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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

RAYMOND CALUORI, an individual
Plaintiff,

v.

NEWELL RUBBERMAID INC., IRWIN INDUSTRIAL TOOLS and DOES 1 through 10,
Defendants.

Case No.: CV 11-05717 CAS(VBKx)

FIRST AMENDED COMPLAINT FOR:

(1) Patent Infringement
(2) Willful Infringement of Patent

DEMAND FOR JURY TRIAL

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Plaintiff Raymond Caluori demands a jury trial on all issues and alleges as follows:

JURISDICTION AND VENUE

1. This is an action for patent infringement arising under the Patent Act of the United States, 35 U.S.C. §271 and §281. This Court has subject matter jurisdiction over the matters complained of under 28 U.S.C. §1338(a) and §1331.

2. Venue is proper in this judicial district pursuant to 28 U.S.C. §1400(b) and §1391(c), as defendant Newell Rubbermaid and Irwin Industrial Tools ("Irwin") have committed acts of patent infringement in this judicial district. Newell Rubbermaid is incorporated in Delaware with its principal place of business in Atlanta, Georgia and is responsible for the manufacturing, promotion, distribution and sale of products through its wholly owned subsidiary, Irwin Industrial Tools which constitute acts of patent infringement committed in this judicial district. Irwin is incorporated and has a principal place of business in a state other than California.

THE PARTIES

3. Plaintiff Raymond Caluori ("Caluori") is the inventor and owner of certain patents for an angled laser cut alignment device mounted on rotary saws that assists operators in cutting wood stock and other materials accurately and co-owner of another patent which is not at issue in this litigation. He marketed this device under the registered trademark, BladePoint.

4. Newell Rubbermaid does business directly in this district and also does business through wholly owned subsidiaries Irwin Industrial Tools and Does 1 through 10. Newell Rubbermaid is incorporated in Delaware and has its principal place of business in Atlanta, Georgia. Irwin Industrial Tools and the other wholly owned subsidiaries of Newell Rubbermaid are incorporated in states other than California and further, have their principal places of business in states other than California. Newell Rubbermaid, Irwin Industrial Tools and Does 1 through 10 are

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doing business in this district and are liable for all of the acts described herein in terms of selling the infringing laser alignment devices.

5. Upon information and belief, in 1999, Newell Company acquired the Rubbermaid and Graco brandnames in a merger and later re-named the combined firm Newell Rubbermaid. In 2000, Newell Rubbermaid acquired Gillette's stationery products business, including the Paper Mate, Parker, Waterman and Liquid Paper user brands. In 2002, Newell Rubbermaid acquired American Tool Companies, which included the Irwin, Vise-Grip, and Quick-Grip brands. In 2003 Newell Rubbermaid acquired American Saw and Manufacturing Company, a manufacturer of linear-edge power tool accessories, hand tools and band saw blades marketed under the Lenox brand.

6. Irwin Industrial Tools is a subsidiary of Newell Rubbermaid which manufactures and distributes hand tools and power tool accessories such as Vise-Grip locking pliers, clamps, drill bits, saw blades, pipe wrenches, screwdrivers, snips, and other construction tools. Irwin was founded in 1885 as the Irwin Auger Bit Company. American Tool Company, after acquiring Irwin Tool Company in 1993, was acquired by Newell Rubbermaid in 2002. In turn, Newell Rubbermaid changed the name of its American Tool subsidiary to Irwin Industrial Tool Company in 2003. Defendants consider the Irwin brandname to have such brand strength and good will as to re-brand as IRWIN items which previously had independent brandnames and good will including but not limited to Chesco, Irwin Metal Star, Uni-Plus, Sprint, Marples, Horsepower, PowerPress, Prosnip, Face-Off, Jack, Pulverizer, Hanson Drill Bits, Fibercut, TurboMax, and Xpert.

7. Newell Rubbermaid and Irwin combined to affix the IRWIN tradename to the laser alignment device which is the infringing product involved in this action. The foregoing defendants initially discussed with Caluori in 2003 and 2005 about potentially either having Caluori manufacture these devices for them or alternatively, having him license them to make a laser alignment device. In that context,

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defendants were aware that Caluori was selling that device brandnamed as the BLADEPOINT® device. Further, defendants were aware Caluori had obtained patents governing the manufacture of this device known as the D492, 951 S (the "951" patent) the 6,915,727 B2 (the "727" patent) and the US 7,836,806 B2 (the "806" patent) (collectively, the "Caluori patents").

8. Defendants Newell Rubbermaid, Irwin and Does 1 through 10 either affixed or were permitted to affix and otherwise use the IRWIN trademark on laser devices which they promoted, marketed, distributed and sold in competition with the BLADEPOINT laser alignment device and regardless of the Caluori patents. Further, defendants marketed the laser alignment device in conjunction with the Lenox saw to obtain a deeper penetration of the market.

9. DOES 1 through 10 are also involved in the manufacture, promotion, sale, distribution and marketing of the IRWIN laser cut alignment device in conjunction as the agents, servants and in a joint enterprise with the named defendants and, in doing so, each of them, jointly and severally, are responsible for the infringement of Caluori's patents described in greater detail below. Further, each of the defendants is responsible for the acts of each of the other defendants. Defendants Newell Rubbermaid, Irwin and Does 1 through 10 – through their efforts in manufacturing, marketing, promoting, selling and distributing the infringing devices – are responsible for the damages caused by the infringement of Caluori's device.

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FACTUAL BACKGROUND

Nature of the patent rights

10. In 1993, a major manufacturer of rotary saws and other power tools, Porter-Cable, attempted to introduce a laser cut alignment device of its own design into the marketplace. That design, however, was faulty; it lacked accuracy, consistency as well as durability. The device, among other defects, would not stay

aligned with the saw blade. Since that laser device was virtually useless, other manufacturers of original equipment believed the entire concept of a laser-guided alignment device was virtually discredited. The manufacturers of power tools, including Newell Rubbermaid and Irwin wanted to reduce their risk of marketing such a device until they could be assured that a reliable product could be manufactured.

11. Caluori, a former carpenter living in a three-story walk-up tenement building in Quincy, Massachusetts, invented such a device although the manufacturers in the power tool industry could not do so. His invention aligns the saw blades of rotary saws with the lumber (and other building materials) that the operators of the saws were cutting. Unlike prior efforts, his device proved to be usable. The device was durable, consistent and accurate for both use by professional carpenters as well as hobbyists.

12. Caluori's device projects a line of light from a laser mounted on the saw so as to create a visible red line for the operator on the lumber and thus, guide the operator in the direction the material should cut. Caluori placed his laser device in a metal housing mounted next to the saw blade which was located on the same axle shaft as the saw blade itself. As the saw blade (and laser device) jointly rotate on the common axle shaft, a centrifugal pressure-switch within the device turns on the laser beam. The device, when rotating with the saw blade, projects a beam of laser light onto the wood or other building material. To the operator of the saw, the light projected from the device appears to be a straight line immediately next to and in front of the saw. Using that laser-created line of light, the operator can guide the saw blade directly and accurately on the lumber or other building material to be cut.

13. Caluori applied for and received a number of patents to protect his angled laser device, i.e. U.S. Patent Nos. 6,035,757 (the "757" patent), D492, 951 S (the "951" patent) the 6,915,727 B2 (the "727" patent) and the US 7,836,806 B2 (the "806" patent) (collectively, the "Caluori patents"). In addition, Caluori owns foreign

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patents and applications corresponding to these U.S. patents, including Canadian Patent No. 2,284,599, Australian Patent No. 757119, and International Application No. PCT/US98/26200 which covers Europe. As alleged below, Caluori does not predicate this complaint upon infringement of the '757 patent.

14. Caluori designed the laser device so it could be retrofitted on virtually every brand and model of rotary saw and his device, when used, proved to be reliable and very cost effective. Using his device reduced the amount of the labor necessary for a carpenter to make various cuts, particularly miter cuts and further, reduced the amount of lumber wasted on construction projects.

15. Caluori, after the device was patented, first began to manufacture and sell the laser device which was manufactured by a company located in Massachusetts. Thereafter, Caluori sold the product directly to consumers at trade shows under the "BladePoint" trademark and also through industry catalogues. He also tried to interest manufacturing companies such as Newell Rubbermaid and Irwin into licencing the patent and paying him a royalty.

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Newell Rubbermaid and Irwin's knowledge of Caluori's patent rights

16. Beginning in 1998, Caluori, to market his device to various manufacturers of power tools and accessories, forwarded a sample of his device to them together with a video demonstrating how the device would be used as well as patent information. Meanwhile, Caluori continued to market the device being manufactured under his direction, under the "BladePoint" trademark, directly to consumers on an average of about 35 trade shows a year from 2000 through 2005.

17. As part of his marketing efforts, in 2003 and 2005, Caluori presented a sample and video – as well as patent information – to Newell Rubbermaid and Irwin. Caluori, through his then-counsel, Michael Cronen, Esq., but rejected the concept of signing a disclosure agreement since his device was being marketed publicly and further, was subject to various patents. Despite Newall Rubbermaid's and Irwin's

knowledge of Caluori's device and Caluori's patents, they marketed and continue to market a laser alignment device incorporating the features of Caluori's invention under the name of IRWIN. That device utilizes the features and implements the concepts of Caluori's patents. Caluori, based upon the infringement of his patents by defendants and others who are not parties to this lawsuit was forced out of the marketplace. Caluori believes and thereon alleges defendants used their marketing power under the IRWIN name to destroy his ability to market the product he had invented and was manufacturing.

18. In sum, defendants Newall Rubbermaid, Irwin and Does 1 through 10, after knowing about Caluori's patents but refusing to pay royalties to him or buying Caluori's device for resale, released a product and continues to market, promote, distribute and sell a device which infringes the claims covered by his patents and incorporates the features of his device in various ways including but not limited to the following:

a. Like Caluori's device, the infringing device has a laser source or its functional equivalent inside a housing.

b. Like Caluori's device, the Irwin device includes a centrifugal switch or its functional equivalent inside the housing so that the laser is turned on only when the housing is rotated at sufficient speed to close the switch.

c. Like Caluori's device, the Irwin device contains a lens located directly in front of the laser and within the housing or its functional equivalent.

d. Like Caluori's device, the Irwin contains batteries within the housing to power the laser or its functional equivalent.

e. Like Caluori's device, the Irwin device directs the laser beam at a slight angle so that the beam is projected at an angle to the saw blade or its functional equivalent to allow the blade to be guided directly to its target.

f. Like Caluori's device, the Irwin device uses radial arms or its functional

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equivalent projecting from the housing of the device to protect the components and to balance the mass within the housing.

g. Like Caluori's device, the Irwin device uses radial arms or its functional equivalent to prevent bending and changing of the alignment of the laser beam when the device is tightened down.

Each of the foregoing features directly conflicts with and incorporates the claims of Caluori's patents. For purposes of this action, Caluori seeks recovery only for the violation of his rights under the '951 patent, the '727 patent and the '806 patent. The '757 patent is not the basis for any claim being made by Caluori in this action.

19. In sum, after knowing of the Caluori patents, Newell Rubbermaid, Irwin and DOES 1 through 10 chose to manufacture, promote, distribute and sell a laser device incorporating the features described by Caluori's patents but have refused to pay the inventor any royalty for doing so. Newell Rubbermaid and Irwin are responsible for any and all of the foregoing acts, events and occurrences which infringe Caluori's patents committed by themselves as well as specifically, does 1 through 10.

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FIRST CAUSE OF ACTION FOR PATENT INFRINGEMENT

(Against all defendants, including DOES 1 through 10)

20. Plaintiff repeats and re-alleges paragraphs 1 through 20 of this Complaint.

21. As background, the Patent and Trademark Office on March 14, 2000 issued the '757 patent, entitled "Rotary Saw Cut Alignment Device," to Caluori and James Baird which is not a subject of the pending action. Subsequent to the issuance of that patent, the PTO issued the first patent which is the subject of this lawsuit; on July 13, 2004, the PTO issued the '951 patent, entitled "Rotary Saw Cut Alignment Guide" to Caluori. After the application for the second patent was published by the PTO in June of 2003, the PTO issued the second patent which is the subject of this lawsuit on July 12, 2005, i.e., the '727 patent entitled "Angled Light Beam Rotary Saw Cut Alignment

Device." The second patent improved upon and superseded the '757 patent. On November 23, 2010 the PTO issued the '806 patent entitled "Positive-angled Light Beam Rotary Saw Cut Alignment Device." True and correct copies of these patents are attached hereto respectively as Exhibits "A," "B," "C" and "D."

22. Newell Rubbermaid, Irwin and Defendants 1 through 10 and each of them are responsible for the infringement of the '951 patent, the '727 patent and the '806 patent in this judicial district and elsewhere, as a result of the promotion, marketing, sale and distribution of laser devices which infringe Caluori's patented laser devices.

23. Unless enjoined by this Court, the infringement of the '951 patent, the '727 patent and the '806 patent will continue by defendants and each of them.

24. As a direct and proximate result of the foregoing conduct, Plaintiff has and will continue to suffer irreparable injury, for which it has no adequate remedy at law. Plaintiff has also been damaged, and, until an injunction issues, will continue to be damaged in his business and reputation in an amount yet to be determined.

25. In addition, Plaintiff has been and continues to be damaged by his failure to receive any royalties for the promotion, sale and manufacture of this device. Newell Rubbermaid and Irwin are liable for these acts, events and occurrences undertaken by themselves and those with whom it acted in concert.

SECOND CAUSE OF ACTION FOR WILLFUL PATENT INFRINGEMENT

(Against all defendants, including DOES 1 through 10)

26. Plaintiff repeats and re-alleges paragraphs 1 through 25 of this Complaint

27. In addition to the compensatory damages flowing from the sale of devices infringing Caluori's patents by defendants and each of them, Newell Rubbermaid and Irwin and the other entities identified above were fully cognizant of Caluori's rights but nonetheless continued to manufacture, distribute, advertise and sell the infringing devices. In marketing, promoting, distributing and selling the infringing device, the acts and conduct have been wilful and deliberate and thus, their infringement renders this an

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exceptional case. As a consequence, Plaintiff is entitled to treble damages, as well as actual attorneys' fees and litigation costs. Newell Rubbermaid and Irwin are liable for these acts, events and occurrences undertaken by themselves and the conduct of those with whom it acted in concert.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for judgment against defendants and each of them:

1. For a judicial determination and declaration that defendants and each of them are infringing the '951, the '727 and the '806 patents with their marketing, promoting, distribution and sales of their laser alignment devices;
2. For a judicial determination and declaration that defendants' marketing, promoting, distribution and sales of their laser alignment device willfully infringe the '951, the '727 and the '806 patents;
3. For an order preliminary and permanent injunction enjoining Newell Rubbermaid, Irwin and each of their respective officers, directors, shareholders, agents, servants, employees and attorneys, and all entities and individuals acting in concert with them or on their behalf, from continuing to infringe the '951, '727 and the '806 patents;
4. For damages according to proof, trebled;

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5. For Plaintiff's attorneys' fees and litigation costs; and

6. For such other and further relief as the Court may deem meet and proper.

DEMAND FOR JURY TRIAL

Plaintiff demands a jury trial on all issues.

DATED: October 4, 2011 ADLER LAW GROUP

By: _____
Erwin Adler, Attorney for
Plaintiff, Raymond Caluori

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Exhibit A

United States Patent [19]

Caluori et al.

