotating cutting blade 4), may be inhibited.

[0005] Although not shown in FIGS. 10 and 11, the splitter 7 and the cutting blade 4 are mounted to a vertically movable base. The vertically movable base is vertically movably disposed below the table 3.

[0006] The splitter 7 vertically pivotally supports a cover 5. The cover 5 is used for covering the upper portion of the cutting blade that extends upward from the upper surface of the table 3. For example, the cover 5 may be made of transparent resin plate and may function as a safety cover for preventing foreign particles from contacting the cutting blade 4. In addition, the cover 5 may also function as a dust cover for preventing cutting chips produced during the cutting operation from scattering to the surrounding environment.

[0007] As the workpiece W moves towards the cutting

blade 4, the cover 5 may be lifted open by the movement of the workpiece W. The cover 5 is held so as to rest upon the workpiece W during the cutting operation. When the workpiece W is removed from a position around the cutting blade 4, the cover 5 moves to return downward (pivots downward) by the force of gravity in order to substantially cover the entire upper portion of the cutting blade 4 that extends upward from the upper surface of the table 3.

[0008] The above known art is disclosed, for example, in Japanese Laid-Open Utility Model Publication No. 6-46901 and U.S. Patent No. 5,979,523.

[0009] However, depending on the type of operation mode, the cover 5 may, by contrast, hinder a cutting operation, such as a grooving operation. Therefore, in some of the practical operations, the cover 5 is removed from the splitter 7. However, in known cover-mounting devices, a nut or a block is fixedly mounted to the upper portion of the splitter 7. A support shaft 8 is mounted to the splitter 7 via the nut or block so as to protrude from the opposite sides of the splitter 7 in the direction of thickness. The cover 5 is vertically pivotally mounted to the splitter 7 via the support shaft 8.

[0010] Therefore, even after the cover 5 has been removed from the splitter 7, the support shaft 8 and the nut or the block that support the support shaft 8 still protrude from opposite sides of the splitter 7. Because the portion of the splitter 7 having the support shaft 8 and the nut or the block are not able to enter the kerf of the workpiece W, the cutting device 1 cannot be used for a grooving operation. Therefore, it is unavoidable to have to remove the cover 5 together with the splitter 7 from the table 3. For this reason, a cutting device having a known cover-mounting device has a usability problem. In addition, in some cases the known cover-mounting device may hinder prompt preparation for a cutting operation.

[0011] It is accordingly an object of the present invention to teach improved cover-mounting structures for enabling the removal of a cover from a splitter without requiring any parts or members to remain on or attached to the splitter after the removal of the cover.

[0012] In one aspect of the present teachings, cover-mounting structures are taught for pivotally mounting a cover (for covering a cutting blade) to a splitter that is positioned to enter a kerf formed in a workpiece after the cutting blade cuts the workpiece. The cover-mounting structures include a mounting slot formed in the splitter throughout the thickness of the splitter, first and second support portions formed on the cover and defining a slit therebetween for receiving the splitter, and a mounting device.

[0013] The mounting device includes first and second support holes, first and second rotary members, a mounting shaft, and an operation device. The first and second support holes are respectively formed in the first and second support portions of the cover along a common axis on opposite sides of the slit. The first and second rotary members are rotatably and axially movably received

within the first and second support holes. The mounting shaft is axially movably coupled to at least one of the first and second rotary members. The mounting shaft has a shaft portion formed in at least a part of the mounting shaft and insertable into the mounting slot. The operation device is operable to move the first and second rotary members relative to each other and has a mounting position and a releasing position. When the operation device is positioned in the mounting position with the shaft portion of the mounting shaft inserted into a slot of the splitter, a peripheral portion about the slot of the splitter is clamped between the first rotary member and the second rotary member. When the operation device is positioned in the releasing position, the peripheral portion about the slot of the splitter is released from a clamped state.

[0014] With this cover-mounting structure, the cover can be mounted to the splitter by mounting the mounting device to the cover, inserting the shaft portion of the mounting shaft into the slot of the splitter, and thereafter operating the operation member from the release position to the mounting position. On the contrary, the cover can be removed from the splitter by operating the operation device from a mounting position to the releasing position and thereafter removing the shaft portion from the slot of the splitter.

[0015] Therefore, the mounting and removing operations of the cover can be easily performed. In addition, because the splitter requires no parts or elements to extend laterally from the splitter, the splitter does not interfere with cutting operations, such as a grooving operation, that are performed with the cover removed from the splitter.

[0016] The mounting shaft, the first rotary member, and the second rotary member, may at least be arranged in any one of the following first to third arrangements:

[0017] According to the first arrangement, the mounting shaft is fixedly coupled to the first rotary member such that the mounting shaft rotates with the first rotary member. In addition, the mounting shaft is rotatably and axially movably coupled to the second rotary member via a threaded mechanism.

[0018] Preferably, the operation device is a grip or a handle disposed on the second mounting member and is operable to rotate the second rotary member. In such a case, a rotation prevention device may be provided in order to prevent the mounting shaft from rotating relative to the mounting slot of the splitter.

[0019] With this arrangement, the first and second rotary members can be easily moved relative to each other in the axial direction by the rotational operation of the grip or the handle.

[0020] According to the second arrangement, the mounting shaft is inserted into the second rotary member. The mounting shaft has a first end fixedly coupled to the first rotary member for rotation therewith and has a second end extending outwardly from the second rotary member. In this case, preferably the operation device is

mounted to the second end for restricting the movement of the second rotary member in a direction toward the second end and is operable to vary the restricting position.

5 **[0021]** According to the third arrangement, the mounting shaft is axially movably inserted into the first and second rotary members and has a first end extending outward from the first rotary member and a second end extending outward from the second rotary member.

10 **[0022]** Preferably, a restricting member may be mounted on the first end of the mounting shaft in order to restrict the movement of the first rotary member in a direction toward the first end of the mounting shaft. The operation device may be mounted on the second end of the mounting shaft in order to restrict the movement of the second rotary member in a direction toward the second end of the mounting shaft.

15 **[0023]** Preferably, in the second and third arrangements, the operation device may be a nut threadably engaging with the second end of the mounting shaft or a lever pivotally mounted to the second end about an axis that is substantially perpendicular to the axis of the mounting shaft. The lever may have a cam surface opposing the second rotary member. The cam surface may vary the restricting position of the second rotary member as the pivotal movement of the lever. In case that the operation device is a lever, the restricting member is preferably configured to permit adjustment of the restricting position of the first rotary member. For example, the restricting member may be a nut.

20 **[0024]** In one embodiment, cover-mounting structures in cutting devices are taught. The cutting devices have a table for placing thereon a workpiece, a rotary circular cutting blade having an upper portion extending upward from the upper surface of the table, a splitter positioned in alignment with the cutting blade in a position rearward of the cutting blade with respect to a cutting direction of the cutting blade, and a cover vertically pivotally mounted to the splitter in order to cover the cutting blade. The cover-mounting structures have first and second support portions, such as support edges, provided on the cover, a mounting device having a support member (first rotary member) and an operation member (second rotary member) respectively rotatably inserted into the first and second support portions, and a threaded mechanism coupling the support member and the operation member from opposite sides with respect to the splitter. As a result, the threaded mechanism fixedly clamps the splitter between the support member and the operation member in order to mount the cover to the splitter.

25 **[0025]** Preferably, the splitter may have a mounting slot having a predetermined width and extending throughout the thickness of the splitter. The support member may have a two-sided portion insertable into the mounting slot. As a result, the threaded mechanism is permitted to couple the operation member to the support member with the two-sided portion inserted into the mounting slot in order to prevent the support member

from rotating relative to the splitter. Thus, the two-sided portion may serve as a mounting shaft that is inserted into the mounting support. Therefore, when the support member and the operation member are coupled to each other via the threaded mechanism in order to clamp the splitter between the support member and the operation member, the mounting device may be mounted to the splitter without producing substantial clearance with respect to directions parallel to and perpendicular to the surface of the splitter. Consequently, the cover can be firmly mounted to the splitter.

[0026] When the threaded mechanism has been loosened in order to release the clamping state of the splitter between the mounting member and the operation member, the cover may be removed together with the mounting device from the splitter.

[0027] The splitter has no part or member, in contrast to the support shafts of the known device, which extend laterally from the splitter after the cover has been removed along with the mounting device. Therefore, the splitter can be kept mounted to the cutting device in order to perform the kickback preventing operation during a grooving operation or a similar type of operation.

[0028] In addition, because the support member is prevented from rotation relative to the splitter, the operation member can be operated to loosen or tighten the threaded mechanism against the non-rotating support member. Therefore, the operation member can be easily rotated via one hand of the operator. The mounting and removing operation of the cover can be further easily performed in this respect.

[0029] Preferably, cutting from one end of the splitter may preferably form the mounting slot. With this arrangement, by loosening the threaded mechanism connecting the support member and the operation member, the clamping state of the splitter can be released. This enables the removal of the mounting device and correspondingly the cover from the splitter without having to completely separate the support member from the operation member. On the contrary, the mounting device along with the cover may be mounted to the splitter by mounting the mounting device to the mounting slot via the open end of the mounting slot with the threaded mechanism slightly loosened. Therefore, the mounting and removing operations of the cover can further be easily performed.

[0030] In another embodiment, a mounting device includes a mounting shaft, a pressing sleeve, and a mounting lever. The mounting shaft has a large-diameter shaft portion (serving as a first rotary member), a small-diameter shaft portion, and a stepped portion formed between the large-diameter portion and the small-diameter portion. The pressing sleeve (serving as a second rotary member) is axially movably fitted onto the small-diameter shaft portion. The mounting lever is pivotally mounted to the small diameter-shaft portion and has a cam surface. The cam surface moves the pressing sleeve toward the stepped portion as the mounting lever pivots toward a mounting position. The large-diameter portion of the

mounting shaft is rotatably inserted into the first mounting hole. The small-diameter portion of the mounting shaft is rotatably inserted into the second mounting hole via the pressing sleeve. As a result, the mounting shaft extends between the first and second support edges with the stepped portion positioned between the first and second support edges. With the small-diameter portion positioned within the mounting slot cut from the end portion of the splitter, pivoting the mounting lever toward the mounting position clamps the splitter between the pressing sleeve and the stepped portion by the action of the cam surface. Consequently, the mounting device is mounted to the splitter in order to mount the cover to the splitter.

[0031] With this arrangement, when the mounting lever has moved to the mounting position, the pressing sleeve is pressed by the cam surface, so that the splitter is clamped between the pressing sleeve and the stepped portion of the mounting shaft. When the mounting lever has moved to a releasing position opposite to the mounting position, the pressing force applied to the pressing sleeve by the cam surface may be released, so that the clamping state of the splitter between the pressing sleeve and the stepped portion of the mounting shaft may also be released. Therefore, the mounting device can be moved along the mounting slot in order to remove the mounting device and correspondingly the cover from the splitter.

