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(54) **Chop saw with top table**

(57) A saw comprising: a base (2); a table (4) having an arm (10) rotatably mounted about a vertical axis (8) within the base (4); a bevel mount (16) pivotally mounted about a horizontal axis (18) on the edge of the table (4); a motor unit (20) pivotally mounted on the bevel mount to allow the motor unit to pivot from a first raised position towards the table to a second lowered position; a saw blade (22) having a cutting edge rotatably mounted on and capable of being rotationally driven by the motor unit (20); a slot (26) which extends across the table (4) and slot (10) and which receives the cutting edge of the cutting blade (22) when the motor unit (20) is in its second lowered position; and a guard assembly capable of surrounding at least part of the cutting edge of the cutting

blade (22); wherein the guard assembly comprises: a fixed guard (30) which surrounds at least the cutting edge of at least the middle portion of the cutting blade (22); a rear guard assembly (68, 70) which is capable of surrounding part of the cutting edge of the lower rear portion of the cutting blade (22) below the fixed guard (30); a front guard assembly (32, 34) which is capable of surrounding part of the cutting edge of the lower front portion of the cutting blade below the fixed guard; characterised in that, when the motor unit (20) is in its lowered second position, the whole of the cutting edge of the cutting blade (22) below the fixed guard (30) is enclosed by being surrounded by the rear guard assembly or the front guard assembly or by being located within the slot (26).

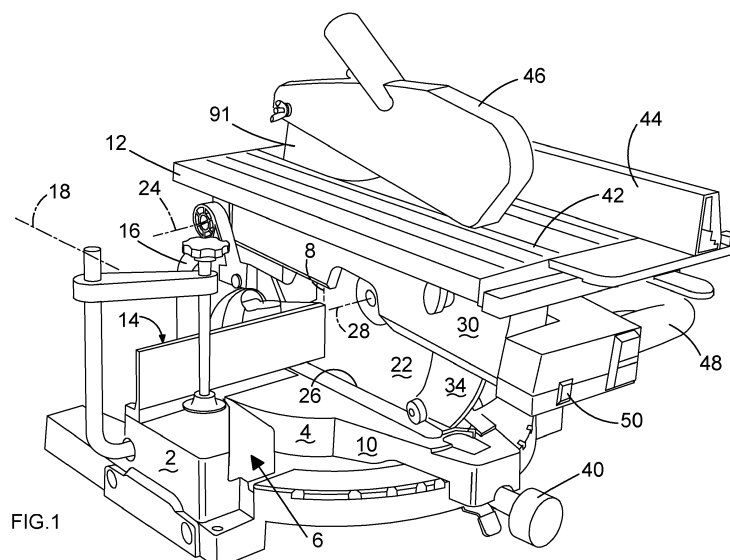


FIG.1

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Description

[0001] The present invention relates to chop saws, and in particular, to chop saws which can also perform mitre cuts and/or bevel cuts.

[0002] EP1813400 discloses a sliding compound mitre saw with a height adjustable table mounted on top of the motor unit. Such a saw can act either as a sliding compound mitre saw performing bevel cuts, mitre cuts, sliding cuts and chop cuts by pivotal movement of the motor unit above a base when a work piece is placed on the base or a table saw when motor unit is locked in its lowest position and the work piece is passed over the table.

[0003] EP1813400 discloses a pivotal rearward guard 232 (using the same reference numbers as EP1813400) mounted about a pivot point 234 on the fixed guard 218 which is attached to the motor unit. As such, when the motor unit pivots towards or away from the base, the pivot point 234 of the rearward guard moves with the motor unit.

[0004] JP2005-178281 describes a chop saw with a table mounted on top of the motor unit. JP2005-178281 also discloses a rearward guard pivotally attached to the motor unit. As such, when the motor unit pivots towards or away from the base, the pivot point of the rearward guard moves with the motor unit.

[0005] A saw comprising:

- a base;
- a table having an arm rotatably mounted about a vertical axis within the base;
- a bevel mount pivotally mounted about a horizontal axis on the edge of the table;
- a motor unit pivotally mounted on the bevel mount to allow the motor unit to pivot from a first raised position towards the table to a second lowered position;
- a saw blade having a cutting edge rotatably mounted on and capable of being rotationally driven by the motor unit;
- a slot which extends across the table and slot and which receives the cutting edge of the cutting blade when the motor unit is in its second lowered position;
- and
- a guard assembly capable of surrounding at least part of the cutting edge of the cutting blade;
- wherein the guard assembly comprises:

- a fixed guard which surrounds at least the cutting edge of at least the middle portion of the cutting blade;
- a rear guard assembly which is capable of surrounding part of the cutting edge of the lower rear portion of the cutting blade below the fixed guard;
- a front guard assembly which is capable of surrounding part of the cutting edge of the lower front portion of the cutting blade below the fixed

guard;

characterised in that, when the motor unit is in its lowered second position, the whole of the cutting edge of the cutting blade below the fixed guard is enclosed by being surrounded by the rear guard assembly and/or the front guard assembly and/or by being located within the slot.

[0006] In known designs of saw, part of the cutting edge of the cutting blade is left exposed, particularly the lower rear portion located towards the bevel mount below the fixed guard.

[0007] Whilst two embodiments described below relate to chop saws with a table mounted on the motor unit and which can perform mitre and/or bevel cuts, it will be appreciated by the reader that the invention is applicable to any type of chop saw. It will be appreciated that the fixed guard may surround the cutting edge of the middle portion of the cutting blade only if the top of the blade is used in conjunction with a table mounted on the motor unit. However, in some designs of saw, there is no table and the fixed guard surrounds the top of saw blade as well.

[0008] A fence (14) can be provided which is mounted to the base and traverses the table, wherein, when the motor unit is in its lowered second position, the rear guard assembly encloses at least part of the cutting edge of the cutting blade behind the fence and the front guard assembly encloses at least part of the cutting edge of the blade forward of the fence.

[0009] A saw table can be provided which is mounted on the motor unit, the top portion of the cutting blade projecting through a slot form through the saw table. The mounting of a table on top of the motor unit enables the saw to be used as a table saw when the motor unit is locked in its lowered position. It is particularly advantageous to enclose the whole of the lower cutting edge of a cutting blade below the fixed guard when the it is being use as a table saw as this part of the blade is not require for use. The saw is likely to be switch on continuously with the operator being able to move his hand freely around the saw. As such, enclosing all parts of saw which are not required provides a beneficial safety feature.

[0010] A locking mechanism can be provided which is capable of locking the motor unit in its second lowered position. Such a locking mechanism can comprises a pin having a tapered head slideably mounted on the bevel mount and which can be slide between a first position where it is remote from the motor unit to a second position, when the motor unit is in its lowered second position, where it engages with a tapered groove in order to prevent movement of the motor unit relative to the bevel mount (16).

[0011] Two embodiments of the present invention will now be described with reference to the accompanying drawings of which:

Figure 1 shows a perspective view of a chop saw

with a height adjustable table mounted on the motor unit when the motor unit locked in its lowest position according to a first embodiment of the invention; Figure 2 shows a partial side view of the chop saw; Figure 2 shows a second partial side view of a chop saw; Figure 4 shows a schematic diagram of the guard assembly; Figure 5 shows a first view of the rear guard assembly when the saw is performing a bevel and mitre cut; Figure 6 shows a second view of the rear guard assembly when the saw is performing a bevel and mitre cut; Figure 7 shows a third view of the rear guard assembly when the saw is performing a bevel and mitre cut; Figure 8 shows the locking mechanism for the motor unit; Figure 9 shows a side view of a chop saw according to a second embodiment of the present invention; Figure 10 shows a perspective view of the locking mechanism for the fifth rearward pivotal guard; and Figure 11 shows a perspective view of the locking mechanism for the fifth rearward pivotal guard when the saw is performing a mitre and bevel cut.

[0012] A first embodiment of the saw will now be described with reference to Figures 1 to 7.

[0013] Referring to Figure 1, there is provided a chop saw with a table 12. The saw comprises a base 2 having a rotatable table 4 mounted within it. The rotatable table 4 can pivot about a vertical axis 8 within the base 2. A locking mechanism 40 can lock the rotatable table 4 in various angular positions within the base 2. An extension arm 10 is rigidly attached to the periphery of the rotatable table 4 and extends forward in well known manner within a recess 6 formed within the base 2. The recess 6 provides a space in which the arm 10 can move when the rotatable table 4 is rotated about the axis 8. The top surface of the base 2, rotatable table 6 and extension arm 10 are flush to provide an overall work surface for a work piece. A slot 26 extends across the rotatable table 104 and along the extension arm 10. The rotation of the rotatable table 4 about the axis 8, in conjunction with a fence 14 fixed to the base 2 and which extends across the rotatable table 4, enables the saw to perform mitre cuts.