[11] **Patent Number: 6,035,757**

[45] **Date of Patent: Mar. 14, 2000**

[54] **ROTARY SAW CUT ALIGNMENT DEVICE**

[76] Inventors: **Raymond Caluori**, 140 Wood Rd., Suite 200, Braintree, Mass. 02184; **James R. Baird**, 82 Hillside Ave., Brockton, Mass. 02402

[21] Appl. No.: **08/990,501**

[22] Filed: **Dec. 15, 1997**

[51] **Int. Cl.**[7] **B27B 5/29**

[52] **U.S. Cl.** **83/520**; 83/522.23; 30/392

[58] **Field of Search** 83/520, 521, 482, 83/522.15, 522.23, 522.26, 522.19, 522.21, 676, 663

[56] **References Cited**

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4,503,740	3/1985	Brand et al.	83/520
4,833,782	5/1989	Smith	83/520
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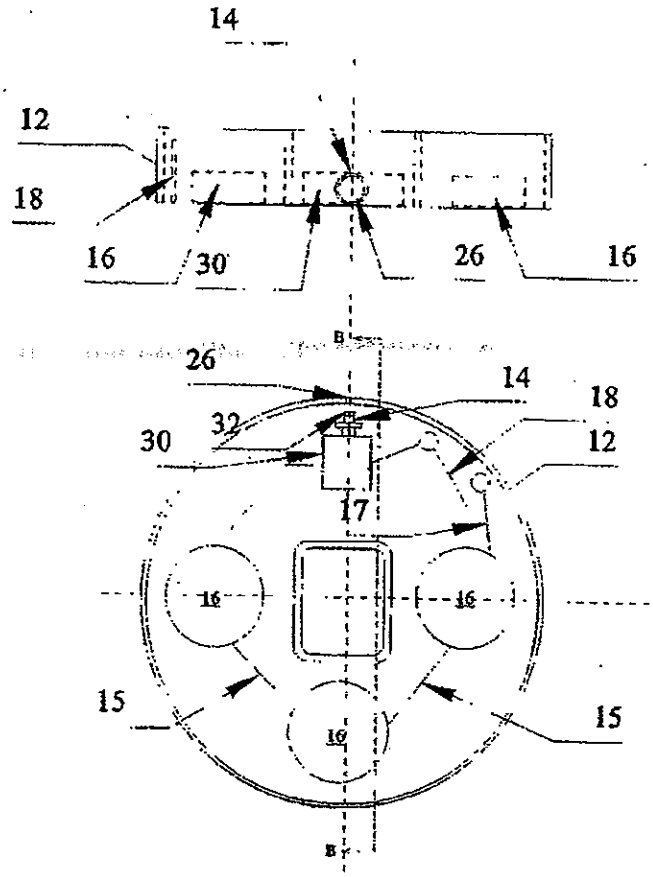
Northern Hydraulics Catalog, Inc, Mail order catalog "Northern", p. 37, right column, Item A, Flyer #701 (1–800–533–5545), Dec., 1998.

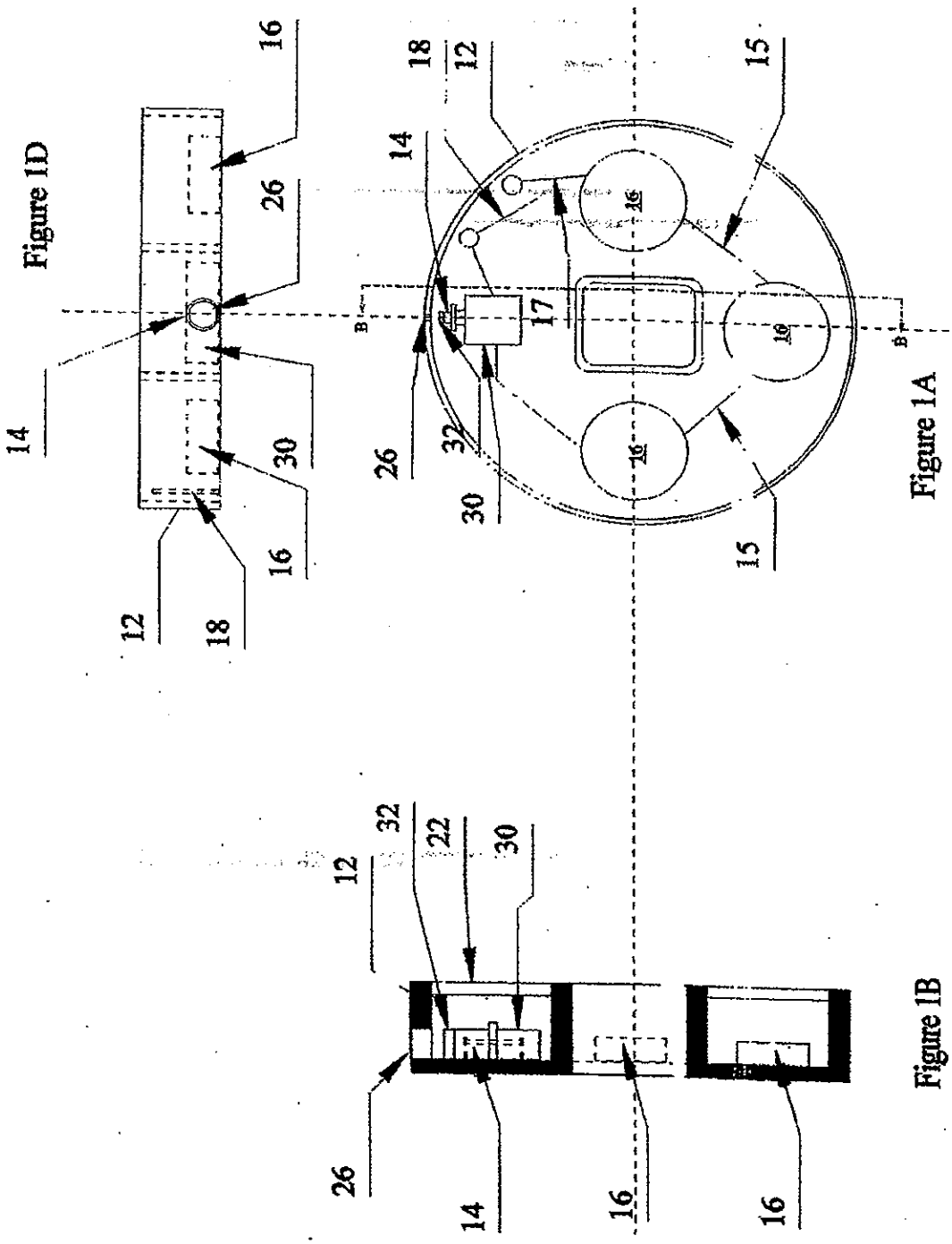
Primary Examiner—Rinaldi I. Rada
Assistant Examiner—Gyounghyun Bae
Attorney, Agent, or Firm—Brian M. Dingman

[57] **ABSTRACT**

A cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device including: a battery power source carried by the cutting unit; and a beam light source, operatively connected to this power source, and carried by the cutting unit; wherein the light source projects a light beam from the cutting unit directed along the cutting edge of the blade to assist the operator in cutting accurately.

9 Claims, 4 Drawing Sheets

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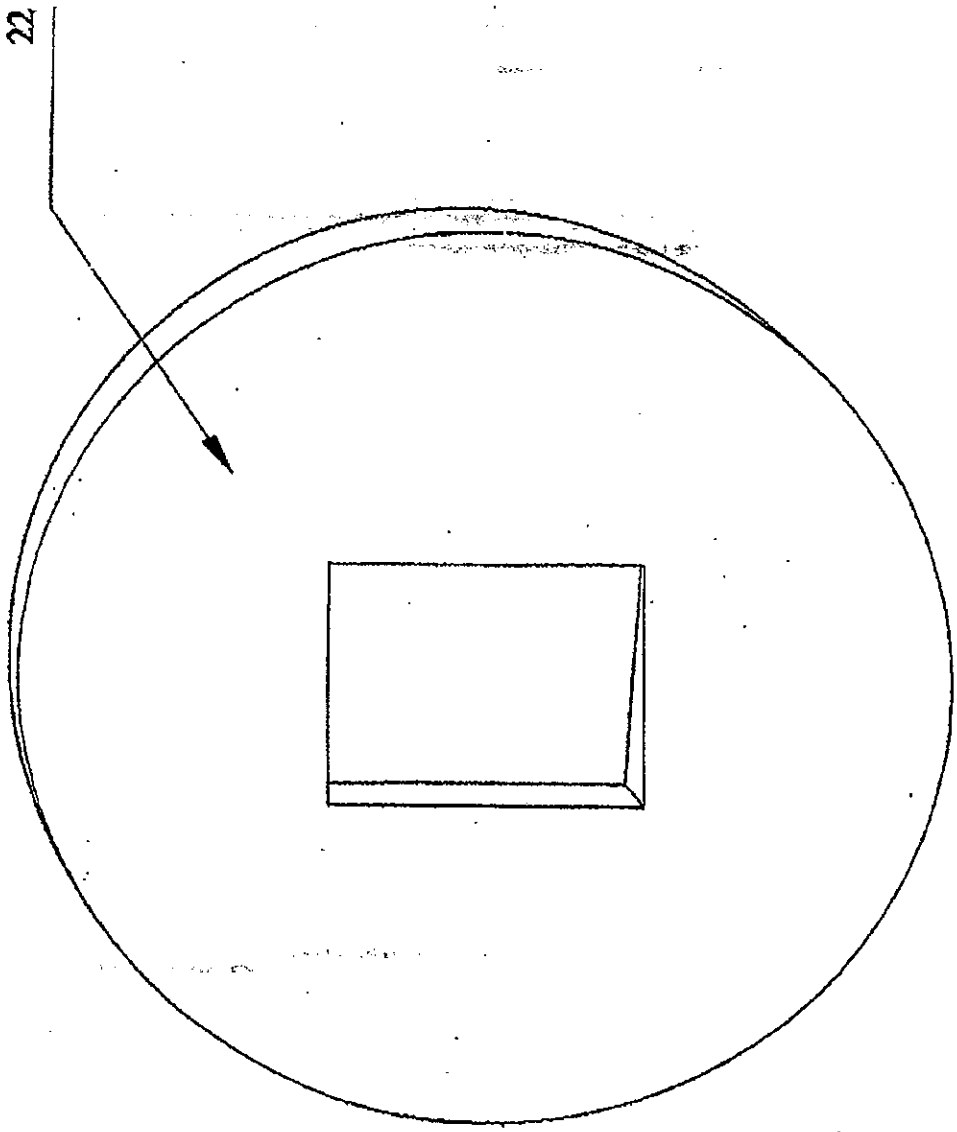