[0032] In this way, the mounting device and the cover can be easily removed by a simple pivoting operation of the lever. In addition, the splitter does not have any parts or members that extend laterally from the sides of the splitter after the removal of the mounting device and the cover.

[0033] In a further embodiment, a mounting device includes a mounting shaft, a pressing sleeve, and a fixing nut. The mounting shaft has a large-diameter shaft portion (serving as a first rotary member), a small-diameter shaft portion, and a stepped portion formed between the large-diameter portion and the small-diameter portion. The pressing sleeve (serving as a second rotary member) is axially movably fitted on the small-diameter shaft portion. The fixing nut engages with a threaded shaft portion. The threaded shaft portion is formed on the small diameter-shaft portion and extends beyond the pressing sleeve. The large-diameter portion of the mounting shaft is rotatably inserted into the first mounting hole. The small-diameter portion of the mounting shaft is rotatably inserted into the second mounting hole via the pressing sleeve. Therefore, the mounting shaft extends between the first and second support edges with the stepped portion positioned between the first and second support edges. With the small-diameter portion positioned within the mounting slot cut from the end portion of the splitter, tightening the fixing nut clamps the splitter between the pressing sleeve and the stepped portion. As a result, the mounting device is mounted to the splitter in order to mount the cover to the splitter.

[0034] With this arrangement, the splitter can be clamped between the pressing sleeve and the stepped portion by simply tightening the fixing nut. The clamping state may be released by simply loosening the fixing nut. Therefore, the mounting device and the cover can be easily and quickly mounted to and removed from the splitter.

[0035] In a still further embodiment, a mounting device includes a mounting shaft, first and second pressing sleeves (serving as first and second rotary members), a mounting lever, and a nut. The mounting shaft has a first end and a second end opposite to the first end. The first and second pressing sleeves are axially movably fitted on the mounting shaft. The mounting lever is pivotally mounted to the first end of the mounting shaft and has a cam surface. The cam surface moves the first pressing sleeve in a direction towards the second end of the mounting shaft stepped portion as the mounting lever pivots toward a mounting position. The nut threadably engages with the second end of the mounting shaft and restricts the movement of the second pressing sleeve in a direction toward the second end. The mounting shaft is rotatably inserted into the first and second mounting holes so that the mounting shaft extends between the first and second support edges. With the mounting shaft positioned within the mounting slot cut from the end portion of the splitter, pivoting the mounting lever toward the mounting position clamps the splitter between the first and second pressing sleeves by the action of the cam surface. Consequently, the mounting device is mounted to the splitter in order to mount the cover to the splitter.

[0036] Therefore, the distance between the first and second pressing sleeves for clamping the splitter by the operation of the lever can be adjusted by the position of the nut along the mounting shaft. As a result, it is possible to clamp splitters having different thicknesses while using the same mounting device.

[0037] Additional objects, features, and advantages, of the present invention will be readily understood after reading the following detailed description together with the claims and the accompanying drawings, in which:

FIG. 1 is a vertical sectional view of a mounting structure according to a first representative embodiment and showing the operation for mounting a cover to a splitter by the mounting device; and

FIG. 2 is a perspective view of a support member of the mounting device; and

FIG. 3 is a side view of the splitter; and

FIG. 4 is a sectional horizontal view of the mounting device and showing the state where the mounting device and the cover have been removed from the splitter; and

FIG. 5 is a sectional horizontal view of a mounting structure according to a second representative embodiment and showing the state where a mounting device and a cover have been assembled to a splitter and where a lever is positioned in a removing position; and

FIG. 6 is a view similar to FIG. 5 but showing the state where the lever has pivoted from the removing position to a mounting position in order to fix the mounting device and the cover in position relative to the splitter; and

FIG. 7 is a view similar to FIG. 5 but showing the state where the mounting device and the cover have been removed from the splitter; and

FIG. 8 is a sectional horizontal view of a mounting structure by a mounting device according to a third representative embodiment; and

FIG. 9 is a sectional horizontal view, of a mounting structure by a mounting device according to a fourth representative embodiment; and

FIG. 10 is a schematic perspective view of a cutting device and showing a known mounting structure for mounting a cover to a splitter; and

FIG. 11 is a schematic side view showing the cover mounted to the splitter by the known mounting structure.

[0038] Each of the additional features and teachings disclosed above and below may be utilized separately or in conjunction with other features and teachings to provide improved cover-mounting structures and cutting devices having such cover-mounting structures. Representative examples of the present invention, which examples utilize many of these additional features and teachings both separately and in conjunction with one another, will now be described in detail with reference to the attached drawings. This detailed description is merely intended to teach a person of skill in the art further details for practicing preferred aspects of the present teachings and is not intended to limit the scope of the invention. Only the claims define the scope of the claimed invention. Therefore, combinations of features and steps disclosed in the following detailed description may not be necessary to practice the invention in the broadest sense, and are instead taught merely to particularly describe representative examples of the invention. Moreover, various features of the representative examples and the dependent claims may be combined in ways that are not specifically enumerated in order to provide additional useful embodiments of the present teachings.

(FIRST REPRESENTATIVE EMBODIMENT)

[0039] A first representative embodiment of the present invention will now be described with reference to FIGS. 1 to 4. Referring to FIG. 1, a representative cover-mounting device is shown and is usable for a cutting device that is configured to be substantially the same (except for the configuration of the cover-mounting device) as the known cutting device 1 shown in FIGS. 10 and 11. Therefore, in FIGS. 1 to 4, like members are given the same reference numerals as in FIGS. 10 and 11 and the description of these like members may not be

repeated.

[0040] Referring to FIG. 1, a cover 10 for covering the cutting blade 4 is vertically pivotally mounted to a splitter 12 by a mounting device 20. Parallel support edges 10a and 10b are formed on the rear portion of the cover 20 and oppose each other. A slit 10e is formed between the support edges 10a and 10b. The width of the slit 10e is sized to allow the insertion of the splitter 12. Therefore the slit 10e is slightly larger than the thickness of the splitter 12. Support holes 10c and 10d are respectively formed in the support edges 10a and 10b and extend along a common axis.

[0041] The mounting device 20 has a support member 21 and an operation member 22 that respectively rotatably support the support edge 10a on one side of the cover 10 (i.e., the right side as viewed in FIG. 1) and the support edge 10b on the opposite side of the cover 10 (i.e., the left side as viewed in FIG. 1). The support member 21 and the operation member 22 are respectively inserted into the support hole 10c of the support edge 10a on one side and the support hole 10d of the support edge 10b on the other side.

[0042] FIG. 2 individually shows the support member 21. The support member 21 has a substantially cylindrical configuration and has an outer diameter that enables insertion into the support hole 10c of the cover 10 without a substantial amount of clearance. A projection 21a with parallel opposite sides is formed on an end surface 21c of the support member 21 and has a width L. A threaded hole 21b is formed in the end surface of the projection 21a and has a predetermined depth in a direction along the axis of the support member 21. The outer periphery of the other end of the support member 21 is knurled to form a grip 21d.

[0043] The projection 21a is adapted to be inserted into a mounting slot 12a formed in the splitter 12. FIG. 3 individually shows the splitter 12. The splitter 12 is adapted to allow positioning in alignment with the cutting blade 4 on the rear side (with respect to the cutting direction) of the cutting blade 4. This allows the splitter 12 to enter the kerf that is formed in the workpiece W after the workpiece W has been cut. Therefore, the splitter 12 has a kickback inhibiting function as with the known splitter. In this first representative embodiment, the mounting slot 12a is formed in the upper portion of the splitter 12 by cutting the splitter 12 from its upper end. The width of the mounting slot 12a is determined to be slightly greater than the width L of the projection 21a of the support member 21. The projection 21a protrudes axially from the end surface 21c of the support member 21 by a distance T that is less than the thickness of the splitter 12.

[0044] The operation member 22 also has a substantially cylindrical configuration and has an outer diameter that also allows for insertion into the support hole 10d of the cover 10 without a substantial amount of clearance. The outer diameter of the operation member 22 is set to be less than the outer diameter of the support member 21. Therefore, the diameter of the support hole 10d is

naturally set to be smaller than the diameter of the support hole 10c. A threaded shaft 22a extends from an end surface 22c of the operation member 22 and extends along a common axis with the operation member 22. The diameter of the threaded shaft 22a is determined to be engageable with the threaded hole 21b formed in the support member 21.

[0045] A grip 22b is integrally mounted on the other end of the operation member 22 and is adapted to be grasped by the operator. The grip 22b is configured to have a cylindrical configuration that has a diameter greater than the diameter of the operation member 22. As a result, the operator can easily grasp the grip 22b.

[0046] Therefore, the operator can grasp the grip 22b in order to rotate the operation member 22 about a central axis. Rotating the operation member 22 in one direction moves the threaded shaft 22a into the threaded hole 21b due to the engagement of the threads. Conversely, rotating the operation member 22 in the opposite direction moves the threaded shaft 22a out of the threaded hole 21b. As the threaded shaft 22a moves into the threaded hole 21b, the distance decreases between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22. Therefore, the splitter 12 may be clamped between the support member 21 and the operation member 22 so that the mounting device 20 is fixedly mounted to the splitter. Consequently, the cover 10 may be mounted to the splitter 12.

[0047] According to the first representative embodiment described above, threading and tightening the threaded shaft 22a of the operation member 22 into the threaded hole 21b of the support member 21 may clamp the splitter 12 between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22. Therefore, the support member 21 and the operation member 22 may be fixed in position relative to the splitter 12. Because the support member 21 and the operation member 22 clamp the splitter 12 between their end surfaces 21c and 22c by a thread tightening force, the support member 21 and the operation member 22 may be firmly fixed in position relative to the splitter 12 so as to not move in either the direction parallel to the side surfaces of the splitter 12 or the direction perpendicular to the side surfaces. The support edges 10a and 10b are respectively rotatably supported by the support member 21 and the operation member 22, which are fixed in position as described above, so that the cover 10 can be vertically pivotally mounted to the splitter 12.

[0048] In order to remove the cover 10 from the splitter 12, the operator may grasp the grip 22b and rotate the operation member 22 in the thread loosening direction so that the threaded shaft 22a is loosened from a tightened condition with the threaded hole 21b. As the threaded shaft 22a is loosened to move in a direction out of the threaded hole 21b, the clamping state of the splitter 12 may be released between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22. With the clamping state thus re-

leased, it is possible to move the mounting device 20 along the mounting slot 12a, eventually removing the mounting device 20 from the splitter 12. The cover 10 can be removed from the splitter 12 without removing the threaded shaft 22a from the threaded hole 21b and without having to completely separate the support member 21 from the operation member 22. Thus, rotating the operation member 22 by a few revolutions in the loosening direction in order to loosen the threaded shaft 22a from a tightened condition with the threaded hole 21b may increase the distance between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22 to be slightly greater than the thickness of the splitter 12. This may permit the removal of the mounting device 20 from the splitter 12. Correspondingly, the cover 10 can also be removed from the splitter 12.