[0014] Connected to the rear of the rotatable table 4 is a bevel mount 16 which is able to pivot about a horizontal axis 18 in relation to the rotatable table 4, which horizontal axis 18 is parallel to the plane of the work surface of the rotatable table 4. A locking mechanism (not shown) enables the angular position about the axis 18 of the bevel mount 16 to be releasably locked relative to the rotatable table 4. The pivotal movement of the bevel mount 16 about axis 18 in relation to the rotatable table 4 enables the saw to perform bevel cuts.

[0015] Pivotaly mounted on the bevel mount 16 is a motor unit 20, which comprises a motor (not shown) for

rotationally driving a circular saw blade 22 mounted on a drive spindle on the motor unit 20 about an axis 28. The motor unit 20 can pivot on the bevel mount 16 about an axis 24 from a raised first position where the motor unit is remote from the base 2 and rotatable table 4, to a lowered second position where it is in close proximity to the base 2 and rotatable table. The axis 24 is parallel to the axis 28. The slot 26 in the table 4 and arm 10 provides a space within the table 4 and arm 10 into which the cutting edge of the saw blade 22 can pass when the motor unit 20 is pivoted to its lowered position to enable it to pass through a work piece when positioned on the table 4 and arm 10. The motor unit 20 is biased to an upward position by a spring 100. A locking mechanism is mounted on the bevel mount which is capable of locking the motor unit 20 in its lowered second position as shown in Figure 1. The locking mechanism comprises a pin 160 mounted within the bevel mount 16 in an axially slideable manner as seen in Figure 8. The pin 160 can be slid between a first position where it is disengaged from the motor unit 20, allowing it to freely pivot about axis 24, to a second position when the motor unit 20 is in its lowered second position where its end 162 engages with a groove 164 formed in the side of the motor unit 20 to lock it in its lower position. The end of the pin is tapered in a lengthwise direction to form a frusto conical shape. The groove 164 narrows along its length in order to provide a corresponding tapered shape along its length which can mate with that of the end 162 of the pin 160. By tapering the groove 164 and the end 162 of the pin 160, it ensures that a tight fit is provided between the two when the end of the pin is engaged with the groove 164. The pivotal movement of the motor unit 20 in relation to the bevel mount 16 about axis 24 enables the saw to perform chop cuts.

[0016] Mounted on the top of the saw is the table 12 which enables the saw to be also used as a table saw. The table 12 is attached to the top side of the motor unit 20. A slot 42 is formed through the table through which the top section of the circular saw blade 22 projects. When the motor unit 20 is locked in its lowered second position, the table 12 is horizontal. A work piece such as a piece of wood can then be slid across the top of the table 12 to engage with the top section of the saw blade 22 thus enabling the saw to be used as a saw table. A table fence 44 is releasably attached to the table 12 and which can be used to guide a work piece across the table 12. A table guard 46 is releasably mounted on the table which can surround the top of the saw blade 22 which projects through the table 12 when it is not being used as a table saw.

[0017] The saw comprises a plurality of guards located below the table 12 which are capable of enclosing the cutting edge of the lower section of the saw blade 22 for safety purposes when the saw is in its raised first position when it is not being used to perform chop, mitre, or bevel cuts, or when the saw is being used as a table saw, with the motor unit 20 locked in its lowered second position.

[0018] A handle 48 is attached to the motor unit by which a user can grip and pivot the motor unit 20 and the circular saw blade 22 downwards towards the rotatable table 4. An electric switch 50 is mounted adjacent the handle 48 for activating the motor. The switch can operate in two modes of operation. The first mode is when the saw is performing chop, mitre or bevel cuts. In this mode, the switch 50 must be constantly depressed by the operator to keep the motor activated thus ensuring the hand of the operator remains on the handle in contact with the switch. In the second mode, when the saw is being used as a table saw, the switch 50 can be depressed once to activate the motor, the motor remaining activated until the switch is depressed again. This allows the operator to move his hands freely without having to maintain contact with the switch.

[0019] The height of the table 12, and hence the amount of saw blade 22 passing through it, can be adjusted vertically. The height adjustment mechanism for the table 12 is the same as that described in EP1813400.

[0020] The cutting edge of the lower part of the circular saw blade 22 below the table 12 is surrounded by a guard assembly. The guard assembly comprises a first fixed guard 30 which surrounds the cutting edges of the middle section of the saw blade 22, a forward guard assembly which is capable of surrounding the lower front section of the cutting edge of the cutting blade 22 and a rear guard assembly which is capable of surrounding the lower rear section of the cutting edge of the cutting blade 22.

[0021] The first fixed guard 30 is attached to the motor unit 20 and surrounds the cutting edges of the middle section of the circular saw blade 22. The fixed guard 30 remains stationary relative to the motor unit 20.

[0022] The forward guard assembly will now be described with reference to figure 4.

[0023] Pivotaly attached to the first fixed guard 30 is a second forward pivotal guard 32. The second forward pivotal guard 32 pivots about the axis 28 of the circular saw blade 22. The second pivotal forward pivotal guard 32 can freely pivot into and out of in a telescopic manner the fixed guard 30. The second forward pivotal guard 32 is prevented from completely pivoting out of the fixed guard 30 by a catch 52 formed on the second forward pivotal guard 32 which engages with a ledge 54 formed on the fixed guard 30 when the second forward pivotal guard 32 has pivoted to its furthest position outside of the fixed guard 30.

[0024] Pivotaly attached to the first fixed guard 30 is a third forward pivotal guard 34. The third forward pivotal guard 32 also pivots about the axis 28 of the circular saw blade 22.

[0025] The third pivotal forward pivotal guard 34 can pivot into and out of, in a telescopic manner, the second forward pivotal guard 32 and also into and out of the fixed guard 30 when the first forward pivotal guard 32 has moved telescopically inside of the fixed guard 30. The third forward pivotal guard 34 is prevented from completely pivoting out of the second forward pivotal guard

32 by a second catch 56 formed on the third forward pivotal guard 32 which engages with a second ledge 58 formed on the first forward pivotal guard 32 when the second forward guard has pivoted to its furthest position outside of the first forward pivotal guard 32. The third forward pivotal guard 34 is prevented from completely pivoting through the second forward pivotal guard 32 by the second catch 56 formed on the third forward pivotal guard 32 engaging with a third ledge 60 formed on the first forward pivotal guard 32 when the second forward guard has pivoted to its furthest position inside of the first forward pivotal guard 32.

[0026] A spring (not shown) biases the third forward pivotal guard 34 downward (clockwise) as shown in figures 1 to 4.

[0027] A bar 62 is pivotally attached at one end about axis 61 to the bevel mount 16. An elongate slot 64 is formed along a section of the length of the bar 62 at the other end. A pin 66, rigidly attached to the third forward pivotal guard 34 passes through the slot 64 and which is capable of sliding along the slot 64. The biasing spring acting on the third forward pivotal guard 34 causes the guard to pivot until the pin 66 is at the inner end position 65 of the slot 64 where it remains held by the force of the spring. The pin 66 located within the slot 64 of the bar 62 controls the pivotal movement of the third guard 34 on the motor unit as the motor unit 20 pivots upwards and downwards. When the motor unit 20 is in its upper most raised first pivotal position, the second and third forward pivotal guards 32, 34 surround the cutting edge of the lower front section of circular saw blade 22 as shown in Figure 2. As the motor unit 20 is pivoted downwardly, the bar 62 pushes the pin 66, causing the third forward pivotal guard 34 to telescopically pivot into the second forward pivotal guard 32 until the second catch 56 engages with the third ledge 60. As the motor unit 20 continues to be pivoted downwardly, the bar 62 continues to push the pin 66, causing the third forward pivotal guard 34 together with the second forward pivotal guard via the second catch 56 and third ledge 60, to telescopically pivot into the first fixed guard 30. The slot 64 allows the guard to pivot freely relative to the bar 62, against the biasing force of the spring, if it encounters a work piece located on the base 2 or table 4.

[0028] The rear guard assembly will now be described with reference to figure 4.

[0029] The rear guard assembly comprises two parts, a fourth rearward fixed guard 68 and a fifth rearward pivotal guard 70.

[0030] The fourth rearward fixed guard 68 comprises a U shaped bracket rigidly fixed to the bevel mount 16 via bolts 72 and which surrounds part of the cutting edge of the rear lower section of the blade 22. One side 74 of the U shaped bracket locates along one side of the cutting blade 22, the other side 76 of the U shaped bracket locates along the other side of the of the cutting blade 22. The fourth rearward fixed guard 68 surrounds the part of the cutting edge of the rear lower section of the blade 22

when the motor unit 20 is in its raised position or its lowered position and all the positions in between, when the motor unit 20 is pivoted about axis 24. A series of elongate holes 78 are formed in one side 74 of the fixed guard 68 to enable a user to view the side of the blade 22 located within the fixed guard 68. The fourth rearward fixed guard 68 is located above the fence 14.

