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(54) **POWER SAW MITER GUIDE**

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B26D 7/01 (2006.01)

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83/745

(58) **Field of Classification Search** 83/435.15,
83/468.4, 574, 745, 438, 444, 449, 581
See application file for complete search history.

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(57) **ABSTRACT**

Operating a power saw between a pair of parallel guide rails, which engage opposing sides of saw base plate to constrain the motion of the saw to a straight path, allows for precise cuts. A set of two or more fences allows for multiple cutting options. In some embodiments, non-parallel fences coupled to the guide rails allow for precise cuts at more than just a single angle. In some embodiments, two fences may engage opposing sides of the object to be cut simultaneously, holding the object more securely with respect to the guide rails than would a single fence. A possible clamping force holding the two fences against the object allows the miter guide to remain fixed relative to the object so that the user's hand may be freed for another task, such as holding the saw with both hands.

13 Claims, 4 Drawing Sheets

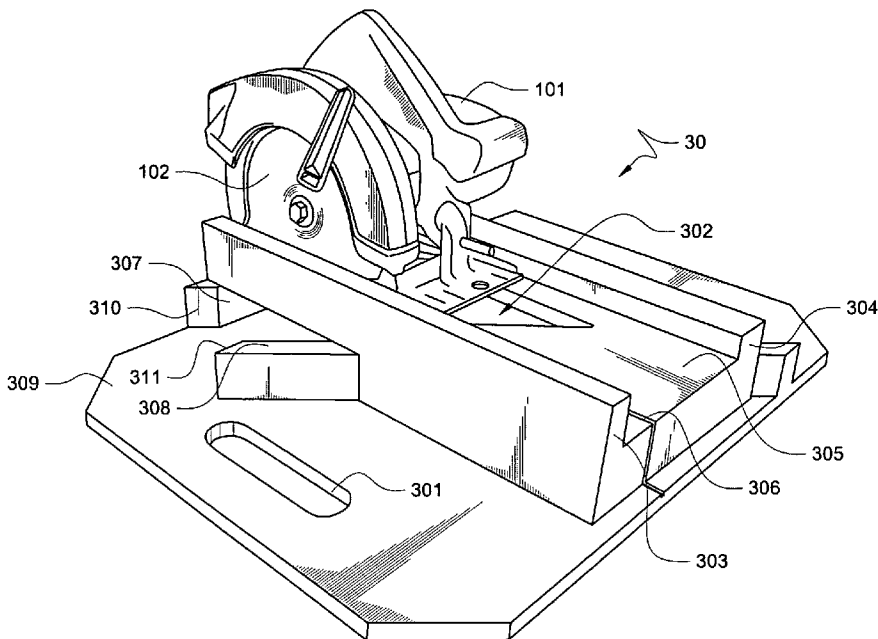


FIG. 1
(Prior Art)

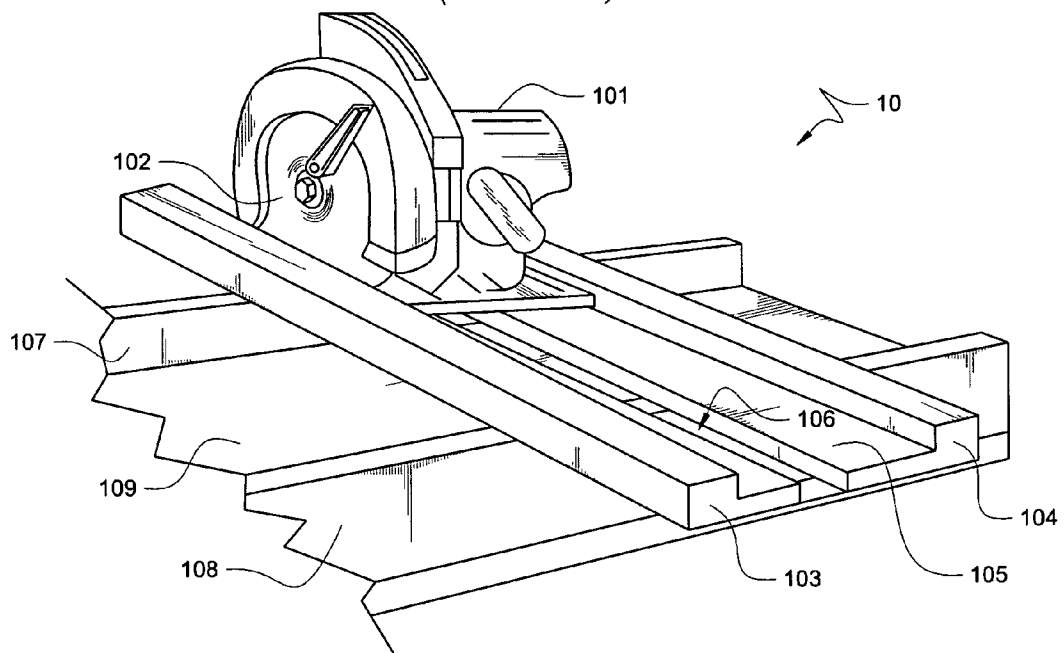


FIG. 2
(Prior Art)