[0049] The outer diameter of the support member 21 is set to be larger than the outer diameter of the operation member 22, i.e., the diameter of the support hole 10d. Therefore, after the cover 10 has been removed from the splitter 12 along with the mounting device 20, it is not possible for the support member 21 to enter or pass through the support hole 10d. In addition, the outer diameter of the grip 22b of the operation member 22 is larger than the diameter of the support hole 10d. For these reasons, the mounting device 20 can remain mounted to the cover 10 and not be removed there from. Consequently, the mounting device 20 may be prevented from being lost and it is possible to rapidly perform the operation for remounting the cover 10 to the splitter 12.

[0050] In order to mount the cover 10 to the splitter 12, the operator may adjust the screw position of the threaded shaft 22a into the threaded hole 21b in order to set the distance between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22 to be slightly greater than the thickness of the splitter 12. The operator may then insert the projection 21a of the support member 21 into the mounting slot 12a from the open side of the slot and move the entire mounting device 20 along the mounting slot 12a. When the projection 21a has reached the end or a position proximate to the end of the mounting slot 12a (i.e., the closed left end as viewed in FIG. 3), the operator may take hold of the grip 22b and rotate the operation member 22 by a few revolutions in the thread tightening direction. Therefore, the threaded shaft 22a may be rotated into the threaded hole 21b. Consequently, the splitter 12 may be clamped between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22 due to the tightening force. As a result, the mounting device 20 and correspondingly the cover 10 may be firmly fixed in position relative to the splitter 12.

[0051] Thus, according to the first representative embodiment, the mounting device 20 and correspondingly the cover 10 can be easily removed from the splitter 12 if the operator takes hold of the grip 22b and rotates the operation member 22 by a few revolutions in the thread

loosening direction. With the removal of the mounting device 20 and the cover 10, there are no parts or members, such as a nut, block, or support shafts, that extend from the side surfaces of the splitter 12 as they do in the known art. Therefore, a grooving operation of the workpiece W can be performed while the splitter 12 remains mounted to the cutting device 1. This means that the splitter 12 can also perform a kickback preventing function during a grooving operation.

[0052] In addition, the splitter 12 is clamped and fixed by the tightening force of the threaded shaft 22a applied between the end surface 21c of the support member 21 and the end surface 22c of the operation member 22. Therefore the support member 21 and the operation member 22 can be firmly fixed in position relative to the splitter 12 without producing a significant clearance with the splitter 12.

[0053] Further, a few revolutions of the operation member 22 either clamps the splitter 12 between the end surfaces 21c and 22c of the support member 21 and the operation member 22 or releases the clamping state. It is not necessary to completely separate the support member 21 from the operation member 22. In this respect, the mounting and removal operations of the cover 10 with the aid of the mounting device 20 can be quickly and easily performed.

[0054] The above first representative embodiment may be modified in various ways. For example, although the mounting slot 12a of the splitter 12 is formed by cutting the splitter 12 from the upper end, the mounting slot 12a may be replaced with a mounting slot that is closed (i.e., not formed by cutting the splitter 12 from an upper end) but has a size and a configuration in order to receive the projection 21a. In such a case in order to remove the cover 10, the operator would have to completely remove the threaded shaft 22a from the threaded hole 21b. This would allow the support member 21 and the operation member 22 to be completely separated from each other. The support member 21 and the operation member 22 may then be removed from the corresponding support holes 10c and 10d. In this way, the mounting device 20 and the cover 10 can be removed from the splitter 12. In order to mount the cover 10 to the splitter 12, the cover 10 may be positioned such that the support holes 10c and 10d oppose to each other with respect to the closed mounting slot (or the mounting slot 12a opened at the upper end of the splitter 12). Thereafter, the operator may insert the support member 21 and the operation member 22 into their respective support holes 10c and 10d from the opposite sides. The operator may then screw the threaded shaft 22a into the threaded hole 21b. As a result, the splitter 12 may be clamped between the end surfaces 21c and 22c. In this way, the cover 10 can be firmly and fixedly mounted to the splitter 12.

[0055] In addition, although the operation member 22 has a cylindrical grip 22b at one end in the above representative embodiment, the grip 22b may be replaced with a lever-like projection or with a knob that can be held by

fingers tips. An essential point is that the operation member 22 is conveniently configured to enable the rotation of the operation member 22 about its axis in order to perform the tightening operation of the threaded shaft 22a into the threaded hole 21b or the loosening operation of a previously tightened threaded shaft 22a.

[0056] Furthermore, although the threaded hole 21b is formed in the support member 21 and the threaded shaft 22a is provided on the operation member 22 in the above representative embodiment, this arrangement may be reversed such that the threaded hole 21b is formed in the operation member 22 and the threaded shaft 22a is provided on the support member 21.

[0057] Still furthermore, the projection 21a with opposing parallel side surfaces of the support member 21 may be replaced with a cylindrical projection that is coaxial with the support member 21.

(SECOND REPRESENTATIVE EMBODIMENT)

[0058] A second representative embodiment will now be described with reference to FIGS. 5 to 7. This second representative embodiment incorporates a mounting device 40 in order to mount a cover 30 to the splitter 12. The mounting device 40 is configured differently from the mounting device 20 of the first representative embodiment. However, the same splitter 12 can be used as described in the first representative embodiment.

[0059] Similar to the cover 10 of the first representative embodiment, the cover 30 has a rear portion with a pair of opposing support edges 30a and 30b. Also, a clearance or a mounting slit 30e is formed between the support edges 30a and 30b so as to enable insertion of the splitter 12.

[0060] A support hole 30c is formed in the support edge 30a and extends throughout the thickness of the support edge 30a. Similarly, a retaining hole 30d is formed in the support edge 30b and extends throughout the thickness of the support edge 30b. The retaining hole 30d is coaxial with the support hole 30c but has a diameter greater than the diameter of the support hole 30c.

[0061] The mounting device 40 is mounted between the support hole 30c and the retaining hole 30d and has a mounting shaft 41. The mounting shaft 41 has a stepped pin-shaped configuration and includes a large-diameter shaft portion 41a coaxial with a small-diameter shaft portion 41b. A flange 41c is formed on one end of the large-diameter shaft portion 41a. The large-diameter shaft portion 41a is rotatably inserted in the support hole 30c. The flange 41c contacts with the outer side surface of the support edge 30a so that the mounting shaft 41 is supported and may not be removed in an upward direction from the support edge 30a, as viewed in FIG. 5.

[0062] A cylindrical pressing sleeve 42 is axially movably inserted into the retaining hole 30d and has an inner bore 42a into which the small-diameter shaft portion 41b of the mounting shaft 41 is axially movably inserted. A front end of the small-diameter shaft portion 41b extends

outward from one end (the topmost end as viewed in FIG. 5) of the pressing sleeve 42. A lever 43 is supported on the extended front end of the small-diameter shaft portion 41b via a support shaft 44. Consequently, the lever 43 is pivotally operable. The function of the lever 43 is to move the pressing sleeve 42 into the retaining hole 30d, towards the mounting slit 30e.

[0063] The lever 43 has a rear edge 43a and a side edge 43b. The distance J2 between the rear edge 43a and the pivotal center of the lever 43 (or the central axis of the support shaft 44) is set to be smaller than the distance J1 between the side edge 43b and the central axis of the support shaft 44 ($J1 > J2$) (see FIG. 7). A corner portion between the rear edge 43a and the side edge 43b is configured to have an arc-shaped configuration in order to smoothly connect the rear edge 43a to the side edge 43b. Therefore, the rear edge 43a, the side edge 43b, and the corner portion of the lever 43, define a cam portion that produces a displacement ($J1 - J2$) as will be hereinafter described.

[0064] As shown in FIG. 5, when the lever 43 has pivoted to a position where the lever 43 extends laterally from the cover 30 (hereinafter called a "removing position"), the rear edge 43a of the lever 43 opposes a rear end surface 42a of the pressing sleeve 42. The distance J2 between the rear edge 43a and the central axis of the support shaft 44 is determined to be smaller than the distance J1 between the side edge 43b and the central axis of the support shaft 44. The distance J2 is suitably sized such that the lever 43 does not press the pressing sleeve 42 so as to move the pressing sleeve 42 in an extending direction into the mounting slit 30e (i.e., the downward direction as viewed in FIG. 5) when the lever 43 has pivoted to the removing position as shown in FIG. 5. In contrast, when the lever 43 has pivoted to a mounting position as indicated by chain lines in FIG. 6, the side edge 43b may oppose the rear end surface 42a of the pressing sleeve 42. The distance J1 between the side edge 43b and the central axis of the support shaft 44 is determined to be larger than the distance J2 between the rear edge 43a and the central axis of the support shaft 44. The distance J1 is suitably sized such that the lever 43 presses the pressing sleeve 42 so as to move the pressing sleeve 42 in the extending direction into the mounting slit 30e due to contact between the side edge 43b of the lever 43 and the rear end surface 42a of the pressing sleeve, when the lever 43 has pivoted to a mounting position.

[0065] According to the second representative embodiment described above, the pressing sleeve 42 may not be pressed in the extending direction into the mounting slit 30e when the lever 43 is in the removing position shown in FIGS. 5 and 7. Therefore, it is possible to move the cover 30 to receive the splitter 12 via the mounting slit 30e in order to mount the mounting device 40 to the splitter 12. Additionally, it is possible to remove the splitter 12 from the mounting slit 30e in order to remove the mounting device 40 from the splitter 12.

[0066] In order to mount the cover 30 to the splitter 12, the operator may move the cover 30 to receive the splitter 12 via the mounting slit 30e and may then insert the small-diameter shaft portion 41b of the mounting shaft 41 into the mounting slot 12a until the small-diameter shaft portion 41b is positioned at the bottom (i.e., the closed or left end of the mounting slot 12a as viewed in FIG. 5) or a position proximate to the bottom of the mounting slot 12a. Thereafter, the operator may pivot the lever 43 from the removing position to the mounting position in the counterclockwise direction as indicated by chain lines in FIG. 6. Consequently, the pressing sleeve 42 is pressed to move in such a direction that the front end of the pressing sleeve 42 extends into the mounting slit 30e. Thus, the lever presses the pressing sleeve 42 via a relatively strong force. The splitter 12 is clamped between the pressing sleeve 42 and a stepped portion 41d of the mounting shaft 41 formed between the large-diameter shaft portion 41a and the small-diameter shaft portion 41b. As a result, the mounting device 40 is firmly fixed in position relative to the splitter 12, and correspondingly, the splitter 12 vertically pivotally supports the cover 30.