Figure 1 C

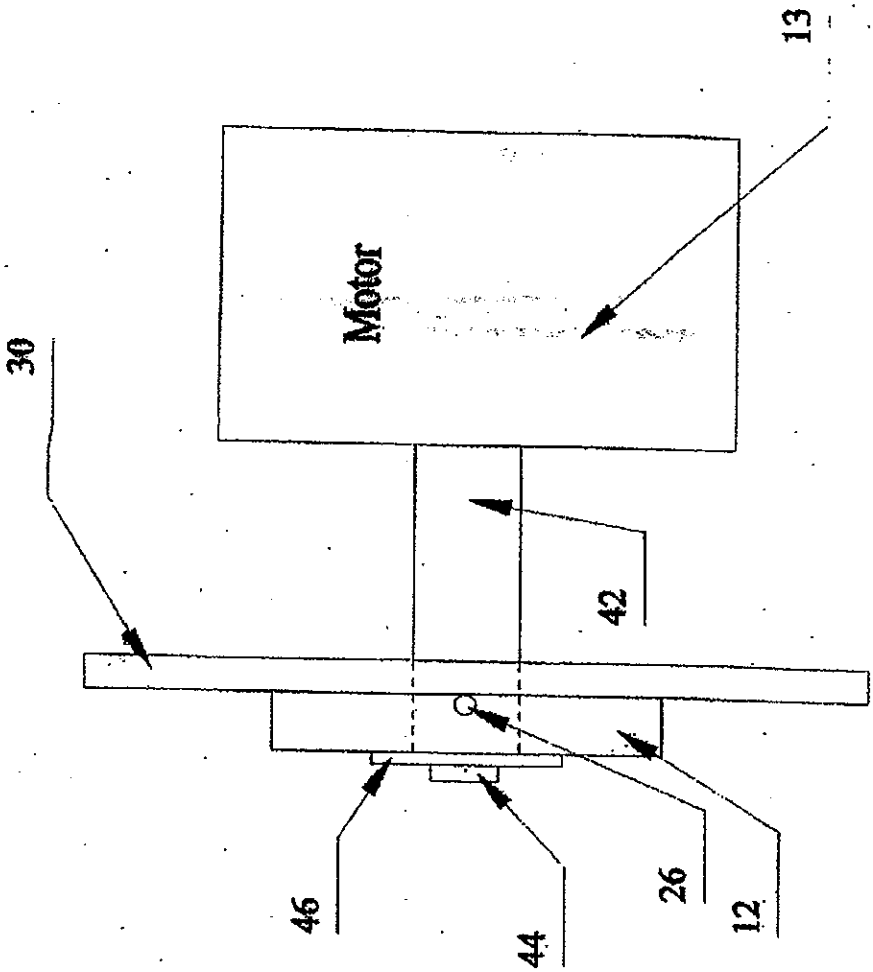

Figure 2A

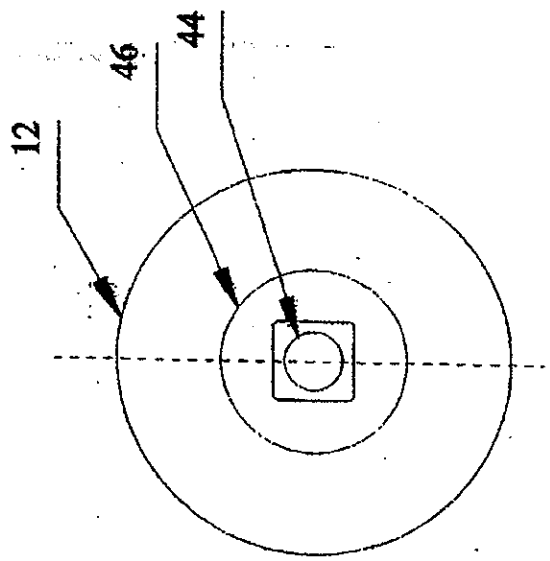

Figure 2B

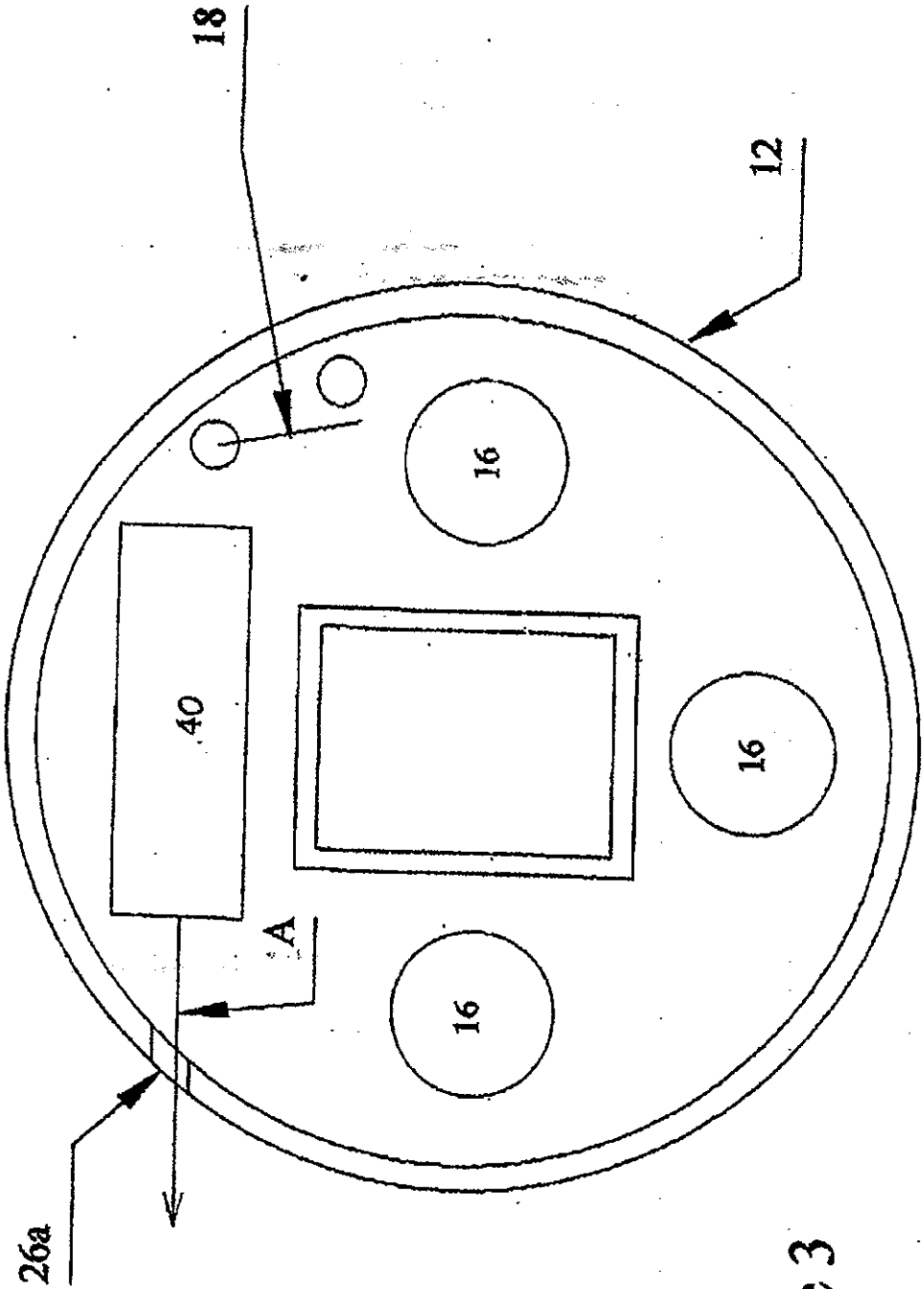

Figure 3

ROTARY SAW CUT ALIGNMENT DEVICE

FIELD OF THE INVENTION

This invention relates to a saw-mounted cut alignment device for a rotary saw which projects a line of light along the cut line.

BACKGROUND OF THE INVENTION

Rotary saws such as circular saws, chop saws, radial arm saws, miter saws and table saws require that the operator properly align the material being cut with the saw blade. This takes time and care, but is critical for a proper cut.

There exist laser-based cut alignment devices which are externally mounted in the vicinity of the saw, and project a light beam along the cut line. These devices must be manually aligned before cutting begins, thus requiring experience and additional time. Also, the operator must monitor this additional piece of equipment in order to use the alignment device properly. Accordingly, devices of this nature are not practical for most saw owners and operators.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a cut alignment device for a rotary saw.

It is a further object of this invention to provide such a cut alignment device which is mounted to the saw.

It is a further object of this invention to provide such a cut alignment device which is automatically self-aligning with the blade cut line.

It is a further object of this invention to provide such a cut alignment device which requires no operator set-up.

It is a further object of this invention to provide such a cut alignment device which illuminates a straight line on the material to be cut along the blade cut line.

It is a further object of this invention to provide such a cut alignment device which turns on only when the saw is activated.

It is a further object of this invention to provide such a cut alignment device which decreases the amount of time required for a saw operator to align the material with the cutting edge of the saw blade.

This invention results from the realization that rotary saws can be made more accurate and easier to use with a light-source mounted on the rotating portion of the saw which projects a beam of light along the saw blade cutting line.

This invention features a cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device comprising: a battery power source carried by the cutting unit; and a beam light source, operatively connected to said power source, and carried by the cutting unit; wherein said light source projects a light beam from the cutting unit directed along the cutting edge of the blade to assist the operator in cutting accurately.

The cut alignment device may further include a switch between said power source and said light source for selectively applying power to said light source. The switch may be centrifically engaged to automatically power said light source when the shaft is spinning. The light source may be mounted within the blade mounting device, and the blade mounting device may define an aperture from which the light beam emanates. The device may further include a focusing lens aligned with said aperture for focusing the light from said light source.

The blade mounting device may include a blade lock washer held on the shaft against the blade, and wherein said light source is mounted within said blade lock washer.

The battery power switch may be mounted within the blade mounting device.

Also featured is a cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device comprising: a battery power source mounted within the blade lock washer; a light source operatively connected to said power source and mounted within the blade lock washer, wherein the blade lock washer defines an aperture from which the light emanates; and a centrifically-engaged switch between said power source and said light source and mounted within the blade lock washer to automatically power said light source when the shaft is spinning; wherein said light source projects a light beam from the aperture directed along the cutting edge of the blade to assist the operator in cutting accurately.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages will occur to those skilled in the art from the following description of the preferred embodiments, and the accompanying drawings, in which:

FIG. 1A is a front, partially disassembled, view of a preferred embodiment of the cut alignment device of this invention;

FIG. 1B is a cross-sectional view of the device of FIG. 1A taken along line B—B;

FIG. 1C is a front view of the cover of the device of FIG. 1A;

FIG. 1D is a side view of the device of FIG. 1A;

FIG. 2A is a side view of a rotary saw carrying the device of FIG. 1A;

FIG. 2B is a front view of the saw of FIG. 2A; and

FIG. 3 is a view similar to that of FIG. 1A of an alternative preferred embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

This invention may be accomplished in a cut alignment device for a rotary saw having a motor which spins a cutting unit. The term "cutting unit" as used herein includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft. The cut alignment device of the invention includes a battery power source with one or more batteries, carried by the cutting unit; and a beam light source, operatively connected to the power source, and also carried by the cutting unit. The result is a light beam which emanates from the cutting unit. The light source is arranged such that the beam intersects the material to be cut along the line along which the saw blade will cut (the cut line). Thus, the operator need only align the light line with a cutting mark in order for the cut to fall directly on the cutting mark.

A preferred embodiment of the cut alignment device of this invention is shown in FIGS. 1 and 2. Hollow annular housing 12 and removable annular cover 22 together are the

same diameter and thickness as a typical lock washer which is part of the blade mounting device of rotary saws. The blade mounting device of rotary saws typically includes a blade bolt 44, washer 46, and a lock washer, not shown (FIGS. 2A and 2B), which is replaced in this embodiment with housing 12 having cover 22. Bolt 44 and washer 46 hold housing 12 against blade 30, so that blade 30 can be rotated by shaft 42, which is driven by motor 13.

Housing 12 is preferably made from cast aluminum. Housing 12 carries battery power source 16 comprising three, 1.2 volt hearing aid batteries interconnected by electrical lines 15. Housing 12 also carries laser diode assembly 14, which emits light in the range of 640 to 670 nm through aperture 26 in housing 12 to accomplish a beam light source. Assembly 14 comprises a laser diode 32, which may be a D6605 diode from NVG, Inc. of Hazlehurst, Ga., driven by diode driver circuit board 30, which may be an NS102, also from NVG. A focusing lens, not shown, such as an NVG. 4 from NVG, may be placed within aperture 26, or just inside or outside of the aperture to focus the light as necessary. Assembly 14 and/or this focusing lens is properly aligned such that the light beam emanating from aperture 26 strikes the material to be cut along the blade cut line. The exact alignment depends on the distance of aperture 26 from blade 30, and the distance between aperture 26 and the blade cutting edge. Centrifugally engaged motion activated switch 18 is between power source 16 and laser diode assembly 14 so that laser diode assembly 14 is automatically powered only when housing 12 is spun by shaft 42. Electrical line 17 connects centrifugally engaged motion activated switch 18 to power source 16, and line 19 provides power to assembly 14.

An alternative embodiment is shown in FIG. 3. The only difference is that cylindrical laser module 40, which may be an MM6605 from NVG replaces diode 32, board 30, and the lens of FIG. 1 with a self-contained unit containing a diode, driver board and focusing lens.

This invention is meant to encompass visible beam light sources other than laser diodes, for example incandescent lamps. Laser diodes are preferred because they are small enough to fit within the interior of a housing having a diameter of 40.8 mm, a thickness of 7.7 mm, and a wall thickness of about 1.5 mm, the dimensions of the preferred embodiment of housing 14 of this invention, yet are bright enough to cast a beam which appears on the material to be cut as a line once the light source is spun. Housing cover 22 is preferably 1 mm thick

This invention is also meant to encompass a battery power source and beam light source carried anywhere on the cutting unit of a rotary saw. Since the cutting unit has a fixed, known relationship to the cutting blade, such will enable the light beam to intersect the material to be cut properly in the proper location—along the blade cut line. Thus, the battery and light source can be placed where desired on or in the rotary shaft, the blade, or the blade mounting device.

Although specific features of the invention are shown in some drawings and not others, this is for convenience only, as each feature may be combined with any or all of the other features in accordance with the invention.

Other embodiments will occur to those skilled in the art and are within the following claims.

What is claimed is:

1. A cut alignment device for a rotary saw having a motor which spins a cutting unit, said cutting unit including a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device comprising:

a battery power source carried by the cutting unit; and

a beam light source, operatively connected to said power source, and carried by the cutting unit;

wherein said light source projects a light beam from the cutting unit directed along the cutting edge of the blade to assist the operator in cutting accurately.

2. The cut alignment device of claim 1 further including a switch between said power source and said light source for selectively applying power to said light source.

3. The cut alignment device of claim 2 in which said switch is centrifically engaged to automatically power said light source when the shaft is spinning.

4. The cut alignment device of claim 1 in which said light source is mounted within the blade mounting device, and the blade mounting device defines an aperture from which the light beam emanates.

5. The cut alignment device of claim 4 further including a focusing lens aligned with said aperture for focusing the light from said light source.

6. The cut alignment device of claim 4 in which the blade mounting device includes a blade lock washer held on the shaft against the blade, and wherein said light source is mounted within said blade lock washer.

7. The cut alignment device of claim 1 in which said battery power source is mounted within the blade mounting device.

8. A cut alignment device for a rotary saw having a motor which spins a cutting unit, said cutting unit including a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device comprising:

a battery power source mounted within the blade mounting device;

a light source operatively connected to said power source and mounted within the blade mounting device, wherein the blade mounting device defines an aperture from which the light emanates; and

a centrifically-engaged switch between said power source and said light source and mounted within the blade mounting device to automatically power said light source when the shaft is spinning;

wherein said light source projects a light beam from the aperture directed along the cutting edge of the blade to assist the operator in cutting accurately.

9. The cut alignment device of claim 8 wherein said blade mounting device includes a lock washer, and said power source, light source, and switch are all located within said lock washer.

* * * * *

Exhibit B

US00D492951S1

(12) **United States Design Patent**
Caluori

(10) **Patent No.: US D492,951 S**
(45) **Date of Patent: ** Jul. 13, 2004**

(54) **ROTARY SAW CUT ALIGNMENT GUIDE**

(76) Inventor: **Raymond J. Caluori**, 5 Briggs St., Quincy, MA (US) 02170

(**) Term: 14 Years

(21) Appl. No.: 29/185,427

(22) Filed: Jun. 26, 2003

(51) LOC (7) Cl. 15-09
(52) U.S. Cl. D15/133; D10/64
(58) Field of Search D10/65; 83/520, 83/392, 522.23

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Primary Examiner—Antoine D. Davis
(74) *Attorney, Agent, or Firm*—Brian M. Dingman, Esq.; Mirick, O'Connell, DeMallie & Lougee, LLP

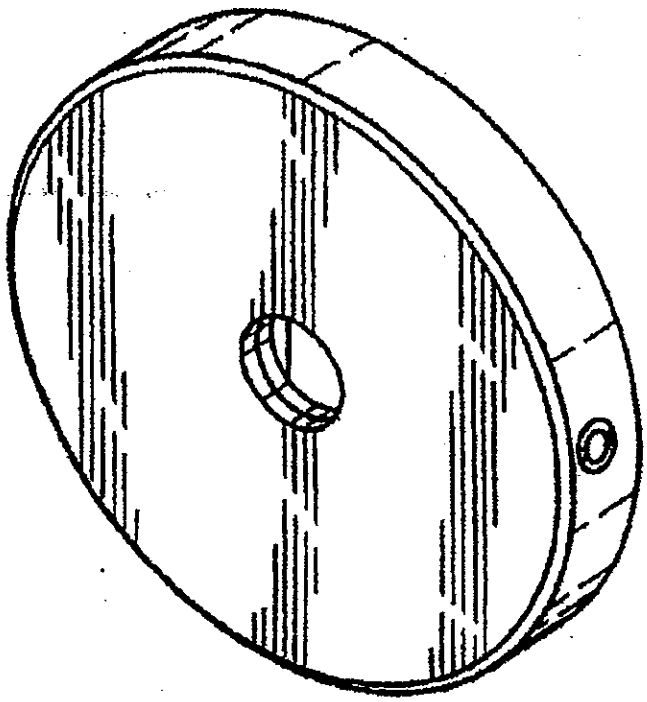
(57) **CLAIM**

The ornamental design for a rotary saw cut alignment guide, as described and shown.

DESCRIPTION

FIG. **1** is a perspective view of the rotary saw cut alignment guide of the invention;
FIG. **2** is a top view of the rotary saw cut alignment guide of FIG. **1**;
FIG. **3** is a bottom view of the rotary saw cut alignment guide of FIG. **1**;
FIG. **4** is a front view of the rotary saw cut alignment guide of FIG. **1**, the rear view being identical;
FIG. **5** is a left side elevational view of the rotary saw cut alignment guide of FIG. **1**; and,
FIG. **6** is a right side elevational view of the rotary saw cut alignment guide of FIG. **1**.