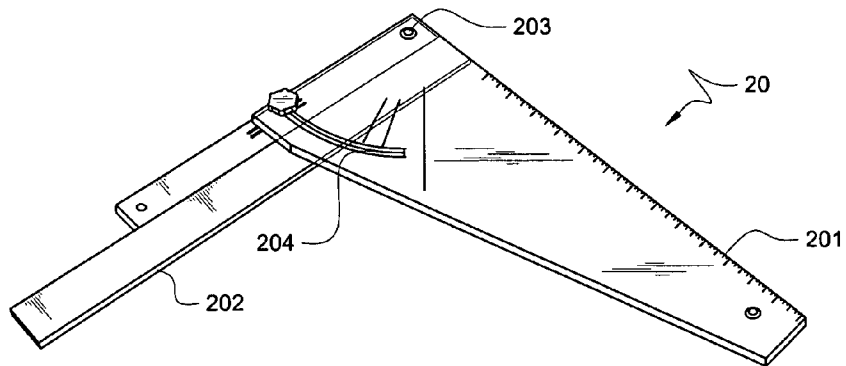


FIG. 3A

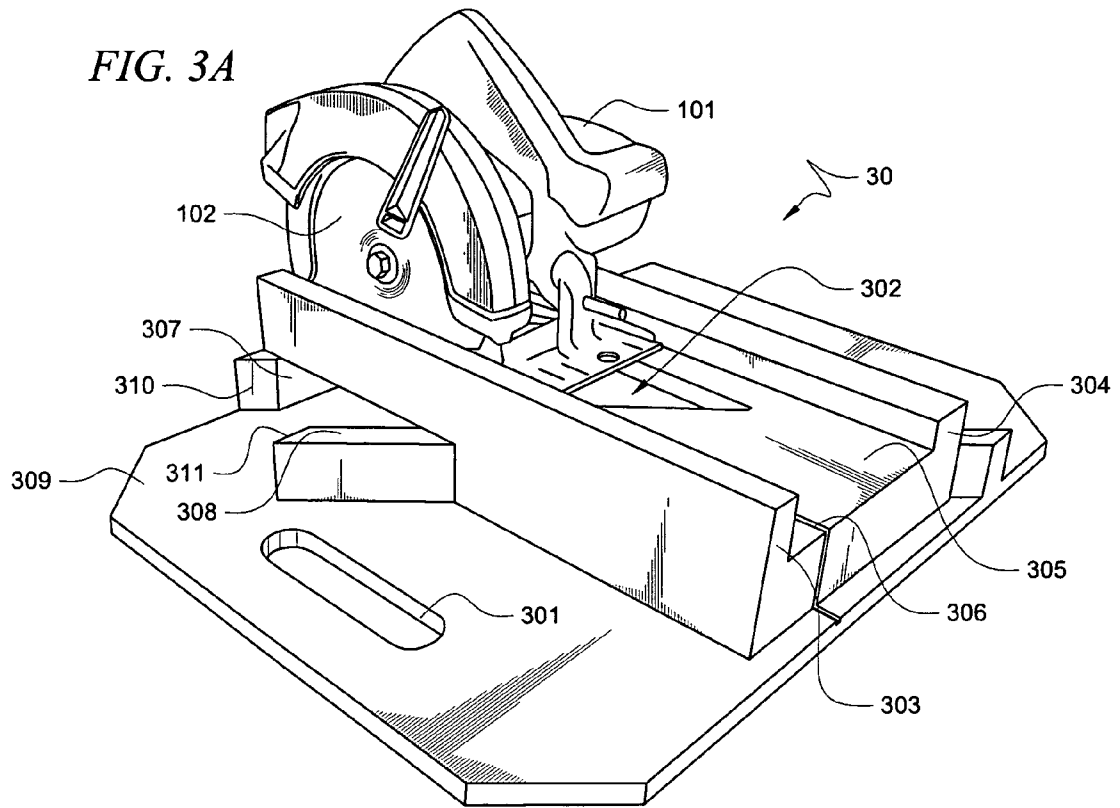