[0031] The fifth rearward pivotal guard 68 also comprises a U shaped bracket pivotally mounted within the fourth rearward fixed guard 68 via a bolt 80. A portion of the fifth rearward pivotal guard 70 locates behind the fence 14. The fifth rearward pivotal guard 70 surrounds a part of the cutting edge of the rear lower section of the blade 22 when the motor unit 20 is pivoted about axis 24 to its lowered position. When the motor unit 20 is in its lowest position, one side 82 of the U shaped bracket locates along one side of the cutting blade 22, the other side 84 of the U shaped bracket locates along the other side of the cutting blade 22. The fifth rearward pivotal guard 70 can pivot about axis 90 from a first forward position where the front edges 86 of the bracket are in close proximity to the working surface 88 of the fence, adjacent to the slot formed through the fence 14 through which the blade 22 passes when the motor unit is pivoted about axis 24 to its lowered position, to a second rearward position (clockwise as shown in Figure 4) where the fifth rearward pivotal guard 70 is located further inside of the fourth rearward fixed guard and where the front edges 86 are located a short distance behind the fence 14. A spring 92 biases the fifth rearward pivotal guard 70 to its first position.

[0032] The rear guard assembly ensures that the part of the cutting edge of the blade 22 which is located below the fixed guard and behind the fence 14 remains enclosed at all times regardless of the pivotal position of the motor unit 20 relative to the bevel mount 16. When the motor unit 20 is pivoted relative to the bevel mount 16 about axis 24, the fifth rearward pivotal guard 70 remains in a fixed position relative to the fourth rearward fixed guard 68 and bevel mount 16, the pivotal movement of the motor unit 20 about axis 24 having no effect on the pivotal position of the fifth rearward pivotal guard 70. When the motor unit 20 is in its raised position as shown in Figure 2, the whole of the cutting edge of the cutting blade 22 located below the fixed guard 30 is surrounded by the front and rear guard assemblies. When the motor unit 20 is in its lowered position as shown in Figure 1, the whole of the cutting edge of the cutting blade 22 located below the fixed guard 30 is enclosed by being surrounded in part by the front guard assembly and the rear guard assembly with the remaining portion being located within the slot 26 in the table 4 and arm.

[0033] The reason for making part of the rear guard assembly pivotal is due to the movement of the bevel mount 16, upon which it is mounted, relative to the base. When the saw performs mitre and/or bevel cuts by pivotal movement of the table 4 about axis 8 and/or pivotal movement of the bevel mount about axis 18, the position of

the front edges 86 of the fifth rearward pivotal guard 70 move relative to the edges 102 of the slot formed through the fence 14 through which the blade 22 can pass as the motor unit 20 moves to its lower position, as shown in Figures 5 to 7. This can result, in certain positions, in the edges engaging with the edge 102 of the fence 14 and hence block or hinder the movement of the bevel mount 16 in relation to the base 2. Therefore, by making the part of the rear guard assembly located behind the fence 14 pivotal, the pivotal part can be moved rearwardly slightly by pivotal movement of the fifth rearward pivotal guard 70 to the movement of the bevel mount 16 being hindered or blocked relative to the base 2 whilst still enclosing the blade within the rearguard assembly when the rear guard assembly is moved due to the movement of the bevel mount relative to the base 2 and fence 14. The pivotal movement of the fifth rearward pivotal guard 70 occurs when it engages with the fence 14 as the bevel mount 16 moves.

[0034] A second embodiment of guard assembly which will now be described with reference to Figures 9 to 11. Where the same features are present in the second embodiment, which are present in the first embodiment, the same reference numbers have been used. The second embodiment is the same as the first except for the addition of a locking mechanism for the fifth rearward pivotal guard 70.

[0035] The locking mechanism comprises an arm 110 rigidly attached to the rotatable table 4 and a projection 112 rigidly attached to the fifth rearward pivotal guard 70. The arm 110 is an elongate strip of metal, attached to the rotatable table 4 using bolts 114 and which projects forward, in front of the bevel mount 16, from the table 4 towards the fifth rearward pivotal guard 70. The projection 112 is a narrow strip of metal integrally formed with the fifth rearward pivotal guard 70 and which projects rearwardly from the fifth rearward pivotal guard 70 towards the bevel mount 16. When the saw is not performing a bevel cut, but a chop cut with or without mitre ie when the saw blade 22 is vertical, the plane of the blade being perpendicular to the surface of the rotatable table 4, the free end of the arm 110 is located immediately above the free end of the projection 112 as best seen in figures 9 and 10. When the arm 110 and projection 112 are located in these relative positions, the fifth rearward pivotal guard 70 is prevented from pivoting backwards from its first position due to the arm 110 blocking the pivotal movement of the projection 112, thus locking the fifth rearward pivotal guard 70 in its first position. When the saw is performing either a bevel cut, with or without mitre, the position of the projection 112 will move relative to the arm 110 due to the movement of the bevel mount relative to the table 4, causing the free end of the arm 110 to be located away from the free end of the projection 112 as best seen in figure 11. In this position the fifth rearward pivotal guard 70 can freely pivot.

[0036] It will be appreciated by the reader that the arm 110 can be mounted onto the base 2 instead of the table

4. In such a construction, when the saw is performing a bevel cut only without bevel or mitre, the free end of the arm 110 is located immediately above the free end of the projection 112. As such, the fifth rearward pivotal guard 70 is prevented from pivoting backwards from its first position due to the arm 110 blocking the pivotal movement of the projection 112, thus locking the fifth rearward pivotal guard 70 in its first position. When the saw is performing a bevel cut an/or a mitre cut, the position of the projection 112 will move relative to the arm 110 due to the movement of the bevel mount relative to the base 2, causing the free end of the arm 110 to be located away from the free end of the projection 112. In this position the fifth rearward pivotal guard 70 can freely pivot.

Claims

1. A saw comprising:

a base (2);
 a table (4) having an arm (10) rotatably mounted about a vertical axis (8) within the base (4);
 a bevel mount (16) pivotally mounted about a horizontal axis (18) on the edge of the table (4);
 a motor unit (20) pivotally mounted on the bevel mount to allow the motor unit to pivot from a first raised position towards the table to a second lowered position;
 a saw blade (22) having a cutting edge rotatably mounted on and capable of being rotationally driven by the motor unit (20);
 a slot (26) which extends across the table (4) and slot (10) and which receives the cutting edge of the cutting blade (22) when the motor unit (20) is in its second lowered position; and
 a guard assembly capable of surrounding at least part of the cutting edge of the cutting blade (22);
 wherein the guard assembly comprises:
 a fixed guard (30) which surrounds at least the cutting edge of at least the middle portion of the cutting blade (22);
 a rear guard assembly (68, 70) which is capable of surrounding part of the cutting edge of the lower rear portion of the cutting blade (22) below the fixed guard (30);
 a front guard assembly (32, 34) which is capable of surrounding part of the cutting edge of the lower front portion of the cutting blade below the fixed guard;
characterised in that, when the motor unit (20) is in its lowered second position, the whole of the cutting edge of the cutting blade (22) below the fixed guard (30) is enclosed by being surrounded by the rear guard assembly and/or the front guard assembly

and/or by being located within the slot (26).

2. A saw according to claim 1 wherein there is provided a fence (14) which is mounted to the base (2) and traverses the table (4), wherein, when the motor unit (20) is in its lowered second position, the rear guard assembly (68, 70) encloses at least part of the cutting edge of the cutting blade (22) behind the fence and the front guard assembly encloses at least part of the cutting edge of the blade forward of the fence.
3. A saw according to either of claims 1 or 2 wherein there is provided a saw table (12) mounted on the motor unit (20), the top portion of the cutting blade (22) projecting through a slot (42) formed through the saw table (12).
4. A saw according to any of the previous claims wherein there is provided a locking mechanism capable of locking the motor unit (20) in its second lowered position.
5. A saw according to claim 4 wherein the locking mechanism comprises a pin (160) having a tapered head (162) slideably mounted on the bevel mount (16) and which can be slide between a first position where it is remote from the motor unit (20) to a second position, when the motor unit (20) is in its lowered second position, where it engages with a tapered groove (164) in order to prevent movement of the motor unit (164) relative to the bevel mount (16).