[0067] In order to remove the cover 30 from the splitter 12, the operator may pivot the lever 43 from the mounting position indicated by chain lines to the removing position or toward the uprising position of the lever 43, where the lever 43 no longer presses the pressing sleeve 42. Therefore, the pressing sleeve 42 is permitted to move in such a direction that the front end of the pressing sleeve 42 retracts from the mounting slit 30e. As a result, the clamped state of the splitter 12 is released. After releasing the clamping state, the operator may remove the splitter 12 from the mounting slit 30e and may retract the small-diameter shaft portion 41b of the mounting shaft 41 from the mounting slot 12a. Thus, the mounting device 40 and eventually the cover 30 can be removed from the splitter 12.

[0068] In this way, the cover 30 can be easily removed from and mounted to the splitter 12 by the pivotal movement of the lever 43. In addition, because the cover 30 may be removed together with the mounting device 40 from the splitter 12, no parts or elements of the mounting device 40, in contrast to the mounting shafts and nut of the known art, extend laterally from the splitter 12 or may remain on the splitter 12 after removal. Therefore, with the cover 30 removed while the splitter 12 is maintained in a mounted condition, it is possible to perform a grooving operation while preventing the kickback phenomenon of the workpiece.

[0069] The above second representative embodiment also may be modified in various ways. For example, it is possible to configure the embodiment such that the relationship between the distance J1 and the distance J2 is reversed to have a relationship of $J1 < J2$. In this case, the pressing sleeve 12 may be pressed to fix the mounting device 40 and correspondingly the cover 30 to the splitter 12 when the lever 43 has been pivoted to an uprising position where the lever 43 extends laterally from

the cover 30.

[0070] In addition, the lever 43 may be replaced with a fixing nut. This modification will be hereinafter described with reference to FIG. 8 as a third representative embodiment.

(THIRD REPRESENTATIVE EMBODIMENT)

[0071] Referring to FIG. 8, a mounting device 46 according to the third representative embodiment incorporates a fixing nut 45 in place of the lever 43. This representative embodiment is a modification of the second representative embodiment. Therefore, in FIG. 8, like members are given the same reference numerals as in the second representative embodiment and the description of these members may not be repeated.

[0072] In the third representative embodiment, a threaded shaft 41e is formed on the smaller-diameter shaft portion 41b of the mounting shaft 41. The fixing nut 45 engages with a portion of the threaded shaft 41e that extends outward from the pressing sleeve 42. With the mounting device 46 thus configured, tightening the fixing nut 45 may press the pressing sleeve 42 against the splitter 12 so that the splitter 12 may be firmly clamped between the pressing sleeve 42 and the stepped portion 41d of the mounting shaft 41. Consequently, the cover 30 can be firmly mounted to the splitter 12 without substantial clearance in the mounting elements.

[0073] On the other hand, loosening the fixing nut 45 may release the pressing state of the pressing sleeve 42 against the splitter 12 so that the clamping state of the splitter 12 between the pressing sleeve 42 and the stepped portion 41d may be released. Therefore, it is possible to rapidly and easily remove the mounting device 46 and the cover 30 from the splitter 12 by removing the small-diameter shaft portion 41b from the mounting slot 12a of the splitter 12.

(FOURTH REPRESENTATIVE EMBODIMENT)

[0074] The second representative embodiment provides a fixed distance between the stepped portion 41d of the mounting shaft 41 for contacting with the splitter 12 and the central axis of the support shaft 44 of the lever 43. Therefore, a fixed distance is provided between the stepped portion 41d and the side edge 43b of the lever 43 or the front end of the pressing sleeve 42 that contacts with the splitter 12 when the lever 43 is in a mounting position. The latter distance will be hereinafter called a "clamping distance." Although the clamping distance may be suitably determined in response to the thickness of the splitter 12 to which the cover 30 is mounted, the second representative embodiment may be modified to provide a variable clamping distance in order to cope with various splitters having different thicknesses. Such a modification will now be described as a fourth representative embodiment with reference to FIG. 9. In FIG. 9, like members are given the same reference numerals

as in the second representative embodiment and a description of these members may not be repeated.

[0075] Referring to FIG. 9, a mounting device 50, according to the fourth representative embodiment, is used for mounting a cover 30 that has retaining holes 30c1 and 30d1 that may correspond to the support hole 30c and the retaining hole 30d of the second representative embodiment. Although the retaining holes 30c1 and 30d1 extend along a common central axis, the retaining holes 30c1 and 30d1 are different from the support hole 30c and the retaining hole 30d in that the retaining holes 30c1 and 30d1 have substantially the same diameter.

[0076] The mounting device 50 has a mounting shaft 51 that is insertable into the retaining holes 30c1 and 30d1. The mounting shaft 51 has a large-diameter shaft portion 51a and a small-diameter shaft portion 51b. The large-diameter shaft portion 51a has a diameter that is relatively constant throughout its length. The small-diameter shaft portion 51b is formed on an end (i.e., the lower end as viewed in FIG. 9) of the large-diameter shaft portion 51a. In the state assembled to the cover 30, as shown in FIG. 9, the other end (i.e., the upper end as viewed in FIG. 9) of the large-diameter shaft portion 51a extends outward from the retaining hole 30d1. The lever 43 is pivotally mounted to the other end of the large-diameter shaft portion 51a via a support shaft 44 in the same manner as in the second representative embodiment. The small-diameter shaft portion 51b extends outward from the retaining hole 30c1 and is configured as a threaded shaft.

[0077] Cylindrical pressing sleeves 52 and 53 are respectively axially movably inserted into the retaining holes 30c1 and 30d1. The outer and inner diameters of the pressing sleeve 52 are substantially the same as the outer and inner diameters of the pressing sleeve 53. The large-diameter shaft portion 51a of the mounting shaft 51 is axially movably inserted into the pressing sleeves 52 and 53. The pressing sleeves 52 and 53 respectively have axial lengths L1 and L2. The axial lengths L1 and L2 are determined such that (1) the axial lengths L1 and L2 are respectively slightly greater than the axial lengths of the corresponding retaining holes 30c1 and 30d1, and (2) the sum of the axial lengths L1 and L2 and an intended minimum thickness of the splitter 12 is greater than a width K of the rear portion of the cover 30 having the support edges 30a and 30b. The intended minimum thickness of the splitter 12 means the thickness of a splitter that has a minimum thickness from among splitters that are intended to be used.

[0078] A washer 60 is slidably fitted on the large-diameter shaft portion 51a of the mounting shaft in a position between the pressing sleeve 53 and the lever 43. The outer diameter of the washer 60 is greater than the outer diameter of the pressing sleeve 53 or the inner diameter of the retaining hole 30d1. A nut 61 is threadably engaged with the smaller-diameter shaft portion 51b configured as a threaded shaft. A washer 62 is slidably fitted on the small-diameter-shaft portion 51b in a position between

the pressing sleeve 52 and the nut 61. The outer diameter of the washer 62 is greater than the diameter of the pressing sleeve 52 or the inner diameter of the retaining hole 30c1. The nut 61 includes a metal nut body 63 and a nylon ring 65 fitted into an annular recess 64 formed in the inner circumference of the nut body 63. The nylon ring 65 interfaces with the threaded outer surface of the small-diameter shaft portion 51b in order to apply a moderate frictional force to the small-diameter shaft portion 51b. Therefore, the nut body 63 may be held in position along the small-diameter shaft portion 51b.

[0079] According to the fourth representative embodiment, the clamping distance of the splitter 12, i.e., the clearance between the pressing sleeves 52 and 53 produced when the lever 43 is positioned at a mounting position indicated by the chain lines in FIG. 9, depends on the distance between the rear edge 43b of the lever 43 and the nut 61. Therefore, if the cover 30 is mounted to a splitter having a thinner thickness, the operator may rotate the nut 61 in one direction (i.e., a tightening direction) to move the nut 61 closer to lever 43 along the small-diameter shaft portion 51b (i.e., upward as viewed in FIG. 9). As a result, the clamping distance can be reduced to effectively clamp a relatively thin splitter. On the contrary, if the cover 30 is mounted to a splitter having a thicker thickness, the operator may rotate the nut 61 in the opposite direction (i.e., a loosening direction) to move the nut 61 away from the lever 43 along the small-diameter shaft portion 51b (i.e., downward as viewed in FIG. 9). As a result, the clamping distance can be increased to effectively clamp a relatively thick splitter.

[0080] As described above, a clamping distance adjusting mechanism is provided by the axially movable pressing sleeves 52 and 53 defining the clearance for clamping the splitter 12 therebetween, and the nut 61 that is operable to move along the small-diameter shaft portion 51b. Therefore, the mounting device 50 has an improved versatility.

[0081] In addition, because the retaining holes 30c1 and 30d1 have the same diameter, it is possible to reverse the position of the mounting shaft 51 with respect to the right and left directions (i.e., the upward and downward directions as viewed in FIG. 9), so that the lever 43 may be positioned on the opposite side (i.e., the lower side as viewed in FIG. 9) to the side proximate to the lever 43 shown in FIG. 9. Therefore, it is possible to operate the lever 43 from either the left side or the right side of the cover 30.

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 re-

stricting the claimed invention, in particular as limits of value ranges.

Claims

1. A cover-mounting structure for pivotally mounting a cover (10; 30) for covering a cutting blade (4) to a splitter (12) that is positioned to enter a kerf formed in a workpiece (W) after the workpiece (W) has been cut by the cutting blade (4), comprising:

a mounting slot (12a) formed in the splitter (12) throughout the thickness of the splitter (12); and first and second support portions (10a, 10b; 30a, 30b) formed on the cover (10; 30) and defining a slit (10e; 30e) therebetween for receiving the splitter (12); and
a mounting device (20; 40; 46; 50) comprising:

first and second support holes (10c, 10d; 30c, 30d; 30c1, 30d1) respectively formed in the first and second support portions (10a, 10b; 30a, 30b) along a common axis on opposite sides of the slit (10e; 30e); and first and second rotary members (21, 22; 41, 42; 52, 53) rotatably and axially movably received within the first and second support holes (10c, 10d; 30c, 30d; 30c1, 30d1); and a shaft (21a; 41b; 51) axially movably coupled to at least one of the first and second rotary members (21, 22; 41, 42; 52, 53) and having a shaft portion formed along at least a part of the shaft (21a; 41b; 51), wherein the shaft portion is insertable (3) into the mounting slot (12a),
an operation device (22b; 43; 45) operable to move the first and second mounting members (21, 22; 41, 42; 52, 53) relative to each other and has a mounting position and a releasing position,

wherein when the operation device (22b; 43; 45) is positioned at the mounting position with the shaft portion of the shaft (21a; 41b; 51) inserted into the slot (12a) of the splitter (12), a peripheral portion about the slot (12a) of the splitter (12) is clamped between the first rotary member (21; 41; 52) and the second rotary member (22b; 42; 53); and
wherein when the operation device (22b; 43; 45) is positioned at the releasing position, the peripheral portion about the slot (12a) of the splitter (12) is released from the clamped state.