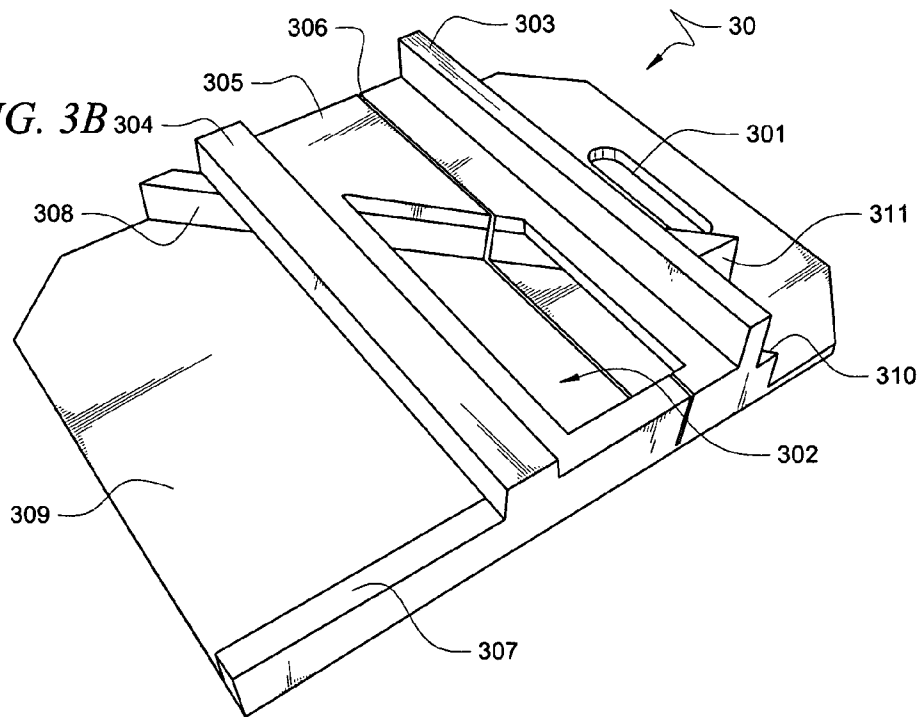
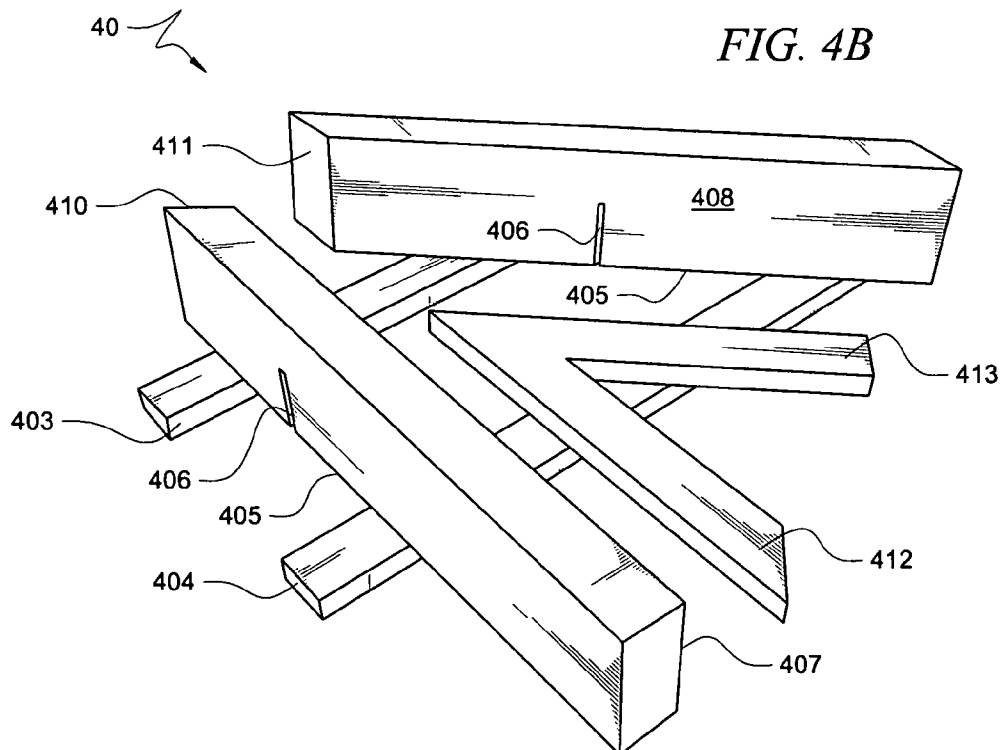
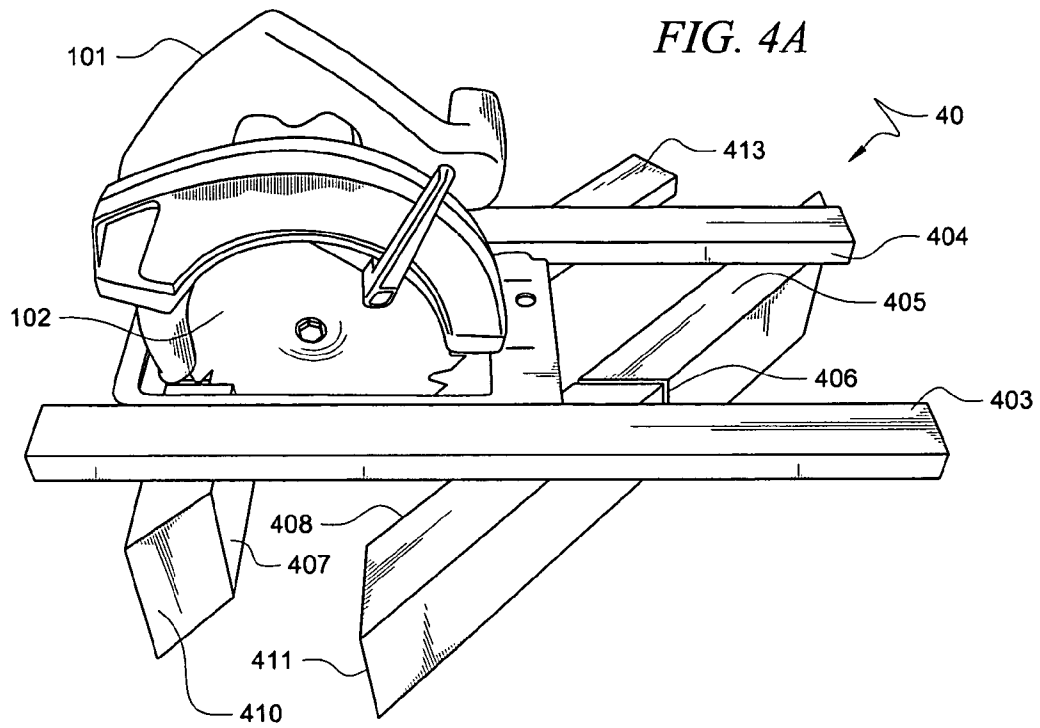