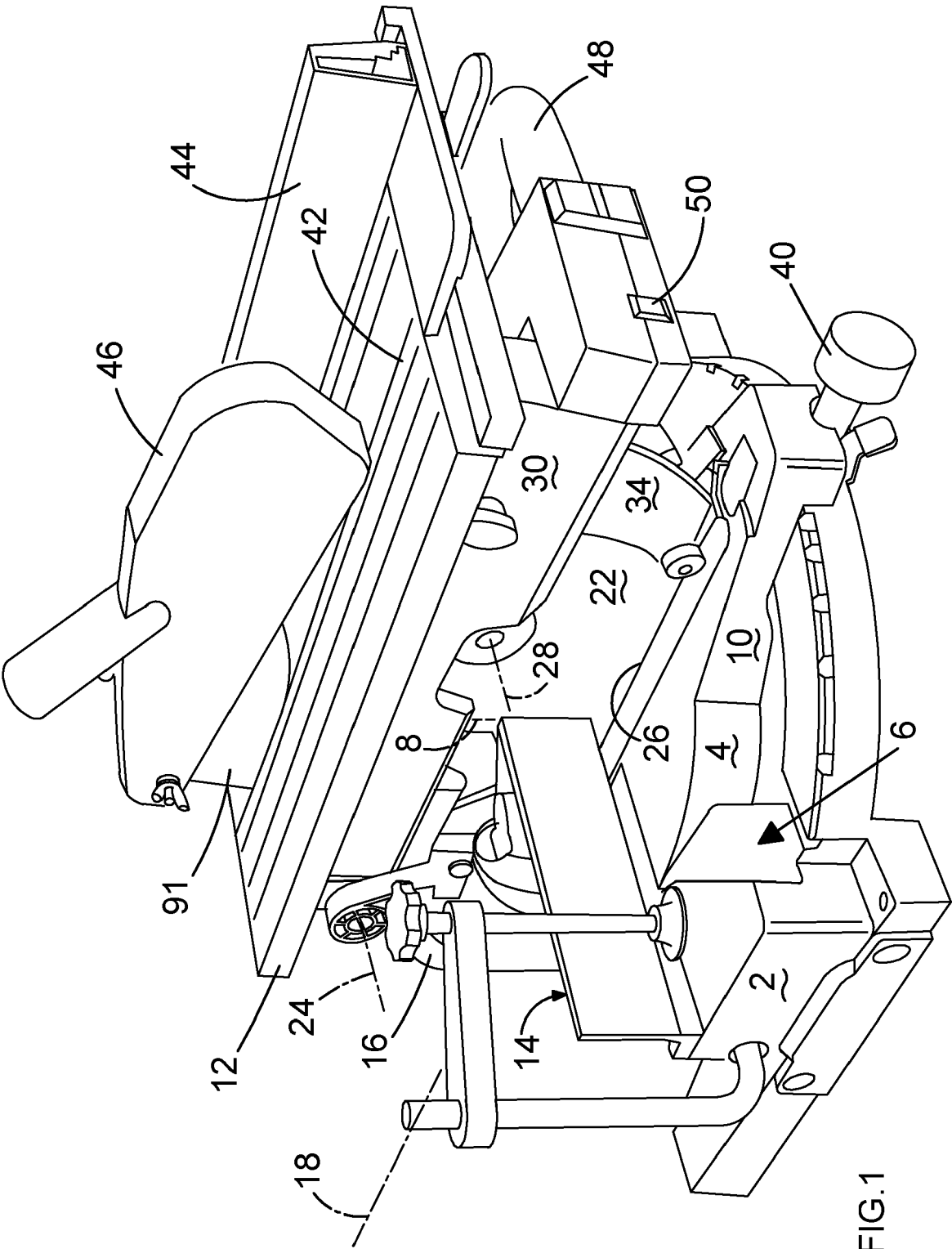
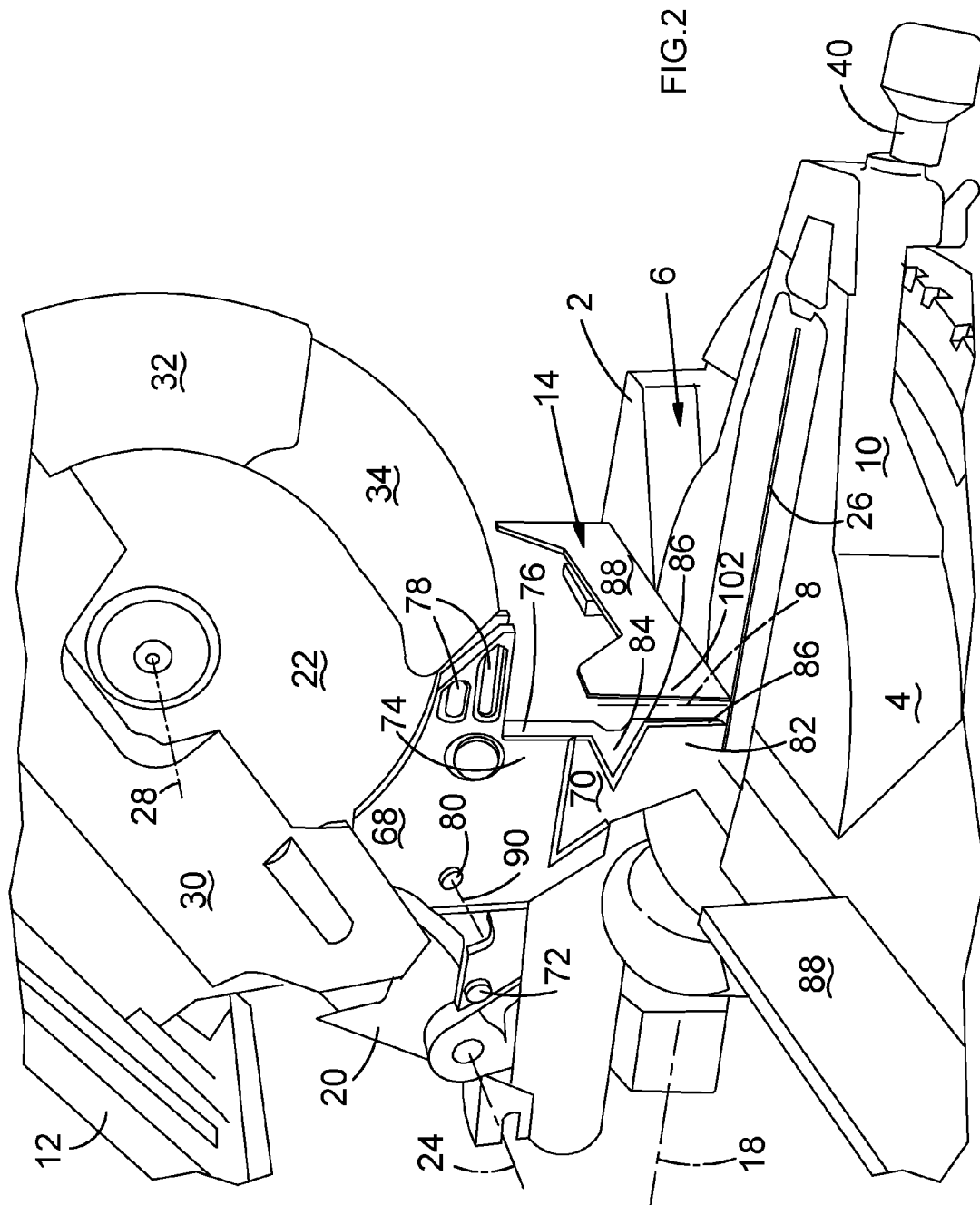