2. The cover-mounting structure as in claim 1, wherein the shaft (21a) is integrally connected to the first rotary member (21), so that the shaft (21 a) is rotatable (3) with the first rotary member (21); and

wherein the shaft (21a) is coupled to the second rotary member (22) via a threaded mechanism (21b, 22a), so that the shaft (21a) is rotatable (3) and axially movable relative to the second rotary member (22); and

wherein the operation device comprises a grip (22b) provided on the second rotary member (22); and wherein the mounting device (20) further comprises a rotation prevention portion for preventing the rotation of the shaft (21a) relative to the mounting slot (12a) of the splitter (12).

3. The cover-mounting structure as in claim 1, wherein the shaft (41b) is inserted into the second rotary member (42) and has a first end and a second end;
wherein the first end of the shaft (41b) is fixedly coupled to the first rotary member (41), so that the shaft (41b) is rotatable with the first rotary member (41); wherein the second end of the shaft (41b) extends outward beyond the second rotary member (42); wherein the operation device (43; 45) is mounted on the second end of the shaft (41b) and defines a first restricting position for restricting the movement of the second rotary member (42), so that the second rotary member (42) is prevented from moving in a direction toward the second end of the shaft (41b) beyond the first restricting position.

4. The cover-mounting structure as in claim 1, wherein the shaft (51) is axially movably inserted into the first and second rotary members (52, 53) and has a first end extending outward beyond the first rotary member (52) and a second end extending outward beyond the second rotary member (53); wherein the mounting device (50) further comprises a restricting member (61) mounted to the first end of the shaft (51);
wherein the operation device (43; 45) is mounted to the second end of the shaft (51) and is arranged and constructed to restrict the movement of the second rotary member (53) in a direction toward the second end of the shaft (51) beyond a first restricting position;
wherein the restricting member (61) is arranged and constructed to restrict the movement of the first rotary member (52) in a direction toward the first end of the shaft (51) beyond a second restricting position.

5. The cover-mounting structure as in claim 3 or 4, wherein the operation device comprises a first nut (45) engaging with the second end of the shaft (41b; 51).

6. The cover-mounting structure as in claim 4 or 5, wherein the restricting member (61) is arranged and constructed to permit adjustment of the second restricting position for the first rotary member (52).

7. The cover-mounting structure as in claim 6, wherein the restricting member comprises a second nut (61) engaging with the first end of the shaft (51).
8. The cover-mounting structure as in any one of claims 3, 4, 6 and 7, wherein the operation device comprises a lever (43) pivotally coupled to the shaft (41b; 51) about a pivotal axis extending substantially perpendicular to the axis of the shaft (41b; 51); wherein the lever (43) has a cam surface (43a, 43b) opposing to the second rotary member (42; 53) and defining the first restricting position, so that the first restricting position varies with pivotal movement of the lever (43).
9. A cover-mounting structure in a cutting device (1) having a table (3) for placing thereon a workpiece (W), a rotary circular cutting blade (4) having an upper portion extending upward from an upper surface of the table (3), a splitter (12) positioned in alignment with the cutting blade (4) in a position rearward of the cutting blade (4) with respect to a cutting direction of the cutting blade (4), and a cover (10) vertically pivotally mounted to the splitter (12) in order to cover the cutting blade (4), the cover-mounting structure comprising:
- first and second support portions (10a, 10b) provided on the cover (10);
- a mounting device (20; 40; 46; 50) comprising a support member (21) and an operation member (22) respectively rotatably inserted into the first and second support portions (10a, 10b);
- a threaded mechanism (21b, 22a) coupling the support member (21) and the operation member (22) from opposite sides with respect to the splitter (12), so that the threaded mechanism (21b, 22a) fixedly clamps the splitter (12) between the support member (21) and the operation member (22) in order to mount the cover (10) to the splitter (12).
10. The cover-mounting structure as in claim 9, wherein the splitter (12) comprises a mounting slot (12a) having a predetermined width and extending throughout the thickness of the splitter (12); and wherein the support member (21) has a two-sided portion (21a) insertable into the mounting slot (12a), so that the threaded mechanism (21b, 22a) is permitted to couple the operation member (22) to the support member (21) with the two-sided portion (21a) inserted into the mounting slot (12a) in order to prevent the support member (21) from rotating about an axis relative to the splitter (12).
11. The cover-mounting structure as in claim 10, wherein the mounting slot (12a) is formed by cutting the split-

ter (12) from one end of the splitter (12).

12. A cover-mounting structure in a cutting device (1) having a table (3) for placing thereon a workpiece (W), a rotary circular cutting blade (4) having an upper portion extending upward from an upper surface of the table (3), a splitter (12) positioned in alignment with the cutting blade (4) in a position rearward of the cutting blade (4) with respect to a cutting direction of the cutting blade (4), and a cover (30) vertically pivotally mounted to the splitter (12) in order to cover the cutting blade (4), the cover-mounting structure comprising:

first and second support portions (30a, 30b) provided on the cover (30) and respectively having first and second mounting holes (30c, 30d);

a mounting device (40) comprising:

a mounting shaft (41) having a large-diameter shaft portion (41a), a small-diameter shaft portion (41b) and a stepped portion (41d) formed between the large-diameter portion (41a) and the small-diameter portion (41b);

a pressing sleeve (42) axially movably fitted on the small-diameter shaft portion (41b);

a mounting lever (43) pivotally mounted to the small diameter-shaft portion (41b) and having a cam surface (43a, 43b), so that the cam surface (43a, 43b) moves the pressing sleeve (42) toward the stepped portion (41d) as the mounting lever (43) pivots toward a mounting position;

wherein the large-diameter portion (41a) of the mounting shaft (41) is rotatably inserted into the first mounting hole (30c); and

wherein the small-diameter portion (41b) of the mounting shaft (41) is rotatably inserted into the second mounting hole (30d) via the pressing sleeve (42), so that the mounting shaft (41) extends between the first and second support portions (30a, 30b) with the stepped portion (41d) positioned between the first and second support portions (30a, 30b); and

wherein with the small-diameter portion (41b) positioned within the mounting slot (12a) cut from the end portion of the splitter (12), pivoting the mounting lever (43) toward the mounting position clamps the splitter (12) between the pressing sleeve (42) and the stepped portion (41d) by the action of the cam surface (43a, 43b), so that the mounting device (40) is mounted to the splitter (12) in order to mount the cover (30) to the splitter (12).

13. A cover-mounting structure in a cutting device (1) having a table (3) for placing thereon a workpiece (W), a rotary circular cutting blade (4) having an up-

per portion extending upward from an upper surface of the table (3), a splitter (12) positioned in alignment with the cutting blade (4) in a position rearward of the cutting blade (4) with respect to a cutting direction of the cutting blade (4), and a cover (30) vertically pivotally mounted to the splitter (12) in order to cover the cutting blade (4), the cover-mounting structure comprising:

first and second support portions (30a, 30b) provided on the cover (30) and respectively having first and second mounting holes (30c, 30d);
a mounting device (46) comprising:

a mounting shaft (41) having a large-diameter shaft portion (41a), a small-diameter shaft portion (41b) and a stepped portion (41d) formed between the large-diameter shaft portion (41a) and the small-diameter shaft portion (41b);

a pressing sleeve (42) axially movably fitted on the small-diameter shaft portion (41b);
a fixing nut (45) engaging with a threaded shaft portion (41e), wherein the threaded shaft portion (41e) is formed on the small-diameter shaft portion (41b) and extends beyond the pressing sleeve (42);

wherein the large-diameter shaft portion (41a) of the mounting shaft (41) is rotatably inserted into the first mounting hole (30c); and

wherein the small-diameter shaft portion (41b) of the mounting shaft (41) is rotatably inserted into the second mounting hole (30d) via the pressing sleeve (42), so that the mounting shaft (41) extends between the first and second support portions (30a, 30b) with the stepped portion (41d) positioned between the first and second support portions (30a, 30b); and
wherein with the small-diameter shaft portion (41b) positioned within the mounting slot (12a) cut from the end portion of the splitter (12), tightening the fixing nut (45) clamps the splitter (12) between the pressing sleeve (42) and the stepped portion (41d), so that the mounting device (46) is mounted to the splitter (12) in order to mount the cover (30) to the splitter (12).

- 14.** A cover-mounting structure in a cutting device having a table (3) for placing thereon a workpiece (W), a rotary circular cutting blade (4) having an upper portion extending upward from an upper surface of the table (3), a splitter (12) positioned in alignment with the cutting blade (4) in a position rearward of the cutting blade (4) with respect to a cutting direction of the cutting blade (4), and a cover (30) vertically pivotally mounted to the splitter (12) in order to cover the cutting blade (4), the cover-mounting structure comprising:

first and second support portions (30a, 30b) provided on the cover (10; 30) and respectively having first and second mounting holes (30c1, 30d1);

a mounting device (50) comprising:

a mounting shaft (51) having a first end and a second end opposite to the first end;
first and second pressing sleeves (52, 53) axially movably fitted on the mounting shaft (51);

a mounting lever (43) pivotally mounted to the first end of the mounting shaft (51) and having a cam surface (43a, 43b), so that the cam surface (43a, 43b) moves the first pressing sleeve (53) in a direction toward the second end of the mounting shaft (51) as the mounting lever (43) pivots toward a mounting position;

a nut (61) threadably engaged with the second end of the mounting shaft (51) and restricting the movement of the second pressing sleeve (52) in a direction toward the second end;

wherein the mounting shaft (51) is rotatably inserted into the first and second pressing sleeves (52, 53), so that the mounting shaft (51) extends between the first and second support portions (30a, 30b); and
wherein with the mounting shaft (51) positioned within the mounting slot (12a) cut from the end portion of the splitter (12), pivoting the mounting lever (43) toward the mounting position clamps the splitter (12) between the first and second pressing sleeves (52, 53) by the action of the cam surface (43a, 43b), so that the mounting device (50) is mounted to the splitter (12) in order to mount the cover (30) to the splitter (12).