FIG. 3B





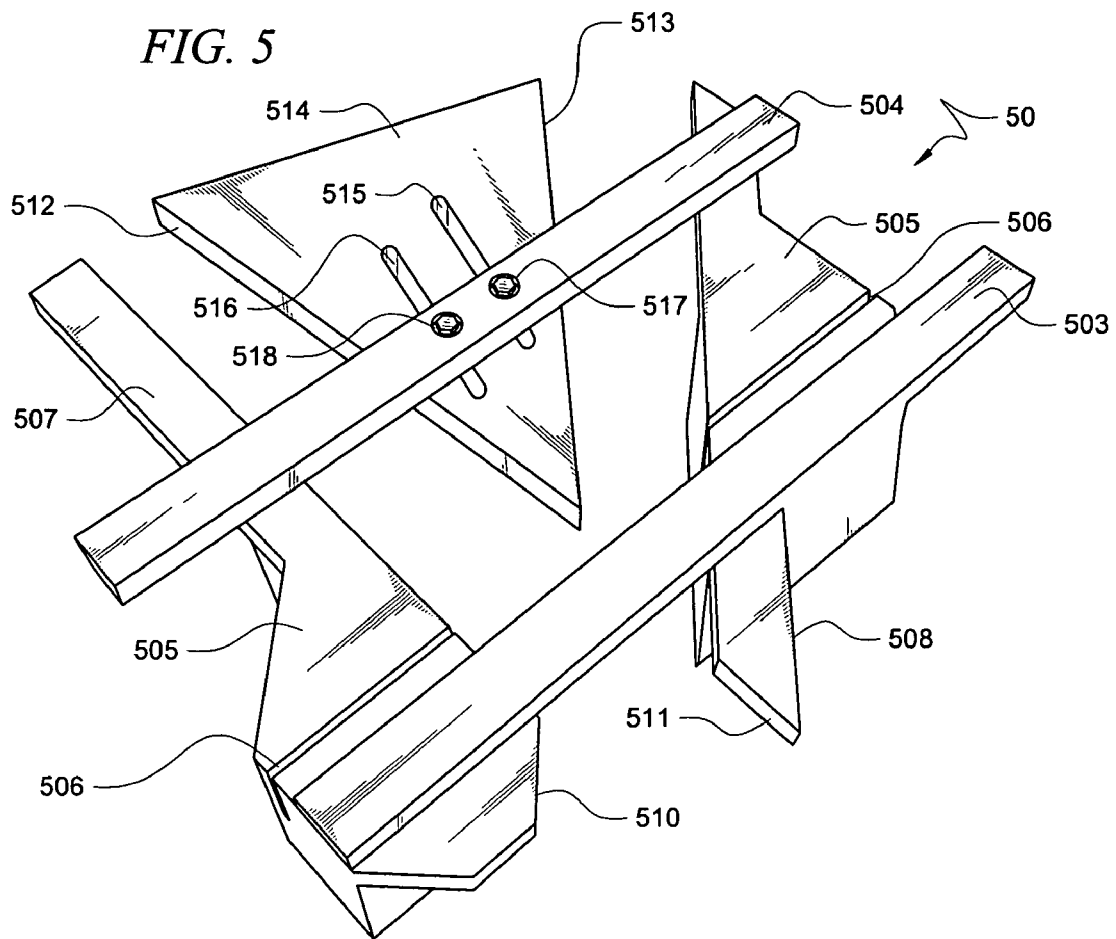
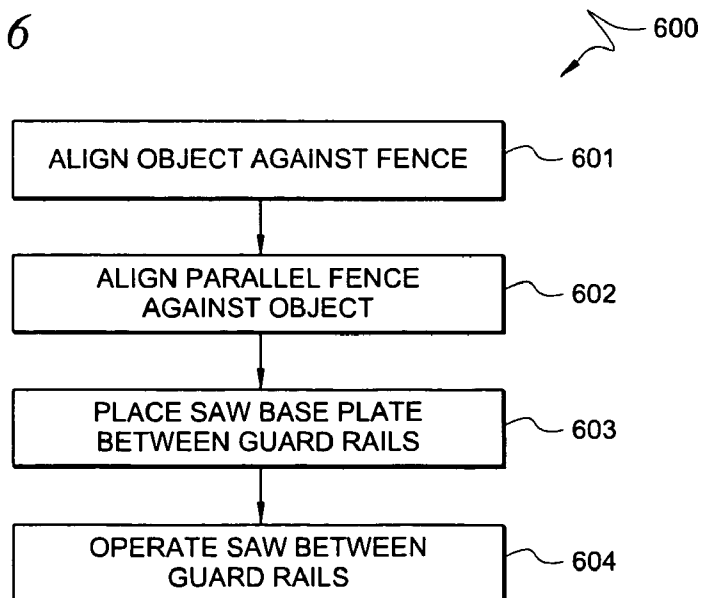