FIG.1



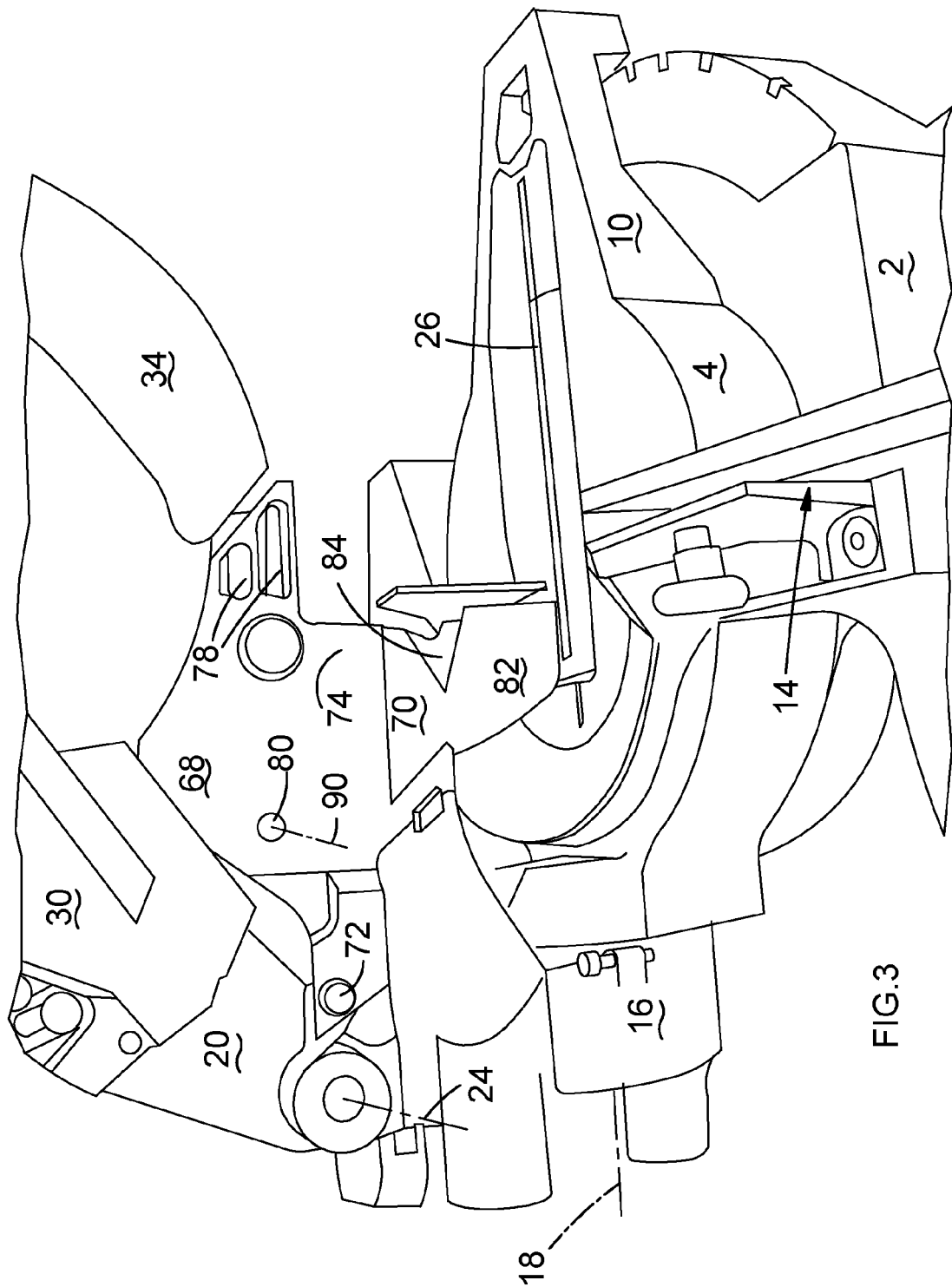


FIG.3

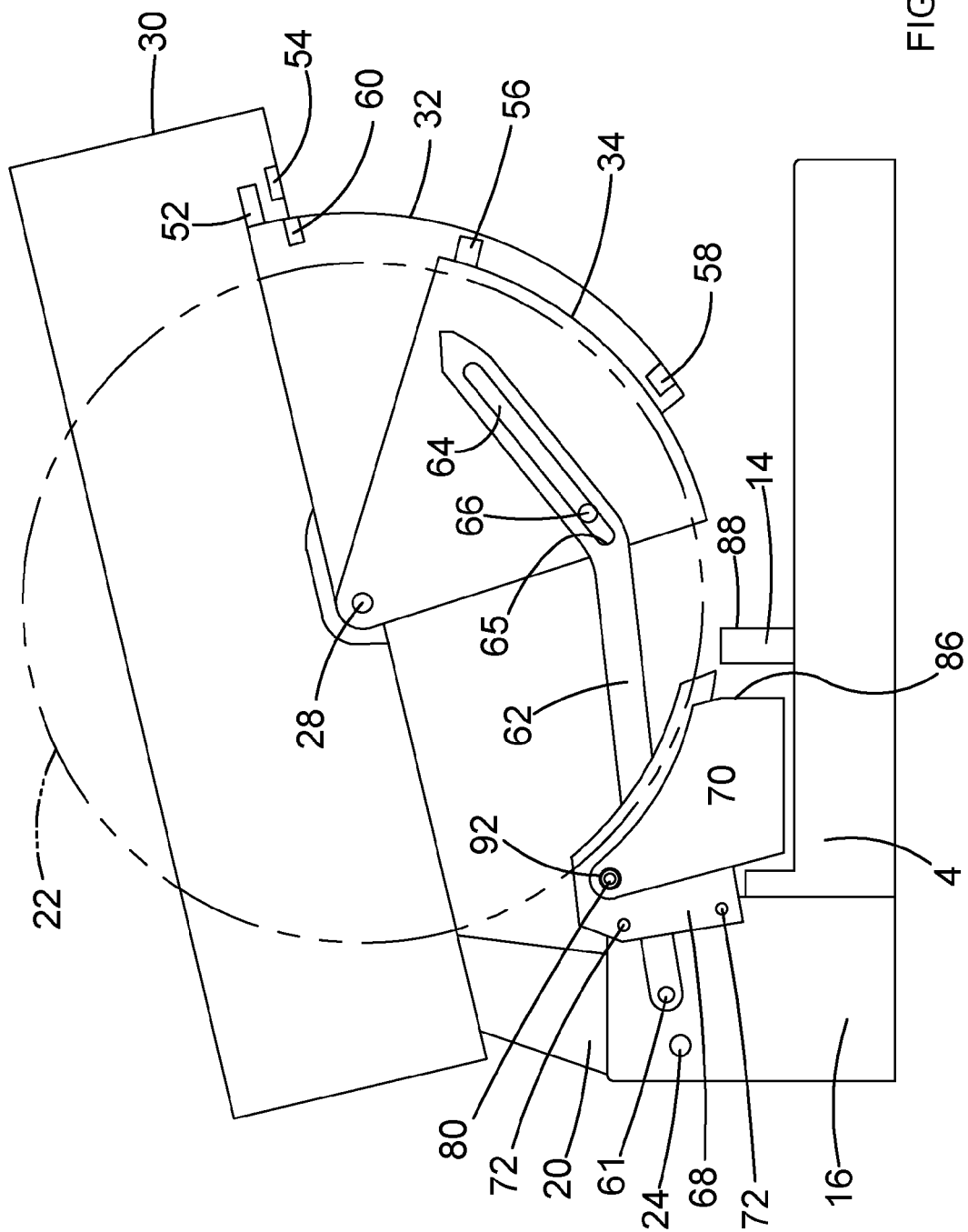