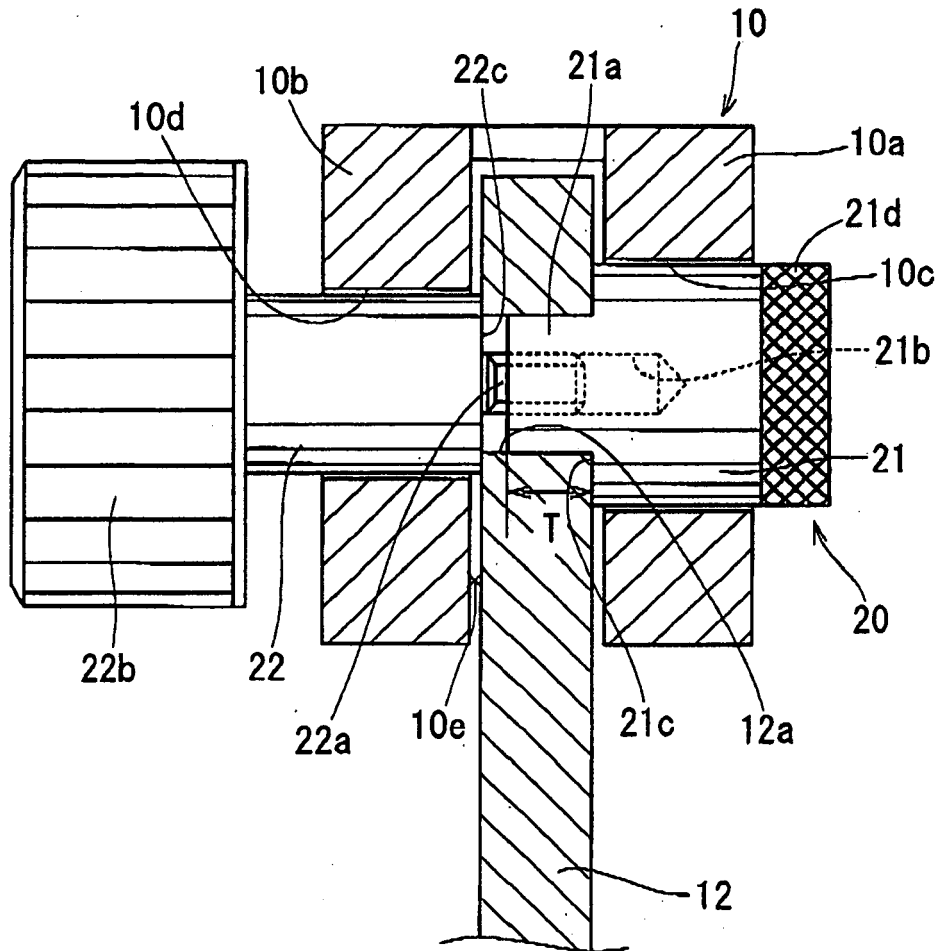


FIG. 1

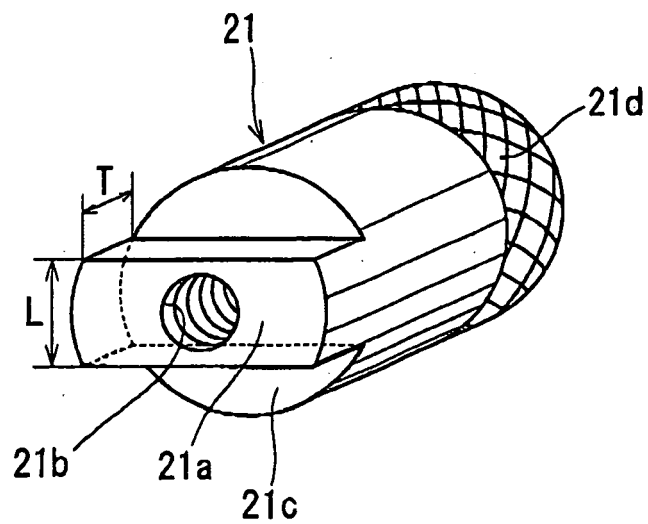


FIG. 2

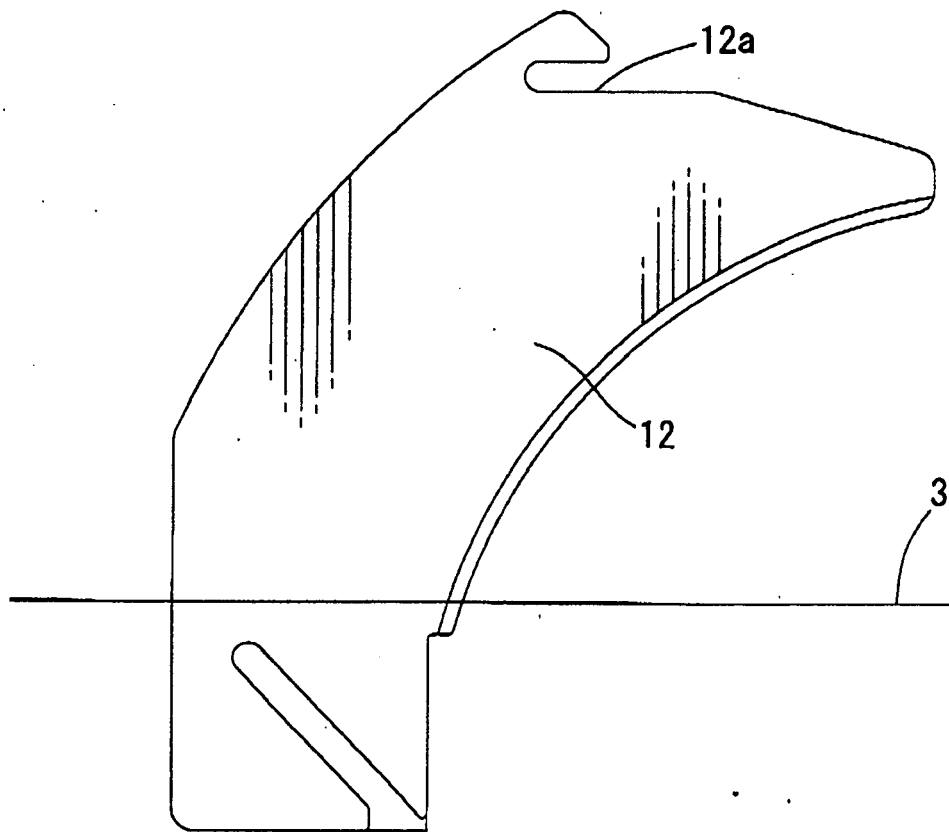


FIG. 3

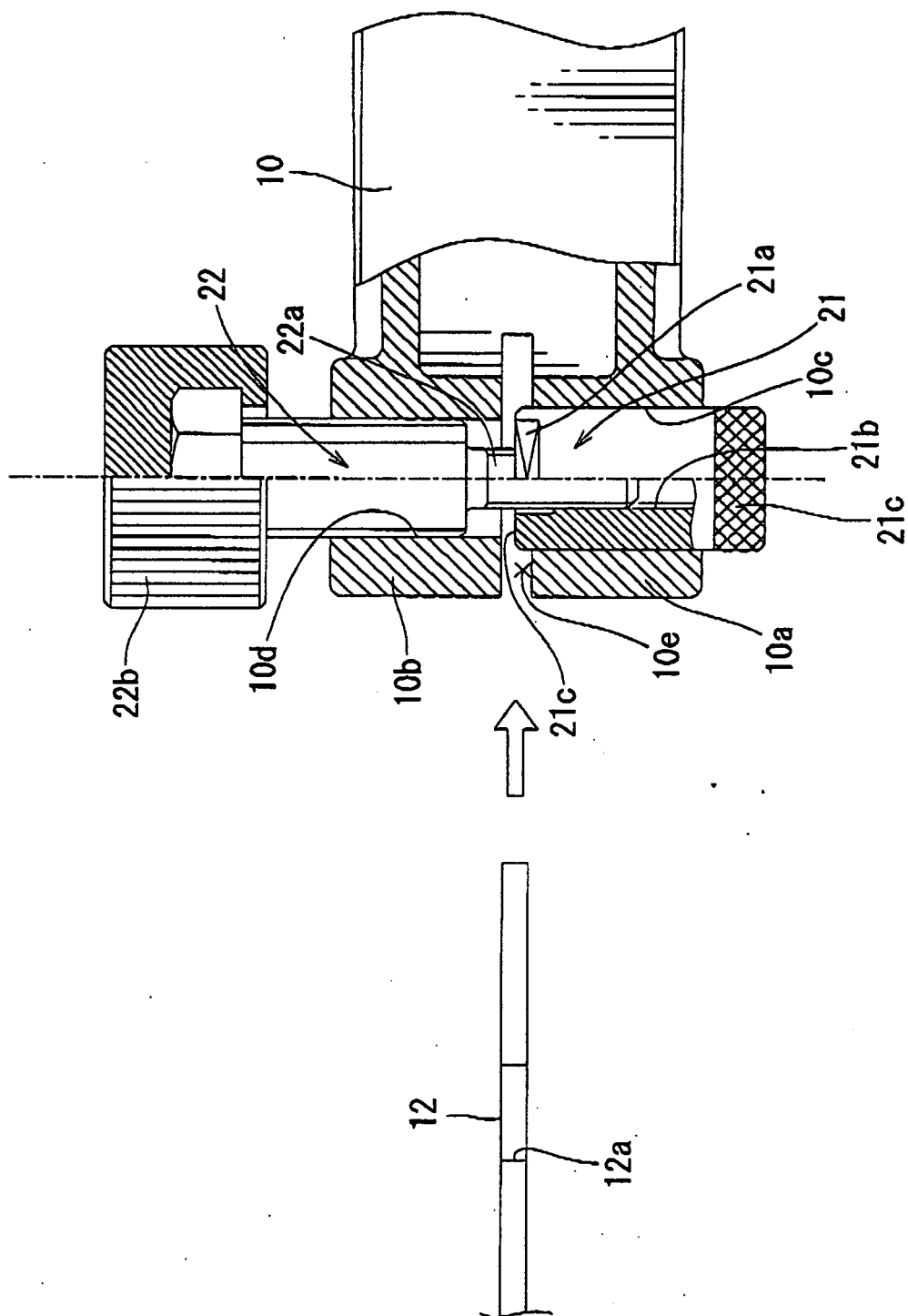


FIG. 4

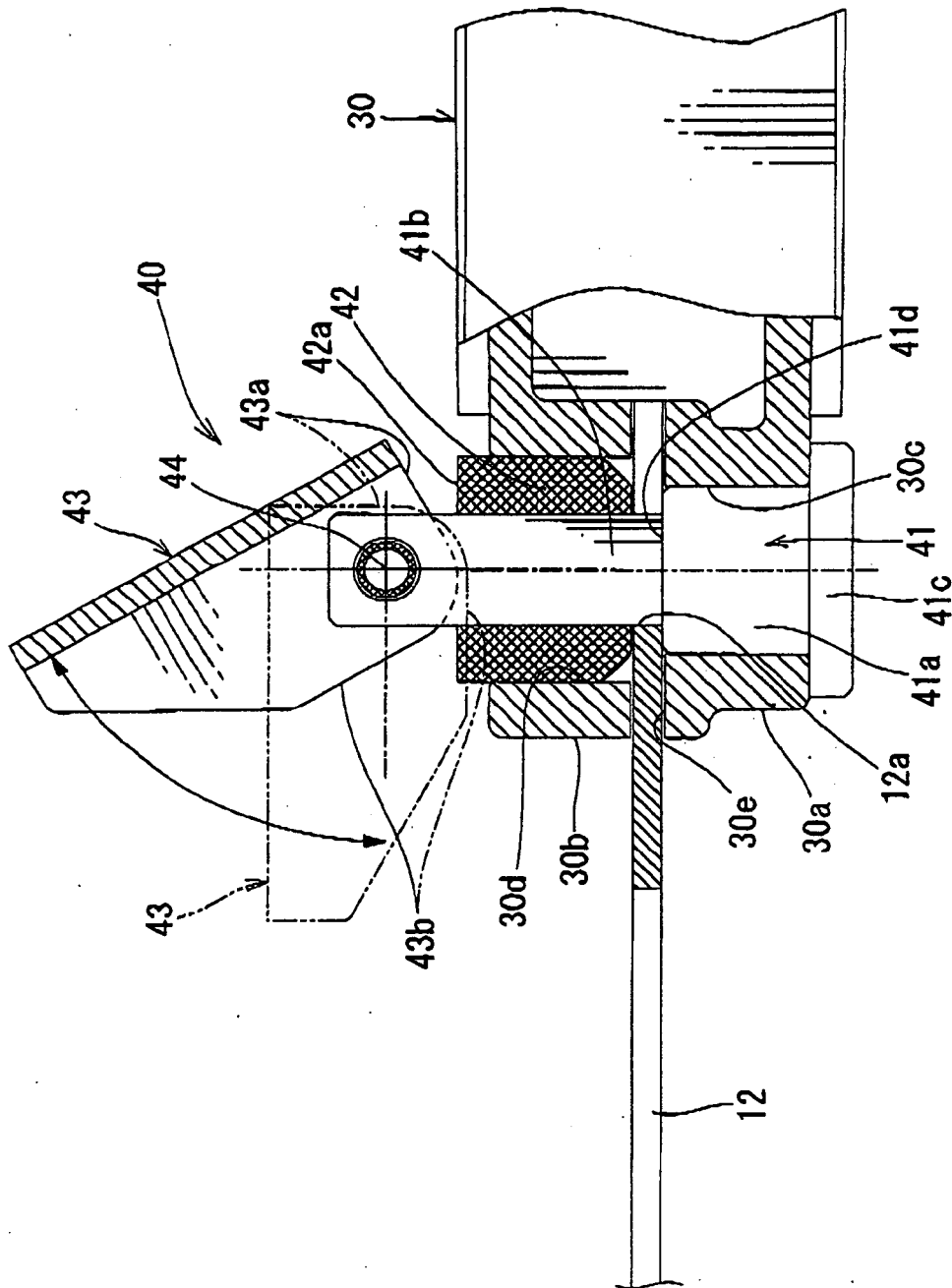


FIG. 5

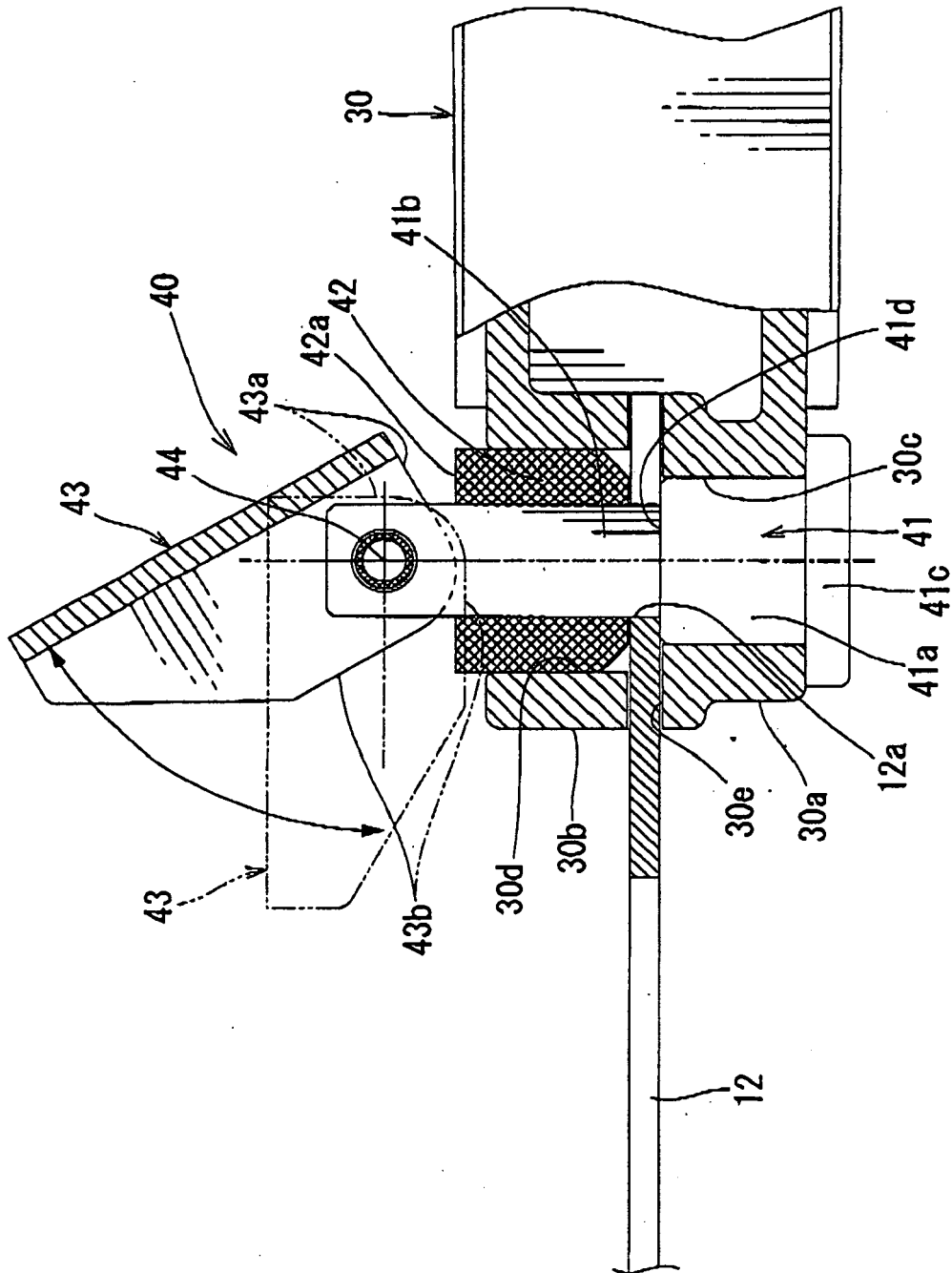