FIG. 6



POWER SAW MITER GUIDE

TECHNICAL FIELD

The invention relates generally to woodworking and industrial power tools, and more particularly, to providing a cutting guide for a hand-held power saw.

BACKGROUND

Miter boxes are cutting guides that allow precision cuts using hand-held saws, because they both constrain the saw to move in a straight line and also align the cutting path with respect to the object being cut. Typical miter boxes are designed for hand-operated saws, and include cutting guides for 90-degree cross cuts, as well as 45-degree miter cuts. The cutting guides in a typical miter box are usually pairs of notches on opposing sides of the box, barely wider than the saw blade, and which are oriented at a precise angle with respect to the box's inner surfaces. These surfaces are a cutting surface, which the blade will score as it cuts through the object, and at least one other alignment surface, which may be identified as a fence. A miter box typically forms a 3-sided trough with a cutting surface at the bottom, and two fences protruding above the cutting surface. The notches are in the fences.

An object to be cut is placed on the cutting surface and held firmly against a fence. The saw blade is then placed in a set of notches, and the user may cut the object by sliding the saw blade back and forth within the notches. The notches work well for guiding hand-operated saws, because the blade spans the width of the miter box and is held in place by both notches. Further, the cutting edge of the blade only engages the object to be cut and the cutting surface. That is, the cutting edge of the blade does not contact the fences.

A typical miter box will not work with a common hand-held power saw, because the blade will not be held in place by both notches simultaneously when the cutting starts. Further, because the blade is circular, it will strike the distant fence and likely cut a new notch in it. For example, if an object to be cut is placed in a typical miter box, the power saw blade is set in one the notch of the first fence, and the saw is turned on, the single notch is unlikely to properly constrain the blade. As a result, as the user passes the saw through the object toward the second fence, the blade will likely engage the fence somewhere other than the pre-cut notch in the second fence. The cutting edge of the blade will then just cut a new notch in the second fence. The miter box will become damaged, and will not have achieved its purpose.

A common power tool for making precision cuts is a power miter saw. A power miter saw arrangement provides a cutting surface, typically a single fence, and a power saw attached to a precisely-oriented moving arm. The arm is allowed to move in an arc about a pivot point, and the angle of the arm motion is usually adjustable. A power miter saw allows precise cuts by guiding the blade via a calibrated arm attached to the motor and coupled to the fence.

Unfortunately, power miter saws may be expensive and heavy, and are often unsuited for some of the tasks for which a power saw is commonly used. Thus, a user may have two saws: a power saw for general cutting tasks and power miter saw for precision cuts. This duplication of power saws can be expensive and burdensome to transport to a job site.

BRIEF SUMMARY

Operating a power saw between a pair of parallel guide rails, which engage opposing sides of saw base plate to constrain the motion of the saw to a straight path, allows for precise cuts. A set of two or more fences allows for multiple

cutting options. In some embodiments, two fences may engage opposing sides of the object to be cut simultaneously, holding the object more securely with respect to the guide rails than would a single fence. A possible clamping force holding the two fences against the object allows the miter guide to remain fixed relative to the object so that the user's hand may be freed for another task, such as holding the saw with both hands. The clamping force may result from one fence being adjustable, or the fences may be spaced apart to fit snugly over common sizes of pre-cut lumber.