FIG. 4

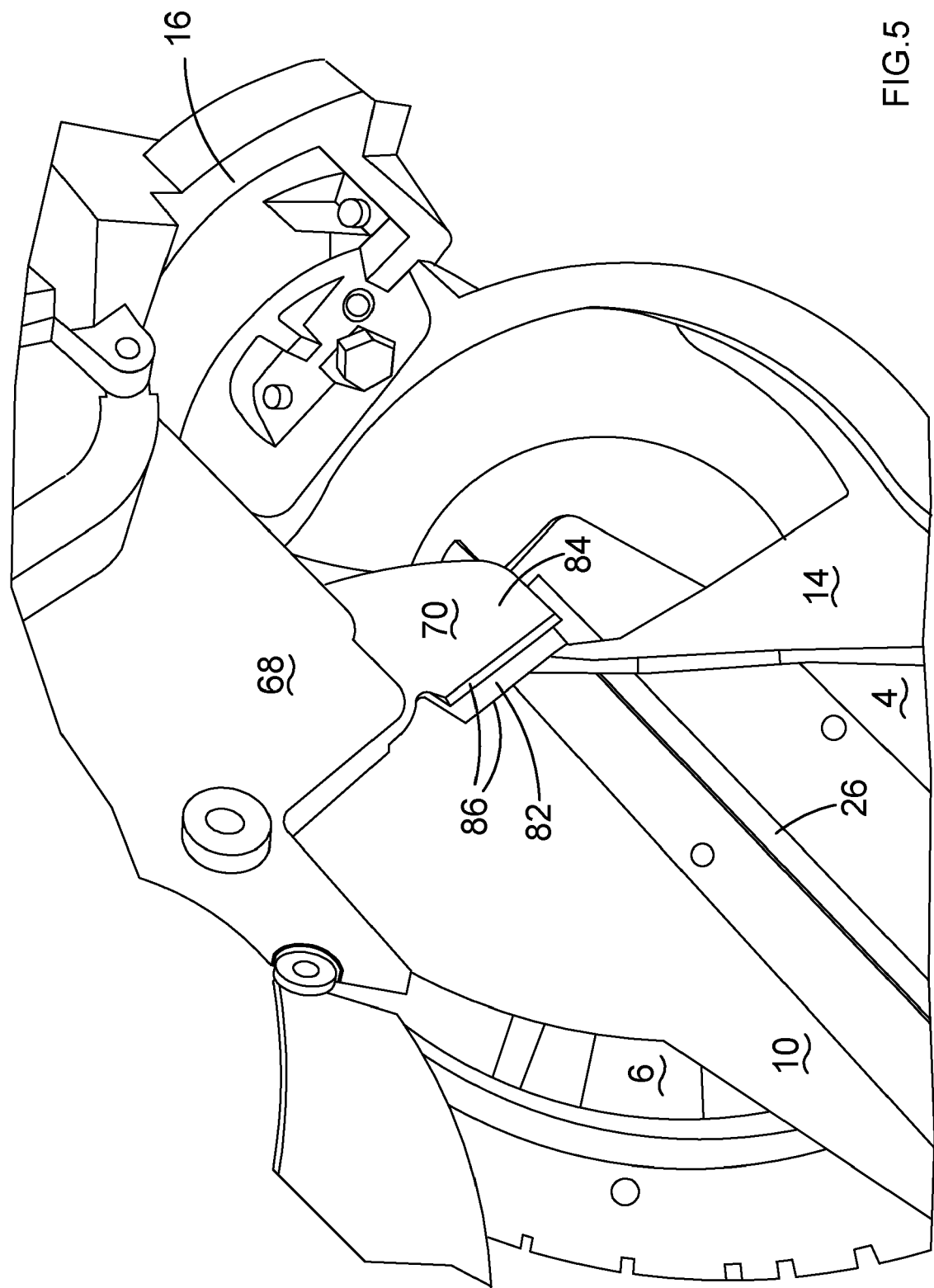


FIG. 5

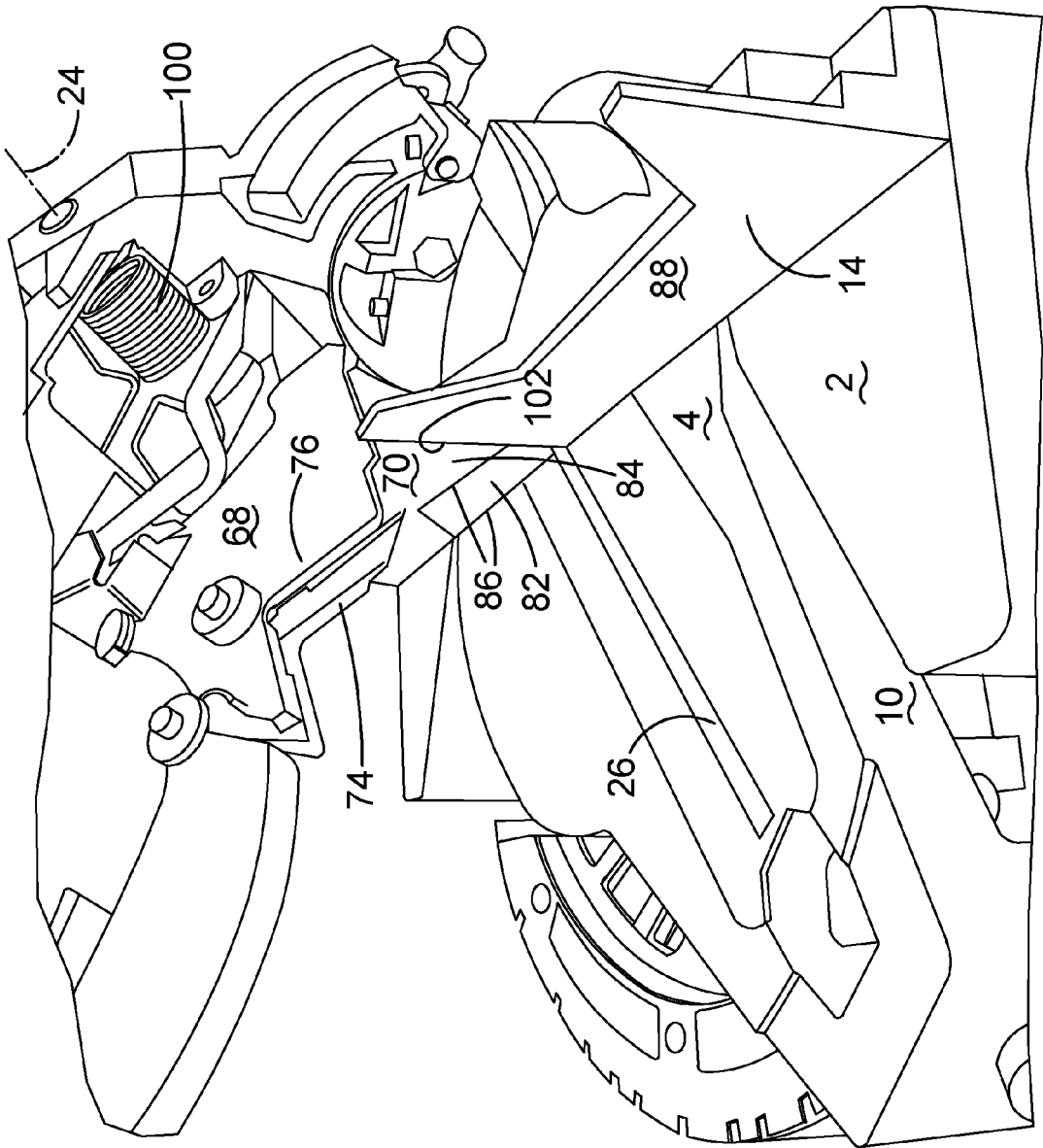