1 Claim, 1 Drawing Sheet



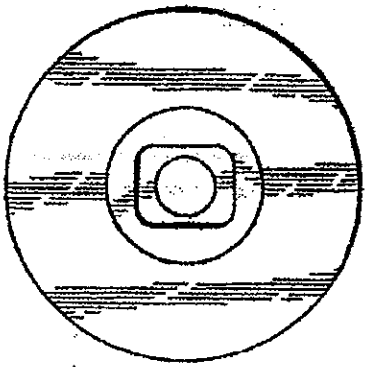


FIG. 3

FIG. 6

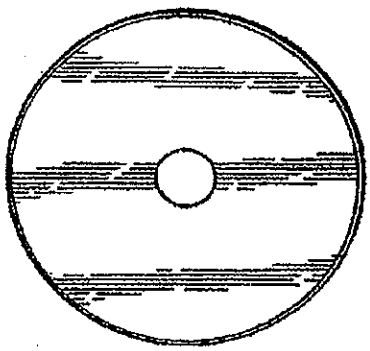


FIG. 2

FIG. 5

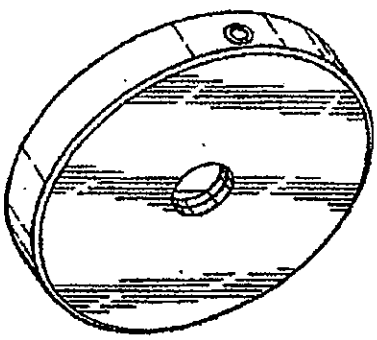


FIG. 1

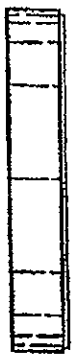


FIG. 4

Exhibit C

US006915727B2

(12) **United States Patent**
Caluori

(10) **Patent No.: US 6,915,727 B2**
(45) **Date of Patent: Jul. 12, 2005**

(54) **ANGLED LIGHT BEAM ROTARY SAW CUT ALIGNMENT DEVICE**

(76) Inventor: **Raymond Caluori**, 5 Briggs St., Quincy, MA (US) 02170

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/207,502**

(22) Filed: **Jul. 29, 2002**

(65) **Prior Publication Data**

US 2003/0116000 A1 Jun. 26, 2003

Related U.S. Application Data

(60) Provisional application No. 60/309,157, filed on Jul. 31, 2001.

(51) **Int. Cl.**[7] **B26D 7/00**; B27B 5/29

(52) **U.S. Cl.** **83/521**; 83/522.17; 83/477.1; 83/663; 30/388

(58) **Field of Search** 83/520, 521, 490, 83/676, 633, 469, 522.18, 522.26, 522.19, 522.21, 477.1, 471.2, 471.3, 522.15, 522.17, 478; 451/6; 408/16; 362/89, 259, 287, 84, 285, 553; 30/392, 388, 123, 390, 391

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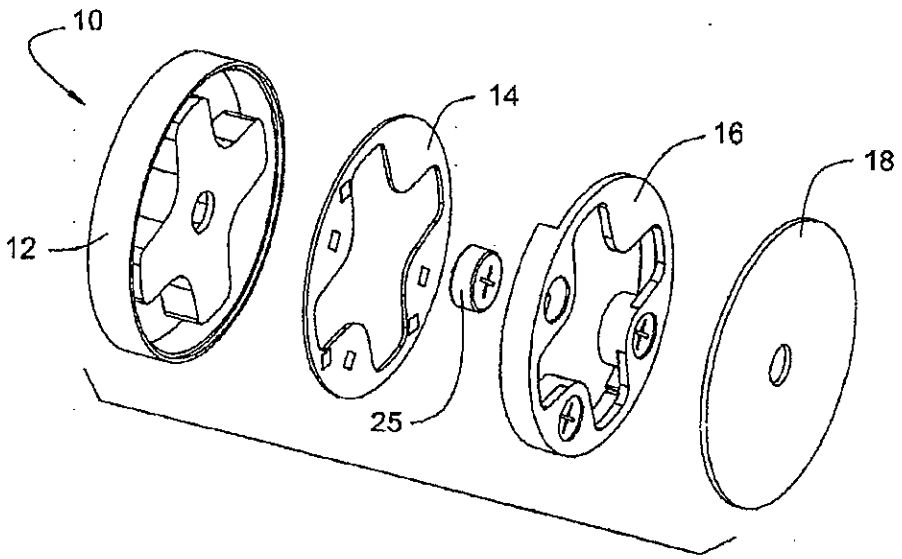
Primary Examiner—Boyer D. Ashley
(74) *Attorney, Agent, or Firm*—Brian M. Dingman, Esq.; Mirick, O'Connell, DeMallie & Lougee, LLP

(57) **ABSTRACT**

A cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft. The cut alignment device includes a battery power source carried by the cutting unit; and a beam light source, operatively connected to this power source, and carried by the cutting unit. The light source projects a light beam at a shallow angle from the cutting unit directed to intersect the plane of the rotary cutting tool or saw blade, to assist the operator in cutting accurately.

52 Claims, 6 Drawing Sheets



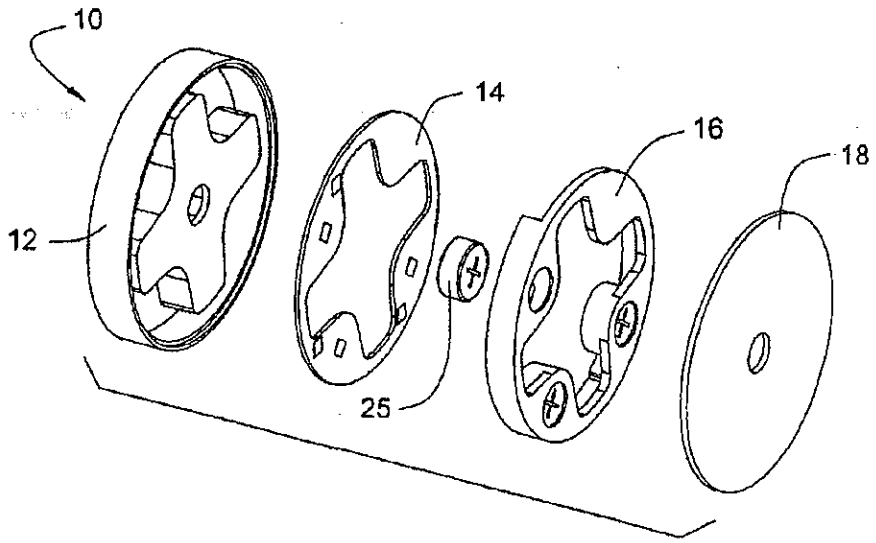


FIG. 1A

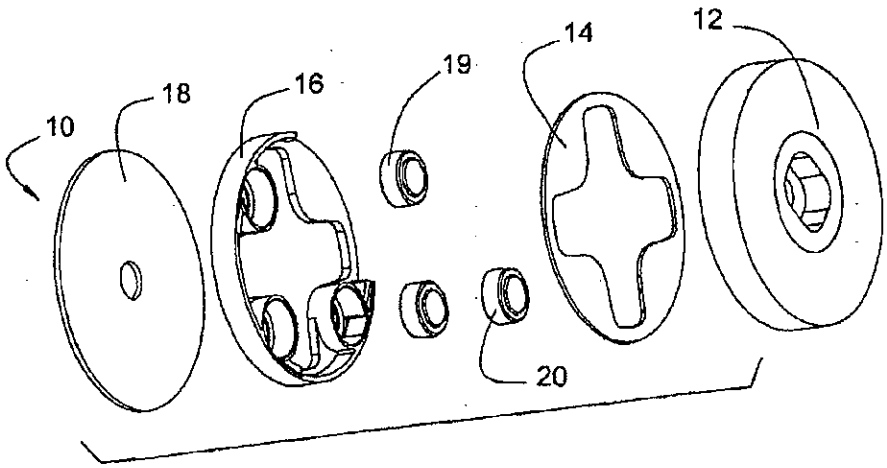


FIG. 1B

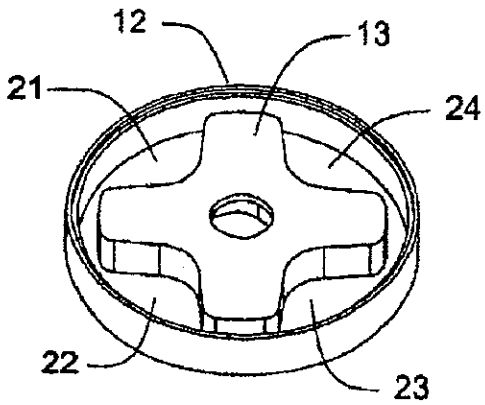


FIG. 2

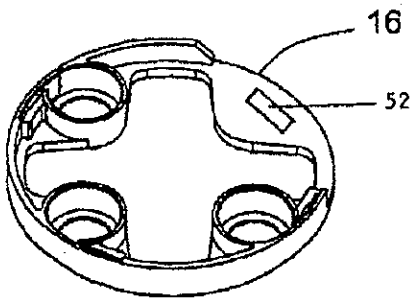


FIG. 3

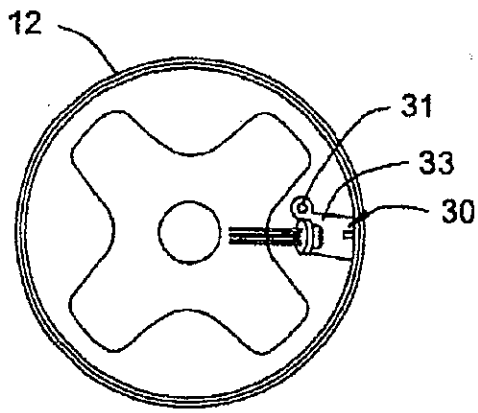
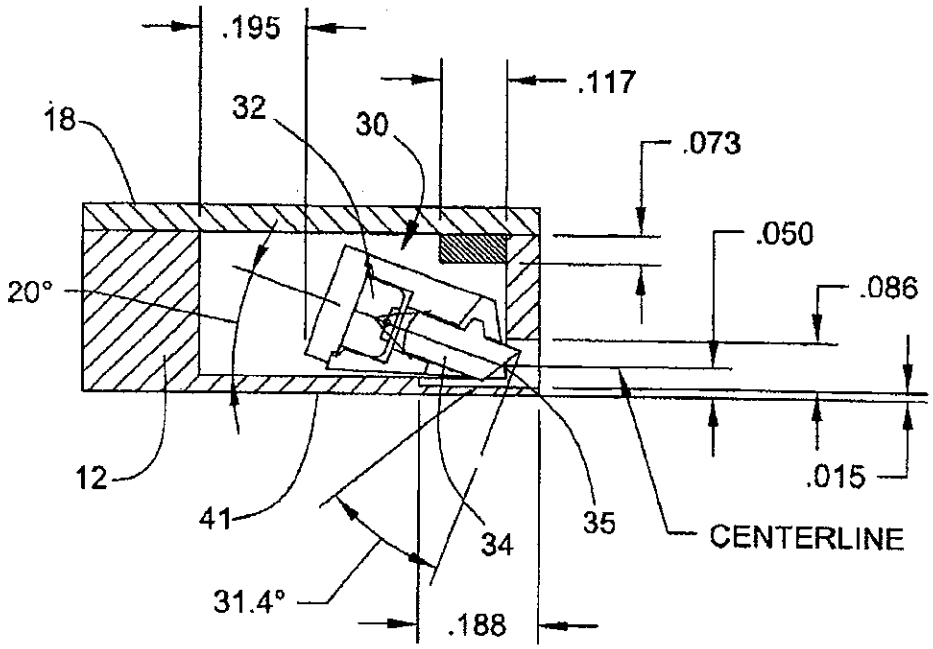


FIG. 4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.117
18
32
30
.073
.050
.086
20°
12
41
34
35
CENTERLINE
.015
31.4°
.188