In some embodiments, non-parallel fences coupled to the guide rails allow for precise cuts at more than just a single angle. One fence may be oriented at an angle between 59 degrees and 91 degrees with respect to the guide rails, and another fence may be oriented at an angle between 29 degrees and 61 degrees with respect to the guide rails. Because the fences are not parallel, they have a closest point on one side of the guide rails. The ends of the fences may be angled so that the end of each fence is parallel to the other fence at the closest point. Some embodiments do not require a cutting surface. That is, unlike a traditional miter box, in which the object to be cut is placed inside the box, embodiments of the invention may be placed on top of the object, with open space below the object.

The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims. The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages will be better understood from the following description when considered in connection with the accompanying figures. It is to be expressly understood, however, that each of the figures is provided for the purpose of illustration and description only and is not intended as a definition of the limits of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

FIG. 1 shows a prior art cutting guide;

FIG. 2 shows another prior art cutting guide;

FIG. 3A shows an embodiment of a power saw miter guide;

FIG. 3B shows another view of the power saw miter guide

of FIG. 3A;

FIG. 4A shows another embodiment of a power saw miter guide;

FIG. 4B shows another view of the power saw miter guide of FIG. 4A;

FIG. 5 shows another embodiment of a power saw miter guide; and

FIG. 6 shows a method for using an embodiment of a power saw miter guide.

DETAILED DESCRIPTION

FIG. 1 shows prior art cutting guide **10** for making 90-degree cross cuts with power saw **101**. Prior art cutting guide

comprises guide rail 103 and 104, saw support surface 105, parallel fences 107 and 108, and cutting surface 109. Saw support surface 105 comprises notch 106 through which saw blade 102 passes when cutting an object. Because notch 106 completely separates saw support surface 105 into two pieces, each of guide rails 103 and 104 must be firmly attached to both fences 107 and 108 for structural rigidity. As a result, in the prior art device 10, fences 107 and 108 are not adjustable.

In operation, a user places an object to be cut on cutting surface 109, between fences 107 and 105, completely to the side of one of guide rails 104 and 103. The object is then slid along cutting surface 109 until the part of the object to be cut is beneath notch 106. Since the object must be able to slide along cutting surface 109, and fences 107 and 108 are not adjustable, fences 107 and 108 cannot hold the object firmly. As a result, the user must use one hand to hold the object firmly against one of fences 107 or 108 while the object is being cut. This either requires the use of an assistant, or else leaves the user only a single hand for operating the saw.

FIG. 2 shows prior art cutting guide 20 for making cuts at an arbitrary angle. Cutting guide 20 comprises a single guide rail 201 attached to a single fence 202, whereby guide rail 201 pivots about hinge 203. Adjustable arc slot 204 works with hinge 203 to allow guide rail 201 to be oriented at a range of angles with respect to fence 202. As with prior art cutting guide 10 from FIG. 1, prior art cutting guide 20 only engages the object to be cut with a single fence, requiring that object be held against prior art cutting guide 20. Further, since prior art cutting guide only has single guide rail 201 a saw may wander away from guide rail 201, resulting in an imprecise cut.

FIG. 3A shows an embodiment of power saw miter guide 30. Power saw miter guide 30 comprises first guide rail 303, second guide rail 304, first fence 307 and second fence 308. Second guide rail 304 is oriented parallel to first guide rail 303. First fence 307 is coupled to first guide rail 303 and second guide rail 304 and is oriented at an angle between 59 degrees and 91 degrees with respect to guide rails 304 and 304. As shown in FIG. 3A, first fence 307 is oriented at an angle of approximately 90 degrees with respect to guide rails 304 and 304. Second fence 308 is also coupled to first guide rail 303 and second guide rail 304 and is oriented at an angle between 29 degrees and 61 degrees with respect to guide rails 304 and 304. As shown in the figure second fence 308 is oriented at an angle of approximately 45 degrees with respect to guide rails 304 and 304.

Guide rails 303 and 304 constrain motion of saw 101 to a straight path by engaging opposing sides of the base plate of saw 101 as saw 101 rides on saw support surface 305. Saw blade 102 passes through notch 306 to cut an object that may be set on cutting surface 309, and aligned against either fence 307 or fence 308. Window 302 in saw support surface 305 between guide rails 303 and 304 allows a user to see that the object being cut is aligned properly within miter guide 30 between fences 307 and 308. Window 302 does not span the entire distance between guide rails 303 and 304, so that a portion of saw support surface 305 is still available to support saw 101.

The arrangement of guide rails 303 and 304, fences 307 and 308 with respect to saw support surface 305 and cutting surface 309 can be seen in FIG. 3A. Saw support surface 305 and cutting surface 309 are parallel. Fences 307 and 308 are on top of cutting surface 309, and saw support surface 305 is on top of fences 307 and 308. Guide rails 303 and 304 are the above saw support surface 305. Fences 307 and 308 are thus coupled to guide rails 303 and 304 through saw support surface 305. Optional carrying handle 301 in cutting surface

309 makes miter guide 30 conveniently transportable. Alternatively, optional carrying handle 301 could be placed at any convenient location on miter guide 30.