FIG.6

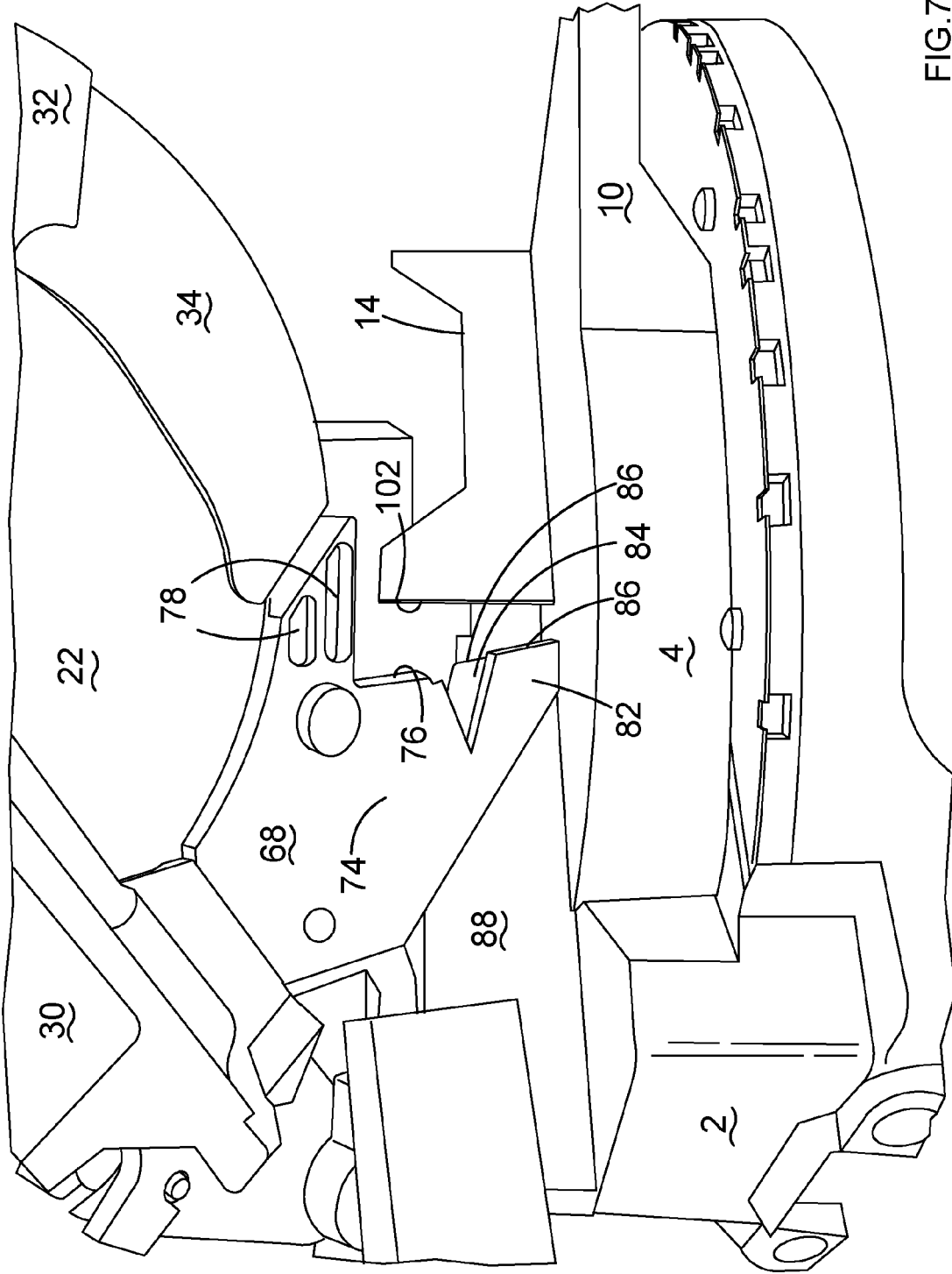
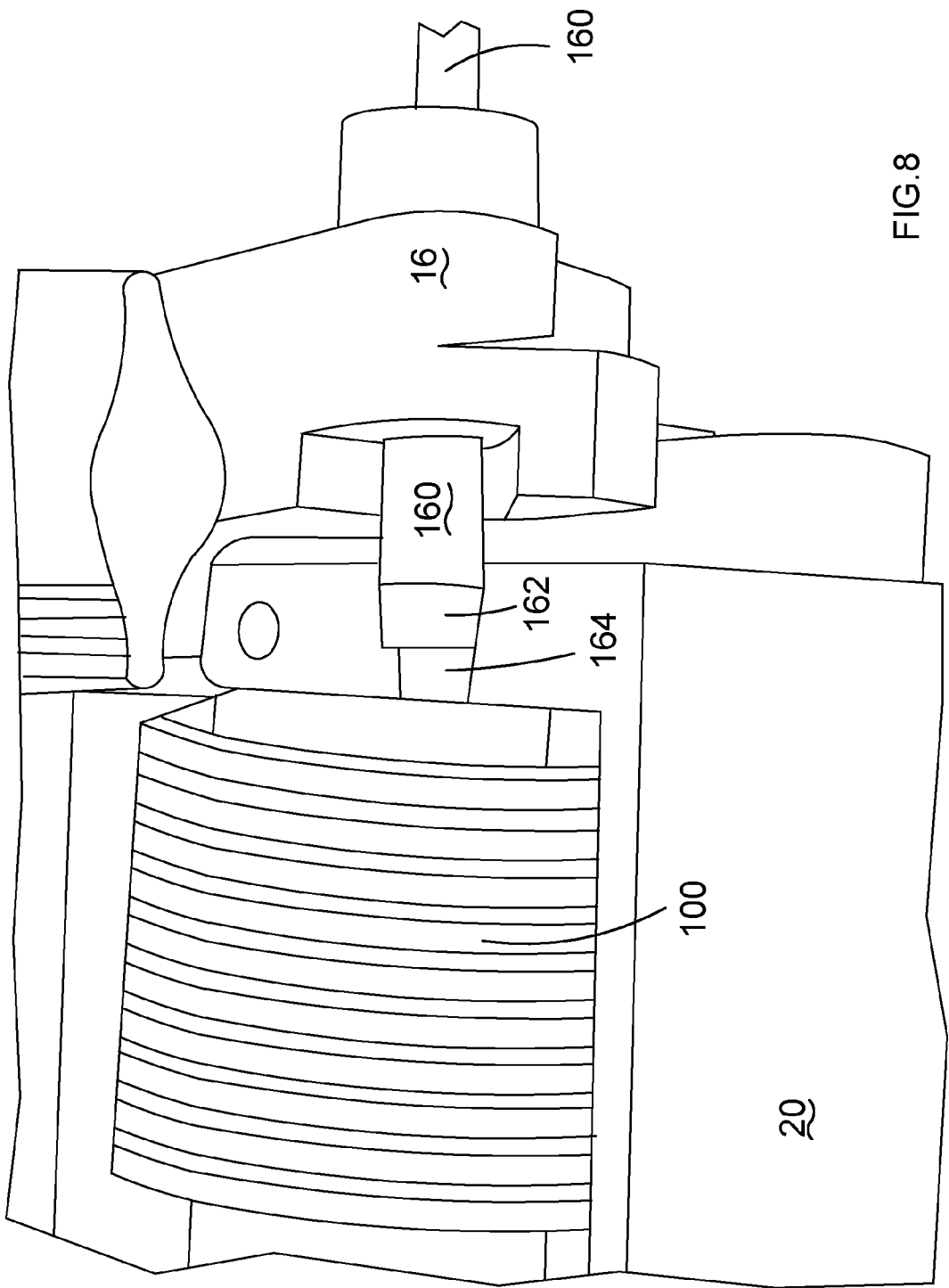