FIG. 5

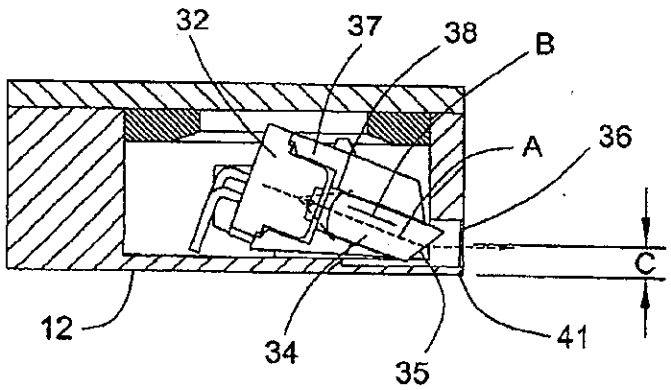
32
37
38
B
A
36
C
12
34
35
41

FIG. 6

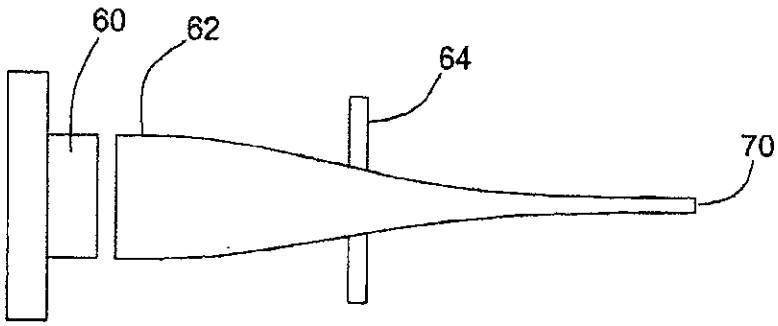

FIG. 7A

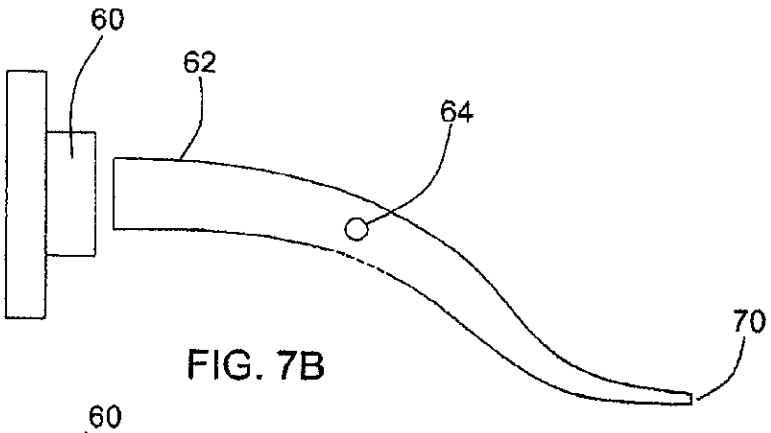

FIG. 7B

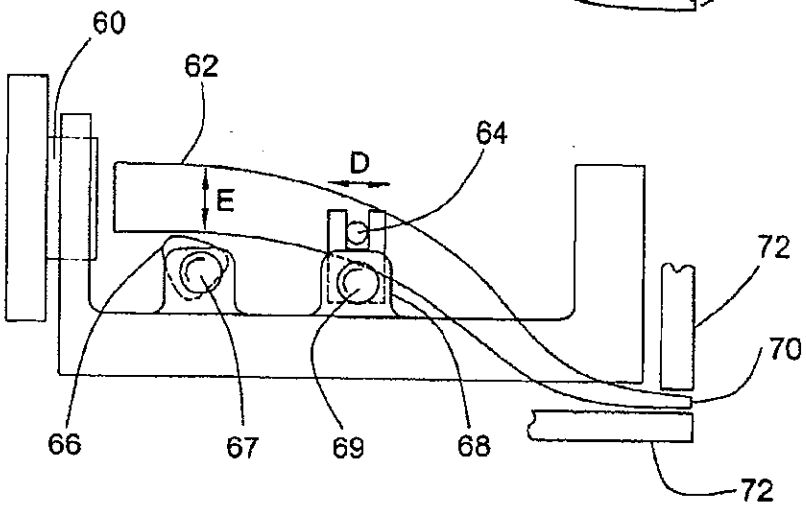

FIG. 8

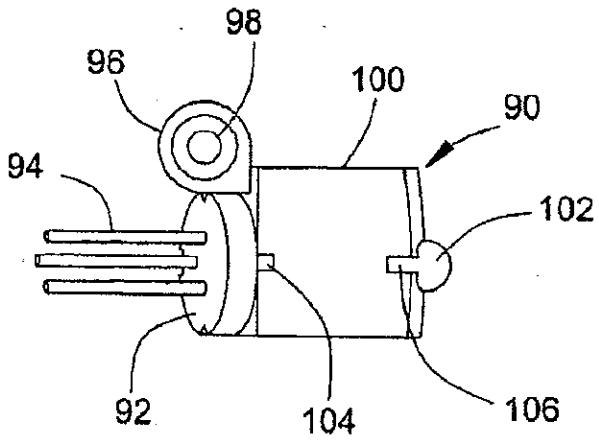

FIG. 9A

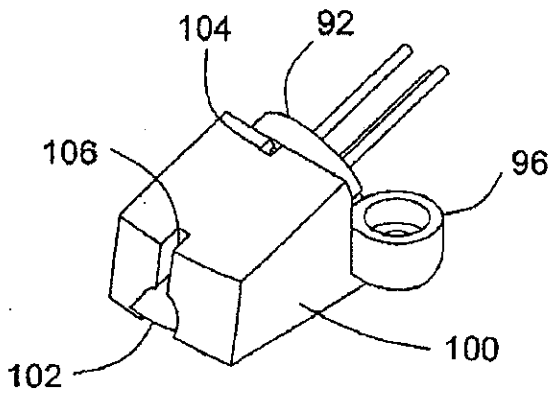

FIG. 9B

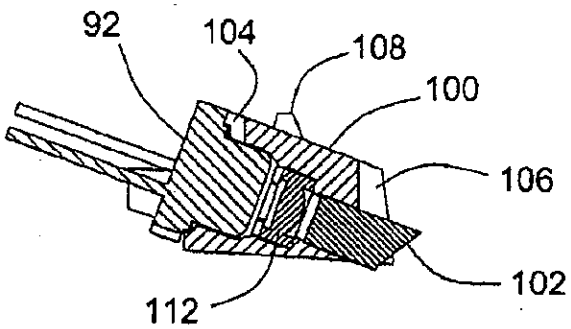

FIG. 9C

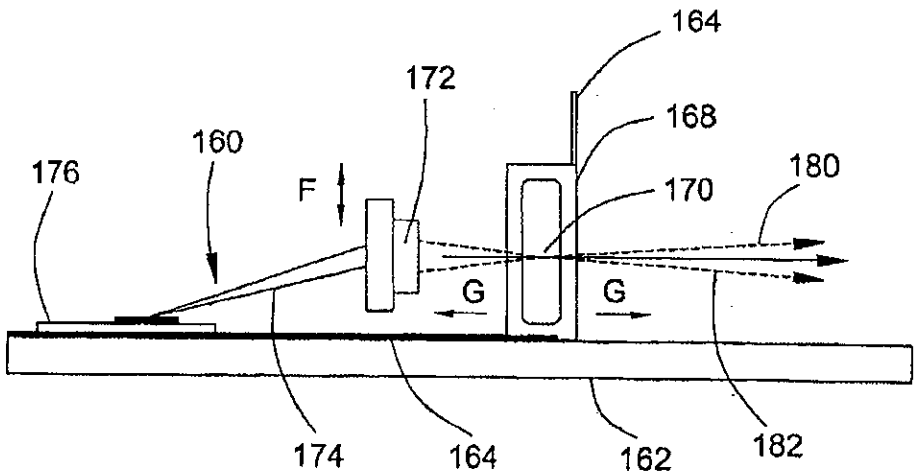

FIG. 10

cutting blade about six inches to eight feet from the housing. The device can be configured to be turned on or off manually as well as automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages will occur to those skilled in the art from the following description of the preferred embodiments, and the accompanying drawings, in which:

FIGS. 1A and 1B are exploded views of one embodiment of the cut alignment device of this invention;

FIG. 2 is a view of the housing of FIG. 1;

FIG. 3 is a view of the battery holder of FIG. 1;

FIG. 4 is a greatly enlarged top view of a partially assembled device of FIG. 1;

FIG. 5 is a partial cross-sectional view of the assembled device of FIG. 1;

FIG. 6 is a partial cross-sectional greatly enlarged view of a portion of the assembly of FIG. 5;

FIGS. 7A and 7B are top and side views, respectively, of an alternative form of delivering the laser light for the device of this invention;

FIG. 8 is a more detailed side view of the light delivery means shown in FIG. 7;

FIGS. 9A–9C are top, perspective and cross-sectional views, respectively, of an alternative embodiment of the laser light delivery means for the invention; and

FIG. 10 is a partial cross-sectional side view of the preferred embodiment of the laser diode light delivery location and focusing means of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

One embodiment of the inventive device is shown in FIGS. 1–6. Device **10** includes stainless steel housing **12** that provides the structural integrity for the device. The raised central cross-shaped portion **13** protects the electronic components that are located in the pockets **21–24** created thereby (not shown fully in the drawings) so that they are not crushed when the device is placed on an arbor and the nut is tightened down; it also maintains the integrity of the housing so that it doesn't bend and change the alignment of the laser beam. Also, this construction helps to maintain the device to be sufficiently mass-balanced around the center of the device, so that it is relatively rotationally balanced. Battery holder **16** is a plastic molded part that has three cavities to hold three button cells **25** in a manner such that their tops and bottoms are exposed, so that electrical contact can be made. The holder has a central cross-shaped opening that allows it to fit over the central portion of the housing. Washer **18** is the cover for the assembly. Part **14**, not shown in detail in the drawings, is a circuit board that provides the electrical connections between the batteries and from the centrifugally-operated switch **52** to the laser diode. The result is a device that emits light only when the arbor to which it is attached is rotating.

Optical assembly **30** is shown in FIGS. **4–6**. Laser diode **32** is held in housing **37**. Lens **34** is slideable in the direction of arrow B within cylindrical bore **38** of housing **37**. Lens **34** has an angled light emitting distal end **35** that refracts the light beam along axis A, so that the beam is emitted almost, but not quite, parallel to the bottom surface **41** of housing **12**. It is critical to the invention that the beam be angled toward the plane of the saw blade rather than be parallel to it, so that it intersects the plane of the blade surface at a desired location, to provide a cutting guide as appropriate for the type of saw and the diameter of the saw blade. The preferred dimensions and angles are shown in FIG. **5**.

Opening **31** in extended housing portion **33** accepts a housing adjustment screw during final assembly of the device. A screw is placed through hole **31** and moved until it contacts the bottom of housing **12**. Adjustment of the screw adjusts the angle of somewhat flexible housing portion of **33**, to change the angle of lens **34** relative to housing **12**. This is the means by which the angle of the beam emitted from lens **34** relative to the saw blade is adjusted during final assembly. The sliding engagement of lens **34** along barrel **38** focuses the light beam at the correct distance from the housing. This sliding focus and the angle adjustment allow the beam to be directed and focused to intersect the saw blade plane at a desired distance from the housing, to accomplish the result described above. Also as described above, the distance from bottom **41** of housing **12** to the lower portion of the light beam, is preferably from 0.001–0.160 inches. Once the diode and lens assembly is properly set in the assembly process, the lens and assembly are fixed in place using a heat conductive epoxy that also helps to conduct heat from the laser diode to the housing so that the housing can act as a heat sink.

FIGS. **7** and **8** disclose an alternative means of delivering light from laser diode **60** using light pipe **62** with distal end **70** that is held in a proper sized opening (FIG. **8**) at the lower side of housing **72**. Preferably the light pipe has a consistent diameter along its length, so that it more efficiently delivers light to the source. The focus and angle adjustment is accomplished in this example, by movement of light pipe **62** up and down in the direction of arrow E and back in forth in the direction of arrow D. Cam **66** provides the up and down motion by turning of knob **67** that is fixed to cam **66**. The back and forth motion is provided by cam **68** that pushes on rod **64** that projects from light pipe **62**. Cam **68** is moved by rotation of knob **69**.

FIGS. 9A–9C show another embodiment of a diode and focusing lens construction, similar to that of the embodiment of FIGS. **1–6**. Assembly **90** includes laser diode **92** with leads **94** held in housing **100** in proximity to lens combination **102** and **112**. Lens **102** is axially slideable within housing **100** similar to the embodiment shown in FIGS. **5** and **6**. Protruding holder **96** with opening **98** provides the screw-enabled height adjustment as described above. Slots **104** and **106** are provided so that laser diode **92** and lens **102** can be fixed-in place relative to housing **100** by introducing a glue or adhesive into the slots once the diode and lens are in the proper position to place and focus the beam as desired.

The preferred embodiment of the laser diode placement and focusing means is shown in FIG. **10**. Laser diode **172** has leads **174** that are soldered to circuit board **176** that is coupled to housing **164**. Lens **170** is held in annular lens holder **168** that is received by threads or other means in housing **164** to allow holder **168** to be moved in direction of arrows G relative to housing **164**, to change the distance between diode **172** and lens **170** and thus achieve a proper beam focus. The beam path, several of which are shown by paths **180**, is established as desired (typically a shallow downward angle relative to saw blade **162** as depicted by path **182**), by physically moving diode **172** up or down in the direction of arrow F. When the desired diode location and lens location are achieved, diode **172** is set in place relative to the housing using a heat conductive epoxy that also helps to transfer heat from diode **172** to housing **164** so that the housing can act as a heat sink.

Although specific features of the invention are shown in some drawings and not others, this is for convenience only as some feature may be combined with any or all of the other features in accordance with the invention.

Other embodiments will occur to those skilled in the art and are within the following claims:

What is claimed is:

1. A cut alignment device for a rotary saw having a motor which spins a cutting unit, the cutting unit including a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, in which the blade-mounting device comprises a structural housing that is held on the shaft against the blade, and wherein a light source is located within the structural housing, the cut alignment device comprising:

a battery power source carried within the structural housing;

the light source, operatively connected to the power source, and carried within the structural housing wherein the light source projects a light beam from the structural housing directed toward the plane of the blade, to assist in cutting accurately; and

wherein the structural housing is essentially a partially hollow cylinder with a raised inner central portion and at least two spaced raised support arms radiating from the central portion, the support arms thereby defining two or more pockets in which the battery power source and the light source are located.

2. The cut alignment device of claim 1 wherein the battery power source is located in one pocket and the light source is located in a different pocket.

3. The cut alignment device of claim 1 further comprising a somewhat flexible housing located within the structural housing and to which the light source is coupled, and at least one adjustment screw received in the flexible housing, wherein movement of said at least one adjustment screw relative to the flexible housing alters the spacing between the flexible housing and the structural housing.

4. The cut alignment device of claim 1, further comprising a plastic battery holder that holds the battery power source in place and is located within the structural housing.

5. The cut alignment device of claim 1 further including a switch between the power source and the light source, for selectively applying power to the light source.

6. The cut alignment device of claim 5 in which the switch is centrifugally engaged, to automatically power the light source when the shaft is spinning.

7. The cut alignment device of claim 1, wherein the distance of the light source from the structural housing is adjustable, to adjust the angle at which the light beam emanates from the structural housing.

8. The cut alignment device of claim 7, further comprising means for coupling the light source to the structural housing once the light source is adjusted, to help prevent misalignment of the light source.

9. The cut alignment device of claim 1 comprising at least three radiating support arms that define at least three pockets.

10. The cut alignment device of claim 9 comprising four radiating support arms.

11. The cut alignment device of claim 1 in which the structural housing defines an aperture from which the light beam emanates.

12. The cut alignment device of claim 11 further including a focusing lens aligned with the aperture for focusing the light beam from the light source.

13. The cut alignment device of claim 12, wherein the distance between the light source and the lens is adjustable.

14. The cut alignment device of claim 1 in which the housing defines an aperture from which the light beam emanates at a distance of less than 0.160 inches from a portion of the structural housing that is against the blade.

15. The cut alignment device of claim 14 wherein the light beam intersects the plane of the blade at a distance of no more than eight feet from the structural housing.

16. The cut alignment device of claim 14 wherein the light beam intersects the plane of the blade at a distance of at least six inches from the structural housing.

17. A cut alignment device for a rotary saw having a motor which spins a cutting unit, the cutting unit including a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, in which the blade-mounting device comprises a structural housing that is held on the shaft against the blade, and wherein a light source is located within the structural housing, the cut alignment device comprising:

a battery power source carried within the structural housing;

the light source, operatively connected to the power source, and carried within the structural housing wherein the light source projects a light beam from the structural housing directed toward the plane of the blade, to assist in cutting accurately; and

a hardened material that mechanically couples the light source to the structural housing, in which the hardened material is heat conductive, to conduct heat from the light source to the structural housing.

18. The cut alignment device of claim 17 further comprising a somewhat flexible housing located within the structural housing and to which the light source is coupled, and at least one adjustment screw received in the flexible housing, wherein movement of said at least one adjustment screw relative to the flexible housing alters the spacing between the flexible housing and the structural housing.

19. The cut alignment device of claim 17, further comprising a plastic battery holder that holds the battery power source in place and is located within the structural housing.

20. The cut alignment device of claim 17 further including a switch between the power source and the light source, for selectively applying power to the light source.

21. The cut alignment device of claim 20 in which the switch is centrifugally engaged, to automatically power the light source when the shaft is spinning.

22. The cut alignment device of claim 17, wherein the distance of the light source from the structural housing is adjustable, to adjust the angle at which the light beam emanates from the structural housing.

23. The cut alignment device of claim 22, further comprising means for coupling the light source to the structural housing once the light source is adjusted, to help prevent misalignment of the light source.

24. The cut alignment device of claim 17 in which the structural housing defines an aperture from which the light beam emanates.

25. The cut alignment device of claim 24 further including a focusing lens aligned with the aperture for focusing the light beam from the light source.

26. The cut alignment device of claim 25, wherein the distance between the light source and the lens is adjustable.

27. The cut alignment device of claim 17 in which the housing defines an aperture from which the light beam emanates at a distance of less than 0.160 inches from a portion of the structural housing that is against the blade.

28. The cut alignment device of claim 27 wherein the light beam intersects the plane of the blade at a distance of no more than eight feet from the structural housing.

29. The cut alignment device of claim 28 wherein the light beam intersects the plane of the blade at a distance of at least six inches from the structural housing.

30. The cut alignment device of claim 17, wherein the structural housing is essentially a partially hollow cylinder with a raised inner central portion and at least two spaced raised support arms radiating from the central portion, the support arms thereby defining two or more pockets in which the battery power source and the light source are located.

31. The cut alignment device of claim 30 wherein the battery power source is located in one pocket and the light source is located in a different pocket.

32. The cut alignment device of claim 31 comprising at least three radiating support arms that define at least three pockets.

33. The cut alignment device of claim 32 comprising four radiating support arms.

34. A cut alignment device for a rotary saw having a motor which spins a cutting unit, the cutting unit including a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, in which the blade-mounting device comprises a structural housing that is held on the shaft against the blade, and wherein a light source is located within the structural housing, the cut alignment device comprising:

a battery power source carried within the structural housing;

the light source, operatively connected to the power source, and carried within the structural housing wherein the light source projects a light beam from the structural housing directed toward the plane of the blade, to assist in cutting accurately; and

a somewhat flexible housing located within the structural housing and to which the light source is coupled, and at least one adjustment device received in the flexible housing, wherein movement of said at least one adjustment device relative to the flexible housing alters the spacing between the flexible housing and the structural housing.

35. The cut alignment device of claim 34 wherein the battery power source is also mounted within the structural housing.

36. The cut alignment device of claim 34, further comprising a plastic battery holder that holds the battery power source in place and is located within the structural housing.