Since fences 307 and 308 are not parallel, there is a point at which they would intersect, if they were not truncated. This arrangement could limit the length of the object to be cut, or at least limit the length that could be cut from it. As a result, unlike fences 107 and 108 of prior art cutting guide 10 from FIG. 1, fences 307 and 308 of miter guide 30 must be truncated shortly outside of guide rails 303 and 304. Fences 307 and 308 reach a closest point just outside guide rail 303. In this area, end 310 of fence 307 is parallel to fence 308, while end 311 of fence 308 is parallel to fence 307. With proper spacing, ends 310 and 311 of fences 307 and 308, respectively, could provide an extra alignment point for common sized pre-cut lumber.

For example, if the distance between ends 310 and 311 may be set so that if one side of a 2x4 piece of lumber is pressed against fence 307, the opposing side of the 2x4 could contact end 311. Alternatively, a 2x4 pressed against 308 may also contact end 310. This arrangement will provide added stability for the object to be cut. Typical dimensions for miter guide 30 to accommodate commonly available power saws would be: the distance between guide rails 303 and 304 set between 5 inches and 7 inches, the distance between saw support surface 305 and cutting surface 309 set between 1 inch and 5 inches, and notch 306 set between 1 and 3 inches in depth.

Other dimensions may be used without departing from the spirit and scope of the invention. Further, if cutting surface 309 was eliminated, miter guide 30 would be placed on top of the object to be cut, rather than the object to be cut being placed inside miter guide 30. That is, the underside of saw support surface 305 or guide rails 303 and 304 would rest on top of the object to be cut. Fences 307 and 308 must then be taller than the depth of notch 306 at the point where notch 306 passes through fences 307 and 308.

FIG. 3B shows another view of power saw miter guide 30, but without saw 101. The extent of window 302 between guides 303 and 304 and fences 307 and 308 is more easily seen in FIG. 3B, as well as the location where notch 306 intersects fence 308. Note that miter guide 30 allows precision cuts at two different angles, which is not possible with prior art cutting guide 10, and holds both sides of saw 101, whereas prior art cutting guide 20 cannot.

FIG. 4A shows another embodiment of the invention as reflected in power saw miter guide 40. Miter guide 40 comprises guide rails 403 and 404, along with fences 407 and 408. Saw support surface 405 is the top surfaces of fences 407 and 408. Since there is no cutting surface, fences 407 and 408 are taller than the depth of notch 406, and notch 406 is separated into two parts. End 410 of fence 407 is parallel to fence 408, while end 411 of fence 408 is parallel to fence 407. Miter guide 40 is used by setting miter guide 40 atop the object to be cut, rather than setting the object to be cut on a cutting surface. As can be seen from FIGS. 4A and 4B, top surfaces 405 of fences 407 and 408 are parallel and lie in a common plane with the undersides of guide rails 403 and 404.

Miter guide 40 also has two additional fences 412 and 413, both of which are visible in FIG. 4B. Fence 412 is parallel to fence 407, while fence 413 is parallel to fence 408. With proper spacing between pairs of fences 407 and 412 or 408 and 413, commonly-sized pre-cut lumber may be held firmly with respect to miter guide 40. That is, fences 407 and 412 may be set apart such that miter guide 40 fits snugly over a 2x4. Additionally, the spacing of fences 408 and 413 may be set to accommodate a common size of lumber. Typical dimen-

5

sions for miter guide **40** may be a distance between fences **407** and **412** or **408** and **413** of between 1 inch and 5 inches.

FIG. **5** shows yet another embodiment of the invention as reflected in power saw miter guide **50**. Miter guide **50** comprises guide rails **503** and **504**, along with fences **507** and **508**. Saw support surface **505** is the top surfaces of fences **407** and **408**, along with some extensions added to improve the rigidity of miter guide **50** at the intersections of guide rail **503** with fences **507** and **508**. Fences **507** and **508** are taller than the depth of notch **506**. Ends **510** and **511** of fences **507** and **508**, respectively, are parallel with the opposing fence, **508** and **507**, respectively.

Fences **512** and **513** are two sides of adjustable fence assembly **514**, where fence **512** is parallel to fence **507** and fence **513** is parallel to fence **508**. Adjustable fence assembly **514** has two slots **515** and **516**. Adjustment bolts **517** and **518** in guide rail **504** pass through slots **515** and **516**, so that adjustable fence assembly **514** rides along an angled path with respect to both fences **507** and **508**. For example, if fences **507** and **508** form a 45-degree angle, then fences **512** and **513** also form a 45 degree angle. Slots **515** and **516** then could be at a 22.5-degree angle with respect to both fences **507** and **507**. This way, as adjustable fence assembly **514** moves inward, toward the closest point between fences **507** and **508**, the distance between fences **507** and **512** closes. The distance between fences **513** and **508** will also close as adjustable fence assembly **514** moves inward. Conversely, as adjustable fence assembly **514** moves outward, away from the closest point between fences **507** and **508**, the distances between fences **507** and **512** or **508** and **513** will increase.