FIG. 7



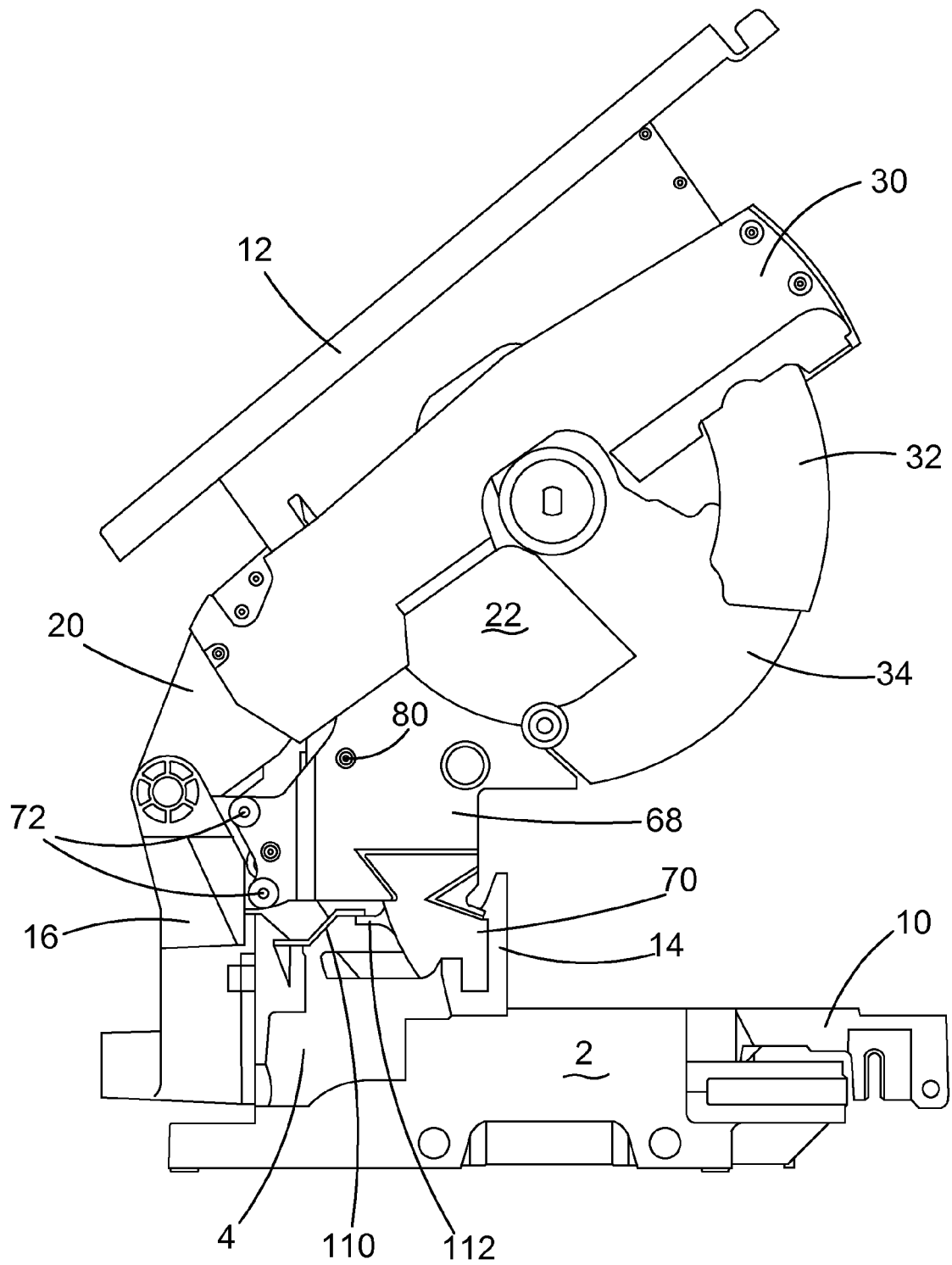


FIG.9

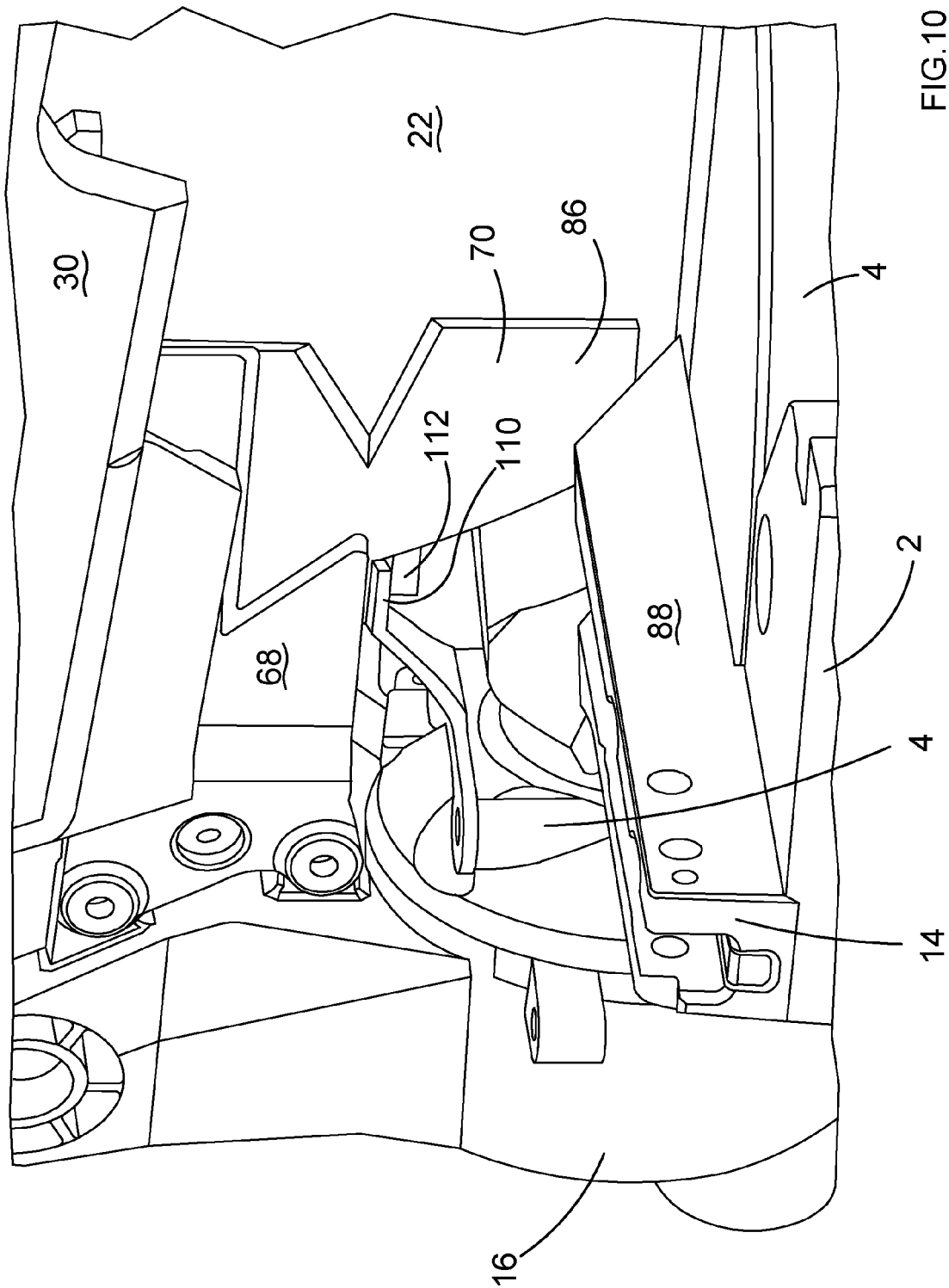


FIG.10

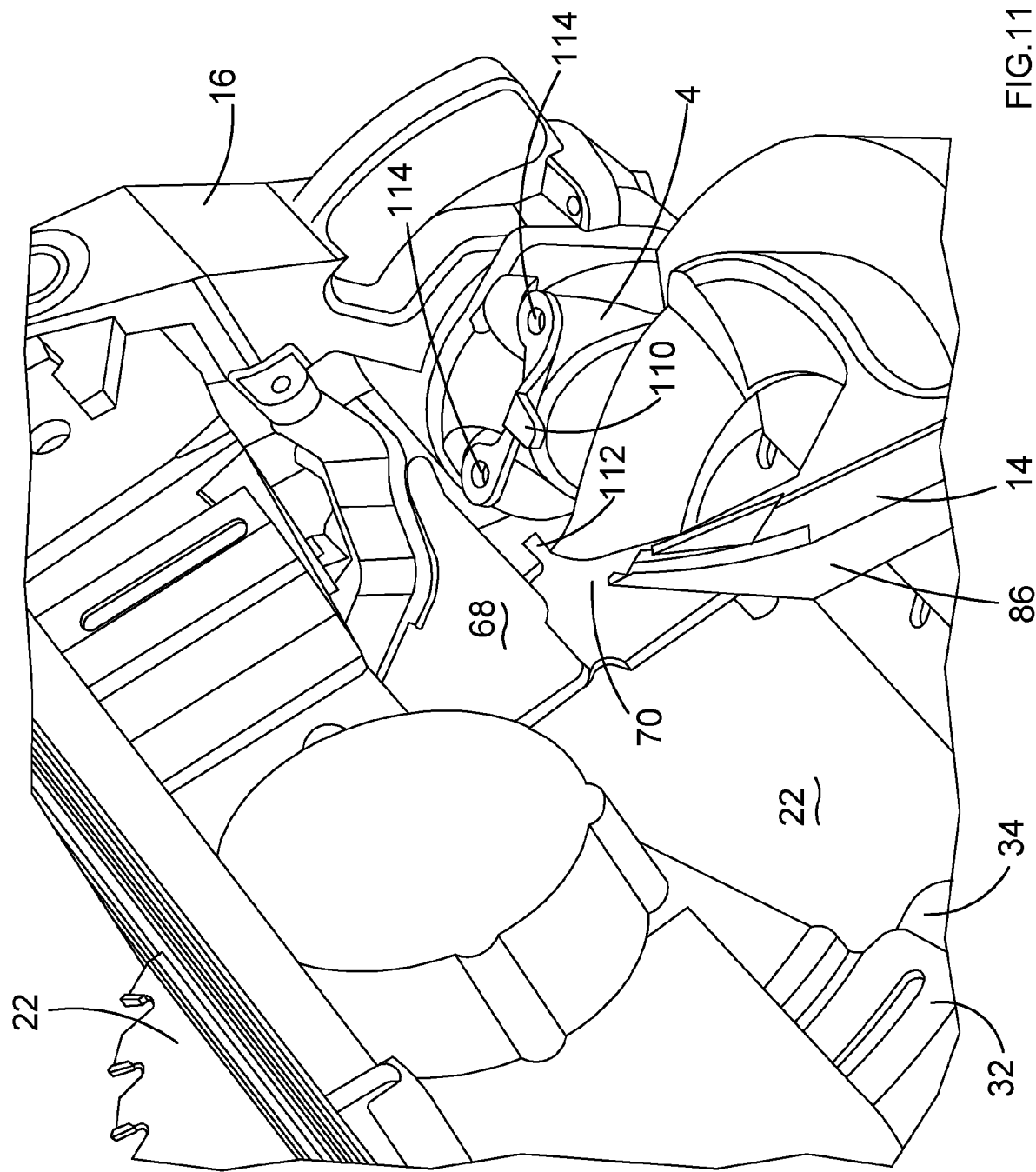


FIG. 11



EUROPEAN SEARCH REPORT

Application Number
EP 12 19 1206

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 253 439 A1 (BLACK & DECKER INC [US]) 24 November 2010 (2010-11-24) * paragraphs [0050], [0077]; figures * -----	1-5	INV. B27B5/16 B27G19/02
X	US 5 950 514 A (BENEDICT CHARLES E [US] ET AL) 14 September 1999 (1999-09-14) * column 2, lines 57-61; figures 2,7 * * column 4, lines 46-50 * -----	1-3	
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A,D	EP 1 813 400 A2 (BLACK & DECKER INC [US]) 1 August 2007 (2007-08-01) * figures 3-6 * -----	1-5	
A	US 4 805 504 A (FUSHIYA FUSAO [JP] ET AL) 21 February 1989 (1989-02-21) * page 1; figures * -----	1-5	
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