37. The cut alignment device of claim 34 further including a switch between the power source and the light source, for selectively applying power to the light source.

38. The cut alignment device of claim 37 in which the switch is centrifugally engaged, to automatically power the light source when the shaft is spinning.

39. The cut alignment device of claim 34, wherein the distance of the light source from the structural housing is adjustable, to adjust the angle at which the light beam emanates from the structural housing.

40. The cut alignment device of claim 39, further comprising means for coupling the light source to the structural housing once the light source is adjusted, to help prevent misalignment of the light source.

41. The cut alignment device of claim 34 in which the light source is mounted within the structural housing, and the structural housing defines an aperture from which the light beam emanates.

42. The cut alignment device of claim 41 further including a focusing lens aligned with the aperture for focusing the light beam from the light source.

43. The cut alignment device of claim 42, wherein the distance between the light source and the lens is adjustable.

44. The cut alignment device of claim 34, in which the structural housing defines an aperture from which the light beam emanates at a distance of less than 0.160 inches from a portion of the structural housing that is against the blade.

45. The cut alignment device of claim 44 wherein the light beam intersects the plane of the blade at a distance of no more than eight feet from the structural housing.

46. The cut alignment device of claim 44 wherein the light beam intersects the plane of the blade at a distance of at least six inches from the structural housing.

47. The cut alignment device of claim 34, wherein the structural housing is essentially a partially hollow cylinder with a raised inner central portion and at least two spaced raised support arms radiating from the central portion, the support arms thereby defining two or more pockets in which the battery power source and the light source are located.

48. The cut alignment device of claim 47, further comprising a hardened material that mechanically couples the light source to the structural housing.

49. The cut alignment device of claim 48, in which the hardened material is heat conductive, to conduct heat from the light source to the structural housing.

50. The cut alignment device of claim 47, wherein the battery power source is located in one pocket and the light source is located in a different pocket.

51. The cut alignment device of claim 50 comprising at least three radiating support arms that define at least three pockets.

52. The cut alignment device of claim 51 comprising four radiating support arms.

* * * * *

Exhibit D

US007836806B2

(12) **United States Patent**
Caluori

(10) **Patent No.: US 7,836,806 B2**
(45) **Date of Patent: Nov. 23, 2010**

(54) **POSITIVE-ANGLED LIGHT BEAM ROTARY SAW CUT ALIGNMENT DEVICE**

(76) Inventor: **Raymond J. Caluori**, 5 Briggs St., Quincy, MA (US) 02170

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 669 days.

(21) Appl. No.: **11/070,913**

(22) Filed: **Mar. 3, 2005**

(65) **Prior Publication Data**

US 2005/0166737 A1 Aug. 4, 2005

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/207,502, filed on Jul. 29, 2002, now Pat. No. 6,915,727, and a continuation-in-part of application No. 10/878,988, filed on Jun. 28, 2004.

(51) **Int. Cl.**
B26D 7/00 (2006.01)

(52) **U.S. Cl.** **83/521**; 83/477.1; 83/522.17; 30/388

(58) **Field of Classification Search** 83/520–521, 83/490, 676, 633, 469, 522.11, 522.18, 522.19, 83/522.26, 522.21, 477.1, 471.2, 471.3, 522.15, 83/522.17, 478; 451/6; 408/16; 362/89, 362/259, 287, 84, 285, 553; 30/390–392, 30/388, 123

See application file for complete search history.

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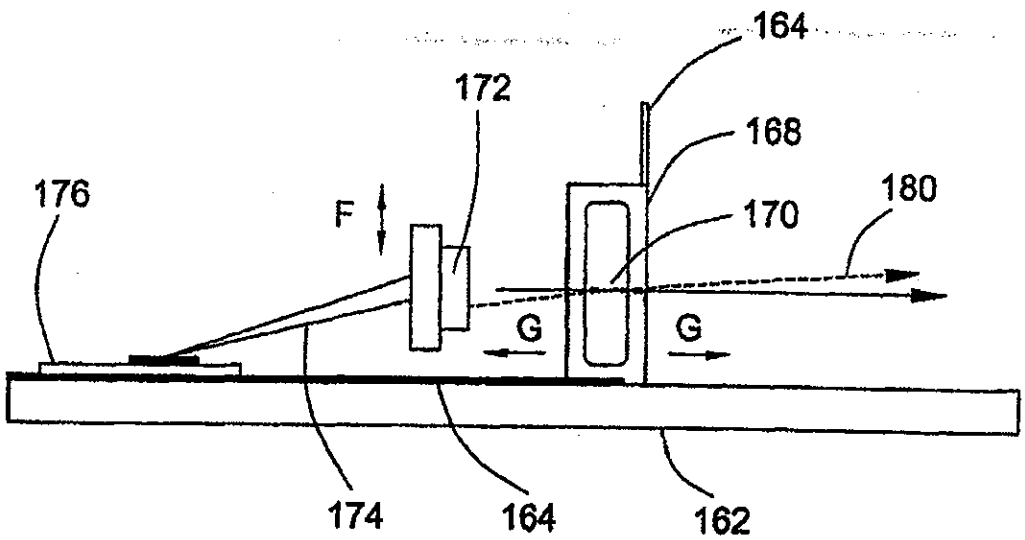
Primary Examiner—Phong H Nguyen
(74) *Attorney, Agent, or Firm*—Brian M. Dingman; Mirick, O'Connell, DeMallie & Lougee

(57) **ABSTRACT**

A cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a structural housing. The cut alignment device includes the structural housing defining two or more internal compartments, a battery power source carried within the structural housing, and a beam light source, operatively connected to this power source, and also located within the structural housing. The light source projects a light beam from the cutting unit directed slightly away from the plane of the rotary cutting tool or saw blade such that it never intersects the plane of the blade, to assist the operator in cutting accurately.