In operation, miter guide **50** may be set on top of an object to be cut, and aligned using either fence **507** or **508**. Adjustable fence assembly **514** is then moved so that the object is held between either fences **507** and **512** or fences **508** and **513**. Adjustment bolts **517** and **518** may then be tightened so that miter guide **50** is held firmly relative to the object. Spring loaded or other flexible tension methods may alternatively be used, rather than bolts, in order to provide holding force for adjustable fence assembly **514**.

FIG. **6** shows method **600** for using an embodiment of a power saw miter guide. In process **601**, an object to be cut is aligned against a first fence. In process **602**, a second fence, parallel to the first fence, is brought against the opposing side of the object. If the distance between the parallel fences is not adjustable, but is rather set to be snug against opposing sides of commonly-sized pre-cut lumber, process **602** may be nearly simultaneous with process **601**. In process **603**, a saw base plate is set between parallel guide rails. In process **604**, the saw is operated between two parallel guide rails. The guide rails engage opposite sides of the base plate to constrain motion of the saw to a straight path.

Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made herein without departing from the spirit and scope of the invention as defined by the appended claims. Moreover, the scope of the present application is not intended to be limited to the particular embodiments of the process, machine, manufacture, composition of matter, means, methods and steps described in the specification. As one of ordinary skill in the art will readily appreciate from the disclosure of the present invention, processes, machines, manufacture, compositions of matter, means, methods, or steps, presently existing or later to be developed that perform substantially the same function or achieve substantially the same result as the corresponding embodiments described herein may be utilized according to the present invention. Accordingly, the appended claims are

6

intended to include within their scope such processes, machines, manufacture, compositions of matter, means, methods, or steps.

What is claimed is:

1. A miter guide for a hand-held power saw comprising:
 - a first guide rail;
 - a second guide rail, wherein said second guide rail is oriented parallel to said first guide rail, wherein said first guide rail and said second guide rail are operable to constrain motion of a hand-held power saw to a straight path by engaging opposing sides of a base plate of the saw, without requiring the saw to be fastened to the miter guide;
 - a first fence, wherein said first fence is coupled to said first guide rail and to said second guide rail and is oriented at a fixed angle between 59 degrees and 91 degrees with respect to said first guide rail;
 - a second fence, wherein said second fence is coupled to said first guide rail and to said second guide rail and is oriented at a fixed angle between 29 degrees and 61 degrees with respect to said first guide rail, wherein said first fence and said second fence are beneath said first guide rail and said second guide rail, and wherein said first fence and said second fence comprise sides of a substantially c-shaped cross section of the channel; and
 - a cutting surface, wherein said first fence and said second fence are on said cutting surface, and wherein the cutting surface forms a portion of the substantially c-shaped cross section of the channel, between said first and second fences.
2. The miter guide of claim 1 wherein an end surface of said first fence closest to said second fence is approximately parallel to said second fence, and wherein said end surface of said first fence is disposed to provide an extra alignment point for an object aligned against said second fence.
3. The miter guide of claim 1 wherein an end surface of said second fence closest to said first fence is approximately parallel to said first fence, and wherein said end surface of said second fence is disposed to provide an extra alignment point for an object aligned against said first fence.
4. The miter guide of claim 1 wherein said first fence is oriented at an angle of approximately 90 degrees with respect to said first guide rail and said second guide rail.
5. The miter guide of claim 1 wherein said second fence is oriented at an angle of approximately 45 degrees with respect to said first guide rail and said second guide rail.
6. The miter guide of claim 1 wherein a distance between said first guide rail and second guide rail is between 5 inches and 7 inches.
7. The miter guide of claim 1 wherein a closest point between said first fence and said second fence is between 1 inch and 5 inches.
8. The miter guide of claim 1 further comprising:
 - a saw support surface, wherein said first guide rail and said second guide rail are on said saw support surface, and wherein said first fence and said second fence are on said saw support surface opposite said first guide rail and said second guide rail.
9. The miter guide of claim 8 further comprising:
 - a window in said saw support surface between said first guide rail, said second guide rail, said first fence and said second fence.
10. The miter guide of claim 1 wherein said cutting surface is parallel to a saw support surface, wherein said first guide rail and said second guide rail are on said saw support surface, wherein said first fence and said second fence are on said saw support surface opposite said first guide rail and said second

7

guide rail, and wherein said cutting surface is opposite said first fence and said second fence from said saw support surface.

11. The miter guide of claim 10 wherein a distance between said saw support surface and said cutting surface is between 1 inch and 5 inches.

12. The miter guide of claim 1 further comprising:
a first notch in said first fence between said first guide rail and said second guide rail; and

8

a second notch in said second fence between said first guide rail and said second guide rail, wherein said first notch and said second notch are between 1 inch and 3 inches in depth.

13. The miter saw guide of claim 1 further comprising:
a carrying handle in the cutting surface.

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