FIG. 6

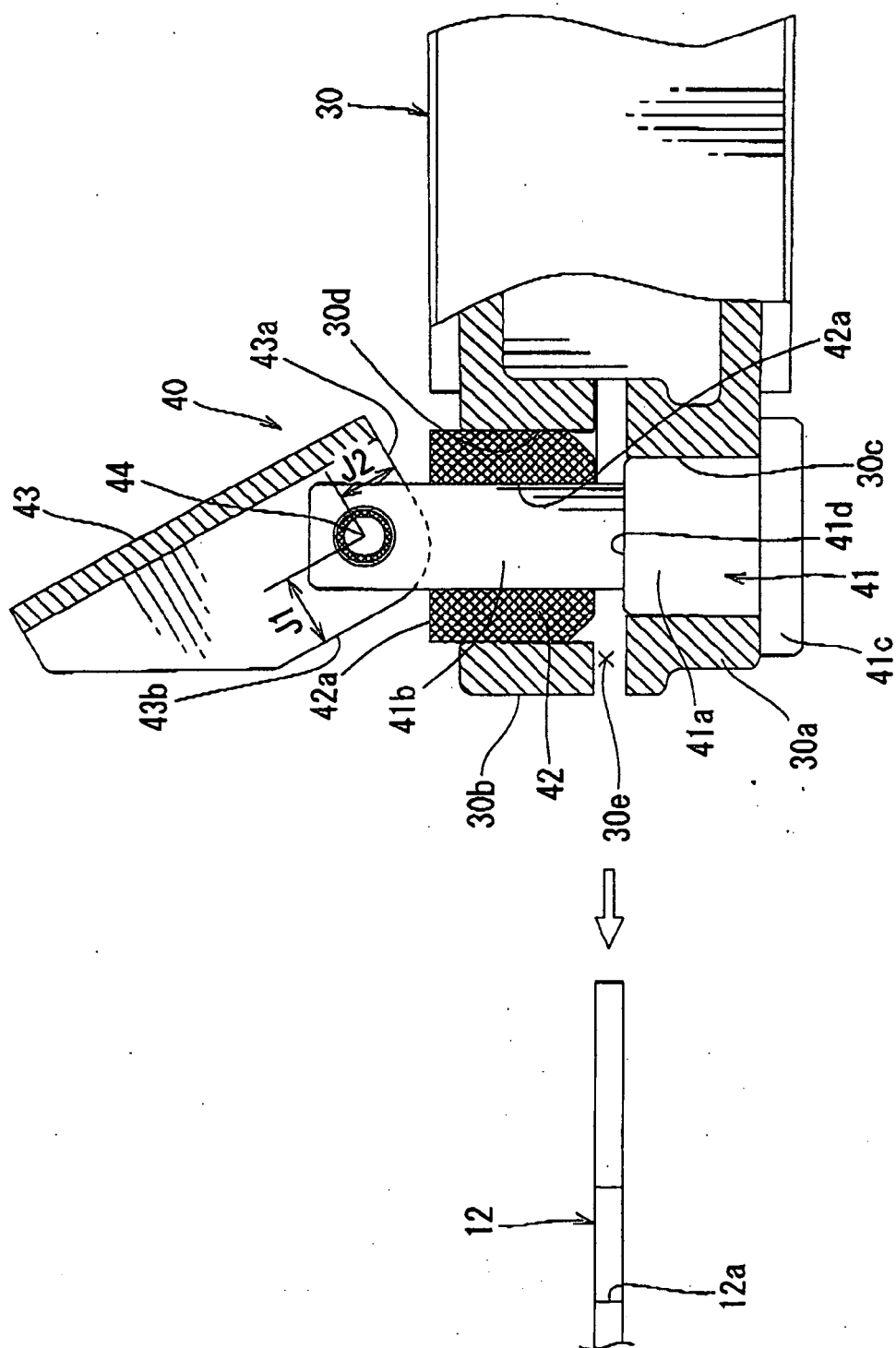


FIG. 7

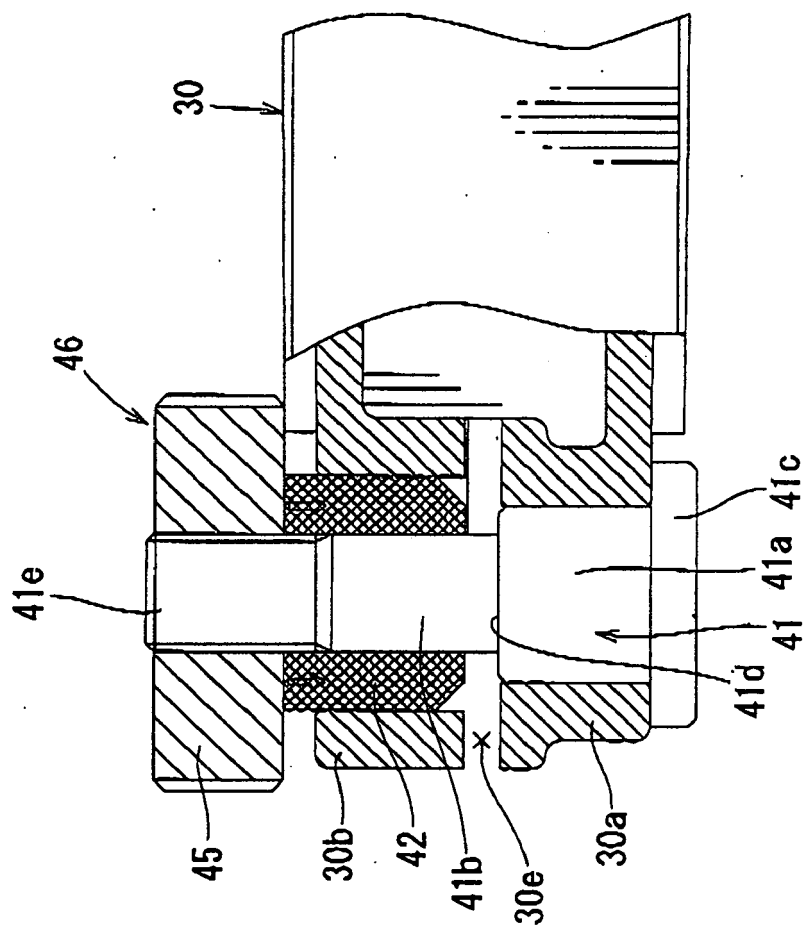


FIG. 8

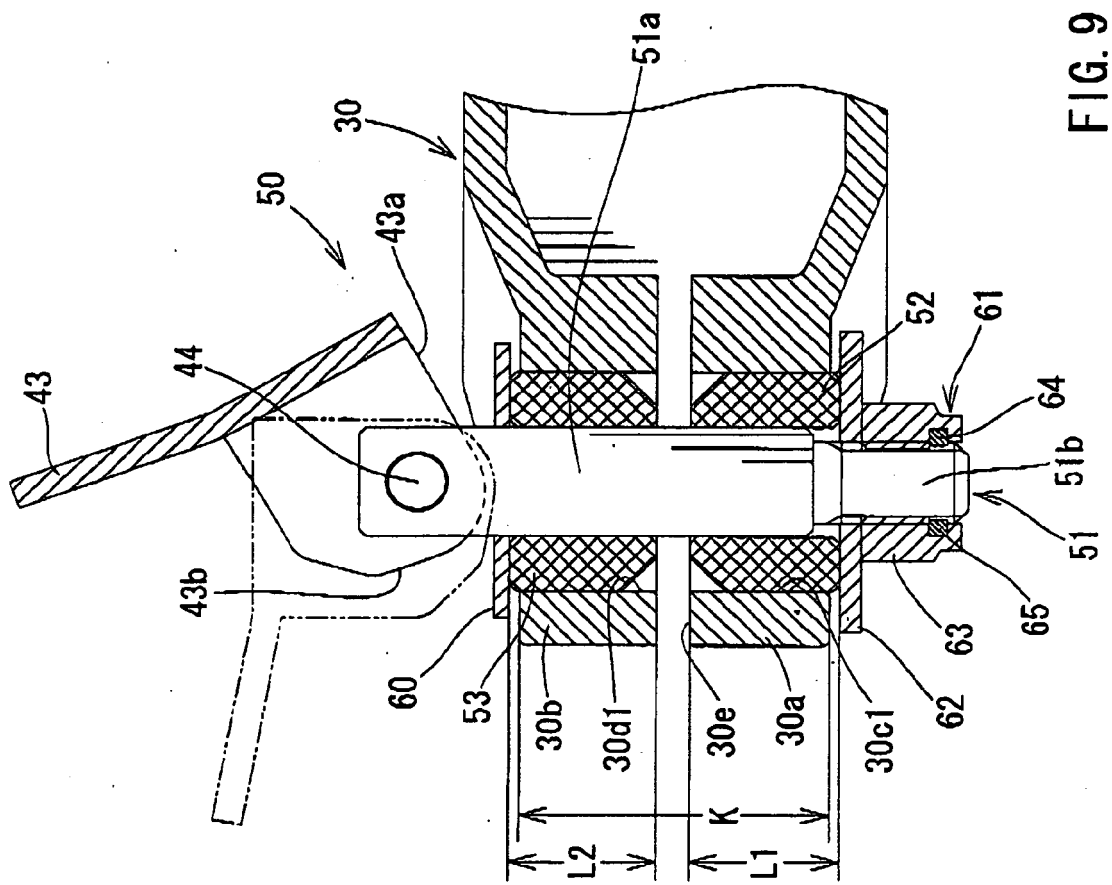


FIG. 9

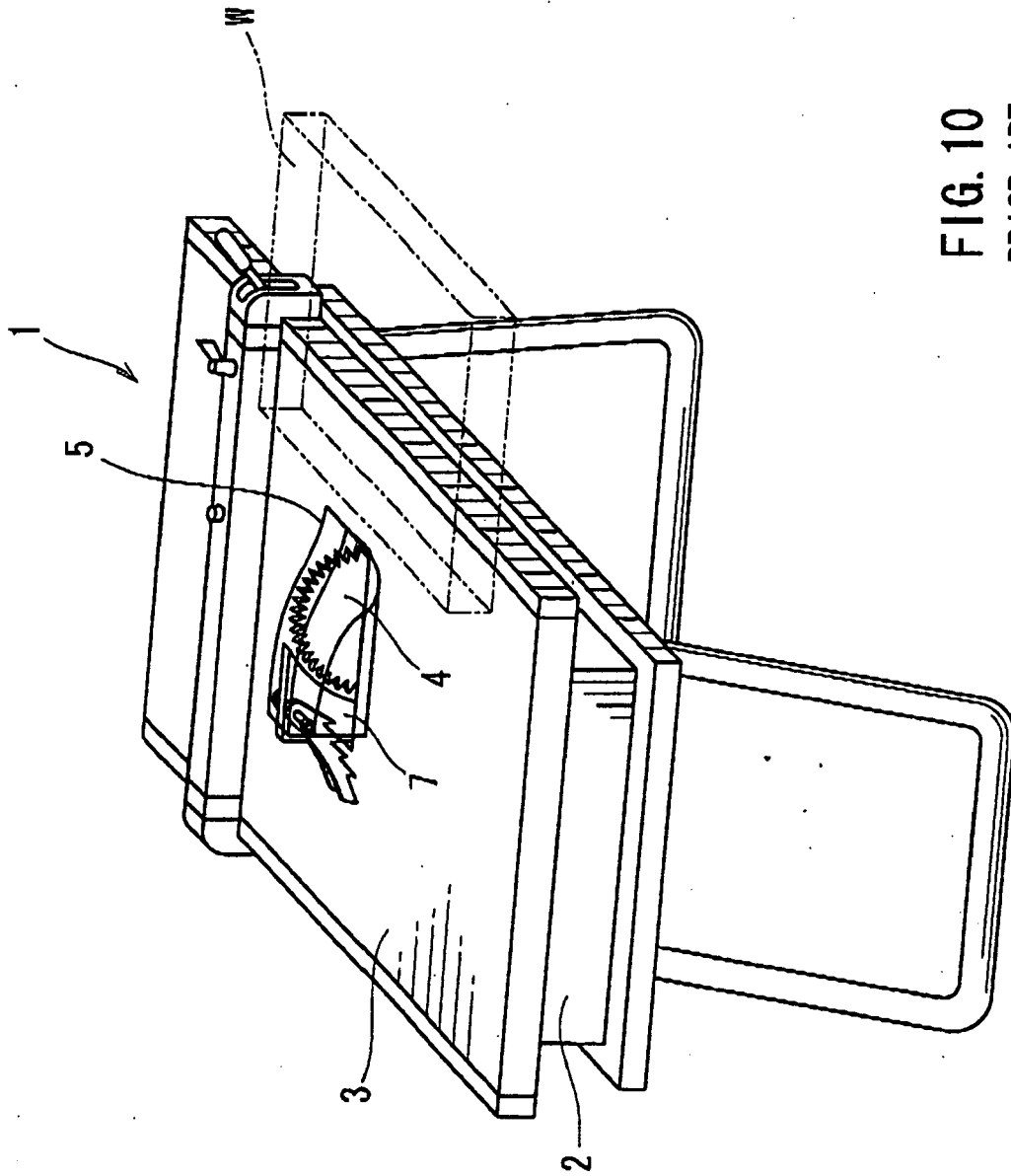


FIG. 10
PRIOR ART

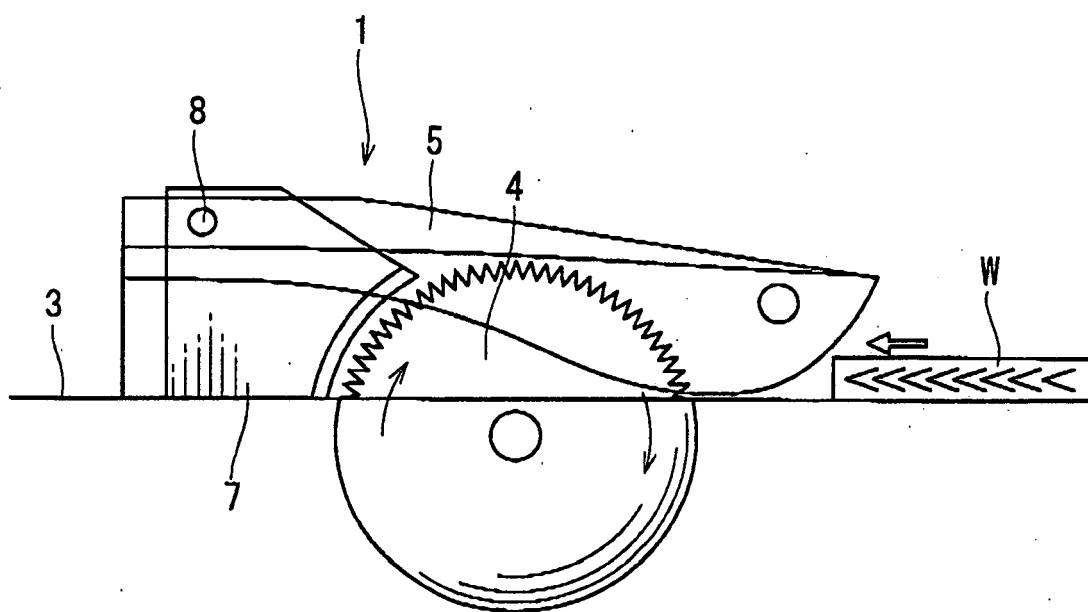


FIG. 11
PRIOR ART



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 02 2895

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Place of search Munich		Date of completion of the search 8 March 2006	Examiner Meritano, L
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