10 Claims, 8 Drawing Sheets



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-30-

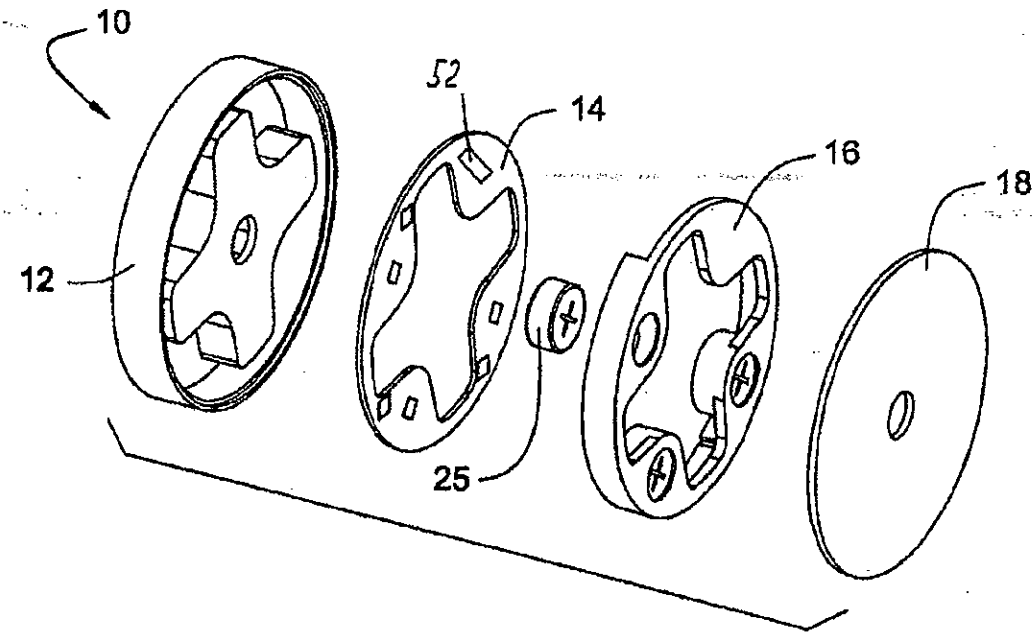

FIG. 1A

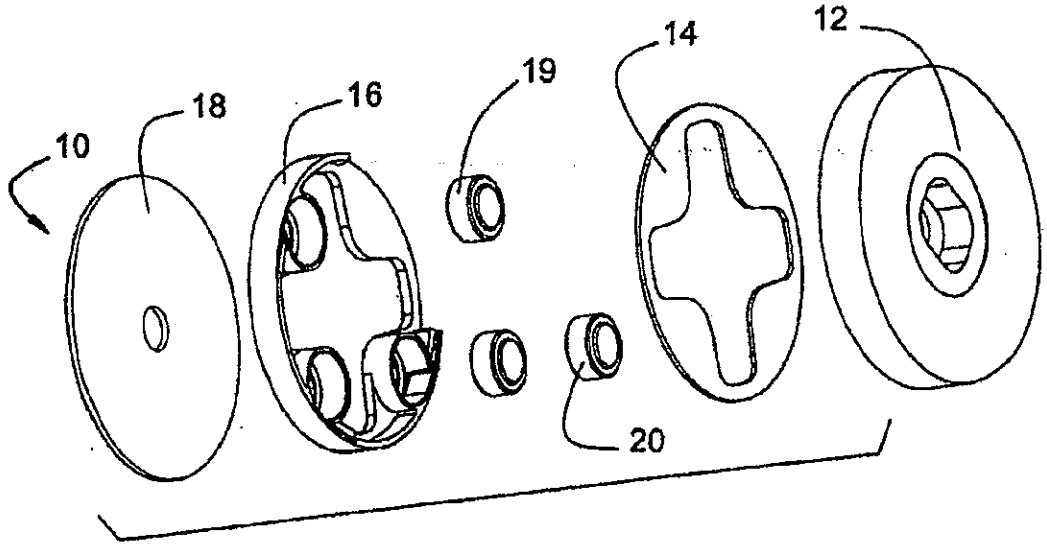

FIG. 1B

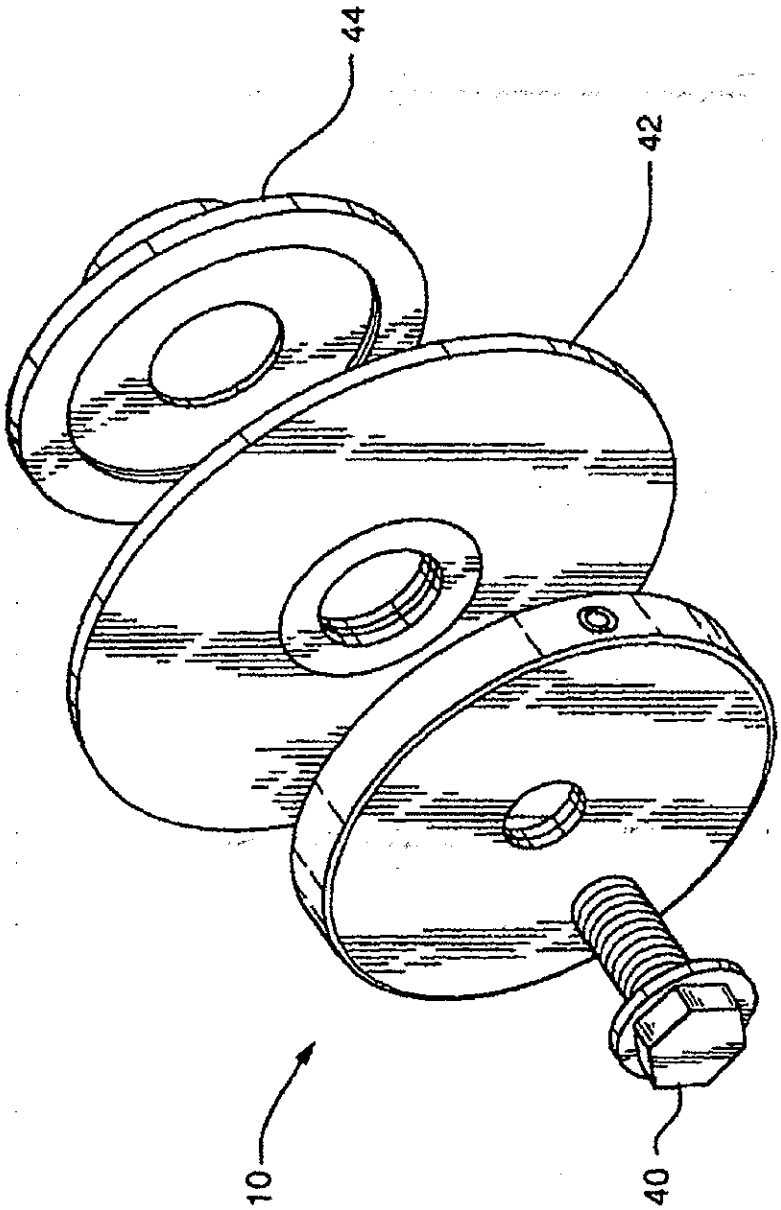

FIG. 1C

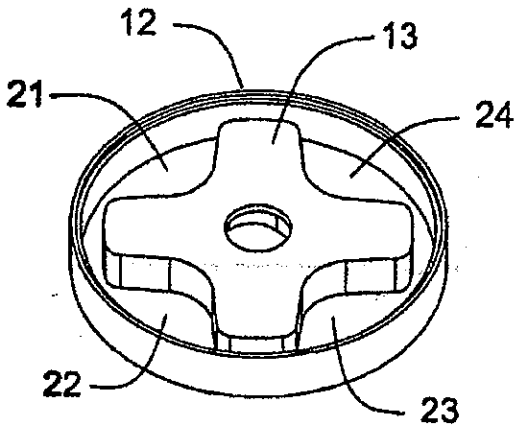

FIG. 2

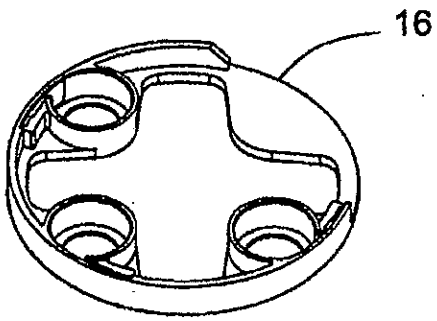

FIG. 3

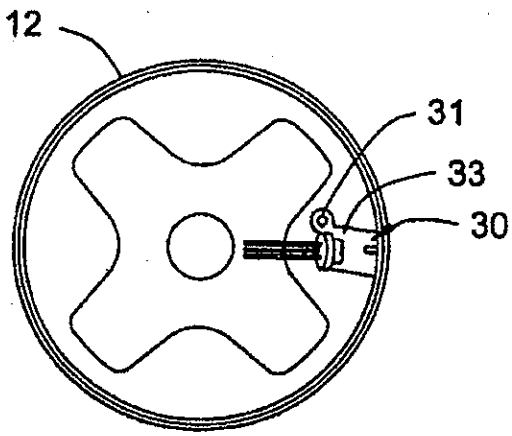

FIG. 4

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-33-

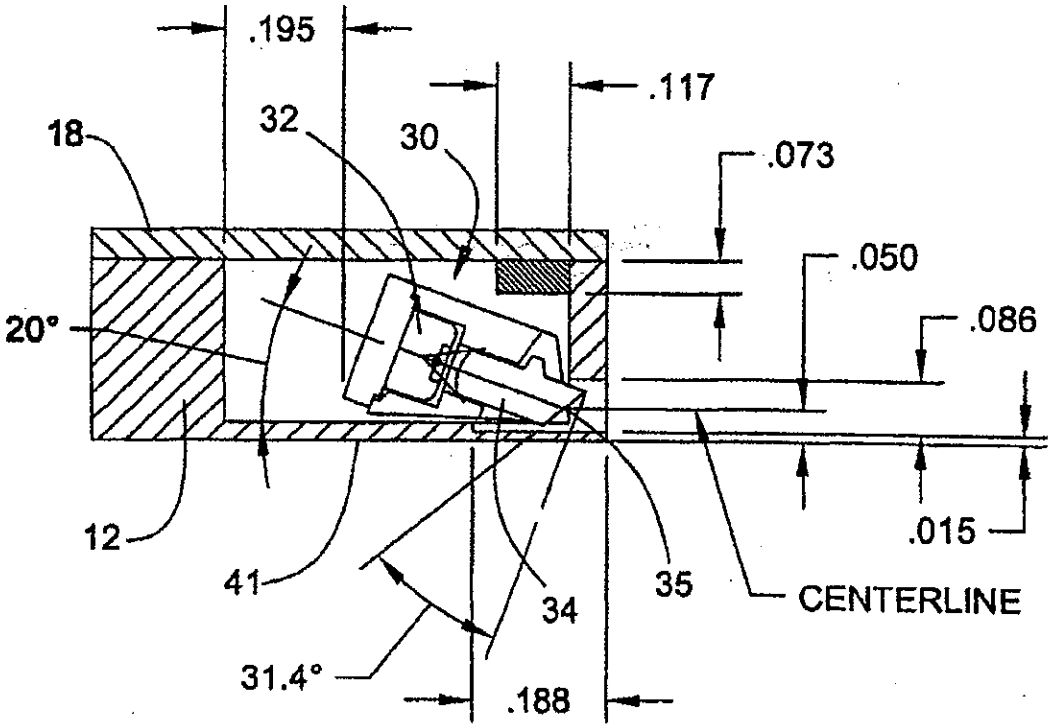

FIG. 5

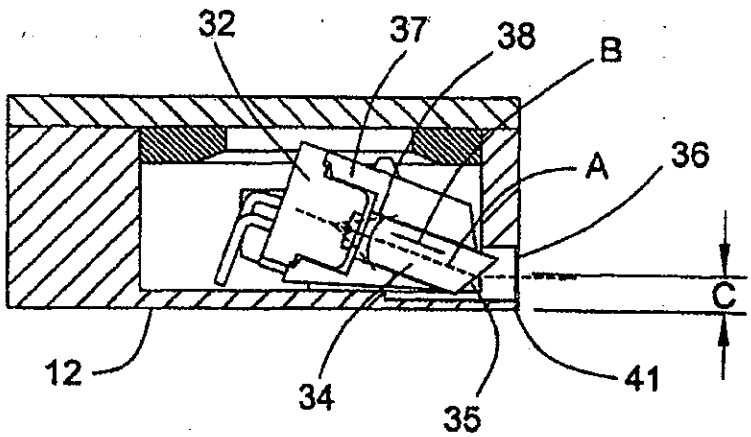

FIG. 6

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-34-

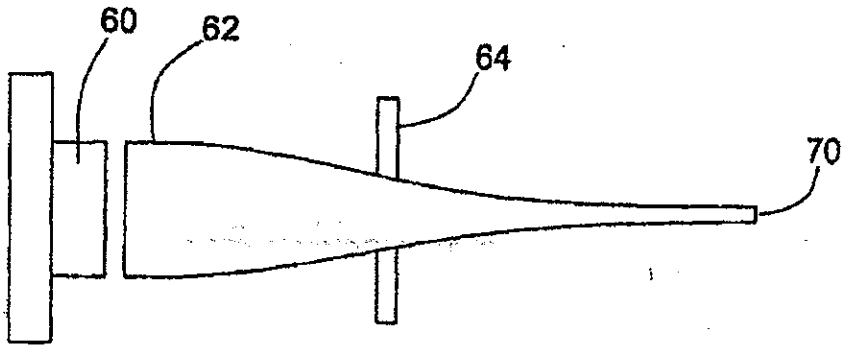

FIG. 7A

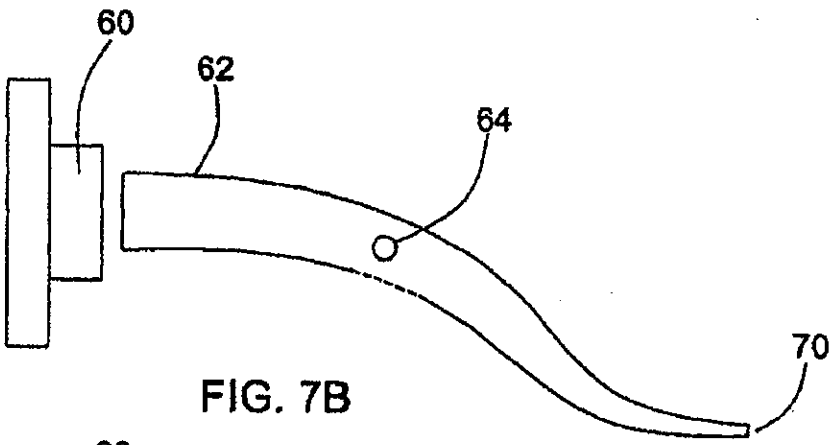

FIG. 7B

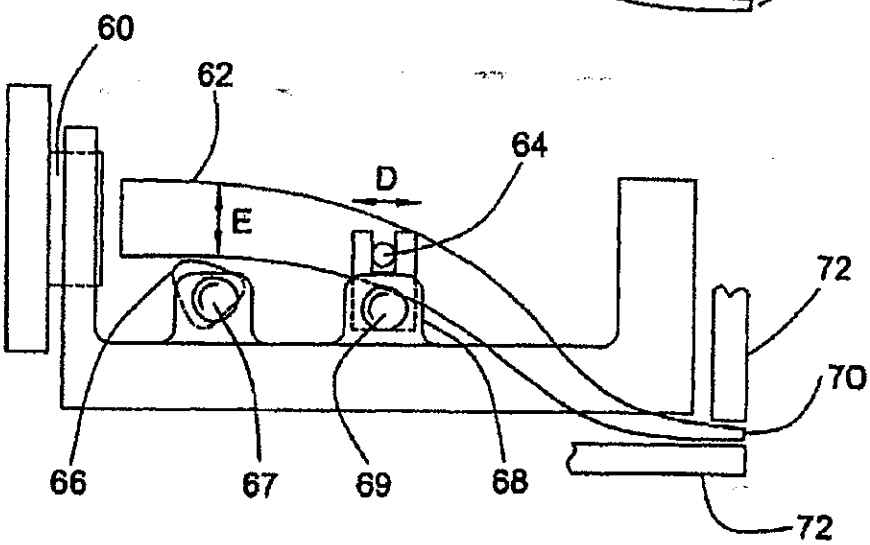

FIG. 8

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-35-

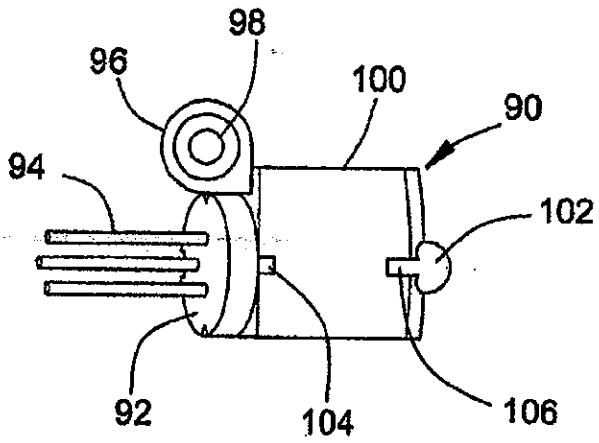

FIG. 9A

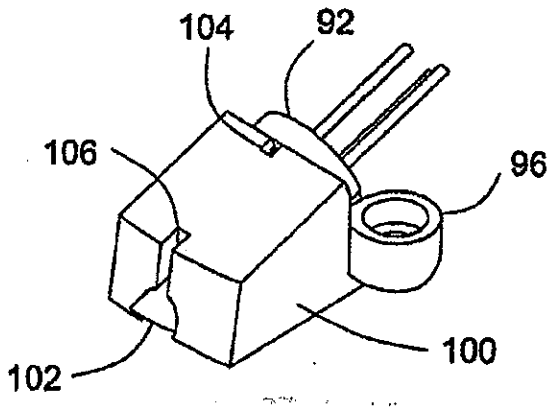

FIG. 9B

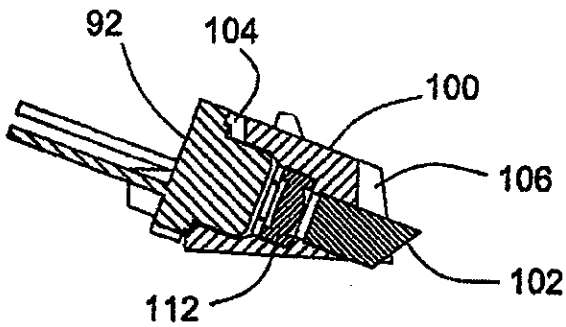

FIG. 9C

-31-
-36-

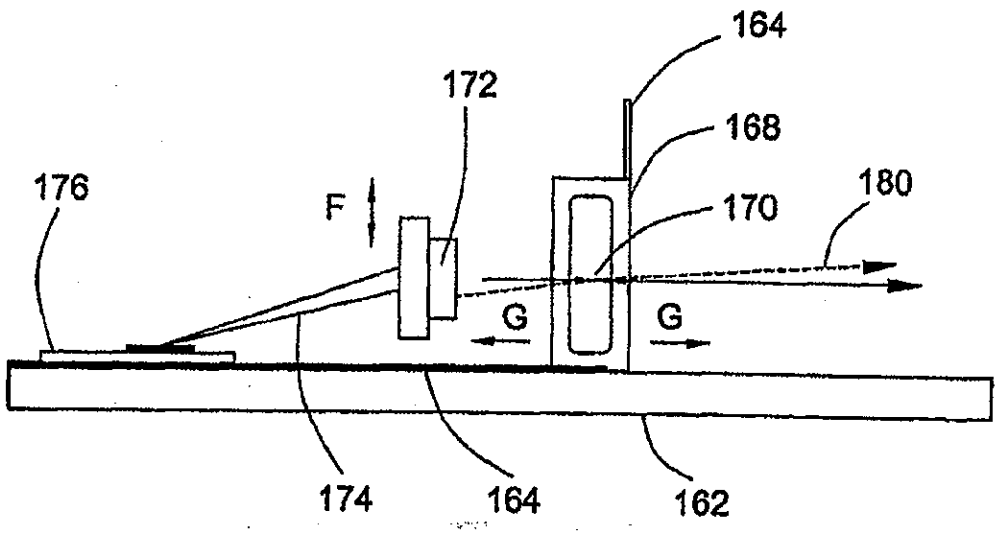

FIG. 10

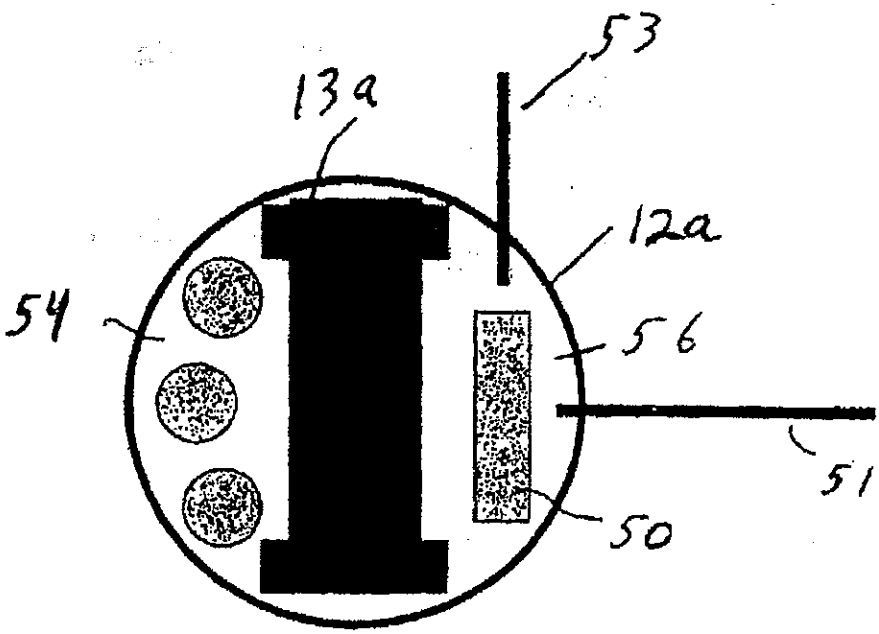

FIG. 11

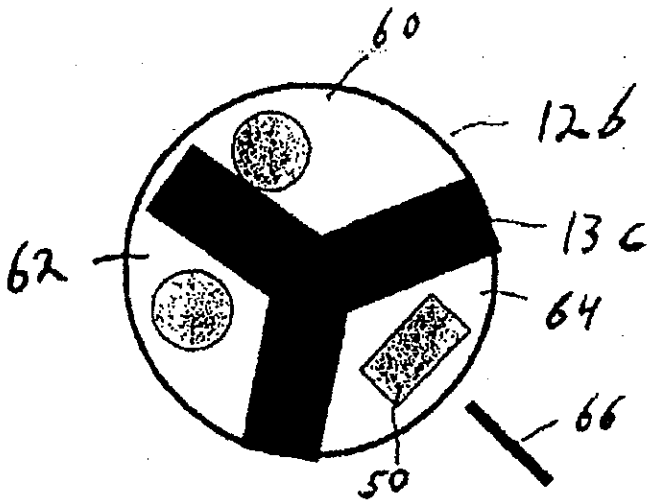

FIG. 12

POSITIVE-ANGLED LIGHT BEAM ROTARY SAW CUT ALIGNMENT DEVICE

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of application Ser. No. 10/207,502 filed on Jul. 29, 2002, now U.S. Pat. No. 6,915,727 and a continuation-in-part of application Ser. No. 10/878,988 filed on Jun. 28, 2004. Priority of both applications is claimed.

FIELD OF THE INVENTION

This invention relates to a saw-mounted cut alignment device for a rotary saw which projects a line of light along the stock being cut to assist the operator in making a cut.

BACKGROUND OF THE INVENTION

Rotary saws such as circular saws, chop saws, radial arm saws, miter saws and table saws require that the operator properly align the material being cut with the saw blade. This takes time and care, but is critical for a proper cut.

There exist laser-based cut alignment devices which are externally mounted in the vicinity of the saw, and project a light beam along the cut line. These devices must be manually aligned before cutting begins, thus requiring experience and additional time. Also, the operator must monitor this additional piece of equipment in order to use the alignment device properly. Accordingly, devices of this nature are not practical for most saw owners and operators.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide a cut alignment device for a rotary saw.

It is a further object of this invention to provide such a cut alignment device which is mounted to the saw.

It is a further object of this invention to provide such a cut alignment device which is automatically self-aligning.

It is a further object of this invention to provide such a cut alignment device that requires no operator set-up.

It is a further object of this invention to provide such a cut alignment device that illuminates a line on the material to be cut.

It is a further object of this invention to provide such a cut alignment device that turns on only when the saw is activated.

It is a further object of this invention to provide such a cut alignment device that decreases the amount of time required for a saw operator to align the material with the cutting edge of the saw blade.

It is a further object of this invention to provide such a cut alignment device that increases the safety of operating the saw.

This invention results from the realization that rotary saws can be made more accurate and easier to use with a light-source mounted on the rotating portion of the saw which projects a beam of light on the material to be cut.

This invention features a cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device comprising a housing, a battery power source located within the housing, and a beam light source, operatively connected to the power source, and located within the housing. The light source projects a light beam from the cutting unit directed slightly away from the plane of the blade at a positive angle such that the beam is not parallel to, and is projected on a path that never intersects the plane of the blade, to assist the operator in cutting accurately.

The cut alignment device may further include a switch between the power source and the light source for selectively applying power to the light source. The switch may be centrifugally engaged to automatically power the light source when the shaft is spinning. The light source may be mounted within the blade mounting device or housing, and the blade mounting device may define an aperture from which the light beam emanates. The device may further include a focusing lens aligned with the aperture for focusing the light from the light source. The blade-mounting device may include the structural housing held on the shaft against the blade, and wherein the light source is mounted within the structural housing.

Also featured is a cut alignment device for a rotary saw having a motor which spins a cutting unit which includes a rotary shaft driven by the motor, a circular blade having a central aperture through which the shaft fits, and a blade mounting device for holding the blade on the shaft, the cut alignment device comprising a battery power source mounted within a housing which comprises the blade mounting device, a light source operatively connected to the power source and mounted within the housing, wherein the housing defines an aperture from which the light emanates, and a centrifugally-engaged switch between the power source and the light source and mounted within the housing to automatically power the light source when the shaft is spinning, wherein the light source projects a light beam from the aperture directed slightly away from the plane of the blade at a positive angle such that the beam is not parallel to the plane of the blade and never intersects the plane of the blade, to assist the operator in cutting accurately.

This invention relates to a light-emitting rotary saw cut alignment device of the type disclosed in U.S. Pat. No. 6,035,757 (incorporated herein by reference). The inventive assembly accomplishes a light source that is focused and adjusted to the desired angle relative to the cutting blade, and then fixed in place so that the resulting light beam falls where desired relative to the cut line.

A key to the successful operation of a light-emitting rotary saw cut alignment device is to have the light beam focused at the proper location relative to the saw and at the proper distance from the device, such that it forms a sharp beam or line at the correct location on the material being cut. This objective can be accomplished with the constructions shown in the drawings, which provide for sufficient structural strength and integrity to allow the device to withstand the rigors (the compressive force and the centrifugal force) of use.

In this invention, the light is emitted from a device that is held on the blade arbor, against the blade. In order to be useful with chop saws and miter saws and all types of rotary saws, it is desirable to have the light beam leave the device housing very close to the surface of the blade (typically within about 0.25 inches from the blade surface), preferably from between 0.0001 and 0.160 inches from the blade surface. This distance is dictated in part by the thickness of the wall of the device housing that rests against the blade, and in part by the construction and layout of the diode and lens assembly, as more fully described below. Preferably, this construction is such that the beam leaves the housing at a shallow positive angle that is sufficient to cause the beam to diverge slightly away from the plane of the cutting blade such that the beam is not

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parallel to the plane of the blade and never intersects the plane of the blade. This allows the line illuminated by the beam to fall where desired relative to a pencil line drawn on the stock, thus assisting the operator in properly aligning the blade. The device can be adapted to be turned on or off manually as well as automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages will occur to those skilled in the art from the following description of the preferred embodiments, and the accompanying drawings, in which:

FIGS. **1A** and **1B** are exploded views of one embodiment of the cut alignment device of this invention;

FIG. **1C** is an exploded view of the device of FIGS. **1A** and **1B** and the preferred mounting hardware to mount the device to a saw arbor;

FIG. **2** is a view of the housing of FIG. **1**;

FIG. **3** is a view of the battery holder of FIG. **1**;

FIG. **4** is a greatly enlarged top view of a partially assembled device of FIG. **1**;

FIG. **5** is a partial cross-sectional view of the assembled device of FIG. **1**;

FIG. **6** is a partial cross-sectional greatly enlarged view of a portion of the assembly of FIG. **5**;

FIGS. **7A** and **7B** are top and side views, respectively, of an alternative form of delivering the laser light for the device of this invention;

FIG. **8** is a more detailed side view of the light delivery means shown in FIG. **7**;

FIGS. **9A-9C** are top, perspective and cross-sectional views, respectively, of an alternative embodiment of the laser light delivery means for the invention;

FIG. **10** is a partial cross-sectional side view of the preferred embodiment of the laser diode light delivery location and focusing means of the invention;

FIG. **11** is a top view of the housing, battery, and electronics for another embodiment of the cut alignment device of this invention; and

FIG. **12** is a top view of the housing, battery, and electronics for yet another embodiment of the cut alignment device of this invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The disclosures of the parent applications, Ser. No. 10/207,502 filed on Jul. 29, 2002, and Ser. No. 10/878,988 filed on Jun. 28, 2004, are incorporated herein by reference.

One embodiment of the inventive device is shown in FIGS. **1-6**. Device **10** includes stainless steel housing **12** that provides the structural integrity for the device. The raised central cross-shaped portion **13** with four arms protects the electronic components that are located in the pockets **21-24** created thereby (not shown fully in the drawings) so that they are not crushed when the device is placed on an arbor and the nut is tightened down; it also maintains the integrity of the housing so that it doesn't bend and change the alignment of the laser beam. Also, this construction helps to maintain the device to be sufficiently mass-balanced around the center of the device, so that it is relatively rotationally balanced. Battery holder **16** is a plastic molded part that has three cavities to hold three button cells **19, 20** and **25** in a manner such that their tops and bottoms are exposed, so that electrical contact can be made. The holder has a central cross-shaped opening that allows it to fit over the central portion of the housing. Washer **18** is the cover for the assembly. Part **14**, not shown in detail in the drawings, is a circuit board that provides the electrical connections between the batteries and from the centrifugally-operated switch **52** to the laser diode. The result is a device that emits light only when the arbor to which it is attached is rotating.

FIG. **1C** shows the preferred manner in which device **10** is mounted to the arbor of a rotary saw. Bolt **40** passes through device **10**, saw blade **42**, and flange **44** into the motor shaft, not shown in this drawing. Device **10** replaces the washer of a typical rotary saw blade mounting assembly. Device **10** preferably has a thickness between 0.125" and 1.0", so that the device does not interfere with the safety guard shield and/or the safety guard shield operating mechanism of the saw.

Optical assembly **30** is shown in FIGS. **4-6**. Laser diode **32** is held in housing **37**. Lens **34** is slideable in the direction of arrow B within cylindrical bore **38** of housing **37**. Lens **34** has an angled light emitting distal end **35** that refracts the light beam along axis A, so that the beam is emitted almost, but not quite, parallel to the bottom surface **41** of housing **12**, at a positive angle such that the beam is not parallel to the plane of the blade and never intersects the plane of the blade. In the invention, the beam is angled slightly away from the plane of the saw blade (or other machine tool), so that the beam falls at a desired location relative to the saw cut line, to provide a cutting guide as appropriate for the type of saw and the diameter of the saw blade. The preferred approximate dimensions and angles of the construction of the preferred embodiment are shown in FIGS. **5** and **10**.

By having the laser beam angled away from the saw blade so that it never intersects the plane of the saw blade or cutting/machining tool, there is enough of a gap between where the saw blade actually cuts and where the laser is shining, relative to the saw blade, so as not to have the laser illumination line completely overlap and thus be completely visually absorbed by the cut indication line drawn on the stock to be cut. The laser illumination line may partially overlap the drawn cut line. If the laser illumination line were placed directly over a dark cut indication line, the laser would not be visible to the operator and the effectiveness of the laser for the operator could be compromised. In wood working the cut indication line on the wood is usually a pencil line, or line or mark darker or lighter than the wood being cut, and of varying thicknesses.

By allowing the laser to have a beam angled away from the blade, the result can be a clear laser illumination line indicator that falls where desired relative to the cut indication line or other marks placed on the stock to be cut.

The angled laser beam benefit is also applicable to all machines and materials not just those used in the woodworking industry, or wood as the material, that may have a cut indication mark on the material being cut.

Opening **31** in extended housing portion **33** accepts a housing adjustment screw during final assembly of the device. A screw is placed through hole **31** and moved until it contacts the bottom of housing **12**. Adjustment of the screw adjusts the angle of somewhat flexible housing portion of **33**, to change the angle of lens **34** relative to housing **12**. This is the means by which the angle of the beam emitted from lens **34** relative to the saw blade is adjusted during final assembly. The sliding engagement of lens **34** along barrel **38** focuses the light beam at the correct distance from the housing. This sliding focus and the angle adjustment allow the beam to be directed away from the plane of the blade such that the beam is not parallel to the plane of the blade, to accomplish the result described above. Also as described above, the distance from bottom **41** of housing **12** to the lower portion of the light beam is pref-

-35-
-40-

erably from 0.0001-1.0 inches. Once the diode and lens assembly is properly set in the assembly process, the lens and assembly are fixed in place using a heat conductive epoxy that also helps to conduct heat from the laser diode to the housing so that the housing can act as a heat sink.

FIGS. **7** and **8** disclose an alternative means of delivering light from laser diode **60** using light pipe **62** with distal end **70** that is held in a proper sized opening (FIG. **8**) at the lower side of housing **72**. Preferably the light pipe has a consistent diameter along its length, so that it more efficiently delivers light to the source. The focus and angle adjustment is accomplished in this example, by movement of light pipe **62** up and down in the direction of arrow E and back in forth in the direction of arrow D. Cam **66** provides the up and down motion by turning of knob **67** that is fixed to cam **66**. The back and forth motion is provided by cam **68** that pushes on rod **64** that projects from light pipe **62**. Cam **68** is moved by rotation of knob **69**.

FIGS. **9**A-9C show another embodiment of a diode and focusing lens construction, similar to that of the embodiment of FIGS. **1**-**6**. Assembly **90** includes laser diode **92** with leads **94** held in housing **100** in proximity to lens combination **102** and **112**. Lens **102** is axially slideable within housing **100** similar to the embodiment shown in FIGS. **5** and **6**. Protruding holder **96** with opening **98** provides the screw-enabled beight adjustment as described above. Slots **104** and **106** are provided so that laser diode **92** and lens **102** can be fixed in place relative to housing **100** by introducing a glue or adhesive into the slots once the diode and lens are in the proper position to place and focus the beam as desired.

The preferred embodiment of the laser diode placement and focusing means is shown in FIG. **10**. Laser diode **172** has leads **174** that are soldered to circuit board **176** that is coupled to housing **164**. Lens **170** is held in annular lens holder **168** that is received by threads or other means in housing **164** to allow holder **168** to be moved in direction of arrows G relative to housing **164**, to change the distance between diode **172** and lens **170** and thus achieve a proper beam focus. The beam path **180** is at a shallow positive angle relative to saw blade **162** such that it never intercepts the plan of the blade. The angle is set by physically moving diode **172** up or down in the direction of arrow F. When the desired diode location and lens location are achieved, diode **172** is set in place relative to the housing using a heat conductive epoxy that also helps to transfer heat from diode **172** to housing **164** so that the housing can act as a heat sink. Alternative manners of fixing the diode and conducting the heat from the diode can be employed.

FIG. **11** shows another embodiment of housing **12***a* with central strengthening/dividing portion **13***a* having two aligned radial arms. Note that the arms in each embodiment can extend all the way to the circumference of the housing, or be shorter than that. Portion **13***a* creates compartments or cavities **54** and **56** that house the batteries and the electronics module **50**, respectively, as shown. Alternative laser paths **51** and **53** depict the possible directions from which the laser beam is emitted from the housing.

FIG. **12** shows another embodiment of housing **12***b* with central strengthening/dividing portion **13***c* having three arms, none of which are aligned. Portion **13***c* creates compartments **60**, **62** and **64**, that house the batteries and the electronics module **50**, respectively, as shown. Laser path **66** is shown.

The device can have a desired diameter. For saws with blades of up to twelve inches in diameter, the device preferably has a diameter of no more than about 2.5", so that the effective cutting depth of the blade is not impacted. For larger commercial saws having blade diameters of up to 24", the device may have a diameter of up to 6". The diameter of the laser device can be selected so as not to substantially limit the cut depth of a particular saw blade.

Although specific features of the invention are shown in some drawings and not others, this is for convenience only as features may be combined as would be apparent to those skilled in the art, in accordance with the invention.

Other embodiments will occur to those skilled in the art and are within the following claims:

What is claimed is:

1. A cut alignment device for a rotary saw having a motor which spins a cutting unit, the cutting unit including a rotary shaft driven by the motor, and a circular blade having a central aperture through which the rotary shaft fits, the circular blade having a flat surface that is transected by the central aperture and wherein the flat surface lies in a plane of the circular blade, the cut alignment device comprising:

a structural housing;

a battery power source located within the structural housing; and

a light source, operatively connected to the battery power source, and located within the structural housing;

wherein the structural housing is mounted on the rotary shaft, and wherein the light source projects a light beam from the structural housing directed slightly away from the plane of the circular blade at a positive angle such that the light beam is not parallel to the plane of the circular blade and never intersects the plane of the circular blade, to assist an operator in cutting accurately.

2. The cut alignment device of claim **1**, further including a switch located within the structural housing and connected between the battery power source and the light source, for selectively applying power to the light source.

3. The cut alignment device of claim **2**, in which the switch is centrifugally engaged, to automatically power the light source when the rotary shaft is spinning.

4. The cut alignment device of claim **1**, in which the structural housing accomplishes a blade mounting device, and the blade mounting device defines an aperture from which the light beam emanates.

5. The cut alignment device of claim **4**, further including a focusing lens located within the structural housing and aligned with the aperture for focusing the light beam from the light source.

6. The cut alignment device of claim **5**, wherein the distance between the light source and the focusing lens is adjustable.

7. The cut alignment device of claim **4**, in which the structural housing is held on the rotary shaft against the circular blade.

8. The cut alignment device of claim **4**, wherein the light source is adjustable relative to the structural housing, to adjust the angle at which the light beam emanates from the housing.

9. The cut alignment device of claim **1**, wherein the structural housing defines at least two internal compartments separated by one or more arms.

10. A cut alignment device for a rotary saw having a motor which spins a cutting unit, the cutting unit including a rotary shaft driven by the motor, and a circular blade having a central aperture through which the rotary shaft fits, the circular blade defining a flat surface that is transected by the central aperture and wherein the surface lies in a plane of the circular blade, the cut alignment device comprising:

a structural housing defining at least two internal compartments;

a battery power source mounted within one compartment in the structural housing;

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a light source operatively connected to the battery power source and mounted within one compartment in the structural housing, wherein the structural housing defines an aperture from which the light beam emanates; and

a centrifugally-engaged switch between the battery power source and the light source and mounted within one compartment in the structural housing, to automatically power the light source when the rotary shaft is spinning;

wherein the structural housing is mounted on the rotary shaft, and wherein the light source projects the light beam from the aperture directed slightly away from the plane of the circular blade at a positive angle such that the light beam is not parallel to the plane of the circular blade and never intersects the plane of the circular blade, to assist an operator in cutting accurately.

* * * * *

CERTIFICATE OF SERVICE

I hereby certify that on October 4, 2011, I caused a copy of the

FIRST AMENDED COMPLAINT FOR: (1) Patent Infringement (2) Willful Infringement of Patent **DEMAND FOR JURY TRIAL**

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